Installation of SAP Systems Based on the Application Server Java of SAP NetWeaver 7.1 to 7.5 on Windows: Oracle
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# Document History

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

**i Note**

Before you start reading, make sure you have the latest version of this installation guide, which is available at https://support.sap.com/sitoolset\[\] System Provisioning \[\] Install a System using Software Provisioning Manager \[\] Installation Option of Software Provisioning Manager 1.0 SP <Current Number> \[\].

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Updated version for software provisioning manager 1.0 SP22 (SL Toolset 1.0 SP22)

- New Features:
  - Signature check for installation archives, documented in: New Features, Downloading SAP Kernel Archives (Archive-Based Installation) Archive-Based Installation for Diagnostics Agent, Downloading the SAP Kernel Archives Required for the Dual-Stack Split (Without Operating System and Database Migration), Downloading the SAP Kernel Archives Required for Operating System and Database Migration
  - Installer Log Files Improvements, documented in: New Features, Useful Information about the Installer, Troubleshooting with the Installer
  - Enabling IPv6, documented in: New Features, Prerequisites for Running the Installer

- New Features section restructured: As of SP22, a dedicated subsection for each new SP has been created. New features below SP22 remain in a common table.

- The Java SDT GUI - which was in the SP21 version still available in parallel to the SL Common GUI - has been deprecated with SP22. As of SP22, SL Common GUI is the only available installer GUI:
  - The following sections which were expliciteely related to Java SDT GUI were completely removed from this documentation: Performing a Remote Installation Remote Processing of the Installer (Java SDT GUI only), Starting the Java SDT GUI Separately, Running the Installer in Accessibility Mode (general accessibility information was moved to Useful Information About the Installer).
  - The Java SDT GUI-specific information was removed from the common installer sections: Running the Installer, Useful Information About the Installer, Interrupted Processing of the Installer, Troubleshooting with the Installer, Deleting an SAP System or Single Instances

- New section Using the Step State Editor (SAP Support Experts Only) was added to section Additional Information About the Installer

- Option to install the SCS instance with an integrated SAP Web Dispatcher, documented in: New Features, SCS Instance with Integrated SAP Web Dispatcher, Additional Parameters for an SAP Web Dispatcher Installation Integrated in the SCS Instance (Optional)

**Note**

This feature was retroactively released on 2018-02-12.
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<td>- Media Signature Check, documented in: <em>New Features, Running the Installer, Preparing the Installation Media</em>. This feature implies that section <em>Creating Kernel Archives from an Existing SAP System</em> has been deleted from this documentation because the related option in the installer had to be removed.</td>
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<td>- Oracle Multitenant Installation, documented in: <em>Oracle Database 12c Multitenant Database Installation</em> [page 168]</td>
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<td>- Using RMOSSWPM<em>SAR instead of SWPM</em>SAR for outdated OS versions not supported by SAP kernel 7.40 and higher, documented in: <em>Introduction</em>  <em>Constraints</em></td>
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<td>- Preparing the Installation Media [page 76]  <em>Downloading Specific Installation Archives (Archive-Based Installation)</em></td>
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1  About this Document

This installation guide describes how to install an SAP system based on the application server **Java** of SAP NetWeaver 7.1 to 7.5 using the installation tool Software Provisioning Manager 1.0 SP25 (“installer” for short), which is part of SL Toolset 1.0 SP25.

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

This guide covers the SAP system products and releases listed in SAP Note 1680045.

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.

**⚠ Caution**
Make sure you have read **Before You Start** before you continue with this installation guide.

**Naming Conventions [page 11]**
This section lists the naming conventions that are currently apply for Software Provisioning Manager 1.0 (the “installer”) and terms used in this documentation.

**Constraints [page 12]**
This section lists the naming constraints that are currently valid for Software Provisioning Manager 1.0 (the “installer”) and this documentation.

**Before You Start [page 12]**
Make sure that you have read the release-specific “Master Guide” for your SAP Business Suite application, SAP NetWeaver application, or SAP Solution Manager system before you continue with this installation guide.

**SAP Notes for the Installation [page 14]**
This section lists the most important SAP Notes relevant for an installation using Software Provisioning Manager

**New Features [page 15]**
This section provides an overview of the new features in Software Provisioning Manager 1.0 (the “installer” for short).
1.1 Naming Conventions

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

- **Software Provisioning Manager 1.0** is the successor of the product- and release-specific delivery of provisioning tools, such as “SAPinst”.
  Before you perform an installation from scratch or a target system installation in the context of a system copy, we strongly recommend that you always download the latest version of the Software Provisioning Manager 1.0 which is part of the Software Logistics Toolset 1.0 ("SL Toolset" for short). For more information, see Preparing the Installation Media [page 76].
  This way, you automatically get the latest version with the latest fixes of the tool and supported processes. For more information about Software Provisioning Manager 1.0 as well as products and releases supported by it, see SAP Note 1680045 and https://wiki.scn.sap.com/wiki/display/SL/Software+Provisioning+Manager+1.0.

  “SAPinst” has been renamed to “Software Provisioning Manager” (“installer” for short) in this documentation, but the terms “SAPinst” and “sapinst” are still used in:
  - The name of the technical framework of Software Provisioning Manager. For more information about the SAPinst Framework, see SAP Note 2393060.
  - Texts and screen elements in the Software Provisioning Manager GUI
  - Names of executables, for example sapinst.exe
  - Names of command line parameters, for example SAPINST_STACK.XML

- **“installer”** refers to “Software Provisioning Manager”.
- **“SAP system”** refers to SAP system based on the application server of SAP NetWeaver CE 7.1 / 7.1 including Enhancement Package 1 / SAP NetWeaver CE 7.2 / SAP NetWeaver 7.3 / 7.3 including Enhancement Package 1 / SAP NetWeaver 7.4 / SAP NetWeaver 7.5.
- **“Java system”** refers to SAP system based on the application server Java of SAP NetWeaver CE 7.1 / 7.1 including Enhancement Package 1 / SAP NetWeaver CE 7.2 / SAP NetWeaver 7.3 / 7.3 including Enhancement Package 1 / SAP NetWeaver 7.4 / 7.4 SR1.
- **“Diagnostics Agent”** refers to the SAP Solution Manager Diagnostics Agent which is the remote component of End-to-End Root Cause Analysis. It allows having a connection between SAP Solution Manager and managed systems, and then to collect information from the managed systems for reporting purposes.

**Operating System Names**

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.

- **Only valid for Microsoft Failover Clustering:** As of Windows Server 2008 the cluster feature is called Failover Clustering. For practical reasons we are continuing to use the previous terminology Microsoft Cluster Service and abbreviation MSCS in some sections of this guide and the corresponding installation documentation of your release.
1.2 Constraints

This section lists the naming constraints that are currently valid for Software Provisioning Manager 1.0 (the “installer”) and this documentation.

- The Dual Stack option, which integrates an AS ABAP and AS Java in a single system (common System ID <SAPSID>, common startup framework, common database), is no longer supported in SAP systems based on SAP NetWeaver 7.5. So if you want to install a new SAP NetWeaver 7.5 Process Integration (PI) system which is based on SAP NetWeaver 7.5, do not use the documentation Installation Guide - SAP Systems Based on the Application Server ABAP+Java of SAP NetWeaver on <OS>: <DB>. Instead, use the Installation Guide - SAP Systems Based on the Application Server ABAP of SAP NetWeaver on <OS>: <DB> to install the ABAP stack with its own <SAPSID> and the Installation Guide - SAP Systems Based on the Application Server Java of SAP NetWeaver on <OS>: <DB> to install the Java stack with its own <SAPSID>. For more information, see the implementation sequence in the Master Guide - SAP NetWeaver 7.5 at help.sap.com/netweaver<Release> Installation and Upgrade.

- Not all SAP NetWeaver releases or SAP Business Suite applications that are available in Software Provisioning Manager 1.0 and are described in this installation guide have already been released. Always check SAP Note 1680045 to ensure that the installation options you want to perform are already supported. For information about supported operating system and database platforms, see the Product Availability Matrix at http://support.sap.com/pam.

- Note that a complete system installation from scratch is not available for every product. For some products - such as SAP NetWeaver 7.4 - a complete new system installation from scratch is only provided for the highest support release. If there are one or more support releases, then a complete system installation is only available for the highest of these support releases. As for the lower support releases, only options for system copy and additional application server instances are provided.

- Your operating system platform must be 64-bit.

1.3 Before You Start

Make sure that you have read the release-specific “Master Guide” for your SAP Business Suite application, SAP NetWeaver application, or SAP Solution Manager system 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 this guide in your installation package or you can download the latest version from https://help.sap.com.

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

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<th>Document</th>
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<td>Master Guide - SAP NetWeaver Composition Environment 7.2</td>
<td><a href="http://help.sap.com/nwce72">http://help.sap.com/nwce72</a></td>
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<tr>
<td>Master Guide - SAP NetWeaver CE 7.1 Including EHP1</td>
<td><a href="http://help.sap.com/nwce711">http://help.sap.com/nwce711</a></td>
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Installation of SAP Systems Based on the Application Server Java of SAP NetWeaver 7.1 to 7.5 on Windows: Oracle
About this Document
1.4 SAP Notes for the Installation

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

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

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

### SAP Notes for the Installation

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<td>Release Note for Software Provisioning Manager 1.0</td>
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<td>1710950</td>
<td>Inst. SAP Systems Based on SAP NetWeaver 7.1 and higher: Windows</td>
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<td>2396282</td>
<td>Installation, System Copy, and Rename of NW 7.3x and NW 7.2x AS Java Systems with Oracle 12c</td>
<td>Since the Java DVD containing open*sql.jar does not support Oracle 12c, this note describes a workaround for the installation, system copy, and system rename with Oracle 12x, which is necessary for the installation, system copy or rename directly with Oracle12c.</td>
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<td>Central Technical Note for Oracle Database 18c</td>
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<td>Central Technical Note for Oracle Database 12c Release 2 (12.2)</td>
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<td>SAP Note Number</td>
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<td>Central Technical Note for Oracle Database 12c Release 1 (12.1)</td>
<td>Information about Oracle 12c Release 1 (12.1) with multiple links to notes on Oracle 12c Release 1 (12.1)</td>
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<td>Oracle 11.2.0: Central Technical Note</td>
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<td>1067221</td>
<td>Composite SAP Note for heterogeneous installation</td>
<td>This SAP Note and its related SAP Notes describe the released operating system and database combinations for heterogeneous SAP systems landscapes.</td>
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<td>Downloading multispansing archives</td>
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### 1.5 New Features

This section provides an overview of the new features in Software Provisioning Manager 1.0 (the "installer" for short).

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

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<tr>
<td>Support of Oracle 18</td>
<td>You can now perform all Software Provisioning Manager 1.0 tasks (installation, system copy, system rename) for SAP systems with the Oracle 18 database.</td>
<td>Software Provisioning Manager 1.0 SP25 (SL Toolset 1.0 SP25)</td>
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<td>For more information, see Installing the Oracle 18 Database Software [page 92] and <a href="https://support.sap.com/pam">https://support.sap.com/pam</a>.</td>
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<tr>
<td>Feature</td>
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<tr>
<td>High-availability system on Microsoft Cluster: Option to install the ASCS instance in a file share on a local disk.</td>
<td>As an alternative to the “classic” way to install the SCS instance on a shared disk, you can now choose to install the SCS instance in a file share on a local disk. For more information, see High Availability with Microsoft Failover Clustering [page 189].</td>
<td>Software Provisioning Manager 1.0 SP25 (SL Toolset 1.0 SP25)</td>
</tr>
<tr>
<td>New Look and Feel of SL Common GUI</td>
<td>As of version 1.0 SP24 Patch Level (PL) 5, Software Provisioning Manager comes with a new look and feel of the SL Common GUI. For more information, see <a href="https://blogs.sap.com/2018/11/10/new-look-for-software-provisioning-manager/">link</a>.</td>
<td>Software Provisioning Manager 1.0 SP24, PLO5 (SL Toolset 1.0 SP24)</td>
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<tr>
<td>New Installer Option Download Software Packages for Maintenance Planner Transaction</td>
<td>If you perform an installation using a stack configuration file, you can now download media according to a Maintenance Plan. For more information, see Installation Using a Stack Configuration File [page 30], Downloading Software Packages for a Maintenance Planner Transaction [page 84], and <a href="https://blogs.sap.com/2018/06/01/software-provisioning-manager-new-option-for-standalone-download-service/">link</a>.</td>
<td>Software Provisioning Manager 1.0 SP23 (SL Toolset 1.0 SP23)</td>
</tr>
<tr>
<td>Option to install an SCS instance with integrated SAP Web Dispatcher</td>
<td>You can now install an SAP Web Dispatcher in an SCS instance. You can choose this option while running the SCS instance installation. For more information, see SCS Instance with Integrated SAP Web Dispatcher [page 25].</td>
<td>Software Provisioning Manager 1.0 SP23 (SL Toolset 1.0 SP23)</td>
</tr>
<tr>
<td>Installer Log Files Improvements</td>
<td>Installer log files are now available immediately after the installer has been started, that is before a product has been selected on the Welcome screen. For more information, see Useful Information about the Installer [page 116] and Troubleshooting with the Installer [page 123].</td>
<td>Software Provisioning Manager 1.0 SP22 (SL Toolset 1.0 SP22)</td>
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<tr>
<td>Signature Check of Installation Archives</td>
<td>The signature of installation archives is checked automatically by the installer during the Define Parameters phase while processing the Software Package Browser screens. As of now the installer only accepts archives whose signature has been checked. For more information, see Downloading SAP Kernel Archives (Archive-Based Installation) [page 81].</td>
<td>Software Provisioning Manager 1.0 SP22 (SL Toolset 1.0 SP22)</td>
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<tr>
<td>Enabling IPv6</td>
<td>You can now set up a new SAP system or SAP system instance using Internet Protocol Version 6 (IPv6). For more information, see Prerequisites for Running the Installer [page 109].</td>
<td>Software Provisioning Manager 1.0 SP22 (SL Toolset 1.0 SP22)</td>
</tr>
<tr>
<td>Option to install an SCS instance with integrated SAP Web Dispatcher</td>
<td>You can now install an SAP Web Dispatcher in an SCS instance. You can choose this option while running the SCS instance installation. For more information, see SCS Instance with Integrated SAP Web Dispatcher [page 25].</td>
<td>Software Provisioning Manager 1.0 SP22 (SL Toolset 1.0 SP22)</td>
</tr>
<tr>
<td>Feature</td>
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<tr>
<td>Media Signature Check</td>
<td>The signature of media is checked automatically by the installer during the Define Parameters phase while processing the Media Browser screens. As of now the installer only accepts media whose signature has been checked. See also the description of this new security feature in SAP Note 2393060. For more information, see Preparing the Installation Media [page 76] and Running the Installer [page 110].</td>
<td>Software Provisioning Manager 1.0 SP21 (SL Toolset 1.0 SP21)</td>
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<tr>
<td>SAP Host Agent Upgrade During the Installation (Optional)</td>
<td>During the Define Parameters phase of the installation, the installer prompts you whether you want to upgrade an existing version of the SAP Host Agent on the installation host. If there is no SAP Host Agent on the installation host, it is installed automatically without prompt. For more information, see the General Parameters table in SAP System Parameters [page 46].</td>
<td>Software Provisioning Manager 1.0 SP21 (SL Toolset 1.0 SP21)</td>
</tr>
<tr>
<td>Support of Oracle Database Vault</td>
<td>Oracle Database Vault 12c has been certified for SAP products that are based on SAP NetWeaver technology. You can now install a new SAP system with Oracle Database 12c and configure Oracle Database Vault in its database. For more information, see Implementing Oracle Database Vault with the Installer [page 167].</td>
<td>Software Provisioning Manager 1.0 SP21 (SL Toolset 1.0 SP21)</td>
</tr>
<tr>
<td>Support of Oracle 12.2</td>
<td>Software Provisioning Manager (the “installer”) now supports SAP system installations with Oracle 12.2. For more information, see Installing the Oracle 12c Database Software [page 95].</td>
<td>Software Provisioning Manager 1.0 SP21 (SL Toolset 1.0 SP21)</td>
</tr>
<tr>
<td>SL Common GUI with SAPINST 7.49</td>
<td>With the new installer framework version SAPINST 7.49, you can now use the new SAPUI5-based graphical user interface (GUI) “SL Common GUI”. For more information, see Useful Information about the Installer [page 116], Running the Installer [page 110].</td>
<td>Software Provisioning Manager 1.0 SP20 (SL Toolset 1.0 SP20)</td>
</tr>
<tr>
<td>Verification of Integrity of Data Units in Software Provisioning Manager</td>
<td>The integrity of data units extracted from the Software Provisioning Manager archive is verified. For more information, see Downloading and Extracting the Software Provisioning Manager 1.0 Archive [page 80]. In addition, check SAP Note 1680045 whether additional information is available.</td>
<td>Software Provisioning Manager 1.0 SP19 (SL Toolset 1.0 SP19)</td>
</tr>
<tr>
<td>Oracle Multitenant Installation</td>
<td>The multitenant option introduced in Oracle Database 12c allows a single container database (CDB) to host multiple separate pluggable databases (PDB). In the Software Provisioning Manager you can create a CDB, PDB, and also a new pluggable database in an existing container database. For more information, see Oracle Database 12c Multitenant Database Installation [page 168].</td>
<td>Software Provisioning Manager 1.0 SP18 (SL Toolset 1.0 SP18)</td>
</tr>
<tr>
<td>Feature</td>
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</tr>
<tr>
<td>Archive-Based Installation</td>
<td>You can now download the required installation archives instead of the complete SAP kernel installation media. For more information, see section Downloading Specific Installation Archives (Archive-Based Installation) in Preparing the Installation Media [page 76].</td>
<td>Software Provisioning Manager 1.0 SP17 (SL Toolset 1.0 SP17)</td>
</tr>
<tr>
<td>Diagnostics Agent</td>
<td>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.</td>
<td>Software Provisioning Manager 1.0 SP10 (SL Toolset 1.0 SP16)</td>
</tr>
<tr>
<td>System Provisioning for SAP NetWeaver 7.5 and SAP NetWeaver 7.5-based Products</td>
<td>All system provisioning tasks (installation, system copy, system rename) are available for the new SAP NetWeaver 7.5 release. The Dual Stack option, which integrates an AS ABAP and AS Java in a single system (common System ID <code>&lt;SAPSID&gt;</code>, common startup framework, common database), is no longer supported in SAP systems based on SAP NetWeaver 7.5. After upgrading to SAP NetWeaver 7.5 PI, you first have to split the still existing dual stack system before you can use SAP NetWeaver 7.5 PI productively. For more information, see the Upgrade Master Guide - SAP NetWeaver 7.5 at: <a href="http://help.sap.com/nw75">http://help.sap.com/nw75</a> &gt; Installation and Upgrade &gt;</td>
<td>Software Provisioning Manager 1.0 SP09 (SL Toolset 1.0 SP15)</td>
</tr>
<tr>
<td>System Provisioning for SAP Solution Manager 7.2</td>
<td>All system provisioning tasks (installation, system copy, system rename) are available for the new SAP Solution Manager 7.2 release. Compared to previous SAP Solution Manager releases, SAP Solution Manager 7.2 is no longer provided as a classical dual-stack system (ABAP system with Java Add-in), but consists of a separate ABAP and Java stack.</td>
<td>Software Provisioning Manager 1.0 SP09 (SL Toolset 1.0 SP15)</td>
</tr>
<tr>
<td>Windows Domain Organizational Units</td>
<td>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 46].</td>
<td>Software Provisioning Manager 1.0 SP09 (SL Toolset 1.0 SP14)</td>
</tr>
<tr>
<td>Feature</td>
<td>Description</td>
<td>Availability</td>
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</tr>
<tr>
<td>Creating Kernel Archives from existing SAP System</td>
<td>You can reuse the binaries of a dedicated SAP system for a new SAP system installation or target system installation in the context of a system copy by creating *.SAR archives based on the *.lst files from the executable (exe) directories of the source SAP system.</td>
<td>Software Provisioning Manager 1.0 SP09 (SL Toolset 1.0 SP14)</td>
</tr>
</tbody>
</table>

**i Note**

This feature is only available for Unicode systems.

**Caution**

This feature has been deprecated with Software Provisioning Manager 1.0 SP21 (SL Toolset 1.0 SP21) and the related option has been removed from the Welcome screen. This deprecation has been accomplished to ensure compliancy with the new feature “Media Signature Check” of Software Provisioning Manager 1.0 SP21 (SL Toolset 1.0 SP21) described above in this table.

| Support of Oracle 12 Database | You can now perform all Software Provisioning Manager 1.0 tasks (installation, system copy, system rename, dual-stack split) for SAP systems with the Oracle 12 database. | Software Provisioning Manager 1.0 SP08 (SL Toolset 1.0 SP13) |

For more information, see http://support.sap.com/pam.

| Usage Type Library Deprecation for SAP Systems Based on SAP NetWeaver 7.3 EHP1 and Higher | Software Provisioning Manager 1.0 no longer uses the “Usage Types” definitions in its business logic for SAP systems based on SAP NetWeaver 7.3 EHP1 and higher. This is done to unify modeling and terminology across all SAP tools used during the planning, installation and maintenance activities. The “Product Instance” definition replaces “Usage Types” regarding product modeling. For more information, see SAP Notes 1970349 and 1877731. | Software Provisioning Manager 1.0 SP07 (SL Toolset 1.0 SP12) |

| Adaptive Installation | You can assign virtual host names to SAP system instances during the input phase of the installation directly on the screens where you define the instance parameters. | Software Provisioning Manager 1.0 SP07 (SL Toolset 1.0 SP12) |

For more information, see SAP System Parameters [page 46].
<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
<th>Availability</th>
</tr>
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<tbody>
<tr>
<td>Feedback Evaluation</td>
<td>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 Prerequisites for Running the Installer [page 109].</td>
<td>Software Provisioning Manager 1.0 SP07 (SL Toolset 1.0 SP12)</td>
</tr>
<tr>
<td>Option Verify Signed Media</td>
<td>The digital signature ensures that the signatory of a digital document can be identified unambiguously and signatory’s name is documented together with the signed document, the date, and the time. For more information, see SAP Note 1979965.</td>
<td>Software Provisioning Manager 1.0 SP06 (SL Toolset 1.0 SP11)</td>
</tr>
<tr>
<td>Valid only for SAP NetWeaver Composition Environment 7.1: Enterprise Services Repository</td>
<td>You can install Enterprise Services Repository in an existing SAP NetWeaver Composition Environment 7.1 system using the Add ESR Capability installation option, which is available on the Welcome screen at:</td>
<td>Software Provisioning Manager 1.0 SP05 (SL Toolset 1.0 SP10)</td>
</tr>
</tbody>
</table>
2 Installation Options Covered by this Guide

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

After you have decided on the installation option that you want to use, continue with Planning [page 28].

- Standard System [page 21]
- Distributed System [page 22]
- High Availability System [page 23]
- Additional Application Server Instance [page 23]
- SCS Instance with Integrated SAP Web Dispatcher [page 25]

2.1 Standard System

You can install a standard system on a single host.

In a standard system, all main instances run on a single host.

There are the following instances:

- Central services instance (SCS instance)
  Contains the Java message server and the Java enqueue server
  Optionally, you can install the SCS instance with an integrated SAP Web Dispatcher. For more information, see SCS Instance with Integrated SAP Web Dispatcher [page 25].
- Database instance (DB)
- Primary application server instance (PAS instance)
2.2 Distributed System

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

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

- Central services instance (SCS instance)
  - Contains the Java message server and the Java enqueue server
  - Optionally, you can install the SCS instance with an integrated SAP Web Dispatcher. For more information, see SCS Instance with Integrated SAP Web Dispatcher [page 25].
- Database instance (DB)
  - The Java stack uses its own database schema in the database.
- Primary application server instance (PAS)

The following figure assumes the following:

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

Optionally, you can install one or more additional application server instances. For more information, see Installation of an Additional Application Server Instance [page 23].
2.3  High Availability System

For more information about the system components you have to install and how to distribute them on the specific hosts, see System Configuration with Microsoft Failover Clustering [page 193].

2.4  Additional Application Server Instance

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

An additional application server instance can run on:

- The host of any instance of the existing SAP system
- On a dedicated host

i Note

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

i Note

If you want to install an additional application server 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].
**Additional Application Server Instance for a Standard System**

The following figure shows additional application server instances that are running on dedicated hosts.

For more information, see Standard System [page 21].

**Additional Application Server Instance for a Distributed System**

The following figure shows additional application server instances that are running on dedicated hosts.
Additional Application Server Instance for a Distributed Java System

For more information, see Distributed System [page 22].

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

### Additional Application Server Instance for a High-Availability System

In a high-availability system, you require, apart from the primary application server instance, at least one additional application server instance. For more information about how to install and distribute the application servers in an HA configuration, see section System Configuration with Microsoft Failover Clustering [page 193].

End of 'High Availability': HA (Windows)

### 2.5 SCS Instance with Integrated SAP Web Dispatcher

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

**i Note**

We only recommend this option for special scenarios. For more information, see SAP Note 908097. For an SAP Web Dispatcher installation, a standalone installation (see below) continues to be the default scenario.
The SAP Web Dispatcher is located between the Web client (browser) and your SAP system that is running the Web application.

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

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

**Installation of “Standalone” SAP Web Dispatcher with its own <SAPSID> and Instance**

If you want to install an SAP Web Dispatcher for another system - that is not for the system for which you use the SCS instance and with its own SAP system ID and instance number - you have to install SAP Web Dispatcher separately as described in the documentation which you can find under http://support.sap.com/sitoolset ➔ System Provisioning ➔ Installation Option of Software Provisioning Manager ➔ Guide for SAP Web Dispatcher for SAP NetWeaver 7.0 or Higher ➔
More Information

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

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<td>Function-Oriented View</td>
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<td>SAP NetWeaver 7.3 including Enhancement Package 1</td>
<td>Application Server Infrastructure</td>
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<td><a href="http://help.sap.com/nw731">http://help.sap.com/nw731</a></td>
<td>Components of SAP NetWeaver</td>
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<td><a href="http://help.sap.com/nw74">http://help.sap.com/nw74</a></td>
<td>SAP Web Dispatcher</td>
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<td>SAP NetWeaver 7.5</td>
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<tr>
<td><a href="http://help.sap.com/nw75">http://help.sap.com/nw75</a></td>
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</tr>
</tbody>
</table>

Related Information

Parameters for Additional Components to be Included in the SCS Instance (Optional) [page 58]
3 Planning

3.1 Planning Checklist

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

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

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

Prerequisites

1. You have planned your SAP system landscape according to the Master Guide available at the appropriate download location as described in Before You Start [page 12].
2. You have decided on your installation option (see Installation Options Covered by this Guide [page 21]).

Standard, Distributed, or High-Availability System

Note

In a standard system, all mandatory instances are installed on one host. Therefore, if you are installing a standard system, you can ignore references to other hosts.

1. Make yourself familiar with the changed file system structure and profiles for SAP systems based on SAP NetWeaver 7.1 and higher compared to SAP systems based on lower SAP NetWeaver releases. For more information, see Changed File System Structure and Profiles for SAP Systems Based on SAP NetWeaver 7.1 and Higher [page 29].
2. If you want to install an SAP Java system along with the required Support Package stack in one implementation run, you need to plan the desired installation target using the maintenance planner at https://apps.support.sap.com/sap/support/mp.

In the maintenance planner, a stack XML file with the desired Support Package stack and Add-On information is generated, which you then hand over to Software Provisioning Manager (the "installer" for short) by calling it with command line parameter SAPINST_STACK_XML=<Absolute_Path_To_Stack_XML_File>. Included constraints and defaults defined in the stack XML file are then used for the initial installation by Software Provisioning Manager and for the application of Support Package stacks and Add-Ons by the Software Update Manager (SUM). For more information, see Installation Using a Stack Configuration File (Optional) [page 30].
→ Recommendation

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

3. You check the hardware and software requirements [page 32] on every installation host.
4. You plan how to set up user and access management [page 43].
5. You identify Basic SAP System Installation Parameters [page 44].
6. You decide whether you want to perform a domain or local installation [page 44].
7. For the database installation, you decide on how to distribute your database components to disk [page 59].
8. If your database release is Oracle 12c and you want to install it as a pluggable database in a container database (multitenant database installation), consider the additional steps described in Oracle Database 12c Multitenant Database Installation [page 168].
9. You decide on the transport host to use [page 64].
10. You decide whether you want to integrate LDAP Directory Services in your SAP system [page 153].
11. You decide if you want to use multiple Oracle homes [page 64].

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 191].

End of 'High Availability': HA (Windows)

12. Optionally, you decide whether you want to install multiple components in one database (MCOD) [page 165].
13. If you want to implement Oracle Database Vault, make sure that you have read section Implementing Oracle Database Vault with the Installer [page 167].
14. Continue with Preparation [page 66].

Additional Application Server Instance

1. You check the hardware and software requirements [page 32] for every installation host on which you want to install one or more additional application server instances.
2. You identify Basic SAP System Installation Parameters [page 44].
3. Continue with Preparation [page 66].

3.2 Changed File System Structure and Profiles for SAP Systems Based on SAP NetWeaver 7.1 and Higher

File system structure

- For SAP system releases based on SAP NetWeaver 7.1 and higher, the directory structure was changed compared to SAP NetWeaver 7.0, in order to support heterogeneous system installations and updates more efficiently.
**Caution**

The directory structure of systems based on SAP NetWeaver 7.1 or higher is not supported on systems based on SAP NetWeaver 7.0 including Enhancement Packages.

- For a manual switch, see the details about targeted file system structure in this documentation and adjust your file system accordingly to avoid later issues for system transformation such as system copy and system rename.

**Profiles**

- As of SAP NetWeaver 7.3, the start profile as separate file has been removed. In earlier versions of SAP NetWeaver there was one default profile per SAP system, one start profile per Instance and one Instance profile per instance. Now the start profile contents are merged with the instance profile. With the help of the new instance profile, SAP processes are started and at the same time instance-specific parameters are read. This reduces the total number of profile files to one default profile per SAP System, and one instance profile per instance.

  For more information, see the SCN blog *What’s new in SAP NetWeaver 7.3 - A Basis perspective* at: https://blogs.sap.com/2012/05/22/whats-new-in-sap-netweaver-73-a-basis-perspective/.

**Caution**

The merged profiles are not supported for SAP NetWeaver 7.0 including Enhancement Packages because this could lead to issues for SAP system copy. If you are not sure which SAP NetWeaver product version you have, see SAP Note 1877731 for more information.

- For more information about merging the start profile with the instance profiles, see SAP Note 1528297.
- **Additional application server instances:** Double-check the values with the profile values from the primary application server - for example for parameters `DIR_CT_RUN`, `DIR_EXECUTABLE`, `DIR_SAPJVM` - to avoid startup issues.

### 3.3 Installation Using a Stack Configuration File

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

- Maintenance Planner, accessible at https://apps.support.sap.com/sap/support/mp
- LMDB in SAP Solution Manager
- Software Provisioning Manager (the “installer” for short)
- Software Update Manager (“SUM”)

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

We recommend that you perform the installation using a stack configuration file for new products, such as SAP S/4HANA or SAP Solution Manager 7.2.

Prerequisites

- To be able to use the Maintenance Planner at https://apps.support.sap.com/sap/support/mp, your SAP Solution Manager system must have at least one of the following release and Support Package (SP) level:
  - SAP Solution Manager 7.2
  - SAP Solution Manager 7.1 SP06 or higher
  - SAP Solution Manager 7.0 SP 23 and you must have applied the following SAP Notes:
    - 1646604
    - 1783371
    - 1743695
- You must have implemented SAP Note 1940845 in your SAP Solution Manager system.
- For additional information about involved tools and supported SAP system releases, see SAP Note 2277574.

Features

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

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

i Note

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

- You can use the installer to directly download the installation software from SAP by providing the Maintenance Plan to the installer while running installer option Download Software Packages for Maintenance Planner Transaction.
Integration

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

Related Information

Preparing the Installation Media [page 76]
Running the Installer [page 110]
Applying the Latest Kernel and Support Package Stacks [page 137]

3.4 Hardware and Software Requirements

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

Prerequisites

- Make sure that the host name meets the requirements listed in SAP Note 611361.
- Contact your OS vendor for the latest OS patches.

Procedure

1. Check the Product Availability Matrix at http://support.sap.com/pam for supported operating system releases.
2. Check the hardware and software requirements using:
   - The Prerequisite Checker:
     - Standalone (optional) before the installation process
       For more information, see Running the Prerequisites Check Standalone [page 33].
     - Integrated in the installation tool (mandatory) as part of the installation process
       For more information, see Running the Installer [page 110].
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:


  **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

### 3.4.1 Running the Prerequisites Check in Standalone Mode (Optional)

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

**Context**

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

**Recommendation**

We recommend that you use both the prerequisites check and the requirements tables for reference.

**Procedure**

1. Download and unpack the Software Provisioning Manager archive to a local directory as described in [Downloading and Extracting the Software Provisioning Manager 1.0 Archive](#).
2. Make either the separate SAPEXE<Version>.SAR archive or the complete kernel medium available as described in [Preparing the Installation Media](#).
3. Start the installer as described in [Running the Installer](#).
4. On the Welcome screen, choose **<SAP_Product> <Database> Preparations Prerequisites Check**.
5. Follow the instructions in the installer dialogs and enter the required parameters.

**Note**

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

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

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

**Results**

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

**Related Information**

- Downloading and Extracting the Software Provisioning Manager 1.0 Archive [page 80]
- Preparing the Installation Media [page 76]

### 3.4.2 Requirements for the SAP System Hosts

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

- Central services instance (SCS)
- Database instance
- Primary application server instance
- Additional application server instance

**Note**

The additional application server instance is optional in a non-HA system, but mandatory in an HA system.

- Only valid for ‘High Availability’: HA (Windows)
- **High Availability only**: Enqueue Replication Server instance (ERS)
- End of ‘High Availability’: HA (Windows)
- SAP Host Agent
General Requirements for a High-Availability System

- Windows Server 2012 (R2) and higher:
  1. Check that your cluster hardware is certified for Windows Server 2012 (R2) or Windows 2016 and has the Windows Server 2012 (R2) or Windows 2016 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 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 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 an external file share or shared disks that can be reached by the cluster nodes via a shared bus. 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 200].
- 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.

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.

ℹ️ 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 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 versions for your SAP product and database, see the Product Availability Matrix (PAM) at:
http://support.sap.com/pam
### Hardware Requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>How to Check</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Minimum disk space</strong></td>
<td></td>
</tr>
<tr>
<td>• Database software:</td>
<td>To check disk space:</td>
</tr>
<tr>
<td>2 to 5 GB</td>
<td>• Windows Server 2012 (R2) and higher:</td>
</tr>
<tr>
<td>• Central services instance (SCS)</td>
<td>1. Open PowerShell in elevated mode, and enter the following command:</td>
</tr>
<tr>
<td>(not including paging file):</td>
<td>* get-volume</td>
</tr>
<tr>
<td>5 GB (x64)</td>
<td>2. Check the value <code>SizeRemaining</code> of the disk you want to install on.</td>
</tr>
<tr>
<td>8 GB (IA64)</td>
<td>• Windows Server 2008 (R2):</td>
</tr>
<tr>
<td>If you install the SCS instance</td>
<td>1. Choose <code>Start</code></td>
</tr>
<tr>
<td>with an integrated SAP Web</td>
<td>➤ <code>All Programs</code></td>
</tr>
<tr>
<td>Dispatcher, for the installation</td>
<td>➤ <code>Administrative</code></td>
</tr>
<tr>
<td>as such you require at least 1 GB</td>
<td>➤ <code>Tools</code></td>
</tr>
<tr>
<td>of hard disk space in addition.</td>
<td>➤ <code>Storage</code></td>
</tr>
<tr>
<td>• Database instance (not including</td>
<td>➤ <code>Computer</code></td>
</tr>
<tr>
<td>paging file):</td>
<td>➤ <code>Management</code></td>
</tr>
<tr>
<td>2 GB</td>
<td>➤ <code>Disk</code></td>
</tr>
<tr>
<td>• Oracle Database 12c Multitenant</td>
<td>➤ <code>Management</code></td>
</tr>
<tr>
<td>Database Installation [page 168]:</td>
<td>2. Right-click the drive and choose <code>Properties</code>.</td>
</tr>
<tr>
<td>- For a container database (CDB),</td>
<td></td>
</tr>
<tr>
<td>you need additional disk space</td>
<td></td>
</tr>
<tr>
<td>for the following tablespaces:</td>
<td></td>
</tr>
<tr>
<td>- SYSTEM DEFAULT: 2x* 350 MB</td>
<td></td>
</tr>
<tr>
<td>- PSAPTEMP DEFAULT: 2x* 350 MB</td>
<td></td>
</tr>
<tr>
<td>- SYSAUX DEFAULT: 2x* 200MB</td>
<td></td>
</tr>
<tr>
<td>• Only valid for 'High Availability':</td>
<td></td>
</tr>
<tr>
<td>HA (Windows)</td>
<td></td>
</tr>
<tr>
<td><strong>High Availability only:</strong></td>
<td></td>
</tr>
<tr>
<td>Enqueue replication server instance</td>
<td></td>
</tr>
<tr>
<td>(ERS) (not including paging file):</td>
<td></td>
</tr>
<tr>
<td>5 GB (x64)</td>
<td></td>
</tr>
<tr>
<td>8 GB (IA64)</td>
<td></td>
</tr>
<tr>
<td>• Primary application server</td>
<td></td>
</tr>
<tr>
<td>instance (not including paging</td>
<td></td>
</tr>
<tr>
<td>file):</td>
<td></td>
</tr>
<tr>
<td>5 GB (x64)</td>
<td></td>
</tr>
<tr>
<td>8 GB (IA64)</td>
<td></td>
</tr>
<tr>
<td>In addition you require 4 GB (x64),</td>
<td></td>
</tr>
<tr>
<td>or 8 GB (IA64) per additional</td>
<td></td>
</tr>
<tr>
<td>platform.</td>
<td></td>
</tr>
<tr>
<td>Up to 2 GB for each usage type or</td>
<td></td>
</tr>
<tr>
<td>software unit you want to install.</td>
<td></td>
</tr>
<tr>
<td>• Additional application server</td>
<td></td>
</tr>
<tr>
<td>instance (not including paging</td>
<td></td>
</tr>
<tr>
<td>file):</td>
<td></td>
</tr>
<tr>
<td>2.5 GB (x64)</td>
<td></td>
</tr>
<tr>
<td>5 GB (IA64)</td>
<td></td>
</tr>
<tr>
<td>• SAP Host Agent:</td>
<td></td>
</tr>
<tr>
<td>256 MB</td>
<td></td>
</tr>
</tbody>
</table>

* These tablespaces are created two times in the CDB, because all further pluggable databases (PDB) are created out of them.

**Note**

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

End of 'High Availability': HA (Windows)
<table>
<thead>
<tr>
<th>Hardware Requirement</th>
<th>Requirement</th>
<th>How to Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temporary disk space for every required installation medium that you have to copy to a local hard disk:</td>
<td>Up to 6 GB</td>
<td></td>
</tr>
</tbody>
</table>
| Minimum RAM | • All instances, except SAP Host Agent: 4 GB  
• SAP Host Agent: 0.5 GB | To check RAM:  
• Windows Server 2012 (R2) and higher: 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. |
<p>| | | If you want to install usage type BI Java, see SAP Note 927530 for current information on hardware sizing. |</p>
<table>
<thead>
<tr>
<th>Requirement</th>
<th>How to Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paging file size</td>
<td>To check paging file size:</td>
</tr>
<tr>
<td></td>
<td>- Windows Server 2012 (R2) and higher:</td>
</tr>
<tr>
<td></td>
<td>For more information, see Checking and Changing the Paging File Settings on Windows Server 2012 (R2) [page 163]</td>
</tr>
<tr>
<td></td>
<td>- Windows Server 2008 (R2):</td>
</tr>
<tr>
<td></td>
<td>1. Choose Start Control Panel System</td>
</tr>
<tr>
<td></td>
<td>2. Choose Advanced system settings.</td>
</tr>
<tr>
<td></td>
<td>3. In section Performance, select Settings...</td>
</tr>
<tr>
<td></td>
<td>4. If required, in section Virtual memory, choose Change.</td>
</tr>
<tr>
<td></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></td>
<td>Do not select <strong>Automatically managed paging file</strong></td>
</tr>
<tr>
<td>Hardware Requirement</td>
<td>Requirement</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Size for all drives.</td>
<td></td>
</tr>
<tr>
<td>Only valid for ‘High Availability’: HA (Windows)</td>
<td></td>
</tr>
</tbody>
</table>

**i Note**

*High Availability only:* You must adjust the size of the paging file on all cluster nodes.

End of ‘High Availability’: HA (Windows)

**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**
## Software Requirements

<table>
<thead>
<tr>
<th>Software Requirement</th>
<th>Requirement</th>
<th>How to Check</th>
</tr>
</thead>
</table>
| Windows operating system | • **64-bit version** of one of the following Windows Server Editions:  
  ○ Windows Server 2012 (R2) and higher:  
    ○ Windows Server Standard Edition  
    ○ Windows Server Datacenter Edition  
  ○ Windows Server 2008 (R2):  
    ○ Windows Server Standard Edition  
    ○ Windows Server Enterprise Edition  
    ○ Windows Server Datacenter Edition  
    ○ Windows Server 2008 (R2) for Itanium-Based Systems Edition | To check your Windows version:  
  • Windows Server 2012 (R2) and higher:  
    Open PowerShell in elevated mode, and enter the following command:  
    ```powershell
    Get-WmiObject Win32_OperatingSystem | select caption
    ```  
  • Windows Server 2008 (R2):  
    1. Choose **Start ➤ All Programs ➤ Accessories ➤ Command Prompt**  
    2. Enter the command `winver`  
  ![Caution](https://via.placeholder.com/150)  
  For up-to-date information on the released and supported operating system versions for your SAP product and database, see the Product Availability Matrix (PAM) at [http://support.sap.com/pam](http://support.sap.com/pam)  
  ![Caution](https://via.placeholder.com/150)  
  Make sure that you install the English language pack so that your support requests can be handled quickly.  
  ![i Note](https://via.placeholder.com/150)  
  For any version of Windows Server, you need the latest supported service pack |

---

*Installation of SAP Systems Based on the Application Server Java of SAP NetWeaver 7.1 to 7.5 on Windows: Oracle Planning*
### Software Requirement

<table>
<thead>
<tr>
<th>Requirement</th>
<th>How to Check</th>
</tr>
</thead>
</table>
| **Database software** | **Database instance:**  
  ○ Database server software for Oracle 11g or 12c  
  ○ Current Oracle patches, if available.  
  ○ Oracle Fail Safe software  |
|   | **Caution**  
  For up-to-date information on the released and supported database versions for your SAP product and database, see the Product Availability Matrix (PAM) at [http://support.sap.com/pam](http://support.sap.com/pam). |
| **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)**.  |
| **Minimum Web Browser** | Make sure that you have at least one of the following web browsers installed on the host where you run the installer GUI:  
  ● Microsoft Internet Explorer 11 or higher  
  ● Microsoft Edge  
  ● Mozilla Firefox  
  ● Google Chrome  
Always use the latest version of these web browsers.  
You need a web browser to be able to run the SL Common GUI, and to display the Evaluation Form and send it to SAP.  |
|   | Choose [Start] > Control Panel > Clock, Language, and Region > Language.  |
|   | Choose [Start] > Control Panel > Programs and Features.  |
3.5 Planning User and Access Management

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

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

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

**i Note**

If you want to install an Advanced Adapter Engine Extended (AEX), you can only use the database of AS Java for the user management. After the installation has finished, you cannot change the user management configuration.

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

**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 108].

**More Information**

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

<table>
<thead>
<tr>
<th>SAP Release and SAP Library Quicklink</th>
<th>SAP Library Path (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP NetWeaver 7.3 including Enhancement Package 1 <a href="http://help.sap.com/nw731">http://help.sap.com/nw731</a></td>
<td></td>
</tr>
<tr>
<td>SAP NetWeaver 7.4 <a href="http://help.sap.com/nw74">http://help.sap.com/nw74</a></td>
<td></td>
</tr>
<tr>
<td>SAP NetWeaver 7.5 <a href="http://help.sap.com/nw75">http://help.sap.com/nw75</a></td>
<td></td>
</tr>
</tbody>
</table>
3.6 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 to all hosts in the system.

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

- You install a distributed system.
- 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 (standard system), you can perform a local installation.

**i Note**

If your SAP system was installed as a local installation and you want to later change to a domain installation, you can use the system rename option. For more information, see the System Rename Guide for your SAP system at:

https://support.sap.com/sitoolset System Provisioning

**More Information**

Required User Authorization for Running the Installer [page 70]

3.7 Basic Installation Parameters

The installer prompts for input parameters during the Define Parameters phase of the installation.
You can install your SAP system either in **Typical** or **Custom** mode:

- **Typical**
  - If you choose **Typical**, the installation is performed with default settings. This means that the installer prompts you only for a small selection of installation parameters. These parameters include at least the following:
    - SAP system ID and database connectivity parameters
    - Master password
    - JCE Unlimited Strength Jurisdiction Policy files archive (only prompted if you install Adobe Document Services)
    - SAP system profile directory – only for systems with instances on separate hosts
    - User Management Engine (UME) Configuration

    **Note**
    If you want to install an optional standalone unit - Advanced Adapter Engine (AAE), Advanced Adapter Engine Extended (AEX), or Process Integration and Orchestration (PI-CP) - you are **not** prompted for UME Configuration. Instead, optional standalone units are automatically configured to store the SAP system users in the Java database (see also section User Management Engine Parameters in SAP System Parameters [page 46]).

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

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

    **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 SAP system installation parameters that you need to specify before installing your SAP system. For all other installation parameters, use the tool help on the installer screens.

**Related Information**

- SAP System Parameters [page 46]
- SAP System Database Parameters [page 57]
- Parameters for Additional Components to be Included in the SCS Instance (Optional) [page 58]
### 3.7.1 SAP System Parameters

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

#### General Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unicode System</td>
<td>A Java standalone system is always a Unicode system.</td>
</tr>
<tr>
<td>SAP System ID</td>
<td>The SAP system ID (&lt;SAPSID&gt;) identifies the entire SAP system.</td>
</tr>
<tr>
<td></td>
<td>The installer prompts you for the &lt;SAPSID&gt; when you execute the first installation option to install a new SAP system.</td>
</tr>
<tr>
<td></td>
<td>If there are further installation options to be executed, the installer prompts you for the profile directory. For more information, see the description of the parameter SAP System Profile Directory.</td>
</tr>
</tbody>
</table>

#### Example

This prompt appears when you install the SCS instance, which is the first instance to be installed in a distributed system.

#### Caution

Choose your SAP system ID carefully since renaming requires considerable effort.

Make sure that your SAP system ID:

- Is unique throughout your organization. Do not use an existing <SAPSID> when installing a new SAP system.

- Consists of exactly three alphanumeric characters
- Contains only uppercase letters
- Has a letter for the first character
- Does not include any of the reserved IDs listed in SAP Note 1979280
- If you want to install an additional application server instance, make sure that no Gateway instance with the same SAP System ID (SAPSID) exists in your SAP system landscape.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP System Instance Numbers</td>
<td>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.</td>
</tr>
</tbody>
</table>

**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 156].

**Caution**

Do not use 43, and 89 for the instance number because:

- 43 is part of the port number for high availability
- 89 is part of the port number for Windows Terminal Server
### Parameter | Description
---|---
Virtual Host Name | Virtual host name (network name) of the SAP cluster group. You can assign a virtual host name to an SAP instance in one of the following ways:
- You can assign a virtual host name for the instance to be installed, by specifying it in the `<Instance Name> Host Name` field of the `<Instance Name> Instance` screen. Then this instance is installed with this virtual host name.
- Alternatively you can assign virtual host names also by starting the installer with the `SAPINST_USE_HOSTNAME` property. For more information, see Running the Installer [page 110].

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

You must have already reserved the virtual host name (network name) and its IP address on a DNS server before you run the installer. For more information, see Using Virtual Host Names [page 71].

**Note**

Fully qualified host names, IPv4, IPv6 are not accepted as virtual host names.

SAP System Profile Directory | The installer retrieves parameters from the SAP system profile directory of an existing SAP system. SAP profiles are operating system files that contain instance configuration information. The installer prompts you to enter the location of the profile directory when the installation option that you execute is not the first one belonging to your SAP system installation, for example if you are installing a distributed system or an additional application server instance to an existing SAP system. See also the description of the parameters SAP System ID and Database ID.

Destination drive | Base directory for the SAP system.

**Note**

If you install a subsequent SAP system, the saploc share already exists and you cannot select the installation drive. The installer uses the installation drive where the saploc share points to.
### Parameter | Description
---|---
Master Password | Common password for all users that are created during the installation:

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

⚠️ **Caution**

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

- Java users

(for example Administrator)

- Secure Store key phrase

| SAP systems based on SAP NetWeaver lower than 7.4: For more information, see line Key Phrase for Secure Store Settings in this table.

---

### i Note

If a user already exists, you are prompted to confirm the password for this user.

### Basic Password policy

The master password must meet the following requirements:

- It must be 8 to 14 characters long
- It must contain at least one letter (a-z, A-Z)
- It must contain at least one digit (0-9)
- It must not contain `\` (backslash) or " (double quote).

### Additional restrictions depending on Windows:

- If a user already exists, you are prompted to confirm the password for this user.
- Depending on the configuration of the password policy, additional restrictions might apply.

### Additional restrictions depending on the Oracle database:

- It must not begin with a digit or an underscore
- It can contain the following characters: `_, #, $, ., a-z, A-Z, 0-9`

Depending on the installation option, additional restrictions may apply.

⚠️ **Example**

The master password must not contain the name of a Java user created during the installation.)
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Server Access Control List</td>
<td>You can specify if you want to have a message server Access Control List (ACL) created. The ACL is created as a file in the <code>/sapmnt/&lt;SAPSID&gt;/global</code> directory. If it exists, it defines the hosts from which the message server accepts requests.</td>
</tr>
<tr>
<td>Caution</td>
<td>Only trigger the creation of this file if you do not plan to install any additional instances for this system. With the creation of this ACL, you overwrite existing settings and prevent instances from being installed on additional hosts. If you decide to install an additional instance later, you need to remove this file manually before the installation and create it again after the installation of the additional instance. For more information, see the information about <code>ms/acl_info</code> in SAP Notes 1495075 and 826779.</td>
</tr>
<tr>
<td>Java(TM) Cryptography Extension (JCE) Unlimited Strength Jurisdiction Policy Files Archive</td>
<td>If you want to install Adobe Document Services, make sure that you download the unlimited version of the JCE Jurisdiction Policy Files archive. For more information about where to download it, see SAP Note 1240081.</td>
</tr>
<tr>
<td>Key Phrase for Secure Store Settings</td>
<td>This is a random word or phrase that is used to encrypt the secure store. The Java EE 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.</td>
</tr>
<tr>
<td>Recommendation</td>
<td>Use a long key phrase that cannot be guessed easily. Use both uppercase and lowercase letters in the phrase and include special characters.</td>
</tr>
<tr>
<td>Note</td>
<td>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.</td>
</tr>
</tbody>
</table>
### Parameter | Description
--- | ---
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 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.

SAP Host Agent Upgrade (Optional) | If there already exists an SAP Host Agent on the installation host, the installer asks you if you want to upgrade it to a newer patch level version. If you want the existing version to be upgraded, you must provide the new target version of the SAPHOSTAGENT<Version>.SAR archive.

For more information, see [Downloading SAP Kernel Archives (Archive-Based Installation)](#) [page 81].

### Ports

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
</table>
| 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<SCS_Instance_Number>.

For more information about the parameters used for message server ports, see SAP Note [821875](#).
Operating System Users

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Definition</th>
</tr>
</thead>
</table>
| 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, SAP creates the following users:  
    - <sapsid>adm  
      This user is the SAP system administrator user. It is a member of the local Administrators group.  
    - SAPService<SAPSID>  
      This user is the Windows account to run the SAP system. It 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 although it is not 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 159].  
      For security reasons, however, SAP strongly recommends you 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 the password of these users is the same as the master password.  
  
 ⚠️ **Caution**  
  Make sure that you have the **required user authorization** [page 70] for these accounts before you start the installation. |

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. |
User Management Engine Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UME Configuration</strong></td>
<td>The installer prompts you for how to configure the UME during the input phase of the installation. You can choose between the following options:</td>
</tr>
<tr>
<td><strong>Note</strong></td>
<td>If you want to install an optional standalone unit - Advanced Adapter Engine (AAE), Advanced Adapter Engine Extended (AEX), or Process Integration and Orchestration (PI-CP) - you can skip this section because you are not prompted for UME Configuration. Optional standalone units are automatically configured during the installation to store the SAP system users in the Java database.</td>
</tr>
</tbody>
</table>

**Note**

If you want to install the application server Java for an SAP NetWeaver 7.5 Process Integration (PI) system or for an SAP Solution Manager 7.2 system, you must use the already installed Application Server ABAP as the data source for user data for the Application Server Java to be installed. In this case, the required users were already created during the installation of the Application Server ABAP and you are prompted to enter these users during the installation of the Application Server Java.

For more information, see Preparing User Management for an External ABAP System (Optional) [page 73].

For more information about supported UME data sources and change options, see SAP Note 718383.

**Using the Java Database:**

<p>| Administrator User | The installer sets the user name Administrator and the master password by default. If required, you can choose another user name and password according to your requirements. |</p>
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guest User</td>
<td>The installer sets the user name <em>Guest</em> and the master password by default. The guest user is a user for anonymous access.</td>
</tr>
</tbody>
</table>

**Using an External ABAP System – Parameters for the ABAP Connection:**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Definition</th>
</tr>
</thead>
</table>
| Application Server Instance 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 primary application server instance, look in the following SAP directory:  
  - SAP systems based on SAP NetWeaver 7.1 to 7.4: `/usr/sap/<SAPSID>/DVEBMGS<Instance_Number>`  
  - SAP systems based on SAP NetWeaver 7.5: `/usr/sap/<SAPSID>/D<Instance_Number>`           |
| 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 primary application server instance. |
| Communication User                       | This is the name and password of the existing ABAP communication user. You must have created this user manually on the external ABAP system. The default user name is *SAPJSF* |

**Note**

If you are installing a SAP NetWeaver 7.5 Process Integration (PI) or a SAP Solution Manager 7.2 system, this user has been created during the installation of the SAP NetWeaver 7.5 PI application server ABAP.

**Using an External ABAP System – Parameters for the Application Server Java Connection:**
### Parameter Definition

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrator User</td>
<td>This is the name and password of the administrator user that you created on the external ABAP system.</td>
</tr>
<tr>
<td></td>
<td>The default user name is <code>J2EE_ADMIN</code></td>
</tr>
<tr>
<td><strong>Note</strong></td>
<td>If you are installing a SAP NetWeaver 7.5 Process Integration (PI) or a SAP Solution Manager 7.2 system, this user has been created during the installation of the Application Server ABAP.</td>
</tr>
<tr>
<td>Administrator Role</td>
<td>The role <code>SAP_J2EE_ADMIN</code> must exist on the external ABAP system.</td>
</tr>
<tr>
<td>Guest User</td>
<td>This is the name and password of the guest user that you created on the external ABAP system.</td>
</tr>
<tr>
<td></td>
<td>The guest user is a user for anonymous access.</td>
</tr>
<tr>
<td></td>
<td>The default user name is <code>J2EE_GUEST</code></td>
</tr>
<tr>
<td><strong>Note</strong></td>
<td>If you are installing a SAP NetWeaver 7.5 Process Integration (PI) or an SAP Solution Manager 7.2 system, this user has been created during the installation of the Application Server ABAP.</td>
</tr>
<tr>
<td>Guest Role</td>
<td>The role <code>SAP_J2EE_GUEST</code> must exist on the external ABAP system.</td>
</tr>
</tbody>
</table>

### System Landscape Directory

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLD Destination for the System</td>
<td>The System Landscape Directory (SLD) registers the systems and the installed software of your entire system landscape.</td>
</tr>
<tr>
<td></td>
<td>You can choose between the following options:</td>
</tr>
<tr>
<td></td>
<td>• <strong>Register in existing SLD</strong></td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>• <strong>No SLD destination</strong></td>
</tr>
<tr>
<td></td>
<td>Choose this option if you do not want to register the SAP system you are installing in an existing SAP System Landscape Directory (SLD).</td>
</tr>
<tr>
<td></td>
<td>You then have to configure the SLD destination manually after the installation has finished.</td>
</tr>
<tr>
<td>Parameter</td>
<td>Definition</td>
</tr>
<tr>
<td>-----------</td>
<td>------------</td>
</tr>
<tr>
<td>SLD Host</td>
<td>The host name of the existing SLD.</td>
</tr>
<tr>
<td>SLD HTTP(S) Port</td>
<td>HTTP port of the SAP system based on AS Java on which the System Landscape Directory (SLD) resides. The following naming convention applies: 5&lt;Primary_Application_Server_Instance_Number&gt;00.</td>
</tr>
<tr>
<td><strong>Example</strong></td>
<td>If the primary application server instance number of the AS Java on which the System Landscape Directory (SLD) resides is 01, the SLD HTTP Port is 50100.</td>
</tr>
<tr>
<td>SLD Data Supplier User and password</td>
<td>The existing SLD Data Supplier user and password of the existing SLD</td>
</tr>
</tbody>
</table>
### 3.7.2 SAP System Database Parameters

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Database ID <code>&lt;DBSID&gt;</code></td>
<td>The <code>&lt;DBSID&gt;</code> identifies the database instance. The installer prompts you for the <code>&lt;DBSID&gt;</code> when you are installing the database instance. The <code>&lt;DBSID&gt;</code> can be the same as the <code>&lt;SAPSID&gt;</code>.</td>
</tr>
<tr>
<td><strong>Caution</strong></td>
<td>Choose your database ID carefully. Renaming is difficult and requires you to reinstall the SAP system.</td>
</tr>
<tr>
<td></td>
<td>• If you want to install a new database:</td>
</tr>
<tr>
<td></td>
<td>Make sure that your database ID:</td>
</tr>
<tr>
<td></td>
<td>○ Is unique throughout your organization</td>
</tr>
<tr>
<td></td>
<td>○ Consists of exactly three alphanumeric characters</td>
</tr>
<tr>
<td></td>
<td>○ Contains only uppercase letters</td>
</tr>
<tr>
<td></td>
<td>○ Has a letter for the first character</td>
</tr>
<tr>
<td></td>
<td>○ Does not include any of the reserved IDs listed in SAP Note 1979280</td>
</tr>
<tr>
<td></td>
<td>• <strong>MCOD only:</strong> If you want to use an existing database system, enter exactly the database ID of the existing database to which you want to add the system. For more information, see Installation of Multiple Components in One Database [page 165].</td>
</tr>
<tr>
<td></td>
<td>• If you want to perform a Multitenant Database installation, you have to specify one database system ID (<code>&lt;DBSID&gt;</code>) for the container database (CDB) and one <code>&lt;PDBSID&gt;</code> for each pluggable database (PDB).</td>
</tr>
<tr>
<td></td>
<td>SAP <code>&lt;PDBSID&gt;</code> cannot be equal to the assigned <code>&lt;DBSID&gt;</code>.</td>
</tr>
<tr>
<td></td>
<td>The <code>&lt;DBSID&gt;</code> must be different from the <code>&lt;SAPSID&gt;</code>, because the default and recommended value for the <code>&lt;PDBSID&gt;</code> is the <code>&lt;SAPSID&gt;</code> of the SAP system running with the PDB. For more information, see Oracle Database 12c Multitenant Database Installation [page 168].</td>
</tr>
<tr>
<td>Database schema, Password</td>
<td>The Java database schema is named SAP <code>&lt;SCHEMA_ID&gt;DB</code>. Default name is SAPSR3DB.</td>
</tr>
<tr>
<td></td>
<td><strong>Recommendation</strong></td>
</tr>
<tr>
<td></td>
<td>Choose a <code>&lt;SCHEMA_ID&gt;</code> that is different from your <code>&lt;SAPSID&gt;</code>.</td>
</tr>
<tr>
<td></td>
<td>It might cause problems when you copy a system where <code>&lt;SCHEMA_ID&gt;</code> is the same as <code>&lt;SAPSID&gt;</code>, and the database-specific method used for the copy does not allow you to rename the database schemas. In certain situations, you might create a system copy with a new <code>&lt;SAPSID&gt;</code>, but where the database schema has the old <code>&lt;SAPSID&gt;</code>. This is not a technical problem but it might confuse the system administrator.</td>
</tr>
</tbody>
</table>
### Parameters

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Description</th>
</tr>
</thead>
</table>
| Oracle parameters | ● Oracle home  
● SAPDATA drives  
● Drives for redolog and archives (oraarch) |
| Oracle Listener Name, Oracle Listener Port, Oracle Listener Domain | ● If you install the database instance on a host where no other Oracle database is installed, you normally do not have to change the default values for Listener Name and Listener Port.  
● If you install the database instance on a host where another Oracle database is already installed, you have the following options:  
  ○ If you install it in the same Oracle home, you use the default values for Listener Name and Listener Port.  
  ○ If you install it in a different Oracle home, you specify an unused Listener Name and Listener Port for the new Oracle Listener.  
● All additional application server instances of an SAP system must use the same Listener Port than the database instance.  
● The default domain in the network configuration files is WORLD. |
| Install Oracle Database Vault | If you want to implement Oracle Database Vault, make sure that you specify this when entering the Oracle Database parameters. For more information, see Implementing Oracle Database Vault with the Installer [page 167]. |
| User Accounts for Oracle Database Vault | If you want to implement Oracle Database Vault, make sure that you specify the passwords for the Oracle Database Vault user accounts secadmin and secacctmgr to be created. For more information, see Implementing Oracle Database Vault with the Installer [page 167]. |

### 3.7.3 Parameters for Additional Components to be Included in the SCS Instance (Optional)

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

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Description</th>
</tr>
</thead>
</table>
| Install an SAP Web Dispatcher integrated in the SCS instance | When processing the screens for the ASCS instance installation, you are prompted to mark this checkbox on the screen Additional Components to be Included in the SCS Instance.  
If you mark the checkbox for SAP Web Dispatcher, you are prompted for the additional parameters required for the SAP Web Dispatcher installation on the subsequent screens: |
### Parameters

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Server Host</td>
<td>The name of the host on which the message server is located (profile parameter <code>rdisp/mshost</code>)</td>
</tr>
<tr>
<td>Message Server HTTP Port</td>
<td>HTTP port of the message server (profile parameter <code>ms/server_port_&lt;xx&gt;</code>)</td>
</tr>
<tr>
<td>Password for the Internet Communication Management (ICM) user</td>
<td>In order to use the web administration interface for the Internet Communication Manager (ICM) and SAP Web Dispatcher, an administration user <code>webadm</code> is created by the installer. You have to assign a password for this user.</td>
</tr>
</tbody>
</table>

### Related Information

**SCS Instance with Integrated SAP Web Dispatcher** [page 25]

### 3.8 Distribution of SAP System and Oracle Database Components to Disks

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

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

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

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

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

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

Configuration for Test or Demo System

Distribution of Database Directories to Disks

<table>
<thead>
<tr>
<th>Disk</th>
<th>Directories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disk 1</td>
<td>\ORACLE&lt;DBSID&gt;\1120&lt;cx&gt; (Oracle 11g)</td>
</tr>
<tr>
<td></td>
<td>&lt;Oracle 12g path&gt; (Oracle 12g, user-defined directory)</td>
</tr>
<tr>
<td></td>
<td>\ORACLE&lt;DBSID&gt;\origlogA</td>
</tr>
<tr>
<td></td>
<td>\ORACLE&lt;DBSID&gt;\origlogB</td>
</tr>
<tr>
<td></td>
<td>\ORACLE&lt;DBSID&gt;\sapdata1</td>
</tr>
<tr>
<td></td>
<td>\ORACLE&lt;DBSID&gt;\sapdata2</td>
</tr>
</tbody>
</table>
### Disk 2
- `\ORACLE\<DBSID>\mirrlogA`
- `\ORACLE\<DBSID>\mirrlogB`
- `\ORACLE\<DBSID>\sapreorg`
- `\ORACLE\<DBSID>\saptrace`
- `\ORACLE\<DBSID>\saparch`
- `\ORACLE\<DBSID>\sapbackup`
- `\ORACLE\<DBSID>\sapcheck`
- `\ORACLE\<DBSID>\sapdata3`
- `\ORACLE\<DBSID>\sapdata4`
- `\ORACLE\<DBSID>\sapprof`

### Disk 3
- `\ORACLE\<DBSID>\oraarch`

---

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

---

**Related Information**

- [Oracle Database File Names for Multitenant Installation](#)
- [Oracle Database 12c Multitenant Database Installation](#)
3.8.1 Oracle Database File Names for Multitenant Installation

This section contains information about seed database paths, pluggable database files and tablespace names in pluggable databases.

Seed Database Path

i Note
The sapdata path cannot be changed in the installer screen for all seed tablespaces

<table>
<thead>
<tr>
<th>Tablespace Name</th>
<th>File Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>System tablespace seed</td>
<td>&lt;drive&gt;: \oracle&lt;DBSID&gt; \sapdata1\seed_system_1\seed_system.data</td>
</tr>
<tr>
<td>Sysaux tablespace seed</td>
<td>&lt;drive&gt;: \oracle&lt;DBSID&gt; \sapdata1\seed_sysaux_1\seed_sysaux.data</td>
</tr>
<tr>
<td>Temp tablespace seed</td>
<td>&lt;drive&gt;: \oracle&lt;DBSID&gt; \sapdata1\seed_temp_1\seed_temp.data1</td>
</tr>
</tbody>
</table>

The sapdata path to the SEED tablespaces is set to the same path as the original tablespaces of SYSTEM, SYSAUX, and PSATEMP.

Pluggable Database Files

<table>
<thead>
<tr>
<th>Tablespace Name</th>
<th>File Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>System tablespace pluggable database</td>
<td>&lt;drive&gt;: \oracle&lt;DBSID&gt; &lt;pdbname&gt;_sapdata1&lt;pdbname&gt;_system_1&lt;pdbname&gt;_system.data</td>
</tr>
<tr>
<td>Sysaux tablespace pluggable database</td>
<td>&lt;drive&gt;: \oracle&lt;DBSID&gt; &lt;pdbname&gt;_sapdata1&lt;pdbname&gt;_sysaux_1&lt;pdbname&gt;_sysaux.data</td>
</tr>
</tbody>
</table>
### Tablespace Names in a Pluggable Database

<table>
<thead>
<tr>
<th>Tablespace Name</th>
<th>File Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temp tablespace pluggable database</td>
<td><code>&lt;drive&gt;: \oracle\&lt;DBSID&gt;\&lt;pdbsid&gt;_sapdata1\&lt;pdbsid&gt;_temp_1\&lt;pdbsid&gt;_temp.data1</code></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tablespace Name</th>
<th>File Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSAP&lt;SCHEMAID&gt; tablespace</td>
<td><code>&lt;drive&gt;: \oracle\&lt;DBSID&gt;\&lt;pdbsid&gt;_sapdata2\&lt;pdbsid&gt;_&lt;schemaid&gt;_1\&lt;pdbsid&gt;_&lt;schemaid&gt;.data1</code></td>
</tr>
</tbody>
</table>

### Required Disk Space

The disk space required for the seed database is the same as for the original tablespaces SYSTEM, SYSAUX, and TEMP.

A pluggable database as such requires the same disk space as, for example, an MCOD database. This is because a pluggable database uses only the data tablespaces PSAPSR3, PSAPSR3<REL>, and PSAPSR3USR.

For more information about MCOD, see *Installation of Multiple Components in One Database* [page 165].

### Naming Conventions Used in this Section

<SCHEMAID>: Default is "SR3"

<schemaid>: Default is "sr3"

<pdbsid>: Pluggable database ID (DBSID) in lower case letters

<DBSID>: Database ID (DBSID) of the container database in capital letters

### Related Information

- Distribution of SAP System and Oracle Database Components to Disks [page 59]
- Requirements for the SAP System Hosts [page 34]
3.9 SAP System Transport Host

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

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

- Use the transport directory that the installer creates during the installation of the SAP system by default on the global host.
  The installer by default creates the transport directory on the global host in `\usr\sap\trans`.
- Use a transport directory located on a host other than the default host:
  - You can use an existing transport directory and host in your SAP system landscape.
  - You can set up a new transport directory on a different host.
  In either case, you must prepare this host for use by the new SAP system [page 72].

More Information

- SAP Directories [page 156]

3.10 Multiple Oracle Homes

The Oracle database software is installed in a directory structure which is referenced as Oracle Home. Before you install your Oracle database software, you need to decide whether you want to set up a single or multiple Oracle Homes as this influences the installation procedure.

If you install more than one database instance on the same host you have the following options:

- You use a single Oracle Home
  - You can use a single Oracle Home, if you use the same Oracle database version on one host for different database instances.
  - With a single Oracle Home, you have to install the database software only once.
  - With a single Oracle Home, you cannot administer your databases independently.
- You use multiple Oracle Homes
  - If you use multiple Oracle Homes, you must set up one Oracle Listener for each Oracle Home. Each listener must have a different TCP/IP port number.
  - With multiple Oracle Homes, you can administer your databases independently.
  - Multiple Oracle Homes are necessary, if you need to install different Oracle databases versions on the same host.
  - Windows Server 2008 (R2) and higher:
    Multiple Oracle Homes are not supported in a Microsoft failover cluster.
Related Information

Setting Up Multiple Oracle Homes [page 106]
4 Preparation

4.1 Preparation Checklist

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

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

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

Standard, Distributed, or High-Availability System

**i Note**

In a standard system, all mandatory instances are installed on one host. Therefore, if you are installing a standard system, you can ignore references to other hosts.

1. Windows Server 2008 (R2) or higher: you disable the Windows Server firewall [page 67] on each host.
2. You perform basic preparations on Windows [page 68].
3. You check that you have the required user authorization for running the installer [page 70].
4. If required, you prepare the SAP system transport host [page 72] for your SAP system.
5. If you need to configure the User Management Engine (UME) of Application Server Java for the user management of a separate ABAP system, you have to prepare user management for an external ABAP System [page 73].

**i Note**

If you want to install an optional standalone unit - Advanced Adapter Engine (AAE), Advanced Adapter Engine Extended (AEX), or Process Integration and Orchestration (PI-CP) - you can skip this section because you are not prompted for UME Configuration. Optional standalone units are automatically configured during the installation to store the SAP system users in the Java database.

6. You check that the required installation media [page 76] are available for each installation 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 steps [page 191].

8. If you want to implement Oracle Database Vault, make sure that you have completed the required preparation steps. For more information, see Implementing Oracle Database Vault with the Installer [page 167].
9. You continue with Installation [page 89].
**Additional Application Server Instance**

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

1. Windows Server 2008 (R2) or higher: you disable the Windows Server firewall [page 67] on each host.
2. You perform basic preparations on Windows [page 68].
3. You check that you have the required user authorization for running the installer [page 70].
4. If required, you prepare the SAP system transport host [page 72].
5. You check that the required installation media [page 76] are available on each installation host.
6. You continue with Installation [page 89].

### 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**

- **Windows Server 2012 (R2) and higher:**
  
  Open PowerShell in elevated mode, and enter the following command:

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

  **Note**

  In a high-availability system, you have to disable the firewall on all failover cluster nodes.
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 which Windows file system you are using on hosts where you want to install the SAP system.

As of Windows Server 2012 R2, you should use the Windows file system ReFs or NTFS. Older Windows Server versions must use NTFS.

**i Note**

Do not install the SAP system on a FAT partition.

Perform the check as follows:

- Windows Server 2012 R2 and higher:
  1. Open PowerShell in elevated mode, and enter the following command:
     ```
     get-volume
     ```
  2. Check that the value `FileSystem` is ReFs or NTFS.

- Windows Server 2008 (R2) and Windows Server 2012:
  1. Open the Windows Explorer.
  2. Select the relevant disk.
     The system displays the type of file system in use.
  4. Check that the file system is NTFS.

Checking the Windows Domain Structure
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

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

Although the installer automatically grants the rights required for the installation 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 does not have 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 relevant domain. All machines in the system must belong to the same domain. In a domain installation, the user information is stored centrally on the domain controller and is accessible to all hosts in the system.

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

⚠️ Caution
- If you install a distributed system 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 local user accounts.
- Only valid for ‘High Availability’: HA (Windows)
  In a high-availability 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 159].

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. 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.

**Related Information**

Performing a Domain Installation Without Being a Domain Administrator [page 159]

### 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 since you do not need to reinstall or reconfigure.

**Prerequisites**

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

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

⚠️ Caution

High Availability only:

- 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)

Procedure

1. Proceed as described in SAP Note 962955. Assign the required virtual host names to the instance to be installed by specifying them in the <Instance_Name> Host Name field of the <Instance_Name> Instance screen while running the installer.
   
   For more information, see the Virtual Host Name parameter description in SAP System Parameters [page 46].

2. To install a non-high-availability system, proceed as described in SAP Note 1564275.

4.6 Preparing the SAP System Transport Host

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

Context

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:
   a. Create the directory `\usr\sap\trans` on the host to be used as the transport host.
   b. 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 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 178].

4.7 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 Application Server Java of your SAP Java system to be installed. To do so, you configure the User Management Engine (UME) of the AS Java for the user management of this 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 an optional standalone unit - Advanced Adapter Engine (AAE), Advanced Adapter Engine Extended (AEX), or Process Integration and Orchestration (PI-CP) - you can skip this section because you are not prompted for UME Configuration. Optional standalone units are automatically configured during the installation to store the SAP system users in the Java database.

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 system.
If you want to install the application server Java for an SAP NetWeaver 7.5 Process Integration (PI) system or for an SAP Solution Manager 7.2 system, you must use the already installed Application Server ABAP (AS ABAP) as the data source for user data for the Application Server Java to be installed. In this case, the required users were already created during the installation of the Application Server ABAP and you are prompted to enter these users during the installation of the Application Server Java.

You can take one of the following approaches when using an external ABAP system as source for user data:

<table>
<thead>
<tr>
<th>Approach</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Each Java system uses different users</td>
<td>No interdependencies between the connected engines</td>
<td>Initially more administration to create the users in the ABAP system</td>
</tr>
</tbody>
</table>
| 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 Java EE Engines |

→ Recommendation

For security reasons, we recommend the first approach.

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

More Information

For more information about AS ABAP user management as data source, see the SAP Library at:

- **SAP NetWeaver Composition Environment 7.1**
- **SAP NetWeaver Composition Environment 7.1 including Enhancement Package 1**
- **SAP NetWeaver Composition Environment 7.2**

**SAP Release and SAP Library Quick Link**

**SAP Library Path (Continued)**

**Procedure**

- The following procedures describe the activities you have to perform in the existing ABAP system and for the Java system to be installed.
- 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.
  b. 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_ADMIN_<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.
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 guide in the Security section of the product page for your SAP product at https://help.sap.com/.

- 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.

4.8 Preparing the Installation Media

This section describes how to prepare the installation media.

Installation media are available as follows:

- The Software Provisioning Manager 1.0 archive containing the installer
  You always have to download the latest version of the Software Provisioning Manager 1.0 archive. For more information, see Downloading and Extracting the Software Provisioning Manager 1.0 Archive [page 80].

- The media containing the software to be installed. These are the following:
  - Kernel media:
    You can make them available in one of the following ways:
    - Download the specific kernel archives from the SAP Software Center - this is the recommended way.
    - Download the SAP kernel archives (SAR files) from the SAP Software Center. If you are performing an Installation Using a Stack Configuration File [page 30], you can directly download the artefacts (SAR archives) as specified in the Maintenance Plan.
    - Use the physical installation media as part of the installation package.
    - Download the complete kernel media from the SAP Software Center.
  - RDBMS and export media.
    You can make them available in one of the following ways:
    - Use the physical installation media as part of the installation package.
    - Download the complete kernel media from the SAP Software Center.

For detailed information about how to obtain these media, see Media Required for the Installation - Listed by SAP System Instance [page 77].

Media Required for the Installation - Listed by SAP System Instance [page 77]

This section provides a list of the media required for the installation, listed by SAP system instance to be installed.
4.8.1 Media Required for the Installation - Listed by SAP System Instance

This section provides a list of the media required for the installation, listed by SAP system instance to be installed.

The signature of installation media is checked automatically by the installer during the Define Parameters phase while the Media Browser screens are processed (see also Running the Installer [page 110]). The installer only accepts media whose signature has been checked. For more information, see SAP Note 2393060.

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.

Proceed as follows to make the media available:

1. Identify the required media for your installation [page 21] as listed below.

<table>
<thead>
<tr>
<th>SAP Instance Installation</th>
<th>Required Software Packages from Installation Media</th>
</tr>
</thead>
</table>
| Central services instance (SCS instance) | ○ Software Provisioning Manager 1.0 archive  
○ UC Kernel (folder K_<Version>_U_<OS>) where U means Unicode. |
| Database instance | ○ Software Provisioning Manager 1.0 archive  
○ UC Kernel (folder K_<Version>_U_<OS>) where U means Unicode.  
○ Database software  
○ Database patches (if available)  
○ **SAP Business Suite Java Applications only:** SAP Business Suite Java Content (folders JAVA_*) |
| Enqueue Replication Server | ○ Software Provisioning Manager 1.0 archive  
○ UC Kernel (folder K_<Version>_U_<OS>) where U means Unicode. |
| Primary application server instance | ○ Software Provisioning Manager 1.0 archive  
○ UC Kernel (folder K_<Version>_U_<OS>) where U means Unicode.  
○ SAP NetWeaver AS for Java Component (folders JAVA_*)  
○ **SAP Business Suite Java Applications only:** SAP Business Suite Java Content (folders JAVA_*)  
○ Database Client Software  
○ CLI Driver / JDBC Driver |
### Required Software Packages from Installation Media

**Additional application server instance**
- Software Provisioning Manager 1.0 archive
- UC Kernel (folder `K_<Version>_U_<OS>`) where `U` means Unicode.
- SAP NetWeaver AS for Java Component (folders `JAVA_*`)
- **SAP Business Suite Java Applications only:** SAP Business Suite Java Content (folders `JAVA_*`)
- Database Client Software

### SAP Host Agent (Separate Installation Only)

<table>
<thead>
<tr>
<th>SAP Instance Installation</th>
<th>Required Media</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP Host Agent (separate installation only)</td>
<td>Software provisioning manager 1.0 archive</td>
</tr>
</tbody>
</table>

### Make the installation media available on each installation host as follows:

1. Download and unpack the latest version of Software Provisioning Manager as described in [Downloading and Extracting the Software Provisioning Manager 1.0 Archive](page 80).  

2. Make the kernel media available.
   - You can do this in one of the following ways:
     - Download the dedicated kernel archives - this is the recommended way.  
       For more information, see [Downloading SAP Kernel Archives (Archive-Based Installation)](page 81).
     - Use the physical kernel medium from the installation package.
       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

If you are using a stack configuration file (see [Installation Using a Stack Configuration File](page 30)), you have the installation media defined when generating the Landscape Plan. The media link provided in the Landscape Plan guides you to the location in the SAP Software Download Center at https://launchpad.support.sap.com/#/softwarecenter where you can download the installation media required for your SAP product, operating system and database.

Using the installer, you can also directly download the artefacts (SAR archives) as specified in the Maintenance Plan. For more information, see [Downloading Software Packages for a Maintenance Planner Transaction](page 84).

### 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.
- 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.
If the user does not yet exist, you have to create the user manually before you install the SAP system.

- Download the kernel medium from the Software Download Center.
  For more information, see Downloading Complete Installation Media [page 87].

**Note**

Even if you use the complete kernel media, the installer might prompt you during the provisioning process for additional archives (*.SAR files) due to special Patch Level (PL) requirements depending on categories such as the product, operating system, and database platform at the end of this section.

For example: The installer might require a certain PL of `<X>` of the `SAPEXEDB.SAR` (for DBTYPE `<Y>`), but this PL of the `SAPEXEDB.SAR` is not contained in the SAP kernel media. In this case you have to download the required PL from [https://launchpad.support.sap.com/#/softwarecenter](https://launchpad.support.sap.com/#/softwarecenter) following the instructions in Downloading SAP Kernel Archives (Archive-Based Installation) [page 81].

**Note**

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

3. Make the RDBMS and export media 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.

**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.
- 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.
  - If the user does not yet exist, you have to create the user manually before you install the SAP system.

---

**Related Information**

- Downloading and Extracting the Software Provisioning Manager 1.0 Archive [page 80]
- Downloading SAP Kernel Archives (Archive-Based Installation) [page 81]
- Downloading Software Packages for a Maintenance Planner Transaction [page 84]
- Downloading Complete Installation Media [page 87]
4.8.1.1 Downloading and Extracting the Software Provisioning Manager 1.0 Archive

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

Procedure

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

   [https://support.sap.com/sitoolset](https://support.sap.com/sitoolset) ➤ System Provisioning ➤ Download Software Provisioning Manager

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

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

   Proceed as follows to get the latest version of SAPCAR:
   a. Go to [https://launchpad.support.sap.com/#/softwarecenter](https://launchpad.support.sap.com/#/softwarecenter) ➤ SUPPORT PACKAGES & PATCHES ➤ By Category ➤ SAP TECHNOLOGY COMPONENTS ➤ SAPCAR
   b. Select the archive file for your operating system and download it to an empty directory.
   c. To check the validity of the downloaded executable, right-click the executable and choose **Properties**. On the Digital Signatures tab you can find information about the SAP signature with which the executable was signed.
   d. Rename the executable to `sapcar.exe`.

   For more information about SAPCAR, see SAP Note [212876](https://support.sap.com/notes/212876).

3. Using the latest version of SAPCAR, you can verify the signature of the downloaded `SWPM10SP<Support_Package_Number>_<Version_Number>.SAR` archive as follows:
   a. Get the latest version of the SAPCRYPTOLIB archive to your installation host as follows:
      1. Go to [https://launchpad.support.sap.com/#/softwarecenter](https://launchpad.support.sap.com/#/softwarecenter) ➤ SUPPORT PACKAGES & PATCHES and search for " sapcryptolib ".
      2. Select the archive file for your operating system and download it to the same directory where you have put the SAPCAR executable.
      3. Use the following command to extract the SAPCRYPTOLIB archive to the same directory where you have put the SAPCAR executable:
         ```bash
         SAPCAR -xvf sapcryptolibp_84.sar -R <target directory>
         ```
      4. Download the Certificate Revocation List from [https://tcs.mysap.com/crl/crlbag.p7s](https://tcs.mysap.com/crl/crlbag.p7s) and move it to the same directory.
b. Verify the signature of the downloaded SWPM10SP<Support_Package_Number>_<Version_Number>.SAR archive by executing the following command:

```bash
<Path to SAPCAR>\sapcar.exe -tvVf<Path to Download Directory>\SWPM10SP<Support_Package_Number>_<Version_Number>.SAR -crl <file name of revocation list>
```

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

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

4.8.1.2 Downloading SAP Kernel Archives (Archive-Based Installation)

Instead of downloading the complete SAP kernel media, we recommend that you download the SAP kernel archives specifically required for your installation option. During the installation, you can either specify the path to each archive separately, or provide the path to a download basket with all downloaded archives.

```
```

4.8.1.2 Downloading SAP Kernel Archives (Archive-Based Installation)

Instead of downloading the complete SAP kernel media, we recommend that you download the SAP kernel archives specifically required for your installation option. During the installation, you can either specify the path to each archive separately, or provide the path to a download basket with all downloaded archives.

```
```

Context

The signature of installation archives is checked automatically by the installer [page 110] during the Define Parameters phase while processing the Software Package Browser screens. The installer only accepts archives whose signature has been checked. After scanning the archives and verifying the signature, an info file is written where you can find detailed information about matching and non-matching archive files. You can access this info file by choosing the info file link in the Archive Scanning Result section of the Software Package Browser screen. The info file contains only the results of the latest archive scan. For more information, see SAP Note 2393060.
Procedure

1. Download and unpack the latest version of Software Provisioning Manager as described in Downloading and Extracting the Software Provisioning Manager 1.0 Archive [page 80].

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

3. Choose the required software component, release, and technical stack:
   - If you want to install SAP S/4HANA <Release> Java, choose SAP NetWeaver and complementary products SAP NETWEAVER SAP NETWEAVER 7.5 Application Server Java
   - If you want to install SAP NetWeaver Composition Environment 7.1 or 7.2, choose SAP NetWeaver and complementary products SAP NETWEAVER CE 7.1X <Release> Entry by Component
   - If you want to install an SAP NetWeaver Java system or optional standalone unit, choose SAP NetWeaver and complementary products SAP NetWeaver <Release> [For releases lower than 7.5: Entry by Component] Application Server Java
   - If you want to install an SAP Business Suite system based on SAP NetWeaver, choose SAP Application Components <SAP CRM | SAP ERP | SAP SCM | SAP SRM> <Release> Entry by Component <Java Product Instance>

4. Choose the required package:

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

   **⚠️ Caution**
   - Make sure that you always use the highest available patch level unless special patch levels are specified for the relevant package in SAP Note 1680045.
   - Make sure that you always choose SAPEXE<Version>.SAR, SAPEXEDB<Version>.SAR of the same SAP kernel release and extension.

   **💡 Example**
   - If SAPEXE<Version>.SAR is of version 7.49, then SAPEXEDB<Version>.SAR must also be of version 7.49.
   - If SAPEXE<Version>.SAR is of version 7.45, then SAPEXEDB<Version>.SAR must also be of version 7.45.
   - If SAPEXE<Version>.SAR is of version 7.42 EXT, then SAPEXEDB<Version>.SAR must also be of version 7.42 EXT.

   - If you provide the archives in one download folder, and there is more than one version of the same archive available - for example SAPEXE<Version>.SAR - and these versions match the product-specific requirements, the installer selects one of these archive versions. If you want a specific archive version to be used, make sure that this is the only version available in the download folder.
   When running system provisioning in GUI mode, you can also check in the GUI which archive is
being used. So even if there is more than one version of the same archive available in the download folder, you can select the exact archive version you want to use and enter the exact path to the required archive file.

○ SAPEXE<Version>.SAR
  ▶ SAP KERNEL <Version> <UC> <Operating System> #DATABASE INDEPENDENT
  ○ If you want to install an SAP system based on SAP NetWeaver 7.5, you can either choose 7.45 or 7.49 UNICODE for SAP KERNEL <Version>.
  ○ If you want to install an SAP system based on SAP NetWeaver 7.4, you can choose either 7.45 or 7.42 for SAP KERNEL <Version>.
  ○ If you want to install an SAP system based on SAP NetWeaver 7.3 EHP1 or lower, choose 7.21 EXT for SAP KERNEL <Version>.

○ SAPEXEDB<Version>.SAR
  Choose the version corresponding to the SAPEXE<Version>.SAR from SAP KERNEL <Version> <UC> <Operating System> <DATABASE>

○ DBATOLLS<Version>.SAR
  ▶ SAP KERNEL <Version> <UC> <Operating System> Oracle

○ igsexec<Version>.sar
  ▶ SAP IGS <Version> <Operating System>
  ○ If you want to install an SAP system based on SAP NetWeaver 7.5, choose SAP IGS <7.45 or 7.49> # OS independent depending on your SAPEXE<Version>.SAR version.
  ○ If you want to install an SAP system based on SAP NetWeaver 7.4 and your SAPEXE<Version>.SAR is of version <7.45 or 7.49>, then choose SAP IGS <7.45 or 7.49> # OS independent depending on your SAPEXE<Version>.SAR version. Otherwise, choose SAP IGS 7.20_EXT # OS independent.
  ○ If you want to install an SAP system based on SAP NetWeaver 7.3 EHP1, choose SAP IGS 7.20_EXT # OS independent.
  ○ If you want to install an SAP system based on SAP NetWeaver 7.3 or lower and use SAP kernel 7.21_EXT, choose SAP IGS 7.20_EXT <Operating System>.
  ○ If you want to install an SAP system based on SAP NetWeaver 7.3 or lower and use SAP kernel 7.21, choose SAP IGS 7.20 <Operating System>.

○ igshelper<Version>.sar
  ○ If you want to install an SAP system based on SAP NetWeaver 7.3 EHP1 or higher, choose SAP IGS HELPER # OS independent.
  ○ If you want to install an SAP system based on SAP NetWeaver 7.3 or lower, choose SAP IGS 7.20 <Operating System>.

○ SAPJVM<Version>.SAR:
  ▶ SAP JVM <Version> <Operating System>
  ○ If you want to install an SAP system based on SAP NetWeaver 7.5 or higher, choose SAP JVM 8.1 <Select Your Operating System>.
  ○ If you want to install an SAP system based on SAP NetWeaver 7.4 or lower, choose SAP JVM 6.1 <Select Your Operating System>.
SAP HOST AGENT 7.21

→ Recommendation

It is highly recommended that you always choose the highest SP version of the SAP HOST AGENT <SP-version>.SAR archive.

Note

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

5. If you want to install an SAP system based on SAP NetWeaver 7.3 EHP1 or lower - that is you have to use SAP kernel 7.21 - download the latest patch level of SAPCRYPTOLIB <Version>.SAR from the following path:

https://launchpad.support.sap.com/#/softwarecenter
Support Packages and Patches ➤ By Category ➤ Additional Components ➤ SAPCRYPTOLIB ➤ COMMONCRYPTOLIB <Version> ➤ <Operating System>

6. If you want to install Adobe Document Services, download the unlimited version of the JCE Jurisdiction Policy Files archive. For more information about where to download it, see SAP Note 1240081 (see also SAP System Parameters [page 46]).

7. Make the RDBMS and the export media available - either by using physical media as described in Media Required for the Installation - Listed by SAP System Instance [page 77] or by downloading them as described in Downloading Complete Installation Media [page 87].

Related Information

Downloading Software Packages for a Maintenance Planner Transaction [page 84]

4.8.1.3 Downloading Software Packages for a Maintenance Planner Transaction

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

Note

This feature is only available if you perform an installation using a stack configuration file.
Prerequisites

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

Procedure

1. Specify a download directory for the artifacts (SAP archives) to be downloaded.
2. Start the installer as described in Running the Installer [page 110].
3. On the Welcome screen, choose Generic Options ➤ Download Software Packages for Maintenance Planner Transaction ➤
4. Follow the instructions on the installer screens.

The installer prompts you for the following input parameters:

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

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

- **Your S-UserID and password**
  You call Software Provisioning Manager with command line parameter SAPINST_STACKXML=<Absolute_Path_To_Stack_XML_File> to get the Maintenance Planner Transaction ID extracted from the stack configuration file.
  You must perform this option directly after creating the Maintenance Planner Transaction, because the contained download links usually expire soon.
  Ensure the following for your S-User:
  1. You have download permissions for all artifacts on https://launchpad.support.sap.com/#/softwarecenter to be able to download them.
  2. Consider the SAP Support Portal and the SAP ONE Support Launchpad password policies. Your password must be the same for both of them. If the passwords are not the same, you will lock the S-User in the SAP Support Portal. The password must meet all of the following requirements:
     - Must be exactly eight characters long
     - Contains at least one upper-case letter (A-Z)
     - Contains at least one lower-case letter (a-z)
Contains at least one decimal digit (0-9)
Contains at least one of the following special characters: ! @ $ % / ( [ ] ) + - * = ? ' ~ # _ . , ; : < >
Must not start with ? or !
Must not contain any blanks
Must not begin with three identical characters
Must be different from the last five passwords you have already used
Only one password change is allowed per day
Location of download folder for the installation software packages to be downloaded
If you have a proxy configured in your network, provide the proxy host and port.
5. You get a list of all downloadable artifacts (SAP archives) as specified in the stack configuration file along with their file size.
You can still deselect downloadable artifacts (SAP archives) that you do not need to be downloaded.
6. Choose Next to start the download.
   If you get a download error, this is the result of an unsuccessful network connection. Check your network connection and proxy configuration. If the download of some artifacts finishes without any error, but still with a status other than OK, you must do one of the following:
   ○ Create an up-to-date Maintenance Plan and perform again the download of the files which were not downloaded successfully. In case of an error, the installer skips the download of the artifact (SAR archive) in question and continue with the next one in the list.
   ○ Download the still missing files directly from the SAP Software Center at https://launchpad.support.sap.com/#/softwarecenter.

Results

You have downloaded the artifacts (SAP archives) required for your SAP system installation with Software Provisioning Manager (the installer) - corresponding to the archives listed in section Downloading SAP Kernel Archives (Archive-Based Installation) [page 81] - and for applying the required kernel and support packages using Software Update Manager (SUM) after the installation has completed.

SAP BW/4HANA 1.0 SR1 only: RDBMS and export media are not covered by this feature. You have to provide them either as physical media or download them from the SAP Software Center as described in Downloading Complete Installation Media [page 87].
4.8.1.4 Downloading Complete Installation Media

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

Procedure

1. Download and unpack the latest version of Software Provisioning Manager as described in Downloading and Extracting the Software Provisioning Manager 1.0 Archive [page 80].
2. Create a download directory on the host where you want to run the installer.
3. You identify the required media as listed in Media Required for the Installation - Listed by SAP System Instance [page 77].
4. Identify all download objects that belong to one medium according to one of the following:

   - Download path or location:
     - To download the complete kernel media, go to https://support.sap.com/sitoolset ➤ Software Provisioning Manager 1.0 SP<Current Version> ➤ Download Kernel releases delivered for SL Toolset ➤ SL TOOLSET 1.0 (INSTALLATIONS AND UPGRADES) ➤ KERNEL FOR INSTALLATION/SWPM ➤.
     - To download all media required for your SAP product, you can use one of the following navigation paths:
       - https://launchpad.support.sap.com/#/softwarecenter ➤ INSTALLATIONS & UPGRADES ➤ By Category ➤ SAP NETWEAVER AND COMPLEMENTARY PRODUCTS ➤<Product> ➤<Product Release> ➤
     - 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
     - ...

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

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

⚠️ Caution

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

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

5.1 Installation Checklist

This section includes the installation steps for the following:

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

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

**Standard System**

1. You install the Oracle database software.

   **Note**
   
   This step is not required if you install a system into an existing database (MCOD) [page 165].

   **Note**
   
   If your database release is Oracle 12c and you want to install it as a container database (CDB) or as a pluggable database PDB in an existing CDB (multitenant database installation), perform the additional steps as described in Oracle Database 12c Multitenant Database Installation [page 168].

2. If required, you set up multiple Oracle Homes [page 106] on the host where you install the SAP system.

   **Note**
   
   This step is not required if you install a system into an existing database (MCOD) [page 165].

3. You check the prerequisites [page 109] and run the installer [page 110] to install the SAP system.
Note
In a standard system, all mandatory instances are installed on one host in one installation run.

Note
If your database release is Oracle 12c and you want to install it as a container database (CDB) or as a pluggable database PDB in an existing CDB (multitenant database installation), perform the additional steps as described in Oracle Database 12c Multitenant Database Installation [page 168].

4. You continue with Post-Installation [page 125].

Distributed System

⚠️ Caution
If your system to be installed is based on SAP NetWeaver CE 7.2, SAP NetWeaver 7.3, or SAP NetWeaver 7.3 EHP1, and is to be installed with Oracle 12c, follow the instructions in SAP Note 2396282.

1. On the database instance host, you install the Oracle database software [page 91].

   Note
   This step is not required if you install a system into an existing database (MCOD) [page 165].

   Note
   If your database release is Oracle 12c and you want to install it as a container database (CDB) or as a pluggable database PDB in an existing CDB (multitenant database installation), perform the additional steps as described in Oracle Database 12c Multitenant Database Installation [page 168].

2. If required, on the database instance host, you set up multiple Oracle Homes [page 106].

   Note
   This step is not required if you install a system into an existing database (MCOD) [page 165].

3. On the SCS instance host, you check the prerequisites [page 109] and run the installer [page 110] to install the central services instance.

   Note
   If you want to install an SCS instance with integrated SAP Web Dispatcher [page 25], you must choose the Custom parameter mode.

   When processing the screens for the SCS instance installation, you are prompted to mark the corresponding checkbox on the screen Additional Components to be Included in the SCS Instance.

   If you mark the checkbox for SAP Web Dispatcher, you are prompted for the additional parameters required for the SAP Web Dispatcher installation on the subsequent screens.

4. On the database instance host, you check the prerequisites [page 109] and run the installer [page 110] to install the database instance.
5. On the primary application server instance host, you check the prerequisites [page 109] and run the installer [page 110] to install the primary application server instance.

6. If required, you install I to \(<N>\) additional application server instances on the respective hosts, as described later in this section.

7. You continue with Post-Installation [page 125].

Only valid for ‘High Availability’: HA (Windows)

**High-Availability System**

1. To install a high-availability system with Microsoft Failover Clustering, you perform the HA-specific installation steps [page 191].

2. You continue with Post-Installation [page 125].

End of ‘High Availability’: HA (Windows)

**Additional Application Server Instance**

You perform the following steps on each host where you install the additional application server instances.

1. You check the prerequisites [page 109] and run the installer [page 110] to install the additional application server instances.

   Only valid for ‘High Availability’: HA (Windows)

   △ Caution

   In a high-availability system, you must install at least one additional application server instance.

   End of ‘High Availability’: HA (Windows)

   🔄 Note

   If your database release is Oracle 12c, during the installation you need to specify how the application server instance is to connect to a pluggable database or a “normal” database. For more information, see Installing a Distributed Application Server Instance [page 170].

2. You continue with Post-Installation [page 125].

**5.2 Installing the Oracle Database Software**

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

Installing the Oracle 18 Database Software [page 92]

You must install the Oracle 18 database software before you start installing the instances of the SAP system.
Installing the Oracle 12c Database Software [page 95]
This section describes the installation of the Oracle 12c server software and patches.

Installing the Oracle 11g Database Software [page 100]
This section describes the installation of the Oracle 11g server software and patches.

Using PowerShell [page 103]
SAP uses Windows PowerShell to run and describe Windows commands.

5.2.1 Installing the Oracle 18 Database Software

You must install the Oracle 18 database software before you start installing the instances of the SAP system.

1. Installing the New Oracle Database Server Software [page 92]
Proceed as described in this section to install the new Oracle database software.

2. Installing Required Patches [page 94]
After the database software installation, you need to install all required Oracle database patches, which on Windows include one patch collection and one or more additional (generic) patch.

5.2.1.1 Installing the New Oracle Database Server Software

Proceed as described in this section to install the new Oracle database software.

Prerequisites

- Only valid for 'High Availability': HA (Windows)
  High Availability only: You have to install the Oracle database server software on all failover cluster nodes.
  End of 'High Availability': HA (Windows)

- Create an Oracle installation user using a dedicated Windows administrator account.
  On Windows, the user installing the Oracle software must have a Windows administrator account. This user is similar to the Oracle software owner in UNIX environments.

  → Recommendation
  We recommend that you do not use the SAP administrator \<DOMAIN>\<sapsid>adm as the Oracle installation user.

  For MSCS or domains, create this user as a domain user that is a member of the local administrator group. For more information, see SAP Note 1915302.
To create a local Oracle installation user called Oracle, you enter the following commands:

```
net user /add Oracle Welcome1 /fullname:"Oracle Installation User" /comment: 
"Administrator for Oracle Software Installation and Patching"
```

```
network localgroup administrators Oracle /add
```

- Starting with Oracle Database 18c, the Oracle Database software is available as an image file (zip file). In order to extract the Oracle home image file with the built-in Windows Powershell capability, you must have Powershell 5.0 or higher installed on your system.
- If you do not meet this requirement to extract the Oracle home image file (for example: winzip, winrar, unzip,...), you receive the warning WARNING: Powershell version is too old. In this case you should upgrade your Windows Powershell to a higher version.
- If you cannot upgrade Powershell, you can manually extract the Oracle home image file as described in SAP Note 2660018.

**Context**

For more information about identifying and installing the correct Oracle database software version, see SAP Note 266020.

For information about the installation of Oracle Database 18c software on Windows, see SAP Note 2660018.

**Procedure**

1. Log on as Administrator or Oracle installation user, such as oracle.
   For more information on the Oracle users, see SAP Note 1915302.
   Oracle Database 12c and higher supports the use of an Oracle home user such as oraclehome01 which must be specified at installation time.
   A Windows local user as Oracle home user can be created during the Oracle software installation. A Windows domain user as Oracle home user must exist before starting the Oracle software installation.
   **MSCS or domain installation only**: The Oracle home user must be a domain user that you have to create before starting the software installation.
2. On the database server, make the Oracle RDBMS Software medium available, and change to the directory:
   `<media>`\WINDOWS_X86_64\db_home\SAP\`
3. Installing a new Oracle home start the **Oracle Universal Installer** (OUI) with the PowerShell script.
   To install the new Oracle home in one step (extract and register), run the following command: **PS>** . \saserver.ps1 [options]. This command will extract the Oracle home image file into the new Oracle home and then register the new Oracle home.
4. After the installation of the Oracle database software you must install the current Bundle Patch. The bundle patch contains important functional fixes and security fixes. For more information which patches are available, see SAP Note 2660020.
Task overview: Installing the Oracle 18 Database Software [page 92]

Next task: Installing Required Patches [page 94]

5.2.1.2 Installing Required Patches

After the database software installation, you need to install all required Oracle database patches, which on Windows include one patch collection and one or more additional (generic) patch.

Prerequisites

1. Changing the Oracle Home
   - With OPatch, you install the Bundle Patch into the Oracle Home. This updates the Oracle home software to the new Bundle Patch
   - You must perform this step before (!) you create or upgrade the database.
2. Changing the Database
   - The database must be adapted to the new Bundle Patch by performing certain post-installation tasks and by adapting database parameters.
   - The step must be done after the database has been upgraded. For detailed instructions see SBP README file.

Patches for Oracle

<table>
<thead>
<tr>
<th>Patches for Oracle Database (SI/FS, Windows)</th>
<th>SAP Note 2660044</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patches for Oracle Grid Infrastructure (RAC, ASM)</td>
<td>SAP Note 2660046</td>
</tr>
<tr>
<td>Patches for Oracle Exadata / SuperCluster</td>
<td>SAP Note 2660052</td>
</tr>
<tr>
<td>Patches for Oracle Database Appliance (ODA)</td>
<td>SAP Note 2660053</td>
</tr>
<tr>
<td>Patches for Oracle Exadata Cloud Service</td>
<td>SAP Note 2660062</td>
</tr>
</tbody>
</table>

You must install a Bundle Patch in your Oracle database to ensure that the database is working properly. From a security and functional perspective you should always install the latest Bundle Patch (best practice) which contains the most current security fixes for the Oracle database and functional patches for an SAP Oracle database. Generic Oracle database patches must be installed in addition to the Bundle patch.
**Procedure**

1. Download the required patches.
2. Log on the Oracle installation user.
3. To install the bundle patch with OPatch follow the instructions of the Bundle Patch README.
4. To install the generic patch(es) with OPatch follow the instructions in SAP Note 2660044.
5. **Note:** You do not need to stop any Oracle services, databases or listeners. The patches are installed in `<New_Oracle_Home>` from which no database instance is currently running.

**Task overview:** Installing the Oracle 18 Database Software [page 92]

**Previous task:** Installing the New Oracle Database Server Software [page 92]

### 5.2.2 Installing the Oracle 12c Database Software

This section describes the installation of the Oracle 12c server software and patches.

**Procedure**

1. You install the Oracle 12c database server software [page 95].
2. You install required patches [page 99].

### 5.2.2.1 Installing the Oracle Database 12c Server Software

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

**Prerequisites**

- **Caution**
  
  If you copy the files from the RDBMS medium to a local disk, do **not** use directory names containing blanks.

- You need 5-10 GB disk space for the Oracle server software.
- Make sure that you have enough space for the Oracle inventory and that you have full access to the directories (inventory, installation location, temp directory). Otherwise, the Oracle Universal Installer cannot perform installation prerequisite checks.
High Availability only: You have to install the Oracle database server software on all failover cluster nodes.

End of 'High Availability': HA (Windows)

Create an Oracle installation user using a dedicated Windows administrator account.
On Windows, the user installing the Oracle software must have a Windows administrator account. This user is similar to the Oracle software owner in UNIX environments.

→ Recommendation

We recommend that you do not use the SAP administrator `<DOMAIN><sapsid>adm` as the Oracle installation user.

For MSCS or domains, create this user as a domain user that is a member of the local administrator group.
For more information, see SAP Note 1915302.

Example

To create a local Oracle installation user called `Oracle`, you enter the following commands:

```plaintext
net user /add Oracle Welcome1 /fullname:"Oracle Installation User" /comment:"Administrator for Oracle Software Installation and Patching"
net localgroup administrators Oracle /add
```

Context

For more information about identifying and installing the correct Oracle database software version, see SAP Note 2470660.

For information about the installation of Oracle Database 12c software on Windows, see SAP Note 1915302.

Procedure

1. Log on as Administrator or Oracle installation user, such as `oracle`.
   For more information on the Oracle users, see SAP Note 1915302.
   Oracle Database 12c supports the use of an Oracle home user such as `oraclehome01`, which must be specified at installation time. A Windows local user as Oracle home user can be created during the Oracle software installation. A Windows domain user as Oracle home user must exist before starting the Oracle software installation.

   MSCS or domain installation only: The Oracle home user must be a domain user that you have to create before starting the software installation.

2. On the database server, make the Oracle RDBMS medium available, and change to the directory:
   `<Media_DRIVE>:<OS>:database\SAP`

3. Start the `Oracle Universal Installer` (OUI) with the PowerShell script `sapserver.ps1`. 

Installation of SAP Systems Based on the Application Server Java of SAP NetWeaver 7.1 to 7.5 on Windows: Oracle Installation
i Note
○ We recommend to use the PowerShell script `sapserver.ps1`, which you can also use with UNC paths to start the OUI. To run the script, right-click and select `Run with Powershell`. When running the script the first time, confirm that you want to change the execution policy. For more information about PowerShell, see Using PowerShell [page 103].

When the Powershell command window appears, respond to the prompts of the script. For a Windows domain user, enter `<Domain>\<Oracle_Home_User>`. For a Windows local user, you only need to enter the name of the local `<Oracle_Home_User>`. For more information, see SAP Note 1915302.

4. In the Oracle Universal Installer, enter the information as shown in the following table:

<table>
<thead>
<tr>
<th>Window</th>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Configure Security Updates</strong></td>
<td>Do not select the check box <em>I wish to receive security updates via My Oracle Support</em>.</td>
</tr>
<tr>
<td></td>
<td>Choose <em>Next</em>.</td>
</tr>
<tr>
<td></td>
<td>The installer issues a warning.</td>
</tr>
<tr>
<td></td>
<td>Choose <em>Yes</em>.</td>
</tr>
<tr>
<td><strong>Installation Option</strong></td>
<td>Confirm the default selection <em>Install database software only</em> and then choose <em>Next</em>.</td>
</tr>
<tr>
<td><strong>Database Installation Options</strong></td>
<td>Confirm the default selection <em>Single instance database installation</em> and then choose <em>Next</em>.</td>
</tr>
<tr>
<td><strong>Database Edition</strong></td>
<td>Confirm the default option <em>Enterprise Edition</em> and then choose <em>Next</em>.</td>
</tr>
<tr>
<td><strong>Oracle Home User Selection</strong></td>
<td>Select <em>Create New Windows User</em> and enter the <em>User Name</em> and <em>Password</em>, or if you want to use an existing user, choose <em>Use existing Windows User</em>. Then choose <em>Next</em>.</td>
</tr>
</tbody>
</table>

i Note
As of 12c, you can specify an Oracle home user when you install a new Oracle home. For enhanced security, Oracle recommends that you use an Oracle home user (instead of Windows built-in account ‘local system’).

MSCS or domain installation only: select *Use existing Windows User* and enter the Oracle home user `<Domain>\<Oracle_Home_User>` that you created before starting the software installation.

For more information, see SAP Note 1915302.
Set these fields as follows, depending on whether you have a standard Windows account (recommended) or a Windows built-in account, and then choose Next:

- **Standard Windows account (recommended)**
  - **Software location** (that is, Oracle home): `<Drive>:\oracle\<DBSID>\<Release>`
  - **Oracle base**: `<Drive>:\oracle\<DBSID>`

  **Example**
  - **Software location** (that is, Oracle home): D:\oracle\OQ1\12201
  - **Oracle base**: D:\oracle\OQ1

- **Windows built-in account**
  - **Oracle home**: `<Drive>:\oracle\<DBSID>\<Release>`
  - **Oracle base**: `<Drive>:\oracle`

  **Example**
  - **Oracle home**: D:\oracle\OQ1\12201
  - **Oracle base**: D:\oracle

For more information, see SAP Note 1915302.

### Prerequisite Checks
This window checks if all the required system prerequisites for the installation of the database software have been met. If some of the checks are displayed as Failed, you can fix these problems and run the check again by choosing Check Again.

**→ Recommendation**
We strongly recommend that you make sure there are no failed checks before starting the software installation.

### Summary
Review the information displayed in this window and choose Finish or Install.

### Install Product
This window shows the progress of the installation.
You can monitor the installation progress details in an additional window.

### Close
After the installation has finished successfully, choose Close to close the Oracle Universal Installer.

5. Install the **required Oracle patches [page 99]** (if available). for this database release. (if available). For more information, see SAP Note 1915316.
5.2.2.2 Installing Required Patches

After the database software installation, you need to install all required Oracle database patches, which on Windows include one patch collection and one or more additional (generic) patch.

Prerequisites

Use an up-to-date version of OPatch to install the patches. Check SAP Note 839182 for instructions on how to use OPatch.

Context

Check SAP Note 2470660 and SAP Note 2507228 for the corresponding Oracle database patches to be installed.

You can download the patches from:

http://support.sap.com/software/databases.html

Procedure

1. Log on the Oracle installation user.
2. Install all the recommended patches into the <New_Oracle_Home>. For more information, see SAP Note 2507228. For the upgrade scripts patch, see SAP Note 2477382.
3. Note: You do not need to stop any Oracle services, databases or listeners. The patches are installed in <New_Oracle_Home> from which no database instance is currently running.
5.2.3  Installing the Oracle 11g Database Software

This section describes the installation of the Oracle 11g server software and patches.

Procedure

1. You install the Oracle 11g database server software [page 100].
2. You install the required patches [page 102].

5.2.3.1  Installing the Oracle 11g Server Software

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

Prerequisites

⚠️  Caution
If you copy the files from the RDBMS medium to a local disk, do not use directory names containing blanks.

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

High Availability only: You have to install the Oracle database server software on all failover cluster nodes.

End of 'High Availability': HA (Windows)

Context

As of Oracle 11.2.0.2, Oracle database patch sets are full installations of the Oracle database software. Patch sets now replace existing installations. For more information about identifying and installing the correct Oracle database software version, see SAP Note 1431799.

Procedure

1. On the database server, make the Oracle RDBMS medium available, and change to the directory:

   `<media_DRIVE>:\database\SAP\`
2. Start the **Oracle Universal Installer** (OUI) with the PowerShell or by double-clicking the file `sapserver.cmd`.

**Note**
- You cannot directly invoke `sapserver.cmd`, if you use UNC paths (`\\<Host_Name>\<Share>\sapserver.cmd`). Instead, you must map a drive letter to the shared directory and start `sapserver.cmd` via the drive letter.
- You can also use the PowerShell script `sapserver.ps1`, which you can also use with UNC paths to start the OUI. To run the script, do not double-click on it, since this by default in the Windows explorer opens the *edit mode*. Instead, open PowerShell in elevated mode and run: `<Path_To_Media_DRIVE>\database\SAP\sapserver.ps1`. For more information about PowerShell, see Using PowerShell [page 103].
- For support reasons, do **not** use the `setup.exe` file in the directory `<media_DRIVE>\database\`. Using `sapserver.cmd` or `sapserver.ps1` guarantees a unique setup of the `ORACLE_HOME` that is common to SAP systems.
- Windows Server 2008 (R2) and Windows Server 2012 (R2) with activated UAC: If you have drive letters that were created in unelevated mode, you cannot access them in elevated mode. Therefore, if you want to double-click `sapserver.cmd`, you have to copy the Oracle RDBMS medium to a local disk. If you want to invoke `sapserver.cmd` from within a command prompt or PowerShell window, you have to elevate (run as administrator) the command prompt or PowerShell window before you create the network drive. Note that there is no UAC in Server Core for Windows Server 2012 (R2).

If a command prompt window appears, specify the drive letter of the local disk where you want to install the Oracle software, and the `<DBSID>`. The command prompt window only appears if you perform a new installation (under a different user), or if the `ORACLE_HOME` and `<DBSID>` are not set.

3. In the **Oracle Universal Installer**, enter the information as shown in the following table:

<table>
<thead>
<tr>
<th>Window</th>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Configure Security Updates</strong></td>
<td>Do <strong>not</strong> select the check box. Choose <strong>Next</strong>. The installer issues a warning. Choose <strong>Yes</strong> and then <strong>Next</strong>.</td>
</tr>
<tr>
<td><strong>Select Installation Option</strong></td>
<td>Confirm the default selection <em>Install database software only</em> and then choose <strong>Next</strong>.</td>
</tr>
<tr>
<td><strong>Grid Installation Options</strong></td>
<td>Confirm the default selection <em>Single instance database installation</em> and then choose <strong>Next</strong>.</td>
</tr>
<tr>
<td><strong>Select Product Languages</strong></td>
<td>Confirm the default option <em>English</em> and then choose <strong>Next</strong>.</td>
</tr>
<tr>
<td><strong>Select Database Edition</strong></td>
<td>Confirm the default option <em>Enterprise Edition</em> and then choose <strong>Next</strong>.</td>
</tr>
</tbody>
</table>
Specify Installation Location

This window displays the value for ORACLE_BASE, which must be set in the environment to `<drive_containing_oracle_home>:\oracle`.

It also displays the value for ORACLE_HOME, which is `\oracle\<DBSID>\1120<x>` (where `1120<x>` is the Oracle version number, for example, `11203` for Oracle 11.2.0.3, `11204` for Oracle 11.2.0.4, and so on).

Select this option and then Next.

Perform Prerequisite Checks

This window checks if all the required system prerequisites for the installation of the database software have been met. If some of the checks are displayed as Failed, you can fix these problems and run the check again by choosing Check Again.

→ Recommendation

We strongly recommend you to make sure that there are no failed checks before starting the software installation.

Summary

Review the information displayed in this window and choose Finish.

Install Product

This window shows the progress of the installation.

Finish

After the installation has finished successfully, choose Finish and close the Oracle Universal Installer.

4. Install the required Oracle patches [page 102] (if available). For more information, refer to SAP Note 1503709.

Only valid for ‘High Availability’- HA (Windows)

i Note

High Availability only: You have to install the Oracle patches (if available) on all failover cluster nodes.

End of ‘High Availability’- HA (Windows)

5.2.3.2 Installing Required Patches

After the database software installation, you need to install all required Oracle database patches, which on Windows include one patch collections and one or more additional (generic) patches.

Prerequisites

Use an up-to-date version of OPatch to install the patches. Check SAP Note 839182 for instructions on how to use OPatch.
Context

Check SAP Note 1631931 for Oracle 11.2.0.3 and SAP Note 1949250 for Oracle 11.2.0.4 for the patches to be installed.

You can download the patches from:

http://support.sap.com/software/databases.html

Procedure

1. Log on as administrator.
2. Install the patches, following the instructions in the relevant README file.

   Note

   ○ The patch collection README file uses the term “bundle patch” instead of “patch collection”.
   ○ Only valid for ‘High Availability’: HA (Windows)

   High Availability only: You have to install the patches on all cluster nodes.

5.2.4 Using PowerShell

SAP uses Windows PowerShell to run and describe Windows commands.

For Windows Server 2012 (R2) and higher, 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:


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

- Windows Server 2016
  - Windows Server 2016 contains PowerShell 5.0
    - You can update to PowerShell 5.0 (search the internet for Windows Management Framework 5.0).
- Windows Server 2012 R2
  - Windows Server 2012 R2 contains PowerShell 4.0.
- Windows Server 2012
    - 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](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.

**How to Start PowerShell**

⚠️ Caution

Make sure that you start the PowerShell in administrator mode.

- Windows Server 2012 (R2) and higher
  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 PowerShell 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) and
higher:

<table>
<thead>
<tr>
<th>Command</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>stop-service sap*</td>
<td>Stops all Windows services with service name starting with “SAP”</td>
</tr>
<tr>
<td>stop-service oracle*</td>
<td>Stops all Windows services with service name starting with “Oracle”</td>
</tr>
<tr>
<td>get-process</td>
<td>Lists currently started processes on your system</td>
</tr>
<tr>
<td>get-process</td>
<td>sort starttime</td>
</tr>
</tbody>
</table>
### Command

<table>
<thead>
<tr>
<th>Command</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>`get-process</td>
<td>sort starttime</td>
</tr>
<tr>
<td>`get-process</td>
<td>sort starttime</td>
</tr>
<tr>
<td>`get-process</td>
<td>%{$<em>.name;&quot;-----------&quot;;$</em>.modules}`</td>
</tr>
<tr>
<td>`$processes = (get-process</td>
<td>sort starttime)`</td>
</tr>
<tr>
<td><code>$processes.length</code></td>
<td>The number of processes in the array (is equivalent to the number of processes on your computer)</td>
</tr>
<tr>
<td><code>$processes[$processes.length-1].kill()</code></td>
<td>Invokes the kill method (terminate process) of the last started process</td>
</tr>
<tr>
<td><code>(dir a.txt).set_attributes(&quot;readonly&quot;)</code></td>
<td>Sets the file <code>a.txt</code> to &quot;read-only&quot;</td>
</tr>
</tbody>
</table>

### 5.3 Setting Up Multiple Oracle Homes

This section only applies if you want to use multiple Oracle Homes. For more information, see Multiple Oracle Homes [page 64].

**i Note**

This step is not required if you install a system into an existing database (MCOD) [page 165].

**i Note**

Windows Server 2008 (R2) and higher:

Multiple Oracle Homes are not supported in a Microsoft failover cluster.

### Procedure

1. Remove all parts referring to `<Oracle_home>`\bin from the system environment variable PATH:
   a. Start the Oracle Universal Installer as follows:
      - Windows Server 2012 (R2):
        Start a PowerShell in elevated mode, and enter the following command:
        `<Oracle_home>\oui\bin\setup.exe`
Windows Server 2008 (R2):
Choose Start > All Programs > Oracle - <Home_Name> > Oracle Installation Products > Universal Installer.

b. On the Welcome screen, choose Installed Products.
c. On the Inventory screen, choose the Environment tab.
d. Deselect all components and choose Apply.

2. Update or create, if not available, the user environment variable `PATH` of the user who performs the installation of the SAP system (at least the `sap<sapsid>adm` user).

### Note
You also have to modify the user environment variable `PATH` for all other users using the Oracle software. You can only change the environment variable, if the user already exists. Otherwise, you have to do this after you have installed at least one instance of the SAP system with the installer.

Perform the following steps:

- Windows Server 2012 (R2):
  1. Retrieve the current environment variable in PowerShell with the following command:
     ```powershell```
        `[environment]::GetEnvironmentVariable("PATH","user")`
     ```powershell```
   
     ⚠ Example
     You get, for example, the following result:
     ```powershell```
     c:\tools
     ```powershell```
  2. Append this path to the current Oracle path in PowerShell by entering the following command in a single line:
     ```powershell```
     `[environment]::SetEnvironmentVariable("PATH","<old_environment_variable_value>;<oracle_home>\bin","user")`
     ```powershell```
   
     ⚠ Caution
     Make sure that there is no space before or after the ";" (colon).

   ⚠ Example
     If the environment variable is `c:\tools` and the Oracle_home is `c:\oracle\X11\112`, you have to enter the following command in PowerShell:
     ```powershell```
     `[environment]::SetEnvironmentVariable("PATH","c:\tools;c:\oracle\X11\112\bin","user")`
     ```powershell```

- Windows Server 2008 (R2):
  2. Under User variable for <user>, modify or create, if not available, the value `PATH` to include the `<Oracle_home>\bin`, which you want to use for the installation.
5.4 Specifying the Initial Data Source of the User Management Engine

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

Prerequisites

You have planned how you want to configure user and access management for your SAP system to be installed as described in Planning User and Access Management [page 43].

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 46]).

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 143].

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 73].
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 46]).
3. After the installation has finished, you can no longer change this configuration of the UME. For more information, see Configuring User Management [page 143].

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 143].
5.5 Prerequisites for Running the Installer

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

- For the SL Common GUI, make sure that the following web browser requirements are met:
  - You have one of the following supported browsers on the device where you want to run the SL Common GUI:
    - Google Chrome (recommended)
    - Mozilla Firefox
    - Microsoft Edge
    - Microsoft Internet Explorer 11 or higher.
  - Always use the latest version of these web browsers.
  - If you copy the SL Common GUI URL manually in the browser window, make sure that you open a new Web browser window in private browsing mode (Internet Explorer), incognito mode (Chrome) or private browsing mode (Firefox). This is to prevent Web browser plugins and settings from interfering with the SL Common GUI.

⚠️ Caution

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

For more information about the SL Common GUI, see Useful Information about the Installer.

- If you want to enable Internet Protocol Version 6 (IPv6), make sure that you set SAP_IPV6_ACTIVE=1 in the environment of the user with the required authorization to run the installer. While running the installer, this setting is then also added to the environment of the <sapsid>adm user.

ℹ️ Note

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

- You need at least 300 MB of free space in the installation directory for each installation option. In addition, you need 300 MB free space for the installer executables. The installer creates an installation directory sapinst_instdir, where it keeps its log files, and which is located directly in the %ProgramFiles% directory. For more information, see Useful Information About the Installer.

- Make sure that you have defined the most important SAP system parameters as described in Basic Installation Parameters before you start the installation.

- Check that your installation host meets the requirements for the installation options that you want to install.

For more information, see Running the Prerequisite Checker.

- If you are installing a second or subsequent SAP system in an existing database (MCOD), make sure that the database is up and running before starting the installation. Check that the SYSTEM tablespace contains at least 400 MB of free space. If there is not enough space left, increase the size of this tablespace with BRSPACE or BRTOOLS.
For more information, see Installation of Multiple Components in One Database [page 165].

- If you want to install an additional application server instance in 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_J20_wsi6408_12 to <Drive>:\usr\sap\S14\SYS\profile\S14_J20_wsi6408.12.

- Make sure that the following ports are not used by other processes:
  - Port 4237 is used by default as HTTPS port for communication between the installer and the SL Common GUI. If this port cannot be used, you can assign a free port number by executing sapinst.exe with the following command line parameter:
    SAPINST_HTTPS_PORT=<Free Port Number>
  - Port 4239 is used by default for displaying the feedback evaluation form at the end of the 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=<Free Port Number>

- If you want to perform the installation in unattended mode, see SAP Note 2230669 which describes an improved procedure using inifile.params.

5.6 Running the Installer

This section describes how to run the installer.

Prerequisites

For more information, see Prerequisites for Running the Installer [page 109].

Context

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

This procedure describes an installation where you run the installer and use the SL Common GUI, that is you can control the processing of the installer from a browser running on any device.
For more information about the SL Common GUI, see Useful Information About the Installer [page 116].

**Procedure**

1. Log on to the installation host using an account with the required user authorization to run the Installer [page 70].

   ![Caution](image)

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

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

2. Make the installation media available.

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

   For more information, see Preparing the Installation Media [page 76].

   ![Note](image)

   Even if you use the complete SAP kernel media, the installer might prompt you during the provisioning process for additional archives (*.SAR files) due to special Patch Level (PL) requirements depending on categories such as the product, operating system, and database platform.

   For example: The installer might require a certain PL of `<X>` of the `SAPEXEDB.SAR` (for `DBTYPE <Y>`), but this PL of the `SAPEXEDB.SAR` is not contained in the SAP kernel media. In this case you must download the required PL from [https://launchpad.support.sap.com/#/softwarecenter](https://launchpad.support.sap.com/#/softwarecenter) following the instructions given in Downloading SAP Kernel Archives (Archive-Based Installation) [page 81].

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

   `sapinst.exe` (in a command prompt)

   `.\sapinst.exe` (in PowerShell)

   ![Note](image)

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

   `sapinst.exe SAPINST_STACK_XML=<Absolute_Path_To_Stack_XML_File>` (in a command prompt)

   `.\sapinst.exe SAPINST_STACK_XML=<Absolute_Path_To_Stack_XML_File>` (in PowerShell)
By default, the SL Common GUI uses the default browser defined for the host where you run the installer. However, you can also specify another supported web browser available on the host where you start the installer. You can do this by starting the sapinst executable with command line option 
\texttt{SAPINST\_BROWSER=<Path to Browser Executable>}, for example \texttt{SAPINST\_BROWSER=firefox.exe}.

\begin{itemize}
\item \textbf{Note}
\end{itemize}

If you need to assign a virtual host name to the instance to be installed and you do not want to assign it by entering it as a parameter using the installer screens (see \textit{SAP System Parameters} [page 46]), you can alternatively assign it as follows:

1. Open a command prompt or \textit{PowerShell} window in elevated mode and change to the directory to which you unpacked the Software Provisioning Manager archive.
2. Start the installer with the following command:
   \texttt{\textit{sapinst.exe SAPINST\_USE\_HOSTNAME=<Virtual\_Host\_Name>}} (in a command prompt)
   \texttt{.\textit{/sapinst.exe SAPINST\_USE\_HOSTNAME=<Virtual\_Host\_Name>}} (in \textit{PowerShell})

For more information, see \textit{Using Virtual Host Names} [page 71].

4. The installer is starting up.

The installer now starts and waits for the connection with the SL Common GUI. If you have a supported web browser (see \textit{Prerequisites for Running the Installer} [page 109]) installed on the host where you run the installer, the SL Common GUI starts automatically by displaying the \textit{Welcome} screen.

If the SL Common GUI does not open automatically, you can find the URL you require to access the SL Common GUI at the bottom of the \textit{Program Starter} window of the installer. You find the icon of the \textit{Program Starter} window in the taskbar of your Windows host. Open a supported web browser and run the URL from there.

\begin{itemize}
\item 
\end{itemize}

Open your browser and paste the following URL address to access the GUI
\begin{verbatim}
https://[<hostname>]:4237/sapinst/docs/index.html
\end{verbatim}
Logon users: [<users>]  
************************************************************************
...
Proceed as follows to avoid security risks such as a man-in-the-middle attack:

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

1. Go to the sapinst.exe.xxxxx.xxxxx directory in the temporary directory to which the installer has extracted itself:
   %userprofile%\sapinst\%
2. In the sapinst.exe.xxxxx.xxxxx directory, execute the sapgenpse tool with the command line option get_my_name -p.
   As a result, you get the server fingerprint or thumbprint from the server certificate.
3. Accept the warning to inform your browser that it can trust this site, even if the certificate could not be verified.

5. On the Welcome screen, choose the required option:
   ○ Perform preparations
     Go to <Generic Options> <Database> <Preparations> and choose the required task.
     To install SAP Host Agent separately, choose <Generic Options> <Database> <Preparations> SAP Host Agent.
   ○ Install an SAP system or an optional standalone unit (Advanced Adapter Engine, Advanced Adapter Engine Extended, or Process Orchestration):
     ○ To install an SAP system based on SAP NetWeaver AS Java from scratch, choose <Product> <Database> Installation <Application Server Java> <System Variant>.
     ○ To install the application server Java for an SAP Process Integration system based on SAP NetWeaver 7.5 from scratch, choose SAP NetWeaver 7.5 <Database> Installation Application Server Java for SAP Process Integration <System Variant>.
     ○ To install the application server Java for an SAP Solution Manager 7.2 system from scratch, choose SAP Solution Manager 7.2 <Support_Release> Installation <Database> SAP System Application Server Java <System Variant>.
     ○ To install an optional standalone unit from scratch, choose SAP NetWeaver <Release> <Database> Installation Optional Standalone Units <Advanced Adapter Engine | Advanced Adapter Engine Extended | Process Orchestration> <System Variant>.
     ○ To install an SAP system based on SAP NetWeaver AS Java as target system of a system copy, choose <Product> <Database> System Copy Target System <System Variant> Based on AS Java.
     ○ To install the application server Java for an SAP Process Integration system based on SAP NetWeaver 7.5 as target system of a system copy, choose SAP NetWeaver 7.5 <Database> System Copy Target System <System Variant> Based on AS Java.
To install the application server Java for an SAP Solution Manager 7.2 system as target system of a system copy, choose **SAP Solution Manager 7.2** <Support_Release> <Database> **System Copy** > **Target System** > <System_Variant> **Based on AS Java**.

To install an optional standalone unit as target system of a system copy, choose **SAP NetWeaver** <Release> <Database> **System Copy** > **Target System** > <System_Variant> **Based on AS Java**.

Install an additional application server instance, go to <Product> <Database> **Additional SAP System Instances** > **Additional Application Server Instance**.

Perform other tasks or install additional components.

Go to **Generic Options** > <Database> and choose the required task.

6. Choose **Next**.

**Note**

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

7. If the installer prompts you to log off from your system, log off and log on again.

The installer restarts automatically.

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

**Note**

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

**Note**

If you want to install an SCS instance with integrated SAP Web Dispatcher [page 25], you must choose the **Custom** parameter mode.

When processing the screens for the SCS instance installation, you are prompted to mark the corresponding checkbox on the screen **Additional Components to be Included in the SCS Instance**.

If you mark the checkbox for SAP Web Dispatcher, you are prompted for the additional parameters required for the SAP Web Dispatcher installation on the subsequent screens.

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

**High Availability only:** If you decide to install an SAP Web Dispatcher or a Gateway in the ASCS instance, note that a failure of the SAP Web Dispatcher or the Gateway causes failover of the ASCS instance to another cluster node. The failover cluster monitors all processes that are started by the SAP start service (sapstartsrv.exe). For an ASCS instance this is: **msg_server.exe** (message server), **enserver.exe** (enqueue server), **gwrd.exe** (Gateway), and **sapwebdisp.exe** (SAP Web Dispatcher).

To prevent failover, see SAP Note 2375999.

End of 'High Availability': HA (Windows)
The signature of installation media and installation archives is checked automatically during the Define Parameters phase while processing the Media Browser and - if you perform an archive-based installation - the Software Package Browser screens.

Note that this automatic check is only committed once and not repeated if you modify artifacts such as SAR archives or files on the media after the initial check has been done. This means that - if you modify artefacts later on either during the remaining Define Parameters phase or later on during the Execute Service phase - the signature is not checked again.

For more information, see SAP Note 2393060.

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

9. To start the installation, choose Next.

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

Multiple Oracle Homes only: The installer uses default values for the Oracle Home and Listener configuration. Therefore, if you use multiple Oracle Homes, you must specify the new Oracle home, as well as the listener port number. You can change these values on the installer Summary screen during the database instance installation. On the Summary screen, check both Oracle > Database System and Oracle > Listener Configuration and use the Revise button. On the upcoming screen, change the Oracle Home and the Listener port number. Make sure that you use a free port number, and do not use the numbers 1521 or 1527 as these might already be in use by default.

Note
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.

10. If required install an additional application server instance for a standard (central) or distributed system.
11. If you copied the installer software to your hard disk, you can delete these files when the installation has successfully completed.
12. For security reasons, we recommend that you delete the .sapinst directory within the home directory of the user with which you ran the installer:

   %userprofile%\sapinst\ 

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

   You find the installer log files in the sapinst_instdir directory. For more information, see Useful Information about the Installer [page 116].
5.7 Additional Information about the Installer

The following sections provide additional information about the installer.

Useful Information about the Installer [page 116]
This section contains some useful technical background information about the installer and the installer GUI.

How to Avoid Automatic Logoff by the Installer [page 117]

Interrupted Processing of the Installer [page 119]
Here you find information about how to restart the installer if its processing has been interrupted.

Entries in the Services File Created by the Installer [page 122]

Troubleshooting with the Installer [page 123]
This section tells you how to proceed when errors occur while the installer is running.

Using the Step State Editor (SAP Support Experts Only) [page 124]
This section describes how to use the Step State Editor available in the installer.

5.7.1 Useful Information about the Installer

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

- Software Provisioning Manager (the “installer” for short) has the web browser-based “SL Common GUI of the Software Provisioning Manager” - “SL Common GUI” for short.

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

  As of version 1.0 SP24 Patch Level (PL) 5, Software Provisioning Manager comes with a new look and feel of the SL Common GUI. For more information, see https://blogs.sap.com/2018/11/10/new-look-for-software-provisioning-manager/.

  The SL Common GUI connects the web browser on a client with the sapinst executable - which is part of Software Provisioning Manager - running on the installation host using the standard protocol HTTPS.

  For the SL Common GUI, the installer provides a pre-generated URL in the Program Starter window. If you have a supported web browser installed on the host where you run the installer, the SL Common GUI starts automatically.

  By default, the SL Common GUI uses the default browser defined for the host where you run the installer. However, you can also specify another supported web browser available on the host where you start the installer. You can do this by starting the sapinst executable with command line option

  SAPINST_BROWSER=[Path to Browser Executable], for example
  SAPINST_BROWSER=firefox.exe.

  Alternatively you can open a supported web browser on any device and run the URL from there.

  For more information about supported web browsers see Prerequisites for Running the Installer [page 109].

  If you need to run the SL Common GUI in accessibility mode, apply the standard accessibility functions of your web browser.
As soon as you have started the sapinst.exe executable, the installer creates a .sapinst directory underneath the <Drive>:\Users\<User> directory where it keeps its log files. <User> is the user which you used to start the installer.

After you have reached the Welcome screen and selected the relevant installer option for the SAP system or instance to be installed, the installer creates a directory sapinst_instdir, where it keeps its log files, and which is located directly 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 TEMP environment variable.

All log files which have been stored so far in the .sapinst folder are moved to the sapinst_instdir directory as soon as the latter has been created.

**Recommendation**

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

The installer extracts itself to a temporary directory (TEMP, TMP, TMPDIR, or SystemRoot). These executables are deleted after the installer has stopped running.

Directories called sapinst.exe.xxxxxx.xxxxx sometimes remain in the temporary directory after the installer has finished. You can safely delete them.

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

**Caution**

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

To see a list of all available installer properties, go to the directory %TEMP%\sapinst.exe.xxxxxx.xxxxx after you have started the installer, and enter the following command:

```bash
sapinst.exe -p
```

If you want to perform the installation in unattended mode, see SAP Note 2230669 which describes an improved procedure using inifile.params.

If required, stop the installer by choosing the Cancel button.

**Note**

If you need to terminate the installer, choose File Exit in the menu of the Program Starter window.

### 5.7.2 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) and higher: Press Ctrl + Esc and choose 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 70]
5.7.3 Interrupted Processing of the Installer

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

Context

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

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

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

⚠️ Caution

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

The following table describes the options in the dialog box:

<table>
<thead>
<tr>
<th>Option</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retry</td>
<td>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.</td>
</tr>
<tr>
<td>Stop</td>
<td>The installer stops the installation, closing the dialog box, the installer GUI, and the GUI server. The installer records its progress in the keydb.xml file. Therefore, you can continue with the installer from the point of failure without repeating any of the previous steps. See the procedure below.</td>
</tr>
<tr>
<td>Continue</td>
<td>The installer continues the installation from the current point.</td>
</tr>
<tr>
<td>View Log</td>
<td>Access installation log files.</td>
</tr>
</tbody>
</table>

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

1. Log on to the installation host as a user with the required permissions as described in Running the Installer [page 110].

2. Make sure that the installation media are still available.
   For more information, see Preparing the Installation Media [page 76].

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

3. Make sure that the installation media are still available.
   For more information, see Preparing the Installation Media [page 76].

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

4. Restart the installer by double-clicking sapinst.exe from the directory to which you unpacked the Software Provisioning Manager archive.
   By default, the SL Common GUI uses the default browser defined for the host where you run the installer. However, you can also specify another supported web browser available on the host where you start the installer. You can do this by starting the sapinst executable with command line option SAPINST_BROWSER=<Path to Browser Executable>, for example SAPINST_BROWSER=firefox.exe.

5. The installer is restarting.

   The installer now starts and waits for the connection with the SL Common GUI. If you have a supported web browser (see Prerequisites for Running the Installer [page 109]) installed on the host where you run the installer, the SL Common GUI starts automatically by displaying the Welcome screen.

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

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

i Note
If the host specified by <hostname> cannot be reached due to a special network configuration, proceed as follows:
1. Terminate the installer as described in Useful Information about the Installer [page 116].
2. Restart the installer from the command line with the `SAPINST_GUI_HOSTNAME=<hostname>` property. You can use a fully-qualified host name.

⚠️ Caution

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

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

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

1. Click on the certificate area on the left hand side in the address bar of your browser, and view the certificate.
2. Open the certificate fingerprint or thumbprint, and compare all hexadecimal numbers to the ones displayed in the console output of the installer.
   Proceed as follows to get the certificate fingerprint or thumbprint from the server certificate printed in the installer console:
   1. Go to the `sapinst_exe.xxxxxx.xxxx` directory in the temporary directory to which the installer has extracted itself:
      `%userprofile%\sapinst\`
   2. In the `sapinst_exe.xxxxxx.xxxx` directory, execute the `sapgenpse` tool with the command line option `get_my_name -p`.
      As a result, you get the server fingerprint or thumbprint from the server certificate.
3. Accept the warning to inform your browser that it can trust this site, even if the certificate could not be verified.

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

6. From the tree structure on the Welcome screen, select the installation option that you want to continue and choose Next.

   The What do you want to do? screen appears.
7. On the What do you want to do? screen, decide between the following alternatives and continue with Next:
### Alternative

**Perform a new run**

The installer does not continue the interrupted installation option. Instead, it moves the content of the old installer directory and all installer-specific files to a backup directory. Afterwards, you can no longer continue the old option.

The following naming convention is used for the backup directory:

`log_<Day>_Month_Year_Hours_Minutes_Seconds`

#### Example

`log_01_Oct_2016_13_47_56`

#### Note

All actions taken by the installation before you stopped it (such as creating directories or users) are not revoked.

#### Caution

The installer moves all the files and folders to a new log directory, even if these files and folders are owned by other users. If there are any processes currently running on these files and folders, they might no longer function properly.

---

**Continue with the existing one**

The installer continues the interrupted installation from the point of failure.

---

### 5.7.4 Entries in the Services File Created by the Installer

After the installation has finished successfully, the installer has created the following entries 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`
If there is more than one entry for the same port number, this is not an error.

5.7.5 Troubleshooting with the Installer

This section tells you how to proceed when errors occur while the installer is running.

Context

If an error occurs, the installer:

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

Procedure

1. Check SAP Note 2393060 for known installer issues.
2. If an error occurs during the Define Parameters or the Execute Service phase, do one of the following:
   - Try to solve the problem:
     - To check the installer log files (sapinst.log and sapinst_dev.log) for errors, choose the LOG FILES tab.
     - Note: The LOG FILES tab is only available if you have selected on the Welcome screen the relevant installer option for the SAP product to be installed.
     - If required, abort the installer by choosing Cancel in the tool menu and restart the installer. For more information, see Interrupted Processing of the Installer [page 119].
   - To check the log and trace files of the installer GUI for errors, go to the directory %userprofile%\sapinst\.
   - Then continue by choosing Retry.
   - If required, abort the installer by choosing Cancel in the tool menu and restart the installer. For more information, see Interrupted Processing of the Installer [page 119].
3. If you cannot resolve the problem, report an incident using the appropriate subcomponent of BC-INS*.
   - For more information about using subcomponents of BC-INS*, see SAP Note 1669327.
5.7.6 Using the Step State Editor (SAP Support Experts Only)

This section describes how to use the Step State Editor available in the installer.

**Note**

Only use the Step State Editor if the SAP Support requests you to do so, for example to resolve a customer incident.

**Prerequisites**

- SAP Support requests you to use the Step State Editor.
- Make sure that the host where you run the installer meets the requirements listed in Prerequisites for Running the Installer [page 109].

**Procedure**

1. Start the installer from the command line as described in Running the Installer [page 110] with the additional command line parameter `SAPINST_SET_STEPSTATE=true`.
2. Follow the instructions on the installer screens and fill in the parameters prompted during the Define Parameters phase until you reach the Parameter Summary screen.
3. Choose Next.
   
   The Step State Editor opens as an additional dialog. Within this dialog you see a list of all steps to be executed by the installer during the Execute Service phase. By default all steps are in an initial state. Underneath each step, you see the assigned installer component. For each step you have a Skip and a Break option.
   
   - Mark the checkbox in front of the Break option of the steps where you want the installer to pause.
   - Mark the checkbox in front of the Skip option of the steps which you want the installer to skip.
4. After you have marked all required steps with either the Break or the Skip option, choose OK on the Step State Editor dialog.
   
   The installer starts processing the Execute Service phase and pauses one after another when reaching each step whose Break option you have marked. You can now choose one of the following:
   
   - Choose OK to continue with this step.
   - Choose Step State Editor to return to the Step State Editor and make changes, for example you can repeat the step by marking the checkbox in front of the Repeat option.
   - Choose Cancel to abort the installer.
5. Continue until you have run through all the steps of the Execute Service phase of the installer.
6 Post-Installation

6.1 Post-Installation Checklist

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

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

More detailed information about the steps are available in the linked sections.

**Standard, Distributed, or High-Availability System**

- If required, you **perform a full system backup** [page 149] immediately after the installation has finished.
- You check whether you can **log on to the Application Server Java** [page 126].
- If you have installed SAP Enterprise Portal or SAP Enterprise Portal Core Component, you check whether you can **log on to the SAP Enterprise Portal** [page 128].
- If you have installed Development Infrastructure, you check whether you can **log on to the Development Infrastructure** [page 129].
- You **provide access to the SAP NetWeaver Administrator** [page 130].
- You **install the SAP license** [page 131].
- You **configure the remote connection to SAP support** [page 133].
- If required, you **set up symbolic links for application servers** [page 134].
- For production systems it is highly recommended that you **connect the system to SAP Solution Manager** [page 135].
- You **apply the latest kernel and Support Packages** [page 137].
- You **configure the Process Integration system after installation** [page 138].

- **Note**
  - This post-installation step is only relevant if you have installed an **SAP NetWeaver 7.5 Process Integration (PI) system**.

- You **configure the user management** [page 143].
- You **ensure user security** [page 144].
- You **run automated configuration** [page 147].
- If you have installed a non-central Advanced Adapter Engine as an optional standalone unit, you **clear the SLD Data Cache** [page 148].
16. On the database instance host, you perform Oracle-specific post-installation steps [page 148].
17. If you have chosen to enable Oracle Database Vault, make sure that you perform the required configuration steps. For more information, see Implementing Oracle Database Vault with the Installer [page 167].
18. You perform a full system backup [page 149].
19. If you chose to install an integrated SAP Web Dispatcher within the SCS instance, you log on to the SAP Web Dispatcher Management Console [page 151]
20. If you chose to install an integrated SAP Web Dispatcher within the SCS instance, you configure the SAP Web Dispatcher [page 152]
21. You perform a full system backup [page 149].

Additional Application Server Instance

1. You check whether you can log on to the Application Server Java [page 126].
2. If you have installed SAP Enterprise Portal or SAP Enterprise Portal Core Component on the primary application server instance, you check whether you can log on to the portal [page 128] from the additional application server instance host.
3. If you have installed Development Infrastructure on the primary application server instance, you check whether you can log on to the Development Infrastructure [page 129] from the additional application server instance host.
4. You ensure user security [page 144].
5. If required, you set up symbolic links for application servers [page 134].
6. You perform a full system backup [page 149].

6.2 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.
- For the Application Server Java of an SAP Process Integration (PI) 7.5 system or SAP Solution Manager 7.2 system, you must have configured the connection to the ABAP system.
In a distributed or high-availability system, you check whether you can log on to every instance of the SAP system that you installed.

### Java User in a Dual-Stack System (SAP Process Integration (PI) 7.5 system or SAP Solution Manager 7.2 system only)

<table>
<thead>
<tr>
<th>User</th>
<th>User Name Storage: ABAP System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrator</td>
<td>J2EE_ADMIN (default) or the name you gave this user during the installation process.</td>
</tr>
</tbody>
</table>

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.

### Java Standalone User

<table>
<thead>
<tr>
<th>User</th>
<th>User Name Storage: Database</th>
<th>User Name Storage: External ABAP System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrator</td>
<td>Administrator</td>
<td>The user that you created manually in the external ABAP system. The recommended name is J2EE_ADMIN_&lt;SAPSID_Java_System&gt;</td>
</tr>
</tbody>
</table>

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 73]

### 6.3 Logging On to the SAP Enterprise Portal

You need to check that you can log on to the application server using the following standard users. This procedure applies when you have installed *EP Core - Application Portal* only and when you have installed it together with *Enterprise Portal (EP)*.

**Prerequisites**

The SAP system is up and running.

**Context**

Java Standalone User

<table>
<thead>
<tr>
<th>User</th>
<th>User Name Storage:</th>
<th>User Name Storage:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrator</td>
<td>Administrator</td>
<td>The user that you created manually in the external ABAP system. The recommended name is J2EE_ADM_&lt;SAPSID_Java_System&gt;</td>
</tr>
</tbody>
</table>

You access the SAP Enterprise 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_AS_Java_Server>:5<Instance_Number>00/irj

   i 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 Enterprise 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.

6.4 Logging On to the Development Infrastructure

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

Procedure

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

   i 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.

---

### 6.5 Providing Access to the SAP NetWeaver Administrator

To be able to log on the SAP NetWeaver Administrator, you must allow access to administration URLs of the NetWeaver Administrator in the Internet Communication Manager (ICM).

#### Context

Due to security restrictions, the SAP NetWeaver Administrator can only be accessed locally via http://<Hostname_of_AS_Java_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.
6.6 Installing the SAP License

You must install a permanent SAP license. When you install your SAP system, a temporary license is automatically installed.

Context

⚠️ Caution

Before the temporary license expires, you must apply for a permanent license key from SAP.

We recommend that you apply for a permanent license key as soon as possible after installing your system.

Only valid for ‘High Availability’: HA (Windows)

High Availability only: If you do a failover of the SAP 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)

ℹ️ Note

The license key is bound to the hardware key of the host where the message server is running.

High Availability only:

In a high-availability system with Microsoft Failover Clustering, the message server is part of the 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 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.

For more information about SAP license keys and how to obtain them, see http://support.sap.com/licensekey.

Procedure

Install the SAP license as described in the SAP Library at:
6.7 High Availability: Setting Up Licenses

You need to install a permanent license, which is determined by the hardware environment of the message server.

Prerequisites

The SAP system is up and running.

Context

SAP has implemented a license mechanism for switchover solutions and clustered environments. Your customer key is calculated on the basis of local information on the message server host. This is the host machine where the central services instance (SCS instance) runs.

To be able to perform a switchover, the temporary license that is installed automatically with the SCS instance is not sufficient. You first need to install a permanent license, which is determined by the hardware
environment of the message server. Since SAP's high-availability (HA) solution stipulates two or more cluster nodes (host machines) where the message server is enabled to run, you have to order as many license keys [page 131] as you have cluster nodes.

When we receive confirmation from your vendor that you are implementing a switchover environment, we provide the required license keys for your system, one key for each machine.

**Procedure**

1. To find the hardware key of the primary host, run the SAP NetWeaver Administrator (NWA) on any application server instance and choose **Configuration Management > Infrastructure Management > Licenses**.
   
   The hardware key is displayed in the NWA.

2. Perform a switchover of the central services instance (SCS) to another node in the cluster and repeat the previous step.
   
   Repeat this for all remaining nodes in the cluster.

3. To obtain the two license keys, enter the hardware IDs for each cluster node, where message server is enabled to run: [http://support.sap.com/licensekey](http://support.sap.com/licensekey).

4. To import the files containing the two licenses to the primary cluster node, run the NWA on any application server instance and choose:
   
   **Configuration Management > Infrastructure Management > Licenses**.

5. Perform a switchover of the central services instance (SCS) to another node in the cluster and repeat the previous step.
   
   Repeat this for all remaining nodes in the cluster.

**Results**

The license is no longer a problem during switchover. This means you do not need to call saplicense in your switchover scripts.

**6.8 Configuring the Remote Connection to SAP Support**

SAP offers its customers access to support and a number of remote services such as the Early Watch Service or the GoingLive Service. Therefore, you have to set up a remote network connection to SAP. For more information, see SAP Support Portal at [https://support.sap.com/remote-support.html](https://support.sap.com/remote-support.html).
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 additional application server 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 primary application server 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) and higher

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\SYS
   ```

   **i 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
   ```

   **i 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 is accessible. If the link does not work after you created it, make sure that it exists and check the accessibility of the UNC path.

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\<SAPSID>\SYS \<sapglobalhost>\sapmnt\<SAPSID>\SYS
   ```
   
   i 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
   ```
   
   i 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 Connecting the System to SAP Solution Manager

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

**Prerequisites**

An SAP Solution Manager system must be available in your system landscape. For more information, see [http://help.sap.com/solutionmanager](http://help.sap.com/solutionmanager).

**Context**

SAP Solution Manager gives you central access to tools, methods, and preconfigured content that you can use to evaluate and implement your solutions.

When your implementation is running, you can use SAP Solution Manager to manage, monitor, and update systems and business processes in your solution landscape, and also to set up and operate your own solution support.
Procedure

You connect a technical system to SAP Solution Manager by the following steps:

1. On the technical systems of your landscape, **data suppliers** are implemented, for example, with transaction RZ70 for Application Server ABAP and with Visual Administrator for Application Server Java.

   For more information, see the SAP Solution Manager Application Help:
   - If your SAP Solution Manager release is 7.1:
   - If your SAP Solution Manager release is 7.2:

2. The data suppliers send information about the hardware and installed software to a central **System Landscape Directory (SLD)**. Updates are sent to the SLD as well.

   For more information, see the **Planning Guide - System Landscape Directory** in the SAP Community Network at [System Landscape Directory (SLD) - Overview](http://help.sap.com/solutionmanager)

3. From the SLD, this information is regularly synchronized with **SAP Solution Manager** where it is managed in the Landscape Management Database (LMDB).

   For more information, see the SAP Solution Manager Application Help:
   - If your SAP Solution Manager release is 7.1:
   - If your SAP Solution Manager release is 7.2:

4. In the LMDB, you complete the information from the SLD manually.

   For more information, see the SAP Solution Manager Application Help:
   - If your SAP Solution Manager release is 7.1:
   - If your SAP Solution Manager release is 7.2:

Installation of SAP Systems Based on the Application Server Java of SAP NetWeaver 7.1 to 7.5 on Windows: Oracle

**Post-Installation**
Next Steps

For more information, see the following pages in the SAP Community Network:

- System Landscape Directory (SLD) - Overview
- Documentation for Landscape Management Database - LMDB

6.11 Applying the Latest Kernel and Support Package Stacks

We strongly recommend that you apply the latest kernel and Support Package stacks before you start configuring your SAP system.

**i Note**

If you are using a stack configuration file (see Installation Using a Stack Configuration File (Optional) [page 30]), you already downloaded the stack.xml file and the delta archives using the Maintenance Optimizer in your SAP Solution Manager. If you then already called the Software Update Manager (SUM) from the installer and applied the Support Package Stacks after the installation had finished, you can skip this section.

Context

**i Note**

If you have installed an SAP Solution Manager 7.2 system, you must apply at least Support Package Stack (SPS) 01. You cannot use SAP Solution Manager 7.2 with SPS 00.

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 <Release> available at https://support.sap.com/sitoolset System Maintenance ➜ Software Update Manager (SUM) scenarios ➜ Software Update/Upgrade with SUM <Release>

- 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_CTXT.
d. Extract the SAR files of the kernel Support Packages of the target SP level to a temporary directory using the SAPCAR tool.
e. Copy or move the extracted programs from the temporary directory to the local kernel directory.

6.12  PI 7.5 Only: Configuring the Process Integration System After the Installation

To configure your SAP Process Integration 7.5 (SAP PI 7.5) system after installation, execute the Central Technical Configuration (CTC) Wizard.

Procedure

To configure your SAP PI 7.5 system, execute the “SAP NetWeaver initial setup” CTC Wizard described in SAP Note 1309239.

i Note

The CTC Wizard automatically executes all required technical configuration steps.

For more details about all single configuration steps executed by the CTC Wizard and how to apply them manually, see the SAP Library at:

<table>
<thead>
<tr>
<th>SAP Release and SAP Library Quick Link</th>
<th>SAP Library Path (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP NetWeaver 7.5</td>
<td>Application Help Function-Oriented View:</td>
</tr>
<tr>
<td></td>
<td>Process Integration After Installation</td>
</tr>
<tr>
<td></td>
<td>Configuring Process Integration (PI) Dual Usage</td>
</tr>
<tr>
<td></td>
<td>Type Basic Configuration for SAP Process Integration (PI)</td>
</tr>
</tbody>
</table>
6.13 PI-PCK, PI-AF, PI-AEX, PI-CP Only: System Configuration After the Installation

The CTC Wizards or Functional Unit Configurations execute automatically all required technical configuration steps.

CTC Wizards or Functional Unit Configurations

SAP Note 1362909 collects all notes that describe the CTC Wizards or Functional Unit Configurations, which must be executed in each of the following systems after the installation:

- Composition Environment (CE)
- Advanced Adapter Engine Extended (PI-AEX)
- Advanced Adapter Engine (PI-AF)
- Partner Connectivity Kit (PI-PCK)
- Process Orchestration (PI-CP)

SAP NetWeaver 7.30: Configuring the Partner Connectivity Kit (PI-PCK)

To configure your PI-PCK system after the installation, execute the “PI-PCK initial setup” CTC Wizard described in SAP Note 1319008.

For more information about all single configuration steps executed by the CTC Wizard and how to apply them manually, see the SAP Library at:

http://help.sap.com/nw73

Configuring Process Integration (PI) After Installation ➤ Basic Configuration (CTC Wizard-Assisted and Manual) ➤ Configuring the Partner Connectivity Kit ➤ Wizard-Based Configuration for the PCK

Configuring the Adapter Engine (PI-AF)

To configure your PI-AF system after the installation execute “PI-AF initial setup” CTC Wizard described in SAP Note 1314855.
For more information about all single configuration steps executed by the CTC Wizard and how to apply them manually, see the SAP Library at:

<table>
<thead>
<tr>
<th>SAP Release and SAP Library Quick Link</th>
<th>SAP Library Path (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• SAP NetWeaver Process Integration 7.1 Including Enhancement Package 1 <a href="http://help.sap.com/nwpi711">http://help.sap.com/nwpi711</a></td>
<td>▶ Configuration of SAP NetWeaver ▶ Configuration of the Standalone Engines ▶ Configuring the Non-Central Advanced Adapter Engine ▶ Wizard-Based Basic Configuration</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SAP NetWeaver 7.3 <a href="http://help.sap.com/nw73">http://help.sap.com/nw73</a></th>
<th>If you want to connect PI-AF to a PI system:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>SAP NetWeaver 7.3 including Enhancement Package 1 <a href="http://help.sap.com/nw731">http://help.sap.com/nw731</a> <a href="http://help.sap.com/nw731">http://help.sap.com/nw731</a></th>
<th>If you want to connect PI-AF to a PI-AEX or PI-CP system:</th>
</tr>
</thead>
</table>

| If you want to connect PI-AF to a PI-AEX or PI-CP system:                                                                                           |
| ▶ Application Help ▶ Function-Oriented View: English ▶ Process Integration ▶ Configuring Process Integration After Installation ▶ Configuring Advanced Adapter Engine Extended (PI-AEX) ▶ Basic Configuration for SAP NetWeaver PI Advanced Adapter Engine Extended ▶ Configuring the Non-Central Advanced Adapter Engine (PI-AF) for AEX |
## SAP Release and SAP Library Quick Link

<table>
<thead>
<tr>
<th>SAP NetWeaver 7.4</th>
<th>SAP Library Path (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="http://help.sap.com/nw74">http://help.sap.com/nw74</a></td>
<td>If you want to connect <strong>PI-AF</strong> to a PI system:</td>
</tr>
<tr>
<td></td>
<td>- <strong>Application Help</strong> &gt; <strong>Function-Oriented View: English</strong> &gt; <strong>Process Integration</strong> &gt; <strong>Configuring Process Integration After Installation</strong> &gt; <strong>Configuring Process Integration Dual Stack</strong> &gt; <strong>Basic Configuration for SAP Process Integration (PI)</strong> &gt; <strong>Configuring the Non-Central Advanced Adapter Engine (PI-AF)</strong> &gt; <strong>Manual Configuration of Non-Central Advanced Adapter Engine (PI-AF)</strong></td>
</tr>
<tr>
<td></td>
<td>If you want to connect <strong>PI-AF</strong> to a PI-AEX or PI-CP system:</td>
</tr>
<tr>
<td></td>
<td>- <strong>Application Help</strong> &gt; <strong>Function-Oriented View: English</strong> &gt; <strong>Process Integration</strong> &gt; <strong>Configuring Process Integration After Installation</strong> &gt; <strong>Configuring Advanced Adapter Engine Extended (PI-AEX)</strong> &gt; <strong>Basic Configuration for SAP PI Advanced Adapter Engine Extended</strong> &gt; <strong>Configuring the Non-Central Advanced Adapter Engine (PI-AF)</strong> for <strong>AEX</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SAP NetWeaver 7.5</th>
<th>SAP Library Path (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="http://help.sap.com/nw75">http://help.sap.com/nw75</a></td>
<td>If you want to connect <strong>PI-AF</strong> to a PI system:</td>
</tr>
<tr>
<td></td>
<td>- <strong>Application Help</strong> &gt; <strong>Function-Oriented View: English</strong> &gt; <strong>Process Integration</strong> &gt; <strong>Configuring Process Integration After Installation</strong> &gt; <strong>Configuring Process Integration (PI) Dual Usage Type</strong> &gt; <strong>Basic Configuration for SAP Process Integration (PI)</strong> &gt; <strong>Configuring the Non-Central Advanced Adapter Engine (PI-AF)</strong> &gt; <strong>Manual Configuration of Non-Central Advanced Adapter Engine (PI-AF)</strong></td>
</tr>
<tr>
<td></td>
<td>If you want to connect <strong>PI-AF</strong> to a PI-AEX or PI-CP system:</td>
</tr>
<tr>
<td></td>
<td>- <strong>Application Help</strong> &gt; <strong>Function-Oriented View: English</strong> &gt; <strong>Process Integration</strong> &gt; <strong>Configuring Process Integration After Installation</strong> &gt; <strong>Configuring Advanced Adapter Engine Extended (PI-AEX)</strong> &gt; <strong>Basic Configuration for SAP PI Advanced Adapter Engine Extended</strong> &gt; <strong>Configuring the Non-Central Advanced Adapter Engine (PI-AF)</strong> for <strong>AEX</strong></td>
</tr>
</tbody>
</table>

---

### SAP NetWeaver 7.30 or Higher: Configuring the Advanced Adapter Engine Extended (PI-AEX)

To configure your PI-AEX system after the installation, execute the “PI-AEX initial setup” CTC Wizard described in SAP Note [1414465](http://help.sap.com/nw75).
For more information about all single configuration steps executed by the CTC Wizard and how to apply them manually, see the SAP Library at:

<table>
<thead>
<tr>
<th>SAP Release and SAP Library Quick Link</th>
<th>SAP Library Path (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• SAP NetWeaver 7.4 [\text{<a href="http://help.sap.com/nw74%7D%5C">http://help.sap.com/nw74}\</a>]</td>
<td></td>
</tr>
<tr>
<td>• SAP NetWeaver 7.5 [\text{<a href="http://help.sap.com/nw75%7D%5C">http://help.sap.com/nw75}\</a>]</td>
<td></td>
</tr>
</tbody>
</table>

**SAP NetWeaver 7.30 Including Enhancement Package 1 and Higher: Configuring the Process Orchestration (PI-CP)**

To configure your PI-CP system after the installation, execute the “PI-CP initial setup” CTC Wizard described in SAP Note [1548120](http://help.sap.com/nw731).

For more information about all single configuration steps executed by the CTC Wizard and how to apply them manually, see the SAP Library at:

<table>
<thead>
<tr>
<th>SAP Release and SAP Library Quick Link</th>
<th>SAP Library Path (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• SAP NetWeaver 7.4 [\text{<a href="http://help.sap.com/nw74%7D%5C">http://help.sap.com/nw74}\</a>]</td>
<td></td>
</tr>
<tr>
<td>• SAP NetWeaver 7.5 [\text{<a href="http://help.sap.com/nw75%7D%5C">http://help.sap.com/nw75}\</a>]</td>
<td></td>
</tr>
</tbody>
</table>
6.14 Configuring the User Management

After the installation has completed, configure the user management of your SAP system.

Procedure

During the installation of your SAP system, you specified one of the following initial data sources of the User Management Engine (UME) (for more information, see SAP System Parameters [page 46]):
- Database of the Application Server 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 changes of data source are supported:
- From the database of the Application Server Java to user management of an external ABAP system
- From the database of the Application Server Java to a directory service

⚠️ Caution
This is not valid for an Advanced Adapter Engine (AEX) installation.

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

<table>
<thead>
<tr>
<th>SAP Release and SAP Library Quick Link</th>
<th>SAP Library Path (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP NetWeaver Composition Environment 7.1</td>
<td><a href="https://help.sap.com/nwce71">Application Help</a></td>
</tr>
<tr>
<td>SAP NetWeaver Composition Environment 7.1 including Enhancement Package 1</td>
<td><a href="https://help.sap.com/nwce711">Application Help</a></td>
</tr>
</tbody>
</table>
6.15 Ensuring User Security

You need to ensure the security of the users that the installer created during the installation.

The tables below at the end of this section list the following users:

- Operating system users
- SAP system users

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

**Recommendation**

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

**Caution**

Make sure that you perform this procedure before the newly installed SAP system goes into production.

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

You can find the security guide in the Security section of the product page for your SAP product at https://help.sap.com/
Operating System and Database Users

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

<table>
<thead>
<tr>
<th>User Type</th>
<th>User Name</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating system user</td>
<td>&lt;sapsid&gt;adm</td>
<td>SAP system administrator</td>
</tr>
<tr>
<td></td>
<td>SAPService&lt;SAPSID&gt;</td>
<td>User to run the SAP system</td>
</tr>
<tr>
<td>Oracle database user</td>
<td>SAP&lt;SCHEMA_ID&gt;DB</td>
<td>Oracle database owner (that is, the owner of the database tables)</td>
</tr>
<tr>
<td></td>
<td>SYSTEM</td>
<td>Oracle standard database user</td>
</tr>
<tr>
<td></td>
<td>SYS</td>
<td>Oracle standard database user</td>
</tr>
<tr>
<td></td>
<td>OUTLN</td>
<td>Oracle standard database user</td>
</tr>
<tr>
<td></td>
<td>DBSNMP</td>
<td>Oracle standard database user</td>
</tr>
<tr>
<td>SAP Host Agent User</td>
<td>sapadm</td>
<td>SAP Host Agent administrator is the user for central monitoring services. You do not need to change the password of this user after the installation. This user is for administration purposes only. You are not able to log on as sapadm as this user is locked.</td>
</tr>
</tbody>
</table>

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 have chosen 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 SAP NetWeaver Administrator only.
- If you have chosen option **Use ABAP**, UME users are stored in an external ABAP system (ABAP UME) – see table **Users Stored in an External ABAP System** below. For more information, see *[Preparing an External ABAP System as Source for User Data]* [page 73].
The following tables show these users together with recommendations on how you can ensure the security of these users:

### SAP System Users Stored in an External ABAP System

<table>
<thead>
<tr>
<th>User</th>
<th>User Name Storage: External ABAP System</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Server Java Administrator</td>
<td>The name that you gave this user when you created it manually in the external ABAP system (see Preparing an External ABAP System as Source for User Data [page 73])</td>
<td>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 Config Tool. We recommend that you use strong password and auditing policies for this user.</td>
</tr>
<tr>
<td>Application Server Java Guest</td>
<td>The name that you gave this user when you created it manually in the external ABAP system (see Preparing an External ABAP System as Source for User Data [page 73])</td>
<td>Lock this user for interactive logon.</td>
</tr>
<tr>
<td>Communication user for Application Server Java</td>
<td>The name that you gave this user when you created it manually in the external ABAP system (see Preparing an External ABAP System as Source for User Data [page 73])</td>
<td>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.</td>
</tr>
</tbody>
</table>

### SAP System Users Stored in the Database

<table>
<thead>
<tr>
<th>User</th>
<th>User Name Storage: Database</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrator</td>
<td>The name that you gave this user during the installation or the default name Administrator</td>
<td>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 AS Java Config Tool. We recommend that you use strong password and auditing policies for this user.</td>
</tr>
<tr>
<td>Guest</td>
<td>The name that you gave this user during the installation or the default name Guest</td>
<td>This user is used for anonymous access. Lock this user for interactive logon.</td>
</tr>
</tbody>
</table>

Installation of SAP Systems Based on the Application Server Java of SAP NetWeaver 7.1 to 7.5 on Windows: Oracle Post-Installation
6.16 Performing Automated Configuration

This section provides references to documentation about how to run automated configuration tasks for the initial configuration of SAP NetWeaver functional units.

⚠️ Caution

Do not use the functional unit configuration tool to configure functional units that have already been enabled after:

- Upgrade
- Update
- System copy

If you need to change the configuration of functional units that have already been enabled, then you must execute the configuration steps manually.

If you want to use a functional unit that has not previously been enabled, you can either use the functional unit configuration tool or execute the steps manually.

To initially configure an SAP NetWeaver functional unit, proceed as described in the SAP Library for the SAP NetWeaver release your application is based on:

<table>
<thead>
<tr>
<th>SAP Release and SAP Library Quick Link</th>
<th>SAP Library Path (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP NetWeaver 7.3</td>
<td>Application Help SAP NetWeaver Library: Function-Oriented View</td>
</tr>
<tr>
<td>SAP NetWeaver 7.3 including Enhancement Package 1</td>
<td>Configuration Wizard</td>
</tr>
<tr>
<td>SAP NetWeaver 7.4</td>
<td></td>
</tr>
<tr>
<td><a href="https://help.sap.com/nw74">https://help.sap.com/nw74</a></td>
<td></td>
</tr>
<tr>
<td>SAP NetWeaver 7.5</td>
<td></td>
</tr>
</tbody>
</table>
6.17 Clearing the SLD Data Cache after Installing a Non-central Advanced Adapter Engine (Optional Standalone Unit)

When you have installed a non-central Advanced Adapter Engine, you need to manually clear the SLD Data Cache in the Integration Builder to make it visible and selectable in the communication channels.

Procedure

1. After SAPinst has finished, open the Integration Builder of your PI system at \http://<host>:<port>/dir/start/index.jsp\ Integration Directory and logon as a user with the ABAP role \SAP_XI_CONFIGURATOR\ assigned.
2. In the Integration Builder, choose \Environment\.
3. From the drop-down list, choose \Clear SLD Data Cache\.

6.18 Performing Oracle-Specific Post-Installation Steps

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

Procedure

- **Checking the Recommended Oracle Database Parameters**
  
  When installing the Oracle database, a standard database parameter set is used. To take into account the size and configuration of your SAP system, and to enable new Oracle features, check and apply the parameter settings as described in SAP Note 1431798 (Oracle 11g) or SAP Note 1888485 (Oracle 12c).

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

- **Configuring Database User Profiles**

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

- **Updating Oracle Optimizer Statistics**

  To update the Oracle optimizer statistics, do the following:
  a. Execute the following commands as the <dbsid>adm user:

     ```bash
     brconnect -u / -c -f stats -t system_stats;
     ```
b. Execute the following commands with SQLPlus:

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

For Oracle 11g, also execute the following command:

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

For more information, see SAP Note 974781.

- **Installing the Latest Version of BR*T tools for Oracle 12c**

  Follow the instructions in SAP Note 2087004 to install the most recent version of BR*T tools for Oracle 12c.

### 6.19 Performing a Full System Backup

You must perform a full system backup, including the operating system disk, system state, and all other disks, 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 the SAP Library at:

<table>
<thead>
<tr>
<th>SAP Release and SAP Library Quick Link</th>
<th>SAP Library Path (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>● SAP NetWeaver Composition Environment 7.1</td>
<td>See the SAP Library path for SAP NetWeaver Composition Environment 7.2:</td>
</tr>
<tr>
<td>● SAP NetWeaver Composition Environment 7.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>● SAP NetWeaver 7.3</td>
<td>Application Help Function-Oriented View: English Solution Life Cycle Management Backup and Recovery Backing Up and Restoring your SAP System on Windows</td>
</tr>
<tr>
<td><a href="http://help.sap.com/nw73">http://help.sap.com/nw73</a></td>
<td></td>
</tr>
<tr>
<td>● SAP NetWeaver 7.3 including Enhancement Package 1</td>
<td></td>
</tr>
<tr>
<td><a href="http://help.sap.com/nw731">http://help.sap.com/nw731</a></td>
<td></td>
</tr>
<tr>
<td>● SAP NetWeaver 7.4</td>
<td></td>
</tr>
<tr>
<td><a href="http://help.sap.com/nw74">http://help.sap.com/nw74</a></td>
<td></td>
</tr>
<tr>
<td>● SAP NetWeaver 7.5</td>
<td></td>
</tr>
<tr>
<td><a href="http://help.sap.com/nw75">http://help.sap.com/nw75</a></td>
<td></td>
</tr>
</tbody>
</table>

When backing up your Oracle database, note the following:

- You must configure your third-party backup tool, if used, for the database backup.
- If you use BR*TOOLS for the database backup, refer to the following Oracle documentation in the SAP Library at:

<table>
<thead>
<tr>
<th>SAP Release and SAP Library Quick Link</th>
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</tr>
</thead>
<tbody>
<tr>
<td>● SAP NetWeaver Composition Environment 7.1</td>
<td>Application Help SAP Library: English Administrator’s Guide Administration of SAP NetWeaver CE General System Administration Administration of Databases Database Administration for Oracle</td>
</tr>
<tr>
<td><a href="http://help.sap.com/nwce71">http://help.sap.com/nwce71</a></td>
<td></td>
</tr>
<tr>
<td>● SAP NetWeaver Composition Environment 7.1 including Enhancement Package 1</td>
<td></td>
</tr>
<tr>
<td><a href="http://help.sap.com/nwce711">http://help.sap.com/nwce711</a></td>
<td></td>
</tr>
<tr>
<td>● SAP NetWeaver Composition Environment 7.2</td>
<td></td>
</tr>
<tr>
<td><a href="http://help.sap.com/nwce72">http://help.sap.com/nwce72</a></td>
<td></td>
</tr>
</tbody>
</table>

http://help.sap.com/nw73

● SAP NetWeaver 7.3 including Enhancement Package 1

http://help.sap.com/nw731

● SAP NetWeaver 7.4

http://help.sap.com/nw74

● SAP NetWeaver 7.5

http://help.sap.com/nw75

When backing up your Oracle database, note the following:

- You must configure your third-party backup tool, if used, for the database backup.
- If you use BR*TOOLS for the database backup, refer to the following Oracle documentation in the SAP Library at:

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<tr>
<th>SAP Release and SAP Library Quick Link</th>
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<td></td>
</tr>
<tr>
<td>● SAP NetWeaver Composition Environment 7.1 including Enhancement Package 1</td>
<td></td>
</tr>
<tr>
<td><a href="http://help.sap.com/nwce711">http://help.sap.com/nwce711</a></td>
<td></td>
</tr>
<tr>
<td>● SAP NetWeaver Composition Environment 7.2</td>
<td></td>
</tr>
<tr>
<td><a href="http://help.sap.com/nwce72">http://help.sap.com/nwce72</a></td>
<td></td>
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</table>

http://help.sap.com/nw73

● SAP NetWeaver 7.3 including Enhancement Package 1

http://help.sap.com/nw731

● SAP NetWeaver 7.4

http://help.sap.com/nw74

● SAP NetWeaver 7.5

http://help.sap.com/nw75

When backing up your Oracle database, note the following:

- You must configure your third-party backup tool, if used, for the database backup.
- If you use BR*TOOLS for the database backup, refer to the following Oracle documentation in the SAP Library at:

<table>
<thead>
<tr>
<th>SAP Release and SAP Library Quick Link</th>
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<tr>
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<td>Application Help SAP Library: English Administrator’s Guide Administration of SAP NetWeaver CE General System Administration Administration of Databases Database Administration for Oracle</td>
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<td></td>
</tr>
<tr>
<td>● SAP NetWeaver Composition Environment 7.1 including Enhancement Package 1</td>
<td></td>
</tr>
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<td></td>
</tr>
<tr>
<td>● SAP NetWeaver Composition Environment 7.2</td>
<td></td>
</tr>
<tr>
<td><a href="http://help.sap.com/nwce72">http://help.sap.com/nwce72</a></td>
<td></td>
</tr>
</tbody>
</table>
6.20 Logging on to the SAP Web Dispatcher Management Console

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

Context

Note
This step is only required if you chose to install an integrated SAP Web Dispatcher instance within the SCS instance.

You must log on to the SAP Web Dispatcher Management Console to do the following:

- Check whether the SAP Web Dispatcher was installed successfully.
- Change the password of the webadm user,
- Access monitoring and administration tools.

Procedure

1. Open a web browser.
2. Enter the following URL, depending on whether you use HTTP or HTTPS:

   \[http(s)://<Webdispatcher_Host>:<HTTP(S)_PORT>/sap/wdisp/admin/public/default.html\]

   Example

   \[https://plx282:44300/sap/wdisp/admin/public/default.html\]
3. Log on as user `webadm` with the password that you entered during the input phase of the installation. The SAP Web Dispatcher Monitor screen appears.

4. We recommend that you change the password of `webadm` immediately after the installation for security reasons.

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

**Related Information**

SCS Instance with Integrated SAP Web Dispatcher [page 25]

### 6.21 SAP Web Dispatcher Configuration (Optional)

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

#### i Note

This step is only required if you chose to install an integrated SAP Web Dispatcher instance within the SCS instance.

You can find the configuration information in the SAP Library at:

<table>
<thead>
<tr>
<th>SAP Release and SAP Library Quicklink</th>
<th>SAP Library Path (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• SAP NetWeaver 7.3</td>
<td><img src="http://help.sap.com/nw73" alt="Application Help" /></td>
</tr>
<tr>
<td>• SAP NetWeaver 7.3 including Enhancement Package 1</td>
<td><img src="http://help.sap.com/nw731" alt="Function-Oriented View" /></td>
</tr>
<tr>
<td>• SAP NetWeaver 7.4</td>
<td><img src="http://help.sap.com/nw74" alt="Application Server Infrastructure" /></td>
</tr>
<tr>
<td>• SAP NetWeaver 7.5</td>
<td><img src="http://help.sap.com/nw75" alt="Components of SAP NetWeaver" /></td>
</tr>
<tr>
<td></td>
<td><img src="http://help.sap.com/nw73" alt="SAP Web Dispatcher" /></td>
</tr>
</tbody>
</table>

**Related Information**

SCS Instance with Integrated SAP Web Dispatcher [page 25]
The following sections provide additional information about optional preparation, installation, and post-installation tasks.

There is also a section describing how to delete an SAP system.

### 7.1 Integration of LDAP Directory Services

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

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

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

**i Note**

The SAP system can interact with the Active Directory using the LDAP protocol, which defines:

- The communication protocol between the SAP system and the directory
- How data in the directory is structured, accessed, or modified

If a directory other than the Active Directory also supports the LDAP protocol, the SAP system can take advantage of the information stored there. For example, if there is an LDAP directory on a UNIX or Windows server, you can configure the SAP system to use the information available there. In the following text, directories other than the Active Directory that implement the LDAP protocol are called **generic LDAP directories**.

### 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: [https://archive.sap.com/documents/docs/DOC-14384](https://archive.sap.com/documents/docs/DOC-14384)
- The SAP Management Console (SAP MC)

SAP Logon

Instead of using a fixed list of systems and message servers, you can configure SAP Logon in the `sapmsg.ini` configuration file to find SAP systems and their message servers from the directory. If you configure SAP logon to use the LDAP directory, it queries the directory each time Server or Group selection is chosen to fetch up-to-date information on available SAP systems.

To use LDAP operation mode, check that the `sapmsg.ini` file contains the following:

```
[Address]
Mode=LDAPdirectory
LDAPserver=
LDAPnode=
LDAPoptions=
```

Distinguish the following cases:

- If you use an Active Directory, you must set `LDAPoptions="DirType=NT5ADS"`. For more information, see the SAP system profile parameter `ldap/options`.
- You must specify the directory servers (for example, `LDAPserver=pcintel6 p24709`) if one of the following is true:
  - The client is not located in the same domain forest as the Active Directory
  - The operating system does not have a directory service client (Windows NT and Windows 9X without installed `dsclient`).
  For more information, see the SAP system profile parameter `ldap/servers`.
- For other directory services, you can use `LDAPnode` to specify the distinguished name of the SAP root node. For more information, see the SAP system profile parameter `ldap/saproot`.

SAP MMC

The SAP MMC is a graphical user interface (GUI) for administering and monitoring SAP systems from a central location. It is automatically set up when you install an SAP system on Windows. If the SAP system has been prepared correctly, the SAP MMC presents and analyzes system information that it gathers from various sources, including the Active Directory.

Integrating the Active Directory as a source of information has advantages for the SAP MMC. It can read system information straight from the directory that automatically registers changes to the system landscape.
As a result, up-to-date information about all SAP application servers, their status, and parameter settings is always available in the SAP MMC.

If you need to administer distributed systems, we especially recommend that you use the SAP MMC together with Active Directory services. You can keep track of significant events in all of the systems from a single SAP MMC interface. You do not need to manually register changes in the system configuration. Instead, such changes are automatically updated in the directory and subsequently reflected in the SAP MMC.

If your SAP system is part of a heterogeneous SAP system landscape that comprises systems or instances both on Unix and Windows operating systems, you can also use the SAP MMC for operating and monitoring the instances running on Unix.

**SAP MC**

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 in the SAP Library at:

<table>
<thead>
<tr>
<th>SAP Release and SAP Library Quick Link</th>
<th>SAP Library Path (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• SAP NetWeaver Composition Environment 7.2</td>
<td><img src="http://help.sap.com/nwce72" alt="Application Help" /> &gt; Administration Tools &gt; SAP Management Console</td>
</tr>
</tbody>
</table>

**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 [page 110] and choosing: [Generic Installation Options] [Database] Preparations [LDAP Registration] Active Directory Configuration.

### i Note
You have to configure the directory server only once. Then all SAP systems that need to register in this directory server can use this setup.

#### Configuration Tasks for Generic LDAP Directories
To configure other LDAP directories, refer to the documentation of your directory vendor. The installer software contains schema extensions for directory servers Netscape/iPlanet (ldregns4.txt, ldregns5.txt) and OpenLDAP slapd (ldregslapd.schema). Both files are located in the directory \<Unpack_Directory>\COMMON\ADS. After you have applied the schema extension, you need to create a root container to store the SAP-related information and create a directory user that the SAP application server can use to write information to the directory.
For more information about how to set up a Netscape/iPlanet directory server, see the documentation SAP System Information in Directory Services at: https://archive.sap.com/documents/docs/DOC-14384

#### Enabling the SAP System LDAP Registration
Once you have correctly configured your directory server, you can enable the LDAP registration of the SAP system by setting some profile parameters in the default profile.
To do this, run the installer [page 110] once for your system and choose: [Generic Installation Options] [Database] Preparations [LDAP Registration] LDAP Support.[Page 110]
If you use a directory server other than Microsoft Active Directory and/or non-Windows application servers, you have to store the directory user and password information by using ldappasswd pf=<any_instance_profile>. The information is encrypted for storage in DIR_GLOBAL and is therefore valid for all application servers. After restarting all application servers and start services, the system is registered in your directory server. The registration protocols of the components are dev_ldap*. The registration is updated every time a component starts.

### 7.2 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 Cluster Configuration [page 205].

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 primary application server instance or the (A)SCS instance on the global host or on any other host.

  End of ‘High Availability’: non-HA

  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 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 `sapcp` 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, `sapcp` 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.

**i Note**

- Windows Server 2008 (R2) and higher:
  
  In a high-availability system, file shares pointing to directories on shared disks are only visible or can be accessed with the virtual host name of the cluster group the shared disks belong to.

  This lets you have several shares with the same name pointing to different disks (multi-SID).

- `\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`. 

---

*Installation of SAP Systems Based on the Application Server Java of SAP NetWeaver 7.1 to 7.5 on Windows: Oracle Additional Information*
If you want to have it created on another host, or if you want to use an already existing transport host of your SAP system landscape, you can specify another host during the installation. In this case, you have to prepare that host to allow the new SAP system to use it as transport host. For more information, see Preparing the SAP System Transport Host [page 72].

Directory Structure

The following figures show how the physical directory \usr\sap is shared on the global host in a standard 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>`
- Primary application server instance: `J<Instance_Number>`
- Additional application server instance: `J<Instance_Number>`.

**High Availability only:** Enqueue Replication Server instance: `ERS<Instance_Number>`

End of ‘High Availability’: HA (Windows)

Directory Structure on the Global Host in a Standard (Central) Java System
7.3 Performing a Domain Installation Without Being a Domain Administrator

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 70]. 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`.

**i 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:

**Creating the SAP Host Agent User and Group Manually**
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 user as a local user.

**Prerequisites**

- You must be domain administrator to perform the required steps.
- You must have installed the feature *Remote Server Administration Tools* as follows:
  - Windows Server 2012 (R2) and higher:
    - 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 starts the installer as described in *Running the Installer* [page 110] and chooses **Generic Installation Options** ➔ **<Database>** ➔ **Preparations** ➔ **Operating System Users and Groups** to have the group and users created automatically.

**Creating the Required Users and Groups Manually**

**i 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) and higher:**
  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:
  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) and higher:**
  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>
<thead>
<tr>
<th>Field</th>
<th>Input for &lt;sapsid&gt;adm</th>
<th>Input for SAPService&lt;SAPSID&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>First name</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Initials</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Last name</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Full name</td>
<td>&lt;sapsid&gt;adm</td>
<td>SAPService&lt;SAPSID&gt;</td>
</tr>
<tr>
<td>User logon name</td>
<td>&lt;sapsid&gt;adm</td>
<td>SAPService&lt;SAPSID&gt;</td>
</tr>
</tbody>
</table>

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

Installation of SAP Systems Based on the Application Server Java of SAP NetWeaver 7.1 to 7.5 on Windows: Oracle

Additional Information
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) and higher:
  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.
  4. Choose OK twice.

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

- Windows Server 2012 (R2) and higher:
  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.
 Checking and Changing the Paging File Settings on Windows Server 2012 (R2) and Higher

Use

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

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:

   ```powershell
   (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:

   ```powershell
   $sys = Get-WmiObject Win32_Computersystem -EnableAllPrivileges
   $sys.AutomaticManagedPagefile = $false
   $sys.put()
   ```

3. Check the size of the paging files with the following command:

   ```powershell
   Get-WmiObject WIN32_Pagefile | Select-Object Name, InitialSize, MaximumSize, FileSize
   ```

   The output looks like the following:

<table>
<thead>
<tr>
<th>Name</th>
<th>InitialSize</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MaximumSize</th>
<th>FileSize</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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*.

---

### 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:

```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).

> **Recommendation**

MCOD is generally available and there is no intention to de-support this installation feature. However, SAP recommends that customers should **not** use the MCOD feature when installing new systems.

The major drawbacks are as follows:

- Previous-point-in-time (PPT) recovery of a single system within an MCOD installation becomes a highly complex and time-consuming procedure.
- SAP Landscape Management (LaMa) is generally not supported for MCOD installations. For more information, see SAP Note [1709155](https://support.sap.com).
- There are strong dependencies, for example on the database version used for the MCOD system.
- Downtime - planned or unplanned - always affects all systems sharing the same database.

**Exception:** In case of a dual-stack split you can use the “Keep Database” option thus keeping ABAP and Java stack in one database. There, the PPT recovery problem does not apply because both stacks belong logically together and would always be recovered jointly anyhow. However, keep in mind that even for this specific case the introduction of SAP Landscape Management would require a split into separate database subsystems.

Additional information is available in SAP Note [2146542](https://support.sap.com).

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

With MCOD we distinguish two scenarios:

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

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

Features

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

i Note

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

Constraints

- We strongly recommend that you test MCOD in a test or development system. We recommend that you run MCOD systems in the same context. We do not recommend that you mix test, development, and production systems in the same MCOD.
- In the event of database failure, all SAP systems running on the single database are affected.
- Automated support in an MCOD landscape for the following administrative tasks depends on your operating system and database:
  - Copying a single component from an MCOD landscape to another database at database level.
  - Uninstalling a single component from an MCOD landscape requires some additional steps. You can use a remote connection to SAP support to request help with these tasks. For more information, see http://support.sap.com/remotecconnection.
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 189].

End of 'High Availability': HA (Windows)

For the second SAP system, you must use the same <DBSID> as for the first SAP system.

If you install an MCOD system, the SYSTEM tablespace must contain at least 400 MB of free space. If there is not enough space left, increase the size of this tablespace with BRSPACE or BRTOOLS.

If you decide to turn off archive log mode during the database load phase of the installation, you need to plan downtime for all MCOD systems sharing the database.

### 7.6 Implementing Oracle Database Vault with the Installer

The installer supports Oracle Database Vault. This section provides information about implementing Oracle Database Vault (DV) with the installer.

#### Prerequisites

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

#### Context

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

DV requires the following additional users:

- secadmin
- secacctmgr

These users are created by the installer.

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

#### Procedure

1. Start the installer and choose the installation option for your system variant as described in Running the Installer [page 110].
2. On the Oracle Database screen where you are prompted to enter the required Oracle database parameters, mark the Install Oracle Database Vault checkbox.
3. On the **Database Accounts for Oracle Database Vault** screen, specify the following:
   ○ Provide the passwords for the Oracle Database Vault user accounts `secadmin` and `secacctmgr` which are to be created by the installer.
   ○ If you want to be enabled after the installation has completed, mark the **Enable Oracle Database Vault** checkbox.

**Next Steps**

Configure Oracle Database Vault as described in SAP Note [2218115](#). 

### 7.7 Oracle Database 12c Multitenant Database Installation

The multitenant option introduced in Oracle Database 12c allows a single container database (CDB) to host multiple separate pluggable databases (PDB). Using Software Provisioning Manager (the "installer") you can create a CDB, PDB, and also a new pluggable database in an existing container database.

#### Container Database (CDB)

The container database is the body of a seed and a pluggable (PDB) database and is called `CDB$ROOT`. In this special database the common user, SGA, control file, and more are stored. Every CDB has a "seed" database. This "seed" is the template for creating additional PDBs. The seed database has the internal name `PDB$SEED`.

#### Pluggable Database (PDB)

The pluggable database includes the customer data, for SAP the `SAP<SCHEMAID>` data. Every PDB shares the SGA, control file, redo logs and undo tablespace from the CDB. Every PDB has its own system and `sysaux` tablespace and can have its own temporary tablespace.

**Installation Features in the Installer**

The installation has the following restrictions:

- This installation is only available for `SWPM 7.*` where * is greater than 1.
- This installation is only available for single instance installation on file system.
- SAP kernel version must be 7.45 or higher.
The installation is possible for the following scenarios:

- Install the CDB and PDB.
- Install one or more PDBs in an existing CDB.

For more information, see 2336881.

**Related Information**

- Installing the Container Database and a Pluggable Database [page 169]
- Installing a Distributed Application Server Instance [page 170]
- Installing an Additional Pluggable Database in a Pre-Installed Container Database [page 170]

### 7.7.1 Installing the Container Database and a Pluggable Database

In this section we describe how you install the container database (CDB) and a pluggable database (PDB).

**Procedure**

1. Start the installer on the database instance host to perform the database instance installation as described in Running the Installer [page 110].
2. On the **SAP System Database** screen, you have to specify the container database (CDB) system id (SID) in the field **Database ID**. The SID cannot have the same SID as the PDB.

   → **Recommendation**
   
   We recommend that you assign the CDB a different SID than the SAP system ID (<SAPSID>) because the default SID of the pluggable database (PDB) equals the <SAPSID>.

3. On the **Oracle Multitenant Database** screen, you select the PDB SID (default is SAP SID). CDB SID cannot have the same SID as PDB SID. When you select No, a normal database installation is done.

**Related Information**

- Oracle Database 12c Multitenant Database Installation [page 168]
- SAP System Database Parameters [page 57]
7.7.2 Installing a Distributed Application Server Instance

For a distributed application server installation, you need to specify how the application server is to connect to a pluggable database (PDB) or a “normal” database. You can install one or more additional PDBs in an existing container database (CDB).

**Procedure**

1. Start the installer on the application server instance host as described in Running the Installer [page 110].
2. On the SAP System Database screen, enter the CDB SID of your existing CDB where your pluggable database is located.
3. On the Oracle Multitenant Database screen, you select the PDB SID where you want to install the application server instances.

**Related Information**

- Oracle Database 12c Multitenant Database Installation [page 168]
- SAP System Database Parameters [page 57]

7.7.3 Installing an Additional Pluggable Database in a Pre-Installed Container Database

This section describes how you install an additional pluggable database (PDB) in a Pre-Installed container database (CDB).

**Procedure**

1. Start the installer on the database instance host to perform the database instance installation as described in Running the Installer [page 110].
2. On the SAP System Database screen, enter the container database system ID (CDB SID) of an existing container database installation.
   The installer recognizes that a normal database installation or a pre-installed CDB already exists.
3. If you want to install an additional PDB, on the Oracle Database screen enter Install Additional Pluggable DB in Existing Container DB.
4. On the Oracle Multitenant Database screen, the installer displays all available PDBs. Select Install or Connect to Multitenant PDB and specify the SID of PDB (PDBSID)
7.8 Installation of Additional Product Instances in an Existing SAP System

You can install additional product instances (former “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

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

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

7.10 Starting and Stopping the SAP System

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

Note the following restrictions about starting and stopping the database instance with the SAP MMC or SAPControl:

Only valid for 'High Availability': non-HA

In a non-high-availability system, 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 high-availability 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 230].

End of 'High Availability': HA (Windows)

Prerequisites

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

Procedure

Starting and Stopping the SAP System with the SAP MMC

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

Note

- To stop the database instance you must use the relevant database administration tools.
- 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) and higher.

For more information about the SAP MMC, see the SAP Library at:

<table>
<thead>
<tr>
<th>SAP Release and SAP Library Quick Link</th>
<th>SAP Library Path (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP NetWeaver Composition Environment 7.2</td>
<td>See the SAP Library path for SAP NetWeaver 7.3 and higher.</td>
</tr>
</tbody>
</table>
To start or stop the SAP system – except the database instance – 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. To stop the database instance, use the relevant database administration tools.
4. If the SAP system is installed on multiple hosts, you have the following options to start or stop your system:
   ○ You start or stop the SAP instances – except the database instance – 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 – except the database instance – with SAPControl (sapcontrol.exe), perform the following steps:

- To start or stop the complete SAP system 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
- To stop the database instance, use the relevant database administration tools.
7.11 Configuring the Windows Server Firewall on Windows Server 2008 (R2) and higher (Optional)

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 of All SAP Products at: https://help.sap.com/viewer/ports.

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

⚠️ Caution

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

Prerequisites

You turn on the disabled firewall [page 67] as follows:

- Windows Server 2012 (R2) and higher:
  Open Windows PowerShell in elevated mode, and enter the following command:
  ```powershell
  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>
<thead>
<tr>
<th>Instance number</th>
<th>00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port type</td>
<td>TCP</td>
</tr>
<tr>
<td>Ports</td>
<td>3200, 3300, 4800, 8000, 3600, 50013, 1433, 1434</td>
</tr>
</tbody>
</table>

- Windows Server 2012 (R2) and higher:
  Open Windows PowerShell in elevated mode, and enter the following command:
  ```powershell
  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):
  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, for example:
     ```plaintext
     3200,3300,4800,8000,3600,50013,1527
     ```
     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 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>
<thead>
<tr>
<th>User account</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;sapsid&gt;adm</td>
<td>This is the SAP system administrator account that enables interactive administration of the system.</td>
</tr>
<tr>
<td>SAPService&lt;SAPSID&gt;</td>
<td>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&lt;SAPSID&gt; 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.</td>
</tr>
<tr>
<td>sapadm</td>
<td>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.</td>
</tr>
</tbody>
</table>

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>
<thead>
<tr>
<th>Group</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP_&lt;SAPSID&gt;_GlobalAdmin</td>
<td>This domain (global) group is a domain-level SAP administration group for organizing SAP system administrators.</td>
</tr>
<tr>
<td>Group</td>
<td>Description</td>
</tr>
<tr>
<td>------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>SAP_SAP_GlobalAdmin</td>
<td>This domain group for the SAP Host Agent is only created if you create the SAP Host Agent user sapadm as a domain user.</td>
</tr>
<tr>
<td>SAP_&lt;SAPSID&gt;_LocalAdmin</td>
<td>This local group is created on each host.</td>
</tr>
<tr>
<td>SAP_SAP_LocalAdmin</td>
<td>If you create the SAP Host Agent user as domain user, the group SAP_SAP_LocalAdmin is also created.</td>
</tr>
<tr>
<td>SAP_LocalAdmin</td>
<td>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_&lt;SAPSID&gt;_GlobalAdmin groups of all the SAP systems that are part of the transport infrastructure are added to the SAP_LocalAdmin group. Therefore, the users &lt;sapsid&gt;adm and SAPService&lt;SAPSID&gt; 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.</td>
</tr>
</tbody>
</table>

### 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.

![User Groups and Accounts](image-url)
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 178]

#### 7.13 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 176].

### 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.
Creating Users and Groups

For Administrators and SAP_LocalAdmin groups assignment of full control over:

For Administrators and SAP_L <CAPSID> LocalAdmin groups assignment of full control over:

Assigning Rights to SAP Directories
7.14  Troubleshooting for SAP Enterprise Portal Installation

This section applies both when you install **EP Core - Application Portal** only and when you install it together with **Enterprise Portal**.

**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:
   - `<drive>:\usr\sap\<SAPSID>\J<Instance_Number>\j2ee\cluster\server0\apps\sap.com\irj\servlet_jsp\irj\root\WEB-INF\deployment`
   - `<drive>:\usr\sap\<SAPSID>\J<Instance_Number>\j2ee\cluster\server0\apps\sap.com\irj\servlet_jsp\irj\root\WEB-INF\deployment\pcd`
   - `<drive>:\usr\sap\<SAPSID>\J<Instance_Number>\j2ee\cluster\server0\apps\sap.com\irj\servlet_jsp\irj\root\WEB-INF\deployment\pcdContent`
   - `<drive>:\usr\sap\<SAPSID>\J<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 AS Java, using the commands `stopsap` and `startsap`, to change the files to `*.bak`.
7.15 Deleting an SAP System or Single Instances

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

Prerequisites

- You have installed your SAP system with standard SAP tools according to the installation documentation.
- You are logged on with a user account that has the required authorization to run the installer and the SAP system. For more information, see Required User Authorization for Running the Installer [page 70].

⚠️ Caution
Do not use the <sapsid>adm user to delete the SAP system.

- Make sure that the SAP system, or single instance, or standalone engine, or optional standalone unit to be deleted is down and that you are not logged on as one of the SAP system users. Also check that all SAP-related processes are stopped. If there is a lock on one of the SAP system objects, the uninstall fails.

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

- When starting the uninstall, make sure that there are no SAP system user sessions still open.

Context

ℹ️ Note
With this installer option you do not delete the database software.

Note the following when deleting an SAP system or single instances:

- You cannot delete an SAP system remotely.
- If you delete network-wide users, groups or service entries in an environment with Network Information System (NIS), other SAP installations might also be affected. Make sure that the users, groups, and service entries to be deleted are no longer required.
- During the uninstall process, all file systems and subdirectories of the selected SAP system or single instance are deleted. Before you start uninstalling, check that you have saved a copy of all files and directories that you want to keep to a secure location.
- The uninstall process is designed to remove as much as possible of the SAP system to be deleted. If an item cannot be removed, a message informs you that you have to remove this item manually. You can do this either at once or after the uninstall process has finished. As soon as you confirm the message, the uninstall process continues.
If you uninstall an SAP instance and you plan to install another SAP instance with the same System ID, first reboot the Windows host to clear all user cached information. For more information, see SAP Note 2296310.

Procedure

1. Start the installer as described in Running the Installer [page 110].
2. On the Welcome screen, choose:
   - Generic Installation Options > Database > Uninstall > Uninstall SAP Systems or Single Instances
3. Follow the instructions on the installer screens to delete a complete SAP system or single instances.

i Note

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

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

<table>
<thead>
<tr>
<th>Deletion of</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard system</td>
<td>You can delete a standard system (where all instances reside on the same host) in one installer run.</td>
</tr>
</tbody>
</table>
Deletion of 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. Additional application server 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 an additional application server 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. Primary application server instance

   If the installer stops responding while trying to delete the primary application server instance, close the installer with **Cancel** and **Exit**. Log off and log on again. To complete the uninstall process of the primary application server instance, restart the installer.

3. Database instance

   Choose whether you want to drop the entire database instance or only one or more database schemas.

   Since the installer only stops local instances automatically, make sure that before deleting the database instance of a distributed system, you stop all remaining instances. You must stop the instance with the message server only after having entered all installer parameters for the deletion of the database instance.

   Before deleting any database schema, make sure that:

   - You have performed a recent offline database backup.
   - You have stopped or deleted all SAP instances belonging to this database schema.
   - If you have installed a Java system, you have stopped the AS Java with transaction SMICM.
   - You only delete the tablespaces that belong to the selected schema.

   The database tablespace `PSAP<SCHEMA_ID>DB` belongs by default to the Java schema `SAP<SCHEMA_ID>DB`. All other SAP tablespaces belong to the ABAP schema `SAP<SCHEMA_ID>` (or `SAPR3` for older SAP systems).

4. Central services instance (SCS)

   If you want to delete additional application server instances of an existing SAP system, you have to run the installer to delete them **locally** on each additional application server instance host.
Deletion of

<table>
<thead>
<tr>
<th>Deletion of</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standalone SAP Host Agent</td>
<td>The SAP Host Agent is automatically uninstalled from a host together with the last remaining SAP system instance.</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
</tbody>
</table>

4. When you have finished, delete the relevant directory structure on the global host.

5. Uninstall the Oracle database software with the Oracle Universal Installer (OUI).
   For more information, see Deleting the Oracle Database Software [page 184].

6. Delete the local user group `SAP_<SAPSID>_LocalAdmin` manually as follows:
   - Windows Server 2012 (R2) and higher:
     Open a PowerShell in elevated mode and enter the following command:
     ```bash
     net localgroup SAP_<SAPSID>_LocalAdmin /delete
     ```
   - Windows Server 2008 (R2):
     2. Choose `Local Users and Groups → Groups`.
     3. Right-click the local group `SAP_<SAPSID>_LocalAdmin` and choose Delete.

7. 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.

8. To remove obsolete SLD data, see the following document: https://wiki.scn.sap.com/wiki/display/SL/More+on+System+Landscape+Directory+Duplicate+System+Entries

### 7.16 Deleting the Oracle Database Software

You use the Oracle Universal Installer to delete the Oracle database software.

### 7.16.1 Deleting the Oracle 18 Database Software

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

**Procedure**

Proceed as described in SAP Note 1915314.
7.16.2 Deleting the Oracle Database Software on Windows Server 2012 (R2)

This section describes how to delete the Oracle database software on Windows Server 2012 (R2).

Prerequisites

Before you delete the database software, make sure that you delete the groups ORA_<DBSID>_DBA and ORA_<DBSID>_OPER as follows:

To delete local groups, open a PowerShell in elevated mode, and enter the following command:

```
net localgroup ORA_<DBSID>_DBA /delete
net localgroup ORA_<DBSID>_OPER /delete
```

To delete domain groups, open a PowerShell in elevated mode, and enter the following command:

```
net group ORA_<DBSID>_DBA /delete /domain
net group ORA_<DBSID>_OPER /delete /domain
```

Context

The Oracle software is installed on all hosts where an SAP instance is running, for example, on a primary application server instance host, database host, or additional application server instance host. Do not delete the Oracle database software, if another SAP instance is running on the same host.

⚠️ Caution

High Availability only:

- Deinstall the Oracle Fail Safe (OFS) software with Oracle Universal Installer before deleting the Oracle database software on both nodes.
- Delete the Oracle database software on both nodes.

Procedure

1. Stop all Oracle services and the Microsoft Distributed Transaction Coordinator (MSDTC) service.
   
   To do so, open a PowerShell in elevated mode, and enter the following command:
   
   `stop-service <Service Name>`

2. Delete the Oracle database software with the Oracle Universal Installer as follows:
   
   a. Start the Oracle Universal Installer by pressing `Ctrl + Esc` and then `Ctrl + Tab`
b. Choose **Installed Products** or **Deinstall Products**.
c. Select the database product (\<Oracle_Home_name\>) you want to uninstall.
d. Choose **Remove**.
e. Confirm with **Yes** and choose **EXIT**.

3. Delete the Oracle home directory and all its subdirectories under <DRIVE>:\ORACLE_HOME.

4. Delete the key for the corresponding Oracle_Home at HKEY_LOCAL_MACHINE \> SOFTWARE \> ORACLE \> KEY_<Oracle_Home>
   To do so use the following PowerShell command:
   ```powershell
   remove-item -path:"HKLM:\SOFTWARE\ORACLE\KEY_<Oracle_Home>"
   ```

5. Delete all Oracle references for the respective Oracle_Home at HKEY_LOCAL_MACHINE \> SYSTEM \> CURRENTCONTROLSET \> SERVICES
   - To display all Oracle keys, use the following PowerShell command:
     ```powershell
     get-childitem -path:"HKLM:\SYSTEM\CURRENTCONTROLSET\SERVICES\Oracle*
     ```
   - To delete all Oracle keys, use the following PowerShell command:
     ```powershell
     remove-item -path:"HKLM:\SYSTEM\CURRENTCONTROLSET\SERVICES\<Oracle_Key>"
     ```

6. Delete all corresponding Oracle references from the Windows user and system environment:
   For example, delete the variables:
   - TNS_ADMIN, NLS_LANG, ORACLE_HOME, ORACLE_<DBSID>
   
   To do so, use the following PowerShell command:
   ```powershell
   remove-itemproperty -path:HKCU:\Environment -name <variable>
   ```

7. Delete Oracle from the PATH variable.

8. Delete Oracle from the registry key:
   HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Session Manager\Environment\Path

9. Select and delete the folders and shortcuts for Oracle in:
   C:\ProgramData\Microsoft\Windows\Start Menu\Programs

---

**7.16.3 Deleting the Oracle Database Software on Windows Server 2008 (R2)**

This section describes how to delete the Oracle database software on Windows Server 2008 (R2).

**Prerequisites**

Before you delete the database software, make sure that you delete the groups ORA_<DBSID>_DBA and ORA_<DBSID>_OPER as follows:

1. Choose Start \> Control Panel \> Administrative Tools \> Computer Management
2. Choose Local Users and Groups \> Groups.
3. Select and delete the local groups `ORA_<DBSID>_DBA` and `ORA_<DBSID>_OPER` with `Action > Delete`.

**Context**

The Oracle software is installed on all hosts where an SAP instance is running, for example, on a primary application server instance host, database host, or additional application server instance host. Do **not** delete the Oracle database software, if another SAP instance is running on the same host.

⚠️ **Caution**

**High Availability only:**
- Deinstall the Oracle Fail Safe (OFS) software with Oracle Universal Installer before deleting the Oracle database software on both nodes.
- Delete the Oracle database software on both nodes.

**Procedure**

1. Stop all Oracle Services and the Microsoft `Distributed Transaction Coordinator` (MSDTC) service.
   - To access the services, choose `Start > Control Panel > Administrative Tools > Services`.
   - Select a service and then choose `Action > All Tasks > Stop`.

2. Delete the Oracle database software with the Oracle Universal Installer as follows:
   a. Start the Oracle Universal Installer with `Start > All Programs > Oracle-<Oracle_Home_name> > Oracle Installation Products > Universal Installer`.
   b. Choose `Installed Products` or `Deinstall Products`.
   c. Select the database product (`<Oracle_Home_name>`) you want to uninstall.
   d. Choose `Remove`.
   e. Confirm with Yes and choose `EXIT`.

3. Delete the relevant Oracle home directory and all its subdirectories under `<DRIVE>:\ORACLE_HOME`.

4. Edit the Oracle Registry entries as follows:
   a. Choose `Start > Run` and enter `REGEDIT`.
   b. Delete the key for the corresponding Oracle_Home at `HKEY_LOCAL_MACHINE > SOFTWARE > ORACLE > KEY_<Oracle_Home>`.
   c. Delete all Oracle references for the respective Oracle Home at `HKEY_LOCAL_MACHINE > SYSTEM > CURRENTCONTROLSET > SERVICES`.

5. Delete all Oracle references from the Windows user and system environment:
   a. Choose `Start > Control Panel > System`.
   b. Choose `Advanced system settings` and select `Environment Variables`.
   c. For example, delete the variables: `TNS_ADMIN, NLS_LANG, ORACLE_HOME, ORACLE_<DBSID>`. 

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Installation of SAP Systems Based on the Application Server Java of SAP NetWeaver 7.1 to 7.5
on Windows: Oracle

**Additional Information**

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d. Delete Oracle from the PATH variable.

6. Delete the corresponding Oracle entries from the Start menu:
   a. Choose Start > Settings > Taskbar & Start Menu.
   b. On the Advanced tab, click Advanced.
   c. On the Start Menu screen, look at All Users\Start Menu\Programs.
      Select and delete the folders for Oracle with File > Delete.
   d. Delete the Oracle shortcut from the desktop.
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 the SAP related parts (for example: SCS instance, additional standalone Gateways, Web Dispatcher instance, etc.) in one Microsoft Failover Cluster.
- You install the SAP related parts (for example: SCS instance, additional standalone Gateways, Web Dispatcher instance, etc.) in two Microsoft Failover Clusters.
- You install several SAP systems in one or more Microsoft Failover Clusters with two or more Microsoft Failover Cluster nodes.

You have the following options to install a Microsoft Failover Cluster:

- CSD (Cluster Shared Disks)
  - A Failover Cluster which contains shared disks.
  - A database can be optionally installed in this Cluster in its own cluster group.

- FSC (File Share Cluster)
  - A Failover Cluster which does not contain shared disks and uses a remote file share instead.
  - A database cannot be installed in this cluster because databases need shared disks. One exception: MS SQL using “AlwaysOn” option.

- **i Note**
  - The user starting the installer must have full access rights on the file share `\\<sapglobalhost>\sapmnt`. 
You have the following options to install the database instance with a high-availability 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 disks, shared disks, or external file shares.
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://support.sap.com/sitoolset System Provisioning System Copy Option

The system copy guide does not include the cluster-specific information, which is described here.

**Terminology**

- In this documentation the hosts in a Microsoft Failover Cluster are referred to as first cluster node and additional cluster node(s):
  - The first cluster node is the cluster node where you perform the general installation of an SAP system, for example where the database or 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) and higher). 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 28] as for a non-HA system, including the hardware and software requirements [page 32].
2. You decide how to set up your SAP system components in an HA configuration [page 193].
3. You decide how to distribute SAP system components to disks for HA [page 200].
You read Directories in an HA Configuration [page 205].
You read IP Addresses in an HA Configuration [page 207].
You obtain IP addresses for HA [page 209].

**Note**
The user starting the installer must have full access rights on the file share `\<sapglobalhost>\sapmnt`.

### Preparation

1. You check that you have completed the same preparations [page 66] as for a non-HA system.
2. To make sure that all preparation steps have been correctly performed, check that the storage resources are available to all cluster nodes. If you want to run the CSD option, check if you can move the disk resources from one cluster node to another so that they are accessible from a single node at any time. If you want to run the FSC option, check if the external file share is accessible by your installation user from all cluster nodes.

### Installation

1. You make sure that:
   1. You are logged on as domain administrator or as a domain user who is a local administrator on all cluster nodes, 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. On all cluster nodes of the database instance host, you install the Oracle database software [page 91].
3. If required, you set up multiple Oracle Homes [page 106].
4. On all cluster nodes of the database instance host, you install the Oracle Fail Safe software [page 212].
5. You configure the first cluster node [page 215].
6. You create the Oracle Fail Safe group [page 216] on the host where the database instance runs.
7. You install the database instance on the first cluster node [page 218] of the host where the database instance is to run.
8. You set up a shared database directory in your Oracle Home [page 219] on the host where the database instance runs.
9. You add the Oracle database resource to the Fail Safe group [page 221] on the host where the database instance runs.
10. You configure the additional cluster node [page 223].
11. You perform additional steps for the Oracle Fail Safe configuration [page 224] of the host where the database instance is to run.
12. You install the primary application server instance [page 226].
13. You install at least one additional application server instance [page 226].
**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 125] as for a non-HA system.

**Additional Information**

- Moving Cluster Groups, or Services and Applications, or Roles [page 229]
- Starting and Stopping the SAP System in a HA Configuration [page 230]

**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 191].

**8.2.1 System Configuration with Microsoft Failover Clustering**

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

- SAP System Components in a Microsoft Failover Cluster [page 194]
- Multiple SAP Systems in One Microsoft Failover Cluster [page 197]
- Multiple SAP Systems in Multiple Microsoft Failover Clusters [page 198]
- Enqueue Replication Server in a Microsoft Failover Cluster [page 200]
## 8.2.1.1 SAP System Components in a Microsoft Failover Cluster

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

### SAP System Components in an Failover Cluster Configuration

<table>
<thead>
<tr>
<th>Component</th>
<th>Number of Components per SAP System</th>
<th>Single Point of Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCS instance (message services and enqueue services)</td>
<td>1</td>
<td>yes</td>
</tr>
<tr>
<td>Database instance (*)</td>
<td>1</td>
<td>yes</td>
</tr>
<tr>
<td>Application server instance (primary application server, additional application server)</td>
<td>1-&lt;n&gt;</td>
<td>no</td>
</tr>
</tbody>
</table>

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

- To protect the SPOFs (SCS instance and database instance), you have to use Microsoft Failover Clustering. If a hardware or software problem occurs on the first cluster node, the clustered SCS instance and the clustered database automatically fail over to another node. If you need to maintain the cluster node where the SCS instance and database are running, you can switch these instances to another node. When maintenance work is finished, you move the 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 (the primary application server instance and one additional application server instance) on two different hosts. You have the following options:
  - You install the primary application server and the additional application server instance on the cluster nodes of a Microsoft Failover Cluster. You install them on a local disk or external file share. Any additional application server instances are installed on hosts outside of the Microsoft failover cluster. If you have to maintain a cluster node, you have to stop the primary application server or the additional application server instance on that node. When you have finished maintenance, you restart the instances.

  **Note**

  If you install the primary application server and the additional application server 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 a failover cluster setup, the 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 primary application server and all additional application server instances on hosts, which are not part of a Microsoft Failover Cluster.

---

Installation of SAP Systems Based on the Application Server Java of SAP NetWeaver 7.1 to 7.5 on Windows: Oracle

High Availability with Microsoft Failover Clustering

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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 an Microsoft Failover Cluster configuration where the non-SPOFs components (primary application server instance, additional application server instance) are installed locally on the cluster nodes. Any additional application server instances are installed outside the Microsoft Failover Cluster on separate hosts.

![Diagram of SAP system components in one Microsoft Failover Cluster](image)

**Java System**

The following figure shows an HA configuration, where the non-SPOFs components (primary application server instance, additional application server instance) are installed on separate hosts that are not part of the failover cluster.

**Notes:**
- PAS = Primary Application Server Instance
- AAS = Additional Application Server Instance
- ERS = Enqueue Replication Server Instance
- DB = Database Instance
- SCS = Central Services Instance

![Diagram of HAA configuration](image)
Besides installing your SAP system in one Microsoft Failover Cluster, you can also set up two 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 SCS instance is installed on the second failover cluster. The application servers (primary application server instance, additional application server 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.

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

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

⚠️ Caution

All local instances such as an enqueue replication server, primary or additional application server and the local part of the SCS when you use a file share cluster are installed on the local disk where the saploc share is pointing to. Make sure that you have enough space on this local disk.

Every SAP system is placed in a separate cluster group with the unique name SAP <SAPSID>. Each SAP cluster group has its own IP address, network name, as well as the SAP service resource (or generic service resource), and the SAP instance resource. If you use the CSD option, the cluster group also contains a shared disk and a sapmnt share. In case of the FSC option, the group does not contain a shared drive and the sapmnt share is located on a file share.
If you have an HA configuration with three or more cluster nodes, the following restrictions apply:

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

The following figure shows the installation of multiple SAP systems in one Microsoft Failover Cluster. For each SAP system you have to install one primary and at least one additional application server.

8.2.1.3 Multiple SAP Systems In Multiple Microsoft Failover Clusters

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

Note
As of Windows Server 2012, the Microsoft Failover Clustering software supports up to 64 cluster nodes.
For this failover cluster configuration, the following restrictions apply:

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

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

**i Note**

If you use an enqueue replication server, you must configure the enqueue replication server, and the SCS instance on two nodes. For more information, see SAP Note 1634991.
8.2.1.4 Enqueue Replication Server in a Microsoft Failover Cluster

The enqueue replication server contains a replica of the lock table (replication table) and is an essential component in a high-availability setup. It is installed on the two cluster nodes where the 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 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 first 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:

8.2.2 Distribution of SAP System Components to Disks for Failover Clustering

When planning the Microsoft Failover Cluster installation, keep in mind that the cluster hardware uses different storage resources:

- Local Resources
  - Local disks that are connected directly to the cluster nodes
- Shared Storage Resources
  - Shared disks that can be accessed by all cluster nodes via a shared interconnect if CSD option is used

**i Note**

Shared disk is a synonym for the cluster resource type Physical disk.

---

Installation of SAP Systems Based on the Application Server Java of SAP NetWeaver 7.1 to 7.5 on Windows: Oracle High Availability with Microsoft Failover Clustering
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
  You install the Oracle database server software and the Oracle Fail Safe software on local disks.
- 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 the failover cluster
    - SCS instance
    - Single quorum device, if used
- Separately on all cluster nodes to use the local storage on each node
  You install the Oracle database server software and the Oracle Fail Safe software on local disks.
- You have two options to distribute the shared files which are used by all cluster nodes:
  - You install the following on different shared disks:
    - Database instance files, if the database instance is installed in the failover cluster
    - SCS instance
    - Single quorum device, if used
  - On an external file share that is made accessible to all cluster nodes:
    - All database files are installed on an external host, or an additional cluster in this scenario
    - If a quorum is used, it is configured as a file share quorum on the file share host

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

The following figure shows a cluster configuration for an SAP system, where the (A)SCS and database 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 Oracle server software in the Oracle HOME directory must have the same drive letter and path on all cluster nodes.
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), the distribution to shared disk and file share, and the number of data centers. For more information, see the Windows documentation.

If the number of cluster nodes is odd, you need no quorum. For a cluster with an even number of nodes you can configure a disk quorum, a file share quorum, or a cloud quorum.

The default quorum configuration is called Node and Disk Majority for clusters with more than two nodes.

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

⚠️ 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 cluster configuration consists of two cluster nodes and a shared storage with all technical components located in the same data center. In a geographically dispersed cluster, also known 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 storage architecture since a standard shared 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 storage subsystem
- Acceptable amount of data loss during a failover
- Physical layout of the 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 cluster and the database is replicated by pure database techniques, such as shadow database, log shipping, and mirrored database.

⚠️ Caution
- Currently, it is only possible to configure geospan clusters in the same subnet since on Windows Server 2008 (R2), you must not change a virtual IP address during failover.
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 cluster configurations.

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

**Distribution of Database Files in a RAID Configuration**

⚠️ Caution

Microsoft does not support a host-based RAID configuration (Dynamic Disks) on shared disks.

The following figures show a secure method to distribute the database files to different RAID volumes.

You must always locate the database data and redo logs on separate RAID volumes.

**Database RAID Volumes**

<table>
<thead>
<tr>
<th>Operating System Level</th>
<th>RAID Configuration Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disk 1</td>
<td>RAID 5</td>
</tr>
<tr>
<td>DB Data</td>
<td></td>
</tr>
<tr>
<td>Disk 2</td>
<td>RAID 1</td>
</tr>
<tr>
<td>Redo Logs Set A</td>
<td></td>
</tr>
<tr>
<td>Mirrored Redo Logs Set A</td>
<td></td>
</tr>
<tr>
<td>Disk 3</td>
<td></td>
</tr>
<tr>
<td>Redo Logs Set B</td>
<td></td>
</tr>
<tr>
<td>Mirrored Redo Logs Set B</td>
<td></td>
</tr>
<tr>
<td>Disk 4</td>
<td></td>
</tr>
<tr>
<td>Archived Redo Logs</td>
<td></td>
</tr>
</tbody>
</table>

*Distribution of Database Files to Different RAID Volumes for Test or Development Systems*
For high-performance production systems, we recommend that you locate the database files on different RAID volumes.

Note that the BR*T ools directories \sapreorg, \saptrace, \sapbackup, and \sapcheck are not shown in the figures. You can locate these directories on any of the database volumes as they do not require special security measures.

### 8.2.3 Directories in a Microsoft Failover Cluster Configuration

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

#### Directories on Local Disks on Cluster Nodes

<table>
<thead>
<tr>
<th>Component</th>
<th>Default Directory</th>
</tr>
</thead>
<tbody>
<tr>
<td>A supported operating system</td>
<td>%windir%</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Microsoft Failover Clustering software</td>
<td>%windir%\Cluster</td>
</tr>
<tr>
<td>Application server</td>
<td>&lt;Local_Drive&gt;:\usr\sap&lt;SAPSID&gt;&lt;Instance&gt;</td>
</tr>
<tr>
<td>Enqueue replication server</td>
<td>&lt;Local_Drive&gt;:\usr\sap&lt;SAPSID&gt;\ERS&lt;Instance_Number&gt;</td>
</tr>
<tr>
<td>Diagnostics Agent (optional)</td>
<td>&lt;Local_Drive&gt;:\usr\sap&lt;DASID&gt;\SMDA&lt;Instance_Number&gt;</td>
</tr>
<tr>
<td>SAP Host Agent</td>
<td>%Program Files%\SAP\hostctrl</td>
</tr>
</tbody>
</table>
### Component Default Directory

**Oracle server software**

Oracle 10g:

<Local_Drive>:\oracle\SAPSID\10<drive_letter>

Oracle 11g:

<Local_Drive>:\oracle\DBSID\11<drive_letter>

Oracle 12c:

<Local_Drive>:\oracle\Oracle_home_user\DBSID\12<drive_letter>

**Oracle Fail Safe software**

<Drive>:\oracle\OFS\version

### Directories on Shared Disks

<table>
<thead>
<tr>
<th>Component</th>
<th>Default Directory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cluster quorum resource (if used)</td>
<td>&lt;Drive&gt;:\Cluster</td>
</tr>
<tr>
<td>SAP global and instance directories</td>
<td>&lt;Drive&gt;:\usr\sap ...</td>
</tr>
<tr>
<td>SAP data files</td>
<td>&lt;Drive&gt;:\ORACLE\SAPSID\SAPSID\DATA1 ... \SAPSID\DATA&lt;N&gt;</td>
</tr>
<tr>
<td>Online redo logs, set A</td>
<td>&lt;Drive&gt;:\ORACLE\SAPSID\origlogA</td>
</tr>
<tr>
<td>Online redo logs, set B</td>
<td>&lt;Drive&gt;:\ORACLE\SAPSID\origlogB</td>
</tr>
<tr>
<td>Mirrored online redo logs, set A</td>
<td>&lt;Drive&gt;:\ORACLE\SAPSID\mirrlogA</td>
</tr>
<tr>
<td>Mirrored online redo logs, set B</td>
<td>\ORACLE\SAPSID\mirrlogB</td>
</tr>
<tr>
<td>Archive of online redo logs</td>
<td>&lt;Drive&gt;:\ORACLE\SAPSID\oraarch</td>
</tr>
<tr>
<td>BR*Tools directories</td>
<td>...\spreorg, \sptrace, ...\sbbackup, \spcheck, ...\saparch</td>
</tr>
</tbody>
</table>

**Note**

In a live system with excessive I/O activity, you must reserve at least three times the minimum amount of space specified above for the redo logs and mirrored redo logs.
8.2.4 Hostnames in a 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.

**i Note**

As of Windows Server 2008, besides static IP addresses, you can also have DHCP-based (dynamic) IP addresses.

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 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 address 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 Cluster configuration has at least two networks:

- A public network that is used for the communication between the primary application server, additional 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.
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>
<thead>
<tr>
<th>Network Adapter</th>
<th>IP Address</th>
<th>Host Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adapter 1 (private network)</td>
<td>10.1.1.1</td>
<td>clusA_priv</td>
</tr>
<tr>
<td>Adapter 3 (heartbeat network)</td>
<td>192.168.1.1</td>
<td>clusA</td>
</tr>
</tbody>
</table>

⚠️ 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 usually the same as the host name. The computer name is displayed in the node column of the Failover Cluster Management. However, it is not required for the TCP/IP communication in the cluster. When you configure IP addresses and corresponding names, keep in mind that it is the host names that are important for the cluster, not the computer names.

Virtual IP Addresses Assigned to Cluster Groups

After you have installed the SAP system and fully configured the cluster, the critical system resources are bound together in three different groups.

Each of these groups requires a virtual IP address and network name that is permanently mapped to the group and not to a particular node. The advantage of this is that, whenever a group is moved between nodes, its IP address and network name move together with the group.
**Caution**

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

An HA 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.

---

### 8.2.5 Obtaining IP Addresses for a Microsoft Failover Cluster Configuration

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

**Context**

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

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

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

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

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

<table>
<thead>
<tr>
<th>Physical IP Addresses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Component</td>
</tr>
<tr>
<td>First cluster node:</td>
</tr>
<tr>
<td>First cluster node:</td>
</tr>
<tr>
<td>Additional cluster node:</td>
</tr>
<tr>
<td>Additional cluster node:</td>
</tr>
</tbody>
</table>
Virtual IP Addresses

<table>
<thead>
<tr>
<th>Component</th>
<th>Example for Virtual IP Address</th>
<th>Example for Host Name</th>
<th>Purpose</th>
<th>Defined During</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cluster group</td>
<td>129.20.5.3</td>
<td>clusgrp</td>
<td>Virtual address and name of the cluster group. It identifies the cluster and is used for administration purposes.</td>
<td>Failover cluster software configuration</td>
</tr>
<tr>
<td>Database cluster group</td>
<td>129.20.5.4</td>
<td>dbgrp</td>
<td>Virtual address and name for accessing the group of database resources, regardless of the node it is running on</td>
<td>Execution of HA-wizard or database-specific cluster scripts</td>
</tr>
<tr>
<td>SAP cluster group</td>
<td>129.20.5.5</td>
<td>sapgrp</td>
<td>Virtual address and name for accessing the group of SAP resources, regardless of the node it is running on</td>
<td>Configuration of SAP system for high availability with the installer on the first node</td>
</tr>
</tbody>
</table>

8.3 Preparation

This section provides information about how to prepare the installation of the SAP system for Microsoft Failover Clustering. For a complete list of all steps, see section Preparation in the Installation Checklist for a High-Availability System [page 191].

1. You check that you have completed the same preparations [page 66] as for a non-HA system.
2. To make sure that all preparation steps have been correctly performed, check that the storage resources are available to all cluster nodes. If you want to run the CSD option, check if you can move the disk resources from one cluster node to another so that they are accessible from a single node at any time. If you want to run the FSC option, check if the external file share is accessible by your installation user from all cluster nodes.

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 191].
You have the following options to install the database instance:

- **CSD (Cluster Shared Disk)**
  - You use a high available database outside the cluster used for the SCS instance. This scenario requires a shared disk for the SCS instance and requires an additional cluster used for the database which may also require shared disks.
  - You install the database on a shared disk in the same cluster used for the SCS instance.
- **FSC (File Share Cluster)**
  - You use a high available database outside the cluster used for the SCS instance. This scenario does not require shared disks for the SCS instance and requires an additional cluster used for the database which may require shared disks.

**i Note**
The user starting the installer must have full access rights on the file share `\<sapglobalhost>\sapmnt`.

### 8.4.1 Installing the Oracle Fail Safe Software

To use the cluster functionality for the Oracle database, you have to install the Oracle Fail Safe (OFS) software. To check which OFS version is supported for your database and operating system, see SAP Note 1972760.

### 8.4.1.1 Installing the Oracle Fail Safe Software for Oracle 11g and 12c

**Use**

This section describes how to install the Oracle Fail Safe software, which you need to use the cluster functionality for the Oracle database.

**Prerequisites**

- You have installed the Oracle database software [page 91] locally on all cluster nodes, using the same `<Oracle_home>`.
- In the Failover Cluster Manager make sure that the other cluster node(s) are not set to Pause
- Make sure that the Cluster Server service is started on all cluster nodes.
- For a domain user, you must use the syntax `<domain_name>\<user_name>`. The Oracle Fail Safe software is not able to handle the syntax `<user_name>@<domain>`.
- You have to install the Oracle Fail Safe (OFS) software on all cluster nodes. Do not install the Fail Safe software in parallel on all cluster nodes. You must install it on one cluster node at a time.
Procedure

1. Start the **Oracle Universal Installer** from the Oracle RDBMS media.
   ○ If you use the **Start** menu, double-click the following file:
     `<media_drive>:\<OFS_version>\SAP\sapofs.cmd`
   ○ If you use a **PowerShell** script, enter the following command:
     `<media_drive>:\<OFS_version>\SAP\sapofs.ps1`
   The installer opens and guides you through the installation process.

2. Enter the required information as shown in the following table:

<table>
<thead>
<tr>
<th>Screen</th>
<th>Entry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Welcome</td>
<td>Choose Next.</td>
</tr>
<tr>
<td>Select Installation Type</td>
<td>Choose Typical, and then Next.</td>
</tr>
<tr>
<td>Specify Home Details</td>
<td>For <strong>Name</strong>:</td>
</tr>
<tr>
<td></td>
<td>Enter the name of the Oracle home for the Oracle Fail Safe software. Make sure you use the same Oracle home name on all cluster nodes.</td>
</tr>
<tr>
<td></td>
<td>The Fail Safe software must be installed in a separate Oracle home directory, for example, <strong>OFS421</strong></td>
</tr>
<tr>
<td></td>
<td>For <strong>Path</strong>:</td>
</tr>
<tr>
<td></td>
<td>Enter the path of the Oracle Home directory for the Oracle Fail Safe software. It must be on a <strong>local</strong> disk and should have the same name on all cluster nodes, for example:</td>
</tr>
<tr>
<td></td>
<td><code>C:\Oracle\OFS421</code></td>
</tr>
<tr>
<td>Reboot Needed After Installation</td>
<td>Choose Next.</td>
</tr>
<tr>
<td>Summary</td>
<td>View the information and choose <strong>Install</strong>.</td>
</tr>
<tr>
<td>Install</td>
<td>Wait while the software is installed.</td>
</tr>
</tbody>
</table>
In the dialog box *Oracle Fail Safe Account/Password*, enter the account and password under which the Oracle Fail Safe software is to run.

The account has to be a member of the local administrators and the *ora_<dbsid>_dba* or *ora_dba* groups on both cluster nodes.

Although the *<SAPSID>adm* user fulfills these requirements, we do not recommend using this user for the following reason:

If you choose to use *<SAPSID>adm*, you have to update the account information for the Oracle Services for MSCS Service after every password change of the *<SAPSID>adm* user.

You can change the user and password for Oracle Services for MSCS Service as follows:

- **Windows Server 2012 (R2):**
  - To do this, press `Ctrl + Esc` and then `Ctrl + Tab`, choose group `Oracle - <OFS_Home_Name>` Set Credentials.
  - You can also open a PowerShell in elevated mode, and enter the following command:
    ```
    <ORACLE_OFS_Home>\FailSafe\Server
    \Oracle.FailSafe.ServerConfig.exe SetCredentials
    ```

- **Windows Server 2008 (R2):**
  - To do this, choose `Start` > `All Programs` > `Oracle OFS for MSCS Security Setup` > `Oracle Service` on all cluster nodes.

3. Reboot and log on again.

**Caution**

- Do not reboot a cluster node, if the installation of the OFS software is in progress on another cluster node.
- 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.

4. Install the latest OFS Patch [page 214].

### 8.4.1.2 MSCS Only: Installing the Latest Oracle Fail Safe Patch Set

**Use**

For more information on the latest note Oracle Fail Safe patch set, see SAP Note 1972760.
You have to perform the following procedure on all cluster nodes.

**Procedure**

1. Download the OFS patch set from [https://support.sap.com/software/databases.html](https://support.sap.com/software/databases.html) Oracle Database Patches ORACLE PATCHES ORACLE PATCHES MISCELLANEOUS.
2. Install the patch set as described in SAP Note 1865953.

### 8.4.2 Configuring the First Cluster Node

At the beginning of the SWPM installation, you will be asked to choose between FSC and CSD installation option. For more information, see Installation [page 211].

When you run the *First Cluster Node* option, the installer:

- Creates the `saploc` share, pointing to a local disk
- Creates the `sapmnt` share, pointing to a local disk if the CSD option is used, or to the external file share if the FSC option is used
- 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.

### 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 159].
- CSD: You must install the SCS instance on a shared disk, and the ERS instance and SAP Host Agent on a local disk.
  
  FSC: You must install the SCS instance on a local disk, like ERS instance and SAP Host Agent.

atee

**Note**

If you are installing SAP NetWeaver 7.5 Process Integration (PI) system, it is mandatory to use different shared disks for the SCS instance if you’re using a shared disk cluster. In case you use a File Share Cluster, you have to use different `sapmnt` shares for both instances.
If you select the FSC option at the beginning of the installation, the global parts of a SAP system are stored on an external file share. The SCS instance, the ERS instance, and SAP Host Agent are installed on a local disk.

**Procedure**

1. Run the installer [page 110] and on the Welcome screen, choose <Product> <Database> SAP Systems <System> High-Availability System First Cluster Node.

   **i Note**
   If the installer prompts you to log off from your system, log off and log on again.

2. Enter the required parameter values.

   **i 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.

**More Information**

Moving Cluster Groups, or Services and Applications, or Roles [page 229]

**8.4.3 Creating the Oracle Fail Safe Group**

You perform the following steps in the Fail Safe Manager on the first cluster node.

**Procedure**

**Creating the OFS Group with OFS Version 4.1**

1. You have installed the PowerShell scripts for Microsoft Failover Clustering.
   For more information, see SAP Note 1976879.

2. Open PowerShell in elevated mode change to the following directory:
   `<Oracle_Home>\sap\ora_mscs`


4. Enter the required parameters.
5. Add the shared database disk to the resource group as follows:
   2. Select group Storage.
   3. Right-click the shared database disk, and choose More Actions > Move this resource to another service or application.

Creating the OFS Group with OFS Version 3.4.2

The following procedure applies for Windows Server 2008 (R2).

1. Start the Oracle Fail Safe Manager on Windows Server 2008 (R2) as follows:
   Choose Start > Programs > Oracle -<OFSClient_Home> > Oracle Fail Safe Manager.
   The first time, you add the OFSClient, the window Add Cluster To Tree appears.
   Perform the following steps:
   1. Insert your virtual cluster name.
   2. Right-click the cluster and choose Connect to cluster.
   3. Enter the following and then confirm your entries with OK:

<table>
<thead>
<tr>
<th>User name</th>
<th>&lt;user&gt; (Oracle Fail Safe account as entered in section Installing the Oracle Fail Safe Software [page 212])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Password</td>
<td>&lt;password&gt;</td>
</tr>
<tr>
<td>Cluster Alias</td>
<td>&lt;virtual_cluster_name&gt; (name of the cluster you are installing)</td>
</tr>
<tr>
<td>Domain</td>
<td>&lt;domain_name&gt;</td>
</tr>
</tbody>
</table>

4. In the Welcome dialog box, choose Verify Cluster.

   The window Clusterwide Operation: Verifying Fail Safe Cluster shows the steps that are executed to verify the cluster. When you are informed that the operation has completed successfully, close the window.

2. In the Oracle Fail Safe Manager window, create the Fail Safe group Oracle<DBSID>.
   Choose Groups > Create.
   The window Create Group... appears.
3. Enter the Group Name ORACLE<DBSID>.
Caution

Do not user blanks in the group name.

In answer to the question **Do you want to allow the group to failback to preferred node?**, select **Prevent failback**.

The window **Finish Creating the Group** appears and displays information about the group. Choose **OK**.

4. In the window **Add Virtual Address**, select **Yes** to indicate that you want to add a virtual address to the group.

The **Add Resource to Group: - Virtual Address** appears.

5. Select **Show networks accessible by clients**.

Under **Network** the entry for your **public** network appears.

Under **Virtual Address**, for **Host Name**, enter the `<VirtualHostname> of the database host.

The **IP Address** is automatically recognized.

Choose **Finish**.

The window **Add the Virtual Address to the Fail Group** appears.

Choose **OK**.

**Note**

If the **Fail Safe Manager** cannot create the **Fail Safe** group, look at the **Windows Event Logs** on all cluster nodes to find out the reason for the failure.

6. Add the shared database disk to the resource group as follows:

1. Start the **Failover Cluster Manager** with **Start > Administrative Tools > Failover Cluster Manager**

2. Select group **Storage**.

3. Right-click the shared database disk, and choose **More Actions > Move this resource to another service or application**

**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 Oracle shared disk is **Online** on the first cluster node.
- The Oracle cluster group is **Online** on the first cluster node.
**Procedure**

Perform the following steps on the first cluster node.

1. **Run the installer [page 110]** and on the Welcome screen, choose \<Product\> \<Database\> SAP Systems \<System\> High-Availability System Database Instance.

   ![Caution](image)
   
   The following only applies if you use multiple Oracle Homes:
   
   - You must have one ORACLE_HOME per database instance on every cluster node on local disks.
   - All ORACLE_HOMES must use the same disks and directories and ORACLE_HOME names on all DB cluster nodes.
   - Since each ORACLE_HOME uses its own Oracle Listener, you must specify unique Oracle TCP/IP port numbers for every database in the DB failover cluster. Use 1527 for the first database, 1526 for the second database, 1525 for the third, and so on.

2. Follow the instructions in the installer dialogs and enter the required parameter values.
   1. For the profile directory you have to use the UNC path of the virtual SCS host name, for example: `\<SAPGLOBALHOST>\sapmnt\<SAPSID>\SYS\profile`.
      
      In an HA-system, the virtual host name of the 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 name.

   ![Caution](image)
   
   By default, the installer locates the saparch, sapreorg, sapcheck, and saptrace directories on the last available drive. If this is a local drive, you must specify that these directories reside on a shared disk by using Advanced Database Options, which you can find on the screen Oracle Database Instance. Continue with Next until you can select Windows Drive Mapping. Check the box and choose Next. Then relocate all folders to a shared disk.

   ![Note](image)
   
   For more information about the input parameters, position the cursor on a parameter and press the F1 key in the installer.

**8.4.5 Setting Up a Shared Database Directory in Oracle Home**

This section describes how to set up a shared database directory in the Oracle home.

The Oracle database uses an spfile. With an spfile you can set up a central (shared) directory `<Oracle_Home>\database` for Microsoft failover clustering with a junction.

A central directory `<Oracle_Home>\database` has the following advantages:

- You can also use sqlplus remotely to make changes to your profile parameters.
You only have to make the changes in the parameter files once in the shared `<Oracle_Home>\database` directory.

**Procedure**

**Setting Up a Shared Database Directory in Oracle Home for OFS 4.1**

1. Stop the Oracle database using `sqlplus`.
2. Stop the Oracle Service `OracleService<DBSID>`.
3. In the `sapdata1` directory on the shared disk in the cluster, create the directory `database`:
   ```bash
   <Shared_Disk>:\ORACLE\<DBSID>\sapdata1\database
   ```
4. On the first cluster node, change to the `<Oracle_Home>\database` directory, and enter the following command in the command prompt:
   ```bash
   move * <Shared_Disk>:\ORACLE\<DBSID>\sapdata1\database
   ``
5. Delete the directory `<Oracle_Home>\database` with the command:
   ```bash
   rd /q /s database
   ``

   **i Note**
   You can also use the Windows Explorer to delete the directory.

6. Create the junction with the following command:
   - **Windows Server 2012 (R2):**
     ```bash
     cmd /c mmlink /d <Oracle_Home>\database <Shared_Disk>:\ORACLE\<DBSID>\sapdata1\database
     ```
   - **Windows Server 2008 (R2):**
     ```bash
     mmlink /d <Oracle_Home>\database <Shared_Disk>:\ORACLE\<DBSID>\sapdata1\database
     ```
7. Select the resource group `Oracle<DBSID>` and move it to the additional cluster node.
8. Repeat steps 5 and 6 on the additional cluster node.
9. Create the `init<DBSID>_OFS.ora` file in the `database` directory, and enter the following line:
   ```bash
   spfile = <Path_To_Oracle_Home>\database\SPFILE<DBSID>.ora
   ```

**Setting Up a Shared Database Directory in Oracle Home for OFS 3.4.2**

1. Stop the Oracle database using `sqlplus`.
2. Stop the Oracle Service `OracleService<DBSID>`.
3. In the `sapdata1` directory on the shared disk in the cluster, create the directory `database`:
   ```bash
   <Shared_Disk>:\ORACLE\<DBSID>\sapdata1\database
   ```
4. On the first cluster node, change to the `<Oracle_Home>\database` directory, and enter the following command in the command prompt:
   ```bash
   move * <Shared_Disk>:\ORACLE\<DBSID>\sapdata1\database
   ```

   **i Note**
   You had to apply all changes in the parameter file `init<DBSID>.ora` in the `<Oracle_Home>\database`-directories on all cluster nodes.
5. Delete the directory `<Oracle_Home>\database` with the command:
   ```cmd
   rd /q /s database
   ```
   **Note**
   
   You can also use the Windows Explorer to delete the directory.

6. Create the junction with the following command:
   - Windows Server 2008 (R2) and Windows Server 2012 (R2):
     Create the junction with the following command:
     ```cmd
     mklink /j `<Oracle_Home>\database <Shared_Disk>:\ORACLE<DBSID> \sapdata1\database
     ```
   7. Select the resource group Oracle<DBSID> and move it to the additional cluster node.
   8. Repeat steps 5 and 6 on the additional cluster node.
   9. Create the init<DBSID>_OFS.ora file in the database directory, and enter the following line:
      ```
      spfile = `<Path_To_Oracle_Home>\database\SPFILE<DBSID>.ora
      ```

8.4.6 Adding the Oracle Database Resource to the Fail Safe Group

This section describes how to add the Oracle Database Resource to the Fail Safe Group.

Adding the Oracle Database Resource to the Fail Safe Group for OFS 4.1

1. Copy the sqlnet.ora file from the directory `<ORACLE_HOME>\network\admin` on the first cluster node to the same directory on the additional cluster nodes.
2. Change to the directory `<Oracle_Home>\sap\ora_mscs`.
3. Right-click the script `AddOracleDbToOracleClusterGroup.ps1` and choose Run with PowerShell.
4. Enter the required parameters:
   1. Enter the `<DBSID>` of your Oracle database.
   2. Enter the path and file name of your Oracle parameter file on the shared cluster disk:
      ```
      <Shared_Disk>:\ORACLE<DBSID>\SAPDATA1\DATABASE\INIT<DBSID>_OFS.ORA
      ```
5. Copy tnsnames.ora from `%ORACLE_HOME%\network\admin` to `<sapglobalhost>\sapmnt <SAPSID>\SYS\profile\oracle`.

Adding the Oracle Database Resource to the Fail Safe Group for OFS 3.4.2

1. Copy the sqlnet.ora file from the directory `<ORACLE_HOME>\network\admin` on the first cluster node to the same directory on the additional cluster nodes.
2. Start the Oracle Fail Safe Manager on Windows Server 2008 (R2) and Windows Server 2012 (R2) as follows:
   - Choose Start > Programs > Oracle - <Fail_Safe_Home_Name> > Oracle Fail Safe Manager
3. If the Welcome dialog box appears, choose Verify Cluster. Otherwise, right-click the cluster and choose Verify Cluster.

**Note**

All cluster nodes must be up and running for this step.

The window Verifying Cluster shows the steps that are executed to verify the cluster. When you are informed that the operation has completed successfully, close the window.

4. Add the SAP database to the cluster group `Oracle<DBSID>`:
   1. In the tree on the left, choose Nodes > First Cluster Node > Standalone Resources.
   2. Select the database `<DBSID>.world`.
   3. Choose Add to Group.

5. In the dialog box Add Resource to Group – Resources:
   - For Resource Type, select Oracle Database.
   - For Group name, select Oracle<DBSID>.
   - Choose Next.

6. In the dialog box Add Resource to Group – Database Identity, enter the following information:

<table>
<thead>
<tr>
<th>Service Name</th>
<th><code>&lt;DBSID&gt;.world</code></th>
</tr>
</thead>
<tbody>
<tr>
<td>Instance Name</td>
<td><code>&lt;DBSID&gt;</code></td>
</tr>
<tr>
<td>Database Name</td>
<td><code>&lt;DBSID&gt;</code></td>
</tr>
<tr>
<td>Parameter File</td>
<td><code>&lt;Shared_Drive&gt;:\&lt;ORACLE_HOME&gt;\oracle\&lt;DBSID&gt;\sapdata1\database\init&lt;DBSID&gt;_OFS.ora</code></td>
</tr>
</tbody>
</table>

7. When you have made all entries, choose Next.

8. In the dialog box Add Resource to Group – Database Authentication:
   - Select Use SYS account.
   - Enter and confirm the password.


10. In the dialog box Finish Adding the Database to the Group, choose OK to add the database resource to the group.

11. In the dialog box Confirm Add database to Group, choose Yes.

    The Adding resource `<DBSID>.world` to group window, shows the steps that are executed to add the database to the cluster group.

12. Copy tnsnames.ora from `%ORACLE_HOME%\network\admin to `\\<sapglobalhost>\sapmnt \<SAPSID>\SYS\profile\oracle`. 

Installation of SAP Systems Based on the Application Server Java of SAP NetWeaver 7.1 to 7.5 on Windows: Oracle High Availability with Microsoft Failover Clustering
8.4.7 Configuring the Additional Cluster Node

Use

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
- If you chose the FSC option:
  - Installs the SCS instance
  - Installs the enqueue replication server instance (ERS) for the SCS instance
- Installs the SAP Host Agent

⚠️ Caution

You must install the instances and SAP Host Agent on a local disk.

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 159].
- You have already performed the First Cluster Node [page 215] option.

Procedure

1. Run the installer [page 110] and on the Welcome screen, choose <Product> <Database> SAP Systems <System> 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.
8.4.8 Additional Steps for the Oracle Fail Safe Configuration

Use

To complete the Oracle Fail Safe configuration, you must perform the following steps:

- Adjusting security settings
  Oracle only allows the use of computer local groups to identify database operators and administrators. Therefore, the local groups that were created on the first cluster node are not known on the other cluster nodes. This means that you have to create these groups manually and grant them access to the database directories.
- Additional steps for a standalone clustered database – see Additional Steps for Clustered Database Instance Running Separately in One Cluster at the end of this section

Procedure

1. On the additional cluster nodes, create the local groups ORA_<dbsid>_DBA and ORA_<dbsid>_OPER and add <sapsid>adm, and SAPService<sapsid> to these groups.

   Example
   ```
   net localgroup ORA_<DBSID>_DBA /add
   net localgroup ORA_<DBSID>_OPER /add
   net localgroup ORA_<DBSID>_DBA <sapsid>adm /add
   net localgroup ORA_<DBSID>_OPER <sapsid>adm /add
   net localgroup ORA_<DBSID>_DBA SAPService<sapsid> /add
   net localgroup ORA_<DBSID>_OPER SAPService<sapsid>/add
   net localgroup ORA_<DBSID>_DBA <Oracle_home_user>/add
   net localgroup ORA_<DBSID>_OPER <Oracle_home_user>/add
   ```

2. Create additional domain groups (only once per database SID), and add the relevant users to these groups.

   Example
   ```
   net group ORA_<DBSID>_DBA /add /domain
   net group ORA_<DBSID>_OPER /add /domain
   net group ORA_<DBSID>_DBA <SAPSID>adm /add /domain
   net group ORA_<DBSID>_OPER <SAPSID>adm /add /domain
   net group ORA_<DBSID>_DBA SAPService<SAPSID>/add /domain
   net group ORA_<DBSID>_OPER SAPService<SAPSID>/add /domain
   net group ORA_<DBSID>_DBA <Oracle_home_user>/add /domain
   ```
3. On all cluster nodes, add the domain groups to the local Oracle groups as follows:
   net localgroup ora_<DBSID>_DBA <domain>
   ORA_<DBSID>_DBA /add
   net localgroup ora_<DBSID>_OPER <domain>
   ORA_<DBSID>_OPER /add

4. On all oracle<DBSID> directories on the shared disk drives, adjust the security settings as follows:
   1. Right-click \oracle<DBSID> and select Properties.

   i Note
   You can select multiple directories before you right-click to adjust the security settings.

   2. Select the Security tab, add both domain groups ORA_<dbsid>_DBA and ORA_<dbsid>_OPER to the
      Group or Users list and grant these domain groups Full Control.

   3. Choose Advanced and check Replace all existing inheritable permissions on all descendants with
      inheritable permissions from this object (Windows Server 2008), or Replace all child object permissions
      with inheritable permissions from this object (Windows Server 2008 R2).

   i Note
   Entries like S-1-5-21-3434515990-3720764010-1539101042-1005 represent local groups from other
   cluster nodes, which cannot be translated to users on the current host. You can safely delete these
   entries from the list.

Additional Steps for Clustered Database Instance Running Separately in One Cluster

If you have not installed the (A)SCS instance and the database instance together in one cluster, but run the
database instance in a separate Microsoft failover cluster, you have to perform the following steps on the
database cluster:

1. On each additional cluster node, grant the user rights by adding the <DBSID>adm user to the local
   Administrators group.

2. Copy the user environment of the database user <DBSID>adm as follows:
   1. Log on to the first cluster node as the user <DBSID>adm.
   2. Run regedit.exe and right-click HKEY_CURRENT_USER\Environment.
   3. Choose Export to export the environment key to a file.
   4. On each additional cluster node, log on as user <DBSID>adm.
   5. Import the exported registry key to the registry by executing the .reg file.

3. Enable the DB13 support on standalone database servers by setting up a standalone Gateway as described
   in SAP Note1764650.
   You have to perform this step on all cluster nodes and for each database instance.
8.4.9 Installing the Primary Application Server Instance

Use

You have the following options to install the primary application server instance:

- You install the primary application server instance on a cluster node.
- You install the primary application server instance on a host outside of Microsoft Failover Cluster.

Procedure

1. Run the installer [page 110] and on the Welcome screen, choose <Product> - <Database> - SAP Systems - <System> - High-Availability System - Primary Application Server 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 primary application server instance on an cluster node, make sure that on the screen General SAP System Parameters for the:
     - Profile Directory, you use the UNC path (not the local path) of the SAPGLOBALHOST host name, for example: \\<SAPGLOBALHOST>\sapmnt\<SAPSID>\SYS\profile.
     - If CSD option is used, the virtual host name of the SCS instance is the same as the SAPGLOBALHOST host name.
     - If FSC option is used the virtual host name of the SCS instance is different from the SAPGLOBALHOST host name.

   Note
   - If you are installing a SAP NetWeaver 7.5 Process Integration (PI) system, make sure that the virtual host names for the ASCS instance and the SCS instance are different.

   - Installation Drive, you choose the local disk where you want to install the primary application server instance.
4. Check that the primary application server instance is running.

8.4.10 Installing the Additional Application Server Instance

Use

You have to install at least one additional application server instance for Microsoft Failover Clustering.
You have the following options, to install the additional application server instance:

- You install the additional application server instance on a cluster node.
- You install the additional application server instance on a host outside of the failover cluster.

**Procedure**

1. **Run the installer [page 110]** and on the Welcome screen, choose <Product> <Database> SAP Systems <System> High-Availability System Additional Application Server 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.

   **i Note**
   - For more information about the input parameters, position the cursor on a parameter and press F1 in the installer.
   - If you install the additional application server instance on a cluster node, make sure that on the screen General SAP System Parameters for the:
     - Profile Directory, you use the UNC path (not the local path) of the SAPGLOBALHOST host name, for example: \\
         \<SAPGLOBALHOST\>\sapmnt\<SAPSID>\SYS\profile.
     - If CSD option is used, the virtual host name of the SCS instance is the same as the SAPGLOBALHOST host name.
     - If FSC option is used, the virtual host name of the SCS instance is different from the SAPGLOBALHOST host name.
     - Installation Drive, you choose the local disk where you want to install the additional application server instance.
     - Additional application server instance, you enter the same instance number as for the primary application server.
4. When you have finished, change the instance profile of the additional application server instance so that the number of its work processes equals the number of work processes of the primary application server instance.
5. If required, install more additional application server instances outside of the failover cluster.

   **i Note**
   - Make sure that on the screen General SAP System Parameters for the Profile Directory, you use the UNC path of the virtual SCS host name, for example:
     \\
         \<SAPGLOBALHOST\>\sapmnt\<SAPSID>\SYS\profile.
   - In a HA-system, the virtual host name of the 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 install the permanent SAP licenses on all cluster nodes.
2. After a new installation of a clustered SCS instance, make sure that you update the saprc.dll (part of the NTCLUST.SAR package in c:\windows\system32 as soon as possible. For more information, see SAP Note 1596496.
3. For information about Rolling Kernel Switch on Windows Failover Clusters, see SAP Note 2199317.
4. You perform the post-installation checks for the enqueue replication server. For more information, see the SAP Library at:

<table>
<thead>
<tr>
<th>SAP Release and SAP Library Quick Link</th>
<th>SAP Library Path (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>○ SAP NetWeaver 7.3</td>
<td><img src="#" alt="Application Help" /> ➤ <img src="#" alt="Function-Oriented View" /> ➤ <img src="#" alt="Application Server" /> ➤ <img src="#" alt="Application Server Infrastructure" /> ➤ <img src="#" alt="Standalone Enqueue Server" /> ➤ <img src="#" alt="Installing the Standalone Enqueue Server" /> ➤ <img src="#" alt="Replication Server: Check Installation" /></td>
</tr>
<tr>
<td>○ SAP NetWeaver 7.3 including Enhancement Package 1</td>
<td><img src="#" alt="Application Help" /> ➤ <img src="#" alt="Function-Oriented View" /> ➤ <img src="#" alt="Application Server" /> ➤ <img src="#" alt="Application Server Infrastructure" /> ➤ <img src="#" alt="Components of SAP NetWeaver Application Server" /> ➤ <img src="#" alt="Standalone Enqueue Server" /> ➤ <img src="#" alt="Installing the Standalone Enqueue Server" /> ➤ <img src="#" alt="Replication Server: Check Installation" /></td>
</tr>
<tr>
<td>○ SAP NetWeaver 7.4</td>
<td><img src="#" alt="Application Help" /> ➤ <img src="#" alt="Function-Oriented View" /> ➤ <img src="#" alt="Application Server" /> ➤ <img src="#" alt="Application Server Infrastructure" /> ➤ <img src="#" alt="Components of SAP NetWeaver Application Server" /> ➤ <img src="#" alt="Standalone Enqueue Server" /> ➤ <img src="#" alt="Installing the Standalone Enqueue Server" /> ➤ <img src="#" alt="Replication Server: Check Installation" /></td>
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<tr>
<td>○ SAP NetWeaver 7.5</td>
<td><img src="#" alt="Application Help" /> ➤ <img src="#" alt="Function-Oriented View" /> ➤ <img src="#" alt="Application Server" /> ➤ <img src="#" alt="Application Server Infrastructure" /> ➤ <img src="#" alt="Components of SAP NetWeaver Application Server" /> ➤ <img src="#" alt="Standalone Enqueue Server" /> ➤ <img src="#" alt="Installing the Standalone Enqueue Server" /> ➤ <img src="#" alt="Replication Server: Check Installation" /></td>
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</table>

5. If required, you perform the general post-installation steps [page 125] 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 229]
- Starting and Stopping the SAP System in a Microsoft Failover Cluster Configuration [page 230].
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, or SCS from one cluster node to the other, you use the following:

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

**Note**
With Oracle, you can also use the *Fail Safe Manager*.

**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) and higher)
  - 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) and higher) or services and applications (Windows Server 2008 (R2)), proceed as follows:

- Windows Server 2012 (R2) and higher:
  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):
  - You use the *Failover Cluster Manager* to move services and applications that do not belong to the database groups.
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) and higher).

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) and higher). Therefore, you cannot move these groups with the Failover Cluster Manager.

- If you use Windows Server 2012 (R2) and higher, 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`

### Moving Oracle Groups with the Fail Safe Manager

You use the Fail Safe Manager to move the Oracle resources, for example, the Oracle database group.

1. Start the Fail Safe Manager as follows.
   - Windows Server 2012 (R2) and higher:
     Press Ctrl + ESC and Ctrl + TAB. Choose Oracle Fail Safe Manager.
   - Windows Server 2008 (R2):
     Start the Fail Safe Manager with Start ➤ All Programs ➤ Oracle <Home_Name_fail safe> ➤ Oracle Fail Safe Manager:

2. On the left-hand pane, right-click the group you want to move, and choose Move to a Different Node on the context menu.
   The group is now moved to another cluster node.

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

#### Use
An SAP System in an HA configuration is typically configured into two HA groups: one cluster resource group contains the database resources, the other group contains the SAP SCS instance.
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 all SAP instances whether they are clustered or not, except the database instance.

With certain HA administration tools (Cluster Administrator, Failover Cluster Manager, or PowerShell), you can only start or stop clustered SAP instances, such as the 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 SCS and Database Instance”.

For more information about SAP MMC or SAPControl, see Starting and Stopping the SAP System [page 171].

**i Note**

- To use SAP MMC or SAPControl for starting or stopping a clustered SAP instance, the "SAP <SAPSID> <Instance_Number> Service" resource of the clustered instance must be online. Therefore, SAP recommends keeping the "SAP <SAPSID> <Instance_Number> 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.

**Starting and Stopping the clustered SCS and Database Instance**

With certain HA administration tools, such as PowerShell (Windows Server 2012 (R2) and higher), or Failover Cluster Manager (Windows Server 2008 (R2)), you can only start or stop clustered SAP instances, such as the SCS instance or the database instance. For all other non-clustered instances, such as additional application server instances or the primary application server instance, you must use the SAP MMC or SAPControl.

- Using PowerShell (Windows Server 2012 (R2) and higher)
  1. To start or stop the clustered 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 SCS instance, open PowerShell in elevated mode, and enter the following command:
        ```
        start-clusterresource "SAP <SAPSID> <Instance_Number> Instance"
        ```
     3. To stop the clustered 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 the Failover Cluster Manager** (Windows Server 2008 (R2))
  With the *Failover Cluster Manager* (Windows Server 2008 (R2)), you can only start or stop clustered instances such as the SCS instance. To start the database instance, you use the *Oracle Fail Safe Manager*. For all other non-clustered instances, such as additional application server instances or the primary application server instance, you must use the *SAP MMC* or *SAPControl*.
  To start or stop the clustered SCS 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 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*.
  3. To stop the 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*.

- **Using the Oracle Fail Safe Manager**
  With the *Oracle Fail Safe Manager*, you can only start or stop the clustered database instance.
  To start or stop the clustered database instance with the *Oracle Fail Safe Manager* do the following:
  1. Start the Oracle Fail Safe Manager as follows:
     - Windows Server 2012 (R2) and higher:
       Press `Ctrl` + `ESC` and `Ctrl` + `TAB`, choose *Oracle Fail Safe Manager*.
     - Windows Server 2008 (R2):
       Choose [Start] > [Programs] > *Oracle - <Fail_Safe_Home_Name>*> > [Oracle Fail Safe Manager].
  2. To start the clustered database instance in the *Oracle Fail Safe Manager*, right-click the database `<DBSID>.world` in the Fail Safe group *ORACLE<DBSID>*. and choose *Place online*.
  3. To stop the clustered database instance in the *Oracle Fail Safe Manager*, right-click the database `<DBSID>.world` in the Fail Safe group *ORACLE<DBSID>*. and choose *Take offline*.

**Note**

- Before you stop the database instance, make sure that you have stopped the SCS instance with the *Failover Cluster Manager* (Windows Server 2008 (R2)).
- If a dialog box appears, asking you how to take the database offline, choose *Immediate*. 
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