



Installation Guide | PUBLIC

Software Provisioning Manager 1.0 SP33

Document Version: 3.5 – 2021-10-11

Installation of SAP liveCache Technology 7.9 on Windows

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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/sltoolset> >>> *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:

Version	Date	Description
3.5	2021-10-11	Updated version for Software Provisioning Manager 1.0 SP33 (SL Toolset 1.0 SP33)
3.4	2021-06-21	Updated version for Software Provisioning Manager 1.0 SP32 (SL Toolset 1.0 SP32)
3.3	2021-02-15	Updated version for Software Provisioning Manager 1.0 SP31 (SL Toolset 1.0 SP31)
3.2	2020-10-05	Updated version for Software Provisioning Manager 1.0 SP30 (SL Toolset 1.0 SP30)
3.1	2020-06-08	Updated version for Software Provisioning Manager 1.0 SP29 (SL Toolset 1.0 SP29)
3.0	2020-01-20	Updated version for Software Provisioning Manager 1.0 SP28 (SL Toolset 1.0 SP28)
2.9	2019-09-16	Updated version for Software Provisioning Manager 1.0 SP27 (SL Toolset 1.0 SP27)
2.8	2019-05-27	Updated version for Software Provisioning Manager 1.0 SP26 (SL Toolset 1.0 SP26)

Version	Date	Description
2.7	2019-01-21	Updated version for Software Provisioning Manager 1.0 SP25 (SL Toolset 1.0 SP25)
2.6	2018-09-17	Updated version for Software Provisioning Manager 1.0 SP24 (SL Toolset 1.0 SP24)
2.5	2018-05-07	Updated version for software provisioning manager 1.0 SP23 (SL Toolset 1.0 SP23)
2.4	2018-01-15	Updated version for software provisioning manager 1.0 SP22 (SL Toolset 1.0 SP22)
2.3	2017-09-11	Updated version for software provisioning manager 1.0 SP21 (SL Toolset 1.0 SP21)
2.2	2017-05-22	Updated version for software provisioning manager 1.0 SP19 (SL Toolset 1.0 SP19)
2.1	2017-02-07	Updated version for software provisioning manager 1.0 SP19 (SL Toolset 1.0 SP19)
2.0	2016-10-07	Updated version for software provisioning manager 1.0 SP18 (SL Toolset 1.0 SP18)
1.9	2016-01-22	Updated version for SAP enhancement package 4 for SAP Supply Chain Management 7.0
1.8	2015-04-27	Updated version for software provisioning manager 1.0 SP08 (SL Toolset 1.0 SP13)
1.7	2014-11-24	Updated version for software provisioning manager 1.0 SP07 (SL Toolset 1.0 SP12)
1.6	2014-07-07	Updated version
1.5	2014-03-17	Updated version
1.4	2013-10-28	Updated version

Version	Date	Description
1.3	2013-10-10	Updated version
1.2	2013-04-10	Updated version
1.1	2012-11-28	Updated version
1.0	2012-08-06	Initial version

1 About this Document

This documentation explains how to install or rename the server for SAP liveCache Technology using Software Provisioning Manager 1.0 SP33, which is part of SL Toolset 1.0 SP33.

SAP liveCache is used in SAP Supply Chain Management (SCM). SAP 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 liveCache installation, see [Options for the Installation of SAP liveCache \[page 12\]](#).

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 \[page 27\]](#) described in this guide. For more information about the OneDB installation, see the relevant SAP SCM guide at:

<https://help.sap.com/scm> ▶

If required, you can install SAP liveCache with Microsoft Failover Clustering. For more information, see [High Availability with Microsoft Failover Clustering \[page 52\]](#). If you plan to install the SAP liveCache server into the same Microsoft cluster where the SCM system is to be installed, make sure that you install SAP liveCache **before** installing the SCM system. Otherwise, you get installation errors and you therefore need to remove the SAP liveCache client software before starting installation of the SAP liveCache server with Microsoft Failover Clustering.

1.1 Before You Start

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

[SAP Notes for the Installation \[page 8\]](#)

Make sure that you have read the following SAP Notes.

[Online Information from SAP \[page 8\]](#)

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.

Note Number	Title
1651606	liveCache 7.9 Installation
1567117	Parameter values liveCache version 7.9
305634	RFC destination for global working on the liveCache

1.1.2 Online Information from SAP

Here you can find online information.

Description	Address
SAP liveCache Installation Guide	https://support.sap.com/sitoolset > <i>System Provisioning</i> > <i>Installation Option of Software Provisioning Manager 1.0</i> > <i>Installation Guides - Standalone Engines and Clients</i> > <i>SAP liveCache Technology</i>
Product Availability Matrix (PAM)	https://support.sap.com/pam
SAP Notes	https://support.sap.com/en/my-support/knowledge-base.html

1.1.3 Naming Conventions

We use the following naming conventions in this documentation.

Variable	Description
INST_DIR	Installation directory
LC_HOST	Domain or server name where the liveCache is installed

Variable	Description
LC_NAME	Name of liveCache instance consisting of three capital letters

1.2 New Features

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

Make sure that you also read the [Release Notes](#) for your SAP product at <https://help.sap.com> > <Search your SAP Product> > <Select your SAP Product Version> > [What's New](#) >.

Feature	Description	Availability
High-availability system on Microsoft Cluster: Option to install the ASCS instance in a file share on a local disk.	As an alternative to the “classic” way to install the ASCS instance on a shared disk, you can now choose to install the ASCS instance in a file share on a local disk. For more information, see High Availability with Microsoft Failover Clustering [page 52] .	Software Provisioning Manager 1.0 SP25 (SL Toolset 1.0 SP25)
New Look and Feel of SL Common GUI	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/ .	Software Provisioning Manager 1.0 SP24, PL05 (SL Toolset 1.0 SP24)
Installer Log Files Improvements	Installer log files are now available immediately after the installer has been started, that is before a product has been selected on the <i>Welcome</i> screen. For more information, see Useful Information about the Installer [page 40] and Troubleshooting with the Installer [page 46] .	Software Provisioning Manager 1.0 SP22 (SL Toolset 1.0 SP22)
Signature Check of Installation Archives	The signature of installation archives is checked automatically by the installer during the <i>Define Parameters</i> phase while processing the <i>Software Package Browser</i> screens. As of now the installer only accepts archives whose signature has been checked. For more information, see .	Software Provisioning Manager 1.0 SP22 (SL Toolset 1.0 SP22)
Enabling IPv6	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 21] .	Software Provisioning Manager 1.0 SP22 (SL Toolset 1.0 SP22)

Feature	Description	Availability
Media Signature Check	<p>The signature of media is checked automatically by the installer during the <i>Define Parameters</i> phase while processing the <i>Media Browser</i> 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.</p> <p>For more information, see Preparing the Installation Media [page 17] and Running the Installer [page 22].</p>	Software Provisioning Manager 1.0 SP21 (SL Toolset 1.0 SP21)
SL Common GUI with SAPINST 7.49	<p>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 40], Running the Installer [page 22].</p>	Software Provisioning Manager 1.0 SP20 (SL Toolset 1.0 SP20)
Verification of Integrity of Data Units in Software Provisioning Manager	<p>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 18].</p> <p>In addition, check SAP Note 1680045 whether additional information is available.</p>	Software Provisioning Manager 1.0 SP19 (SL Toolset 1.0 SP19)
System Provisioning for SAP NetWeaver 7.5 and SAP NetWeaver 7.5-based Products	<p>All system provisioning tasks (installation, system copy, system rename) are available for the new SAP NetWeaver 7.5 release.</p> <p>The Dual Stack option, which integrates an AS ABAP and AS Java in a single system (common System ID <code><SAPSID></code>, common startup framework, common database), is no longer supported in SAP systems based on SAP NetWeaver 7.5.</p> <ul style="list-style-type: none"> • 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 <i>Upgrade Master Guide - SAP NetWeaver 7.5</i> at: http://help.sap.com/nw75 ►► Installation and Upgrade ► • SAP NetWeaver 7.5 is Unicode only • The primary application server instance directory has been renamed from <code>/usr/sap/<SAPSID>/DVEBMGS<Instance_Number></code> to <code>/usr/sap/<SAPSID>/D<Instance_Number></code>. • Declustering and depooling of tables during the installation is enabled by default. For more information, see SAP Note 1892354. 	Software Provisioning Manager 1.0 SP09 (SL Toolset 1.0 SP15)

Feature	Description	Availability
System Provisioning for SAP Solution Manager 7.2	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.	Software Provisioning Manager 1.0 SP09 (SL Toolset 1.0 SP15)
Feedback Evaluation Form	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.	Software Provisioning Manager 1.0 SP07 (SL Toolset 1.0 SP12)
Option <i>Verify Signed Media</i>	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 .	Software Provisioning Manager 1.0 SP06 (SL Toolset 1.0 SP11)

2 Planning

Procedure

To plan the installation you need to:

1. Choose which of the [Options for the Installation of SAP liveCache \[page 12\]](#) you want to use.
2. [Check the software requirements \[page 14\]](#).
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 liveCache

You have the following options to install SAP liveCache:

- 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 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 and Update Guide* at http://help.sap.com/hana_appliance >> *Installation and Upgrade Information* >
For more information on installing the SAP liveCache Applications, see section *Installing or Updating SAP HANA Components* of the *SAP HANA Server Installation and Update Guide* at http://help.sap.com/hana_appliance >> *Installation and Upgrade Information* >.
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)

i Note

While installing SAP SCM using Software Provisioning Manager (the “ installer” for short), select the checkbox *Use SAP liveCache integrated in SAP HANA*, in step 2, >> *Define Parameters* > *SAP HANA liveCache* >.

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

i 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
For more information, see the *SAP HANA Server Installation Guide* at http://help.sap.com/hana_appliance >> *Installation and Upgrade Information* >.
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>.

3 Preparation

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

Prerequisites

You have completed [planning the installation \[page 12\]](#).

Procedure

1. You [choose a liveCache system name \[page 15\]](#).
2. You [check liveCache file systems \[page 16\]](#).
3. You [check that you have the required user authorization for running the installer \[page 16\]](#).
4. You [prepare the installation media \[page 17\]](#).

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 Checking SAP liveCache File Systems

You need to check whether you have enough space for the SAP liveCache file systems on your disk.

Procedure

Make sure that you have enough space for the following on your disk.

Description	Recommendation
liveCache software and LCA objects	400 MB
Additional trace files for problem analysis	3 GB

3.3 Required User Authorization for Running the Installer

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

This section informs you about the authorization required for a domain and a local installation.

Procedure

⚠ Caution

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

Domain Installation

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

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

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

For a domain installation, you need to:

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

Local Installation

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

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

⚠ Caution

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

For a local installation, you need to:

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

Related Information

[Performing a Domain Installation Without Being a Domain Administrator \[page 39\]](#)

3.4 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 \[page 18\]](#).
- 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 Download Center.

For more information, see [Downloading Installation Media \[page 19\]](#).

i 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](#).

3.4.1 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 use the **latest** version of the `SAPCAR` tool when manually extracting the Software Provisioning Manager archive.

i Note

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

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

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

For more information about `SAPCAR`, see SAP Note [212876](#).

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/sltoolset> > [System Provisioning](#) > [Download Software Provisioning Manager](#)

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

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

i Note

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

⚠ Caution

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

3.4.2 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 \[page 18\]](#).
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 \[page 17\]](#).
4. Identify **all** download objects that belong to one medium according to one of the following:

i Note

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

- Download path or location:
 - To download the complete kernel media, go to <https://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> > *INSTALLATIONS & UPGRADES* > *By Category* > *SAP NETWEAVER AND COMPLEMENTARY PRODUCTS* > *<Product>* > *<Product Release>* >

- <https://launchpad.support.sap.com/#/softwarecenter>  **INSTALLATIONS & UPGRADES** 
 By Alphabetical Index (A-Z)  *<First Letter of Product>*  *<Product>*  *<Product Release>* 
- Material number
All download objects that are part of an installation medium have the same material number and an individual sequence number:
<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](#) .

⚠ 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 \[page 21\]](#)
2. You [you run the installer to install SAP liveCache \[page 22\]](#)

4.1 Prerequisites for Running the Installer

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

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

Caution

The installer uses a self-signed certificate, which is used temporarily only while the installer is running. This certificate is not trusted by the browser unless it is imported manually by the user running the installer. This behavior is intentionally designed in this way because - unlike ordinary public web servers - the installer has different usage patterns. You must configure your browser do trust the self-issued certificate of the installer after carefully performing the “thumbprint” verification described in [Running the Installer \[page 22\]](#) . 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 \[page 40\]](#).

- If you want to enable Internet Protocol Version 6 (IPv6), make sure that you set **SAP_IPv6_ACTIVE=1** in the environment of the user with the [required authorization \[page 16\]](#) to run the installer. While running the installer, this setting is then also added to the environment of the `<sapsid>adm` user.

i Note

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

- You need at least 300 MB of free space in the installation directory for each installation option. In addition, you need 300 MB free space for the installer executables. The installer creates an installation directory `sapinst_instdir`, where it keeps its log files, and which is located directly in the `%ProgramFiles%` directory. For more information, see [Useful Information About the Installer \[page 40\]](#).
- Make sure that the following ports are not used by other processes:
 - Port 4237 is used by default as HTTPS port for communication between the installer and the SL Common GUI.
If this port cannot be used, you can assign a free port number by executing `sapinst.exe` with the following command line parameter:
`SAPINST_HTTPS_PORT=<Free Port Number>`
 - Port 4239 is used by default for displaying the feedback evaluation form at the end of the installer processing.
The filled-out evaluation form is then sent to SAP using HTTPS.
If this port cannot be used, you can assign a free port number by executing `sapinst.exe` with the following command line parameter:
`SAPINST_HTTP_PORT=<Free Port Number>`

4.2 Running the Installer

This section describes how to run the installer.

Prerequisites

For more information, see [Prerequisites for Running the Installer \[page 21\]](#).

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 \[page 40\]](#).

Procedure

1. Log on to the installation host using an account with the [required user authorization to run the Installer \[page 16\]](#).

⚠ Caution

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

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

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

`sapinst.exe` (in a command prompt)

`.\sapinst.exe` (in PowerShell)

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

`SAPINST_BROWSER=<Path to Browser Executable>`, for example

`SAPINST_BROWSER=firefox.exe`.

i Note

1. Open a command prompt or PowerShell window in elevated mode and change to the directory to which you unpacked the Software Provisioning Manager archive.
2. Start the installer with the following command:

`sapinst.exe SAPINST_USE_HOSTNAME=<Virtual_Host_Name>` (in a command prompt)

`.\sapinst.exe SAPINST_USE_HOSTNAME=<Virtual_Host_Name>` (in PowerShell)

3. The installer is starting up.

The installer now starts and waits for the connection with the SL Common GUI. If you have a supported web browser (see [Prerequisites for Running the Installer \[page 21\]](#)) installed on the host where you run the installer, the SL Common GUI starts automatically by displaying the *Welcome* screen.

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

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

i Note

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

1. Terminate the installer as described in [Useful Information about the Installer \[page 40\]](#).
2. Restart the installer from the command line with the `SAPINST_GUI_HOSTNAME=<hostname>` property.
You can use a fully-qualified host name.

⚠ Caution

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

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

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

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

Proceed as follows to get the certificate fingerprint or thumbprint from the server certificate printed in the installer console:

1. Go to the `sapinst_exe.xxxxxxx.xxxx` directory in the temporary directory to which the installer has extracted itself:
`%userprofile%\sapinst\`
2. In the `sapinst_exe.xxxxxxx.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:
 - To install an SAP liveCache **server**, choose `► SAP Business Suite <Version> ► <SAP SCM ABAP Product Version> ► Database ► Installation ► Standalone Engines ► SAP liveCache ► liveCache Server Installation ►`.
The installer creates a subdirectory for the chosen installation service below the current working directory.
 - To install an SAP liveCache **client**, choose `► SAP Business Suite <Version> ► <SAP SCM ABAP Product Version> ► Database ► Installation ► Standalone Engines ► SAP liveCache ► SAP liveCache Client Installation ►`.

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.

- To install a High-Availability SAP liveCache **on First Cluster Node**, choose ► [SAP Business Suite <Version>](#) ► [<SAP SCM ABAP Product Version>](#) ► [Database](#) ► [Installation](#) ► [Standalone Engines](#) ► [SAP liveCache](#) ► [HA - SAP liveCache on First Cluster Node](#) ►. For more information, see [Installing SAP liveCache on the First Node \[page 63\]](#).
- To install a High-Availability SAP liveCache **on an Additional Cluster Node**, choose ► [SAP Business Suite <Version>](#) ► [<SAP SCM ABAP Product Version>](#) ► [Database](#) ► [Installation](#) ► [Standalone Engines](#) ► [SAP liveCache](#) ► [HA - SAP liveCache on an Additional Cluster Node](#) ►. For more information, see [Configuring SAP liveCache on the Additional Node \[page 64\]](#).
- 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. If the installer prompts you to log off from your system, log off and log on again. The installer restarts automatically.
7. Follow the instructions on the installer 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.

- Only valid for 'High Availability': HA (Windows)
High Availability only: If you decide to install an SAP Web Dispatcher or a Gateway in the ASCS instance, note that a failure of the SAP Web Dispatcher or the Gateway causes failover of the ASCS instance to another cluster node. The failover cluster monitors all processes that are started by the SAP start service (`sapstartsrv.exe`). For an ASCS instance this is: `msg_server.exe` (message server), `enserver.exe` (enqueue server), `gwrdd.exe` (Gateway), and `sapwebdisp.exe` (SAP Web Dispatcher). To prevent failover, see SAP Note [2375999](#).

End of 'High Availability': HA (Windows)

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/slttoolset> >>> [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.

8. 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.

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 delete the `.sapinst` directory within the home directory of the user with which you ran the installer:

```
%userprofile%\ .sapinst\
```

11. 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 \[page 40\]](#).

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 \[page 30\]](#), 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> >> > Version 5.1 > Installation and Upgrade >

i 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 \[page 31\]](#).
2. You [install or upgrade Database Studio for SAP MaxDB \[page 30\]](#).
3. If required, you [install Secure Sockets Layer \(SSL\) protocol for database server communication \[page 31\]](#).

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.
4. Create a backup.

For more information about backups, see the *Application Operations Guide* at <https://help.sap.com/scm>

▶▶ <Version> ▶ Operations ▶

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 \[page 28\]](#), 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/>.

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

User Type	User	Comment
liveCache users	SAP<LC_NAME>	liveCache database owner (that is, the owner of the database tables)
	<div data-bbox="555 792 963 981">i Note This name is a suggestion. If required, you can change it during the installation.</div>	
	CONTROL	liveCache database manager operator
	SUPERDBA	liveCache system administrator

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

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

- You can obtain the required files by downloading them from:

<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

For more information about Database Studio, see <https://help.sap.com/maxdb/<Version>> > *Application Help* > *SAP MaxDB Library* > *Tools* > *Database Studio* .

i 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 \[page 32\]](#) and [generate the personal security environment \[page 34\]](#) (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 \[page 37\]](#).

Related Information

[Installing the SAP Cryptographic Library \[page 32\]](#)

[Generating the Personal Security Environment \[page 34\]](#)

[Configuring the SSL Communication between the Application Server and the Database Server \[page 37\]](#)

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

- Configuration tool `sapgenpse.exe`

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

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:

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

Note

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

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

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

```
dbmcli dbm_getpath IndepProgPath
```

Example

The independent program directory might be called the following:

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

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

Example

The result might look as follows:

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

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

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 \[page 34\]](#)
2. You [generate the SSL Client PSE \[page 36\]](#)

5.3.2.1 Generating the SSL Server PSE

Proceed as follows to generate the SSL Server PSE.

Context

i Note

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

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 a SSL Server PSE, `SDBSSLS.pse`, and generate a certificate request file, `certreq`, in the directory defined by `SECUDIR` (see step 2):

```
sapgenpse gen_pse -v -r <SECUDIR>\certreq -p SDBSSLS.pse "<your distinguished name>"
```

For each database server that uses a server-specific PSE, you must set up a unique certificate request. If you are using a valid system-wide SSL Server PSE, you only need to set up a single certificate request for all servers.

5. Send the certificate request to the CA for signing. You can either send it to the SAP CA or to another CA.

You must make sure that the CA offers a certificate corresponding to the PKCS#7 certificate chain format. Thawte CA at the Thawte website offers a suitable certificate, either SSL Chained CA Cert or PKCS#7 certificate chain format.

The CA validates the information contained in the certificate request, according to its own guidelines, and sends a reply containing the public key certificate.

6. After you have received the reply from the CA, make sure that the contents of the certificate request have not been destroyed during download.

For example, if you requested the certificate on a UNIX system and stored it on a Windows front end, the formatting (that is, line indents and line breaks) is affected.

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

❁ Example

This is an example of a certificate request:

≡ Sample Code

```
-----BEGIN CERTIFICATE REQUEST-----
MIIBPzCBqQIBADAAMIGfMA0GCSqGSIb3DQEBAQUAA4GNADCBiQKBgQD/302IT+/Y
wpignSw7U9FWneyWz3Wl10S18aFCYkRo00wCpD8UwcaC4dds4uGT6h12WlJ0/FOtUg
+EQxonZbaRrk9sTalknlmqx3YAUE/gEaGdf1wvuYkb0gjMk81iM/
jb9BJd8srMPyoBy9jMC7v5u7+TZWmWa6RjnvClvYGgMwIDAQABAAAwDQYJKoZIhvcNAQEFBQ
ADgYEA
x2zuaTAOKPdGmxUKY1WdasUpim4vhfaHa7ZDBwipvKJ8akYCT
+dpmVjhcp9E7cUjL80/6Rup5cnLAAO5FhVt5MS6zNJa9YYSN9XP+5/
MPF6Q4ayJ0VryTkSpbbPrWLBKh1Dds97LQVuQ/myKIAHECwyW6t7sAFJWn4P0fdxmKo=
-----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 import command:

```
sapgenpse import_own_cert -c srcert -p SDBSSLS.pse
```

You have generated the SSL Server PSE. You can now start the XServer as usual (if it is already running, you must stop and restart it).

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

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. Create an anonymous client SSL Client PSE, `SDBSSLA.pse` in the directory defined by `SECUDIR` (see previous step):

```
sapgenpse gen_pse -v -noreq -p SDBSSLA.pse
```

You can leave the distinguished name empty.

Before you can establish an SSL connection to a database server, the server certificate must be entered in the PK list of the anonymous client certificate.

4. To see the database server certificate, enter the following command:

```
„x_ping -n <servermode> -c[apture]
```

You can check whether to trust the database server certificate. The client certificate is not affected by this.

5. Start the import with this command:

```
„x_ping -n <servermode> -i[import]
```

6. To administer the PSE, use the configuration tool `sapgenpse`. For more information, enter the following command:

```
sapgenpse -h
```

i 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](#).

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. Drop the database instance:

```
dbmcli -d <LC_NAME> -u <dbm_user>, <password> db_drop
```
2. Delete integration entries on the SAP server:
 - a. Log on to the SAP System as user DDIC.
 - b. Call transaction LC10.
The *liveCache: Initial Screen* appears.
 - 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**.
3. 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 Performing a Domain Installation Without Being a Domain Administrator

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

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

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

1. Create/Delete/Modify Users and Groups within OUs only. Ask the AD administrator about the company's OU concept.
2. Create/Delete/Modify Computer Objects within this OU. This is required for users which install SAP or database applications in Failover Clusters, LAMA environments or other HA environments. Optional rights might be necessary related to your company's security policy, for example:
3. Create/Delete/Modify DNS server records within a specific DNS zone, where the Windows hosts with SAP software belong to.
4. Create/Delete/Modify Organizational Unit objects within a specific OUs only.

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

The required objects in the domain are:

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

Note

The installer creates the operating system user for the SAP Host Agent by default as a local user that is not a member of the local Administrators group. If you want to create this user manually as a domain user, you must perform the following steps:

Creating the SAP Host Agent User and Group Manually

1. Create the new global group `SAP_SAP_GlobalAdmin`
2. Create the SAP system user `sapadm`.
3. Add the user `sapadm` to the newly created group `SAP_SAP_GlobalAdmin`.

However, for security reasons we strongly recommend that you create this user as a local user.

6.4 Additional Information about the Installer

The following sections provide additional information about the installer.

[Useful Information about the Installer \[page 40\]](#)

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

[How to Avoid Automatic Logoff by the Installer \[page 42\]](#)

[Interrupted Processing of the Installer \[page 43\]](#)

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

[Troubleshooting with the Installer \[page 46\]](#)

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

[Using the Step State Editor \(SAP Support Experts Only\) \[page 47\]](#)

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

6.4.1 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 foot print, since only a web browser is required on the client
- New controls and functionality, for example, view logs in web browser.

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

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

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

By default, the SL Common GUI uses the default browser defined for the host where you run the installer. However, you can also specify another supported web browser available on the host where you start the

installer. You can do this by starting the `sapinst` executable with command line option

`SAPINST_BROWSER=<Path to Browser Executable>`, for example

`SAPINST_BROWSER=firefox.exe`.

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

For more information about supported web browsers see [Prerequisites for Running the Installer \[page 21\]](#).

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

- As soon as you have started the `sapinst.exe` executable, the installer creates a `.sapinst` directory underneath the `<Drive>:\Users\<User>` directory where it keeps its logs and other technical files. `<User>` is the user which you used to start the installer.
After you have reached the *Welcome* screen and selected the relevant installer option for the SAP system or instance to be installed, the installer creates a directory `sapinst_instdir`, where it keeps its logs and other technical files, and which is located directly in the `%ProgramFiles%` directory. If the installer is not able to create `sapinst_instdir` there, it tries to create `sapinst_instdir` in the directory defined by the `TEMP` environment variable.
All log files which have been stored so far in the `.sapinst` folder are moved to the `sapinst_instdir` directory as soon as the latter has been created.
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 a temporary directory (`TEMP`, `TMP`, `TMPDIR`, or `SystemRoot`). These executables are deleted after the installer has stopped running.
Directories called `sapinst_exe.xxxxxx.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, go to the directory `%TEMP%\sapinst_exe.xxxxxx.xxxx` after you have started the installer, and enter the following command:
`sapinst.exe -p`
- If required, stop the installer by choosing the *Cancel* button.

i Note

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

6.4.2 How to Avoid Automatic Logoff by the Installer

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

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

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

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

- Act as part of the operating system
- Adjust memory quotas for a process
- Replace a process level token

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

Procedure

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

Caution

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

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

Related Information

[Required User Authorization for Running the Installer \[page 16\]](#)

6.4.3 Interrupted Processing of the Installer

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

Context

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

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

Caution

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

The following table describes the options in the dialog box:

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

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 \[page 17\]](#) .

→ 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 \[page 17\]](#) .

→ Recommendation

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

4. Restart the installer by double-clicking `sapinst.exe` from the directory to which you unpacked the Software Provisioning Manager archive.

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

`SAPINST_BROWSER=<Path to Browser Executable>`, for example
`SAPINST_BROWSER=firefox.exe`.

5. The installer is restarting.

The installer now starts and waits for the connection with the SL Common GUI. If you have a supported web browser (see [Prerequisites for Running the Installer \[page 21\]](#)) installed on the host where you run the installer, the SL Common GUI starts automatically by displaying the *Welcome* screen.

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

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

i Note

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

1. Terminate the installer as described in [Useful Information about the Installer \[page 40\]](#).
2. Restart the installer from the command line with the `SAPINST_GUI_HOSTNAME=<hostname>` property.
You can use a fully-qualified host name.

Caution

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

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

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

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

Proceed as follows to get the certificate fingerprint or thumbprint from the server certificate printed in the installer console:

1. Go to the `sapinst_exe.xxxxxx.xxxx` directory in the temporary directory to which the installer has extracted itself:
`%userprofile%\sapinst\`
2. In the `sapinst_exe.xxxxxx.xxxx` directory, execute the `sapgenpse` tool with the command line option `get_my_name -p`.

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

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

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

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

The *What do you want to do?* screen appears.

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

Alternative	Behavior
<i>Perform a new run</i>	<p>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.</p> <p>The following naming convention is used for the backup directory:</p> <pre>log_<Day>_<Month>_<Year>_<Hours>_<Minutes>_<Seconds></pre> <div style="background-color: #f0f0f0; padding: 5px;"> <p>❖ Example</p> <pre>log_01_Oct_2016_13_47_56</pre> </div> <div style="background-color: #f0f0f0; padding: 5px;"> <p>i Note</p> <p>All actions taken by the installation before you stopped it (such as creating directories or users) are not revoked.</p> </div> <div style="background-color: #f0f0f0; padding: 5px;"> <p>⚠ Caution</p> <p>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.</p> </div>
<i>Continue with the existing one</i>	The installer continues the interrupted installation from the point of failure.

6.4.4 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 [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.

i 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 the files in the `.sapinst` directory underneath the `<Drive>:\Users\<User>` directory, where `<User>` is the user that you used to start the installer.

For more information, see [Useful Information about the Installer \[page 40\]](#).

- To check the log and trace files of the installer GUI for errors, go to the directory `%userprofile%\sapinst\`
 - Then continue by choosing *Retry*.
 - If required, abort the installer by choosing *Cancel* in the tool menu and restart the installer. For more information, see [Interrupted Processing of the Installer \[page 43\]](#).
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](#).

6.4.5 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 \[page 21\]](#).

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.

7 Using PowerShell

SAP uses Windows PowerShell to run and describe Windows commands.

For Windows Server 2012 (R2) and higher, SAP only uses Windows PowerShell to run and describe Windows commands.



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

For more information about the Windows PowerShell, see:

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

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

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

- Windows Server 2019
Windows Server 2019 contains PowerShell 5.0
You can update to PowerShell 5.0 (search the internet for *Windows Management Framework 5.0*).
- Windows Server 2016
Windows Server 2016 contains PowerShell 5.0
You can update to PowerShell 5.0 (search the internet for *Windows Management Framework 5.0*).
- Windows Server 2012 R2
Windows Server 2012 R2 contains PowerShell 4.0.
- Windows Server 2012
Windows Server 2012 contains PowerShell 3.0.
You can update to PowerShell 4.0 (search the internet for *Windows Management Framework 4.0*).
- Windows Server 2008 R2
Windows Server 2008 R2 contains PowerShell 2.0.
For more information about PowerShell 2.0, see <http://support.microsoft.com/kb/968929>  .
You can update to PowerShell 3.0 or 4.0 (search the internet for *Windows Management Framework 3.0* or *Windows Management Framework 4.0*).
- Windows Server 2008
Windows Server 2008 contains PowerShell 1.0.
You have to activate the PowerShell feature with **Start** > *Administrative Tools* > *Server Manager* > *Features*  .
On Windows Server 2008, you can update to PowerShell 3.0 (search the internet for *Windows Management Framework 3.0*).

How to Start PowerShell

Caution

Make sure that you start the PowerShell in administrator mode.

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

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

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

How to Work with PowerShell

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

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

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

- Before you can run PowerShell scripts (text files with the file extension `.ps1` that contain PowerShell statements), you might have to change the default security setting to allow the execution of non-signed scripts as follows:
`set-executionpolicy ("unrestricted")`
- By default, when double-clicking PowerShell scripts (`.PS1` files) in the Windows explorer, this does not execute the script as is the default for `.cmd` files, but opens the script in an editor. If you want to activate automatic script execution after a double-click, you have to change the value `HKEY_CLASSES_ROOT\Microsoft.PowerShellscript.1\Shell\Open\Command` from `notepad.exe` to the full path of the PowerShell executable.
- The output of PIPE commands is not just a stream of characters (strings) but a stream of objects. You can easily access the properties and methods for these objects (see the process list DLL example below).
- The current working directory is not part of the directory search path that the PowerShell looks at for scripts and programs. The PowerShell only searches directories listed in the environment variable `path`. Therefore, you might have to run a local program with `./sapcontrol.exe` or specify its full path.
- You can use the UNIX-like directory delimiters, such as `cd /usr/sap/C11`.
- You can have your current working directory in a UNC path (`cd \\sapglobalhost\sapmnt`).
- The shell distinguishes between environment variables and shell variables:
 - Use of shell variables:
Definition: `$x="hello"`
Reference: `write-host $x`
 - Use of an environment variable:
Definition: `$env:x="hello"`
Reference: `write-host $env:x`

- The PowerShell has an interesting container concept called `ps-drives`. Within `ps-drives` you can navigate in other objects, such as the registry or shell internal lists in the same way as you typically navigate in a file system (`cd`, `dir`, `del`, and so on).
 - `dir env`: to get a list of environment variables
 - `dir variable`: to get the list of shell variables
 - `dir HKLM`: to get a list of registry keys in HKEY_LOCAL_MACHINE
 - `get-psdrive` to get a list of available ps-drives
- Windows PowerShell has full access to the .NET runtime. You can directly access missing functions in the PowerShell via .NET.
- With Windows PowerShell, you can create GUI-class user interfaces using Windows forms.

PowerShell Commands

The following table lists some PowerShell commands that are available on Windows Server 2012 (R2) and higher:

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

8 High Availability with Microsoft Failover Clustering

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

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

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

Important Information

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

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

Terminology

- In the sections on Microsoft Failover Clustering we use “SAP system” to mean SAP liveCache.
- In this documentation the hosts in a Microsoft Failover Cluster are referred to as first cluster node and additional cluster node(s):
 - The **first** cluster node is the cluster node where you perform the general installation of SAP liveCache.
 - The **additional** cluster node is the node where you configure the already installed SAP liveCache to run in Microsoft Failover Clustering.
- As of Windows Server 2008, there are the following terminology changes for a cluster configuration:
 - The cluster feature is called *Failover Clustering*. You might still find the previous terminology *Microsoft Cluster Service* and abbreviation *MSCS* in some sections of this guide.

- *Cluster groups* are called *services and applications* (Windows Server 2008 (R2)), or *roles* (Windows Server 2012 (R2) and higher).
In some sections we are continuing to use the old term. In this case, “cluster group” also means “service and application”, or “role”.
- The *Cluster Administrator* is called *Failover Cluster Manager*.

8.1 Checklist for a High-Availability System

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

Planning

1. You check that you have completed the same [planning activities \[page 12\]](#) as for a non-HA system, including the [software requirements \[page 14\]](#).
2. You decide how to [distribute SAP system components to disks for HA \[page 54\]](#).
3. You read [Directories in an HA Configuration \[page 57\]](#).
4. You read [IP Addresses in an HA Configuration \[page 58\]](#).
5. You [obtain IP addresses for HA \[page 61\]](#).

Preparation

1. For the installation of a high-availability SAP liveCache system with Microsoft Failover Clustering, you have to perform the same [preparations \[page 12\]](#) as for an ordinary SAP liveCache system. In addition, you have to perform the following HA-specific preparation tasks:
2. To make sure that all preparation steps have been correctly performed, check that you can move the disk resources from one cluster node to another so that they are only accessible from a single node at any time.

Installation

1. You make sure that:
 1. You are logged on as a domain administrator user or a domain user, who has the necessary rights on all cluster nodes. .

i Note

In Failover Cluster configurations, make sure that the account of the cluster (<clustername>\$) has full rights in the OU (Organizational Unit) on which your Domain administrator configures the SAP users and the SAP group.

If these rights are missing, SWPM will try to add the cluster network name resource to the SAP cluster group. However, because the cluster itself has no rights to add the related computer object (CNO) to the OU, SWPM will stop and show the error message `<access denied>`.

2. You do **not** use the user `<sapsid>adm` unless specified.
3. If you are prompted during the installation process, log off and log on again.
2. You [install SAP liveCache on the first cluster node \[page 63\]](#).
3. You [configure SAP liveCache on the additional cluster node \[page 64\]](#).

8.2 Planning

The following sections provide information about how to plan the installation of the SAP system for Microsoft Failover Clustering. For a complete list of all steps, see section *Planning* in the [Installation Checklist for a High-Availability System \[page 53\]](#).

8.2.1 Distribution of SAP System Components to Disks for Failover Clustering

When planning the Microsoft Failover Cluster installation, keep in mind that the cluster hardware has two different sets of disks:

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

Note

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

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

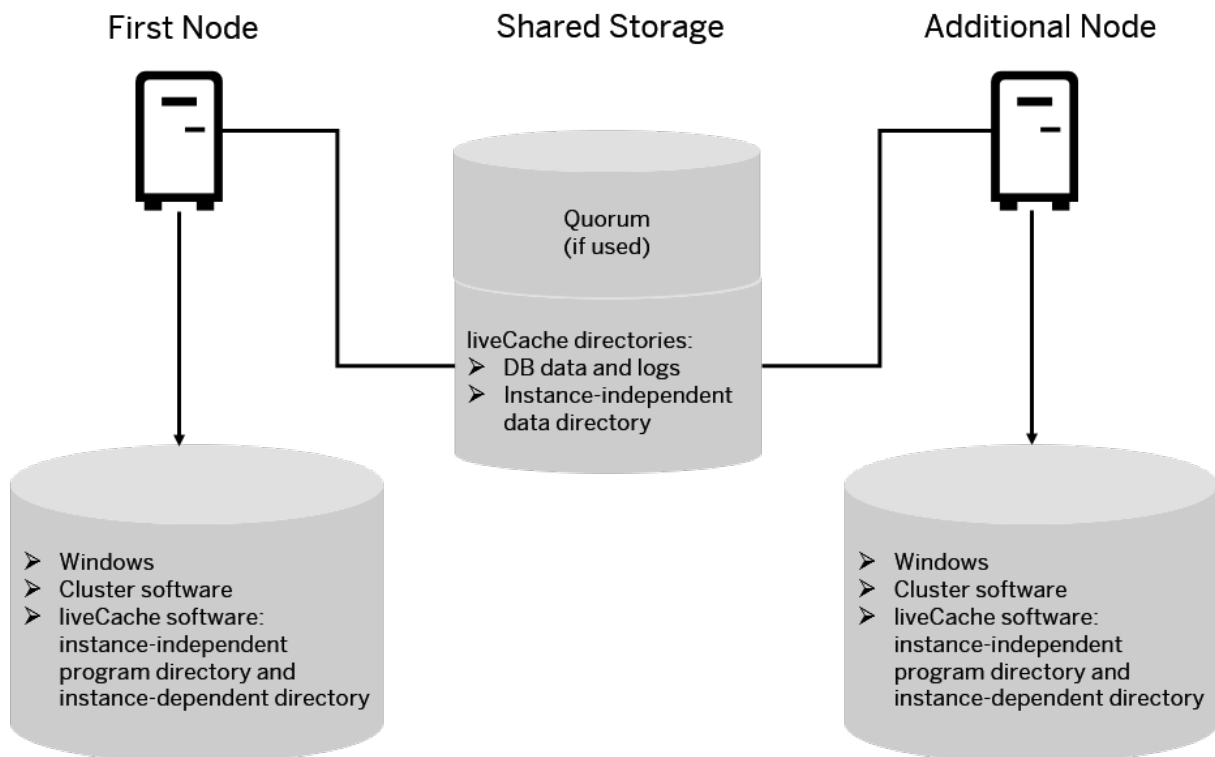
- Separately on all cluster nodes to use the local storage on each node
- On the shared storage used in common by all cluster nodes

Caution

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

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

The following figure shows a SAP liveCache cluster configuration. It illustrates how to distribute the SAP liveCache data files, and the quorum resource (if used) to **different** disks. Only with this distribution of files to distinct disks is it possible to move SAP liveCache as a separate entity in a failover situation.



i Note

The following software on the local disks must have the **same drive letter and path** on both nodes:

- Global program software
- Instance-dependent software

Quorum Configurations on Windows

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

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

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

⚠ Caution

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

Geographically Dispersed Cluster (Geospan)

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

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

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

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

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

⚠ Caution

- Currently, it is only possible to configure geospan clusters in the same subnet since on Windows Server 2008 (R2), you must **not** change a virtual IP address during failover.
- The numerous variants with geospan cluster configurations and the complex technical requirements are the reasons why the installation and configuration of such high-availability (HA) systems are not directly supported by SAP. Instead, the hardware vendors of this cluster configuration are responsible for the installation, configuration, and operation of the HA components running in geospan clusters. SAP only supports the standard operation and function of the SAP components running in such cluster configurations.

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

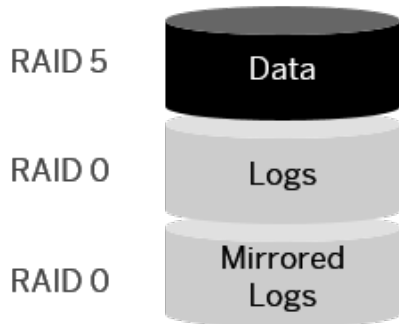
Distribution of Database Files in a RAID Configuration

⚠ Caution

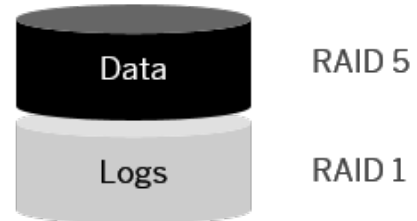
Microsoft does **not** support a host-based RAID configuration (Dynamic Disks) on shared disks.

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

liveCache Mirroring



Hardware Mirroring



SAP liveCache RAID Volumes

8.2.2 Directories in a Microsoft Failover Cluster Configuration

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

Directories on Local Disks on Cluster Nodes

Component	Default Directory
A supported operating system [page 14]	%windir%
Microsoft Failover Clustering software	%windir%\Cluster
Application server	<Local_Drive>:\usr\sap<SAPSID>\<Instance>
Enqueue replication server	<Local_Drive>:\usr\sap<SAPSID>\ERS<Instance_Number>
Diagnostics Agent (optional)	<Local_Drive>:\usr\sap<DASID>\SMDA<Instance_Number>
SAP Host Agent	%Program Files%\SAP\hostctrl
SAP liveCache instance-independent programs	<Drive>:\sapdb\program
SAP liveCache instance-dependent software	<Drive>:\sapdb<DBSID>\db

Directories on Shared Disks

Component	Default Directory
Cluster quorum resource (if used)	<Drive>:\Cluster
SAP liveCache data volumes	<Drive>:\sapdb<DBSID>\sapdata\...

Component	Default Directory
SAP liveCache database log volumes	<Drive>:\sapdb\<DBSID>\saplog\...
SAP liveCache mirrored database log volumes	<Drive>:\sapdb\<DBSID>\saplog\...
SAP liveCache instance-independent data	<Drive>:\sapdb\data
SAP MaxDB private data	<Drive>:\sapdb\<DBSID>\data

8.2.3 Hostnames in a Failover Cluster Configuration

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

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

i Note

As of Windows Server 2008, besides static IP addresses, you can also have DHCP-based (dynamic) IP addresses.

DHCP-based IP configurations are not supported for high-availability SAP systems. If the virtual IP address of the SAP cluster group changes during a failover, your clients can no longer reach the system due to caching.

Types of IP Addresses

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

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

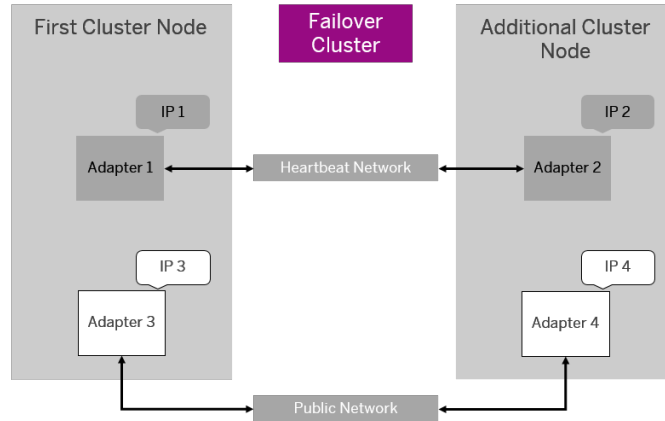
Physical IP Addresses Assigned to Network Adapters

A Microsoft Failover Cluster configuration has at least two networks:

- A public network that is used for the communication between the primary application server, additional application servers, and the LAN.

- A private network that is used internally for communication between the nodes of the cluster, also called heartbeat.

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



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

Host Names Assigned to Network Adapters

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

IP Addresses and Host Names

Network Adapter	IP Address	Host Name
Adapter 1 (private network)	10.1.1.1	clusA_priv
Adapter 3 (heartbeat network)	192.168.1.1	clusA

⚠ Caution

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

Virtual IP Addresses Assigned to Cluster Groups

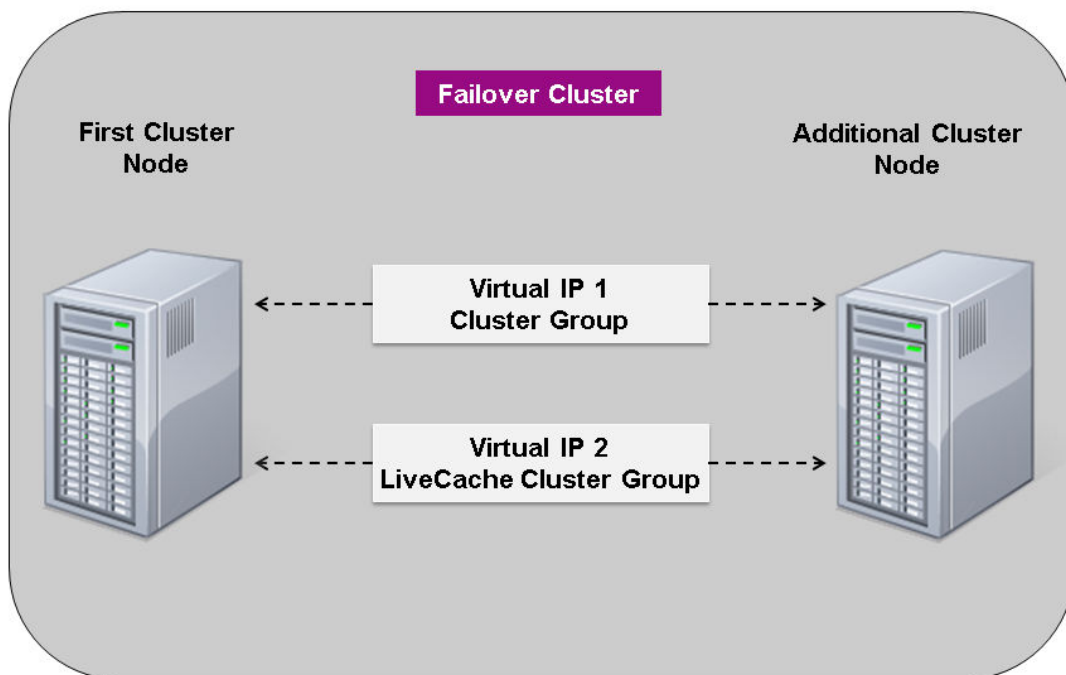
When you have installed SAP liveCache and fully configured the cluster, the critical system resources are bound together in two different **groups**.

Each of these groups requires a virtual IP address and network name that is permanently mapped to the group and not to a particular node. The advantage of this is that, whenever a group is moved between nodes, its IP address and network name move together with the group.

An HA configuration has the following groups:

- SAP liveCache cluster group
- Cluster group

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



Failover of Virtual IP Addresses

8.2.4 Obtaining IP Addresses for a Microsoft Failover Cluster Configuration

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

Context

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

Procedure

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

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

⚠ Caution

Use the names **exactly** as specified by the system administrator.

i Note

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

Physical IP Addresses

Component	Example for Physical IP Address	Example for Physical Host Name	Purpose	Defined During
First cluster node: adapter for heartbeat network	10.1.1.1	clusA_priv	Address for internode communication on the heartbeat network	Windows installation

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

Virtual IP Addresses

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

8.3 Preparation

This section provides information about how to prepare the installation of the SAP system for Microsoft Failover Clustering. For a complete list of all steps, see section *Preparation* in the [Installation Checklist for a High-Availability System \[page 53\]](#).

1. For the installation of a high-availability SAP liveCache system with Microsoft Failover Clustering, you have to perform the same [preparations \[page 12\]](#) as for an ordinary SAP liveCache system.
2. To make sure that all preparation steps have been correctly performed, check that you can move the disk resources from one cluster node to another so that they are accessible from a single node at any time.

8.4 Installation

The following sections provide information about how to install the SAP liveCache system in a high-availability environment. You need to use the **70SWPM*.SAR** package for the installation. You download the most recent version of this package from the SAP software download center at <http://support.sap.com/swdc>. For more information, see [Preparing the Installation Media \[page 17\]](#).

8.4.1 Installing SAP liveCache on the First Node

This section describes how to install SAP liveCache on the first node of a Microsoft Failover Cluster.

Procedure

1. [Run the installer \[page 22\]](#) and choose:
 ▶ *SAP Business Suite <Version>* ▶ *<SAP SCM ABAP Product Version>* ▶ *Database* ▶ *Installation* ▶
 Standalone Engines ▶ *SAP liveCache* ▶ *HA-liveCache on First Cluster Node* ▶
2. If you are installing SAP liveCache with the installer for the first time and the installer prompts you to log off, do the following:
 - a. Choose *OK* and log on again.
 - b. Perform step 1 above.
 - c. Select *Run a new installation* and choose *OK*.
3. Follow the instructions in the installer dialogs and enter the required parameter values.

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 or the *HELP* tab. Then the available help text is displayed in the *HELP* tab.

⚠ Caution

Make sure that you distribute the SAP liveCache software, data, and logs correctly to local and shared disks as described in [Directories in a Microsoft Failover Cluster Configuration \[page 57\]](#).

8.4.2 Configuring SAP liveCache on the Additional Node

This section describes how to configure SAP liveCache on the additional node of a Microsoft Failover Cluster.

Procedure

1. On the additional cluster node, [run the installer \[page 22\]](#) and choose:

► *SAP Business Suite <Version>* ► *<SAP SCM ABAP Product Version>* ► *Database* ► *Installation* ►
Standalone Engines ► *SAP liveCache* ► *HA-liveCache on an Additional Cluster Node* ►

2. Follow the instructions in the installer dialogs and enter the required parameter values.

⚠ Caution

Make sure that you distribute the SAP liveCache software data and logs correctly to local and shared disks as described in [Directories in a Microsoft Failover Cluster Configuration \[page 57\]](#).

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 or the *HELP* tab. Then the available help text is displayed in the *HELP* tab.

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