Upgrade Guide | PUBLIC

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Upgrade to SAP MaxDB Database 7.9 on UNIX
Operating System: UNIX

THE BEST RUN **SAP**

Content

Document History

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

Version	Date	Description
1.06	2022-02-14	Revised version
1.05	2019-10-03	Revised version
1.04	2016-01-20	Revised version
1.03	2015-01-28	Revised version
1.02	2014-10-02	Revised version
1.01	2012-04-17	Revised version
1.00	2011-11-10	Initial version

1   Introduction

This documentation explains how to upgrade the SAP MaxDB database for the SAP system:

- **From** at least SAP Max DB version **7.5**
- **To** SAP MaxDB version **7.9**

> ⚠ Caution
>
> Make sure you have the **latest version of this document**. You can always find the latest version at:
>
> https://community.sap.com/topics/maxdb ▶ *Guides* ❭

If you have a high-availability (HA) liveCache with a cluster environment, see SAP Note 2113981 for more information before starting the upgrade.

Implementation Considerations

- Make sure that you read the relevant SAP Notes [page 5] before beginning the upgrade. These notes contain the most recent information about the upgrade, as well as corrections to the documentation.
- For more information about SAP MaxDB, see the following:
  http://help.sap.com ▶ *SAP NetWeaver* ❭ *SAP MaxDB* ❭
  For the most up-to-date information about the SAP MaxDB documentation and where to find it, see SAP Note 767598.

1.1   New Features

For more information about the new features for SAP MaxDB version 7.9, see:

http://www.sdn.sap.com/irj/sdn/maxdb

For more information about the most important enhancements and features for version 7.9, see **SAP Note** 1444241.

> i Note
>
> As of SAP MaxDB version 7.6, support packages and patch levels have been introduced. For more information, see **SAP Note** 820824.

As of SAP MaxDB version 7.8, the installation has changed. For more information, see SAP MaxDB Isolated Installation [page 8].

1.2　Before You Start

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

- SAP Notes for the Upgrade [page 5]
- More Online Information [page 6]
- Naming Conventions [page 6]

1.2.1　SAP Notes for the Upgrade

Read the SAP notes **before** you begin the upgrade. Make sure that you have the most recent version of each SAP Note, which you can find at:

https://support.sap.com/en/my-support/knowledge-base.html

The following notes contain information relevant to the upgrade:

SAP Note	Subject
1492467	Additional Information for Upgrade to MaxDB 7.9
820824	Frequently Asked Questions (FAQ): SAP MaxDB
498036	Overview note on importing database versions
668849	Problems due to several DB versions on one host
829408	Upgrading a database in the UNIX cluster
2113981	SAP MaxDB / liveCache / Content Server Maintenance in High Availability System Environment

> ⚠ Caution
>
> **Before** you begin the upgrade, always make sure that you read the first SAP Note listed above, 1492467 , because it contains up-to-date information essential to the upgrade, including corrections not contained in this upgrade documentation.
>
> This note also contains the valid DVD numbers for SAP MaxDB 7.9.

1.2.2 More Online Information

You can find more online information as follows:

Description	Address
SAP MaxDB upgrade guides	https://help.sap.com/docs/SUPPORT_CONTENT/maxdb/
Product Availability Matrix (PAM)	https://support.sap.com/en/release-upgrade-maintenance.html
SAP Notes	https://support.sap.com/en/my-support/knowledge-base.html
Support Packages and patches	https://support.sap.com/en/my-support/software-downloads/support-package-stacks.html ▸ *MaxDB* ▸ *MAXDB GUI COMPONENTS/TOOLS* ▸

1.2.3 Naming Conventions

We use the following naming conventions in this documentation:

- Release
  Unless otherwise specified, we use "release" to refer to the release of SAP NetWeaver
- SAP MaxDB name
  `DBSID` refers to the SAP MaxDB name. For `<DBSID>` you need to substitute your SAP MaxDB name, for example, `MDB`.
- SAP system name
  `SAPSID` refers to the SAP system name. Pay attention to lowercase or uppercase. If `<SAPSID>` is used, insert your SAP System name, for example, `PRD`.
- `<SAPSID>` user name
  The user name is written in uppercase and abbreviated with `<SAPSID>ADM`.

> ⚠ Caution
>
> Always enter the user name `<sapsid>adm` in **lowercase** for the standalone database server.

- Support Packages and patches
  For more information, see:
  https://support.sap.com/patches
- SAP MaxDB operational states
  There are the following SAP MaxDB operational states:

SAP MaxDB State Identifier	Meaning
ONLINE	The database instance has been started and users can log on.

SAP MaxDB State Identifier	Meaning
ADMIN	The database instance is only available to administrators.
OFFLINE	The database instance is not running.

2 Planning

Prerequisites

You have checked the SAP Notes for the upgrade [page 5].

Process Flow

You have to complete the following planning activities:

1. If required, you read about the SAP MaxDB isolated installation [page 8], which is the new kind of installation as of SAP MaxDB version 7.8.
2. You check the database requirements [page 10].
3. You check the operating system requirements [page 10].
4. You check the SAP system requirements [page 10].
5. You choose an upgrade strategy [page 11].

2.1 SAP MaxDB Isolated Installation

As of SAP MaxDB version 7.8, the installation principles of SAP MaxDB have changed, so that the following features are now supported:

- Multiple SAP MaxDB installations of the same version can be installed on one computer
- Multiple SAP MaxDB installations of different versions can be installed on one computer
- Multiple different clients as well as multiple versions of the same client can be installed on the same computer
- Any server or client installation can be maintained individually
- SAP MaxDB databases or liveCache installations can be maintained individually

When installing SAP MaxDB software of version 7.8 and higher, for SAP environments the software and database are stored in the following paths:

Path Name	Variable Name	Properties	Shared	Stored Components
Global programs path	`GlobalProgPath`	`/sapdb/programs` Once per computer only	By all SAP MaxDB installations on this computer	Installation tools, (for example: `sdbuninst`, `sdbverify`, `sdbconfig`) global listener (`sdbgloballistener`)

Path Name	Variable Name	Properties	Shared	Stored Components
Global data path	`GlobalDataPath`	`/sapdb/data` Once per computer only	By all SAP MaxDB installations <7.8 on this computer	Parameter and log files of SAP MaxDB versions < 7.8

Installation path	`InstallationPath`	For database server software:
		
		`/sapdb/<DBSID>/db`
		
		For database client software:
		
		`/sapdb/clients/<SAPSID>`
		
		Once per installation, several Installation paths allowed on a computer
			No	Database server software, such as database kernel, X server software (for SAP MaxDB versions < 7.8), and database client software, such as DBMCLI, SQLDBC, JDBC

Private data path	`PrivateDataPath`	For database server software:
		
		`/sapdb/<DBSID>/data`
		
		For database client software:
		
		`/sapdb/clients/<SAPSID>/data`
		
		Once per installation, several private paths on a computer are allowed
			No	All database related files are stored here (they are no longer stored in the global data path). These files include installation registry and log files, database parameter files, knldiag file, and so on.

As a consequence of the new installation principles, higher versions can no longer unintentionally update existing software from a previous version.

Since more than one client can be installed on an individual computer, as of SAP MaxDB 7.8 each application server has its own SAP MaxDB runtime (client software installation). This lets you update any client installation without affecting any other client installation. For example, you can now update the SAP MaxDB runtime of an individual application server without affecting a second application server on the same computer. Likewise, you can upgrade a database together with its software to a higher version without affecting another database on this computer and its current connections. You also can run test systems and production systems on the same computer. The creation of system copies in SAP systems is now much easier, since a private data path is used for the SAP MaxDB software.

> ⚠ Caution
>
> There is still only one database instance allowed for each software installation.

2.2 Database Requirements

As part of the upgrade planning [page 8], make sure that your database meets the following requirements before you start the upgrade:

- The database is ready to run.
- The system tables have been loaded at least once for the existing instance.
- The database instance is the only instance that refers to the installation path of the software version that you want to upgrade.
- The database parameters of the database instance that you want to upgrade have **not** changed since the last restart.
- The database start version – that is, **before** you start the upgrade – is at least **7.5**

> ⚠ Caution
>
> If the database start version does **not** meet the above requirement, you **must** upgrade to this version before starting the upgrade
>
> For more information about how to upgrade to the correct database start version, see **SAP Note 498036** .

2.3 Operating System Requirements

As part of the upgrade planning [page 8], make sure that your operating system is released for the SAP MaxDB-specific release. For the most up-to-date SAP MaxDB-specific release information on the database and operating system of your product, including required patch levels, check the SAP Product Availability Matrix (PAM) at:

https://support.sap.com/pam

There you can also find additional information on required operating system patch levels and patches for C++ RTE.

As of SAP MaxDB version 7.6, we **no longer support** the operating system HP Tru64 UNIX.

2.4 SAP System Requirements

As part of the upgrade planning [page 8], make sure that your SAP system meets the following requirements before you start the upgrade:

- SAP MaxDB Version 7.9 is initially released for SAP NetWeaver 7.0 Enhancement Package 3, and subsequent releases.

- For **previous** SAP releases, SAP Note 1353266 shows – with reference to the Product Availability Matrix (PAM) – whether an official downward-compatible release exists for SAP products or whether a special release has been granted for the SAP upgrade start release.

For more information, see the Product Availability Matrix (PAM) at:

https://support.sap.com/pam

You can also find the information in the above SAP Notes at:

https://support.sap.com/notes

2.5 Upgrade Strategy

As part of the upgrade planning [page 8], you choose an upgrade strategy, which depends on your database start version:

Your Database

Start Version	Your Upgrade Strategy
7.5 or later	In-Place Upgrade
	With an In-Place upgrade, you upgrade the database instance **and** the database software.
	The start version of the database software must be Version 7.5 or later and the target version must be 7.9 or later
	For an In-Place upgrade, the software has a significant amount of new functionality that could cause incompatibilities between the existing data and the new software.
	Therefore, the adaptations to the new database functionality and structures are made internally during an In-Place upgrade.
7.9	Patch Installation
	With a patch installation, you **only** upgrade the database software.
	You can use this procedure if the **only** difference between the source and target version is the build number or the support package number, or both.
	For a patch installation, the software does **not** have a significant amount of new functionality that could cause incompatibilities between the existing data and the new software.

3 Preparation

Prerequisites

You have completed planning the upgrade [page 8].

Process Flow

You have to complete the following preparations:

1. If your upgrade strategy is In-Place, you prepare for an In-Place upgrade [page 12].
2. If your upgrade strategy is Patch installation, you prepare for an upgrade with Patch installation [page 13].

3.1 Preparing for an Upgrade with In-Place

Use

As part of the upgrade preparations [page 12] for an In-Place upgrade, you need to perform the preparations described below.

Procedure

1. Make sure that the operational state [page 6] of your database is ONLINE.
2. In case you need to recover the database, make sure that you have an installation kit with the **start version** of the database software. This means that you must have database Version 7.5, 7.6, 7.7, or 7.8 with the same or a higher build.
3. Check the required free space in the database. You need at least 15% free space.
4. Check that there are no bad indexes in the database, using the Database Studio or the Database Manager GUI.
   For more information about how to remove bad indexes, see **SAP Note** 566883🔧.
5. Shut down the SAP system using the command `stopsap` or – if you have Windows platforms in your SAP system – the SAP Microsoft Management Console (SAP MMC).
   To use `stopsap`, enter the following command as user `<sapsid>adm`:
   `stopsap <system ID> <system number> <SAPDIAHOST>`

   > **i** Note
   >
   > `<SAPDIAHOST>` refers to the instance ID of the additional application server instance.

> In SAP NetWeaver 7.0 or earlier, this is known as the dialog instance.

For more information about SAP MMC, see:

http://help.sap.com/nw70 ⟩ *SAP NetWeaver 7.0 Library – English* ⟩ *SAP NetWeaver Library* ⟩ *SAP NetWeaver by Key Capability* ⟩ *Solution Life Cycle Management by Key Capability* ⟩ *Solution Monitoring* ⟩ *Monitoring in the CCMS* ⟩ *SAP Microsoft Management Console: Windows* ⟩

6. Bring the database to operational state OFFLINE using the Database Manager CLI command `db_offline`, Database Manager GUI, or Database Studio.
7. Bring the database to operational state ADMIN using Database Manager CLI command `db_admin`, Database Manager GUI, or Database Studio.
8. Set up the database so that it can be recovered:
   - If you have a recent data backup, make an incremental data backup and a log backup.
   - Otherwise, make a complete data backup

   > ⚠ Caution
   >
   > If you do not have a backup, you might lose data in the event of a database failure that requires database recovery.
   >
   > After the backup, put the database in operational state ONLINE before the upgrade.

9. Exit the Database Manager CLI, GUI, or Database Studio and any other database applications that are running.
10. If you need to upgrade your operating system do this now.

3.2 Preparing for an Upgrade with Patch Installation

Use

As part of the upgrade preparations [page 12] for an upgrade with Patch installation, you need to perform the preparations described below.

Procedure

1. Make sure that the operational state [page 6] of your database is ONLINE, ADMIN, or OFFLINE without any errors.
2. Stop **application software** – such as Database Studio, Database Manager CLI or GUI – and the database that you intend to upgrade, so that you can run a full backup. In this case, you do **not** need to stop the X server.

> ⚠ Caution
>
> The upgrade tool does **not** check whether a database backup is available.

Therefore, **always perform a database backup before the upgrade**, so that you can recover the database in the event of data loss.

4   Upgrade Process

Prerequisites

You have completed preparing for the upgrade [page 12].

Process Flow

You have to complete the following to perform the upgrade:

1. If your upgrade strategy [page 11] is In-Place, perform the upgrade for In-Place [page 15].
2. If your upgrade strategy [page 11] is Patch installation, perform the upgrade for Patch installation [page 16].
3. If required, you upgrade the SAP MaxDB client software [page 17].

4.1   Performing an Upgrade for In-Place

Prerequisites

> **i** Note
>
> Depending on the size of your database catalog, the upgrade can take a long time to finish, especially database migration.

> ⚠ Caution
>
> **Never terminate the upgrade.**
>
> If you terminate the upgrade, you risk losing all your data. Your only option then is to use data backups to recover the database instance, which is risky and time-consuming.

Context

As part of upgrading the database [page 15], you perform this procedure to upgrade your database if your chosen upgrade strategy [page 11] is In-Place.

Procedure

> ⚠ Caution
>
> When upgrading large databases, make sure that - regarding system limits - the environment of the OS user `root` corresponds to the environment which is normally used for the database. Otherwise, the upgrade process might stop due to insufficient limit settings.

1. Log on as user `root`.
2. Load the SAP MaxDB 7.9 DVD in the drive and mount the DVD.
3. Change the working directory as follows:

   `cd <SAP MaxDB DVD>/DATA_UNITS/MAXDB_<OS>`

4. Start the upgrade as follows:

   `./DBUPDATE.SH`

5. When the upgrade prompts you, enter the following:
   - SAP MaxDB name: **`<DBSID>`**
   - SAP system ID: **`<SAPSID>`**
   - DBM user name: **`control`**
   - DBM user password

Results

When you see the message confirming that the upgrade has completed successfully, this means that:

- The database instance and its software are now upgraded.
- The database instance is in the operational state ONLINE.
- The isolated database client software (installation name `CL_<SAPSID>`) is now installed in the directory `/sapdb/clients/<SAPSID>`. This is only valid for database servers where associated SAP application software is installed.
- The DBENV scripts (`.dbenv_<hostname>.csh`, `.dbenv_<hostname>.sh`, `dbenv.csh`, and `.dbenv.sh`) are now up-to-date in the home directories of the SAP system administrator (`<sapsid>adm`) and the SAP database administrator (`sqd<sapsid>`). This is only valid for database servers where associated SAP application software is installed.
- The upgrade is flagged as complete.

4.2 Performing an Upgrade for Patch Installation

As part of upgrading the database [page 15], you perform this procedure to upgrade your database if your chosen upgrade strategy [page 11] is Patch installation.

Procedure

1. Log on as user `root`.
2. Load the SAP MaxDB 7.9 DVD in the drive and mount the DVD.
3. Change the working directory as follows:
   `cd <SAP MaxDB DVD>/DATA_UNITS/MAXDB_<OS>`
4. Start the upgrade as follows:
   `./DBUPDATE.SH`
5. When the upgrade prompts you, enter the following:
   SAP MaxDB name: `<DBSID>`
   SAP system ID: `<SAPSID>`
   DBM user name: `control`
   DBM user password

Result

When you see the message confirming that the upgrade has completed successfully, this means that:

- The database software is now upgraded.
- The database instance is now in the operational state ONLINE.
- The upgrade is flagged as complete.

4.3   Upgrading the SAP MaxDB Client Software

If required, as part of upgrading the database [page 15], you must upgrade the database client software for the host where the SAP central or dialog instance runs

Prerequisites

Stop the following:

- The central and dialog instance
- Any other SAP MaxDB instances that are running on the central or dialog instance server

Procedure

1. Log on as the `root` user.
2. Load the SAP MaxDB 7.9 DVD in the drive and mount it.

3. Start the client software upgrade:

```
<SAP MaxDB DVD>/DATA_UNITS/MAXDB_<OS>/DBUPDATE.SH -client <SAP System Name>
```

4. Log on again as the `<sapsid>adm` or `sqd<dbsid>` user, or both.

> **i Note**
>
> Only valid for database start version 7.7 or lower:
>
> Make sure that you log on from the beginning, because the environment of `<sapsid>adm` and `sqd<dbsid>` has been changed.
>
> After logging on again, restart the SAP service `SAP<SAPSID>_<InstanceNumber>` so that the environment changes become active.

5. Restart the SAP system using the commands `stopsap` and `startsap` or – if you have Windows platforms in your SAP system – the SAP Microsoft Management Console (SAP MMC).
   To use the `stopsap` and `startsap` commands, enter the following commands as user `<sapsid>adm`:

```
stopsap <system ID> <system number> <SAPDIAHOST>
startsap <system ID> <system number> <SAPDIAHOST>
```

> **i Note**
>
> `<SAPDIAHOST>` refers to the instance ID of the additional application server instance.
>
> In SAP NetWeaver 7.0 or earlier, this is known as the dialog instance.

   For more information about SAP MMC, see:

   https://help.sap.com/docs/SAP_NETWEAVER_750 ⟩ *Application Help* ⟩ *SAP NetWeaver Library: Function-Oriented View* ⟩ *Solution Life Cycle Management* ⟩ *SAP Microsoft Management Console: Windows* ⟩

6. If required, check the client software version as described in SAP Note 822239 . If you need to obtain the latest client software, see SAP Note 649814 , which describes how to download it from: https://me.sap.com/softwarecenter

5 Post-Upgrade

Prerequisites

You have completed the upgrade [page 15].

Process Flow

You have to complete the following post-upgrade steps:

1. If your upgrade strategy [page 11] is In-Place, perform post-upgrade steps after an In-Place upgrade [page 19].
2. You update the database software to the current release [page 21].
3. You install or upgrade Database Studio [page 21].
4. If required, you set up Secure Sockets Layer (SSL) protocol for database server communication [page 23].

5.1 Performing Post-Upgrade Steps After an In-Place Upgrade

As part of the post-upgrade [page 19] steps, you perform this procedure if your chosen upgrade strategy [page 11] is In-Place.

Procedure

1. Perform a complete backup of the database data so that you can recover the new database if necessary.

   > ⚠ **Caution**
   >
   > We do **not** guarantee that you can recover the database using backups from different versions of the database.

2. Log on again as the `<sapsid>adm` or `sqd<dbsid>` user, or both.

   > **i** Note
   >
   > Only valid for database start version 7.7 or lower:
   >
   > Make sure that you log on from the beginning, because the environment of `<sapsid>adm` and `sqd<dbsid>` has been changed.

> After logging on again, restart the SAP service `SAP<SAPSID>_<InstanceNumber>` so that the environment changes become active.

3. This step applies only to SAP installations that include **AS Java (SAP J2EE Engine)** and when the database start version is 7.7 or lower:
   Obtain the JDBC driver as follows:
   `/sapdb/clients/<SAPSID>/runtime/jar`

   > ### i Note
   >
   > The location of the driver has changed compared to previous versions of SAP MaxDB. This is the **old** location of the JDBC driver, before SAP MaxDB version 7.8:
   >
   > `/sapdb/programs/runtime/jar`

   SAP Note 867976 describes how to update the location of the JDBC driver for the Java application server.

4. Start the SAP system using the command `startsap` or – if you have Windows platforms in your SAP system – the SAP Microsoft Management Console (SAP MMC).
   To use `startsap`, enter the following command as user `<sapsid>adm`:
   `startsap <system ID> <system number> <SAPDIAHOST>`

   > ### i Note
   >
   > `<SAPDIAHOST>` refers to the instance ID of the additional application server instance.
   >
   > In SAP NetWeaver 7.0 or earlier, this is known as the dialog instance.

   For more information about SAP MMC, see:

   http://help.sap.com/nw70 ▶ *SAP NetWeaver 7.0 Library – English* ❯ *SAP NetWeaver Library* ❯ *SAP NetWeaver by Key Capability* ❯ *Solution Life Cycle Management by Key Capability* ❯ *Solution Monitoring* ❯ *Monitoring in the CCMS* ❯ *SAP Microsoft Management Console: Windows* ❯

5. We recommend you to update the optimizer statistics.

6. Only valid for database start version 7.7 or lower:
   After a successful update and assuming that no SAP application is using it, you can deinstall the SAP MaxDB client software from version 7.7 or lower:

   > ### ⚠ Caution
   >
   > Only deinstall the old legacy SAP MaxDB client software if you are completely sure that you do not need it.

   Log in as user root and execute the following command
   `/sapdb/programs/bin/sdbuninst -i Legacy`

5.2 Updating the Database Software to the Current Release

After the upgrade and before you start production operation, we strongly recommend you to update the database software to the latest SAP MaxDB patch available on the SAP Software Distribution Center (SWDC).

Procedure

Download the latest SAP MaxDB patches from https://launchpad.support.sap.com/#/ softwarecenter/ ➤ *Databases* ❯ *SAP MaxDB* ➤ .

For more information about upgrading to a SAP MaxDB patch from a SWDC Support Package, see SAP Note 735598 ➤ .

5.3 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.

  > **i** 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 and higher

Operating System	Database Studio 7.9.08	Database Studio 7.9.09 and Higher
Windows Server	X64	X64

Operating System	Database Studio 7.9.08	Database Studio 7.9.09 and Higher
Linux Server	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.

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.

5.4 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 23] and generate the personal security environment [page 25] (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 28].

Related Information

Installing the SAP Cryptographic Library [page 23]
Generating the Personal Security Environment [page 25]
Configuring the SSL Communication between the Application Server and the Database Server [page 28]

5.4.1 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>
   ```

   > **i 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`.

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

Procedure

1. You
2. You

5.4.2.1 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
   > > wpignSw7U9FWneyWz3Wil0S18aFCYkRo00wCpD8UwcaC4dds4uGT6hl2WlJ0/FOtUg
   > > +EQxonZbaRrk9sTalkn1mqx3YAUe/gEaGdf1wvuYkb0gjMk81iM/
   > > jb9BJd8srMPyoBy9jMC7v5u7+TZWmWa6RjnvClvYGgMwIDAQABoAAwDQYJKoZIhvcNAQEFBQ
   > > ADgYEA
   > > x2zuaTAOKPdGmxUKYlWdasUpim4vhfaHa7ZDBwipvKJ8akYCT
   > > +dpmVjhcph9E7cUjL80/6Rup5cnLAAO5FhVt5MS6zNJa9YYSN9XP+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 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.

5.4.2.2 Generating the SSL Client PSE

Proceed as follows to generate the SSL Client PSE.

Procedure

1. Change to the `<global programs>\lib` directory.
2. Set up the following environment variable:

   `SECUDIR=<global data>\sec`
3. Enter **`<global program>/lib`** in the environment variable `LD_LIBRARY_PATH`.
4. Create an anonymous client SSL Client PSE, `SDBSSLA.pse` in the directory defined by `SECUDIR` (see previous step):

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

   You can leave the distinguished name empty.

   Before you can establish an SSL connection to a database server, the server certificate must be entered in the PK list of the anonymous client certificate.
5. To see the database server certificate, enter the following command:

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

   You can check whether to trust the database server certificate. The client certificate is not affected by this.
6. Start the import with this command:

   `„x_ping -n <servermode> -i[import]`
7. To administer the PSE, use the configuration tool sapgenpse. For more information, enter the following command:

   `sapgenpse -h`

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

5.4.3 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 Database Directory Structure

You can set up several database instances with different releases in one user environment. For this the database services are split into the following areas.

> **i Note**
>
> As of SAP MaxDB version 7.8, with the introduction of the isolated installation, the database directory structure in SAP installations has changed. This section describes the new structure.

- Global programs path: `GlobalProgPath`
  This area contains all services that are only allowed to exist once per computer and are downward compatible (for example, installation tools and the global listener, `sdbgloballistener`). Therefore, only programs of the most recent installed version exist here.
  You can check the path for `GlobalProgPath` with the following `dbmcli` command:
  dbmcli dbm_getpath GlobalProgPath
  By default, `GlobalProgPath` is set as follows for the installation:
  `/sapdb/programs`
- Global data path: `GlobalDataPath`
  This area contains all data necessary for an instance with version 7.7 or lower, including run directories and their parameter files. The directory containing this data is called the `GlobalDataPath`.
  You can check the path for `GlobalDataPath` with the following `dbmcli` command:
  dbmcli dbm_getpath GlobalDataPath
  By default, `GlobalDataPath` is set as follows for the installation:
  `/sapdb/data`
- Private data path: `PrivateDataPath`
  This area contains all data necessary for an instance with version 7.8 or higher, including run directories and their parameter files. The directory containing this data is called the `PrivateDataPath`.
  You can check the path for `PrivateDataPath` with the following `dbmcli` command:
  dbmcli -s inst_enum <InstallationPath>
  By default, `PrivateDataPath` is set as follows for the installation:
  - SAP MaxDB server software installations:
    `/sapdb/<DBSID>/data`
  - SAP MaxDB client software installations:
    `/sapdb/clients/<SAPSID>/data`
- Installation path: `InstallationPath`
  This area contains all programs necessary for a running database instance or for client software.
  `InstallationPath` of server software (for a database instance):
  The programs must all correspond to the instance version and are installed once per instance. The programs include, for example, `kernel`, `console`, `dbmsrv`, and so on. The storage location is known as the `InstallationPath` of the instance.

InstallationPath of a client software:

This area contains shared libraries and dlls required by SAP clients at runtime connecting to database instances of version 7.8 or higher, including SQLDBC, JDBC, ODBC, and so on. The client software is installed on each computer, for each SAP instance separately.

The installation sets up the directory as follows:

- SAP MaxDB server software installations:

  `/sapdb/<DBNAME>/db`

- SAP MaxDB client software installations:

  `/sapdb/clients/<SAPSID>`

You can display instance names and the associated `InstallationPath` on a computer with the following dbmcli command:

dbmcli db_enum

You can display the `InstallationPath` of installed software on a computer with the following dbmcli command:

dbmcli inst_enum

6.2 Log Files for Troubleshooting

This section provides information about how you can find log files relevant for the upgrade and the associated software installation.

All steps of the upgrade and the associated software installation are logged in the file with the following name:

`/var/tmp/SDBUPD.log`

If the directory `<independent_data_path>` is not known at the time of failure, the log is written to the current directory.

> **i Note**
>
> If you are updating the SAP MaxDB client software, you can find the log files here instead:
>
> `/var/tmp/SDBINST.log`

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