Installation of SAP MaxDB liveCache Technology 7.9 on UNIX
# Content

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>About this Document</td>
<td>6</td>
</tr>
<tr>
<td>1.1</td>
<td>Before You Start</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>SAP Notes for the Installation</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Online Information from SAP</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Naming Conventions</td>
<td>8</td>
</tr>
<tr>
<td>1.2</td>
<td>New Features</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>Planning</td>
<td>11</td>
</tr>
<tr>
<td>2.1</td>
<td>Options for the Installation of SAP MaxDB liveCache</td>
<td>11</td>
</tr>
<tr>
<td>2.2</td>
<td>Software Requirements Check</td>
<td>13</td>
</tr>
<tr>
<td>3</td>
<td>Preparation</td>
<td>14</td>
</tr>
<tr>
<td>3.1</td>
<td>Choosing a SAP liveCache System Name</td>
<td>14</td>
</tr>
<tr>
<td>3.2</td>
<td>Creating SAP liveCache File Systems</td>
<td>15</td>
</tr>
<tr>
<td>3.3</td>
<td>Preparing the Installation Media</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Downloading and Extracting the Software Provisioning Manager 1.0 Archive</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Downloading Installation Media</td>
<td>17</td>
</tr>
<tr>
<td>4</td>
<td>Installation</td>
<td>19</td>
</tr>
<tr>
<td>4.1</td>
<td>Prerequisites for Running the Installer</td>
<td>19</td>
</tr>
<tr>
<td>4.2</td>
<td>Running the Installer</td>
<td>22</td>
</tr>
<tr>
<td>5</td>
<td>Post-Installation</td>
<td>26</td>
</tr>
<tr>
<td>5.1</td>
<td>Common Post-Installation Activities</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>Configuring the SAP liveCache Instance</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Checking the SAP liveCache Instance</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Changing Passwords of Created Users</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Setting Up a liveCache Super User</td>
<td>28</td>
</tr>
<tr>
<td>5.2</td>
<td>Installing or Upgrading Database Studio for SAP MaxDB</td>
<td>29</td>
</tr>
<tr>
<td>5.3</td>
<td>Secure Sockets Layer Protocol for Database Server Communication</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Installing the SAP Cryptographic Library</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>Generating the Personal Security Environment</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>Configuring the SSL Communication between the Application Server and the Database Server</td>
<td>36</td>
</tr>
<tr>
<td>6</td>
<td>Additional Information</td>
<td>37</td>
</tr>
<tr>
<td>6.1</td>
<td>Operating Information for liveCache</td>
<td>37</td>
</tr>
<tr>
<td>6.2</td>
<td>Uninstalling SAP liveCache</td>
<td>37</td>
</tr>
<tr>
<td>6.3</td>
<td>Additional Information about the Installer</td>
<td>38</td>
</tr>
</tbody>
</table>
Useful Information about the Installer ........................................... 38
Interrupted Processing of the Installer ......................................... 40
Troubleshooting with the Installer ............................................. 44
Using the Step State Editor (SAP Support Experts Only) .................. 45
iNote
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>
<tbody>
<tr>
<td>3.0</td>
<td>2020-01-20</td>
<td>Updated version for Software Provisioning Manager 1.0 SP28 (SL Toolset 1.0 SP28)</td>
</tr>
<tr>
<td>2.9</td>
<td>2019-09-16</td>
<td>Updated version for Software Provisioning Manager 1.0 SP27 (SL Toolset 1.0 SP27)</td>
</tr>
<tr>
<td>2.8</td>
<td>2019-05-27</td>
<td>Updated version for Software Provisioning Manager 1.0 SP26 (SL Toolset 1.0 SP26)</td>
</tr>
<tr>
<td>2.7</td>
<td>2019-01-21</td>
<td>Updated version for Software Provisioning Manager 1.0 SP25 (SL Toolset 1.0 SP25)</td>
</tr>
<tr>
<td>2.6</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>2.5</td>
<td>2018-05-07</td>
<td>Updated version for software provisioning manager 1.0 SP23 (SL Toolset 1.0 SP23)</td>
</tr>
<tr>
<td>2.4</td>
<td>2018-01-15</td>
<td>Updated version for software provisioning manager 1.0 SP22 (SL Toolset 1.0 SP22)</td>
</tr>
<tr>
<td>2.3</td>
<td>2017-09-11</td>
<td>Updated version for software provisioning manager 1.0 SP21 (SL Toolset 1.0 SP21)</td>
</tr>
<tr>
<td>Version</td>
<td>Date</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>----------</td>
<td>--------------------------------------------------------------</td>
</tr>
<tr>
<td>2.2</td>
<td>2017-05-22</td>
<td>Updated version for software provisioning manager 1.0 SP19 (SL Toolset 1.0 SP19)</td>
</tr>
<tr>
<td>2.1</td>
<td>2017-02-07</td>
<td>Updated version for software provisioning manager 1.0 SP19 (SL Toolset 1.0 SP19)</td>
</tr>
<tr>
<td>2.0</td>
<td>2016-10-07</td>
<td>Updated version for software provisioning manager 1.0 SP18 (SL Toolset 1.0 SP18)</td>
</tr>
<tr>
<td>1.9</td>
<td>2016-01-22</td>
<td>Updated version for SAP enhancement package 4 for SAP Supply Chain Management 7.0</td>
</tr>
<tr>
<td>1.8</td>
<td>2015-04-27</td>
<td>Updated version for software provisioning manager 1.0 SP08 (SL Toolset 1.0 SP13)</td>
</tr>
<tr>
<td>1.7</td>
<td>2014-11-24</td>
<td>Updated version for software provisioning manager 1.0 SP07 (SL Toolset 1.0 SP12)</td>
</tr>
<tr>
<td>1.6</td>
<td>2014-07-07</td>
<td>Updated version</td>
</tr>
<tr>
<td>1.5</td>
<td>2014-03-17</td>
<td>Updated version</td>
</tr>
<tr>
<td>1.4</td>
<td>2013-10-28</td>
<td>Updated version</td>
</tr>
<tr>
<td>1.3</td>
<td>2013-10-10</td>
<td>Updated version</td>
</tr>
<tr>
<td>1.2</td>
<td>2013-04-10</td>
<td>Updated version</td>
</tr>
<tr>
<td>1.1</td>
<td>2012-11-28</td>
<td>Updated version</td>
</tr>
<tr>
<td>1.0</td>
<td>2012-08-06</td>
<td>Initial version</td>
</tr>
</tbody>
</table>
1 About this Document

This documentation explains how to install or rename the server for SAP MaxDB liveCache Technology using Software Provisioning Manager 1.0 SP28, which is part of SL Toolset 1.0 SP28.

SAP MaxDB liveCache is used in SAP Supply Chain Management (SCM). SAP MaxDB liveCache is the SAP memory-resident object management technology that enables higher levels of performance in business processing for SAP Supply Chain Management (SCM). For more information on how to plan your SAP MaxDB liveCache installation, see Options for the Installation of SAP liveCache [page 11].

The installation tool is the software provisioning manager (“installer” for short).

⚠️ Caution

Make sure you have the latest version of this document. See the version number on the front page. You can always find the latest version at:

https://support.sap.com/sltoolset ➔ System Provisioning ➔ Installation Option of Software Provisioning Manager ➔ Installation Guides - Standalone Engines and Clients ➔ SAP liveCache Technology

For more information about SAP SCM technology, see:

https://help.sap.com/scm

If you have already installed OneDB with SAP SCM, you only need to perform the post-installation steps [page 26] described in this guide. For more information about the OneDB installation, see the relevant SAP SCM guide at:

https://help.sap.com/scm

1.1 Before You Start

Make sure that you read the following sections before you start the installation:

SAP Notes for the Installation [page 7]
Make sure that you have read the following SAP Notes.

Online Information from SAP [page 7]
Here you can find online information.

Naming Conventions [page 8]
We use the following naming conventions in this documentation.
1.1.1 SAP Notes for the Installation

Make sure that you have read the following SAP Notes.

<table>
<thead>
<tr>
<th>Note Number</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1651606</td>
<td>liveCache 7.9 Installation</td>
</tr>
<tr>
<td>1567117</td>
<td>Parameter values liveCache version 7.9</td>
</tr>
<tr>
<td>3056345</td>
<td>RFC destination for global working on the liveCache</td>
</tr>
<tr>
<td>4292155</td>
<td>UNIX Settings for File Systems and Trace Files &gt; 2 GB</td>
</tr>
<tr>
<td>6876965</td>
<td>Procedure for installing an APO One DB Server</td>
</tr>
<tr>
<td>6498145</td>
<td>Updating SAP MaxDB / liveCache client software</td>
</tr>
<tr>
<td>8222715</td>
<td>FAQ: SAP MaxDB client software</td>
</tr>
</tbody>
</table>

1.1.2 Online Information from SAP

Here you can find online information.

<table>
<thead>
<tr>
<th>Description</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Availability Matrix (PAM)</td>
<td><a href="https://support.sap.com/pam">https://support.sap.com/pam</a></td>
</tr>
</tbody>
</table>
1.1.3 Naming Conventions

We use the following naming conventions in this documentation.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>INST_DIR</td>
<td>Installation directory</td>
</tr>
<tr>
<td>LC_HOST</td>
<td>Domain or server name where the liveCache is installed</td>
</tr>
<tr>
<td>LC_NAME</td>
<td>Name of liveCache instance consisting of three capital letters</td>
</tr>
</tbody>
</table>

- “SAP liveCache” refers to “SAP MaxDB liveCache”.
- “SAP liveCache client” refers to “SAP MaxDB liveCache client”.

1.2 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>New Look and Feel of SL Common GUI</td>
<td>As of version 1.0 SP24 Patch Level (PL) 5, Software Provisioning Manager comes with a new look and feel of the SL Common GUI. For more information, see <a href="https://blogs.sap.com/2018/11/10/new-look-for-software-provisioning-manager/">https://blogs.sap.com/2018/11/10/new-look-for-software-provisioning-manager/</a></td>
<td>Software Provisioning Manager 1.0 SP24, PL05 (SL Toolset 1.0 SP24)</td>
</tr>
<tr>
<td>Installer Log Files Improvements</td>
<td>Installer log files are now available immediately after the installer has been started, that is before a product has been selected on the Welcome screen. For more information, see Useful Information about the Installer [page 38] and Troubleshooting with the Installer [page 44].</td>
<td>Software Provisioning Manager 1.0 SP22 (SL Toolset 1.0 SP22)</td>
</tr>
<tr>
<td>Signature Check of Installation Archives</td>
<td>The signature of installation archives is checked automatically by the installer during the Define Parameters phase while processing the Software Package Browser screens. As of now the installer only accepts archives whose signature has been checked. For more information, see .</td>
<td>Software Provisioning Manager 1.0 SP22 (SL Toolset 1.0 SP22)</td>
</tr>
<tr>
<td>Enabling IPv6</td>
<td>You can now set up a new SAP system or SAP system instance using Internet Protocol Version 6 (IPv6). For more information, see Prerequisites for Running the Installer [page 19].</td>
<td>Software Provisioning Manager 1.0 SP22 (SL Toolset 1.0 SP22)</td>
</tr>
<tr>
<td>Feature</td>
<td>Description</td>
<td>Availability</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Media Signature Check</td>
<td>The signature of media is checked <strong>automatically</strong> 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 15] and Running the Installer [page 22].</td>
<td>Software Provisioning Manager 1.0 SP21 (SL Toolset 1.0 SP21)</td>
</tr>
<tr>
<td>SL Common GUI with SAPINST 7.49</td>
<td>With the new installer framework version SAPINST 7.49, you can now use the new SAPUI5-based graphical user interface (GUI) “SL Common GUI”. For more information, see Useful Information about the Installer [page 38], Running the Installer [page 22].</td>
<td>Software Provisioning Manager 1.0 SP20 (SL Toolset 1.0 SP20)</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 .</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 16]. 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>System Provisioning for SAP NetWeaver 7.5 and SAP NetWeaver 7.5-based Products</td>
<td>All system provisioning tasks (installation, system copy, system rename) are available for the new SAP NetWeaver 7.5 release. The Dual Stack option, which integrates an AS ABAP and AS Java in a single system (common System ID &lt;SAPSID&gt;, common startup framework, common database), is no longer supported in SAP systems based on SAP NetWeaver 7.5. • After upgrading to SAP NetWeaver 7.5 PI, you first have to split the still existing dual stack-system before you can use SAP NetWeaver 7.5 PI productively. For more information, see the Upgrade Master Guide - SAP NetWeaver 7.5 at: <a href="http://help.sap.com/nw75">http://help.sap.com/nw75</a> Installation and Upgrade • SAP NetWeaver 7.5 is Unicode only • The primary application server instance directory has been renamed from /usr/sap/&lt;SAPSID&gt;/DVEBMGS&lt;Instance_Number&gt; to /usr/sap/&lt;SAPSID&gt;/D&lt;Instance_Number&gt;. • Declustering and depooling of tables during the installation is enabled by default. For more information, see SAP Note 1892354.</td>
<td>Software Provisioning Manager 1.0 SP09 (SL Toolset 1.0 SP15)</td>
</tr>
<tr>
<td>Feature</td>
<td>Description</td>
<td>Availability</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>System Provisioning for SAP Solution Manager 7.2</td>
<td>All system provisioning tasks (installation, system copy, system rename) are available for the new SAP Solution Manager 7.2 release. Compared to previous SAP Solution Manager releases, SAP Solution Manager 7.2 is no longer provided as a classical dual-stack system (ABAP system with Java Add-in), but consists of a separate ABAP and Java stack.</td>
<td>Software Provisioning Manager 1.0 SP09 (SL Toolset 1.0 SP15)</td>
</tr>
<tr>
<td>Feedback Evaluation Form</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.</td>
<td>Software Provisioning Manager 1.0 SP07 (SL Toolset 1.0 SP12)</td>
</tr>
<tr>
<td>Option Verify Signed Media</td>
<td>The digital signature ensures that the signatory of a digital document can be identified unambiguously and signatory’s name is documented together with the signed document, the date, and the time. For more information, see SAP Note 1979965.</td>
<td>Software Provisioning Manager 1.0 SP06 (SL Toolset 1.0 SP11)</td>
</tr>
</tbody>
</table>
2 Planning

Procedure

To plan the installation you need to:

2. Check the software requirements [page 13].
3. Check the hardware requirements by using the Quick Sizer tool, which you can find at https://sap.com/sizing.

2.1 Options for the Installation of SAP MaxDB liveCache

You have the following options to install SAP MaxDB liveCache (“SAP liveCache” for short):

- SAP liveCache is integrated in the SAP HANA Database, so that SAP liveCache and SCM Server are running on the same database instance.
  Valid for:
  - SAP enhancement package 4 for SAP Supply Chain Management 7.0
  - SAP enhancement package 3 for SAP Supply Chain Management 7.0
  - SAP enhancement package 2 for SAP Supply Chain Management 7.0, version for SAP HANA

- SCM Server is installed on the SAP HANA Database or another SAP-supported database, while SAP liveCache is installed on a separate server using SAP MaxDB technology.
  Valid for:
  - SAP enhancement package 4 for SAP Supply Chain Management 7.0

  i Note
  The configuration “SCM Server on HANA with an external liveCache” is no longer supported for new installations. However, upgrades from previous SCM EhPs based on this configuration are still supported. (also known as SAP LCA, LCAPPS-Plugin or
  - SAP enhancement package 3 for SAP Supply Chain Management 7.0
  - SAP enhancement package 2 for SAP Supply Chain Management 7.0, version for SAP HANA
  - SAP enhancement package 2 for SAP Supply Chain Management 7.0

SAP liveCache and SCM Server on the Same SAP HANA Database Instance

i Note
SAP liveCache applications for SAP HANASAP HANA (also known as LCAPPS) are no longer released as part of SAP HANA Platform Edition. For more information, see SAP Note 2223318.
If SCM Server and SAP liveCache are to be located on the same SAP HANA Database instance, proceed with the installation as follows:

1. **Install the SAP HANA Database plus the SAP liveCache Applications.**
   
   For more information on installing the SAP HANA Database, see the [SAP HANA Server Installation Guide](http://help.sap.com/hana_appliance) at http://help.sap.com/hana_appliance.


   In this configuration, the following scenarios are possible:
   - **Integrated SAP liveCache, single-node scenario**
     The SAP HANA Database is running on a single node including SAP liveCache.

     For more information about issues that might occur during the installation of this scenario, see SAP Note 1830427 for SCM 712 and SAP Note 1871831 for SCM 713 and higher.
   - **Integrated SAP liveCache, scale-out scenario**
     SAP liveCache is running on a dedicated, separate node in SAP HANA.

2. **Install one of the following using the relevant Support Package:**
   - SAP enhancement package 4 for SAP Supply Chain Management 7.0 (SCM 714)
   - SAP enhancement package 3 for SAP Supply Chain Management 7.0 (SCM 713)
   - SAP enhancement package 2 for SAP Supply Chain Management 7.0 (SCM 712)

   **Note**
   While installing SAP SCM using SWPM, select the checkbox *Use HANA integrated liveCache*, in step 2, *Define Parameters*.

3. **If necessary, migrate data from your SAP SCM system that ran on a non-HANA database to the SAP SCM system running on an SAP HANA Database.**

**SAP liveCache and SCM Server on Separate Database Instances**

**Note**
As of SCM 7.14 the configuration “SCM Server on HANA with an external liveCache” is no longer supported for new installations. However, upgrades from previous SCM EhPs based on this configuration are still supported.

If SCM Server and SAP liveCache are to be located on two separate database instances, with SCM Server on SAP HANA Database or some other SAP-supported database, and SAP liveCache on SAP MaxDB technology, proceed with the installation as follows:

1. **Only relevant if you are installing SCM Server on SAP HANA Database:**
   Install SAP HANA Database without installing SAP liveCache.
   

2. **Install one of the following using the relevant Support Package:**
   - SAP enhancement package 4 for SAP Supply Chain Management 7.0 (SCM 714)
   - SAP enhancement package 3 for SAP Supply Chain Management 7.0 (SCM 713)
SAP enhancement package 2 for SAP Supply Chain Management 7.0, version for SAP HANA (SCM 712)
○ SAP enhancement package 2 for SAP Supply Chain Management 7.0 (SCM 702)
3. Install SAP liveCache on a separate server, as described in this installation guide.

2.2 Software Requirements Check

For the most up-to-date information on the operating system of your product, check the SAP Product Availability Matrix (PAM)

For the most up-to-date information on the operating system of your product, check the SAP Product Availability Matrix (PAM) at https://support.sap.com/pam.

<table>
<thead>
<tr>
<th>Only valid for 'Platform': AIX</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIX: There you can also find additional information on required operating system patch levels for C++ RTE.</td>
</tr>
<tr>
<td>End of 'Platform': AIX</td>
</tr>
</tbody>
</table>

Installation of SAP MaxDB liveCache Technology 7.9 on UNIX
3 Preparation

You have to complete the following preparations before installing SAP liveCache.

Prerequisites

You have completed planning the installation [page 11].

Procedure

1. You choose a liveCache system name [page 14].
2. You create liveCache file systems [page 15].
3. You prepare the installation media [page 15].

3.1 Choosing a SAP liveCache System Name

You need to choose a SAP liveCache system name.

Procedure

Choose a liveCache name, <LC_NAME>, noting the following restrictions:

○ 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.

⚠️ Caution

Choose your SAP system ID carefully. Renaming is difficult and might require a system reinstallation.
3.2 Creating SAP liveCache File Systems

You need to set up file systems on your SAP liveCache host.

→ Recommendation
We recommend using raw devices as volumes. Raw devices are faster and more secure than files.

Procedure

- Creating File Systems for Raw Devices
If you are using raw devices you need to create the following file system:

<table>
<thead>
<tr>
<th>File System Name</th>
<th>Description</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>/sapdb</td>
<td>liveCache software + LCA objects</td>
<td>400 MB</td>
</tr>
<tr>
<td></td>
<td>Additional trace files for problem analysis</td>
<td>3 GB</td>
</tr>
</tbody>
</table>

- Creating Normal File Systems
If you do not want to use raw devices, you need to create the following file systems:

<table>
<thead>
<tr>
<th>File System Name</th>
<th>Description</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>/sapdb</td>
<td>liveCache software + LCA objects</td>
<td>400 MB</td>
</tr>
<tr>
<td>/sapdb/&lt;LC_NAME&gt;/sapdata</td>
<td>Data Volumes</td>
<td>2 x RAM, minimum 3 GB</td>
</tr>
<tr>
<td>/sapdb/&lt;LC_NAME&gt;/saplog</td>
<td>Log Volume</td>
<td>2 GB</td>
</tr>
</tbody>
</table>

3.3 Preparing the Installation Media

This section describes how to prepare the installation media.

Installation media are available as follows:

- The Software Provisioning Manager 1.0 archive containing the installer
  You always have to download the latest version of the Software Provisioning Manager 1.0 archive.
  For more information, see Downloading and Extracting the Software Provisioning Manager 1.0 Archive [page 16].
The SAP liveCache Installation Media
You can provide them in one of the following ways:
  ○ Use the physical liveCache installation medium as part of the installation package of your SAP system.
  ○ Download the liveCache installation package from the SAP Software Center.
For more information, see Downloading Installation Media [page 17].

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

3.3.1 Downloading and Extracting the Software Provisioning Manager 1.0 Archive

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

Prerequisites

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

You require the latest version of the SAPCAR tool to unpack the Software Provisioning Manager 1.0 archive SWPM10SP<Support_Package_Number>_<Version_Number>.SAR. 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 SWPM10SP<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.

Note
An older SAPCAR version might extract archive files in a wrong way and this could prevent the installer from working consistently.
Proceed as follows to get the latest version of **SAPCAR**:

a. Go to [https://launchpad.support.sap.com/#/softwarecenter](https://launchpad.support.sap.com/#/softwarecenter) ➤ SUPPORT PACKAGES & PATCHES ➤ By Category ➤ SAP TECHNOLOGY COMPONENTS ➤ SAPCAR.

b. Select the archive file for your operating system and download it to an empty directory.

c. Rename the executable to **sapcar.exe**.

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

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

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

<i>Note</i>

Make sure that all users have at least read permissions for the directory to which you unpack the installer.

<i>Caution</i>

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.

### 3.3.2 Downloading Installation Media

This section describes how you can download 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 16].

2. Create a download directory on the host where you want to run the installer.

3. You identify the required media as listed in Preparing the Installation Media [page 15].

4. Identify all download objects that belong to one medium according to one of the following:

<i>Note</i>

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

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

- [https://launchpad.support.sap.com/#/softwarecenter](https://launchpad.support.sap.com/#/softwarecenter) › INSTALLATIONS & UPGRADES › By Category › SAP NETWEAVER AND COMPLEMENTARY PRODUCTS › <Product> › <Product Release>

- **Material number**
  All download objects that are part of an installation medium have the same material number and an individual sequence number:
  
  `<Material_Number>_<Sequence_Number>`

  **Example**
  
  51031387_1
  51031387_2
  ...

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

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

   In the unpacking directory, the system creates a subdirectory with a short text describing the medium and copies the data into it. The data is now all in the correct directory, the same as on the medium that was physically produced. For more information, see SAP Note [1258173](https://launchpad.support.sap.com/).

**Caution**

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

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

This section describes how to run the installation of SAP liveCache using Software Provisioning Manager (the "installer" for short).

Procedure

1. You check the prerequisites for running the installer [page 19]
2. You run the installer to install SAP liveCache [page 22]

4.1 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 do trust the self-issued certificate of the installer after carefully performing the "thumbprint" verification described in Running the Installer [page 22]. 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 38].

- A working /bin/csh must be available on the host where you run the installer. For more information about recommended login shells, see SAP Note 202227.
The installer uses `csh` scripts to obtain the environment for user `<sapsid>adm`. This is also true if user `<sapsid>adm` already exists from an earlier SAP system installation, and the shell of this user is not `csh`. Before you start the installer, execute the following command as user `<sapsid>adm` to make sure that the `csh` scripts are up-to-date:

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

- Make sure that your operating system does not delete the contents of the temporary directory `/tmp` or the contents of the directories to which the variables `TEMP`, `TMP`, or `TMPDIR` point, for example by using a `crontab` entry.

  Make sure that the temporary directory has the permissions 755.

- 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 38].

- Make sure that `umask` is set to 022 for the user with `root` permissions that you want to use for running the installer.

  As the user with `root` permissions that you want to use for running the installer, enter the following command: `umask 022`

- **Only valid for 'Platform': AIX**

  AIX: Make sure that you have set the limits for operating system users as described in SAP Note 323816.

  End of 'Platform': AIX

- **Only valid for 'Platform': HP-UX, Linux, Oracle Solaris**

  HP-UX, Linux, Oracle-Solaris: Make sure that you have set the limits for operating system users `root`, `<sapsid>adm`, and your database-specific operating system users (see also sections `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>
</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>
<tr>
<td>open files</td>
<td>nofile</td>
<td>8192</td>
</tr>
<tr>
<td>max memory size (kbytes)</td>
<td>max memory size (Kibytes)</td>
<td>unlimited</td>
</tr>
</tbody>
</table>

- 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>`
4.2 Running the Installer

This section describes how to run the installer.

Prerequisites

For more information, see Prerequisites for Running the Installer [page 19].

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 38].

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

2. 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`

   ▪ Note
   
   `<Path_To_Unpack_Directory>/sapinst SAPINST_USE_HOSTNAME=<Virtual_Host_Name>`

3. The installer is starting up.
The installer now starts and waits for the connection with the SL Common GUI.

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

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

**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 38].
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 19]) 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.

4. On the Welcome screen, choose the required option:

The installer creates a subdirectory for the chosen installation service below the current working directory.


**i Note**

If you intend to use SAP liveCache with a server running a database other than SAP MaxDB, you need to install the liveCache client software for the host where the SAP central or dialog instance runs. If the server is running on SAP MaxDB, this is not necessary.

○ If you want to rename an SAP liveCache system or client, choose the relevant option under System Rename SAP liveCache.

5. 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.

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

**i Note**

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

**i Note**

If you are performing the target system installation in the context of a system copy with parallel export/import using the Migration Monitor and the target database is declustered - that is you started the installer for the target database instance installation with command line option SUPPORT_DECLUSTERING=true as described above - add the following load options parameter in the SAP System Advanced Load Configuration screen:

-<datacodepage> <datacodepage_of_source_system>

The advanced screen for load configuration only appears if you run the installer in Custom parameter mode. You can check the parameter within the import_monitor_cmd.properties file located in the installation directory, in the loadArgs entry.

For more information, see the system copy guides at http://support.sap.com/sltoolset System Provisioning System Copy Option Guide for Systems Based on SAP NetWeaver 7.1 & Higher.
Caution

The signature of installation media and installation archives is checked automatically during the Define Parameters phase while processing the Media Browser and - if you perform an archive-based installation - the Software Package Browser screens.

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

For more information, see SAP Note 2393060.

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

7. To start the installation, choose Next.

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

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

9. If you copied the installer software to your hard disk, you can delete these files when the installation has successfully completed.

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

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.

11. 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/

12. 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 38].
5 Post-Installation

You perform the following post-installation steps.

Context

⚠️ Caution

If you are performing a new installation of liveCache during an SCM 5.1 upgrade, to change from an unsupported operating system for liveCache – such as Windows 32-bit – to a supported operating system, do not perform the steps listed below.

The exception to this is the step Installing or Upgrading Database Studio for SAP MaxDB [page 29], which you can still perform if required.

The required liveCache post-installation activities—setup of the logical database connection with transaction LC10 and the loading of the master and transaction data—occur in phase REQ_LCUPG of the SCM upgrade. For more information, see SAP Supply Chain Management 5.1 ABAP: <Your Operating System and Database>, which you can find as follows:

https://help.sap.com/scm

Note

If you have already installed OneDB with SAP SCM, you only need to perform the post-installation steps described below to complete the OneDB installation.

Procedure

1. You perform common post-installation activities [page 30].
2. You install or upgrade Database Studio for SAP MaxDB [page 29].
3. If required, you install Secure Sockets Layer (SSL) protocol for database server communication [page 30].

5.1 Common Post-Installation Activities

You always need to perform the common post-installation activities listed below, regardless of the server with which you intend to use liveCache.
5.1.1 Configuring the SAP liveCache Instance

This section describes how to configure the SAP liveCache Instance.

Procedure

1. Start the SAP instances:
   - Windows application server
     1. Start service SAP<SID>_<instno>.
     2. Start the SAP central instance using Microsoft Management Console (if not already running).
   - UNIX application server
     Restart all SAP central and dialog instances running on UNIX.
   2. Log on to the SAP System as user DDIC (production client).
   3. Execute the program /SAPAPO/OM_SETUP and follow the instructions.

5.1.2 Checking the SAP liveCache Instance

Procedure

Call transaction LCA03 in a liveCache-relevant client. For more information, see Configuring the liveCache Instance [page 27], step 3.

This transaction performs a liveCache check, consisting of a configuration check and a functional check. This also checks whether all required periodic jobs are scheduled. If there are open issues during the configuration check, the transaction guides you to fix them immediately.

If you receive errors during the functional check, open an OSS message for the component BC-DB-LCA.

5.1.3 Changing Passwords of Created Users

You need to change the passwords of the users that the installer creates during the installation. The table below lists these users. You also need to remove the contents of the installation directory and store them securely because otherwise they might represent a security risk.

⚠️ Caution

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

1. Change the passwords of these users.

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

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

<table>
<thead>
<tr>
<th>User Type</th>
<th>User</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating system user</td>
<td>&lt;lcid&gt;adm</td>
<td>live Cache instance administrator</td>
</tr>
</tbody>
</table>

   For more information about how to change the passwords for the following liveCache users, see SAP Note 25591.

<table>
<thead>
<tr>
<th>User Type</th>
<th>User</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>liveCache users</td>
<td>SAP&lt;L_NAME&gt;</td>
<td>liveCache database owner (that is, the owner of the database tables)</td>
</tr>
<tr>
<td></td>
<td>Note</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>This name is a suggestion. If required, you can change it during the installation.</td>
</tr>
<tr>
<td></td>
<td>CONTROL</td>
<td>liveCache database manager operator</td>
</tr>
<tr>
<td></td>
<td>SUPERDBA</td>
<td>liveCache system administrator</td>
</tr>
</tbody>
</table>

2. Remove the contents of the installation directory and store them securely.

5.1.4 Setting Up a liveCache Super User

   You need to create a liveCache and liveCache applications super user for liveCache administration. Assign the roles SAP_APO_LC_ALL or SAP_LCA_ALL and SAP_BC_LVC_SUPERUSER to the user, as these roles already contain all required privileges

   If you want to create users with limited privileges for transaction LC10, see SAP Note 452745 for more information about the authorization concept for transaction LC10.
5.2 Installing or Upgrading Database Studio for SAP MaxDB

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

Prerequisites

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

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

- Your PC must meet the following minimum requirements:
  - Software requirements:
    - Operating System Requirements for Database Studio 7.9
      
      | Operating System | Database Studio 7.9.08 | Database Studio 7.9.09 |
      |------------------|-----------------------|-----------------------|
      | Windows 2008     | X64                   | X64                   |
      | Windows 2008 R2  | X64                   | X64                   |
      | Windows Vista    | IA32 and X64          | X64                   |
      | Windows 7        | IA32 and X64          | X64                   |
      | Windows 8        | IA32 and X64          | X64                   |
      | Windows 10       | IA32 and X64          | X64                   |
    - RAM: 512 MB (recommended RAM: 1 GB)
    - Processor speed: 1.5 GHz
    - Free disk space: 200 MB
    - Monitor: 1024x768 pixels, 256 colors
  - Hardware requirements:
  - You can obtain the required files by downloading them from: [https://launchpad.support.sap.com/#/softwarecenter>Databases SAP MaxDB Database Patches MAXDB GUI COMPONENTS/TOOLS MAXDB DATABASE STUDIO 7.9]
  - Database Studio 7.9.09 comes with the SAP Java Runtime SAPJVM. You no longer need to download the Java runtime.
Database Studio 7.9.08 is still available for downloading.
To check your Java version, enter the following command:
```
java -version
```
To download Java, go to http://java.com/en/download.

Context


Note

Database Studio replaces Database Manager GUI and SQL Studio, which were available in previous releases.
The use of Database Studio for SAP liveCache is optional. If you do not want to use it, skip this section.

For up-to-date information about installing Database Studio, see SAP Note 1097311.
For more information about Database Studio, including troubleshooting, see SAP Note 1097311 and 1795588.

Procedure

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

5.3 Secure Sockets Layer Protocol for Database Server Communication

The SAP MaxDB database server supports the Secure Sockets Layer (SSL) / Transport Layer Security (TLS) protocol. You can use this protocol to communicate between the database server and its client, here the Application Server (AS).

SSL guarantees encrypted data transfer between the SAP MaxDB database server and its client applications. In addition, the server authenticates itself to the client. You need to install SAP's cryptographic library - SAPCRYPTOLIB. For more information on software versions, see SAP Note 2243688.
Caution

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

To use SSL you need to install the SAP Cryptographic Library [page 31] and generate the personal security environment [page 33] (PSE) on the server (SSL Server PSE) and on the client (SSL Client PSE). In addition, you need to configure the SSL communication between the application server and the database server [page 36].

Related Information

Installing the SAP Cryptographic Library [page 31]
Generating the Personal Security Environment [page 33]
Configuring the SSL Communication between the Application Server and the Database Server [page 36]

5.3.1 Installing the SAP Cryptographic Library

This section describes how to install the SAP Cryptographic Library.

Prerequisites

Prerequisites

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

https://launchpad.support.sap.com/#/softwarecenter

Support Packages & Patches ➔ SAP TECHNOLOGY COMPONENTS ➔ SAPCRYPTOLIB ➔ COMMONCRYPTOLIB <version> ➔

Context

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

The installation package consists of the following:

- The SAP Cryptographic Library:
  - SAP liveCache >= 7.9.09: CommonCryptoLib (CCL)
  - SAP liveCache < 7.9.09: SAPCRYPTOLIB
The installation package is called SAPCRYPTOLIBP_<patch_level>-<platform_id>.SAR. For example, CCL 8.4.45 on 64-bit AIX is called SAPCRYPTOLIBP_8445-20011699.SAR.

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

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

**Procedure**

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

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

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

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

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

   ```bash
   dbmcli dbm_getpath IndepProgPath
   ```

   **Example**
   The independent program directory might be called the following:

   ```bash
   /sapdb/programs/lib
   ```

3. Copy the configuration tool sapgenpse.exe to the directory <independent program>\lib.

4. Create a subdirectory called sec under the independent data directory.

   **Example**
   The result might look as follows:

   ```bash
   /sapdb/data/sec
   ```

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

This section describes how to generate the SSL Server PSE and the SSL Client PSE.

Context

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

- **SSL Server PSE**
  This PSE contains the security information from the database server, for example, the public-private cryptographic key pair and certificate chain. To install the SSL Server PSE, you need to generate the PSE. You can either do this for a single database server or system-wide. The SSL Server PSE is called `SDBSSLS.exe`.

- **SSL Client PSE**
  The client requires an anonymous certificate called `SDBSSLA.exe`, which contains the list of the public keys of trustworthy database servers.

Procedure

1. You generate the SSL Server PSE [page 33]
2. You generate the SSL Client PSE [page 35]

5.3.2.1 Generating the SSL Server PSE

Proceed as follows to generate the SSL Server PSE.

Context

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

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

**Example**

This is an example of a certificate request:

```plaintext
-----BEGIN CERTIFICATE REQUEST-----
MIIBPzCBqIBADAAMIGfMA0GCSqGSIb3DQEBAQUAA4GNADCBiQKBgQD/302IT+/Y
wpigSnw7U9FwneyWz3Wi10S18aFCYkRo00wCpd8UwcaC4dds4uGT6h12WJ0/FotUg
+EQxonZbaRrk9sTalkn1mgx3YAUe/gEaGdf1wwuYkb0gjm81M/J
jb9JBj38srMFyoBy9jMC7v5u7+TZNwMvJvC1YmGm1DAQAb0AAwDQYJKoZIhlcNAQEBQ
ADgYEA
x2zuaTAOKpdCmxUKY1WdasUpim4whfaHa7ZDBwipvKJ8akYCT
+dpVMHzhc9E7UjL80/6Rup5cnLAA05FbVs5Mr6zLNj9YNSN9XP+5/
MPF6qayJ0VryTkpSpbbPrWLhKh1Dds97LQvuo/myKIAHECwyW6t7sAFJwH4P0fdxmKo=
-----END CERTIFICATE REQUEST-----
```

7. Import the reply to the SSL Server PSE:
   a. Copy the text to a temporary file called `srcert`.
   b. Enter the following command:
      ```bash
      sapgenpse import_own_cert -c srcert -p SDBSSLS.pse
      ```
You have generated the SSL Server PSE. You can now start the XServer as usual (if it is already running, you must stop and restart it).

8. To check whether the SSL functionality is working correctly, view the trace file niserver_<local computer name>.trace in the <global data>/wrk directory.

5.3.2.2 Generating the SSL Client PSE

Proceed as follows to generate the SSL Client PSE.

Procedure

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

Note
For applications such as SQL Studio replace the global data or global program in the above description with the relevant installation directory.
5.3.3 Configuring the SSL Communication between the Application Server and the Database Server

Set the connection information for each database connection for which SSL is to be used.

Procedure

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

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

For more information, see SAP Note [2190094](https://support.sap.com).

Example

Database connection: Test

<host>: lu12345
<SID>: WB9

Connection information for database connection Test:

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

Connection information for Test+:

`@DBM_SSL:lu12345-WB9`
6 Additional Information

6.1 Operating Information for liveCache

If you manually reinitialize liveCache with transaction LC10, make sure that you first delete all administration reports, especially /SAPAPO/DELETE_LC_ANCHORS and SLCA_INIT_FOLLOW_UP, from the definition of the logical liveCache LCA connection.

6.2 Uninstalling SAP liveCache

This section describes how to uninstall SAP liveCache.

Prerequisites

Stop liveCache with transaction LC10 in the SAP system.

Procedure

1. Log on to the liveCache server as user <lc_name>adm.
2. Drop the database instance:
   ```bash
dbmcli -d <LC_NAME> -u <dbm_user>,<password> db_drop
   ```
3. Delete integration entries on the SAP server:
   a. Log on to the SAP System as user DDIC.
   c. In the Name of database connection field, enter LCA and choose Integration.
   d. Choose Display Change.
   e. Choose Delete the logical link and confirm the deletion.
   f. Save your entries.
   g. Repeat steps b to f for database connections LDA and LEA.
4. Perform the following as UNIX user root:
   a. Using the steps appropriate for your operating system, delete user <lc_name>adm along with the home directory and all sub-directories.
b. If not already deleted automatically, delete the user’s home directory.
c. If not already deleted automatically, delete user <lc_name>adm from group sapsys.
d. If group sapsys is now empty, delete the complete group using the steps appropriate for your operating system.

5. Delete the liveCache software (dependent package) using the SAP MaxDB SDBUNINST tool, as described in SAP Note 599129.

Results

You have now removed the liveCache instance.

6.3 Additional Information about the Installer

The following sections provide additional information about the installer.

Useful Information about the Installer [page 38]
This section contains some useful technical background information about the installer and the installer GUI.

Interrupted Processing of the Installer [page 40]
Here you find information about how to restart the installer if its processing has been interrupted.

Troubleshooting with the Installer [page 44]
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 45]
This section describes how to use the Step State Editor available in the installer.

6.3.1 Useful Information about the Installer

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

- Software Provisioning Manager (the “installer” for short) has the web browser-based “SL Common GUI of the Software Provisioning Manager” - “SL Common GUI” for short.
- The SL Common GUI uses the SAP UI Development Toolkit for HTML5 - also known as SAPUI5 - a client-side HTML5 rendering library based on JavaScript. The benefits of this new user interface technology for the user are:
  - Zero footprint, since only a web browser is required on the client
  - New controls and functionality, for example, view logs in web browser.
- As of version 1.0 SP24 Patch Level (PL) 5, Software Provisioning Manager comes with a new look and feel of the SL Common GUI. For more information, see https://blogs.sap.com/2018/11/10/new-look-for-software-provisioning-manager/. The SL Common GUI connects the web browser on a client with the sapinst executable - which is part of Software Provisioning Manager - running on the installation host using the standard protocol HTTPS.
For the SL Common GUI the installer provides a pre-generated URL 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 19].

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>
<tbody>
<tr>
<td>Bourne shell (sh)</td>
<td>TEMP=&lt;Directory&gt;</td>
</tr>
<tr>
<td></td>
<td>export TEMP</td>
</tr>
<tr>
<td>C shell (csh)</td>
<td>setenv TEMP &lt;Directory&gt;</td>
</tr>
<tr>
<td>Korn shell (ksh)</td>
<td>export TEMP=&lt;Directory&gt;</td>
</tr>
</tbody>
</table>

⚠️ Caution

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

The installer records its progress in the keydb.xml file located in the sapinst_instdir directory. Therefore, if required, you can continue with the installer from any point of failure, without having to repeat the already completed steps and without having to reenter the already processed input parameters. For security reasons, a variable encryption key is generated as soon as the sapinst_instdir directory is created by the installer. This key is used to encrypt the values written to the keydb.xml file.

⚠️ Recommendation

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

- The installer extracts itself to the temporary directory. These executables are deleted again after the installer has stopped running. Directories called sapinst_exe.xxxxx.xxxx sometimes remain in the temporary directory after the installer has finished. You can safely delete them.
The temporary directory also contains the log file `dev_selfex.out` from the self-extraction process of the installer, which might be useful if an error occurs.

⚠️ Caution

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

- To see a list of all available installer properties, start the installer as described above with the option `-p`:

  ```
  ./sapinst -p
  ```

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

⚠️ Caution

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

---

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

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 22].
2. Make sure that the installation media are still available.

   For more information, see Preparing the Installation Media [page 15].

   → Recommendation

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

For more information, see Preparing the Installation Media [page 15].

→ Recommendation

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

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

```bash
<Path_To_Unpack_Directory>/sapinst
```

5. 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 38].
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 19]) 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.

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

The What do you want to do? screen appears.

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

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Behavior</th>
</tr>
</thead>
</table>
| 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:

\[ \text{log}_<\text{Day}>_<\text{Month}>_<\text{Year}>_<\text{Hours}>_<\text{Minutes}>_<\text{Seconds}> \]

**Example**

\[ \text{log}_01_{-}\text{Oct}_{2016}_13_47_56 \]

**i Note**

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

**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. |

---

### 6.3.3 Troubleshooting with the Installer

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

#### Context

If an error occurs, the installer:

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

#### Procedure

1. Check SAP Note 2393060 for known installer issues.
2. If an error occurs during the Define Parameters or the Execute Service phase, do one of the following:
Try to solve the problem:

- To check the installer log files (sapinst.log and sapinst_dev.log) for errors, choose the LOG FILES tab.

  **Note**
  The LOG FILES tab is only available if you have selected on the Welcome screen the relevant installer option for the SAP product to be installed.

  If you need to access the log files before you have done this selection, you can find them in the .sapinst directory underneath the /home/<User> directory, where <User> is the user that you used to start the installer.

  For more information, see Useful Information about the Installer [page 38].

- 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 40].

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.

### 6.3.4 Using the Step State Editor (SAP Support Experts Only)

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

**Note**

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

### Prerequisites

- SAP Support requests you to use the Step State Editor.
- Make sure that the host where you run the installer meets the requirements listed in Prerequisites for Running the Installer [page 19].

### Procedure

1. Start the installer from the command line as described in Running the Installer [page 22] 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.
Important Disclaimers and Legal Information

Hyperlinks

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

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

- Links with the icon 🚪: You are leaving the documentation for that particular SAP product or service and are entering a SAP-hosted Web site. By using such links, you agree that (unless expressly stated otherwise in your agreements with SAP) you may not infer any product claims against SAP based on this information.

Beta and Other Experimental Features

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

Example Code

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

Gender-Related Language

We try not to use gender-specific word forms and formulations. As appropriate for context and readability, SAP may use masculine word forms to refer to all genders.

Videos Hosted on External Platforms

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