



SAP Process Mining by Celonis
Installation Guide

Version 1.5

Corresponding Software Version: 4.2

This document is copyright of the Celonis SE. Distribution or reproduction are only permitted by written approval of the Celonis SE. Usage only permitted, if a valid software license is available.

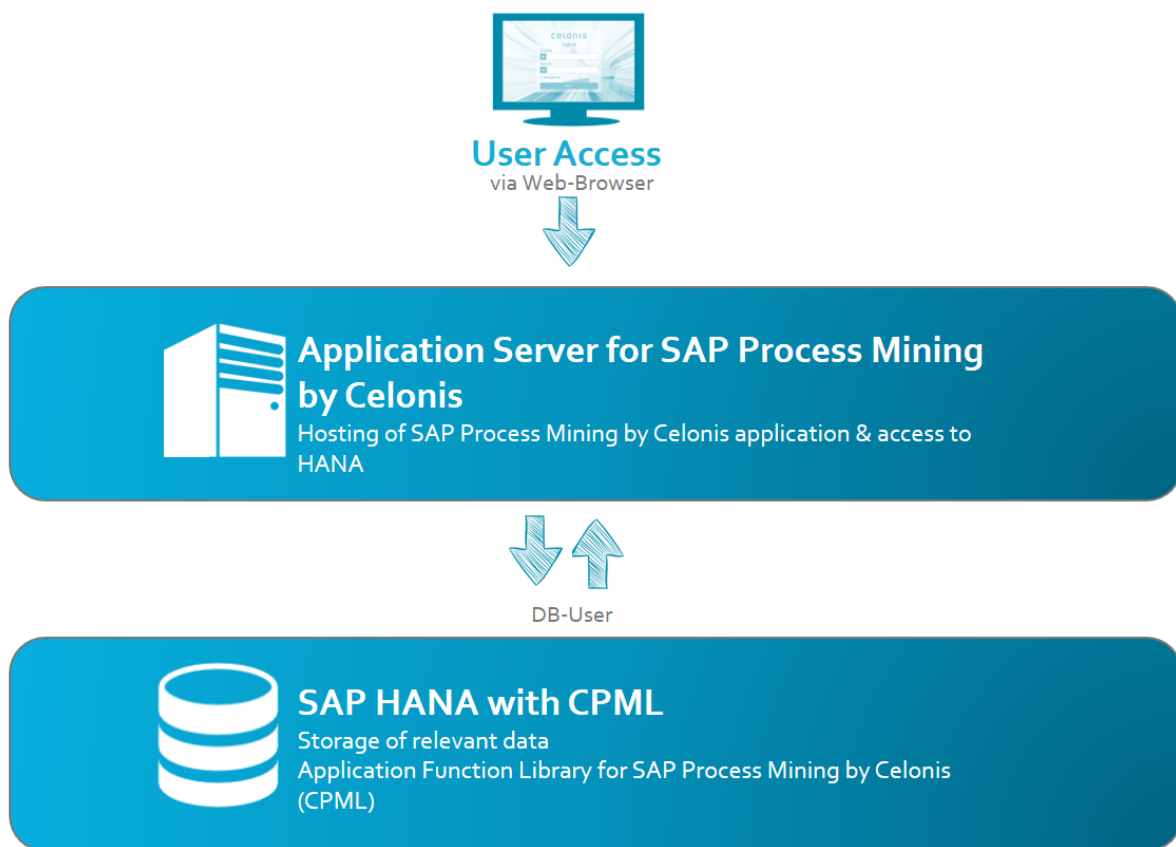
Content

| | |
|--|-----------|
| Install SAP Process Mining by Celonis | 3 |
| Overview | 3 |
| Preconditions | 4 |
| CPML | 5 |
| Installation on SAP HANA server | 5 |
| Configure Database | 5 |
| Set up the users | 6 |
| Deinstallation | 6 |
| SAP Process Mining by Celonis | 7 |
| Installation on Windows | 7 |
| Installation on Linux | 7 |
| After the installation on Windows and Linux | 9 |
| Configure SAP Process Mining by Celonis | 10 |
| License Activation | 10 |
| Remarks on CPML | 10 |
| Implementation on Multi-Tenant Installations of SAP HANA | 10 |
| PDF/PNG exporting | 11 |
| HANA 2.0 | 12 |

Install SAP Process Mining by Celonis

Overview

SAP Process Mining by Celonis consists of two components: The core SAP Process Mining web application and the SAP HANA AFL plugin for SAP Process Mining by Celonis (called CPML). Please refer to below diagram for further information.



For both components, an installation package is available. The installation package for SAP Process Mining by Celonis comes as an Windows installer (sappm-setup.exe) or a Linux executable runfile (sappm-<dist>.run). The installation package for CPML is delivered as a zip-package (cpml_plugin_sps-<no>.tar.gz), which contains an executable hdbinst file for Linux. There is one version for HANA 1.0 SPS 9 and 10 (compiled with GCC 4.7) and one version for HANA 1.0 SPS 11 and 12 (compiled with GCC 4.8 – this package is also suitable for HANA 2.0).

Preconditions

- SAP HANA on Intel Architecture
 - minimum supported revision: 93
 - minimum recommended revision: 112
- Application Server on Intel Architecture with one of the following operating systems:
 - Windows Server 2008 R2 and higher
 - Recommended version: 2012 R2
 - SUSE Linux Enterprise Server 12 and higher
 - Recommended version: 12 SP1
 - RedHat Enterprise Linux 7 and higher
 - Recommended version: 7.2
 - Ubuntu Server 14.04 LTS or 16.04 LTS
 - Recommended version: 16.04 LTS
- Possibility to transfer the install files to both servers (HANA, application server)
- Text editor (syntax highlighting support recommended (e.g. Notepad++))
- Root / Admin access to both servers

Please note, that SAP HANA on IBM Power Systems Architecture is currently not supported!

CPML

Installation on SAP HANA server

The installation is based on the installation routines for AFL libraries, provided by SAP.

NOTE: During this process the SAP HANA database will be automatically restarted.

1. Transfer the installation bundle to the SAP HANA server
2. Extract installation bundle
3. Execute hdbinst with root privileges
4. Follow the instructions of the installer
5. If the installer complains, that files are locked by the indexserver or the scriptserver, you can manually restart the SAP HANA database to release the locks.

Configure Database

First check if the plugin was successfully installed by checking if CELONIS_AFL_SDK_CPML is listed as installed plugin in the system overview of the HANA Administration Overview in HANA Studio.

Then the scriptserver needs to be activated, in case it is not running yet. In the Administration Overview in HANA Studio, go to the tab "Configuration", expand "daemon.ini" and then expand "script server". In case there is a 0 in the field "instances", add a 1:

The screenshot shows the SAP HANA Administration Overview Configuration tab. The 'daemon.ini' file is expanded, and the 'scriptserver' section is also expanded. The 'instances' field is highlighted with a red box and contains the value '1'.

| Name | Default | System | Host - hana-sp10 |
|------------------------|------------------------|--------|------------------|
| attributes.ini | | | |
| compileserver.ini | | | |
| daemon.ini | | | |
| > [] compileserver | | | |
| > [] daemon | | | |
| > [] dpserver | | | |
| > [] dummyserver | | | |
| > [] esserver | | | |
| > [] etbserver | | | |
| > [] etsserver | | | |
| > [] etxserver | | | |
| > [] indexserver | | | |
| > [] indexserver.c | | | |
| > [] limits | | | |
| > [] mdcdispatcher | | | |
| > [] nameserver | | | |
| > [] preprocessor | | | |
| > [] rdsyncserver | | | |
| > [] scriptserver | | | |
| arguments | | | |
| executable | hdbscriptserver | | |
| flags | COMPRESSBACKUP | | |
| instances | 0 | | 1 |
| name | HDB Scriptserver | | |
| runlevel | 3 | | |
| startdir | \$(SAP_RETRIEVAL_PA... | | |
| stderr | | | |
| stdout | \$(SAP_RETRIEVAL_PA... | | |
| > [] scriptserver.c | | | |
| > [] statisticsserver | | | |

Please note that for SAP HANA multi-tenant installations the procedure for activating the scriptserver on certain tenants differs from the herein mentioned method. Please consult the SAP HANA documentation on multi-tenant installations on how to activate the scriptserver.

Set up the users

We need to grant every user which is used by SAP Process Mining by Celonis to log on to the SAP HANA database the following privileges:

- **AFL__SYS_AFL_CPML_AREA_EXECUTE**
- **AFLPM_CREATOR_ERASER_EXECUTE**

To grant the rights to a user you can execute:

```
GRANT AFL__SYS_AFL_CPML_AREA_EXECUTE TO <USER>;
GRANT AFLPM_CREATOR_ERASER_EXECUTE TO <USER>;
```

To check if privileges for CPML are correctly set up you can execute the following statement as <USER>:

```
CALL _SYS_AFL.CPML_AREA_ECHO_STRING_PROC('Test was successful',?);
```

If everything is set up correctly, the call returns 'Test was successful'.

Additionally, the users minimally need the following privileges on the SAP HANA schema where the tables and views reside which are read by SAP Process Mining:

- **CREATE ANY**
- **DROP**
- **EXECUTE**
- **SELECT**
- **INSERT**

Deinstallation

1. On the SAP HANA server go to the SAP HANA installation directory (Usually /hana/shared/<SID>).
2. From there go to ./exe/linuxx86_64/plugins
3. Delete all celonis_afl_sdk_cpml_* directories
 1. If files are locked by an indexserver or scriptserver process, you can manually restart the SAP HANA database to release the locks.
4. Restart the database

SAP Process Mining by Celonis

Installation on Windows

Execute the sappm-setup.exe installer and enter

1. The path where the software is to be installed
2. The port under which the web application will be reachable
3. Set a password for the user for system administrator user "sysadmin". NOTE: You'll have to change the password on your first login. (To use the default password "\$admin!" just press enter)

After successful installation start the Service "SAP Process Mining by Celonis" from your Service Manager.

Installation on Linux

Prerequisites

Before you start the installation, please ensure you meet the following requirements:

1. The installation file sappm_<dist>.run is located on your target system (e.g. /tmp/celonis/). There are separate installers for the different supported Linux distribution, make sure to pick the one matching your distribution and major version.
2. You have root privileges on the target system
3. You have created a dedicated system user to run the Celonis₄ Server on the target system (Optional)
4. You have installed the OS package **graphviz** (including its automatic dependencies) provided by your distribution, or verified its existence. The installer will fail if this package is not installed.
5. Additionally, to use the PDF and PNG exporting functionalities, you need to install the following OS packages (including their automatic dependencies). Please note that the PDF and PNG exporting functionalities are only available on newer linux distributions (SLES 12, RHEL 7, Ubuntu 16) and are not required to use the software.

| SLES | RHEL | Ubuntu |
|--|--|---|
| <ul style="list-style-type: none"> • xauth • xorg-x11-server • libXss1 • gconf2 • mozilla-nss | <ul style="list-style-type: none"> • xorg-x11-auth.x86_64 • xorg-x11-server-Xvfb • libXtst • GConf2 • libXScrnSaver | <ul style="list-style-type: none"> • xauth • xvfb • libgtk2.0-0 • libxtst6 • libxss1 • libgconf-2-4 • libnss3-1d • libasound2 |

Installation

1. Log in on the target system.
2. Navigate to the folder where your installation files are located (e.g. /tmp/celonis/)
3. Start the installation script with the following command:

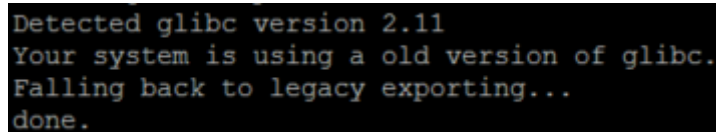
- a. As root:

```
sh sappm.run
```

- b. As non-root:

```
sudo sh sappm.run
```

NOTE: On SLES 11 / RHEL 6 you might get the following information (Fig. 1).¹



```
Detected glibc version 2.11
Your system is using a old version of glibc.
Falling back to legacy exporting...
done.
```

Figure 1: Information about old version of glibc on SLES 11

4. Please enter the target directory where you wish to install SAP Process Mining by Celonis and press enter (To use the default path /opt/celonis/celonis4/ just press enter)

```
Please specify the target directory [/opt/celonis/celonis4]:
```

5. Please enter the system user which runs the Celonis4 Server. (To use root just press enter)

```
Please enter the default OS user which runs the Celonis4 Server
The user will be the owner of the writable directories [root]
```

6. Specify the port on which you will access the Celonis4 web frontend (To use the default port 9000 just press enter)

```
Please enter port for the Celonis4 server [9000]
```

7. Specify the initial password for the user sysadmin. This user will be used to login on the web frontend. NOTE: You'll have to change the password on your first login. (To use the default password "\$admin!" just press enter)

```
Please specify the initial password for the user sysadmin [$admin!]
```

8. The installation is now complete. To start the server, navigate to your install directory (default /opt/celonis/celonis4/) and type

```
sudo sh start.sh
```

¹ SAP Process Mining by Celonis uses Electron to generate downloadable Stories. On older Linux distributions, where prerequisites cannot be met, the exporting functionalities will not be available.

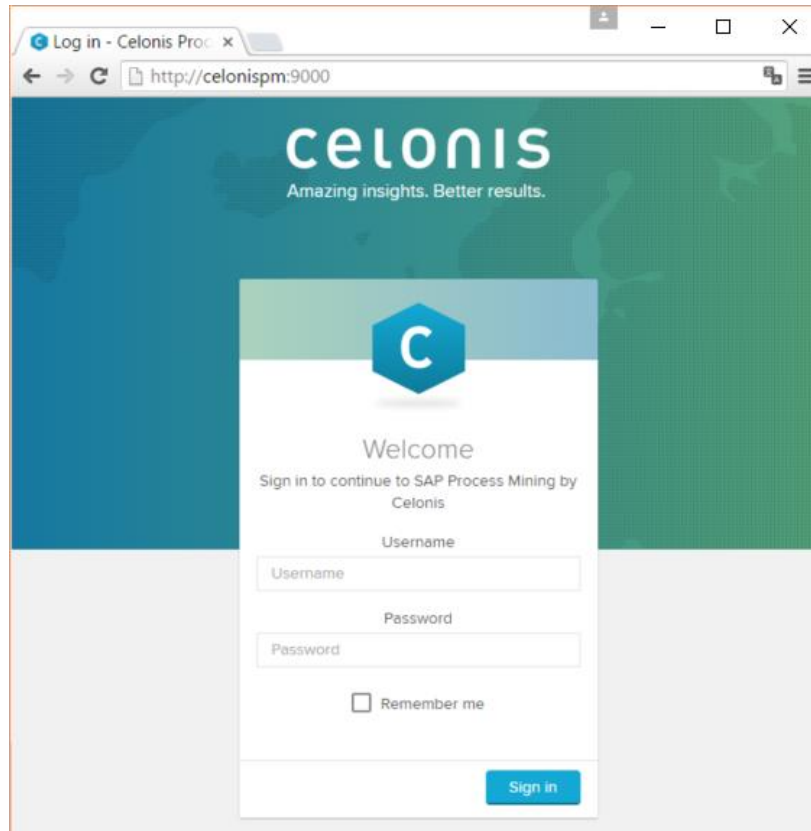
After the installation on Windows and Linux

You can access the web frontend with the following address

`http://<hostname of your server>:<port>`

e.g.

<http://celonispm:9000>



9. To log in you can use the user: sysadmin and the password you provided in step 7. (Default is \$admin!)

After the login you will have to activate the license. How to do that is described in the next chapter.

For more information regarding configuration of the installation, especially with regards to Security, please consult the Celonis Operation Guide.

Configure SAP Process Mining by Celonis

License Activation

In order to get a license for SAP Process Mining by Celonis, please sign up on https://my.celonis.de/sappm_signup

After successful sign up and license approval, you need to activate your license with the Server ID displayed in the SAP Process Mining by Celonis frontend.

Remarks on CPML

Wrapper Functions

CPML needs wrapper functions, in order to be able to load data from HANA to CPML. The wrapper functions are written in SQL-script and are data model specific. SAP Process Mining by Celonis generates the functions dynamically for you. You have to trigger the generation after the creation of a data model and each time you change the model. For each table of the data model a set of wrapper functions is generated and stored in the schema of the table. The wrapper functions can be viewed in the HANA Studio (Schema -> Procedures).

Parallel Loading / Memory Management

You can configure the number of parallel tables to be loaded on HANA as well as the number of columns, that are staged in parallel via the properties *cpml.table.max.parallel* and *cpml.column.max.parallel* in the *config-custom.properties*. Lower these values in case you run into memory issues on HANA. Increase the values to try to decrease the load time on HANA while being aware of the memory implications.

Implementation on Multi-Tenant Installations of SAP HANA

When implementing process mining projects on a multi-tenant installation of SAP HANA, you should pay special attention to the design of your eventlog scripts. Currently, monitoring views (e.g. M_TABLES), that might be used under the hood by e.g. the currency conversion cannot be queried cross-tenant.

PDF/PNG exporting

In case the PDF/PNG exporting does not work, please check the following points:

- PDF and PNG exporting functionalities are only available on newer linux distributions (SLES 12, RHEL 7, Ubuntu 16) and on Windows. Please note that when upgrading the OS (e.g. from SLES11 to SLES12, the software has to be reinstalled with the appropriate installer for the new OS.
- Make sure you have installed all previously listed OS packages on Linux. Check the logfiles of the application for possible errors or further missing libraries.
- In case you have SSL activated, the user running the SAP Process Mining service/process needs to trust the certificate. For certificates signed by an official CA or your company's CA, this should already be the case. In case you are using a self-signed certificate, make sure to add this certificate to the trusted certificates of the service user.
- You have correctly set the parameter *server.url* to the URL, at which the application is accessible from within the network (e.g. <https://celonis.mycompany.com>) in the *config-custom.properties*. In case the local access for the process generating the PDF on the server needs to be different (e.g. because you unload SSL on a frontend server that also handles a third-party authentication), you can set the parameter *server.external* to the address, where the instance is reachable locally.
- The HTTP header *X-Frame-Options* is by default set to DENY for security reasons. If you see error messages in the browser console regarding this header while downloading a PDF, you can set the property *http.framepolicy.xframeoptions* in the *config-custom.properties* to *SAME-ORIGIN* while considering the security implications.
- In case the PDF only contains the structure of the analysis and charts, but no data (i.e. only lines), your system might be lacking the necessary fonts or font libraries. In this case, you can set the property *externaltool.legacy=true* in the *config-custom.properties*.
- The user running Celonis needs to have a valid and writable home directory for storing temporary files.
- As a last resort, you can manually adjust the script and executable used for exporting. Check the logs generated during startup of the application for the current configuration. One example of an adjustment would be a manual override of the user's home directory (the home directory of the user running the Celonis process needs to be writable by this user. If the home directory points to a non-writable directory (e.g. /root), the exporting will fail).

HANA 2.0

Please consider the following in case you want to connect your SAP Process Mining by Celonis Installation with HANA 2.0:

Since each SAP HANA Support Stack brings its own version of the SAP HANA JDBC driver, you need to replace the default SAP HANA JDBC driver shipped with SAP Process Mining by Celonis (currently 1.0 SP 12) with the suitable driver for HANA 2.0.

To do so, get the suitable JDBC driver from your HANA Client or HANA studio installation (you can download those from the SAP Marketplace). You will need to search for a file called "ngdbc.jar" and copy this file. To verify its version, you can run `java -jar ngdbc.jar --version`. It should display something like `package package com.sap.db.jdbc, Java Platform API Specification, version 1.6, SAP HANA JDBC Driver, SAP SE, 2.0.13-dc4d9b4446a4c5cef1666c4a8a8b8383300a274e`, wherein **2.0** shows you, that this is a driver for HANA 2.0.

Shut down your SAP Process Mining by Celonis installation, go to `<installDir>\appdata\appfiles\WEB-INF\lib` (on Windows) or `<installDir>\root\appfiles\WEB-INF\lib` (on Linux) and rename the existing file `ngdbc-1.111.06.jar` to `ngdbc.jar.orig`. Paste the new `ngdbc.jar` file into the same folder. Start the SAP Process Mining by Celonis application.