Installation of SAP Systems Based on the Application Server ABAP of SAP NetWeaver 7.0 to 7.03 on UNIX: IBM Db2 for Linux, UNIX, and Windows

Database: IBM Db2 for Linux, UNIX, and Windows
Operating System: UNIX and Linux
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Document History

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

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

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
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<tr>
<td>2.8</td>
<td>2018-09-17</td>
<td>Updated version for software provisioning manager 1.0 SP24 (SL Toolset 1.0 SP24)</td>
</tr>
<tr>
<td>2.7</td>
<td>2018-05-07</td>
<td>Updated version for software provisioning manager 1.0 SP23 (SL Toolset 1.0 SP23)</td>
</tr>
</tbody>
</table>
Updated version for software provisioning manager 1.0 SP22 (SL Toolset 1.0 SP22)

- New Features:
  - Signature check for installation archives, documented in: New Features, Downloading SAP Kernel Archives (Archive-Based Installation) Archive-Based Installation for Diagnostics Agent, Downloading the SAP Kernel Archives Required for the Dual-Stack Split (Without Operating System and Database Migration), Downloading the SAP Kernel Archives Required for Operating System and Database Migration
  - Installer Log Files Improvements, documented in: New Features, Useful Information about the Installer, Troubleshooting with the Installer
  - Splitting Off an ABAP Central Services Instance from an Central Instance, documented in: New Features, Splitting Off an ABAP Central Services Instance from an Central Instance

- New Features section restructured:
  - As of SP22, a dedicated subsection for each new SP has been created. New features below SP22 remain in a common table.
  - The Java SDT GUI - which was in the SP21 version still available in parallel to the SL Common GUI - has been deprecated with SP22. As of SP22, SL Common GUI is the only available installer GUI:
    - The following sections which were explicitly related to Java SDT GUI were completely removed from this documentation: Performing a Remote In-
<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Description</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td><strong>Installation Remote Processing of the Installer (Java SDT GUI only), Starting the Java SDT GUI Separately, Running the Installer in Accessibility Mode</strong> (general accessibility information was moved to <strong>Useful Information About the Installer</strong>).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>○ The Java SDT GUI-specific information was removed from the common installer sections: <strong>Running the Installer</strong>, <strong>Useful Information About the Installer</strong>, <strong>Interrupted Processing of the Installer</strong>, <strong>Troubleshooting with the Installer</strong>, <strong>Deleting an SAP System or Single Instances</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>● New section <strong>Using the Step State Editor (SAP Support Experts Only)</strong> added to section <strong>Additional Information About the Installer</strong>.</td>
</tr>
<tr>
<td>2.5</td>
<td>2017-09-11</td>
<td>Updated version for software provisioning manager 1.0 SP21 (SL Toolset 1.0 SP21)</td>
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<tr>
<td></td>
<td></td>
<td>● New Features:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>○ Media Signature Check, documented in: <strong>New Features</strong>, <strong>Running the Installer</strong>, <strong>Preparing the Installation Media</strong>.</td>
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<tr>
<td>2.4</td>
<td>2017-05-22</td>
<td>Updated version</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● New Features:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>○ New SAPUI5-based user graphical interface (GUI) “SL Common GUI”, documented in: <strong>Prerequisites for Running the Installer</strong>, <strong>Running the Installer</strong>, <strong>Useful Information About the Installer</strong></td>
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<tr>
<td></td>
<td></td>
<td>○ Cleanup of operating system users, documented in: <strong>SAP System Parameters</strong>, <strong>Creating Operating System Users and Groups</strong>.</td>
</tr>
<tr>
<td>Version</td>
<td>Date</td>
<td>Description</td>
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<td>2.3.1</td>
<td>2017-03-02</td>
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<tr>
<td>2.3</td>
<td>2017-02-07</td>
<td>Updated version for software provisioning manager 1.0 SP19 (SL Toolset 1.0 SP19)</td>
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<tr>
<td>2.2</td>
<td>2016-10-10</td>
<td>Updated version for software provisioning manager 1.0 SP18 (SL Toolset 1.0 SP18)</td>
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<tr>
<td></td>
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<td>• New Features: Option to choose installing an integrated SAP Web Dispatcher during the ASCS instance installation, documented in: ASCS Instance with Integrated SAP Web Dispatcher [page 21]</td>
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<tr>
<td></td>
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<td>• New dialogs for tablespace pools for IBM Db2 for Linux, UNIX, and Windows</td>
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<tr>
<td>2.1</td>
<td>2016-06-06</td>
<td>Updated version</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Re-designed dialogs for tablespace storage management and layout (sapdata and saptmp directories)</td>
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<td></td>
<td></td>
<td>For more information, see New Features [page 14].</td>
</tr>
<tr>
<td>2.0</td>
<td>2016-02-15</td>
<td>Updated version</td>
</tr>
<tr>
<td>1.9</td>
<td>2015-10-12</td>
<td>Updated version</td>
</tr>
<tr>
<td>1.8</td>
<td>2015-09-14</td>
<td>Updated version</td>
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<tr>
<td>1.7</td>
<td>2015-04-27</td>
<td>Updated version</td>
</tr>
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<td>1.6</td>
<td>2014-11-25</td>
<td>Updated version</td>
</tr>
<tr>
<td>1.5</td>
<td>2014-07-07</td>
<td>Updated version</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Instead of a separate installation guide for each UNIX-based operating system, we now deliver a single installation guide for all UNIX-based operating systems. Sections that are only relevant for one or more specific operating systems are highlighted accordingly.</td>
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Installation of SAP Systems Based on the Application Server ABAP of SAP NetWeaver 7.0 to 7.03 on UNIX: IBM Db2 for Linux, UNIX, and Windows
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<th>Description</th>
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<tbody>
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<td>1.4</td>
<td>2014-03-17</td>
<td>Updated version</td>
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<td>1.3</td>
<td>2013-10-28</td>
<td>Updated version</td>
</tr>
<tr>
<td>1.2</td>
<td>2013-07-15</td>
<td>Updated version</td>
</tr>
<tr>
<td>1.1</td>
<td>2013-04-02</td>
<td>Updated version</td>
</tr>
<tr>
<td>1.0</td>
<td>2012-12-17</td>
<td>First version for Software Provisioning Manager 1.0</td>
</tr>
</tbody>
</table>
1  About this Document

This installation guide describes how to install an SAP system based on the application server ABAP of SAP NetWeaver 7.0 to 7.0 EH43 using the installation tool Software Provisioning Manager 1.0 SP24 (“installer” for short), which is part of SL Toolset 1.0 SP24.

This guide is valid for the operating systems AIX, HP-UX, Linux, and Solaris, and covers the SAP system products and releases listed in SAP 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 https://support.sap.com/pam.

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

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

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

Related Information

Naming Conventions [page 10]
Constraints [page 11]
Before You Start [page 12]
SAP Notes for the Installation [page 12]
New Features [page 14]

1.1  Naming Conventions

- 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 88].

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 http://scn.sap.com/docs/DOC-30236.

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

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

- “installer” refers to Software Provisioning Manager.
- “SAP system” refers to SAP system based on the application server of SAP NetWeaver 7.0 / 7.0 including Enhancement Package 1 / 7.0 including Enhancement Package 2 / 7.0 including Enhancement Package 3.
- “ABAP system” refers to SAP system based on the application server ABAP of SAP NetWeaver 7.0 / 7.0 including Enhancement Package 1 / 7.0 including Enhancement Package 2 / 7.0 including Enhancement Package 3.
- “Diagnostics” refers to diagnostics in SAP Solution Manager.
- “Diagnostics Agent” refers to the agent of diagnostics in SAP Solution Manager.

### IBM Product Terminology

The following abbreviations are used in this guide:

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Refers to…</th>
</tr>
</thead>
<tbody>
<tr>
<td>Db2 V9.7</td>
<td>Version 9.7 for IBM Db2 for Linux, UNIX, and Windows</td>
</tr>
<tr>
<td>Db2 10.1</td>
<td>Version 10.1 for IBM Db2 for Linux, UNIX, and Windows</td>
</tr>
<tr>
<td>Db2 10.5</td>
<td>Version 10.5 for IBM Db2 for Linux, UNIX, and Windows</td>
</tr>
<tr>
<td>Db2 11.1</td>
<td>Version 11.1 for IBM Db2 for Linux, UNIX, and Windows</td>
</tr>
</tbody>
</table>

### 1.2 Constraints

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

- Your operating system platform must be **64-bit**.
- The `startsap` and `stopsap` commands have been deprecated. For more information and for information on alternatives, see Starting and Stopping SAP System Instances Using Commands [page 179].
1.3 Before You Start

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

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

You can find a printed version of the Master Guide in your installation package or you can download the latest version from http://help.sap.com.

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

<table>
<thead>
<tr>
<th>Title</th>
<th>Internet Address</th>
</tr>
</thead>
</table>

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.
<table>
<thead>
<tr>
<th>SAP Note Number</th>
<th>Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1680045</td>
<td>Release Note for Software Provisioning Manager 1.0</td>
<td>Software provisioning manager 1.0 with installation and system copy for SAP NetWeaver-based systems</td>
</tr>
<tr>
<td>2378874</td>
<td>Install SAP Solutions on Linux on IBM Power Systems (little endian)</td>
<td>Information about how to install SAP solutions on Linux on IBM Power Systems (little endian)</td>
</tr>
<tr>
<td>1724554</td>
<td>Inst. Systems Based on SAP NetWeaver 7.0 incl. EHPs: UNIX IBM Db2</td>
<td>Database-specific information about the SAP system installation (ABAP and Java) and corrections to this documentation.</td>
</tr>
<tr>
<td>702175</td>
<td>DB6: Support of Db2 DPF and IBM Db2 pureScale</td>
<td>Platform-specific additional information about the support of multiple partitions with IBM Db2 for Linux, UNIX, and Windows and about IBM Db2 pureScale</td>
</tr>
<tr>
<td>101809</td>
<td>DB6: Supported Versions and Fix Pack Levels</td>
<td>Provides information about the currently released database and Fix Pack combinations</td>
</tr>
<tr>
<td>73606</td>
<td>Supported Languages and Code Pages</td>
<td>Information on possible languages and language combinations in SAP systems</td>
</tr>
<tr>
<td>1972803</td>
<td>SAP on AIX: Recommendations</td>
<td>This SAP Note contains recommendations and clarifications for many topics relevant for SAP on AIX.</td>
</tr>
<tr>
<td>1075118</td>
<td>SAP on HP-UX: FAQ</td>
<td>This SAP Note contains information that is specific to the SAP system installation on HP-UX.</td>
</tr>
<tr>
<td>2369910</td>
<td>SAP Software on Linux: General information</td>
<td>This SAP Note contains Linux-specific information about the SAP system installation.</td>
</tr>
<tr>
<td>1669684</td>
<td>SAP on Oracle Solaris 11</td>
<td>This SAP Note contains information and references to SAP Notes relevant for Solaris 11</td>
</tr>
<tr>
<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>
</tr>
<tr>
<td>1258912</td>
<td>PLM Core 7.00 Release Notes and Information</td>
<td>Information and references to other notes about installing PLM Core 7.00 and importing PLM Core 7.00 Support Packages.</td>
</tr>
<tr>
<td>915367</td>
<td>TDL: Automatic activation of the transaction data areas</td>
<td>Information about a TDL function and the settings you have to make during a system setup.</td>
</tr>
</tbody>
</table>
### 1.5 New Features

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


<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<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 114] and Troubleshooting with the Installer [page 120].</td>
<td>Software Provisioning Manager 1.0 SP22 (SL Toolset 1.0 SP22)</td>
</tr>
<tr>
<td>Splitting Off an ABAP Central Services Instance from an Existing Central Instance</td>
<td>With the installer option Split Off ASCS Instance from existing Central Instance, you can move the message server and the enqueue work process from an existing central instance to a newly installed ABAP central services instance (ASCS instance). The new ASCS instance is installed while the split is done. For more information, see Splitting Off an ABAP Central Services Instance from an Existing Central Instance [page 172].</td>
<td>Software Provisioning Manager 1.0 SP22 (SL Toolset 1.0 SP22)</td>
</tr>
<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 88] and Running the Installer [page 108].</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) &quot;SL Common GUI&quot;. For more information, see Useful Information About the Installer [page 114], Running the Installer [page 108].</td>
<td>Software Provisioning Manager 1.0 SP20 (SL Toolset 1.0 SP20)</td>
</tr>
<tr>
<td>Feature</td>
<td>Description</td>
<td>Availability</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Cleanup of Operating System Users</td>
<td>You can now specify during the Define Parameters phase that the operating system users are to be removed from group sapinst after the execution of the installer has completed. For more information, see Operating System Users in SAP System Parameters [page 45].</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 89]. 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>Option to install an SAP Web Dispatcher in an ASCS instance</td>
<td>You can now install an SAP Web Dispatcher in an ASCS instance. You can choose this option while running the ASCS instance installation. For more information, see ASCS Instance with Integrated SAP Web Dispatcher [page 21]</td>
<td>Software Provisioning Manager 1.0 SP18 (SL Toolset 1.0 SP18)</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 SP16</td>
</tr>
<tr>
<td>Feedback Evaluation Form available in the Software Provisioning Manager:</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 the Prerequisites section in Running the Installer [page 108].</td>
<td>Software Provisioning Manager 1.0 SP12</td>
</tr>
<tr>
<td>Installation option ASCS Instance available for central and distributed system installation</td>
<td>You can also choose to install the ABAP central services instance (ASCS instance) when installing a central system or distributed system based on SAP NetWeaver Application Server for ABAP. So far this was only possible for high-availability systems.</td>
<td>Software Provisioning Manager 1.0 SP11</td>
</tr>
<tr>
<td>Area</td>
<td>Description</td>
<td>Availability</td>
</tr>
<tr>
<td>----------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>Tablespace pools</td>
<td>During installation and system copy, tablespace pools are created for data,</td>
<td>Software Provisioning Manager 1.0 SP18 (SL Toolset 1.0 SP18)</td>
</tr>
<tr>
<td></td>
<td>index, and long tablespaces. For more information, see SAP System Database</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Parameters [page 50].</td>
<td></td>
</tr>
<tr>
<td>Script create</td>
<td>The script createTablespaces.sql, which was already available previously for</td>
<td>Software Provisioning Manager 1.0 SP18 (SL Toolset 1.0 SP18)</td>
</tr>
<tr>
<td>Tablespaces.sql</td>
<td>creating tablespaces manually, was updated to incorporate the creation of</td>
<td></td>
</tr>
<tr>
<td>changed</td>
<td>a standard tablespace pool for SAP systems.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>For more information about createTablespaces.sql, see Creating Tablespace</td>
<td></td>
</tr>
<tr>
<td></td>
<td>systems Manually (Optional) [page 169]. For more information about tablespace</td>
<td></td>
</tr>
<tr>
<td></td>
<td>pools, see Db2 Tablespace [page 62].</td>
<td></td>
</tr>
<tr>
<td>Automatic storage</td>
<td>As of SAP NetWeaver 7.51, IBM DB2 for Linux, UNIX, and Windows databases are</td>
<td>Software Provisioning Manager 1.0 SP18 (SL Toolset 1.0 SP18)</td>
</tr>
<tr>
<td></td>
<td>always installed with automatic storage for SAP systems. Deselecting</td>
<td></td>
</tr>
<tr>
<td></td>
<td>automatic storage is no longer possible in the installer dialog.</td>
<td></td>
</tr>
</tbody>
</table>
Dialogs for tablespace directories and storage group paths redesigned

The installer now provides completely re-designed dialogs for tablespaces, where you can specify the following:

- Creation of tablespaces during installation
- Automatic storage management for tablespaces
- Directories for table data, index data, and temporary data in tablespaces (sapdata and saptmp directories)

You can now also specify if you want additional parent directories sapdata and saptmp, under which all subdirectories for table data, index data, and temporary data are located.

Previously, saptmp directories were only available as of DB2 10.1 for storage group paths for temporary data if automatic storage management was selected. As of Software Provisioning Manager 1.0 SP17, saptmp directories are also available for lower DB2 versions if you do not use automatic storage. For DB2 10.1 and higher, they are now always available, regardless of whether you have chosen automatic storage or not.

For more information, see Required File Systems for IBM Db2 for Linux, UNIX, and Windows [page 57].

Storage group paths for temporary tablespaces

As of IBM DB2 version 10.1, the installer automatically creates the storage group SAPTMPGRP for temporary tablespaces if automatic storage management is selected. This ensures that permanent tablespaces for table data and indexes are kept separate from temporary tablespaces (see also SAP Note 1895425). By default, the installer creates four storage group paths for the storage group SAPTMPGRP.

For more information, see SAP System Database Parameters [page 50].

<table>
<thead>
<tr>
<th>Area</th>
<th>Description</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dialogs for tablespace directories and storage group paths redesigned</td>
<td>The installer now provides completely re-designed dialogs for tablespaces, where you can specify the following:</td>
<td>Software Provisioning Manager 1.0 SP17 (SL Toolset 1.0 SP17)</td>
</tr>
<tr>
<td>Storage group paths for temporary tablespaces</td>
<td>As of IBM DB2 version 10.1, the installer automatically creates the storage group SAPTMPGRP for temporary tablespaces if automatic storage management is selected. This ensures that permanent tablespaces for table data and indexes are kept separate from temporary tablespaces (see also SAP Note 1895425). By default, the installer creates four storage group paths for the storage group SAPTMPGRP.</td>
<td>Software Provisioning Manager 1.0 SP08 (SL Toolset 1.0 SP13)</td>
</tr>
</tbody>
</table>
This section shows the installation options covered by this guide. You have to decide what exactly you want to install because the steps you have to perform vary according to the installation option you choose.

**Note**

This installation guide does not describe how to install an SAP system running on IBM Db2 for Linux, UNIX, and Windows with the IBM Db2 pureScale Feature. If you want to install an SAP system with the IBM Db2 pureScale Feature, follow the instructions of the installation guide *Running an SAP System on IBM Db2 with the pureScale Feature* (see Online Information from SAP [page 192]).

**Related Information**

Central System [page 18]
Distributed System [page 19]
High-Availability System [page 20]
ASCS Instance with Integrated SAP Web Dispatcher [page 21]
Dialog Instance [page 23]
SAP Host Agent as a Separate Installation [page 25]

## 2.1 Central System

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

These are the following instances:

- **ABAP central services instance (ASCS instance)**
  - Contains the ABAP message server and the ABAP enqueue server
    - SAP recommends installing the ASCS instance because this enables you to cluster the message server and enqueue server separately from the central instance.
    - However, you can also install your SAP system without the ASCS instance. In this case, follow the instructions in *Installing a Central or Distributed System Without the ASCS Instance* [page 165].
    - Optionally you can install the ASCS instance with an integrated SAP Web Dispatcher. For more information, see **ASCS Instance with Integrated SAP Web Dispatcher** [page 21].

- **Database instance (DB instance)**

- **Central instance**

Additionally, you can install one or more dialog instances. For more information, see **Dialog Instance** [page 23].
The following figure shows an example of SAP instances in a central system.

![Central ABAP System Diagram]

### 2.2 Distributed System

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

These are the following instances:

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

  **Note**

  SAP recommends installing the ASCS instance because this enables you to cluster the message server and enqueue server separately from the central instance.

  However, you can also install your SAP system without the ASCS instance. In this case, follow the instructions in *Installing a Central or Distributed System Without the ASCS Instance [page 165]*.

- **Database instance (DB instance)**
- **Central instance**

  **Note**

  You can also use the SAP transport host or the SAP global host as your central instance host.

  Optionally, you can install one or more dialog instances. For more information, see *Installation of a Dialog Instance [page 23]*.
The following figure assumes the following:

- The ASCS instance runs on the SAP global host. The SAP global host is the host where the global file system /<sapmnt> resides. For more information, see SAP Directories [page 79]. If you do not want to install the ASCS instance, you have to prepare the global host.
- The global transport directory resides on a separate SAP transport host. For more information, see SAP Transport Host [page 68].

![Distributed ABAP System Diagram]

2.3 High-Availability System

In a high-availability system, every instance can run on a separate host. These are the following instances:

- ABAP central services instance (ASCS instance)
  Contains the ABAP message server and the ABAP enqueue server
  Optionally you can install the ASCS instance with an integrated SAP Web Dispatcher. For more information, see ASCS Instance with Integrated SAP Web Dispatcher [page 21].
- Enqueue replication server instance (ERS instance) for the ASCS instance
- Database instance
- Central instance

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

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

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

- The ASCS instance and its related ERS instance run on the switchover cluster infrastructure. For more information, see Setting Up File Systems for a High-Availability System [page 84].
- The global transport directory resides on a separate SAP transport host. For more information, see SAP Transport Host [page 68].

2.4 ASCS Instance with Integrated SAP Web Dispatcher

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

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

**i Note**

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

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

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

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

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

If you want to install an SAP Web Dispatcher for another system - that is not for the system for which you use the ASCS instance and with its own SAP system ID and instance number - you have to install SAP Web Dispatcher separately as described in the documentation which you can find under http://help.sap.com/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 Library at: http://help.sap.com/nw70 <Enhancement Package> Application Help » SAP NetWeaver by Key
2.5 Dialog Instance

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

A dialog instance can run on:

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

**Note**

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

**Note**

If you want to install dialog instances running on an operating system other than the central instance, see Heterogeneous SAP System Installation [page 181]. For example, you need to do this if your central instance runs on Linux for z System but the dialog instance is to run on Windows.

**Dialog Instance for a Central System**

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

- On the main host of the SAP system, that is, on the host on which the central instance and the database instance run
- On dedicated hosts
Dialog Instance for a Central ABAP System

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

Dialog Instance for a Distributed System
Dialog Instance for a High-Availability System

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

- The host of the central instance
- Dedicated hosts

This figure assumes the following:

- The ASCS instance and its related ERS instance run on the switchover cluster infrastructure. For more information, see Setting Up File Systems for a High-Availability System [page 84].
- The global transport directory resides on a separate SAP transport host. For more information, see SAP Transport Host [page 68].

For more information, see High-Availability System [page 20].

2.6 SAP Host Agent as a Separate Installation

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

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

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

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

The section **Installing the SAP Host Agent Separately [page 166]** describes how to perform the installation.

### Installing the SAP Host Agent

You can also install SAP Host Agent manually. For more information, see the SAP Host Agent documentation at:

<table>
<thead>
<tr>
<th>Release</th>
<th>SAP Help Portal Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP NetWeaver 7.0</td>
<td><a href="https://help.sap.com/viewer/p/SAP_NETWEAVER">https://help.sap.com/viewer/p/SAP_NETWEAVER</a></td>
</tr>
<tr>
<td>SAP NetWeaver 7.0 including enhancement package 1</td>
<td>SAP NetWeaver 7.0&lt;Including Enhancement Package&gt;</td>
</tr>
<tr>
<td>SAP NetWeaver 7.0 including enhancement package 3</td>
<td>Application Help &gt; SAP NetWeaver by Key Capability</td>
</tr>
<tr>
<td>SAP NetWeaver 7.0 including enhancement package 2</td>
<td>Solution Life Cycle Management by Key Capability &gt; SAP Host Agent &gt; Installing SAP Host Agent Manually</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3 Planning

3.1 Planning Checklist

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

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

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

Prerequisites

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

Central, Distributed, or High-Availability System

i Note

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

You can install the optional standalone units J2EE Adapter Engine, Partner Connectivity Kit, Application Sharing Server only as a central system.

1. You check the hardware and software requirements [page 28] for each installation host.
2. You plan how to set up user and access management [page 43].
3. You identify Basic SAP System Installation Parameters [page 44].
4. You carefully plan the setup of your database [page 56].
5. You decide on the transport host to use [page 68].
6. To install a high-availability system, you read Planning the Switchover Cluster for High Availability [page 69].
7. Continue with Preparation [page 73].
Dialog Instance

1. You check the hardware and software requirements [page 28] for the installation host on which you want to install one or more dialog instances.
2. You identify Basic SAP System Installation Parameters [page 44].
3. Continue with Preparation [page 73].

3.2 Hardware and Software Requirements

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

Prerequisites

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

Procedure

1. Check the Product Availability Matrix at http://support.sap.com/pam for supported operating system releases.
2. Check the hardware and software requirements using:
   - The Prerequisite Checker in one of two modes:
     - Standalone mode (optional) before the installation process
       For more information, see Running the Prerequisite Checker Standalone [page 29].
     - Integrated in the installer (mandatory) during the installation process
       For more information, see Running the Installer [page 108].
   - The hardware and software requirements tables in Requirements for the SAP System Hosts [page 30].
3. If you want to install a production system, the values provided by the Prerequisite Checker and the hardware and software requirements checklists are not sufficient. In addition, do the following:
   - You contact your hardware vendor, who can analyze the load and calculate suitable hardware sizing depending on:
     - The set of applications to be deployed
○ How intensively the applications are to be used
○ The number of users

3.2.1 Running the Prerequisites Check in Standalone Mode (Optional)

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

Context

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

Procedure

1. Download and unpack the Software Provisioning Manager 1.0 archive to a local directory and make the SAP kernel media available as described in Preparing the Installation Media [page 88].
2. Start the installer as described in Running the Installer [page 108].
3. On the Welcome screen, choose <Product> ➤ Software Life-Cycle Options ➤ Additional Preparation Options ➤ Prerequisites Check.
4. Follow the instructions in the installer dialogs and enter the required parameters.

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

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

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

3.2.2 Requirements for the SAP System Hosts

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

In addition to the hardware and software requirements listed here, make sure that you also consult the hardware and software requirements provided by IBM at http://www.ibm.com/support/docview.wss?uid=swg27038033.

If you are planning to install an SAP NetWeaver BW system with BLU Acceleration, note that there are special hardware and software requirements in addition to those listed in this section. For more information, see the Hardware and Software Requirements for BLU Acceleration chapter in the SAP NetWeaver BW Administration Guide (see Online Information from SAP [page 192]).

**i Note**

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

Related Information

- General Installation Information for Your Operating System [page 31]
- Hardware Requirements [page 31]
- Software Requirements [page 36]
- Other Requirements [page 42]
### 3.2.2.1 General Installation Information for Your Operating System

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

#### Operating System Information

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIX</td>
<td>Before you start the installation, make sure that you have read SAP Note 1972803. In addition, we also recommend that you check the information available in the SAP on AIX space on the SAP Community Network at <a href="https://www.sap.com/community/topic/aix.html">https://www.sap.com/community/topic/aix.html</a>.</td>
</tr>
<tr>
<td>HP-UX</td>
<td>Before you start the installation, make sure that you have read SAP Note 1075118. In addition, we also recommend that you check the information available in the SAP on HP-UX Best Practices space on the SAP Community Network at <a href="https://www.sap.com/community/topic/hp-ux.html">https://www.sap.com/community/topic/hp-ux.html</a>.</td>
</tr>
<tr>
<td>Linux</td>
<td>Before you start the installation, make sure that you have read the SAP Notes for your Linux distribution listed in the central SAP Note 2369910. In addition, we also recommend that you check the information available in the SAP on Linux space on the SAP Community Network at <a href="https://www.sap.com/community/topic/linux.html">https://www.sap.com/community/topic/linux.html</a>.</td>
</tr>
<tr>
<td>Solaris</td>
<td>Before you start the installation, make sure that you have read SAP Note 1669684. In addition, we also recommend that you check the information available in the SAP on Oracle Solaris space on the SAP Community Network at <a href="https://www.sap.com/community/topic/oracle-solaris.html">https://www.sap.com/community/topic/oracle-solaris.html</a>.</td>
</tr>
</tbody>
</table>

In addition to the hardware and software requirements listed here, make sure that you also consult the hardware and software requirements provided by IBM at http://www.ibm.com/support/docview.wss?uid=swg27038033.

### 3.2.2.2 Hardware Requirements

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

- **Note**

  If you are planning to install an SAP NetWeaver BW system with BLU Acceleration, note that BLU Acceleration has higher demands on hardware than the hardware requirements listed in this section.

  Therefore, make sure that you read the Hardware and Software Requirements for BLU Acceleration chapter in the SAP NetWeaver BW Administration Guide (see Online Information from SAP [page 192]).
<table>
<thead>
<tr>
<th>Requirement</th>
<th>Values and Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processing units</td>
<td><strong>For application server instances and database instances</strong>: The number or physical or virtual processing units usable by the operating system image must be equal to or greater than 2.</td>
</tr>
<tr>
<td></td>
<td><strong>For an ASCS instance running on a separate host</strong>: One physical or virtual processing unit usable by the operating system image might be sufficient.</td>
</tr>
<tr>
<td></td>
<td>Examples of processing units are processor cores or hardware threads (multithreading).</td>
</tr>
<tr>
<td></td>
<td>In a virtualized environment, ensure that adequate processor resources are available to support the workloads of the running SAP systems.</td>
</tr>
</tbody>
</table>
Hard disk space

- **General requirements:**
  - 4.3 GB of temporary disk space for every required installation medium that you have to copy to a local hard disk. For more information, see *Preparing the Installation Media* [page 88].
  - 1.2 GB of temporary disk space for the installation.
  - If there is no tape drive attached to your system, you need additional disk space for the files created by Db2’s database backup command and the archived database log files. Alternatively, you need access to network-based storage management products, such as Legato Networker or Tivoli Storage Manager (TSM) (for database backup/restore).
  - If an advanced disk array is available (for example, RAID), contact your hardware vendor to make sure that the data security requirements are covered by this technology.

- **Instance-specific requirements:**
  If you install several instances on one host, you have to add up the requirements accordingly.
  For more information about space requirements for the file systems and directories of the instances, see *SAP Directories* [page 79] and the appropriate database-specific information listed below.
  - ABAP central services instance (ASCS instance)
    2 GB
    If you install the ASCS instance with an integrated SAP Web Dispatcher, for the installation as such you require at least 1 GB of hard disk space in addition. For production use of the SAP Web Dispatcher, you need to reserve at least 5 GB.
  - Enqueue replication server instance for the ASCS instance (high-availability only)
    2 GB
  - Database instance:
    - For information about how much disk space is required for the database file systems, see SAP Note 1724554.

  - If there is no tape drive attached to your system, you need additional disk space for the files created by the database backup command of Db2 and the archived database log files. Alternatively, make sure that there is access to network-based storage management products, such as Legato Networker or Tivoli Storage Manager (TSM) (for database backup/restore).
  - Central instance:
    3 GB

**Note**
- For safety reasons (system failure), the file systems must be physically distributed over several disks or RAID-technology must be used.
- To ensure good performance of your production system, create separate file systems for the directories listed in *Required File Systems for IBM Db2 for Linux, UNIX, and Windows* [page 57].
<table>
<thead>
<tr>
<th>Requirement</th>
<th>Values and Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>○ Dialog instance:</td>
<td>3 GB</td>
</tr>
<tr>
<td>○ SAP Host Agent:</td>
<td>0.5 GB</td>
</tr>
</tbody>
</table>

**Note**

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

The following lists the RAM requirements for each instance.

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

- ABAP central services instance (ASCS instance)
  - Minimum 1 GB
  - If you install the ASCS instance with an integrated SAP Web Dispatcher, see SAP Note 2007212 for memory consumption in productive use.
- Enqueue replication server instance for the ASCS instance (high-availability only)
  - Minimum 1 GB
- Database instance:
  - Minimum 2 GB
- Central instance:
  - Minimum 3 GB (BW server: Minimum 2 GB)
- Dialog instance:
  - Minimum 3 GB (SAP NetWeaver BW server: Minimum 2 GB)
- SAP Host Agent:
  - 1 GB

**Note**

Only valid for **Platform**: HP-UX

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

**Note**

Only valid for **Platform**: Linux

See SAP Note 1382721 for the commands to display the RAM size on Linux.
## Requirement | Values and Activities
--- | ---
**AIX: Paging space** | You need hard disk drives with sufficient paging space. Calculate the required paging space as follows:
- Optimistic strategy:
  - You need at least 20 GB for the **central instance** and at least another 10 GB for every **dialog instance**.
  - In addition, you need at least 20 GB for the **central instance** and at least another 10 GB for the **SCS instance** and also for every **dialog instance**.
- Defensive strategy:
  - 3 * RAM, at least 20 GB
  - In addition, for the **database instance** you need:
    - 0.75 * RAM, if RAM is greater than 8 GB
    - 1 * RAM, if RAM is less than 8 GB
  - For the latest information about recommended paging space, see SAP Note [1121904](#).

**HP-UX: Swap Space** | You need hard disk drives with sufficient space for swap. Calculate the required swap space as follows:
- 2 * RAM, at least 20 GB
For more information about HP-UX swap space recommendations and about how to set up swap space, see SAP Note [1112627](#).

**Linux: Swap Space** | You need hard disk drives with sufficient space for swap. Calculate the required swap space as follows:
- 2 * RAM, at least 20 GB
We recommend that you use the amount of swap space as described in SAP Note [1597355](#). You might decide to use more or less swap space based on your individual system configuration and your own experience during daily usage of the SAP system.

**Solaris: Swap Space** | You need hard disk drives with sufficient space for swap:
- At least 20 GB are required. For more information, see SAP Note [570375](#).
You can execute `memlimits` to verify paging space size and kernel settings as follows:

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

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

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

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

### Software Requirements

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

#### Software Requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Values and Activities</th>
</tr>
</thead>
</table>
| Database software / client software | As of SAP NetWeaver 7.0 Enhancement Package 3 or higher, you must use at least IBM Db2 V9.7 or higher. (The database software is automatically installed by the SAP installer, the Software Provisioning Manager.)

For more information about supported database platforms, check the Product Availability Matrix (PAM) at http://support.sap.com/pam.

⚠️ Caution
- For the installation of your SAP system, only the English version of the Db2 database is supported.
- You must only use the Db2 software that is provided by the SAP installation media.

For information about supported database and Fix Pack combinations, see SAP Note 101809. |
<table>
<thead>
<tr>
<th>Requirement</th>
<th>Values and Activities</th>
</tr>
</thead>
</table>
| **AIX: Operating System Version** | Check the Product Availability Matrix (PAM) at [http://support.sap.com/pam](http://support.sap.com/pam) for supported operating system versions.  
Contact your OS vendor for the latest OS patches.  
Minimal OS requirements for the specific SAP Kernel releases are listed in SAP Note 1780629.  
You require at least AIX 6.1 TL7 SP10 to be able to run the installer.  
| **HP-UX: Operating System Version** | Check the Product Availability Matrix (PAM) at [http://support.sap.com/pam](http://support.sap.com/pam) for supported operating system versions.  
To check the operating system version on your installation hosts, use the following command: 
```
uname -r
```
For information about support time frames of HP-UX, see SAP Note 939891.  
The installation with IBM Db2 V9.7 and higher is only supported with HP-UX Itanium. As of IBM Db2 V9.7, the installation on the HP-UX platform PA_RISC is not supported.  
| **Linux: Operating System Version** | Check the Product Availability Matrix (PAM) at [http://support.sap.com/pam](http://support.sap.com/pam) for supported operating system versions.  
Contact your OS vendor for the latest OS patches.  
To check the operating system version on your installation hosts, use the following command: 
```
cat /etc/*-release
```
<table>
<thead>
<tr>
<th>Requirement</th>
<th>Values and Activities</th>
</tr>
</thead>
</table>
| **Solaris**: Operating System Version | Check the Product Availability Matrix (PAM) at [http://support.sap.com/pam](http://support.sap.com/pam) for supported operating system versions.  
To check the operating system version on your installation hosts, use the following command:  
```bash
/bin/uname -r
```
| **HP-UX**: OS Patches | Contact your OS vendor for the latest OS patches.  
To check the minimum required OS patches, see SAP Note [837670](http://support.sap.com/pam).  
SAP only supports the use of native binaries. Always use the appropriate SAP binaries for your processor. |
| **Solaris**: OS Patches | Contact your OS vendor for the latest OS patches.  
Check the relevant SAP Note for required Solaris patches:  
- Solaris 9 on **SPARC**: SAP Note [550585](http://support.sap.com/pam)  
- Oracle Solaris 10 on **SPARC**: SAP Note [832871](http://support.sap.com/pam)  
- Oracle Solaris 10 on x64: SAP Note [908334](http://support.sap.com/pam)  
- Oracle Solaris 11: SAP Note [1797712](http://support.sap.com/pam) |
<p>| <strong>AIX</strong>: Kernel Parameters | To adjust AIX Virtual Memory Management settings, see SAP Note <a href="http://support.sap.com/pam">973227</a>. |</p>
<table>
<thead>
<tr>
<th>Requirement</th>
<th>Values and Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP-UX: Kernel Parameters</td>
<td>To run an SAP system, make sure that you check and, if necessary, modify the HP-UX kernel.</td>
</tr>
</tbody>
</table>

**Caution**

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

Proceed as follows:

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

**Caution**

If a kernel value is already larger than the one suggested in the SAP Note, do not automatically reduce it to match the SAP requirement.

You have to analyze the exact meaning of such a parameter and, if required, to reduce the parameter value. In some cases this might improve the performance of your SAP applications.

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

After the installation, you should check the kernel using the `db2osconf` utility, which provides recommendations for appropriate kernel configuration parameters.

The `db2osconf` utility suggests values that are:

- Based on the size of your system
- High enough for a given system to accommodate most reasonable workloads

You can use `db2osconf` only in a Db2 64-bit environment. On HP-UX, no authorization is required. To make the changes recommended by the `db2osconf` utility, you must have root access.
<table>
<thead>
<tr>
<th>Requirement</th>
<th>Values and Activities</th>
</tr>
</thead>
</table>
| **Linux:** Kernel Parameters | Check SAP Note [2369910](#) for Linux kernel versions certified by SAP. To check the Linux kernel parameters for your Linux distribution, see one of the following SAP Notes:  
  - RHEL4: SAP Note [722273](#)  
  - RHEL5: SAP Note [1048303](#)  
  - RHEL6: SAP Note [1496410](#)  
  - RHEL7: SAP Note [2002167](#)  
  - SLES9: SAP Note [797084](#)  
  - SLES10: SAP Note [958253](#)  
  - SLES 11: SAP Note [1310037](#)  
  - SLES 12: SAP Note [1984787](#)                                                                                                                                   |
| **Note**               | Modify the kernel parameter `msgmni` as follows:  
  - In file `/etc/sysctl.conf`, add the line `kernel.msgmni=1024`.  
  - Activate the modified kernel parameters with the following command: `sysctl -p`  
  In most cases these steps are sufficient.                                                                                                                          |
| **Solaris:** Kernel Parameters | To run an SAP system, you must check and, if necessary, modify the Solaris kernel parameters or resource controls.  
  → Recommendation  
  We recommend that a UNIX system administrator performs all kernel modifications.  
  For more information about current Solaris kernel parameters and about how to modify them, see the relevant SAP Note:  
  - Solaris 9: SAP Note [395438](#)  
  - Oracle Solaris 10: SAP Note [724713](#)  
  - Oracle Solaris 11: SAP Note [1797712](#)  
  After the installation, check the kernel using the `db2osconf` utility, which provides recommendations for appropriate kernel configuration parameters. The `db2osconf` utility suggests values that are:  
  - Based on the size of your system  
  - High enough for a given system to accommodate most reasonable workloads  
  You can use `db2osconf` only in a Db2 64-bit environment. On Db2 for Solaris, you must have `root` access or be a member of the `sys` group. |
### Requirement | Values and Activities
--- | ---
**AIX**: National Language Support (NLS) | Make sure that National Language Support (NLS) and corresponding locales are installed.

**HP-UX**: National Language Support (NLS) | Make sure that National Language Support (NLS) and corresponding locales are installed.

You can check this as follows:

- Enter the following commands to check whether National Language Support (NLS) is installed:
  
  ```bash
  swlist -v | grep -i nls
  ```

  The output should contain the string NLS-AUX ...

- Enter the following commands to check which locales are available:
  
  ```bash
  locale -a
  ```

  The following files must be available: de_DE.iso88591, en_US.iso88591.

**Linux**: National Language Support (NLS) | Make sure that National Language Support (NLS) and corresponding locales are installed.

You can check this as follows:

- Ensure that the required locales such as the following are available:
  
  de_DE, en_US

- Check SAP Note 187864 for information about corrected operating system locales and SAP blended Code Pages.

**Solaris**: National Language Support (NLS) | Make sure that National Language Support (NLS) and corresponding locales are installed.

Enter the following command to check which locales are available:

```bash
locale -a
```

The following locale must be available: en_US.ISO8859-1

**System Language** | For the installation, you must choose English as the operating system language on all hosts that run SAP software.

**Linux**: Activated Hardware Drivers | To check the activated hardware drivers, enter the following command:

```bash
lsmod
```
### 3.2.2.4 Other Requirements

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

#### Other Requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Values and Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Web Browser</td>
<td>Make sure that you have at least one of the following web browsers installed on the host where you run the installer GUI:</td>
</tr>
<tr>
<td></td>
<td>- Microsoft Internet Explorer 11 or higher</td>
</tr>
<tr>
<td></td>
<td>- Microsoft Edge</td>
</tr>
<tr>
<td></td>
<td>- Mozilla Firefox</td>
</tr>
<tr>
<td></td>
<td>- Google Chrome</td>
</tr>
<tr>
<td></td>
<td>Always use the latest version of these web browsers</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>AIX: Additional Software</td>
<td>Make sure that the following additional file sets are installed:</td>
</tr>
<tr>
<td></td>
<td>- bos.adt = Base Application Development</td>
</tr>
<tr>
<td></td>
<td>- bos.perf = performance and diagnostics tools</td>
</tr>
<tr>
<td></td>
<td>- perfagent.tools = performance monitoring tools</td>
</tr>
<tr>
<td></td>
<td>- bos.perf.libperfstat = Performance Statistics Library</td>
</tr>
<tr>
<td>Host Name</td>
<td>To find out physical host names, open a command prompt and enter <code>hostname</code>. For more information about the allowed host name length and characters allowed for SAP system instance hosts, see SAP Note 611361.</td>
</tr>
</tbody>
</table>

**Only valid for 'Platform': HP-UX**

For HP-UX, see SAP Note 1503149 in addition.

**End of 'Platform': HP-UX**

If you want to use virtual host names, see SAP Note 962955.
### Requirement | Values and Activities
--- | ---
Login Shell | The installer only prompts you for this parameter if you use a login shell other than the recommended C shell (csh).

For more information, see SAP Note [202227](#).

Only valid for ‘Platform’: HP-UX

For HP-UX, see SAP Note [1038842](#) in addition.

End of ‘Platform’: HP-UX

SAP Host Agent installation:

- Make sure that `/bin/false` can be used as a login shell.

Only valid for ‘Platform’: AIX

AIX only: Add `/bin/false` to the list of valid login shells (attribute `shells`) in `/etc/security/login.cfg`.

End of ‘Platform’: AIX

<table>
<thead>
<tr>
<th>Platform</th>
<th>Sub-Requirement</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP-UX</td>
<td>Mount and file system configuration</td>
<td>For recommendations about block size and mount option configuration, see SAP Note <a href="#">1077887</a>.</td>
</tr>
<tr>
<td>Required additional shell</td>
<td>Make sure that the korn shell (ksh) is installed on the hosts where you install the SAP system. If you perform a system copy, make sure that the korn shell (ksh) is installed on the target system host.</td>
<td></td>
</tr>
<tr>
<td>Shared file systems for decentralized systems</td>
<td>If application servers are installed decentralized, then a “shared” file system must be installed, for example Network File System (NFS).</td>
<td></td>
</tr>
<tr>
<td>AIX: C++ Runtime Environment</td>
<td>Minimal C++ runtime requirements for the specific SAP Kernel releases are listed in SAP Note <a href="#">1780629</a>.</td>
<td></td>
</tr>
<tr>
<td>Linux: C compiler</td>
<td>Make sure that the C compiler <code>gcc</code> is installed.</td>
<td></td>
</tr>
</tbody>
</table>

### 3.3 Planning User and Access Management

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

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

- Central User Administration (CUA)
- Use an LDAP directory as the data source for user data.
Procedure

To specify the initial data source of the User Management Engine (UME), proceed as described in Specifying the Initial Data Source of the User Management Engine [page 104]

More Information

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


3.4 Basic Installation Parameters

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

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

- **Typical**
  If you choose Typical, you perform the installation with default settings. This means that the installer prompts you only for a small selection of input parameters. These parameters include at least the following:
  - SAP System ID and Database Connectivity Parameters
  - SAP system profile directory – only for systems with instances on separate hosts
  - Master password
  - System Landscape Directory (SLD) destination
  For more information about the parameters, see the corresponding tables below in this document. If you want to change any of the default settings, you can do so on the Parameter Summary screen.

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

  **i Note**
  If you want to install an ASCS instance with an integrated SAP Web Dispatcher instance [page 21], you must choose Custom. Otherwise, you are not prompted for the SAP Web Dispatcher installation parameters [page 56] during the Define Parameters phase.

  **i Note**
  You cannot change from Custom to Typical mode or from Typical to Custom mode on the Parameter Summary screen.
The tables in the sections below list the basic system parameters that you need to specify before installing your SAP system. For all other installation parameters, use the tool help on the installer screens.

Related Information

SAP System Parameters [page 45]
SAP System Database Parameters [page 50]
Additional Parameters for an SAP Web Dispatcher Installation Integrated in the ASCS Instance (Optional) [page 56]

3.4.1 SAP System Parameters

The tables in this section 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.

General Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unicode System</td>
<td>Every new installation of an SAP system is Unicode. You can only deselect this option if you perform the system copy for a non-Unicode SAP system that has been upgraded to the current release. If you install a dialog instance in an existing non-Unicode system (that has been upgraded to the current release), the dialog instance is installed automatically as a non-Unicode instance. The installer checks whether a non-Unicode system exists and chooses the right executables for the system type.</td>
</tr>
</tbody>
</table>
| SAP System ID <SAPSID> | The SAP System ID <SAPSID> identifies the whole SAP system. Caution Choose your SAP system ID carefully since renaming requires considerable effort. Make sure that your SAP system ID:  
  - Is unique throughout your organization. Do not use an existing <SAPSID> when installing a new SAP system.  
  - Consists of exactly three alphanumeric characters  
  - Contains only uppercase letters  
  - Has a letter for the first character  
  - Does not include any of the reserved IDs listed in SAP Note 1979280  
  - If you want to install a dialog instance, make sure that no Gateway instance with the same SAP system ID (SAPSID) exists in your SAP system landscape. |
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Definition</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.</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>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>
<tr>
<td></td>
<td>To find out instance numbers of SAP systems that already exist on the installation host, look for subdirectories ending with <code>&lt;Instance_Number&gt;</code> of local (not mounted) <code>/usr/sap/&lt;SAPSID&gt;</code> directories.</td>
</tr>
<tr>
<td></td>
<td>For more information about the naming of SAP system instances, see <a href="#">SAP Directories</a> [page 79].</td>
</tr>
</tbody>
</table>

**Caution**

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

**End of 'Platform': AIX**

**Caution**

**HP-UX only:** Do not use:

- 75 for the instance number because this number is already used by the operating system. For more information, see SAP Note [29972](#).
- 02 as the instance number because this number is used to determine the port number for report RSLGCOLL, which is `14<Instance_Number>` by default. However, port 1402 is already used by the OS process `rslisten`. If you still decide to use 02 as the instance number, the instance fails to start during the installation process. You then have to manually change the port number for report RSLGCOLL to continue with the installation. For more information, see [Running the Installer](#) [page 108].

**End of 'Platform': HP-UX**
### Parameter Definitions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP System Profile Directory</td>
<td><code>&lt;sapmnt&gt;/&lt;SAPSID&gt;/profile</code> or <code>&lt;usr/sap&gt;/&lt;SAPSID&gt;/SYS/profile</code>&lt;br&gt;The installer retrieves parameters from the SAP system profile directory of an existing SAP system.&lt;br&gt;SAP profiles are operating system files that contain instance configuration information.&lt;br&gt;The installer prompts you to enter the location of the profile directory when the installation option that you execute is not the first one belonging to your SAP system installation, for example if you are installing a distributed system or a dialog instance to an existing SAP system.&lt;br&gt;See also the description of the parameters SAP System ID and Database ID. <code>/usr/sap/&lt;SAPSID&gt;/SYS/profile</code> is the soft link referring to <code>&lt;sapmnt&gt;/&lt;SAPSID&gt;/profile</code>.</td>
</tr>
<tr>
<td>Master Password</td>
<td>Common password for all users created during the installation:&lt;br&gt;&lt;br&gt;<strong>Basic Password policy</strong>&lt;br&gt;The master password must meet the following requirements:&lt;br&gt;- It must be 8 to 14 characters long&lt;br&gt;- It must contain at least one letter (a-z, A-Z)&lt;br&gt;- It must contain at least one digit (0-9)&lt;br&gt;- It must not contain \ (backslash) or &quot; (double quote).&lt;br&gt;Depending on the installation option, additional restrictions may apply.</td>
</tr>
<tr>
<td>DNS Domain Name for SAP System</td>
<td>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.&lt;br&gt;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:&lt;br&gt;<code>&lt;Host_Name&gt;.&lt;Domain_Name&gt;</code>&lt;br&gt;The DNS Domain Name is needed to define the URLs for the ABAP application servers. It is appended to the server name to calculate the FQDN.&lt;br&gt;&lt;br&gt;<strong>Example</strong>&lt;br&gt;If your application server host is called kirk.wdf.sap.com, the DNS Domain Name is wdf.sap.com.</td>
</tr>
</tbody>
</table>
Path to SAPCRYPTO.SAR

The SAP Cryptographic Library is required to enable Secure Sockets Layer (SSL) encryption of HTTP connections. In most cases, it is installed automatically from the kernel medium. In case it is not installed automatically and you are prompted for it during the installation, you can download it as described in SAP Note 455033.

This software product is subject to export control regulations in Germany as the country of origin and import regulations of your own country. SAP may not yet have a corresponding export license for your user or company. Contact the contract department in your local SAP company. To download the SAP Cryptographic Software from the SAP Help Portal, you need a customer user ID. Before any transfer of these software products to persons, companies or other organizations outside your company, in particular in the case of any re-export of the software products, authorization is required from the German export control authorities. This might also be required from your responsible national export control authorities. This also applies to transfers to affiliated companies. Corresponding laws and regulations in the recipient country may also exist which restrict the import or the use of these software products.

### Ports

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABAP Message Server Port</td>
<td><strong>Caution</strong> The message server port number must be unique on the host where the message server for the SAP system is running. If there are several message servers running on one host, the message server ports must all be unique. If you do not specify a value, the default port number is used. <strong>ABAP Message Server Port</strong> There is an external message server port and an internal message server port. The ABAP message server uses both the internal and the external message server ports. The default profile contains the configuration for both message server ports. The <strong>external</strong> message server port uses the parameter rdisp/msserv with default value 36&lt;Instance_Number_Of_ABAP_Message_Server_Instance&gt;. The <strong>internal</strong> message server port uses the parameter rdisp/msserv_internal with default value 39&lt;Instance_Number_Of_ABAP_Message_Server_Instance&gt;.</td>
</tr>
</tbody>
</table>
Operating System Users

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating System Users and Groups</td>
<td>The installer processes the operating system users as follows:</td>
</tr>
<tr>
<td></td>
<td>● If the operating system users do not exist, the installer creates the following users:</td>
</tr>
<tr>
<td></td>
<td>○ The SAP system administrator user <code>&lt;sapsid&gt;adm</code></td>
</tr>
<tr>
<td></td>
<td>○ Database administrator users</td>
</tr>
<tr>
<td></td>
<td>The installer sets the master password for these users by default. You can overwrite and change the passwords either by using the parameter mode</td>
</tr>
<tr>
<td></td>
<td>Custom or by changing them on the parameter summary screen.</td>
</tr>
<tr>
<td></td>
<td>● If the operating system users already exist, the installer prompts you for the existing password, except if the password of these users is</td>
</tr>
<tr>
<td></td>
<td>the same as the master password.</td>
</tr>
<tr>
<td></td>
<td>● Make sure that the user ID and group ID of these operating system users are unique and the same on each relevant application server instance host.</td>
</tr>
<tr>
<td></td>
<td>The <code>sapinst_instdir</code> directory belongs to a group named <code>sapinst</code>. If this group is not available, it is created automatically as a local group.</td>
</tr>
<tr>
<td></td>
<td>For security reasons, we recommend removing the operating system users from the group <code>sapinst</code> after the execution of the installer has completed.</td>
</tr>
<tr>
<td></td>
<td>During the Define Parameters phase of the installer, you can specify that the operating system users are to be removed automatically from the group <code>sapinst</code> after the execution of the installer has completed.</td>
</tr>
<tr>
<td></td>
<td>For more information about the group <code>sapinst</code>, see Creating Operating System Users and Groups [page 74].</td>
</tr>
<tr>
<td></td>
<td>For more information about the <code>sapinst_instdir</code> directory, see Useful Information About the Installer [page 114].</td>
</tr>
</tbody>
</table>
### 3.4.2 SAP System Database Parameters

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Database ID &lt;DBSID&gt;</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.</td>
</tr>
<tr>
<td></td>
<td>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 that you reinstall the SAP system.</td>
</tr>
<tr>
<td></td>
<td>• If you want to install a new database, 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>Db2 instance owner db2&lt;dbsid&gt;</td>
<td><code>db2&lt;dbsid&gt;</code> has the Db2 system administration authorities and belongs to group <code>db&lt;dbsid&gt;adm</code>, which has DB2 SYSADM authorities. By default, user <code>db2&lt;dbsid&gt;</code> is a member of group <code>db&lt;dbsid&gt;adm</code>.</td>
</tr>
<tr>
<td>ABAP database schema</td>
<td>This is the name of the database schema where ABAP tables are created. The default name for the ABAP database schema is <code>sap&lt;sapsid&gt;</code>. You can change the name of the ABAP database schema during the dialog phase of the installer, but the name must still conform to the pattern <code>sapxxx</code>, where <code>xxx</code> can be replaced by any alphanumeric characters.</td>
</tr>
<tr>
<td>ABAP database connect user</td>
<td>The default name for the ABAP connect user is <code>sap&lt;sapsid&gt;</code>. You can change the name of the ABAP connect user during the dialog phase of the installer, but the name must still conform to the pattern <code>sapxxx</code>, where <code>xxx</code> can be replaced by any alphanumeric characters.</td>
</tr>
<tr>
<td><strong>Recommendation</strong></td>
<td>We recommend that you keep the name of the ABAP connect user identical to the name of the ABAP database schema in standard use cases.</td>
</tr>
<tr>
<td></td>
<td>The exception to this rule, for example, is a system copy using database means, where Db2 is not able to change the schema name. So you can choose a connect user name that is different from the schema name.</td>
</tr>
<tr>
<td>Parameters</td>
<td>Description</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| ID of the `db<dbsid>adm` group | **Note**  
In a multi-partitioned database environment, the group ID **must** be the same on all database partition servers.                                                                                      |
| `db<dbsid>adm` group | Members of this group have DB2 SYSADM authorities. By default, user `db2<dbsid>` is a member of this group.                                                                                                 |
| ID of the `db<dbsid>ctl` group | **Note**  
In a multi-partitioned database environment, the group ID **must** be the same on all database partition servers.                                                                                      |
| `db<dbsid>ctl` group | Members of this group have DB2 SYCTRL authorities. By default, `<sapsid>adm` is a member of this group.                                                                                                      |
| ID of the `db<dbsid>mnt` group | **Note**  
In a multi-partitioned database environment, the group ID **must** be the same on all database partition servers.                                                                                      |
| `db<dbsid>mnt` group | Members of this group have DB2 SYMAINT authorities.                                                                                                                                                       |
| ID of the `db<dbsid>mon` group | **Note**  
In a multi-partitioned database environment, the group ID **must** be the same on all database partition servers.                                                                                      |
| `db<dbsid>mon` group | Members of this group have DB2 SYSMON authorities.  
By default, `sap<sapsid>` (the ABAP database connect user) is a member of this group.                                                                                                         |
| Database communication port | The Db2 communication port is used for TCP/IP communication between the database server and remote Db2 clients.  
In a central system installation and for the database instance in a distributed installation, the installer always proposes 5912 as default value.  
**Note**  
The installer requests this value during the database instance installation. |
<table>
<thead>
<tr>
<th>Parameters</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>First port</td>
<td>The database partition servers communicate using registered services. During the installation a port range is assigned for this communication. The installer proposes default values. You must make sure that these values correspond to the values of your database partition servers. If necessary, adapt them according to your settings.</td>
</tr>
<tr>
<td></td>
<td><strong>Caution</strong></td>
</tr>
<tr>
<td></td>
<td>The value for first port <strong>must</strong> be the same for all database partition servers.</td>
</tr>
<tr>
<td></td>
<td>The range between first port and last port must correspond to the maximum number of partitions on a database partition server.</td>
</tr>
<tr>
<td>Last port</td>
<td>The database partition servers communicate using registered services. During the installation a port range is assigned for this communication. The installer proposes default values. You must make sure that these values correspond to the values of your database partition servers. If necessary, adapt them according to your settings.</td>
</tr>
<tr>
<td></td>
<td><strong>Caution</strong></td>
</tr>
<tr>
<td></td>
<td>The range between first port and last port must correspond to the maximum number of partitions on a database partition server.</td>
</tr>
<tr>
<td>Create tablespaces during the installation procedure</td>
<td>By default, the installer creates the required tablespaces for the SAP system. If the tablespace layout used by the installer does not meet your requirements, you can create the tablespaces manually by deselecting the option Create Tablespaces During the Installation Procedure on the dialog IBM Db2 for Linux and UNIX and Windows: Tablespace Storage Management. For more information, see Creating Tablespaces Manually (Optional) [page 169]. By default, automatic storage is selected for the database if possible. This is the recommended option. You can deselect automatic storage on the dialog IBM Db2 for Linux and UNIX and Windows: Tablespace Storage Management. As of SAP NetWeaver 7.51, deselection of automatic storage is no longer supported. For more information about tablespaces and automatic storage, see Db2 Tablespaces [page 62].</td>
</tr>
<tr>
<td>Parameters</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Automatic storage</td>
<td>By default, automatic storage is selected for the database if possible. This is the recommended option. You can deselect automatic storage on the dialog IBM Db2 for Linux and UNIX and Windows: Tablespace Storage Management. As of SAP NetWeaver 7.51, deselection of automatic storage is no longer supported. For more information about tablespaces and automatic storage, see Db2 Tablespaces [page 62].</td>
</tr>
<tr>
<td>Tablespace layout: Storage locations and layout for sapdata directories</td>
<td>The sapdata directories are the storage locations for the Db2 tablespaces. By default, the installer creates four sapdata directories (sapdata1, sapdata2, sapdata3, sapdata4). Change the number of directories if this is necessary in your customer environment. By default, tablespaces are stored in /db2/&lt;DBSID&gt;/sapdata&lt;n&gt; (with automatic storage) or in /db2/&lt;SAPSID&gt;/sapdata&lt;n&gt; (without automatic storage). You can change the default storage location on the Tablespace Layout dialog of the installer, so that all sapdata&lt;n&gt; directories are located under an additional sapdata parent directory. As of IBM Db2 10.1 and with automatic storage management, the sapdata directories are used as the storage group paths for the Db2 default storage group IBMSTOGROUP. This is the storage group to which tablespaces for regular table data and indexes are assigned. In SAP systems running on IBM Db2 10.1 or higher, temporary data is stored in the storage group SAPTMPGRP, for which you can also define storage group paths on the Tablespace Layout dialog of the installer.</td>
</tr>
<tr>
<td>Parameters</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Tablespace layout: Storage locations and layout for saptmp directories</td>
<td>As of IBM Db2 version 10.1, the installer automatically creates <code>saptmp</code> directories for temporary tablespaces. With automatic storage management selected, the storage group <code>SAPTMPGRP</code> for temporary tablespaces is also created. This ensures that permanent tablespaces for table data and indexes are kept separate from temporary tablespaces (see also SAP Note <a href="https://support.sap.com">1895425</a>). By default, temporary tablespaces are stored at <code>/db2/&lt;DBSID&gt;/saptmp&lt;n&gt;</code> (with automatic storage) or at <code>/db2/&lt;SAPSID&gt;/saptmp&lt;n&gt;</code> (without automatic storage). <code>saptmp</code> directories are also used for temporary data for lower Db2 versions if you do not use automatic storage management. By default, the installer creates four <code>saptmp</code> directories. On the Tablespace Layout dialog, you can change the number of directories if this is necessary in your customer environment. You can also change the default storage location on the Tablespace Layout dialog of the installer, so that all <code>saptmp&lt;n&gt;</code> directories are located under an additional <code>saptmp</code> parent directory.</td>
</tr>
<tr>
<td>Database memory or instance memory</td>
<td>Specify the size of the memory that Db2 requires for the database instance.</td>
</tr>
<tr>
<td>Minimize database size</td>
<td>You can significantly reduce the size of your database by selecting the following options in the installer during the dialog phase:</td>
</tr>
<tr>
<td></td>
<td>● Use Db2’s Data Compression</td>
</tr>
<tr>
<td></td>
<td>● Use Deferred Table Creation</td>
</tr>
<tr>
<td></td>
<td><strong>Caution</strong></td>
</tr>
<tr>
<td></td>
<td>Before you select these options, make sure that you have read the information in Optimization of Database Size on Disk [page 65] and SAP Note <a href="https://support.sap.com">1151343</a>.</td>
</tr>
<tr>
<td>Db2 software path</td>
<td>Specify the file system path where either an existing Db2 software installation already resides or where you want the new copy of Db2 to be installed.</td>
</tr>
<tr>
<td></td>
<td><strong>Recommendation</strong></td>
</tr>
<tr>
<td></td>
<td>If you want to install a new copy of Db2, we recommend that you accept the default path suggested by the installer.</td>
</tr>
<tr>
<td>Parameters</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>IBM Db2 pureScale Feature</td>
<td>Specify whether you want to install the software libraries required for the IBM Db2 pureScale Feature.</td>
</tr>
<tr>
<td></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></td>
<td>If you want to use the IBM Db2 pureScale Feature, you must purchase an IBM Db2 pureScale license (see SAP Note 1260217). For more information about the installation of IBM Db2 with the pureScale Feature, see the installation guide <em>Running an SAP System on IBM Db2 with the pureScale Feature</em> (see Online Information from SAP [page 192]).</td>
</tr>
<tr>
<td>IBM General Parallel File System (GPFS)</td>
<td>Specify whether you want to create IBM GPFS file systems using the installer. These file systems are required to install a Db2 pureScale cluster. If you want the installer to create the IBM GPFS file systems, specify the disks where the file systems will be located.</td>
</tr>
<tr>
<td></td>
<td>If you do not use the installer to create the IBM GPFS file systems and you want to install a Db2 pureScale cluster later, you must create the IBM GPFS file systems manually. For more information about GPFS, see the installation guide <em>Running an SAP System on IBM Db2 with the pureScale Feature</em> (see Online Information from SAP [page 192]).</td>
</tr>
<tr>
<td>Use of SAP standard tablespace pool</td>
<td>As a default, the installer creates one standard tablespace pool for your SAP system for data, indexes, and LOB objects. Tablespace pools help ensure a better distribution of data across tablespaces compared to the traditional tablespace layout. We recommend that you use tablespace pools.</td>
</tr>
<tr>
<td></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></td>
<td>Make sure that after the installation, you read SAP Note 2267446 to check whether your system fulfills the requirements for the use of tablespace pools.</td>
</tr>
<tr>
<td></td>
<td>For more information, see <em>Db2 Tablespaces</em> [page 62]. As of SAP NetWeaver 7.51, the tablespace pool for data, indexes, and LOB objects is always used and cannot be deselected anymore.</td>
</tr>
<tr>
<td>Tablespace pool size</td>
<td>The pool size must be between 10 and 99. The default size chosen by the installer is 20. The tablespace pool size determines the number of tablespaces that are generated for the pool. Tablespace pools consist of data tablespaces, index tablespaces, and long tablespaces. For example, if you choose a tablespace pool size of 20, you get a tablespace pool with 20 data tablespaces, 20 index tablespaces, and 20 long tablespaces.</td>
</tr>
</tbody>
</table>
3.4.3 Additional Parameters for an SAP Web Dispatcher Installation Integrated in the ASCS Instance (Optional)

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

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

<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 rdisp/mshost)</td>
</tr>
<tr>
<td>Message Server HTTP Port</td>
<td>HTTP port of the message server (profile parameter ms/server_port_&lt;xx&gt;)</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 webadm is created by the installer. You have to assign a password for this user.</td>
</tr>
</tbody>
</table>

**Related Information**

ASCS Instance with Integrated SAP Web Dispatcher [page 21]

3.5 Setup of Database Layout

**i Note**
The following sections apply especially to the installation of a production system.

When you plan your SAP system installation, it is essential to consider the setup of your database layout with regard to the distribution of, for example, SAP directories or database file systems, to disks. The distribution depends on your specific environment and you must take factors into consideration, such as storage consumption of the software components involved, safety requirements and expected workload. Make sure that you read the following sections before starting the SAP system installation:

1. Required File Systems for IBM Db2 for Linux, UNIX, and Windows [page 57]
2. Users and Groups [page 60]
3.5.1 Required File Systems for IBM Db2 for Linux, UNIX, and Windows

This section lists the file systems that are required by the Db2 database as well as the permissions that you have to set.

<table>
<thead>
<tr>
<th>File System/Logical Volume</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/db2/db2&lt;dbsid&gt;</td>
<td>Home directory of user db2&lt;dbsid&gt; and contains the Db2 instance data for &lt;DBSID&gt; and the Db2 software. Size: at least 1 GB</td>
</tr>
<tr>
<td>/db2/&lt;DBSID&gt;/</td>
<td>Size: at least 1 GB</td>
</tr>
</tbody>
</table>

Only valid for 'Platform': AIX, Linux, Oracle Solaris

⚠️ Caution

AIX, Linux, and Oracle Solaris only: If you plan to set up a high availability database cluster (SA MP) that is based on a shared disk, all the file systems listed in the table below must be located on the shared disk.

For more information, see the document IBM Db2 High Availability Solution: IBM Tivoli System Automation for Multiplatforms (see Online Information from SAP [page 192]).

End of 'Platform': AIX, Linux, Oracle Solaris
### File System/Logical Volume

<table>
<thead>
<tr>
<th>Description</th>
<th>File Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contains at least the online database log files.</td>
<td>/db2/&lt;DBSID&gt;/log_dir</td>
</tr>
<tr>
<td>Size: at least 1.4 GB</td>
<td></td>
</tr>
<tr>
<td>Contains Db2 diagnostic log files, Db2 dump files, and further service engineer information.</td>
<td>/db2/&lt;DBSID&gt;/db2dump</td>
</tr>
<tr>
<td>Size: 100 MB</td>
<td></td>
</tr>
</tbody>
</table>

- **With Db2's automatic storage:**
  - /db2/<DBSID>/sapdata<n> or /db2/<DBSID>/sapdata/sapdata<n>

- **No automatic storage:**
  - /db2/<SAPSID>/sapdata<n> or /db2/<SAPSID>/sapdata/sapdata<n>

Storage path for tablespaces with container type `database managed space (DMS) FILE` or for tablespaces with Db2's automatic storage.

By default, the installer creates four directories (`sapdata1, sapdata2, sapdata3, sapdata4`). If you require more or fewer sapdata directories, you can change the number of directories on the `Tablespace Layout` dialog of the installer. If you add additional `sapdata` directories during the dialog phase of the installer, the corresponding tablespace containers are equally distributed.

On the `Tablespace Layout` dialog of the installer, you can also decide whether you want all directories stored under one parent directory `sapdata`.

For more information about the required size of the `sapdata` directories, see the installation note 1724554 for IBM Db2 for Linux, UNIX, and Windows.

In a **production system**, you must make sure that the sapdata directories are located in different file systems. Otherwise, system performance can decrease. For more information, see Data Safety and Performance Considerations for Database Directories [page 67].

- **Only valid for `Platform`: AIX, HP-UX**

On AIX or HP-UX, use large enabled file systems. For more information about large enabled file systems, see your operating system documentation.

- **End of `Platform`: AIX, HP-UX**
With Db2's automatic storage:
  ○ /db2/<DBSID>/saptmp<n> or /db2/<DBSID>/sapdata/saptmp<n> (for IBM Db2 10.1 and higher)
  ○ /db2/<DBSID>/sapdata<n> or /db2/<DBSID>/sapdata/sapdata<n> (for IBM Db2 up to and including V9.7)

No automatic storage:
/db2/<SAPSID>/saptmp<n> or /db2/<SAPSID>/sapdata/sapdata<n>

Storage path for temporary tablespaces.
For IBM Db2 versions lower than 10.1, saptmp directories are used for temporary tablespaces, but only if you do not use automatic storage management.

As of IBM Db2 10.1, saptmp directories are always used for temporary tablespaces (regardless of whether you use automatic storage or not). If automatic storage is used, the temporary tablespaces are assigned by default to the storage group SAPTMPGRP.

By default, the installer creates four directories (saptmp1, saptmp2, saptmp3, saptmp4). If you require more or fewer directories, you can change the number of directories on the Tablespace Layout dialog of the installer.

On the Tablespace Layout dialog of the installer, you can also decide whether you want all directories stored under one parent directory (saptmp or sapdata).

---

**File System Permissions**

The file systems and logical volumes must have the permissions and owner shown in the following table and they must be created and mounted before starting the installer. The installer then sets the required permissions and owners.

**i Note**
For information about SAP file systems, see SAP Directories [page 79].

**i Note**
You can create the owners and groups manually if they do not exist yet. Otherwise, the installer creates them automatically. For more information, see Creating Operating System Users Manually [page 74].

<table>
<thead>
<tr>
<th>File System/Logical Volume</th>
<th>Permissions</th>
<th>Owner</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>/db2/&lt;DBSID&gt;</td>
<td>755</td>
<td>db2&lt;dbsid&gt;</td>
<td>db&lt;dbsid&gt;adm</td>
</tr>
<tr>
<td>/db2/&lt;DBSID&gt;/log_dir</td>
<td>755</td>
<td>db2&lt;dbsid&gt;</td>
<td>db&lt;dbsid&gt;adm</td>
</tr>
<tr>
<td>/db2/&lt;DBSID&gt;/db2dump</td>
<td>755</td>
<td>db2&lt;dbsid&gt;</td>
<td>db&lt;dbsid&gt;adm</td>
</tr>
</tbody>
</table>
### 3.5.2 Users and Groups

If they have not yet been created, the installer creates the following users and groups as shown in the following table:

<table>
<thead>
<tr>
<th>User</th>
<th>Home Directory</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>db2&lt;dbsid&gt;</td>
<td>/db2/db2&lt;dbsid&gt;</td>
<td>db2&lt;dbsid&gt;adm</td>
</tr>
<tr>
<td>&lt;sapsid&gt;adm</td>
<td>Can be chosen</td>
<td>sapsys (primary group), db2&lt;dbsid&gt;ctl (secondary)</td>
</tr>
</tbody>
</table>

Default ABAP connect user: sap<sapsid>

You may change this user during the installation.

**i Note**

You can specify the name of the ABAP connect user (sap<sapsid>) independently from the SAP schema name during the dialog phase of the installation.

We recommend, however, that you keep the names of the connect user and the database schema identical in standard use cases. If you are performing a system copy using database means, Db2 is not able to change the schema name and you can then choose a connect user name that is different from the schema name.
As of IBM Db2 V9.7, the installer automatically creates roles that restrict the privileges of the users on the database. For more information, see Ensuring User Security [page 136].

### 3.5.3 Directory Structure of the IBM Db2 Client Connectivity

#### Use

The Db2 client connectivity has a directory structure as shown in the following figure:

```
Directory Structure of the Database Client
(Including the JDBC Driver)

```

```
<table>
<thead>
<tr>
<th>global/db6/</th>
</tr>
</thead>
<tbody>
<tr>
<td>- db2cli.ini</td>
</tr>
<tr>
<td>- jdbc/</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>- db2dump/</td>
</tr>
<tr>
<td>- &lt;OS&gt;/db6_clidriver/</td>
</tr>
</tbody>
</table>
```

Where `<OS>` is:
- AIX_64
- HP_U_64, HP_UA_64
- LINUXX86_64, LINUXPPC64_64
- SUNOS_64

#### Directory Structure of the Db2 Client

**Db2 Thin Client**

During the installation of the database instance, the Db2 CLI driver is installed in the global directory of your SAP system (`global/db6/<OS>/db6_clidriver/`). The Db2 CLI driver is installed for the same operating system as the database instance.

**Note**

If you are installing an application server (central or dialog instance) on the same operating system as the database instance, the already existing Db2 CLI driver in directory `global/db6/<OS>/db6_clidriver` is used.
If you install an application server (central or dialog instance) on an operating system that is new to your SAP system landscape, an additional Db2 CLI driver for this new operating system is also installed in the global directory, for example, global/db6/<OS_application_server>/db6_clidriver.

Each time you start the application server, the Db2 CLI driver is copied from the global/db6 directory to the local exe directory, and the active SAP system uses these copies of the Db2 CLI driver in the local exe directory. Therefore, by exchanging the driver software in the global/db6 directory, you are able to update the Db2 CLI driver while the SAP system is up and running. Each time you restart the application server, the Db2 CLI driver is again copied to the local exe directory, and always the latest version is used.

⚠️ Caution

However, be aware that if you start SAP standalone tools (for example, tp or R3trans) from the command line, these tools use the Db2 CLI driver in the global/db6 directory and not the one in the local exe directory.

If you have updated the Db2 CLI driver in the global directory but not yet restarted the application server, the versions of the Db2 CLI driver in the global/db6 and in the local exe directory can differ.

The configuration and connectivity information of the Db2 CLI driver is stored in file db2lci.ini in the global directory of your SAP system and it is shared among all central and dialog instances. File db2lci.ini is created during the installation of the database server.

### Updating the Global Directory During Fix Pack Installation

During the Fix Pack installation, the database software is automatically updated. However, to update the Db2 CLI drivers or JDBC driver in the global directory, run the db6_update_client.sh script as follows:

1. Log on to the database server as user `<sapsid>adm`.
2. Mount the CLI/JDBC Driver medium for your Db2 software version.
4. Run the db6_update_client.sh script using the following command:
   ```
   db6_update_client.sh -u
   ```
   The db6_update_db.sh updates the Db2 CLI driver in the global/db6 directory for all operating systems available as well as the JDBC driver.

### 3.5.4 Db2 Tablespaces

#### Tablespace Types

During the dialog phase of the installation, the installer offers to create the following tablespace types:

- Data and index tablespaces managed by Db2’s automatic storage management (AutoStorage)
  During the installation, the installer assigns the sapdata directories to the database, which automatically distributes all tablespaces over the sapdata directories or file systems. In addition, the database automatically adjusts the tablespace sizes as long as there is enough free space left in the sapdata directories or file systems.
  If one of the sapdata directories becomes full, new stripe sets are automatically created in the remaining sapdata directories.
Since the Db2 database automatically creates and administers the tablespace containers, the overall administration effort for the database decreases considerably using tablespaces managed by automatic storage management.

**Recommendation**

We recommend that you use automatic storage management for data and index tablespaces.

As of SAP NetWeaver 7.51, you must use automatic storage. The possibility to deselect automatic storage during the dialog phase of the installer is no longer supported.

- **DMS File tablespaces in autosize mode**
  The installer creates all DMS tablespaces with FILE containers in autosize mode as well as one tablespace container for each tablespace in every sapdata directory or file system. Db2 automatically extends the size of all DMS FILE tablespaces in autosize mode as long as there is space left in the sapdata directories or file systems.
  With DMS FILE tablespaces in autosize mode, you are more flexible to distribute heavily used tablespaces to dedicated storage devices at a later point in time.

**i Note**

As of IBM Db2 10.1, do not use DMS tablespaces because they are deprecated.

- **Other tablespace types**
  If you want to use other tablespace types, for example SMS or DMS DEVICE (raw devices), you have to create them manually. In this case, deselect the option Create Tablespaces During the Installation Procedure during the dialog phase of the installation and proceed as described in Creating Tablespaces Manually [page 169].

At a later point in time, you can switch between DMS FILE and DMS DEVICE tablespaces using Db2’s redirected restore tool. In addition, you can enable and disable autoresize mode for databases that are not set up with automatic storage management.

To move tablespaces of a Db2 release lower than IBM Db2 V9.7 from automatic storage management to other storage modes or the other way round, you have to perform a homogenous system copy. For more information, see the appropriate system copy guide at http://support.sap.com/sitoolset > System Provisioning > System Copy Option As of IBM Db2 V9.7, you can move tablespaces from DMS to automatic storage management.

**Container Type FILE**

If you are using **tablespaces managed by Db2’s automatic storage management**, Db2 creates and administers the tablespace containers for you.

If you are using **DMS FILE tablespace in autosize mode**, each tablespace of your SAP installation has at least one container. A container is a file that holds pages belonging to a tablespace. Since you might want to add containers as your database grows in size, you should adhere to the following naming scheme:

The first container of a tablespace is given the name of the tablespace plus the ending container001. Therefore, <$SAPSID>#BTABD has at least the container <$SAPSID>#BTABD.container001. The next container is called <$SAPSID>#BTABD.container002, and so on.
**Container Sizes**

Equal container sizes ensure the proper balancing of container access and therefore better performance, if the containers reside on different disks. The installer creates all containers of a tablespace with the same size.

**Tablespace Sizes Without Autoresize**

By default, the tablespaces are created with autoresize mode. If you are using tablespaces without the autoresize mode, you must extend the tablespaces manually. If you do not increase your tablespace sizes in time, the following error occurs:

Error occurred during DB access SQLException SQLCODE: -289

**Temporary Tablespaces**

To prevent you from running out of storage space for temporary data, we recommend that you place your temporary tablespaces on separate storage as follows:

- **IBM Db2 version 10.1 and higher**: By default, the installer creates separate storage locations for data and index tablespaces on the one hand and for temporary tablespaces on the other. If automatic storage is selected, the installer additionally automatically creates the storage group `SAPTMPGRP` for temporary tablespaces.
- **Db2 versions up to and including 9.7**: Do not use automatic storage for your temporary tablespaces. Instead, use SMS temporary tablespaces. Ensure that you provide multiple containers to your SMS temporary tablespaces. You must use SMS temporary tablespaces for performance reasons. Do not use DMS temporary tablespaces.

**Tablespace Pools**

Tablespace pools help ensure a better distribution of data across tablespaces compared to the traditional tablespace layout. A tablespace pool is a set of tablespaces that allows the system to assign a table flexibly to one of the tablespaces in the set. When you assign a table to a tablespace pool, the application server ABAP creates the table in one of the tablespaces of the tablespace pool using a distribution algorithm based on the table name. By these means, a more evenly balanced distribution of tables across tablespaces is achieved.

As a default, the installer creates a standard SAP tablespace pool `<SAPSID>#{DATA{20}}` for your SAP system during installation. In the custom installation mode, you can deselect the automatic creation of the tablespace pool if needed.

We recommend that you use tablespace pools because unbalanced tablespaces are disadvantageous for the following reasons:

- Db2 has a limit on the number of objects that can be created in a tablespace. If a very high number of tables reside in a tablespace, you are likely to exceed the object limit at some point in time, for example, during an SAP upgrade or SAP update, or when you create your own tables.
The overall runtime of a Db2 backup is determined by the backup duration of the largest tablespace. Therefore, backup runtime improves if the tables are distributed over multiple tablespaces of smaller size instead of over fewer tablespaces of a larger size.

As of SAP NetWeaver 7.51, the standard tablespace pool for data, indexes, and LOB objects is always automatically created and its creation cannot be deselected any longer during the dialog mode of the installer.

Each tablespace pool consists of as many data, index, and long tablespaces as indicated by the pool size. For example, a tablespace pool of size 10 consists of 10 data tablespaces, 10 index tablespaces, and 10 long tablespaces. The default tablespace pool size is 20. In the custom installation mode, you can change the default tablespace pool size if needed.

**i Note**

After the installation, make sure you read SAP Note 2267446 to check whether your system fulfills the requirements for the use of tablespace pools and take the relevant steps, if necessary, as described in the SAP Note.

### Tablespace in an MCOD Environment

If you want to install additional SAP components into the same database, make sure that you consider the information under [MCOD Tablespaces and File Systems](#) [page 155].

### More Information

Important information and prerequisites for the use of tablespace pools: SAP Note 2267446

SAP Note 1895425

Creating Tablespaces Manually [page 169]

### 3.5.5 Optimization of Database Size on Disk

#### Use

With the increasing cost for managed storage, database sizes become more and more a concern. You can significantly reduce the size of your database by selecting the following options during the dialog phase of the installation:

- **Use Db2's Data Compression**
- **Use Deferred Table Creation**
Features

Db2’s Data Compression

When you select the Use Db2’s Data Compression checkbox, you activate the following:

- Tables are compressed using Db2’s (static) row compression during installation (up to and including IBM Db2 10.1), and using adaptive compression for IBM Db2 as of version 10.5.
- Indexes are compressed using Db2’s index compression during installation (for IBM Db2 as of version 9.7).
- The global compression option is set to YES, that is, static row compression is enabled for tables that are created after the installation (for IBM Db2 up to and including version 10.1). As of IBM Db2 10.5, adaptive compression is used.

i Note

If you want to use static row compression, adaptive compression, and index compression, make sure that you have a valid license for this function. If you have purchased your IBM Db2 license from SAP (an SAP OEM license), these compression types are already part of your license agreement.

Static or Classic Row Compression

Db2’s classic row compression transparently compresses table data in your database, using a dictionary-based compression algorithm. Using row compression typically reduces the size of tables by 60 to 80%. As a result, the size of the database decreases by approximately 30 to 55%.

Db2’s (classic) row compression is also referred to as “static (row) compression”, as opposed to “adaptive compression” available as of IBM Db2 10.1 (see below).

For more information about row compression, see the Database Administration Guide for SAP on IBM Db2 for Linux, UNIX, and Windows.

Adaptive Compression

As of IBM Db2 10.1, table data can be compressed using adaptive compression. This compression technique comprises the classic row compression and a compression algorithm that works on page level. For more information about adaptive compression, see Adaptive Compression in the IBM Db2 10.1 Knowledge Center at: http://publib.boulder.ibm.com/infocenter/db2luw/v10r1/topic/com.ibm.db2.luw.admin.dbobj.doc/doc/c0059054.html.

For more information about enabling adaptive compression, see the Database Administration Guide for SAP on IBM Db2 for Linux, UNIX, and Windows.

Index Compression

As of IBM Db2 V9.7, indexes can also be compressed. To minimize the size of the index on disk, the Db2 database manager can use various index compression techniques, for example, RID list compression or prefix compression.

Index compression is not supported on catalog indexes and MDC block indexes.

For more information about index compression, see SAP Note 1351160.

Global Compression Option

By activating the global compression option, you can ensure that when tables are newly added to the database during the operation of the SAP system, these tables are automatically compressed. The default compression
type up to and including IBM Db2 10.1 is static row compression. As of IBM Db2 10.5, the default is adaptive compression.

Deferred Table Creation

⚠️ Caution
- Before you use this function, make sure that you read SAP Note 1151343.

The SAP function deferred table creation delays the creation of empty database tables until the first row is inserted. That is, until the first row is inserted, the table is substituted by a virtual table (which effectively is a special database view). As soon as the first row is inserted, the SAP kernel transparently replaces the virtual table with a database table. Depending on the number of tables that remain empty over your system lifetime, the use of deferred table creation can reduce the size of your database by several GB.

More Information

- Minimizing the Database Size after the Installation (Optional) [page 181]
- Database Administration Guide for SAP on IBM Db2 for Linux, UNIX, and Windows (see Online Information from SAP [page 192])

3.5.6 Data Safety and Performance Considerations for Production Systems

During the installation of a production SAP system, you should control the distribution of database directories or file systems to physical disks. On Windows operating systems, you assign drive letters to the system components when running the installation tool. On UNIX operating systems, this is done when you create file systems before you start the installation tool. The way you distribute your database components to disks can significantly affect system throughput and data security, and must therefore be carefully planned.

⚠️ Note
When you work out the assignment of components to disks, you first need to obtain an overview of the main components and their corresponding directories. Make sure that you have an overview of the expected database size, the available disks, and the I/O adapters that are used to attach the disks to your system.

Data Safety and Performance Considerations

When you plan your SAP system installation, you must consider the following:
- In an emergency situation you must be able to perform a rollforward recovery of your database in a production system.
In a production system, the Db2 database must run in log retention mode. Otherwise, log files cannot be applied to the database rollforward operations. You can set the database to log retention mode by changing database configuration parameters at the very end of the installation process. After changing the parameters, you are automatically forced to perform an offline backup. Otherwise, you cannot reconnect to the database, which is reported with an error message. For information, see Enabling Recoverability of the Database [page 142].

- Keep the tablespace container files in directories *sapdata* and the online log directory *log_dir* on separate disks to be able to perform a full rollforward recovery if a database container file is damaged or lost.
- Since transaction data is lost if online log files are damaged, we recommend that the online log directory *log_dir* is stored on redundant storage. You can perform hardware mirroring using RAID adapters or intelligent storage systems. For performance reasons, hardware solutions for mirroring should be preferred over mirroring solutions like logical volume managers that are offered by operating systems.
- A high transaction volume can cause high I/O on the online log files. Therefore, the distribution of the online log files is a crucial factor of performance considerations. Ideally, the online log files should be located on fast physical volumes that do not have high I/O load coming from other components. This allows efficient logging activity with a minimum of overhead such as waiting for I/O. You should avoid storing the online log files on the same physical volume as the operating system paging space, or a physical volume with high I/O activity.
- By default, the SAP installation tool creates tablespaces that are managed by Db2’s automatic storage management (automatic storage tablespaces). Tablespaces with automatic storage offer maximum ease of use and low administrative cost. If you are not using tablespaces with automatic storage, you must manually control the distribution of data on disk. As of IBM Db2 10.1, use automatic storage because DMS tablespaces are deprecated. As of SAP NetWeaver 7.51, automatic storage is the standard storage management and cannot be deselected in the dialog phase of the installer.
- You can run Db2 databases with multiple page sizes in a single database. But once specified for a tablespace, the page size cannot be changed. For each page size, a separate buffer pool has to be created in your database. During a standard installation, the installer creates the database with a uniform page size of 16 KB. As a result only buffer pools with 16 KB have to be created and administered. A mixture of different page sizes in the Db2 database is not recommended.

**More Information**

For more information, see the Administration Guide: Performance that you can access using the link in section Online Information from IBM [page 192].

### 3.6 SAP System Transport Host

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

- Use the transport directory that the installer creates during the installation of the SAP system by default on the global host in /usr/sap/trans.
- Use a transport directory located on a host other than the global host (default host):
  - You can use an existing transport directory and host in your SAP system landscape.
  - You can set up a new transport directory on a different host.

In either case, you must prepare this host for use by the new SAP system. For more information, see Exporting and Mounting the Global Transport Directory [page 101].

More Information

- Required File Systems and Directories [page 79]
- See the SAP Library:

3.7 Planning the Switchover Cluster for High Availability

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

Switchover clusters also have the advantage that you can deliberately initiate switchover to release a particular node for planned system maintenance. Switchover solutions can protect against hardware failure and operating system failure but not against human error, such as operator errors or faulty application software.

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

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

→ Recommendation

We recommend switchover clusters to ensure HA for your SAP system.
A switchover cluster consists of:

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

**Prerequisites**

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

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

- **Only valid for ‘Platform’: AIX, Linux, Oracle Solaris**
  
  On database level, IBM provides a high-availability cluster solution for AIX, Linux, and Solaris SPARC only that is called *IBM Tivoli System Automation for Multiplatforms (SA MP)*. The corresponding installation guide describes how to set up a switchover cluster with SA MP based on the Db2 feature “High Availability and Disaster Recovery (HADR)” or a shared disk: *IBM Tivoli System Automation for MultiPlatforms-Db2 for LUW* (see Online Information from SAP [page 192]).

- Check the information and the installation guides available at: https://wiki.scn.sap.com/wiki/display/SI/SAP%2BHigh%2BAvailability
- The enqueue replication server (ERS) is essential for a high-availability system. You need one ERS for the ASCS installed in your system.
Features

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

**Note**

This figure and the figures in this section are only examples. Only the instances relevant to the switchover are shown – for example, the primary application server instance is not shown.

These graphics summarize the overall setup and do not show the exact constellation for an installation based on one of the available technologies (ABAP, dual-stack, or Java).

You need to discuss your individual HA setup with your HA partner.
The following graphic shows an example of a switchover cluster in more detail:

![Switchover Cluster Diagram]

**Constraints**

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

Make sure that your hardware is powerful enough to handle the increased workload after a switchover. Some reduction in performance might be acceptable after an emergency. However, it is not acceptable if the system comes to a standstill because it is overloaded after switchover.
4 Preparation

4.1 Preparation Checklist

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

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

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

Central, Distributed, or High-Availability System

**Note**

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

You can install optional standalone units **J2EE Adapter Engine, Partner Connectivity Kit, Application Sharing Server** only as a central system.

1. You check that the required operating system users and groups [page 74] are created.
2. You set up the required file systems [page 79] and make sure that the required disk space is available for the directories to be created during the installation.
3. If required, you set up virtual host names [page 87].
4. If you want to install a high-availability system, you perform switchover preparations [page 87].
5. If you want to share the transport directory `trans` from another system, you export [page 101] this directory to your installation hosts.
6. You install the SAP frontend software [page 88] on the desktop of the end user.
7. You check that the required installation media [page 88] are available on each host.
8. Continue with Installation [page 96].

Dialog Instance

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

1. You check that the required operating system users and groups [page 74] are created.
2. You set up file systems [page 79] and make sure that the required disk space is available for the directories to be created during the installation.
3. If required, you set up virtual host names [page 87].
4. If you want to share the transport directory from another system, you export this directory to your installation hosts.

5. You check that the required installation media are available on the dialog instance host.

6. If you upgraded the SAP system to which you want to install a new dialog instance, you might have to update instance profiles of the existing system.

7. Continue with installation.

### 4.2 Creating Operating System Users and Groups

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

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

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

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

> **Caution**

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

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

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

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

> **Recommendation**

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

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

- You start the installer and choose `Software Life-Cycle Options` > ```Additional Preparation Options``` > ```Operating System Users and Groups```. For more information, see `Running the Installer`.
- You create operating system users and groups manually. Check the settings for these operating system users.
**User Settings**

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

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

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

⚠️ **Caution**

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

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

<table>
<thead>
<tr>
<th>Output</th>
<th>Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>cputime</td>
<td>unlimited</td>
</tr>
<tr>
<td>filesize</td>
<td>unlimited</td>
</tr>
<tr>
<td>datasize</td>
<td>unlimited</td>
</tr>
<tr>
<td>stacksize</td>
<td>8192 KB</td>
</tr>
<tr>
<td>coredumpsize</td>
<td>unlimited</td>
</tr>
<tr>
<td>descriptors</td>
<td>8192</td>
</tr>
<tr>
<td>memoryuse</td>
<td>unlimited</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Output</th>
<th>Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>cputime</td>
<td>unlimited</td>
</tr>
<tr>
<td>filesize</td>
<td>unlimited</td>
</tr>
<tr>
<td>datasize</td>
<td>unlimited</td>
</tr>
<tr>
<td>stacksize</td>
<td>8192 KB</td>
</tr>
<tr>
<td>coredumpsize</td>
<td>unlimited</td>
</tr>
<tr>
<td>descriptors</td>
<td>8192</td>
</tr>
<tr>
<td>memoryuse</td>
<td>unlimited</td>
</tr>
<tr>
<td>Output sh</td>
<td>Output ksh</td>
</tr>
<tr>
<td>-------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>cpu time (seconds)</td>
<td>cpu time (seconds)</td>
</tr>
<tr>
<td>file size (blocks)</td>
<td>file size (blocks)</td>
</tr>
<tr>
<td>data seg size (kbytes)</td>
<td>data size (Kibytes)</td>
</tr>
<tr>
<td>stack size (kbytes)</td>
<td>stack size (Kibytes)</td>
</tr>
<tr>
<td>core file size (blocks)</td>
<td>core file size (blocks)</td>
</tr>
<tr>
<td>open files</td>
<td>nofile</td>
</tr>
<tr>
<td>max memory size (kbytes)</td>
<td>max memory size (Kibytes)</td>
</tr>
</tbody>
</table>

All users must have identical environment settings. You make any change to the environment – such as variables, or paths – at your own responsibility.

Do not delete any shell initialization scripts in the home directory of the OS users. This applies even if you do not intend to use the shells that these scripts are for.

If you install an SAP system with instances distributed over several hosts, make sure that the following requirements are met:

- The user ID (UID) and group ID (GID) of each operating system user must be unique and the same on each instance host that belongs to the same SAP system.
- The group ID of group sapinst is always different from the group ID of any other group (for example, of group sapsys) used during the installation. For example, if you want to install a dialog instance for an existing SAP system, you must make sure that the group ID of group sapinst created on the host of the dialog instance is different from the group ID of any other group on the central instance host of the existing SAP system.
- If you use local operating system user accounts instead of central user management (for example, NIS), user <sapsid>adm, sapadm, and the database operating system user must have the same password on all hosts.
- If you use local operating system user accounts, make sure that you install your SAP system in Custom mode and specify suitable IDs for user <sapsid>adm and group sapsys on all hosts. The IDs have to be the same on all hosts. If you choose Typical mode, you are not asked to specify the user and group IDs.
- If operating system users already exist, make sure that they are assigned to group sapinst.
- If you create operating system users manually or use already existing operating system users, make sure that the home directory for each of these users is not the root directory (/).
- Make sure that the home directory of user <sapsid>adm is not critical for recursive changes on permissions:
  When operating system users are created by the installer, the permissions on the home directories of these users are changed recursively. This can cause unpredictable errors if you define a critical home directory. For example, the home directory must not be / or /usr/sap.
Operating System Users and Groups

The installer chooses available operating system user IDs and group IDs unless you are installing a dialog instance. On a dialog instance host you have to enter the same IDs as on the host of the central instance.

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

You can specify the name of the ABAP connect user (sap<sapsid>) independently of the SAP schema name during the dialog phase of the installer.

We recommend, however, that you keep the names of the connect user and the database schema identical in standard use cases.

If you are performing a system copy using database means, Db2 is not able to change the schema name and you can then choose a connect user name that is different from the schema name.

→ Recommendation

For security reasons, we recommend that you remove the operating system users from the group sapinst after the installer has completed. For more information, see Ensuring User Security [page 136].

We recommend that you specify this “cleanup” already during the Define Parameters phase on the Cleanup Operating System Users screen. Then, the removal of the operating system users from the group sapinst is done automatically. For more information, see Cleanup of Operating System Users in SAP System Parameters [page 45].

<table>
<thead>
<tr>
<th>User</th>
<th>Primary Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNIX superuser root</td>
<td>No primary group assigned by the installer (group sapinst is assigned as secondary group)</td>
</tr>
<tr>
<td>SAP system administrator&lt;sapsid&gt;adm</td>
<td>sapsys(db&lt;dbsid&gt;ctl as secondary group)</td>
</tr>
<tr>
<td>ABAP connect user sap&lt;sapsid&gt;</td>
<td>db&lt;dbsid&gt;mon</td>
</tr>
</tbody>
</table>

**Note**

Only used on the database host.
### User and Groups of the SAP Host Agent

#### User and Groups of the SAP Host Agent

<table>
<thead>
<tr>
<th>User</th>
<th>Primary Group</th>
<th>Additional Group</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>sapadm</td>
<td>sapsys</td>
<td></td>
<td>SAP Host Agent administrator</td>
</tr>
</tbody>
</table>

**i Note**

If `sapadm` does not exist, it is created during the SAP Host Agent installation using `/bin/false` shell.

Make sure that `/bin/false` can be used as a login shell.

- **Only valid for 'Platform': AIX**
- **AIX**: Add `/bin/false` to the list of valid login shells (attribute `shells`) in `/etc/security/login.cfg`.

End of 'Platform': AIX

### Groups and Members of the SAP Host Agent User

<table>
<thead>
<tr>
<th>Groups</th>
<th>Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>sapsys</td>
<td>sapadm</td>
</tr>
</tbody>
</table>

### Groups and Members

<table>
<thead>
<tr>
<th>Groups</th>
<th>Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>sapsys</td>
<td>&lt;sapsid&gt;adm</td>
</tr>
<tr>
<td>db&lt;dbsid&gt;ctl</td>
<td>&lt;sapsid&gt;adm</td>
</tr>
<tr>
<td>db&lt;dbsid&gt;adm</td>
<td>db2&lt;dbsid&gt;</td>
</tr>
<tr>
<td>db&lt;dbsid&gt;mnt</td>
<td>-</td>
</tr>
<tr>
<td>db&lt;dbsid&gt;mon</td>
<td>ABAP connect user sap&lt;sapsid&gt;</td>
</tr>
</tbody>
</table>

**i Note**

Only used on the database host.
4.3 Required File Systems and Directories

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

- SAP Directories [page 79]
- Setting Up File Systems for High-Availability [page 84]

4.3.1 SAP Directories

Depending on the installation option you have chosen, the installer automatically creates the directories listed in the following figures and tables.

Before running the installation, you have to set up the required file systems manually. In addition, you have to make sure that the required disk space for the directories to be installed is available on the relevant hard disks.

The figure below assumes that you have set up one file system for the SAP system mount directory `<sapmnt>` and one file system for the `/usr/sap` directory. However, you have to decide for which directories you want to set up separate file systems. If you do not set up any file system on your installation host, the installer creates all directories in the root directory (`/`).

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

The following types of directories are created automatically:

- Physically shared directories
- Logically shared directories
- Local directories
Only valid for 'Platform': HP-UX

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

End of 'Platform': HP-UX

The following figure shows the directory structure of the SAP system:

Every new installation of an ABAP standalone system is Unicode.

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

Physically Shared Directories

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

- The directory `/<sapmnt>/<SAPSID>` , which contains SAP kernel and related files, is created on the first installation host. The first installation host is usually the host where the central services instance is to run, but you can also choose another host for `/<sapmnt>/<SAPSID>` . You need to manually share this directory with Network File System (NFS) and – for a distributed system such as an HA system or a system with dialog instance – mount it from the other installation hosts.
The installer creates the following shared subdirectories in `/<sapmnt>/<SAPSID>` during the SAP system installation. If you install an SAP system with instances distributed over several hosts, you have to share these directories for all hosts with the same operating system (see Exporting and Mounting Global Directories [page 102]):

- **global**
  - Contains globally shared data
- **profile**
  - Contains the profiles of all instances
- **exe**
  - Contains executable kernel programs

- The directory `/usr/sap/trans`, which is the global transport directory.
  - If you want to use an existing transport directory, you have to mount it before you install the application server instance in question. Otherwise, the installer creates `/usr/sap/trans` locally.
  - For more information, see Exporting and Mounting the Global Transport Directory [page 101].

### Physically Shared SAP Directories

<table>
<thead>
<tr>
<th>Directory</th>
<th>Description</th>
<th>Required Minimum Disk Space</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>&lt;sapmnt&gt;/&lt;SAPSID&gt;</code></td>
<td>SAP system directory</td>
<td>Minimum 3 GB</td>
</tr>
<tr>
<td><code>/usr/sap/trans</code></td>
<td>SAP transport directory</td>
<td>This value heavily depends on the use of your SAP system. For production systems, we recommend to use as much free space as available (at least 2 GB), because the space requirement normally grows dynamically. For the installation, it is sufficient to use 2 GB for each SAP system instance. You can enlarge the file system afterwards.</td>
</tr>
</tbody>
</table>

### Logically Shared Directories

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

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

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

The following entry in the start profile is responsible for this:

```bash
Execute_00 = immediate $(DIR_CT_RUN)/sapcpe$(FT_EXE) pf=$( _PF)
```
where $( _PF )$ points to the instance profile.

⚠️ Caution

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

Local Directories (SAP System)

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

- **SYS**

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

- Instance-specific directories with the following names:
  - The directory of the central instance is called DVEBMGS<Instance_Number>.
  - The directory of a dialog instance is called D<Instance_Number>.
  - The directory of the ABAP central services instance (ASCS instance) is called ASCS<Instance_Number>.
  - The directory of an enqueue replication server instance (ERS instance) is called ERS<Instance_Number> (high availability only).
  For a high-availability system, you must install an ERS instance for the ASCS instance.

### Local SAP Directories

<table>
<thead>
<tr>
<th>Directory</th>
<th>Description</th>
<th>Required Minimum Disk Space</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>/usr/sap/&lt;SAPSID&gt;/DVEBMGS&lt;Instance_Number&gt;</code></td>
<td>Central instance directory</td>
<td>4 GB</td>
</tr>
<tr>
<td><code>/usr/sap/&lt;SAPSID&gt;/D&lt;Instance_Number&gt;</code></td>
<td>Dialog instance directory</td>
<td>4 GB</td>
</tr>
<tr>
<td><code>/usr/sap/&lt;SAPSID&gt;/ASCS&lt;Instance_Number&gt;</code></td>
<td>ABAP central services instance (ASCS instance) directory</td>
<td>2 GB</td>
</tr>
<tr>
<td><code>/usr/sap/&lt;SAPSID&gt;/ERS&lt;Instance_Number&gt;</code></td>
<td>Enqueue replication server instance (ERS instance) directory for the ASCS (high availability only)</td>
<td>2 GB</td>
</tr>
</tbody>
</table>
Directories of the SAP Host Agent

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

Local Directories (SAP Host Agent)

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

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

More Information

Required File Systems for IBM Db2 for Linux, UNIX, and Windows [page 57]
4.3.2 Setting Up File Systems for a High-Availability System

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

Prerequisites

You have already installed the hardware – that is, hosts, disks, and network – and decided how to distribute the database, SAP instances, and – if required – Network File System (NFS) server over the cluster nodes (that is, over the host machines). For more information, see Planning the Switchover Cluster for High Availability [page 69].

Context

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

- Physically shared directories: /*<sapmnt>/<SAPSID> and /usr/sap/trans
- Logically shared directories that are bound to a node such as /usr/sap with the following local directories:
  - /usr/sap/<SAPSID>
  - /usr/sap/<SAPSID>/SYS
  - /usr/sap/hostctrl
- Local directories that contain the SAP instances, such as /usr/sap/<SAPSID>/ASCS<Instance_Number>

Only valid for 'Platform': HP-UX

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

Procedure

1. Create the file systems or raw partitions for the SAP instances you can switch over in such a way that the content can be made available to all nodes that can run the service. At least the ABAP central services (ASCS) instance must be part of the switchover cluster.

The SAP directories /*<sapmnt>/<SAPSID> and /usr/sap/trans are usually mounted from a Network File System (NFS). However, an SAP instance directory /usr/sap/<SAPSID>/<Instance_Type><Instance_Number> that you want to prepare for HA has always to be mounted on the cluster node currently running the instance. Do not mount such directories with NFS.
Therefore, if the host running the central instance is not the NFS server host, you might have to mount the file systems for /<sapmnt>/<SAPSID> and /usr/sap/trans on different physical disks from the file system for /usr/sap/<SAPSID>/<Instance_Type><Instance_Number>.

⚠️ Caution

To start or stop an SAP instance, you have to do one of the following:

○ Make the physically shared SAP directories under /<sapmnt>/<SAPSID> available to the server beforehand.
○ Replace the links in /usr/sap/<SAPSID>/SYS by a physical copy.
Consult your HA partner to clarify the best solution for the cluster software.

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

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

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

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

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

The instance-specific directory name for the ABAP central services instance is normally ASCS<Instance_Number>. Migrating only these directories avoids mount conflicts when switching over to a node on which another SAP instance is already running. The ASCS<Instance_Number> directory can join the /usr/sap/<SAPSID> tree instead of mounting on top of it.

ℹ️ Note

This approach becomes increasingly important when you want to cluster the central services instances with other local instances running on the cluster hosts outside the control of the switchover software. This applies to the Enqueue Replication Server instance (ERS instance) and dialog instances. The result is a more efficient use of resources. Use this approach for integrated installations of the application server with ABAP and Java stacks.

3. You assign the local (non-switching) file systems to permanent mount points.
4. You assign the shared file systems as documented by your HA partner.

💡 Example

The graphic below shows an example of the file systems and disks in an HA setup.

Note that this is only an example. For more information on a setup that meets your needs, consult your HA partner.
Installation of SAP Systems Based on the Application Server ABAP of SAP NetWeaver 7.0 to 7.03 on UNIX: IBM Db2 for Linux, UNIX, and Windows

Preparation

File Systems and Disks in an HA Setup
4.4 Using Virtual Host Names

You can use one or more virtual TCP/IP host names for SAP servers within an SAP server landscape to hide their physical network identities from each other. This can be useful when quickly moving SAP servers or complete server landscapes to alternative hardware without having to reinstall or reconfigure.

Prerequisites

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

Procedure

Proceed as described in SAP Note 962955.

4.5 Performing Switchover Preparations for High Availability

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

Context

To be able to use the required virtual host names, you have to set the installer property SAPINST_USE_HOSTNAME to specify the required virtual host name before you start the installer.

For more information, see SAP System Parameters.

Procedure

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

Note

For more information on virtual addresses and virtual host names and how to assign resources to failover groups, ask your HA partner.
4.6 Installing the SAP Front-End Software

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

Procedure

1. Check SAP Note 147519 for the recommended SAP front-end release.
2. Install the SAP front-end software required for your SAP system release as described in the documentation SAP Frontend Installation Guide - <Release> at: https://wiki.scn.sap.com/wiki/display/ATopics/SAP+GUI+Family

4.7 Preparing the Installation Media

This section describes how to prepare the installation media.

Installation media are available as follows:

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

**i Note**

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

Related Information

- Downloading and Extracting the Software Provisioning Manager 1.0 Archive [page 89]
- Using the Physical Media from the Installation Package [page 90]
- Downloading Installation Media [page 94]
4.7.1 Downloading and Extracting the Software Provisioning Manager 1.0 Archive

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

Context

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

Procedure

1. Download the latest version of the Software Provisioning Manager 1.0 archive 70SWPM10SP<Support_Package_Number>_<Version_Number>.SAR from:
   https://support.sap.com/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.

   \textbf{i Note}

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

   Proceed as follows to get the latest version of SAPCAR:
   a. Go to https://launchpad.support.sap.com/#/softwarecenter SUPPORT PACKAGES & PATCHES and search for “sapcar”.
   b. Select the archive file for your operating system and download it to an empty directory.
   c. Rename the executable to sapcar.exe.

   For more information about SAPCAR, see SAP Note 212876.

3. Using the latest version of SAPCAR, you can verify the signature of the downloaded 70SWPM10SP<Support_Package_Number>_<Version_Number>.SAR archive as follows:
   a. Get the latest version of the SAPCRYPTOLIB archive to your installation host as follows:
      1. Go to https://launchpad.support.sap.com/#/softwarecenter SUPPORT PACKAGES & PATCHES and search for “sapcryptolib”.
      2. Select the archive file for your operating system and download it to the same directory where you have put the SAPCAR executable.
3. 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 and move it to the same directory.

   b. Verify the signature of the downloaded 70SWPM10SP<Support_Package_Number>_<Version_Number>.SAR archive by executing the following command:

   ```bash
   Note
   Check SAP Notes 2178665 and 1680045 whether additional information is available.
   ```

   ```bash
   Note
   Check SAP Notes 2178665 and 1680045 whether additional information is available.
   ```

   ```bash
   [Path to SAPCAR]/sapcar -tvVf [Path to Download Directory]/
   70SWPM10SP<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
   Note
   Make sure that all users have read permissions for the directory where you want to unpack the installer.
   ```

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

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

   ```bash
   Note
   Make sure that you unpack the Software Provisioning Manager archive to a dedicated folder. Do not unpack it to the same folder as other installation media.
   ```

4.7.2 Using the Physical Media from the Installation Package

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

Context

The signature of installation media is checked automatically by the installer during the Define Parameters phase while the Media Browser screens are processed (see also Running the Installer [page 108]). The installer only accepts media whose signature has been checked. For more information, see SAP Note 2393060.
Procedure

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

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

<table>
<thead>
<tr>
<th>SAP Instance Installation</th>
<th>Required Media</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global host preparation</td>
<td>○ Software Provisioning Manager 1.0 archive</td>
</tr>
<tr>
<td></td>
<td>○ UC or NUC Kernel (folder K_&lt;Version&gt;<em>U&lt;N or U&gt;</em>&lt;_OS&gt;) where U means</td>
</tr>
<tr>
<td></td>
<td>Unicode and N means non-Unicode.</td>
</tr>
<tr>
<td></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></td>
<td>For a central system, where all mandatory instances reside on one host, you</td>
</tr>
<tr>
<td></td>
<td>need the installation media that are required for the central instance and</td>
</tr>
<tr>
<td></td>
<td>database instance.</td>
</tr>
<tr>
<td>ABAP central services instance</td>
<td>○ Software Provisioning Manager 1.0 archive</td>
</tr>
<tr>
<td>(ASCS instance)</td>
<td>○ UC or NUC Kernel (folder K_&lt;Version&gt;<em>&lt;N or U&gt;</em>&lt;_OS&gt;) where U means</td>
</tr>
<tr>
<td></td>
<td>Unicode and N means non-Unicode.</td>
</tr>
<tr>
<td></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></td>
<td>For more information about which kernel version to use, see SAP Note 1680045.</td>
</tr>
<tr>
<td></td>
<td>In addition, check the Product Availability Matrix at</td>
</tr>
<tr>
<td></td>
<td><strong>i Note</strong></td>
</tr>
<tr>
<td></td>
<td>Every new installation of an SAP system is Unicode. You can only use the</td>
</tr>
<tr>
<td></td>
<td>non-Unicode kernel if you perform the system copy for a non-Unicode SAP</td>
</tr>
<tr>
<td></td>
<td>system that has been upgraded to the current release.</td>
</tr>
<tr>
<td></td>
<td>Every new installation of an SAP system is Unicode. You can only use the</td>
</tr>
<tr>
<td></td>
<td>non-Unicode kernel if you perform the system copy for a non-Unicode SAP</td>
</tr>
<tr>
<td></td>
<td>system that has been upgraded to the current release.</td>
</tr>
<tr>
<td>SAP Instance Installation</td>
<td>Required Media</td>
</tr>
<tr>
<td>--------------------------</td>
<td>----------------</td>
</tr>
</tbody>
</table>
| Central instance         | ○ Software Provisioning Manager 1.0 archive  
○ UC or NUC Kernel (folder K_<Version>_<N or U>_<OS>) where U means Unicode and N means non-Unicode. |
|                          | **i Note**  
Every new installation of an SAP system is Unicode. You can only use the non-Unicode kernel if you perform the system copy for a non-Unicode SAP system that has been upgraded to the current release. |
|                          | ○ Only valid for 'Software Component': SAP SCM  
SAP SCM only: SAP liveCache  
End of 'Software Component': SAP SCM |
|                          | ○ CLI Driver / JDBC Driver medium |
| Database instance        | ○ Software Provisioning Manager 1.0 archive  
○ UC or NUC Kernel (folder K_<Version>_<N or U>_<OS>) where U means Unicode and N means non-Unicode. |
|                          | **i Note**  
Every new installation of an SAP system is Unicode. You can only use the non-Unicode kernel if you perform the system copy for a non-Unicode SAP system that has been upgraded to the current release. |
|                          | ○ Export  
○ RDBMS medium and CLI Driver / JDBC Driver medium for your database version |
|                          | **Caution**  
○ You must only use the Db2 software provided by the SAP installation media.  
○ For information about the supported hardware platform of your operating system, see the Hardware and Software Requirements Tables [page 30]. |
SAP Instance Installation

<table>
<thead>
<tr>
<th>SAP Instance Installation</th>
<th>Required Media</th>
</tr>
</thead>
</table>
| Dialog instance           | ○ Software Provisioning Manager 1.0 archive  
○ UC or NUC Kernel (folder \K_<Version>_\N or \U_<OS>) where \U means Unicode and \N means non-Unicode. |

**Note**

If you install a dialog instance in an existing non-Unicode system, the dialog instance is created automatically as a non-Unicode instance. The installer checks whether a non-Unicode system exists and chooses the right executables for the system type.

○ Only valid for 'Software Component': SAP SCM  
  SAP SCM only: SAP liveCache  
  End of 'Software Component': SAP SCM

2. Make the installation media available on each installation host as follows:
   a. Download and unpack the latest version of Software Provisioning Manager as described in [Downloading and Extracting the Software Provisioning Manager 1.0 Archive](page 89).
   b. Make the installation media containing the software to be installed available.

You can do this in one of the following ways:
○ Copy the required media folders directly to the installation hosts.
○ Mount the media on a central media server that can be accessed from the installation hosts.

**Note**

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

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

**Caution**

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

3. If you want to perform target system installation in the context of a heterogeneous system copy you need a migration key. You can generate it at [http://support.sap.com/migrationkey](http://support.sap.com/migrationkey).
4.7.3 Downloading Installation Media

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

Procedure

1. Download and unpack the latest version of Software Provisioning Manager as described in Downloading and Extracting the Software Provisioning Manager 1.0 Archive [page 89].
2. Create a download directory on the host on which you want to run the installer.
3. Identify all download objects that belong to one installation medium according to the following criteria:

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

   - Download path or location:
     You can download installation media from the SAP Software Download Center using one of the following paths:
     - To download the kernel media, go to [https://support.sap.com/sitoolset](https://support.sap.com/sitoolset) ➤ System Provisioning ➤ Software Provisioning Manager 1.0 SP<Current Version> ➤ Download Kernel releases delivered for SL Toolset ➤ SL TOOLSET 1.0 (INSTALLATIONS AND UPGRADES) ➤ KERNEL FOR INSTALLATION/SWPM.
     - To download all media required for your SAP product, you can use one of the following navigation paths:
   - 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
Title

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

4. Download the objects to the download directory.

5. To correctly recombine the media that are split into small parts, unpack all parts into the same directory.

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

⚠️ Caution

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

Related Information

Downloading Installation Media [page 94]
5 Installation

5.1 Installation Checklist

This section includes the installation steps for the following:

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

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

Note

This guide does not cover the installation of SAP systems running on IBM Db2 with the pureScale Feature. For more information about the required installation steps for IBM Db2 with the pureScale Feature, see the installation guide Running an SAP System on IBM Db2 with the pureScale Feature listed in Online Information from SAP [page 192].

Central System

1. You check the prerequisites [page 105] and run the installer [page 108] on the central system host with option Central System to install the SAP system.

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

   Note
   
   If you want to install an ASCS instance with integrated SAP Web Dispatcher [page 21], you must choose the Custom parameter mode.

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

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

2. You continue with Post-Installation [page 122].
Distributed System

1. If you want to share the transport directory `trans` from another system, you have to `mount [page 101] it from this system. Otherwise, we recommend that you share the `trans` directory that is created during the installation of the central instance (`/usr/sap/trans`).

2. On the **ASCS instance host**, proceed as follows:
   1. You check the prerequisites [page 105] and run the installer [page 108] to install the ABAP central services instance (ASCS instance).

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

   **i Note**
   
   If you want to install an **ASCS instance** with integrated SAP Web Dispatcher [page 21], you must choose the **Custom** parameter mode.

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

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

2. You export the global directories [page 102] to the database instance host, to the central instance host, and – if required – to the hosts where you want to install one or more dialog instances.

3. On the **database instance host**, proceed as follows:
   1. You mount the exported global directories [page 102] from the SAP global host (`<sapmnt>/<SAPSID>/exe`, `<sapmnt>/<SAPSID>/profile`, `<sapmnt>/<SAPSID>/global`) and SAP transport host (`/usr/sap/trans`).
   2. You check the prerequisites [page 105] and run the installer [page 108] to install the database instance.

4. On the **central instance host**, proceed as follows:

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

   1. You mount the exported global directories [page 102] from the SAP global host (`<sapmnt>/<SAPSID>/exe`, `<sapmnt>/<SAPSID>/profile`, `<sapmnt>/<SAPSID>/global`) and SAP transport host (`/usr/sap/trans`).
   2. You check the prerequisites [page 105] and run the installer [page 108] to install the central instance.
   3. If required, you install one or more dialog instances on the chosen hosts as described in subsection **Dialog Instance of this section.**
2. You check the prerequisites [page 105] and run the installer [page 108] to install the dialog instance.

6. You continue with Post-Installation [page 122].

**Graphical Overview**

The following figure shows how you install the various instances in a distributed system:

**High-Availability System**

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

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

1. If you want to share the transport directory trans from another system, you have to mount [page 101] it from this system. Otherwise, we recommend that you share the trans directory that is created during the installation of the central instance (see below).

2. You set up the switchover cluster infrastructure as follows:
   1. You check the prerequisites [page 105] and run the installer [page 108] to install the ABAP central services instance (ASCS instance) using the virtual host name [page 87] on the primary cluster node, host A.

**i Note**

If you want to install an ASCS instance with integrated SAP Web Dispatcher [page 21], you must choose the Custom parameter mode.

When processing the screens for the ASCS instance installation, you are prompted to mark the corresponding checkbox on the screen Additional Components to be Included in the ASCS Instance.
If you mark the checkbox for SAP Web Dispatcher, you are prompted for the additional parameters required for the SAP Web Dispatcher installation on the subsequent screens.

2. You export global directories [page 102] in `<sapmnt>/<SAPSID>` to the database host and to the central instance host.

3. You prepare the standby cluster node, host B, and make sure that it has all the necessary file systems [page 84], mount points, and (if required) Network File System (NFS).

4. You set up the user environment on the standby node, host B as follows:
   1. You use the same user and group IDs as on the primary node.
   2. You create the home directories of users and copy all files from the home directory of the primary node.

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

5. You configure the switchover software and test that switchover functions correctly to all standby nodes in the cluster.

6. You repeat the following steps until you have finished installing the enqueue replication server (ERS instance) on all nodes in the cluster:
   1. You perform the switchover to a node where you want to install the enqueue replication server instance (ERS instance) for the ABAP central services instance (ASCS instance).
   2. You check the prerequisites [page 105] and run the installer [page 108] to install the enqueue replication server instance (ERS instance) for the ABAP central services instance (ASCS instance).

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

   → Recommendation

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

   1. You prepare the database instance host and make sure that it has all the necessary file systems [page 84], mount points, and (if required) Network File System (NFS).
   2. You check the prerequisites [page 105] and run the installer [page 108] to install the database instance.

4. On the central instance host, proceed as follows:

   i Note

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

   1. You prepare the central instance host and make sure that it has all the necessary file systems [page 84], mount points, and (if required) Network File System (NFS).
   2. You check the prerequisites [page 105] and run the installer [page 108] to install the central instance.
   3. If you want to use the shared transport directory `trans` from another system, you also mount [page 101] this directory (see above).

5. We recommend that you install dialog instances with the installer to create redundancy. The application server instances are not a SPOF. Therefore, do not include these instances in the cluster.
   1. You mount the global directories [page 102] in `<sapmnt>/<SAPSID>`.
   2. You check the prerequisites [page 105] and run the installer [page 108] to install the dialog instance.
3. If you want to use the shared transport directory `trans` from another system, you also mount [page 101] this directory (see above).

6. You continue with Post-Installation [page 122].

Graphical Overview

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

**Dialog Instance**

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

1. You make sure that the global directories of the SAP system for which you want to install the dialog instance are mounted [page 102] on the host where you want to install the dialog instance.

2. You check the prerequisites [page 105] and run the installer [page 108] to install the dialog instance.

3. You continue with Post-Installation [page 122].
5.2 Exporting and Mounting the Transport Directory

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

Context

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

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


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

Procedure

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

2. Mounting the Transport Directory

   i Note

   If the transport directory resides on your local SAP instance installation host, you do not need to mount it.
1. Log on as user root to the central or dialog instance host where /usr/sap/trans is to be mounted.
2. Create the mount point /usr/sap/trans.

Related Information

Exporting and Mounting Directories via NFS for Linux [page 159]
Exporting and Mounting Directories via NFS for AIX [page 157]
Exporting and Mounting Directories via NFS for Oracle Solaris [page 161]
Exporting and Mounting Directories via NFS for HP-UX [page 158]

5.3 Exporting and Mounting Global Directories

If you install an SAP system distributed over several hosts, you have to nominate one host as the SAP global host. This is the host on which the global directories are to reside. You have to make sure that the global directories are also available on the hosts on which you intend to install the remaining instances of the SAP system. You do this by exporting the global directories on the SAP global host and mounting them on the installation hosts of the remaining SAP system instances to be installed.

Context

Example

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

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

Procedure

- Exporting and Mounting Global Directories for a Homogeneous Installation

  With a homogeneous installation, all SAP system instances are installed on hosts with the same UNIX operating system.
Proceed as follows:

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

\[\texttt{<sapmnt>/<SAPSID>/exe}\]
\[\texttt{<sapmnt>/<SAPSID>/profile}\]
\[\texttt{<sapmnt>/<SAPSID>/global}\]

⚠️ Caution
Make sure that the global transport directory is mounted on every host where you want to install an SAP system instance. For more information, see Exporting and Mounting the Transport Directory [page 101]. Otherwise, the installation of this SAP system instance fails.

b. Log on to the host of the new instance as user root.

c. Create the following mount points and mount them from the SAP global host:

\[\texttt{<sapmnt>/<SAPSID>/exe}\]
\[\texttt{<sapmnt>/<SAPSID>/profile}\]
\[\texttt{<sapmnt>/<SAPSID>/global}\]

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

- Exporting and Mounting Global Directories for a Heterogeneous Installation

With a heterogeneous installation, the instances of an SAP system are installed on hosts with different UNIX operating systems. If you need information about the installation of application servers on Windows in a UNIX environment, see Heterogeneous SAP System Installations [page 181].

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

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

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

\[\texttt{<sapmnt>/<SAPSID>/profile}\]
\[\texttt{<sapmnt>/<SAPSID>/global}\]

⚠️ Caution
Do not export \[\texttt{<sapmnt>/<SAPSID>/exe}\].
b. Log on to the host of the new instance as user root.

c. Create the following mount points and mount them from the SAP global host:

\[ \text{<sapmnt>/<SAPSID>/profile} \]

\[ \text{<sapmnt>/<SAPSID>/global} \]

**Caution**

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

**Caution**

Do not mount \[ \text{<sapmnt>/<SAPSID>/exe} \] and do not create it locally. It is created automatically during the installation.

**Related Information**

- Exporting and Mounting Directories via NFS for Linux [page 159]
- Exporting and Mounting Directories via NFS for AIX [page 157]
- Exporting and Mounting Directories via NFS for Oracle Solaris [page 161]
- Exporting and Mounting Directories via NFS for HP-UX [page 158]

### 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 Central User Management
1. You install your SAP system as described in this installation guide.
2. Add the system to Central User Administration (CUA). For more information, see Configuring User Management [page 136].

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 136].

5.5 Prerequisites for Running the Installer

Make sure you fulfill 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 to trust the self-issued certificate of the installer after carefully performing the “thumbprint” verification described in Running the Installer [page 108]. For more information about adding trusted certificates, see the documentation of your browser.

For more information about the SL Common GUI, see Useful Information About the Installer [page 114].

• We recommend that you use the csh shell for the installation. If you want to use another shell, make sure that you have read SAP Note 202227.
  The installer uses csh scripts during the installation to obtain the environment for user $<sapsid>adm$.
  This is also true if user $<sapsid>adm$ already exists from an earlier SAP system installation, and the shell
of this user is not csh. Before you start the installer, execute the following command as user <sapsid>adm to make sure that the csh scripts are up-to-date:

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

- Make sure that you have specified the most important SAP system parameters as described in Basic SAP System Installation Parameters [page 44] before you start the installation.
- Check that your installation hosts meet the requirements for the installation options that you want to install. For more information, see Running the Prerequisite Checker [page 29].
- If you want to install a dialog instance into an existing system, make sure that you have exported and mounted global directories [page 102].
- Make sure that you have carefully planned your database layout, in particular the tablespace layout, as described in Setup of Database Layout [page 56].
- If you are installing a second or subsequent SAP system into an existing database (MCOD), make sure that the database is up and running before starting the installation. For more information, see Installation of Multiple Components in One Database [page 153].

<table>
<thead>
<tr>
<th>Shell Used</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bourne shell (sh)</td>
<td><code>TEMP=&lt;Directory&gt;</code> &lt;br&gt; <code>export TEMP</code></td>
</tr>
<tr>
<td>C shell (csh)</td>
<td><code>setenv TEMP &lt;Directory&gt;</code> &lt;br&gt; <code>export TEMP=&lt;Directory&gt;</code></td>
</tr>
<tr>
<td>Korn shell (ksh)</td>
<td></td>
</tr>
</tbody>
</table>

- Make sure that your operating system does not delete the contents of the temporary directory /tmp or the contents of the directories to which the variable TEMP, TMP, or TMPDIR points – for example, by using a crontab entry.
- Make sure that you have at least 300 MB of free space in the installation directory for each installation option. In addition, you need 300 MB free space for the installer executables. If you cannot provide 300 MB free space in the temporary directory, you can set one of the environment variables TEMP, TMP, or TMPDIR to another directory with 300 MB free space for the installer executables. You can set values for the TEMP, TMP, or TMPDIR environment variable to an alternative installation directory as described in section Useful Information About the Installer [page 114].
- Make sure that the temporary directory has the permissions 755.

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

- AIX: Make sure that you have set the limits for operating system users as described in SAP Note 323816.
Only valid for 'Platform': HP-UX, Linux, Oracle Solaris

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

⚠️ **Caution**

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

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

  **Example**

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

<table>
<thead>
<tr>
<th>Output</th>
<th>Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>cputime</td>
<td>unlimited</td>
</tr>
<tr>
<td>filesize</td>
<td>unlimited</td>
</tr>
<tr>
<td>datasize</td>
<td>unlimited</td>
</tr>
<tr>
<td>stacksize</td>
<td>8192 KB</td>
</tr>
<tr>
<td>coredumpsize</td>
<td>unlimited</td>
</tr>
<tr>
<td>descriptors</td>
<td>8192</td>
</tr>
<tr>
<td>memoryuse</td>
<td>unlimited</td>
</tr>
</tbody>
</table>

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

  **Example**

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

<table>
<thead>
<tr>
<th>Output sh</th>
<th>Output ksh</th>
<th>Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>cpu time (seconds)</td>
<td>cpu time (seconds)</td>
<td>unlimited</td>
</tr>
<tr>
<td>file size (blocks)</td>
<td>file size (blocks)</td>
<td>unlimited</td>
</tr>
<tr>
<td>data seg size (kbytes)</td>
<td>data size (Kibytes)</td>
<td>unlimited</td>
</tr>
<tr>
<td>stack size (kbytes)</td>
<td>stack size (Kibytes)</td>
<td>8192 KB</td>
</tr>
<tr>
<td>core file size (blocks)</td>
<td>core file size (blocks)</td>
<td>unlimited</td>
</tr>
</tbody>
</table>
If you want to install a dialog instance to an existing SAP system, make sure that:
  ○ There is exactly one entry in the `/usr/sap/sapservices` file for each SAP instance installed on this host. Make sure that you check that the entry refers to the correct profile.
  ○ There are no profile backup files with an underscore "_" in their profile name. If so, replace the "_" with a ".".

Example


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

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

5.6 Running the Installer

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

Prerequisites

For more information, see Prerequisites for Running the Installer [page 105].
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 114].

Procedure

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

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

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

2. Make the installation media available.

   For more information, see Preparing the Installation Media [page 88].

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

   Only valid for ‘Platform’: Oracle Solaris

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

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

   /<Path_To_Unpack Directory>/sapinst

   i Note
   If you want to use a virtual host name, start the installer with the installer property SAPINST_USE_HOSTNAME as follows:

   ./sapinst SAPINST_USE_HOSTNAME=<Virtual_Host_Name>
For more information, see Using Virtual Host Names [page 87].

⚠️ Caution

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

4. The installer is starting up.

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

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

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

⚠️ Note

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

1. Terminate the installer as described in Useful Information About the Installer [page 114].
2. Restart the installer from the command line with the `SAPINST_GUI_HOSTNAME=<hostname>` property.
   You can use a fully-qualified host name.

If you have a supported web browser (see Prerequisites for Running the Installer [page 105]) installed on the host where you run the installer, you can open this URL directly in the shell. Otherwise, open the URL in a supported web browser that runs on another device.

⚠️ Caution

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

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

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

1. Click on the certificate area on the left hand side in the address bar of your browser, and view the certificate.
2. Open the certificate fingerprint or thumbprint, and compare all hexadecimal numbers to the ones displayed in the console output of the installer.
   Proceed as follows to get the certificate fingerprint or thumbprint from the server certificate printed in the installer console:
   1. Go to the `sapinst_exe.xxxxx.xxxx` directory in the temporary directory to which the installer has extracted itself:
      `<User_Home>/sapinst/`
2. In the `sapinst exe.xxxxxxxx.xxxx` directory, execute the `sapgenpse` tool with the command line option `get_my_name -p`.

As a result, you get the server fingerprint or thumbprint from the server certificate.

3. Accept the warning to inform your browser that it can trust this site, even if the certificate could not be verified.

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

5. On the Welcome screen, choose the required option:
   - Install an SAP system
     - To install an SAP system based on SAP NetWeaver AS ABAP from scratch, choose `Product` > `SAP Application Server ABAP` > `Database` > `System Variant`.
     - To install an SAP system based on SAP NetWeaver AS ABAP as target system of a system copy, choose `Product` > `Software Life-Cycle Options` > `System Copy` > `Database` > `Target System Installation` > `System Variant` > `Based on AS ABAP`.
   - Perform other tasks or install additional components
     - Go to `Product` > `Software Life-Cycle Options` and choose the required task.

6. Choose Next.

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

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

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

i Note
If you want to install an ASCS instance with integrated SAP Web Dispatcher [page 21], you must choose the Custom parameter mode.

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

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

⚠️ Caution
The signature of media is checked automatically during the Define Parameters phase while processing the Media Browser screens.

Keep in mind that this automatic check is only committed once and not repeated if you modify artefacts such as SAR archives or files on the media after the initial check has been done. This means that - if you modify artefacts later on either during the remaining Define Parameters phase or later on during the Execute Service phase - the signature is not checked again.
8. After you have entered all requested input parameters, the installer displays the Parameter Summary screen. This screen shows both the parameters that you entered and those that the installer set by default. If required, you can revise the parameters before starting the installation.

Make sure that you check the following parameters depending on the installation type that you have chosen:

○ If you are performing a typical installation, the installer creates the following:
  ○ Directories for tablespaces with table data and indexes (sapdata directories)
    The installer creates four sapdata directories by default. If you require more or fewer sapdata directories, depending on the storage devices you are using, you must change this parameter before you start the installation. Select this parameter on the Summary screen and choose Revise. The installer then returns to the screen IBM Db2 for Linux, UNIX, and Windows: Tablespace Layout.
  ○ As of IBM Db2 10.1 and for lower Db2 versions without automatic storage: Directories for temporary tablespaces (saptmp directories)
    The installer creates four saptmp directories by default. If you require more or fewer saptmp directories, you must change this parameter before you start the installation. Select this parameter on the Summary screen and choose Revise. The installer then returns to the screen IBM Db2 for Linux, UNIX, and Windows: Tablespace Layout.

For more information, see Db2 Tablespaces [page 62].

○ If you are performing a custom installation, you set these parameters during the Define Parameters phase of the installer.

9. To start the installation, choose Next.

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

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

Only valid for Platform: HP-UX

Caution

HP-UX only: If you decided to use 02 as the instance number, the instance fails to start during the installation process. For more information about the cause, see SAP System Parameters [page 45]. You have to manually change the port number for report RSLGCOLL to continue with the installation.

Proceed as follows:
1. Go to directory /<sapmnt>/<SAPSID>/profile.
2. Edit DEFAULT.PFL.
3. Set the parameter `rslg/collect_daemon/listen_port` to a free port number.

End of 'Platform': HP-UX

10. If required, install a dialog instance for a central system or distributed system.

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

→ Recommendation

Keep all installation directories until you are sure that the system, including all instances, is completely and correctly installed. Once the system is completely and correctly installed, make a copy of the installation directories with all their contents. Save the copy to a physically separate medium, such as a medium or a USB drive that is separate from your installation hosts.

This might be useful for analyzing issues occurring later when you use the system. For security reasons, do not keep installation directories on installation hosts, but make sure that you delete them after saving them separately.

12. If not already done, install the Db2 license.

i Note

Check SAP Note 101809 to see which Db2 edition and fix packs are relevant for you. If you have bought your Db2 license from SAP (OEM customers), install the Db2 license as described in SAP Note 816773.

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

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

i Note

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

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

   `<User_Home>/.sapinst/`

16. 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 114].
5.7 Additional Information about the Installer

The following sections provide additional information about the installer.

Useful Information About the Installer [page 114]
This section contains some useful technical background information about the installer and the installer GUI.

Interrupted Processing of the Installer [page 116]
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 119]

Troubleshooting with the Installer [page 120]
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 121]
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.

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

  - For the SL Common GUI the installer provides a pre-generated URL at the bottom of the shell from which you are running the installer. If you have a supported web browser installed on the host where you run the installer, you can start the SL Common GUI directly from this URL. Otherwise, open a web browser supported by the SL Common GUI on any device and run the URL from there.

  - For more information about supported web browsers see Prerequisites for Running the Installer [page 105].

  - If you need to run the SL Common GUI in accessibility mode, apply the standard accessibility functions of your web browser.

- As soon as you have started the sapinst executable, the installer creates a .sapinst directory underneath the /home/<User> directory where it keeps its log files. <User> is the user with which you have started the installer.

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

If you want the sapinst_instdir directory to be created in another directory than /tmp, set the environment variable TEMP, TMP, or TMPDIR to this directory before you start the installer.

### Shell Used

<table>
<thead>
<tr>
<th>Shell Used</th>
<th>Command</th>
</tr>
</thead>
</table>
| Bourne shell (sh)| `TEMP=<Directory>`
|                  | `export TEMP`                   |
| C shell (csh)    | `setenv TEMP <Directory>`       |
| Korn shell (ksh) | `export TEMP=<Directory>`       |

⚠️ **Caution**

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

→ **Recommendation**

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

- The installer extracts itself to a temporary directory called `sapinst_exe.xxxxx.xxxx`, which is located in the environment variables TEMP, TMP, or TMPDIR. These files are deleted after the installer has stopped running.
  
The temporary directory `sapinst_exe.xxxxx.xxxx` sometimes remains undeleted. You can safely delete it.
  
The temporary directory also contains the log file `dev_selfex.out` from the self-extraction process of the installer, which might be useful if an error occurs.

⚠️ **Caution**

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

- To see a list of all available installer properties, start the installer as described above with command line parameter `-p`:
  
  `.sapinst -p`.

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

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

ℹ️ **Note**

If you need to terminate the installer, press **Ctrl + C**.
5.7.2 Interrupted Processing of the Installer

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

Context

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

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

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

⚠️ Caution

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

The following table describes the options in the dialog box:

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

ℹ️ Note

You can also terminate the installer by choosing Ctrl + C but we do not recommend this because it kills the process immediately.
The following procedure describes the steps to restart an installation, which you stopped by choosing Stop, or to continue an interrupted installation after an error situation.

**Procedure**

1. Log on to the installation host as a user with the required permissions as described in Running the Installer [page 108].
2. Make sure that the installation media are still available.

   For more information, see Preparing the Installation Media [page 88].

   → **Recommendation**

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

   Only valid for Platform: Oracle Solaris

   → **Note**

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

   End of Platform: Oracle Solaris

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

   `<Path_To_Unpack_Directory>/sapinst`

4. The installer is restarting.

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

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

   ...

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

   → **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 114].
   2. Restart the installer from the command line with the `SAPINST_GUI_HOSTNAME=<hostname>` property.

   You can use a fully-qualified host name.
If you have a supported web browser (see Prerequisites for Running the Installer [page 105]) installed on the host where you run the installer, you can open this URL directly in the shell. Otherwise, open the URL in a supported web browser that runs on another device.

⚠️ Caution

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

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

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

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

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

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

The What do you want to do? screen appears.

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

**Perform a new run**

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

The following naming convention is used for the backup directory:

$log_{<\text{Day}_1>}_{<\text{Month}>}_{<\text{Year}>}_{<\text{Hours}>}_{<\text{Minutes}>}_{<\text{Seconds}>}$

#### Example

$log\_01\_Oct\_2016\_13\_47\_56$

#### i Note

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

#### i Caution

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

**Continue with the existing one**

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

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

After the installation has finished successfully, the installer has created the following entries in `/etc/services`:

- `sapdp<\text{Instance\_Number}> = 32<\text{Instance\_Number}>/tcp`
- `sapdp<\text{Instance\_Number}>s = 47<\text{Instance\_Number}>/tcp`
- `sapgw<\text{Instance\_Number}> = 33<\text{Instance\_Number}>/tcp`
- `sapgw<\text{Instance\_Number}>s = 48<\text{Instance\_Number}>/tcp`
- `sapms<\text{SAPSID}> = 36<\text{Instance\_Number}>/tcp` (unless you specified another value during the installation)

#### i 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<\text{Instance\_Number}> = 33<\text{Instance\_Number}>/tcp` the following range of entries is created:
  - `sapgw00 = 3300/tcp`
  - `sapgw01 = 3301/tcp`
  - `sapgw02 = 3302/tcp`
If there is more than one entry for the same port number, this is not an error.

5.7.4 Troubleshooting with the Installer

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

Context

If an error occurs, the installer:
- Stops processing
- Displays a dialog informing you about the error

Procedure

1. Check SAP Note 1548438 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.
     - To check the log and trace files of the installer GUI for errors, go to the directory <User_Home>/./sapinst/
     - Then continue by choosing Retry.
     - If required, abort the installer by choosing Cancel in the tool menu and restart the installer. For more information, see Interrupted Processing of the Installer [page 116].
3. If you cannot resolve the problem, report an incident using the appropriate subcomponent of BC-INS*. For more information about using subcomponents of BC-INS*, see SAP Note 1669327.
5.7.5 Using the Step State Editor (SAP Support Experts Only)

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

**i Note**

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

**Prerequisites**

- SAP Support requests you to use the Step State Editor.
- Make sure that the host where you run the installer meets the requirements listed in Prerequisites for Running the Installer [page 105].

**Procedure**

1. Start the installer from the command line as described in Running the Installer [page 108] 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 installation options:

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

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

Central, Distributed, or High-Availability System

**i Note**

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

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

1. If required, you **perform a full installation backup** [page 143] immediately after the installation has finished.
2. You check and if necessary modify the settings for the operating system users for your SAP system if they were created by the installer.
   For more information, see Creating Operating System Users and Groups [page 74].
3. You check whether you can **log on to the Application Server ABAP** [page 124].
4. You **install the SAP license** [page 125].
5. If you installed a high-availability system, you **set up the licenses for high availability** [page 126].
6. You **configure the remote connection to SAP support** [page 127].
7. You **install the SAP online documentation** [page 127].
8. You **perform the consistency check** [page 128].
9. You **configure the Transport Management System** [page 129].
10. For production systems it is highly recommended that you **connect the system to SAP Solution Manager** [page 129].
11. You **apply the latest kernel and Support Package stacks** [page 131].
12. You perform **post-installation steps for the application server ABAP** [page 132].
13. If required, you **install additional languages and perform language transport** [page 134].
14. You **configure the user management** [page 136].
15. You **ensure user security** [page 136].
16. You perform **the client copy** [page 140].
17. For a production system, you must **enable the database for monitoring** [page 141].
18. For a production system, you enable recoverability of the database [page 142] immediately after the installation.

19. You perform a full backup of the installation [page 143].

20. You check the parameters for database configuration and database manager configuration (see Checking Database Parameters [page 145]).

21. You check the Master Guide for your SAP Business Suite application or SAP NetWeaver application (chapter Configuration of Systems and Follow-Up Activities) for further implementation and configuration steps, such as language installation, monitoring, work processes, transports, SAP license, printers, system logs, and connectivity to system landscape directory (SLD).

**Dialog Instance**

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

1. If required, you perform an installation backup [page 143] immediately after the installation has finished.
2. You check and if necessary modify the settings for the operating system users for your SAP system if they were created by the installer. For more information, see Creating Operating System Users and Groups [page 74].
3. You check whether you can log on to the Application Server ABAP [page 124].
4. You install the SAP online documentation [page 127].
5. If you installed a dialog instance in a heterogeneous UNIX environment, that is on a host with a UNIX operating system different from the UNIX operating system of the central instance, you have to update the kernel of the dialog instance [page 135].
6. You ensure user security [page 136].
7. You enable recoverability of the database [page 142].
8. You perform an installation backup [page 143] for the dialog instance.
9. You check the parameters for database configuration and database manager configuration (see Checking Database Parameters [page 145]).
10. If you chose to install an integrated SAP Web Dispatcher instance within the ASCS instance, you log on to the SAP Web Dispatcher Management Console [page 146].
11. If you chose to install an integrated SAP Web Dispatcher instance within the ASCS instance, you configure the SAP Web Dispatcher [page 148].
6.2 Logging On to the Application Server ABAP

You need to check that you can log on to the Application Server ABAP with the standard users, given in the table below.

Prerequisites

- The SAP system is up and running.
- You have installed the SAP front-end software.

Context

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

<table>
<thead>
<tr>
<th>User</th>
<th>User Name</th>
<th>Client</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP system user</td>
<td>SAP*</td>
<td>000, 001, 066</td>
</tr>
<tr>
<td></td>
<td>DDIC</td>
<td>000, 001</td>
</tr>
</tbody>
</table>

You access the application server ABAP using SAP Logon

Procedure

1. Start SAP Logon on the host where you have installed the front end as follows:
   - SAP GUI for Windows:
     On the host where you have installed the front end, choose:
     ![Start Programs SAP Front End Release SAPlogon]
   - SAP GUI for Java:
     Enter the following command from the GUI installation directory:
     guilogon
2. Create a logon entry for the newly installed system in the SAP Logon.
   For more information about creating new logon entries, press F1
3. When you have created the entry, log on as user SAP* or DDIC.
6.3 Installing the SAP License

You must install a permanent SAP license.

Context

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

⚠️ Caution

Before the temporary license expires, you must apply for a permanent license key from SAP. We recommend that you apply for a permanent license key as soon as possible after installing your system.

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

Procedure

Install the SAP license as described in SAP Library at http://help.sap.com/nw SAP NetWeaver Platform SAP NetWeaver 7.0 (Including Enhancement Package) Application Help Key Areas of SAP NetWeaver Solution Life Cycle Management by Key Capability SAP Licenses SAP License Key / SAP Licensing Procedure

If you have installed a high-availability system, proceed as described in High Availability: Setting Up Licenses [page 126].
6.4 High Availability: Setting Up Licenses

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

Prerequisites

The SAP system is up and running.

Context

Every SAP system needs a central license, which is determined by the environment of the message server. Since SAP's high-availability (HA) solution stipulates 2 or more cluster nodes (host machines) where the message server is enabled to run, you have to order as many license keys [page 125] as you have cluster nodes.

When we receive confirmation from your vendor that you are implementing a switchover environment, we provide the required license keys for your system, 1 key for each machine.

SAP has implemented a license mechanism for transparent and easy use with switchover solutions and clustered environments. Your customer key is calculated on the basis of local information on the message server host. This is the host machine where the ABAP central services instance (ASCS instance) runs. There is no license problem when only the database is switched over.

Procedure

1. Make sure that the ABAP central services instance (ASCS instance) on the primary host, node A, is running.
2. To find the hardware ID of the primary host, log on to any application server instance of the SAP system and call transaction SLICENSE.
3. Perform a switchover of the ABAP central services instance (ASCS instance) to another node in the cluster and repeat the previous step.
   Repeat this for all remaining nodes in the cluster.
4. To obtain the two license keys, enter the hardware IDs for the primary and backup hosts at: http://support.sap.com/licensekey
5. To import the files containing the two licenses, log on to any application server instance of the SAP system and call transaction SLICENSE.
6. Perform a switchover of the ABAP central services instance (ASCS instance) to another node in the cluster and repeat the previous step.
   Repeat this for all remaining nodes in the cluster.
Results

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

6.5 Configuring Remote Connection to SAP Support

SAP offers its customers access to support and a number of remote services such as the Early Watch Service or the GoingLive Service. Therefore, you have to set up a remote network connection to SAP.

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

6.6 Installing SAP Online Documentation

You can install SAP online documentation as application help.

Context

SAP currently provides an HTML-based solution for the online documentation, including the Application Help, Glossary, Implementation Guide (IMG), and Release Notes. You can display the documentation with a Java-compatible Web browser on all front-end platforms supported by SAP.

Procedure

Install the application help in your SAP system as described in the `README.TXT` file contained in the root directory of the application help media.

Online documentation media are delivered as part of the installation package. You can also download them from [https://launchpad.support.sap.com/#/softwarecenter](https://launchpad.support.sap.com/#/softwarecenter) > `Installations & Upgrades` > `By Category` > `APPLICATION HELP (SAP LIBRARY)`.

### 6.7 Performing the Consistency Check

We recommend that you check the consistency of the newly installed SAP ABAP system. When logging on to the system for the first time, you need to trigger a consistency check manually. The function is then called automatically whenever you start the system or an application server.

**Prerequisites**

- If the installation finished successfully, your SAP system should be up and running. Otherwise, start it as described in Starting and Stopping SAP System Instances [page 175].
- You have logged on to the SAP system [page 124].

**Context**

The following checks are performed:

- Completeness of installation
- Version compatibility between the SAP release and the operating system
  
  The initial consistency check determines whether:
  - The release number in the SAP kernel matches the release number defined in the database system
  - The character set specified in the SAP kernel matches the character set specified in the database system
  - Critical structure definitions that are defined in both the data dictionary and the SAP kernel are identical. The structures checked by this function include SYST, T100, TSTC, TDCT and TFDIR.
- Accessibility of the message server
- Availability of all work process types
- Information about the enqueue server and the update service

**Procedure**

1. Perform a system check:
   
   Call transaction `SICK`.
   
   You should see the entry `SAP System Check | no errors reported`

2. Perform a database check:
   
   In the DBA Cockpit (transaction `DBACOCKPIT`), check for missing tables or indexes by choosing `Diagnostics` > `Missing Tables and Indexes`.
6.8 Configuring the Change and Transport System

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

Procedure

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

   http://help.sap.com/nw\SAP NetWeaver Platform\SAP NetWeaver 7.0 \Including Enhancement_Package\Application Help\Key Areas of SAP NetWeaver\Solution Life Cycle Management by Key Capability\Software Life Cycle Management\Software Logistics\Change and Transport System\Change and Transport System – Overview\Basics of the Change and Transport System\Transport Management System – Concept

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

   http://help.sap.com/nw\SAP NetWeaver Platform\SAP NetWeaver 7.0 \Including Enhancement_Package\Application Help\Key Areas of SAP NetWeaver\Solution Life Cycle Management by Key Capability\Software Life Cycle Management\Software Logistics\Change and Transport System\Transport Organizer (BC-CTS-ORG)\Requirements for Working with the Transport Organizer\Setting the System Change Option

3. Call transaction SE38 to schedule a dispatcher job for transport programs by executing program RDDIMPDP.

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

6.9 Connecting the System to SAP Solution Manager

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

Prerequisites

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

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

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

Procedure

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

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

   For more information, see the SAP Solution Manager Application Help:
   - If your SAP Solution Manager release is 7.1: http://help.sap.com/solutionmanager Version 7.1 SPS <No> Application Help (English) SAP Solution Manager Operations Managing System Landscape Information Managing Technical System Information Register Technical Systems Automatically by Data Suppliers
   - If your SAP Solution Manager release is 7.2:

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

   For more information, see the Planning Guide - System Landscape Directory in the SAP Community Network at System Landscape Directory (SLD) - Overview

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

   For more information, see the SAP Solution Manager Application Help:
   - If your SAP Solution Manager release is 7.1:
     http://help.sap.com/solutionmanager Version 7.1 SPS <No> Application Help (English) SAP Solution Manager Operations Managing System Landscape Information Setting Up the Landscape Management Infrastructure Connecting LMDB to System Landscape Directory (SLD)
   - If your SAP Solution Manager release is 7.2:
     http://help.sap.com/solutionmanager Version 7.2 SPS <No> Application Help (English) Technical Infrastructures Landscape Management Database (LMDB) Setting Up the Landscape Management Infrastructure Connecting LMDB to System Landscape Directory (SLD)

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

   For more information, see the SAP Solution Manager Application Help:
If your SAP Solution Manager release is 7.1:
Solution Manager Operations > Managing System Landscape Information

If your SAP Solution Manager release is 7.2:

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

6.10 Applying the Latest Kernel and Support Package Stacks

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

Procedure

- Download and apply the latest Kernel and Support Package stacks using the Software Update Manager (SUM) as described in the documentation Updating SAP Systems Using Software Update Manager 1.0 SP<Number> available at http://support.sap.com/sltoolset > System Maintenance > Software Update Manager (SUM) 1.0 SP <Latest Version> > Guides for SUM 1.0 SP <Latest Version>
- If you want to update the kernel manually, proceed as described below:
  a. Log on as user <sapsid>adm to the hosts of the SAP system instances to be updated.
  b. Download the latest kernel for your operating system and database platform as described in SAP Note 19466.
  c. Back up the kernel directory that is specified by the profile parameter DIR_CT_RUN.
  d. Extract the SAR files of the kernel Support Packages of the target SP level to a temporary directory using the SAPCAR tool.
  e. Copy or move the extracted programs from the temporary directory to the local kernel directory.
  f. Adjust the ownership and permissions of the kernel binaries by entering the following command sequence (Execute the saproot.sh script that is located in the kernel directory):

```bash
su - root
```
cd <Kernel_Directory>
./saproot.sh <SAPSID>
exit

6.11 Performing Post-Installation Steps for the Application Server ABAP

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

Prerequisites

You have logged on to the application server ABAP as described in Logging On to the Application Server [page 124].

Context

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

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

For more information, see the appropriate sections below.

Procedure

- Upload and Set System Profiles using Transaction RZ10
  
  You upload system profiles, such as default profile and instance profile, from the file system into the database of the target system using transaction RZ10.
For more information about how to maintain SAP system profiles, see the SAP Library at:

<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 7.0 EHP3</td>
<td><img src="http://help.sap.com/nw703" alt="Application Help ➤ SAP NetWeaver by Key Capability ➤ Application Platform by Key Capability ➤ Application Server ABAP ➤ Administration of Application Server ➤ ABAP ➤ Monitoring and Administration Tools for Application Server ABAP ➤ Configuration in the CCMS ➤ Profiles ➤ Profile Maintenance" /></td>
</tr>
<tr>
<td><img src="http://help.sap.com/nw702" alt="SAP NetWeaver 7.0 EHP2" /></td>
<td><img src="http://help.sap.com/nw701" alt="Application Help ➤ SAP NetWeaver by Key Capability ➤ Solution Life Cycle Management by Key Capability ➤ System Management ➤ Configuration ➤ Profiles ➤ Maintaining Profiles" /></td>
</tr>
<tr>
<td><img src="http://help.sap.com/nw701" alt="SAP NetWeaver 7.0 EHP1" /></td>
<td><img src="http://help.sap.com/nw70" alt="Application Help ➤ SAP NetWeaver by Key Capability ➤ Solution Life Cycle Management by Key Capability ➤ System Management ➤ Configuration ➤ Profiles ➤ Maintaining Profiles" /></td>
</tr>
<tr>
<td><img src="http://help.sap.com/nw70" alt="SAP NetWeaver 7.0" /></td>
<td><img src="http://help.sap.com/nw70" alt="Application Help ➤ SAP NetWeaver by Key Capability ➤ Solution Life Cycle Management by Key Capability ➤ System Management ➤ Configuration ➤ Profiles ➤ Maintaining Profiles" /></td>
</tr>
</tbody>
</table>

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

  You create the following:
  - Logon groups using transaction SMLG
  - RFC server groups using transaction RZ12

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

  If required, you create the RFC server group `parallel_generators`.

- **Create Operation Modes using Transaction RZ04**

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

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

  Select the corresponding checkbox to assign the operation mode to the following:
  - Time table (assignment only from 0-24 h)
  - Current application server instance

- **Schedule Standard Jobs using Transaction SM36**

  You schedule SAP standard jobs using transaction SM36.

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

- **Configuration of SLD Data Supplier using Transaction RZ70**
a. Make sure that the SLD and the SLD bridge (the receiving thread of the SLD, which runs on a J2EE engine) are running.
b. Configure the System Landscape Directory (SLD) data supplier with default settings, using transaction RZ70.

- **Perform Load Generation using Transaction SGEN**

You generate the ABAP loads using transaction SGEN. ABAP loads are platform-dependent programs that are generated during runtime and stored in database tables. Using transaction SGEN you can generate ABAP loads of a number of programs, function groups, classes, and so on.

Choose one of the following generation modes:

- **Generate All Objects**
  All existing objects of all software components are generated synchronously. Job RSPARGENER8M starts the generation directly after all ABAP objects have been prepared for generation and have been stored in table GENSETC. Be aware that this is a time-consuming process.

  **Note**
  Make sure that you have sufficient space available on your database. The generation of all existing objects requires around 2 - 9 GB of free space.

- **Prepare All Objects for Generation**
  All objects to be generated are prepared for generation and stored in table GENSETM. You can start the generation of these objects later with transaction SGEN. Choose this strategy if object generation is to be done outside the configuration task due to performance issues.

### 6.12 Installing Additional Languages and Performing Language Transport

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

**Context**

If you have problems during the language installation, see SAP Note 2456868.

**Procedure**

1. Configure the language settings by using transaction I18N and choosing I18N Customizing I18N System Configuration or by executing report RSCPINST directly. For more information, see SAP Note 42305.

   For more information, see SAP Note 42305.
AIX: If you wish to use the Turkish locale with SAP on AIX, you must install the Turkish locale supplied by SAP instead of the one supplied with the operating system. For more information, see SAP Note 39718.

2. Perform the language transport using transaction SMLT:

   i Note
   German is already available in the system. Do not transport it via SMLT.

   a. Classify the language.
   b. Schedule the language transport.
   c. Schedule the language supplementation.

Next Steps

   i Note
   You can also install additional languages later, but if you install any Support Packages in the meantime, you have to do one of the following:
   - Install the Support Packages again.
   - Use the report RSTLAN_IMPORT_OCS to extract the language-relevant information from each Support Package.


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

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

Procedure

1. Stop the dialog instance as described in Starting and Stopping SAP System Instances [page 175].
2. Update the kernel to the same level as the central instance by replacing the old kernel with the new one as follows:
   a. Log on as user <sapsid>adm to the host of the dialog instance to be updated.
b. Download the required kernel, as described in SAP Note 19466.
c. Back up the kernel directory specified by the profile parameter DIR_CT_RUN.
d. Extract the SAR files of the kernel Support Packages of the target SP level to a temporary directory using the SAPCAR tool.
e. Copy or move the extracted programs from the temporary directory to the local kernel directory.
f. Adjust the ownership and permissions of the kernel binaries by entering the following command sequence (execute the saproot.sh script located in the kernel directory):
   ```
su - root
cd <kernel directory>
./saproot.sh <SAPSID>
exit
```

3. Restart the dialog instance as described in Starting and Stopping SAP System Instances [page 175].

### 6.14 Configuring User Management

After the installation of your SAP system has finished, you must decide whether you want to do the following:
- Add the system to Central User Administration (CUA)
- Use Lightweight Directory Access Protocol (LDAP) synchronization

For more information, see the SAP Library at:


### 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 these users:
- Operating system users
- SAP system users

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

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

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

For more information, see:

http://help.sap.com/nw

SAP NetWeaver Platform ➤ SAP NetWeaver 7.0 <Including Enhancement_Package> ➤ Application Help ➤ SAP NetWeaver by Key Capability ➤ Security ➤ Network and Transport Layer Security

Caution

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

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


Example

http://help.sap.com/nw

SAP NetWeaver Platform ➤ SAP NetWeaver 7.0 Including Enhancement Package 2 ➤ Security ➤ SAP NetWeaver Security Guide

Operating System and Database Users

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

Recommendation

For security reasons, we recommend that you remove the operating system users from the group sapinst after you have completed the installation of your SAP system.

You do not have to do this if you specified this “cleanup” already during the Define Parameters phase on the Cleanup Operating System Users screen. Then the removal had already been done automatically when the processing of the installer had completed. For more information, see Operating System Users in SAP System Parameters [page 45].

<table>
<thead>
<tr>
<th>User Type</th>
<th>User</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating system user</td>
<td>&lt;sapid&gt;adm</td>
<td>SAP system administrator</td>
</tr>
</tbody>
</table>
Database and operating system user

<table>
<thead>
<tr>
<th>User Type</th>
<th>User</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Database and operating system user</td>
<td>db2&lt;dbsid&gt;</td>
<td>Database administrator</td>
</tr>
<tr>
<td>Operating system user</td>
<td>sap&lt;sapsid&gt;</td>
<td>Database connect user in an ABAP system</td>
</tr>
</tbody>
</table>

As of SAP enhancement package 3 of SAP NetWeaver 7.0, you can specify the name of the ABAP connect user (sap<sapsid>) independently from the SAP schema name during the dialog phase of the installation.

We recommend, however, that you keep the names of the connect user and the database schema identical in standard use cases.

If you are performing a system copy using database means, Db2 is not able to change the schema name and you can then choose a connect user name that is different from the schema name.

SAP Host Agent User

<table>
<thead>
<tr>
<th>User Type</th>
<th>User</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating system user</td>
<td>sapadm</td>
<td>SAP system administrator</td>
</tr>
</tbody>
</table>

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.

Role-Based Security Concept for Database Users

You can use roles to restrict user privileges on the database according to organizational tasks. The following database roles are available for SAP systems running on IBM Db2 as of version 9.7:

- **SAPAPP** role (for business applications, assigned to all connect users by default)
- **SAPMON** role (for monitoring)
- **SAPTOOLS** role (for database administration)

All new SAP system installations running on IBM Db2 as of version 9.7 work with the new role-based security concept. The installer creates the roles automatically and does not assign any single user authorizations. The installer also assigns the SAP default users to their appropriate database role.

For more information about the role-based security concept, see SAP Note 1365982 and the Database Administration Guide for SAP on IBM Db2 for Linux, UNIX, and Windows listed in Online Information from SAP [page 192].
iNote

The `<sapsid>adm` user is not assigned to any of the new database roles. The `<sapsid>adm` user still belongs to the database group `SYSCTRL`, so administrators with this user can start and stop the database server.

SAP System Users

After the installation, ABAP system users are available. The following table shows these users together with recommendations on how you can ensure the security of these users:

<table>
<thead>
<tr>
<th>User</th>
<th>User Name</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP system user</td>
<td>SAP*</td>
<td>User exists in at least SAP system clients 000, 001, and 066</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Caution</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>This user has extensive authorizations. Make sure that you assign a secure password.</td>
</tr>
<tr>
<td>DDIC</td>
<td></td>
<td>User exists in at least SAP system clients 000 and 001</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Caution</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>This user has extensive authorizations. Make sure that you assign a secure password.</td>
</tr>
<tr>
<td>EARLYWATCH</td>
<td></td>
<td>User exists in at least SAP system client 066</td>
</tr>
<tr>
<td>SAPCP1C</td>
<td></td>
<td>User exists in at least SAP system clients 000 and 001</td>
</tr>
</tbody>
</table>

More Information

For more information about managing ABAP users, see:

6.16 Performing the Client Copy

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

**Context**

The installer creates three ABAP clients during the installation, client 000, client 001, and client 066. Client 000 is the SAP reference client for ABAP.

Use client 000 as source client for the client copy.

**Note**

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

**Procedure**

1. Maintain the new client with transaction SCC4.
2. Activate kernel user SAP*:
   a. Set the profile parameter login/no_automatic_user_sapstar to 0.
   b. Restart the application server.
3. Log on to the new client with kernel user SAP* and password PASS.
4. Copy the client with transaction SCCL and profile SAP_CUST.
5. Check the log files with transaction SCC3.
6. Create the required users. These users must have at least the authorizations required for user administration and system administration. Create a user SAP* with all required authorizations for this user. If you want to have other users for system administration, you can also create user SAP* without authorizations.
7. Deactivate kernel user SAP*:
   a. Reset login/no_automatic_user_sapstar to 1.
   b. Restart the application server.

**Next Steps**

For more information about the client copy and about how to perform it, see the SAP Library at [http://help.sap.com/nw](http://help.sap.com/nw) > SAP NetWeaver Platform > SAP NetWeaver 7.0 <Including Enhancement Package>
6.17 Enabling the Database for Monitoring

Use

i Note

Enabling the database for monitoring is only relevant if you use an SAP system based on SAP NetWeaver 7.0 EHP2, 7.0.3, or on SAP NetWeaver 7.30 and higher.

After the SAP system installation, you must enable the database for monitoring by setting up a data collection framework (DCF). The DCF provides a time-based collection and evaluation of performance, configuration, and space-related data. The DCF consists of the following:

- A set of tables holding history data
- Tablespaces to store these monitoring tables
- A set of stored procedures to collect data on a regular basis
  These stored procedures are scheduled by the Db2 administrative task scheduler (ATS).

Procedure

In your SAP system, call transaction DBACOCKPIT to start the DBA Cockpit. Calling the DBA Cockpit automatically checks the existence of the DCF:

- If you installed the database with automatic storage management, calling the DBA Cockpit automatically installs the DCF.

Recommendation

To make sure that the DCF was set up correctly, we recommend that you go to the screen Data Collection Framework: Configuration to check the status of the DCF.

- If you installed the database without automatic storage management, set up and configure the DCF as described in section Enablement of Databases for the Data Collection Framework in the Database Administration Guide: Database Administration Using the DBA Cockpit.

Caution

Any error during the installation process can result in the DCF not being automatically installed. For example, if the installation failed due to missing tablespaces, create these tablespaces first and retry the installation. If the installation completes successfully, the DCF also has been installed and is available for monitoring.
6.18 Enabling Recoverability of the IBM Db2 for Linux, UNIX, and Windows Database

Use

⚠️ Caution
This section applies only to your database. You only have to perform the steps outlined in this section once – even if you install multiple SAP systems into one database.

Roll forward recovery enables you to recover lost data due to media failure, such as hard disk failure, and applies log file information (log journal) against the restored database. These log files contain the changes made to the database since the last backup.

⚠️ Caution
A production system must run in log retention mode.

If a system is not running in log retention mode, all changes applied to the database since the last complete backup are lost in the event of a disk failure.

In log retention mode, the log files remain in the log directory (log_dir). To archive the log files, you can use Db2’s own log file management solution. For more information, see the documentation Database Administration Guide for SAP on IBM Db2 for Linux, UNIX, and Windows.

Procedure

1. Log on to the database server as user db2<dbsid>.
2. To activate log retention mode and to specify the log archiving method, set configuration parameter LOGARCHMETH1 to one of the following options:
   - LOGRETAIN
     No log archiving takes place. Log files remain in the log directory.
   - DISK:<log_archive_path>
     Log files are archived to a disk location. You can archive them to tape using the Db2 tape manager (db2tapemgr) at a later point in time.
   - TSM:<TSM_management_class>
     Log files are archived to Tivoli Storage Management (TSM)
For downward compatibility with the former user exit concept, you can specify value USEREXIT for parameter LOGARCHMETH1.

Log files are archived to a library that is provided by your vendor storage management. To set configuration parameter LOGARCHMETH1 for your preferred archiving method, enter the following command:

```
db2 update db cfg for <dbsid> using LOGARCHMETH1 <log_archiving_method>
```

For more information, see the documentation Database Administration Guide for SAP on IBM Db2 for Linux, UNIX, and Windows.

3. To activate the settings, restart the database. The database is now in backup pending mode. You need to take an offline backup before you can continue.

4. To start the offline backup for a single-partitioned database, enter the following command:

```
db2 backup db <dbsid> to <device>
```

**Example**

For example, to perform an offline backup of database C11 to tapes in devices rmt0 and rmt1, enter the following command:

```
db2 backup database C11 to /dev/rmt0, /dev/rmt1
```

**Note**

On a multipartitioned database, you must activate log retention mode on all database partitions. In addition, you also have to perform an offline backup for all database partitions.

For more information about how to start a Db2 backup, see the IBM Db2 online documentation.

**More Information**

- Database Administration Guide for SAP on IBM Db2 for Linux, UNIX, and Windows (see Online Information from SAP [page 192])
- For direct access to online information about Db2 that is provided by IBM, see Online Information from IBM [page 192].
- For access to more documentation for SAP systems on IBM Db2 for Linux, UNIX, and Windows, see Online Information from SAP [page 192].

### 6.19 Performing a Full Installation Backup

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

**Caution**

Make sure that you fully back up your database so that you can recover it later if necessary.
The UNIX commands used in this procedure work on all hardware platforms. For more information about operating system-specific backup tools, see your operating system documentation.

Prerequisites

You have logged on as user <sapsid>adm and stopped the SAP system and database [page 179].

Use the backup tool of your choice and refer to the backup software documentation. You can also use the standard UNIX commands as described below.

Backing Up the Installation

1. Back up the following file systems:
   - /usr/sap/<SAPSID>
   - /usr/sap/trans
   - /<sapmnt>/<SAPSID>
   - Home directory of the user <sapsid>adm
   - Home directory of the user db2<dbsid>

   **Caution**
   When you back up the home directory of db2<dbsid>, make sure that you exclude all database containers, the database log files and other database metadata.

   Proceed as follows:
   1. Log on as user root.
   2. Manually create a compressed tar archive that contains all installed files:
      - Saving to tape:
        ```bash
        tar -cf -<File_System> | compress -c > <Tape_Device>
        ```
      - Saving to the file system:
        ```bash
        tar -cf -<File_System> | compress -c > <ARCHIVENAME>.tar.Z
        ```
      
      Only valid for 'Platform': Linux

   **Note**
   Linux only: You can also execute the following command to manually create a compressed GNU tar archive that contains all installed files and save it to the file system:
   ```bash
   tar -czf <ARCHIVENAME>.tgz <File_System>
   ```
   
   End of 'Platform': Linux

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

3. Perform your offline database backup.
   For more information about backups, see the IBM Db2 documentation.

### Restoring Your Backup

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

⚠️ Caution

Check for modifications to the existing parameter files before you overwrite them when restoring the backup.

1. Log on as user root.
2. Go to the location in your file system where you want to restore the backup image.
3. Execute the following commands to restore the data:
   - Restoring the data from tape:
     ```bash
     cat <tape_device> | compress -cd | tar -xf -
     ```
   - Restoring the data from the file system:
     ```bash
     cat ARCHIVENAME.tar.Z | compress -cd | tar -xf -
     ```

   Only valid for ‘Platform’: Linux

ılan Note

Linux only: If you want to restore the data from a GNU tar archive, you have to execute the following command:

```bash
    tar -xzf <ARCHIVENAME>.tgz
```

End of ‘Platform’: Linux

4. Restore your offline database backup.
   For more information about how to restore backups, see the Db2 documentation [page 192].

### 6.20 Checking the Database Parameters for IBM Db2 for Linux, UNIX, and Windows

#### Use

After installation has completed, make sure that you check the parameters of the database configuration and the database manager configuration. A check of the database parameters ensures that your database parameters conform with the latest SAP recommendations where necessary and are adapted to your needs.
Procedure

You can check the parameters of the database in one of the following ways:

- Compare the current parameters of your database with the parameters as they are recommended for SAP systems in the following SAP Notes:

<table>
<thead>
<tr>
<th>Database Version</th>
<th>Corresponding SAP Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM Db2 V9.7</td>
<td>1329179</td>
</tr>
<tr>
<td>IBM Db2 10.1</td>
<td>1692571</td>
</tr>
<tr>
<td>IBM Db2 10.5</td>
<td>1851832</td>
</tr>
<tr>
<td>IBM Db2 11.1</td>
<td>2303771</td>
</tr>
</tbody>
</table>

- Use the DBA Cockpit to compare the current parameters with the standard parameters. In the DBA Cockpit (transaction DBACOCKPIT), on the Database tab page, choose Configuration > Parameter Check.

**i Note**

The parameter check in the DBA Cockpit is available as of SAP Basis 7.00 with enhancement package 2 and support package 6. For more information about the parameter check, see the Database Administration Guide: Database Administration Using the DBA Cockpit – IBM Db2 for Linux, UNIX, and Windows listed in Online Information from SAP [page 192].

6.21 Logging on to the SAP Web Dispatcher Management Console

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

Context

**i Note**

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

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

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

Procedure

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

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

   ![Example](https://plx282:44300/sap/wdisp/admin)

3. Log on as user webadm with the password that you entered during the input phase of the installation.

   The SAP Web Dispatcher Monitor screen appears.

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

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

   **SAP Release and SAP Library Quick Link**

<table>
<thead>
<tr>
<th>SAP NetWeaver 7.0 EHP3</th>
<th>SAP Library Path (Continued)</th>
</tr>
</thead>
</table>

   ○ SAP NetWeaver 7.0 EHP2
   ○ SAP NetWeaver 7.0 EHP1
   ○ SAP NetWeaver 7.0

   ![Application Help](http://help.sap.com/nw70) |
   ![Solution Life Cycle Management by Key Capability](http://help.sap.com/nw70) |
   ![System Management](http://help.sap.com/nw70) |
   ![SAP Web Dispatcher](http://help.sap.com/nw70) |
   ![Administration of the SAP Web Dispatcher](http://help.sap.com/nw70) |
   ![Using the Web Administration Interface](http://help.sap.com/nw70) |
   ![Area menu](http://help.sap.com/nw70) |
   ![Section “HTTP Handler”](http://help.sap.com/nw70) |

**Related Information**

ASCS Instance with Integrated SAP Web Dispatcher [page 21]
6.22 SAP Web Dispatcher Configuration

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

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

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

<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 7.0 EHP3</td>
<td><img src="http://help.sap.com/nw703" alt="Application Help" /> SAP NetWeaver by Key Capability SAP NetWeaver by Key Capability Platform-Wide Services SAP Web Dispatcher</td>
</tr>
<tr>
<td>SAP NetWeaver 7.0 EHP2</td>
<td><img src="http://help.sap.com/nw702" alt="Application Help" /> SAP NetWeaver by Key Capability Solution Life Cycle Management by Key Capability System Management SAP Web Dispatcher</td>
</tr>
<tr>
<td>SAP NetWeaver 7.0 EHP1</td>
<td><img src="http://help.sap.com/nw701" alt="Application Help" /> SAP NetWeaver by Key Capability Solution Life Cycle Management by Key Capability System Management SAP Web Dispatcher</td>
</tr>
<tr>
<td>SAP NetWeaver 7.0</td>
<td><img src="http://help.sap.com/nw700" alt="Application Help" /> SAP NetWeaver by Key Capability Solution Life Cycle Management by Key Capability System Management SAP Web Dispatcher</td>
</tr>
</tbody>
</table>

Related Information

ASCS Instance with Integrated SAP Web Dispatcher [page 21]
7 Additional Information

The following sections provide additional information about optional preparation, installation, and post-installation tasks.

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

7.1 Integration of LDAP Directory Services

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

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

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

Note

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

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

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

This section does not provide information about the use of LDAP directories with the LDAP Connector. For more information about using and configuring the LDAP Connector for an ABAP system, see SAP Help Portal at:

Prerequisites

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

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Required Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIX</td>
<td>IBM Tivoli Directory Server client packages</td>
</tr>
<tr>
<td>HP-UX</td>
<td>The LDAP libraries listed in SAP Note 541344</td>
</tr>
<tr>
<td>Linux</td>
<td>You must have at least the following RPM packages installed:</td>
</tr>
<tr>
<td></td>
<td>○ Oracle Linux: openldap2</td>
</tr>
<tr>
<td></td>
<td>○ Red Hat Linux: openldap2</td>
</tr>
<tr>
<td></td>
<td>○ SUSE LINUX openldap2 openldap2-client</td>
</tr>
<tr>
<td>Solaris</td>
<td>You must have at least the libldap.so library installed.</td>
</tr>
</tbody>
</table>

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:


- The SAP Management Console (SAP MC)

SAP Logon

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

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

```
<Address>
```
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`).
  - The operating system does not have a directory service client (Windows NT and Windows 9X without installed `dsclient`).
  - For more information, see the SAP system profile parameter `ldap/servers`.
- For other directory services, you can use `LDAPnode` to specify the distinguished name of the SAP root node. For more information, see the SAP system profile parameter `ldap/saproot`.

**SAP MMC**

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

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

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

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

**SAP MC**

The SAP MC is a graphical user interface (GUI) for administering and monitoring SAP systems from a central location. If the SAP system has been prepared correctly, the SAP MC presents and analyzes system information that it gathers from various sources, including generic LDAP Directory.

Integrating a generic LDAP Directory as a source of information has advantages for the SAP MC. It can read system information straight from the directory that automatically registers changes to the system landscape. As a result, up-to-date information about all SAP application servers, their status, and parameter settings is always available in the SAP MC.
For more information about the SAP MC and about how to configure it to access LDAP directories, see the documentation SAP Management Console at the following locations:

<table>
<thead>
<tr>
<th>Release</th>
<th>Path on SAP Help Portal</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP NetWeaver 7.0 including enhancement package 1</td>
<td>Application Help &gt; SAP NetWeaver by Key Capability</td>
</tr>
<tr>
<td>SAP NetWeaver 7.0 including enhancement package 2</td>
<td>Application Platform by Key Capability &gt; Java Technology</td>
</tr>
<tr>
<td>SAP NetWeaver 7.0 including enhancement package 3</td>
<td>Administration Manual &gt; J2EE Engine</td>
</tr>
<tr>
<td></td>
<td>J2EE Engine</td>
</tr>
<tr>
<td></td>
<td>Administration Tools &gt; SAP Management Console</td>
</tr>
<tr>
<td></td>
<td>SAP NetWeaver by Key Capability</td>
</tr>
<tr>
<td></td>
<td>Solution Life Cycle Management by Key Capability</td>
</tr>
<tr>
<td></td>
<td>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 on the Windows server where you want to use Active Directory Services and choosing Software Life-Cycle Options > LDAP Registration > Active Directory Configuration. For more information about running the installer on Windows, see the documentation Installation Guide - Installation of SAP Systems Based on the Application Server ABAP of SAP NetWeaver <Release> on Windows: <Database> at http://support.sap.com/sitoolset > System Provisioning > Installation Option.

**Note**

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

**Configuration Tasks for Generic LDAP Directories**

To configure other LDAP directories, refer to the documentation of your directory vendor.

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

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

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

### 7.2 Installation of Multiple Components in One Database

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

**Recommendation**

MCOD is generally available and there is no intention to de-support this installation feature.

However, SAP recommends that customers should **not** use the MCOD feature when installing new systems.

The major drawbacks are as follows:

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

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

Additional information is available in SAP Note 2146542.

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

With MCOD we distinguish two scenarios:

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

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

  You can size multiple components in one database by sizing each individual component using the Quick Sizer tool and then adding the requirements together. For more information about the Quick Sizer, see http://sap.com/sizing.

Features

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

**Note**

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

Constraints

- We **strongly recommend** that you test MCOD in a test or development system. We recommend that you run MCOD systems in the same context. We do not recommend that you mix test, development, and production systems in the same MCOD.
- In the event of database failure, all SAP systems running on the single database are affected.
- Automated support in an MCOD landscape for the following administrative tasks depends on your operating system and database:
  - Copying a single component from an MCOD landscape to another database at database level.
  - Uninstalling a single component from an MCOD landscape requires some additional steps. You can use a remote connection to SAP support to request help with these tasks. For more information, see http://support.sap.com/remoteconnection.
- You **cannot** install a Unicode ABAP system with a non-Unicode ABAP system in one database.
- For the first SAP system, the database system ID can be different from the SAP system ID.
• For the second SAP system, you must use the same <DBSID> as for the first SAP system.
• If you decide to turn off database logging during the database load phase of the installation, you need to plan downtime for all MCOD systems sharing the database.

7.3 MCOD Tablespaces, File Systems, and Connect Users

If you install multiple SAP components into one database (MCOD), you might need additional tablespaces, file systems, and connect users for each SAP component.

MCOD Tablespaces

If you install additional SAP components into one database, each system has its own tablespaces. Only SYSCATSPACE and temporary tablespaces are shared. For example, the additional SAP system <SAPSID2> uses tablespaces, such as <SAPSID2>#BTABD and <SAPSID2>#BTABI.

ℹ️ Note

During an installation of multiple components on one database, additional space is required for tablespace SYSCATSPACE. If you are not using tablespaces with autoresize mode or Db2’s automatic storage, you must extend SYSCATSPACE manually before you start the SAP system installation.

If you are using a database with automatic storage in an MCOD environment, you can choose on the Tablespace Storage Management dialog if your tablespaces are also managed using automatic storage. Otherwise, the checkbox for automatic storage is disabled and autoresize is used.
### Required File Systems for the Database

The following table lists the required database-specific file systems for an additional SAP system:

<table>
<thead>
<tr>
<th>Use</th>
<th>File System/Logical Volume</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Directories for table spaces for table and index data</td>
<td>● With Db2’s automatic storage:</td>
<td>The sapdata directories are used for automatic storage tablespaces or for container type database-managed space (DMS) FILE.</td>
</tr>
<tr>
<td></td>
<td>The installer uses the automatic storage paths that have already been configured in your database (/db2/&lt;DBSID&gt;/sapdata&lt;n&gt; or /db2/&lt;DBSID&gt;/sapdata/sapdata&lt;n&gt;).</td>
<td>No automatic storage: By default, four directories are created (sapdata1, sapdata2, sapdata3, sapdata4). You can change the number of sapdata directories and the path of the directories on the Tablespace Layout dialog of the installer.</td>
</tr>
<tr>
<td></td>
<td>● No automatic storage:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The installer uses the paths /db2/&lt;DBSID&gt;/sapdata&lt;n&gt; or /db2/&lt;DBSID&gt;/sapdata/sapdata&lt;n&gt; (for IBM Db2 versions up to and including V9.7, when using automatic storage)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● No automatic storage:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The installer uses the paths /db2/&lt;DBSID&gt;/saptmp&lt;n&gt; or /db2/&lt;DBSID&gt;/saptmp/saptmp&lt;n&gt; (for IBM Db2 versions 10.1 and higher, when using automatic storage)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● No automatic storage:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The installer uses the paths /db2/&lt;DBSID&gt;/saptmp&lt;n&gt; or /db2/&lt;DBSID&gt;/saptmp/saptmp&lt;n&gt; (for all Db2 versions, when not using automatic storage)</td>
<td></td>
</tr>
</tbody>
</table>

The temporary table spaces of the additional SAP system <SAPSID2> are the same as for <SAPSID1>. If the expected temporary table spaces do not exist, the installer creates them automatically using the following paths:

- /db2/<DBSID>/sapdata<n> or /db2/<DBSID>/sapdata/sapdata<n> (for IBM Db2 versions up to and including V9.7, when using automatic storage)
- /db2/<DBSID>/saptmp<n> or /db2/<DBSID>/saptmp/saptmp<n> (for IBM Db2 versions 10.1 and higher, when using automatic storage)
- /db2/<SAPSID2>/saptmp<n> or /db2/<SAPSID2>/saptmp/saptmp<n> (for all Db2 versions, when not using automatic storage)

If expected temporary table spaces do not exist:

By default, four directories are created. You can change the number of sapdata and saptmp directories and the path of the directories on the Tablespace Layout dialog of the installer.

For more information about required file systems for the application server, see SAP Directories [page 79].
SAP Connect Users

Each additional system works with its own SAP connect user sap<sapsid>, that means all database objects of SAP system <SAPSID2> are owned by sap<sapsid2>. You can specify the name of the ABAP connect user (sap<sapsid>) independently from the SAP schema name during the dialog phase of the installation.

We recommend, however, that you keep the names of the connect user and the database schema identical in standard use cases. If you are performing a system copy using database means, Db2 is not able to change the schema name and you can then choose a connect user name that is different from the schema name.

⚠️ Caution
There is only one database administrator db2<dbsid>.

7.4 Exporting and Mounting Directories via NFS

Related Information

- Exporting and Mounting Directories via NFS for Linux [page 159]
- Exporting and Mounting Directories via NFS for AIX [page 157]
- Exporting and Mounting Directories via NFS for Oracle Solaris [page 161]
- Exporting and Mounting Directories via NFS for HP-UX [page 158]

7.4.1 Exporting and Mounting Directories via NFS for AIX

This topic is only valid for 'Platform': AIX

This procedure describes how to export and mount directories via NFS for AIX using the command line.

Context

This section only provides the basic procedure. If you need more detailed information, check your OS vendor’s documentation.
Procedure

- To export an NFS filesystem, do the following steps:
  a. Take the backup of the exports file:

     ```bash
     cp -p /etc/exports /etc/exports_bak
     ```
  b. Create an entry for each directory to be exported, using the full path name of the directory:

     ```bash
     vi /etc/exports
     ```
  c. Read the /etc/exports file and export all the directories listed:

     ```bash
     exportfs -a
     ```
  d. Confirm the exported directory listed:

     ```bash
     showmount -e
     ```
  e. Confirm the nfs client name and directory list:

     ```bash
     showmount -a
     ```

- Mounting the NFS filesystem on the client:
  a. Verify if the NFS server has exported the directory.

     ```bash
     showmount -e <server_name>
     ```
  b. Create the mounting directory if not already exist.

     ```bash
     mkdir /local_directory
     ```
  c. Mount the remote directory on the client:

     ```bash
     mount <ServerName>:/<remote_directory> /<local_directory>
     ```
  d. Confirm that the NFS filesystem has been mounted:

     ```bash
     df -gt <NFS mount_name>
     ```

End of 'Platform': AIX

7.4.2 Exporting and Mounting Directories via NFS for HP-UX

This topic is only valid for 'Platform': HP-UX

This section describes how to export and mount directories via NFS for HP-UX manually.

Context

This section only provides the basic procedure. If you need more detailed information, check your OS vendor’s documentation.
Procedure

1. On the host where you want to export directories do the following:
   a. Add the file system that you want to export to the file /etc/dfs/dfstab using the following syntax:
      
      share -F nfs -o root= <client_1>:<client_n> access= <client_1>:<client_n> <file system to share>

      If you encounter problems, try using the FQDN (Fully Qualified Domain Name).
   b. To make the file system available to NFS clients, enter the following command:

      /usr/sbin/shareall

2. On the host where you want to mount the directories you exported in the previous step, do the following:
   a. Add the remote file system to /etc/fstab.

      hw5115:/sapmnt/C11 /sapmnt/C11 nfs defaults 0 0
   b. Mount the file system.

      mount -a

7.4.3 Exporting and Mounting Directories via NFS for Linux

This topic is only valid for ‘Platform’: Linux

To export directories via NFS, perform the following steps.

Context

This section only provides the basic procedure. If you need more detailed information, check your OS vendor’s documentation.

The following procedure assumes that the central instance host is the NFS server.

Procedure

1. Log on as user root to the NFS server.
2. Make sure that your host is configured as NFS server as follows:
   a. On Red Hat Linux, make sure that the output of the command:

      chkconfig --list nfs
The output looks as follows:

Example

| nfs 0:off 1:off 2:off 3:on 4:on 5:on 6:off |

- On SUSE Linux, enter the following command:
  - `yast2`

You can set up your host as NFS server as follows:

- On Red Hat Linux, enter the following command:
  - `system-config-users`
- On SUSE Linux, enter the following command:
  - `yast2`

3. To export a directory from a local file system, you can proceed as follows:

- On Red Hat Linux, use the following tool:
  - `system-config-nfs`
- On SUSE Linux, use the following tool:
  - `yast2`

Perform the configuration manually.

To perform the configuration manually, proceed as follows:

a. To add a line to the local file `/etc/exports`, enter the following:

```bash
#/etc/exports
<directory> <hostname>(<options>)
```

**Note**

There must not be a blank between `<hostname>` and `<options>`. Otherwise, the directory is exported with default option (ro) (read-only) to the host specified by `<hostname>` and with the option specified by `<options>` to all other hosts.

To export directories on Linux with root permissions, use the option `no_root_squash`. For security reason, only use this option during installation.

Example

- To export the directory `/usr/sap/trans` in read-only mode to the NFS client host `wdf.sap-ag.de`, enter the following:

  ```bash
  #/etc/exports
  /usr/sap/trans host.wdf.sap-ag.de(ro)
  ```

- To export the directory in read-write mode with root permissions, enter the following:

  ```bash
  #/etc/exports
  /usr/sap/trans host.wdf.sap-ag.de(rw,no_root_squash)
  ```

- To export the directory to all NFS clients of the domain using a wildcard (*), enter the following:

  ```bash
  #/etc/exports
  /usr/sap/trans *.wdf.sap-ag.de(rw)
  ```

b. To activate the changes (that is, inform the NFS daemon about the changes performed in `/etc/exports`), enter the following command:
To see a list of all currently exported directories, enter the following command:

```
exportfs -v
```

For more information, consult the man page by entering `man exports`.

4. Log on as user root to the host where the file system is to be imported.

5. To mount the file systems, enter the following command:

```
mount <nfs_server>:<file_system> <mount_point>
```

**Example**

```
mount <nfs_server>:/usr/sap/trans /usr/sap/trans
```

---

### 7.4.4 Exporting and Mounting Directories via NFS for Oracle Solaris

This topic is only valid for ‘Platform’: Oracle Solaris

To mount directories via NFS from the host where the directory resides that you want to mount, log on as user root and proceed as follows.

**Context**

This section only provides the basic procedure. If you need more detailed information, check your OS vendor’s documentation.

**Procedure**

- On the host on which the directory to be mounted resides:
  - a. Enter the following command:

    ```
    /usr/sbin/share
    ```
  - b. To add file systems shared via NFS, edit file `/etc/dfs/dfstab`:

    ```
    vi /etc/dfs/dfstab
    ```

    Add the following line for each file system:

    ```
    share -F nfs -o root=<nfsclient1>:<nfsclient2>,anon=0 -d "description" <file_system_to_be_shared>
    ```
Note
Depending on your configuration, a full qualified name may be required for nfsclient, for example, myclient.mydomain.com.

Caution
After your SAP system has been installed successfully, in the above line you have to change \-o root to \-o rw (or remove anon=0, respectively) for all exported directories:
\[share -F nfs -o rw=<nfsclient1>:<nfsclient2> -d "description" <file_system_to_be_shared>\]

c. If the /etc/dfs/dfstab was empty, the NFS server is not active.
   ○ On Solaris 9, start the NFS server with the following command:
     /etc/init.d/nfs.server start
   ○ On Solaris 10, start the NFS server with the following command:
     svcadm enable svc:/network/nfs/server:default

d. To see if the NFS server is active and which partitions are mountable, enter the command:
\[showmount -e <NFS-server>\]
   - On the host on which the additional instance runs:
     a. If you are mounting NFS disks for the first time, the NFS client software is not active.
        ○ On Solaris 9, start the NFS server with the following command:
          /etc/init.d/nfs.client start
        ○ On Solaris 10, start the NFS server with the following command:
          svcadm enable svc:/network/nfs/client:default
     b. Edit the file /etc/vfstab to mount the directory:
        Edit the file /etc/vfstab to mount the directory:
        vi /etc/vfstab
        Add the following line for each file system:
        \[<host_name_where_directory_resides>:<file_system_to_be_shared> - <mount point> nfs - yes -\]
        If the mount point exists, mount <file_system_to_be_shared> with the command:
7.5 Dialog Instance Installation for an Upgraded System only: Updating Profiles

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

Prerequisites

1. You upgraded your SAP system from an earlier source release as follows:
   ○ You upgraded your SAP NetWeaver system from an earlier source release to a target release lower than SAP NetWeaver 7.0 SR3.
   ○ You upgraded your SAP ERP system from an earlier source release to a target release lower than SAP ERP 6.0 SR3.
   ○ You upgraded your SAP CRM system from an earlier source release to a target release lower than SAP CRM 5.0 SR3.
   ○ You upgraded your SAP SCM system from an earlier source release to a target release lower than SAP SCM 5.0 SR3.
   ○ You upgraded your SAP SRM system from an earlier source release to a target release lower than SAP SRM 5.0 SR3.
2. You installed the current Enhancement Package.

Procedure

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

   i Note

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

2. Make sure that the parameter `DIR_CT_RUN`, if set, has identical values in the instance profile and the start profile of the central instance:
   ○ If it is set in the instance profile, it must also be set in the start profile.
   ○ If it is not set in the instance profile, it must not be set in the start profile either.
3. Change the default profile `DEFAULT.PFL` by setting `rdisp/msserv_internal` to a free port number.
4. In a high-availability system, change the instance profile of the ABAP central services instance (ASCS instance) as follows:
   a. Set \texttt{rdisp/msserv} to 0.
   b. Set \texttt{rdisp/msserv\_internal} to the port number assigned to \texttt{rdisp/msserv}.

Example

\texttt{Instance profile of the ASCS instance:}

\textbf{Before the change:}

\ldots
\texttt{rdisp/msserv = 4711}
\ldots

\textbf{After the change:}

\ldots
\texttt{rdisp/msserv = 0}
\texttt{rdisp/msserv\_internal = 4711}
\ldots

5. Restart all SAP services and instances of your SAP system.
7.6 Installing a Central or Distributed System Without the ASCS Instance

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

Context

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

- Central system: You first have to prepare the central system host as global host, and then to separately install the database instance and the central instance. In this case, make sure that you follow the specifically marked instructions in the Installation Checklist. [page 96].
- Distributed system: If you do not want to install the ASCS instance, you have to prepare the relevant host as global host instead. In this case, make sure that you follow the specifically marked instructions in the installation Checklist. [page 96]

Procedure

- Central System
  
  Do not run installation option Central System. Instead, you have to install the required SAP system instances separately on the central system. This means you have to run the installation options for a Distributed System (except for the ASCS instance option) on the central system host as follows:
  
a. You run the installer [page 108] to prepare the central system host as SAP global host using installation option <Product> Additional Preparation Options Global Host Preparation for an ABAP System. This sets up the global directories <sapmnt>/<SAPSID>/exe, <sapmnt>/<SAPSID>/profile, and <sapmnt>/<SAPSID>/global.
  
b. You run the installer [page 108] on the central system host to install the database instance using installation option Distributed System Database Instance.
  
c. You run the installer [page 108] on the central system host to install the central instance using installation option Distributed System Central Instance.

- Distributed System
  
a. Do not run installation option ASCS Instance. Instead, you have to run the installer [page 108] to prepare the SAP global host using installation option <Product> Additional Preparation Options Global Host Preparation for an ABAP System. This sets up the global directories <sapmnt>/<SAPSID>/exe, <sapmnt>/<SAPSID>/profile, and <sapmnt>/<SAPSID>/global.
7.7 Installing the SAP Host Agent Separately

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

Context

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

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

SAP Host Agent has the following executable programs and services:

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

**Note**

The installed programs are automatically started when the host is booted.

The automatic start is ensured by the startup script sapinit, which starts the required executables.

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

Procedure

1. Check the hardware and software requirements on the installation host.

   The minimum requirements are as follows:
   - Hard Disk Space: 1 GB
   - RAM: 0.5 GB
   - Swap Space: 2 x RAM

   For more information, see hardware and software requirements [page 28].

2. Make sure that the sapadm user is created.

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

<table>
<thead>
<tr>
<th>User</th>
<th>Primary Group</th>
<th>Additional Group</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>sapadm</td>
<td>sapsys</td>
<td>–</td>
<td>SAP Host Agent administrator</td>
</tr>
</tbody>
</table>

**Note**

If `sapadm` does not exist, it is created during the SAP Host Agent installation using `/bin/false` shell.

Make sure that `/bin/false` can be used as a login shell.

Only valid for 'Platform': AIX

**AIX:** Add `/bin/false` to the list of valid login shells (attribute shells) in `/etc/security/login.cfg`.

### Groups and Members of the SAP Host Agent User

<table>
<thead>
<tr>
<th>Groups</th>
<th>Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>sapsys</td>
<td>sapadm</td>
</tr>
<tr>
<td>sapinst</td>
<td>sapadm</td>
</tr>
</tbody>
</table>

### 3. Set up the required file system for the SAP Host Agent.

<table>
<thead>
<tr>
<th>Directories</th>
<th>Description</th>
<th>Required Disk Space</th>
</tr>
</thead>
<tbody>
<tr>
<td>/usr/sap/hostctrl</td>
<td>Contains the following directories:</td>
<td>100 MB</td>
</tr>
<tr>
<td></td>
<td>o  exe</td>
<td></td>
</tr>
<tr>
<td></td>
<td>o  Contains the profile</td>
<td></td>
</tr>
<tr>
<td></td>
<td>o  host_profile</td>
<td></td>
</tr>
<tr>
<td></td>
<td>o  work</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Working directory of the SAP Host Agent</td>
<td></td>
</tr>
</tbody>
</table>

For more information, see [Setting up file systems and raw devices](page 79).

### 4. Make the unpacked Software Provisioning Manager 1.0 archive available on the installation host as described in [Downloading and Extracting the Software Provisioning Manager 1.0 Archive](page 89).

### 5. Make the latest patch level of the SAPHOSTAGENT <Version>.SAR file available on the host where you want to install the SAP Host Agent.
You can do this in the following ways:

○ Download it from the following path: https://launchpad.support.sap.com/#/softwarecenter

SUPPORT PACKAGES & PATCHES ➤ By Category ➤ SAP Technology Components ➤ SAP HOST AGENT ➤ SAP HOST AGENT 7.21 ➤ Operating System

○ Alternatively, you can also copy it from the UC kernel medium (folder K_<Version>_U_<OS>), where "_U_" means Unicode.

You can either use the physical UC kernel medium from the installation package of your SAP system, or download the kernel medium from https://launchpad.support.sap.com/#/softwarecenter. For more information, see Downloading Installation Media [page 94].

→ Recommendation

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

6. You run the installer [page 108] to install the SAP Host Agent.

On the Welcome screen, choose <Product> ➤ Software Life-Cycle Options ➤ Additional Preparation Options ➤ Host Agent ➤

7. Check whether the installed services are available as follows:

a. Log on as user sapadm.

b. Check whether the following services are available:

○ The control program saphostexec
○ The operating system collector saposcol.
○ The SAP NetWeaver Management agent SAPHostControl (sapstartsrv in host mode)

Note

The installed programs are automatically started when the host is booted.

The automatic start is ensured by the startup script sapinit, which starts the required executables.

Next Steps

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

<table>
<thead>
<tr>
<th>Release</th>
<th>SAP Help Portal Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP NetWeaver 7.0</td>
<td><a href="https://help.sap.com/viewer/p/SAP_NETWEAVER">https://help.sap.com/viewer/p/SAP_NETWEAVER</a></td>
</tr>
<tr>
<td>SAP NetWeaver 7.0 including enhancement package 1</td>
<td>SAP NetWeaver 7.0 &lt;Including Enhancement Package&gt;</td>
</tr>
<tr>
<td>SAP NetWeaver 7.0 including enhancement package 3</td>
<td>Application Help ➤ SAP NetWeaver by Key Capability ➤ Solution Life Cycle Management by Key Capability ➤ SAP Host Agent</td>
</tr>
</tbody>
</table>
Creating Tablespaces Manually (Optional)

Use

If the tablespace layout used by the installer does not meet your requirements, you can optionally create your tablespaces manually. During the dialog phase of the installation, you can specify if you want to use tablespaces managed by Db2’s automatic storage management and if you want the installer to create your tablespaces.

Procedure

⚠️ Caution

The installer does not check the page size of tablespaces that have either been created manually or are already existing. If you create the tablespaces manually, you must use a page size of 16 KB.

1. On the dialog IBM Db2 for Linux, UNIX, and Windows: Tablespace Storage Management, you must deselect the option Create Tablespaces During the Installation Procedure.

ℹ️ Note

In a typical installation, this dialog does not appear. To get to this dialog, select this parameter on the Parameter Summary screen and choose Revise.

2. Continue to enter all the required parameters and start the installer.

During the installation phase, a message box appears that prompts you to create tablespaces using the script createTablespaces.sql.

3. Go to your installation directory and search for script createTablespaces.sql. This file content depends on your selection during the dialog phase and the file contains the same commands for the creation of tablespaces that the installer uses.

ℹ️ Note

You must create all the tablespaces that are listed in the script.
4. Modify the CREATE statements according to your requirements.
5. To execute the script, enter the following command:
   
   ```
   db2 -tvf <script_name>
   ```
6. When you have finished, continue with the installation by choosing OK on the message box.

**More Information**

- Db2 Tablespaces [page 62]
- Data Safety and Performance Considerations for Production Systems [page 67]

### 7.9 Adding Database Partitions to a Database Instance

**Use**

You can add database partitions to a database instance so that you can distribute the following tablespaces for SAP NetWeaver BW tables across multiple database partitions:

- `<SAPSID>#ODSD`
- `<SAPSID>#ODSI`
- `<SAPSID>#FACTD`
- `<SAPSID>#FACTI`

**Note**

These tablespaces are used for SAP NetWeaver BW reporting only. Therefore, only consider installing on a distributed database server if you plan to use SAP NetWeaver BW reporting extensively with large volumes of data in SAP NetWeaver BW InfoCubes.

**Prerequisites**

**→ Recommendation**
We strongly recommend that you involve a consultant with multi partition skills in the whole process of planning and installing a multi-partition SAP system on a Db2 database.

- You have successfully installed an SAP database instance.
- The multi-partition database manager instance `DB2<DBSID>` for SAP NetWeaver BW is only created on database server 1.
• Check if your database is enabled for automatic storage management:
  ○ If the database is enabled for automatic storage management, make sure that the automatic storage paths exist on the host where you want to add a new database partition. In addition, make sure that the user `db2<dbsid>` can access these automatic storage paths.
  ○ If the database is not enabled for automatic storage management, no further action is required.

Procedure

1. Stop the SAP system and the SAP database instance.
2. To add database partitions on a database server, proceed as follows:
   1. Log on with the same user who installed Db2 on the instance-owning database partition server.
   2. Make sure that you have the same system time on each participating computer as on the instance-owning database partition server.
   3. On every additional database server where you want to add database partitions, mount the home directory of user `db2<dbsid>` (`/db2/db2<dbsid>`).

   **Note**
   Optionally, you can also mount `/db2/<DBSID>/db2dump` so that diagnostic files are all written to a central location. If you do not mount `/db2/<DBSID>/db2dump`, all diagnostic files are written to each additional database server.

   Therefore, we recommend that you mount `/db2/<DBSID>/db2dump` to have all diagnostic files in one place.

4. Mount the following directory on every additional database server:
   `/sapmnt/<SAPSID>`
5. Start SAP's installer, the Software Provisioning Manager.
7. To continue choose Next and follow the instructions on the installation dialogs.

   **Note**
   Choose the same communication ports on all database servers.

3. Add the new partitions to the existing database partition groups by using the BW Data Distribution wizard in the DBA Cockpit:
   1. In the SAP system, call transaction `DBACOCKPIT` and choose BW Administration BW Data Distribution.
   2. Follow the instructions on the screens.
7.10 Splitting Off an ABAP Central Services Instance from an Existing Central Instance

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

Prerequisites

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

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

Context

Before the Split

The central instance includes:

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

After the Split

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

The central instance now includes:

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

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

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

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

![Diagram showing the effect of the split]

Procedure

1. Plan the basic parameters, as described in SAP System Parameters [page 45]:
   - Choose an instance number for the ASCS instance to be created.
   - Note that the message server port is not changed during the split.
2. Check the hardware and software requirements for the ASCS instance to be created as described in Hardware and Software Requirements [page 28].
3. Specify basic SAP System Parameters [page 45] for the ASCS instance to be created.
4. Set up the required file systems [page 79] for the ASCS instance to be created.
5. Check the prerequisites [page 105] and start the installer [page 108] on the host where the ASCS instance is to be created.
6. On the Welcome screen, choose Generic Options &gt; Split Off ASCS Instance from Existing Central Instance.
7. Follow the instructions on the installer screens and enter the required parameters.
To find more information on each parameter during the Define Parameters phase, position the cursor on the required parameter input field, and choose either [F1] or the HELP tab. Then the available help text is displayed in the HELP tab.

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

8. To start the installation, choose Start.

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

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

9. You check and if necessary modify the settings for the operating system users for your SAP system if they were created by the installer.

For more information, see Creating Operating System Users and Groups [page 74].

10. Restart the application server instances [page 175] (central instance and dialog instances if they exist).

11. Check whether you can log on to the application servers [page 124].

12. Ensure user security [page 136] for the operating system users of the newly created ASCS instance.

13. If required, perform an installation backup [page 143].

7.11 Installing a Near-Line Storage Database for an SAP NetWeaver BW System

Use

Caution
The following section only applies if you have installed an SAP NetWeaver BW system.

You install a near-line database if you want to use a Db2 remote database as repository to store SAP NetWeaver BW data that is not frequently used.

Prerequisites

You have successfully installed an SAP NetWeaver BW system. You use IBM Db2 V9.7 or higher for the installation of the near-line storage database. You must use IBM Db2 V9.7 or higher for the installation of the near-line storage database, even if you have installed your SAP NetWeaver BW system on a lower Db2 version.
Procedure

1. Log on as user root to the host where you want to install the Db2 remote database.
2. Start the installer [page 108].
3. On the Welcome screen, choose <SAP System> Software Life-Cycle Options Database Tools IBM Db2 for Linux, UNIX, and Windows Install Near-Line Storage Database.
4. To continue choose Next and follow the instructions on the installation dialogs.

Note
During the dialog phase of the installation, write down the following information:
- Name of server where you installed the Db2 remote database
- Communication port
- Name of database

This information is required when you want to configure the access to the remote database from your SAP NetWeaver BW system.

5. To further configure and set up the NLS database for near-line storage, follow the steps described in the guide Enabling an SAP BW to Use IBM Db2 for Linux, UNIX, and Windows as Near-Line Storage.

More Information

Enabling an SAP BW to Use IBM Db2 for Linux, UNIX, and Windows as Near-Line Storage (see Online Information from SAP [page 192])

7.12 Starting and Stopping SAP System Instances

Start or stop SAP system instances in one of the following ways:
- Using the SAP Management Console (SAP MC) [page 176]
- Using commands [page 179].
7.12.1 Starting and Stopping SAP System Instances Using the SAP Management Console

You can start and stop all instances of your SAP system using the SAP Management Console (SAP MC).

Prerequisites

- Make sure that the host names defined in the DNS server match the names of the SAP system instance hosts. In particular, keep in mind that host names are case-sensitive. For example, if the names of the SAP system instance hosts are in upper case, but the same host names are defined in the DNS server in lower case, starting and stopping the system does not work.
- If you want to start or restart remote systems or instances, make sure that you have registered them in the SAP Management Console (SAP MC). You do not need to register SAP systems or instances installed on the local host, because the SAP MC displays them automatically.
- The SAP Host Agent is installed on the host where the application server of the SAP system or instance runs.
- You have installed Java Runtime Environment (JRE) 5.0 or higher.
- Your Web browser supports Java.
- Your Web browser’s Java plug-in is installed and enabled to run scripting of Java applets.

Context

→ Recommendation

If you experience any issues when starting or using the SAP Management Console, refer to SAP Note 1153713.

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

<table>
<thead>
<tr>
<th>Release</th>
<th>SAP Help Portal Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>○ SAP NetWeaver 7.0</td>
<td><a href="https://help.sap.com/viewer/p/SAP_NETWEAVER">https://help.sap.com/viewer/p/SAP_NETWEAVER</a></td>
</tr>
<tr>
<td>○ SAP NetWeaver 7.0 including enhancement package 1</td>
<td>SAP NetWeaver 7.0 &lt;Including Enhancement Package&gt;</td>
</tr>
<tr>
<td>○ SAP NetWeaver 7.0 including enhancement package 3</td>
<td>Application Help</td>
</tr>
</tbody>
</table>
If your newly installed SAP system is part of a heterogeneous SAP system landscape comprising systems or instances on Windows platforms, you can also start and stop it from a Windows system or instance using the SAP Microsoft Management Console (SAP MMC).

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

<table>
<thead>
<tr>
<th>Release</th>
<th>SAP Help Portal Path</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[Application Help] [SAP NetWeaver by Key Capability]</td>
</tr>
<tr>
<td></td>
<td>[Solution Life Cycle Management by Key Capability]</td>
</tr>
<tr>
<td></td>
<td>[Solution Monitoring] [Monitoring in the CCMS] [SAP Management Console]</td>
</tr>
</tbody>
</table>

- If your newly installed SAP system is part of a heterogeneous SAP system landscape comprising systems or instances on Windows platforms, you can also start and stop it from a Windows system or instance using the SAP Microsoft Management Console (SAP MMC).

### Procedure

#### Starting the Web-Based SAP Management Console

1. Start a Web browser and enter the following URL:
   
   \[http://<Host_Name>:5<Instance_Number>13\]

   **Example**

   If the instance number is 53 and the host name is saphost06, you enter the following URL:

   \[http://saphost06:5313\]

   This starts the SAP MC Java applet.

   **Note**

   If your browser displays a security warning message, choose the option that indicates that you trust the applet.
2. Choose **Start**.

   The SAP Management Console (SAP MC) appears.

   By default, the instances installed on the host you have connected to are already added in the SAP MC.

   **Note**

   If the instances have not been added or if you want to change the configuration to display systems and instances on other hosts, you have to register your system manually. This is described in Registering Systems and Instances in the SAP Management Console below.

- **Starting SAP Systems or Instances**

  Similarly, you can start or restart all SAP systems and individual instances registered in the SAP MC.

  1. In the navigation pane, open the tree structure and navigate to the system node that you want to start.
  2. Select the system or instance and choose **Start** from the context menu.
  3. In the **Start SAP System(s)** dialog box, choose the required options.
  4. Choose **OK**.

    The SAP MC starts the specified system or system instances.

   **Note**

   The system might prompt you for the credentials of the SAP system administrator. To complete the operation, you require administration permissions. Log in as user `<sapsid>adm`.

  **Starting SAP System Instances Successively**

  If you need to start the instances of an SAP system successively – for example when you want to start a distributed or a high-availability system – proceed as follows:

  1. Start the database instance.
  2. Start the ABAP central services instance `ASCS<Instance_Number>`.
  3. Start the central instance `DVEBMGS<Instance_Number>`.
  4. Start dialog instances `D<Instance_Number>`, if there are any.

- **Stopping SAP Systems or Instances**

  Similarly, you can stop all SAP systems and individual instances registered in the SAP MC.

  1. Select the system or instance you want to stop and choose **Stop** from the context menu.
  2. In the **Stop SAP System(s)** dialog box, choose the required options.
  3. Choose **OK**.

    The SAP MC stops the specified system or system instances.

   **Note**

   The system might prompt you for the SAP system administrator credentials. To complete the operation, you require administration permissions. Log in as user `<sapsid>adm`.

  **Stopping SAP System Instances Successively**

  If you need to stop the instances of an SAP system successively – for example when you want to start a distributed or a high-availability system – proceed as follows:

  1. Stop dialog instances `D<Instance_Number>`, if there are any.
  2. Stop the central instance `DVEBMGS<Instance_Number>`.
3. Stop the ABAP central services instance ASCS<Instance_Number>.
4. Stop the database instance.

### 7.12.2 Starting and Stopping SAP System Instances Using Commands

#### Prerequisites

You are logged on to the SAP system host as user <sapsid>adm.

#### Context

**i Note**
The `startsap` and `stopsap` commands are deprecated. SAP recommends that you do not use them any longer. For more information, see SAP Notes 1763593 and 809477.

This section only lists the basic commands to start or stop an SAP system. You can find a detailed list of all `SAPControl` options and features in the command line help, which you can call as follows:

`/usr/sap/hostctrl/exe/sapcontrol --help`

#### Procedure

- **Starting an SAP System or Instance**
  - Starting an SAP System:
    You can start an SAP system by executing the following commands from the command line (`<Instance_Number>` can be the number of any instance of the SAP system):
    `/usr/sap/hostctrl/exe/sapcontrol -nr <instance_number> -function StartSystem`
  - Starting an SAP System Instance
    You can start an SAP system instance by executing the following commands from the command line:
    `/usr/sap/hostctrl/exe/sapcontrol -nr <instance_number> -function Start`
    For remote instances, the syntax is slightly different, because you also have to apply the `-host` and `-user` parameters:
    `/usr/sap/hostctrl/exe/sapcontrol -nr <instance_number> -host <remote host> -user <sapsid>adm <password> -function Start`

- **Stopping an SAP System or Instance**
  - Stopping an SAP System
You can stop an SAP system by executing the following commands from the command line (\<Instance_Number\> can be the number of any instance of the SAP system):

```
/usr/sap/hostctrl/exe/sapcontrol -nr <instance_number> -function StopSystem
```

- Stopping an SAP System Instance
  You can stop an SAP system instance by executing the following commands from the command line:
  `/usr/sap/hostctrl/exe/sapcontrol -nr <instance_number> -function Stop`
  For remote instances, the syntax is slightly different, because you also have to apply the `-host` and `-user` parameters:
  `/usr/sap/hostctrl/exe/sapcontrol –nr <instance_number> -host <remote_host> -user <sapsid>adm <password> -function Stop`

**Note**
The database is not stopped by these commands. You have to stop the database using database-specific tools or commands.

- **Checking System Instance and Processes**
  - With the following command you get a list of system instances, their status, and the ports used by them (\<Instance_Number\> can be the number of any instance of the SAP system):
    `/usr/sap/hostctrl/exe/sapcontrol –nr <instance_number> -host <remote_host> -user <sapsid>adm <password> -function GetSystemInstanceList`
  - With the following command you get a list of instance processes and their status:
    `/usr/sap/hostctrl/exe/sapcontrol –nr <instance_number> -host <remote_host> -user <sapsid>adm <password> -function GetProcessList`

- **Troubleshooting**
  If you get an error like "FAIL: NIECONN_REFUSED", execute `sapcontrol -nr <Instance_Number> -function StartService <SAPSID>` to ensure that `sapstartsrv` is running. Then execute again the start or stop command.

### 7.13 Creating a User for LDAP Directory Access

If you use LDAP directory services, you have to set up a user with a password on the host where the SAP system is running. This permits the SAP system to access and modify the LDAP directory.

**Prerequisites**

During the SAP instance installation you chose to configure the SAP system to integrate LDAP services.
Context

For more information, see Preparing the Active Directory in the Windows installation guide for your SAP system solution and database.

Procedure

1. Log on as user `<sapsid>adm`.
2. Enter:
   
   `ldappasswd pf=<Path_and_Name_of_Instance_Profile>`
3. Enter the required data.
   
   The following is an example of an entry to create an LDAP Directory User:
   
   `CN=sapldap,CN=Users,DC=nt5,DC=sap-ag,DC=de`

7.14 Heterogeneous SAP System Installation

This section provides information on the installation of an SAP system in a heterogeneous system landscape. “Heterogeneous system landscape” means that application servers run on different operating systems.

See SAP Note 1067221 for more information on:

- Supported combinations of operating systems and database systems
- How to install an application server on Windows in a heterogeneous (UNIX) SAP system environment
- Heterogeneous SAP system landscapes with different UNIX operating systems (see also Exporting and Mounting Global Directories: Distributed and High-Availability Systems [page 102])

7.15 Minimizing the Database Size After the Installation

Use

Even if you have installed your SAP system without selecting the options `Use Db2’s Data Compression` and `Use Deferred Table Creation`, you can still minimize the database size at a later point in time as follows:

- **Compress existing tables and indexes.**
  
  You can use the `Compression Candidates` screen in the DBA Cockpit to identify candidates for compression and to compress tables and indexes.

- **Activate the global compression option.**
If the global compression option is set to **YES**, compression is enabled for all tables that are created during the productive use of the database. Up to IBM Db2 10.1, static row compression is used as a default. As of IBM Db2 10.5, adaptive compression is used.

- **Activate deferred table creation.**
- **Use additional features for minimizing the database size** (as of IBM Db2 10.1 only).

### Procedure

#### Compressing Existing Tables and Indexes Using the DBA Cockpit

**Note**

The following steps apply if the database collection framework has been set up correctly as described in the separate document *Database Administration Using the DBA Cockpit: IBM Db2 for Linux, UNIX, and Windows*.

In your SAP system, call transaction `DBACOCKPIT` and choose **Space Tables and Indexes Compression Candidates** on the *Database* tab page of the DBA Cockpit. On the *Compression Candidates* screen, you can identify tables that are candidates for compression (or recompression) based on selection criteria that you can specify.

For more information, see the section *Compression Candidates* in the document *Database Administration Using the DBA Cockpit: IBM Db2 for Linux, UNIX, and Windows*.

#### Activating the Global Compression Option

**Note**

The following steps apply if the database collection framework has been set up correctly as described in the separate document *Database Administration Using the DBA Cockpit: IBM Db2 for Linux, UNIX, and Windows*.

If you do not want to use the DBA Cockpit, you can follow the instructions in SAP Note 1690077 instead.

1. In your SAP system, call transaction `DBACOCKPIT` and choose **Space Compression Status** on the *Database* tab page of the DBA Cockpit.
2. Set the compression option that suits your system best.

For more information, see the section *Compression Status* in the document *Database Administration Using the DBA Cockpit: IBM Db2 for Linux, UNIX, and Windows*.

#### Activating Deferred Table Creation

**Caution**

Before you use this function, make sure that you read SAP Note 1151343.

The following tables are excluded from the conversion to virtual tables:

- Volatile tables
- MDC tables
1. In your SAP system, call transaction DBACOCKPIT and choose \(\text{Space} \rightarrow \text{Virtual Tables}\) on the Database tab page of the DBA Cockpit.
2. On the \text{Virtual Tables} screen, choose the \text{Candidates for Virtualization} tab page. A list of tables that are candidates for being dropped and re-created as virtual tables is displayed.
3. Choose the \text{Convert Empty Tables} pushbutton.
   A job is scheduled that checks a background job is scheduled that checks each table if it is:
   - Empty
   - Not volatile
   - Does not have a partitioning key
   - Not using MDC tables
   Tables that meet these conditions are dropped and re-created as virtual tables.

**i Note**
To materialize tables again, that is, to create the empty tables that have not yet been created after the installation, select one or more tables from the list on the \text{Virtual Tables} tab page and choose the \text{Materialize} pushbutton.

**Using Additional Features for Compression and Space Reclamation**
As of IBM Db2 10.1, additional features for database compression and space reclamation are available:
- Insert time clustering tables (ITC tables)
- Compression of log files
- More compact indexes (new registry variable \text{DB2\_INDEX\_PCTFREE\_DEFAULT} = 0)
- Automatic reclamation of index space
For more information, see SAP Note 1700631.

**More Information**

*Database Administration Using the DBA Cockpit: IBM Db2 for Linux, UNIX, and Windows* (see Online Information from SAP [page 192])
7.16 Deleting an SAP System or Single Instances

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

Prerequisites

- You have installed your SAP system with standard SAP tools according to the installation documentation.
- You are logged on as a user with root permissions.

⚠️ Caution

Do not use the <sapsid>adm user to delete the SAP system.

- Make sure that the SAP system, or single instance, or standalone engine, or optional standalone unit to be deleted is down and that you are not logged on as one of the SAP system users. If there is a lock on one of the SAP system objects, the uninstall fails. Make also sure that all SAP-related processes are stopped.

ℹ️ Note

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

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

Context

Note the following when deleting an SAP system:

- We strongly recommend that you delete an SAP system using the installer. To delete an SAP system manually, proceed as described in SAP Note 1229586.
- When you uninstall an SAP system, the database content is also deleted.
- You cannot delete an SAP system remotely.
- The installer deletes the database instance and optionally the database software.
- During the uninstall process, all file systems and subdirectories of the selected SAP system or single instance are deleted. Before you start uninstalling, check that you have saved a copy of all files and directories that you want to keep in a secure location.
- The uninstall process is designed to remove as much as possible of the SAP system to be deleted. If an item cannot be removed, a message informs you that you have to remove this item manually. You can do this either at once or after the uninstall process has finished. As soon as you confirm the message, the uninstall process continues.
Procedure

1. Start the installer as described in Running the Installer [page 108].


3. Follow the instructions in the installer input dialogs to delete a complete SAP system or single instances.

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

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

<table>
<thead>
<tr>
<th>Deletion of</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central system</td>
<td>You can delete a central 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. Dialog instances, if there are any
   
   **Caution**
   
   Do not select checkbox *Uninstall all instances of the SAP system from this host* if you do not want to uninstall the complete SAP system or standalone engine. For example, do not select this checkbox if you only want to uninstall a dialog instance of an existing SAP system distributed over several hosts. Otherwise the contents of mounted global directories under `/<sapmnt>/`, such as instance profiles and kernel executables, are also deleted.

2. Central instance
3. Database instance
   
   Since the installer only stops local instances automatically, make sure that before deleting the database instance of a distributed system, you stop all remaining instances. You must stop the instance with the message server only after having entered all installer parameters for the deletion of the database instance.
   
   To delete the database instance or one or more database schemas, choose one of the following options:
   
   - **Drop database**
     Select this option if you want to drop the database.
   - **Select the database schema that you want to delete**
     Select this option in one of the following situations:
     
     - You are running multiple components on one database (MCOD) and you only want to delete the database schema of the corresponding component to be deleted
     - You want to delete the Java part of an ABAP+Java system.

4. Enqueue Replication Server
5. ABAP central services instance (ASCS instance)

**Note**

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

**Caution**

If you are running multiple components on one database (MCOD), do not delete the database.

Dialog instance

If you want to delete dialog instances of an existing SAP system, you have to run the installer to delete them locally on each dialog instance host.
Deletion of

<table>
<thead>
<tr>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standalone SAP Host Agent</td>
</tr>
</tbody>
</table>

4. When you have finished, delete the relevant directory structure on the global host.
5. If required, you can delete the directory /usr/sap/trans and its content manually. The installer does not delete /usr/sap/trans because it might be shared.
6. If you created the directories /usr/sap/<SAPSID> and /<sapmnt>/<SAPSID> as mount points, but not as directories on the local file system, you have to remove them manually.

7.17 Deleting a Database Instance, the Database Software, or a Database Schema Manually

The software provisioning manager allows you to delete database instances and database software. If you cannot use the uninstall functions of the software provisioning manager, delete the database instance and database software manually as described in the following instructions.

In addition, this section also contains information how to delete a single database schema (not a database) in an MCOD scenario, for example.

7.17.1 Deleting the Database and the Db2 Instance Manually

You use this procedure to manually delete the database and the Db2 instance of a complete SAP system.

⚠️ Caution

Do not delete the database in one of the following situations:
- You are running multiple components on one database (MCOD) and you only want to delete one or more of your components but not the complete system
- You only want to delete the Java part of an SAP system (ABAP+Java or Java Add-In).

In this case you delete the corresponding database schema as described in Deleting a Database Schema Manually [page 189].
Prerequisites

Before deleting the database, stop and delete all SAP instances belonging to the database.

Procedure

1. To delete the database, proceed as follows:
   1. Log on as user `db2<dbsid>`.
   2. To start the database, enter the following command:
      ```
      db2start
      ```
   3. To delete the database `<DBSID>`, enter the following command:
      ```
      db2 drop database <DBSID>
      ```
   4. To stop the database, enter the following command:
      ```
      db2stop
      ```
2. To delete the Db2 instance, log on as user `root`.
3. Enter the following command:
   ```
   %DB2PATH%/instance/db2idrop db2<dbsid>
   ```
4. Remove user `db2<dbsid>` from group `db<dbsid>adm` (if the group `db<dbsid>adm` is now empty, remove it also).
5. Delete user `db2<dbsid>`.
6. To remove the home directory of `db2<dbsid>` and all subdirectories, enter the following command.
   ```
   rm -rf /db2/db2<dbsid>
   ```
7. Unmount and delete the following file systems (if they exist):
   ```
   /db2/<DBSID>/log_dir
   /db2/<DBSID>/db2dump
   /db2/<DBSID>/sapdata<n>
   /db2/<DBSID>/sapdata/sapdata<n>
   /db2/<SAPSID>/sapdata/sapdata<n>
   /db2/<DBSID>/saptmp<n>
   /db2/<DBSID>/saptmp/saptmp<n>
   /db2/<SAPSID>/saptmp<n>
   /db2/<SAPSID>/saptmp/saptmp<n>
   /db2/<DBSID>
   ```
8. Remove the connect user from group `db<dbsid>mon` (if the group `db<dbsid>mon` is now empty, remove it, too).

   **Note**
   The standard connect user for ABAP is `sap<sapsid>`. Note that you might have a different connect user name if you have changed the standard name during installation.

9. Delete the connect user, its home directory, and all subdirectories of this directory.
10. If they are empty and not longer required, delete the groups `db<dbsid>adm, db<dbsid>mon, db<dbsid>ctl`. 
11. Delete the `/etc/services` entries for `sapdb2<DBSID>`. In other words, delete the lines starting with `sapdb2<DBSID>`.

### 7.17.2 Deleting the Db2 Software Installation Manually

1. Check that no Db2 instance exists by entering the following command:
   ```
   %DB2PATH%/instance/db2ilist
   ```
   
   **Note**
   
   If no instance is listed, you can continue with step 2. If any instance is listed, you must delete this instance before you can delete the database software. For more information, see Deleting the Database and Db2 Instance Manually [page 187].

2. Log on as user with root authority.

3. Enter the following command:
   ```
   %DB2PATH%/install/db2_deinstall -a
   ```

### 7.17.3 Deleting a Database Schema Manually

You can generate and use the following scripts to delete a database schema manually (not the complete database). During the manual deletion, you must delete all tables and indexes, modules, views, functions, procedures, variables, and tablespaces belonging to the schema.

**Prerequisites**

- Make sure that any instance that uses the schema is stopped.
- The database must be up and running.

**Context**

You delete a database schema in the following situation: You are running multiple components on one database (MCOD) and you only want to delete the database schema of the corresponding component to be deleted.

You also delete a database schema if you want to delete the Java part of an SAP system (ABAP+Java or Java Add-In).
### Procedure

1. Log on to the database server as `db2<dbsid>` and open a command prompt.

2. To delete all tables of the database schema, proceed as follows:
   a. Enter the following SQL statement to create a script:
      
      ```sql
      db2 "SELECT 'DROP TABLE ' || CHR(34) || VARCHAR(tabschema) || CHR(34) || '.'
      || CHR(34) || tabname || CHR(34) || ';' FROM syscat.tables WHERE tabschema='<SAP_SYSTEM_SCHEMA>' AND TYPE in ('T', 'G') " | grep "DROP" > drop_<sap_system_schema>_tables.txt
      
      where `<SAP_SYSTEM_SCHEMA>` is the name of the database schema.
   b. To delete all tables, run this script using the following command:
      
      ```bash
      db2 -tvf drop_<sap_system_schema>_tables.txt
      ```

3. To delete all views of the database schema, proceed as follows:
   a. Enter the following SQL statement to create a script:
      
      ```sql
      db2 " SELECT 'DROP VIEW ' || CHR(34) || VARCHAR(tabschema) || CHR(34) || '.'
      || CHR(34) || tabname || CHR(34) || ';' FROM syscat.tables WHERE tabschema='<SAP_SYSTEM_SCHEMA>' AND TYPE='V' " | grep "DROP" > drop_<sap_system_schema>_views.txt
      
      where `<SAP_SYSTEM_SCHEMA>` is the name of the database schema.
   b. To delete all views, run this script using the following command:
      
      ```bash
      db2 -tvf drop_<sap_system_schema>_views.txt
      ```

4. To delete all modules of the database schema, proceed as follows:
   a. Enter the following SQL statement to create a script:
      
      ```sql
      db2 " SELECT 'DROP MODULE ' || CHR(34) || VARCHAR(moduleschema) || CHR(34) || '.
      || CHR(34) || modulename || CHR(34) || ';' FROM syscat.modules WHERE moduleschema='<SAP_SYSTEM_SCHEMA>' " | grep "DROP" > drop_<sap_system_schema>_modules.txt
      
      where `<SAP_SYSTEM_SCHEMA>` is the name of the database schema.
   b. To delete all modules, run this script using the following command:
      
      ```bash
      db2 -tvf drop_<sap_system_schema>_modules.txt
      ```

5. To delete all functions of the database schema, proceed as follows:
   a. Enter the following SQL statement to create a script:
      
      ```sql
      db2 " SELECT 'DROP SPECIFIC FUNCTION ' || CHR(34) || VARCHAR(funcschema) || CHR(34) || '.
      || CHR(34) || specificname || CHR(34) || ';' FROM syscat.functions WHERE funcschema='<SAP_SYSTEM_SCHEMA>' " | grep "DROP" > drop_<sap_system_schema>_functions.txt
      
      where `<SAP_SYSTEM_SCHEMA>` is the name of the database schema.
   b. To delete all functions, run this script using the following command:
      
      ```bash
      db2 -tvf drop_<sap_system_schema>_functions.txt
      ```

6. To delete all procedures of the database schema, proceed as follows:
a. Enter the following SQL statement to create a script:

```
db2 " SELECT 'DROP SPECIFIC PROCEDURE ' || CHR(34) || VARCHAR(routineschema) || CHR(34) || '.' || CHR(34) || specificname || CHR(34) || ';' FROM syscat.routines WHERE routineschema='<SAP_SYSTEM_SCHEMA>' " | grep "DROP" > drop_<sap_system_schema>_procedures.txt
```

where `<SAP_SYSTEM_SCHEMA>` is the name of the database schema.

b. To delete all procedures, run this script using the following command:

```
db2 –tvf drop_<sap_system_schema>_procedures.txt
```

7. To delete all variables of the database schema, proceed as follows:

a. Enter the following SQL statement to create a script:

```
db2 "SELECT 'DROP VARIABLE ' || CHR(34) || VARCHAR(varschema) ||CHR(34) || '.' || CHR(34) || varname || CHR(34) || ';' FROM syscat.variables WHERE varschema='<SAP_SYSTEM_SCHEMA>' " | grep "DROP" > drop_<sap_system_schema>_variables.txt
```

where `<SAP_SYSTEM_SCHEMA>` is the name of the database schema.

b. To delete all variables, run this script using the following command:

```
db2 –tvf drop_<sap_system_schema>_variables.txt
```

8. Drop the database schema using the following command:

```
db2 drop schema <SAP_SYSTEM_SCHEMA> restrict
```

9. Delete all tablespaces by performing the following steps:

a. To see an overview, list all tablespaces using the following command:

```
db2 list tablespaces
```

b. When you delete the Java part of an SAP system (ABAP+Java or Java Add-In), delete only the Java tablespaces, that is `<SAPSID>#DBD` and `<SAPSID>#DBI`.

c. In an ABAP-only or Java-only system, delete all tablespaces starting with `<SAPSID>海峡`.

d. To delete the relevant tablespaces, enter the following command:

```
db2 drop tablespace <tablespace_name>
```
A  Appendix

A.1  Online Information from SAP

More information is available online as follows:

<table>
<thead>
<tr>
<th>Title</th>
<th>Internet Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central access to all guides for SAP on IBM Db2</td>
<td><a href="https://help.sap.com/viewer/p/DB6">https://help.sap.com/viewer/p/DB6</a></td>
</tr>
<tr>
<td>Running an SAP System on IBM Db2 with the Db2 pureScale Feature</td>
<td>IBM Db2 11.1: <a href="https://help.sap.com/viewer/db6_purescale_11_1">https://help.sap.com/viewer/db6_purescale_11_1</a></td>
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<tr>
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<td>IBM Db2 10.5: <a href="https://help.sap.com/viewer/db6_purescale_10_5">https://help.sap.com/viewer/db6_purescale_10_5</a></td>
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<td>IBM Db2 10.1: <a href="https://help.sap.com/viewer/db6_purescale_10_1">https://help.sap.com/viewer/db6_purescale_10_1</a></td>
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<td>Database Administration Using the DBA Cockpit: IBM DB2 for Linux, UNIX, and Windows</td>
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</tr>
<tr>
<td>SAP on Db2 for Linux, UNIX, and Windows Community</td>
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</tr>
</tbody>
</table>

A.2  Online Information from IBM

You can use the following IBM Knowledge Center welcome page as a starting point to all kinds of documentation for your IBM Db2 for Linux, UNIX, and Windows version: http://www.ibm.com/support/knowledgecenter/en/SSEPGG
The following tables provide direct links to IBM Db2 online documentation and manuals, listed by database version:

**IBM Db2 Knowledge Center**

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<thead>
<tr>
<th>Database Version</th>
<th>Internet Address</th>
</tr>
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<td>IBM Db2 10.5</td>
<td><a href="https://www.ibm.com/support/knowledgecenter/SSEPGG_10.5.0/com.ibm.db2.luw.kc.doc/welcome.html">https://www.ibm.com/support/knowledgecenter/SSEPGG_10.5.0/com.ibm.db2.luw.kc.doc/welcome.html</a></td>
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**IBM Manuals**

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<td><a href="http://www-01.ibm.com/support/docview.wss?uid=swg27050624">http://www-01.ibm.com/support/docview.wss?uid=swg27050624</a></td>
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<td>IBM Db2 10.1</td>
<td><a href="http://www.ibm.com/support/docview.wss?uid=swg27024478">http://www.ibm.com/support/docview.wss?uid=swg27024478</a></td>
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