



CA Application Performance Management Version 10.7 Installation Guide For SAP

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1 Installation Overview

This document covers the installation and configuration of CA Application Performance Management (CA APM) in the context of SAP products in the following chapters:

- [Installation Overview](#)
- [Upgrading previous versions to 10.7](#)
- [Installing CA APM Enterprise Manager](#)
- [Introscope-enabling SAP J2EE Systems \(Agent Installation\)](#)
- [Optional: Installing CA APM Workstation](#)
- [Optional: Additional Installation Options](#)

➤ CA APM Overview

CA Application Performance Management is an application management solution created to manage Java application performance. Unlike development tools, CA APM is designed to scale with minimal performance impact. This allows you to monitor and manage your application performance in live production environments.

This guide focuses on the SAP-specific aspects of CA APM. For a full overview on CA APM please check the official product documentation provided by CA:

<https://techdocs.broadcom.com/content/broadcom/techdocs/us/en/ca-enterprise-software/it-operations-management/application-performance-management/10-7.html> . Note, however, that not all features described in the CA documentation will be available to SAP customers as part of the "RTV" (Right To View) delivery.

The Right to View (RTV) version of CA APM is a restricted, read-only form of the full product and is bundled with SAP Solution Manager. With the RTV version, support is limited to products that are licensed and supported by SAP. The instrumentation, dashboards, Probe Builder Directives (PBDs), management modules, and Smartstor data contained within the RTV version of CA APM as provided by SAP are the intellectual property of SAP. Use of these functions is restricted by SAP.

➤ Reviewing the Installation and Configuration Process

You will be installing the following CA APM components:

- **CA APM Enterprise Manager** (central server component)
The Enterprise Manager is typically installed on the Solution Manager host. Alternatively, you can install the Enterprise Manager on a separate host.
The memory and CPU requirements for the Enterprise Manager mainly depend on the number of CA APM (Introscope) agents that you connect and on the complexity of the monitored systems. Typically, for up to ten agents, the default configuration

using 1024MB Java heap will suffice. More details on Enterprise Manager sizing can be found in <https://wiki.scn.sap.com/wiki/display/TechOps/Introscope+HowTo> → Sizing and Performance Guide.

- **CA APM (Introscope) Java Agent** (on the managed systems)
The setup of the Java agent for SAP Netweaver Java systems is typically done centrally via the managed setup in Solution Manager. For other types of managed systems manual installation may be necessary, as described below. After activation by restarting the Java VM, the agent runs within the Java process of the monitored system.
- **Host-Level Introscope Agent** (on the managed systems)
The so-called Introscope Host Adapter runs as part of the Diagnostics Agent in the Diagnostics Agent process to collect data on operating system level, e.g., operating system data from the SAP Host Agent, GC logs, data from ABAP instances and TREX. The host adapter generates less load on the Enterprise Manager than a normal agent. For this reason, it should not be included with the same weight in the memory sizing calculation above. The host adapter is configured automatically by the managed systems configuration.
- Optionally, you can install the **CA APM Workstation** on the Enterprise Manager host or any client PC. See the next section for recommendations about the user interface for CA APM.

Deciding About the UI for CA APM

There are three different options to access CA APM:

1. CA APM **Workstation**: Swing-based client user interface, full functionality
 - a. Use Java WebStart to download the Workstation on demand from the Enterprise Manager. No explicit installation of the Workstation is necessary. Java 7 or 8 including WebStart must be installed on the client PC, default URL: <http://emhost:8081/workstation>. The workstation will be downloaded only once and is then cached on the client PC. For every new start of the Workstation the cached version is checked against the Enterprise Manager and, if the Enterprise Manager was updated, a new version is downloaded automatically.
 - b. Explicit installation on the client PC on which you want to use it (see Chapter 5).
2. CA APM **WebView**: Browser-based user interface, based on HTML5. In some details limited functionality.

WebView is available out of the box on the Enterprise Manager (no installation necessary), default URL: <http://emhost:8081/webview>.

In general, using the Workstation should be preferred to WebView since it is more powerful. The most convenient option is to use 1a (Launch Workstation via Java Webstart). The binaries are then only downloaded once and after that cached on the client PC. You may also decide to install the workstation explicitly on your client PC (1b).

CA APM Access

After installation, the following default user accounts exist to access CA APM:

User	Access Rights
Admin	read, run_tracer, live_agent_control, historical_agent_control
Guest	read

The passwords for these users must be set after running the Enterprise Manager installation as described in Chapter 3. By default, the users are blocked by an invalid password hash. You can set these passwords by editing the `users.xml` configuration file manually as described in the user management section in Chapter 6. Alternatively, you can use the *User Management* button in the *Define CA Introscope* step of the *Infrastructure Preparation* in SAP Solution Manager to maintain users and passwords for the Introscope Enterprise Manager. We recommend creating a dedicated connection user for each Solution Manager accessing Introscope. Using the default passwords for Admin/Guest known from earlier releases will be blocked automatically.

The Installation Process

The CA APM installation process consists of the following steps:

1. Check SAP Notes [797147](#) and [2909673](#) for latest updates to the installation procedure and to this document.
2. Download installation files from SAP Service Marketplace.
3. Install the CA APM Enterprise Manager on the central monitoring system and add the management modules.
4. Install the CA APM (Introscope) Java agents and host agents on managed systems.
5. Optional: Install the CA APM Workstation.

➤ Obtain the Latest File Versions

SAP Notes and Wiki

SAP Note [797147](#) is the central entry point for up to date information regarding the installation of CA APM. Review the latest version of this note before you start the installation.

SAP Note [2909673](#) (CA APM 10.7 Release Notes) provides recent information specific to CA APM 10.7 releases like known problems and updates.

The CA APM Wiki section can be found via this URL on the SAP Community Network: http://wiki.scn.sap.com/wiki/display/TechOps/RCA_Introscope_Home

Download the Latest Updates from the Service Marketplace

Download all files listed in SAP Note [2909673](#) from the SAP Service Marketplace. The note explains the exact locations of the files.

2 Upgrading from Previous Versions to CA APM 10.7

This chapter explains the options to upgrade an CA APM (Introscope) installation to CA APM 10.7. If you are performing a fresh installation, please proceed to the next chapter.

➤ Version Compatibility and Upgrade Sequence

The CA APM Enterprise Manager supports CA APM (Introscope) agents of older releases. In other words, you can connect with agents of different versions (e.g. version 8.x, 9.x, 10.x) to Enterprise Manager Version 10.7 at the same time. Connecting a new version 10.7 agent to an older Enterprise Manager does **not** work.

Workstation and Enterprise Manager must always have the same version and patch level.

When using older agents with a newer Enterprise Manager, some charts on the Console may remain empty because the SAP customizing assumes that agents and Enterprise Manager have the same version.

Due to this version dependency we recommend the following upgrade sequence:

1. Upgrade Enterprise Manager and Workstation first. This can be done without impact on any monitored systems. Since WebView is running as part of the Enterprise Manager an explicit upgrade of WebView is not needed.
2. Then upgrade the CA APM (Introscope) agents in the monitored systems at your convenience. Upgrading the agents will require a restart of the monitored systems.

➤ Enterprise Manager Upgrade

There is no tool support for an in-place upgrade of the Enterprise Manager. If you want to keep the performance database (SmartStor) of the previous version or any other configuration settings follow the procedure as described in

<https://wiki.scn.sap.com/wiki/display/TechOps/IntroscopeEMUpgrade>.

➤ Agent Upgrade

All agent installations and upgrades can (and should) be done centrally by the administration tools of Solution Manager. The only manual steps are to restart the managed systems after any configuration change.

In case you want to do a manual upgrade: To get rid of any obsolete files we recommend performing a fresh installation, e.g. by moving the old agent installation to a different directory. Since some agent files are locked while the monitored system is running, the monitored system must be down for the agent upgrade.

Note: CA APM (Introscope) Java Agent 10.7 only supports Java 6, Java 7, and Java 8.

3 Installing the CA APM Enterprise Manager

To install the CA APM Enterprise Manager you will run the installer file and add some SAP customization (management modules, scripts, etc.).

➤ Installation User

You should run the installer with the same user account that will be used later on for running the Enterprise Manager. In particular, on Unix operating systems **do not use the root** account to launch the installer. A common best practice is to use the *sidadm* user of the Solution Manager installation to install and run the Enterprise Manager. For Solution Manager 7.2 please review the installation master guide: A Diagnostics Agent must be installed on the host of the Enterprise Manager and it must have write access to the EM installation.

➤ Choose the Enterprise Manager Installer File

Depending on the operating system on which you want to install the Enterprise Manager, different installation files must be chosen. The first table below lists the platforms for which a platform specific installer with a bundled Java VM is available. If you find your operating system listed here, download the file `WILYISEM*.zip` from the corresponding folder on the Service Marketplace (see Note [2909673](#) for the exact location). The file names listed below may vary slightly for patch updates to the Enterprise Manager.

Operating System	Installer Filename
AIX 64bit	introscope10.7.0.307aix64SAP.bin
Linux on x86_64 64bit	introscope10.7.0.307linuxAMD64SAP.bin
Solaris on SPARC 32bit Solaris on SPARC 64bit*	introscope10.7.0.307solarisSAP.bin
Windows x86_64 64bit	introscope10.7.0.307windowsAMD64SAP.exe

* For Solaris SPARC only 32-bit installers are available. If you want to run the Enterprise Manager on a 64 Java VM, you can exchange the Java VM after the installation. See below for details.

➤ Platform Independent CA APM Installer

If you do not find your operating system in the table above, you can try using the generic installer. Note, however, that due to some native libraries that are part of the Enterprise Manager it will not work on all platforms where the installation succeeds. Installation via the platform independent installer includes one additional step:

1. Install a Java 8 VM
2. Launch the OS-independent installer

The operating system independent installer is contained in the file WILYISEM*.zip of the folder *#OS independent* on the Service Marketplace.

➤ Enterprise Manager Installation

Extract the CA APM Introscope Installer

Extract the zip file `WILYISEM*.zip`

As a result, you will find four files:

1. The file `installer.properties` which configures the installation procedure
2. an installer file as mentioned above, depending on your platform
3. File `ca-eula.txt` which is the CA End User License Agreement
4. File `version.txt` showing the version of the Enterprise Manager.

The CA APM installer will perform an automated install of CA APM components. The CA APM installer is invoked from the command line and runs "silently", getting its input from the response file `installer.properties`. The installer runs in the background as it installs CA APM components.

After installation, you can check the results in the installer logs.

When launching the installer, make sure the `installer.properties` file is in the same directory as the installer `.exe`, `.bin` or `.jar` file.

Optional: Configuring the Installation Directory

The installation of the Enterprise Manager by default goes to the following directories:

- Windows: `C:\usr\sap\ccms\apmintroscope\`
- Unix: `/usr/sap/ccms/apmintroscope/`

If you want to change this directory, e.g., because your SAP installation is located on a different Windows drive, use one of the following alternatives.

Note: The Installation Directory must not contain blanks in the path.

Alternative 1: Set the Installation Directory via Command Line Option

1. Open a command prompt and go to the directory where the installer file and the file `installer.properties` are located.
2. Add the option `-DUSER_INSTALL_DIR=<installation directory>` to the invocation of the installer (see below), .e.g.,
`introscope10.7.0.307windowsSAP.exe`
`-DUSER_INSTALL_DIR=d:\\usr\\sap\\ccms\\apmintroscope\\`

Alternative 2: Edit `installer.properties`

1. Open the file `installer.properties` in a text editor.
2. Locate the `USER_INSTALL_DIR` property.
To change the install directory location, enter the desired location in the `USER_INSTALL_DIR` property.

Note: The instructions in this guide will use examples relative to the default installation directory.

Accept the Licenses

Open file `ca-eula.txt` in a text editor, read the license, and modify the last line to read `CA-EULA=accept`. If the license is not accepted installation will fail.

Start the Installer

The minimum disk space for the temporary directory of the user running the installer is typically three times the size of the installation file (~5GB). See <https://techdocs.broadcom.com/content/broadcom/techdocs/us/en/ca-enterprise-software/it-operations-management/application-performance-management/10-7/installing/apm-installation/pre-installation-requirements/installation-disk-space-requirements.html>

how to specify an alternate temporary directory if needed.

1. Launch the installer for your platform using the appropriate command:

- For Windows, double-click on the installer executable e.g. `introscope10.7.0.307windowsAMD64SAP.exe`, or launch it from command-line with the suitable command e.g.

```
introscope10.7.0.307windowsAMD64SAP.exe
```

- For any other platform-dependent installer, use the command in the following example. You may have to set the right permission before you can launch the installation:

```
./introscope10.7.0.307linuxAMD64SAP.bin  
-Djava.awt.headless=true
```

Note: Parameter `-Djava.awt.headless=true` has to be set to avoid the need of having an X server.

- For the platform independent installer that does not contain a bundled Java VM use the following command. `/some_path/java` refers to the Java 8 VM that you installed as described above:

```
/some_path/java -classpath introscope10.7.0.307otherUnixSAP.jar install
```

Note: In any case, the configuration file `installer.properties` must be located in the current directory where you launch the installer. You can avoid copying the installation file itself by using the complete path to the executable.

2. Verify installation using instructions in the following section, Verifying Installation.

Verifying Installation

The installer give confirmation of successful installation on the console. Anyway to confirm installation was successful:

1. Verify that the Introscope directory exists at:

- `<drive>:\usr\sap\ccms\apmintroscope` (Windows)
- `/usr/sap/ccms/apmintroscope` (Unix)

respectively the location you specified.

2. Open the file,

```
/usr/sap/ccms/apmintroscope/install/Introscope_<version>_InstallLog.log
```

3. Verify that the following lines appear in the file:

```
Summary
-----

Installation: Successful.

1468 Successes
0 Warnings
0 NonFatalErrors
0 FatalErrors
```

Note: The number of successes may be different than what is shown in this example.

Adapt Java VM and Java VM Parameters

Depending on the startup mode the Java VM and the Java VM parameters are adapted in different locations:

`<EM_HOME>/bin/EMService.conf`: Used when Enterprise Manager is running as Windows Service on Windows platforms. The property `wrapper.java.command` defines the Java VM to use. Increase the value of `wrapper.java.maxmemory` to increase the Java heap (corresponds to `-Xmx`).

`Introscope_Enterprise_Manager.lax`: Enterprise Manager launched with script `<EM_HOME>/bin/EMCtrl.sh` (typically only on Unix). Adapt `lax.nl.current.vm` to the full path of the VM to use (if you want to change the default) and use `lax.nl.java.option.additional` to modify Java VM parameters.

The following Java VM parameter changes should be considered:

- Increase the heap size (`-Xmx`) of the Enterprise Manager if you have more than ~10 agents.
- Enter the absolute path to a Java 8 VM if you want to use a Java VM that is not bundled with the installer. In particular, you have to do this in two cases:
 - Enter the path of a separately installed 64 bit Java 8 VM for platforms on which by default only a 32 bit VM is provided:
 - Solaris on SPARC
 - Enter the path of a separately installed Java 8 VM for platforms where you used the platform independent installer.
- Set the Java VM parameter `-Djava.awt.headless=true` for all platforms. Otherwise, the Enterprise Manager will need an X server, i.e., the `DISPLAY` environment variable must point to a valid X Windows server.

- More details:
<http://wiki.scn.sap.com/wiki/display/TechOps/Introscope+Troubleshooting#IntroscopeTroubleshooting-RecommendedJavaVMparametersforEnterpriseManager>.

Install the SAP Management Modules

Extract the file `WILYISMM*.zip` in the home directory of the Enterprise Manager installation, e.g., `/usr/sap/ccms/apmintroscope`.

As a result, you will find one or more `.jar` files in the subdirectory `config/modules`, some `.js` files in the subdirectory `scripts`, and some other files distributed over the Enterprise Manager installation.

The newly installed management modules only become active after the Enterprise Manager is (re-)started. For Windows installations the Enterprise Manager is typically automatically launched as Windows Service. This means you will have to restart the Windows Service for the Enterprise Manager.

Note: Please read SAP Note [1579474](#) regarding Management Modules.

Launch Enterprise Manager as Windows Service

To launch the Enterprise Manager automatically at system restart, it is registered as Windows service (on Unix you should run it as background process). To check, perform the following:

1. Open the Services Control Panel (Start Menu → Control Panel → Administrative Tools → Services) and check that the service "CA APM Enterprise Manager" has been created.
2. Start the service if it is not yet running.

Running the Enterprise Manager on UNIX

On Unix platforms a shell script is provided to start and stop the CA APM Enterprise Manager.

Go to the subdirectory `bin` of the Enterprise Manager installation and issue the following command to launch the Enterprise Manager. Make sure to use the correct user account when launching the EM:

```
./EMCtrl.sh start
```

The shell script launches the Enterprise Manager in background mode (via `nohup`). It is not necessary to explicitly use `nohup` for `EMCtrl.sh`.

Consider launching the Enterprise Manager automatically at system startup. Typically, you will have to hook it into one of the operating system specific init scripts.

➤ Check that CA APM Enterprise Manager is Running Properly

After you have launched the Enterprise Manager, check that it is running properly.

1. Locate the Enterprise Manager log at
`<EM_Home>/logs/IntroscopeEnterpriseManager.log`.
2. Check that the Enterprise Manager has started. Look for the following line in the logfile:

```
[INFO] [Manager] Introscope Enterprise Manager started.
```

3. Check the TCP port that CA APM Enterprise Manager is using for agent connections. Look for lines similar to the following in the logfile:

```
[INFO] [Manager.PostOfficeHub] Server listening for incoming default  
socket connections on port 6001
```

In this case, the Enterprise Manager agent port is 6001 (default value).

4 CA APM-Enabling SAP J2EE Systems

After you have installed the Enterprise Manager, you are ready to install and configure the CA APM (Introscope) agent and CA APM-enable your Java applications.

Note:

- **The CA APM (Introscope) Java Agent 10.7 does NOT support applications running on Java 1.4 and Java 1.5. This means you should use Java Agent 10.7 only for Netweaver starting of version 7.2.**
- **The recommended procedure to install and customize the CA APM (Introscope) Java Agent for SAP Netweaver AS Java is to use the setup wizard provided in Solution Manager. If you do not have Solution Manager available, follow the manual procedure described in the second section of this chapter below.**

Automated Installation of the CA APM (Introscope) Agent via Solution Manager

The Solution Manager provides an application that performs the setup of the CA APM (Introscope) byte code agent for Java automatically. This section explains the steps to run the setup. Before you can run the CA APM agent setup, the setup wizard for the managed system must have been executed.

1. Enable Maintenance Mode on Solution Manager.
2. Deploy ISAGENTJ5*.SCA which is the CA APM Java Agent 10.7 to Solution Manager.
3. Disable Maintenance Mode on Solution Manager.
4. Launch the CA APM Setup application: SAP Solution Manager Configuration → Managed Systems Configuration → Finalize Configuration → Automatic Activity "Byte Code Adapter Installation" → "Open Java URL" (only available in edit mode). Your screen will look similar to the image on next page:

Introscope Agent Settings

System:

Enterprise Manager: dewdfgwp00362.wdf.sap.corp running on port 6105, version 10520

Selected	Host	Instance	DiagAgent	IS Agent Profile	IS Agent Name	IS Agent Version	IS Agent State	Online	License
<input type="checkbox"/>	ldcifaj	J04		FAJ_IntroscopeAgent.profile	FAJ_J04_{elem/Name}	ISAGENT.10.5.2.27-2017-11-14	Running	<input checked="" type="checkbox"/>	<input type="checkbox"/>

J2EE Node Information Details

Introscope Full License Support

If you have a full Introscope license, specify the "Unified Loader" file to unlock the agent. It must match instrumentation version:ISAGENT.10.5.2.27-2017-11-14

File:

Introscope Agent Setup

The buttons below enable you to change the Introscope Agent settings. Ensure that you select the relevant J2EE nodes first.

Last Operation Results

Operation	Message
Information retrieval from FAJ_SM~JAVA	Operation succeeded
Get Introscope Agent settings: ldcifaj - J04	Operation succeeded

5. Check the *Enterprise Manager Settings* at the top of the screen. These are the connection parameters that will be used by the agent to connect to the Enterprise Manager.
6. In the pane *CA APM Agent Settings*, select the system that you want to instrument with the agent. Check "select all" and click "Retrieve Current Settings". This will display the current status of the agent setup.
7. To initially setup or update the agents, click *Configure Introscope Agent Setup ...*. This will open the setup dialog as shown below. The agent version is pre-selected and you can choose the profile.
8. Next, check the desired instrumentation with clicking on button "Autoprobe Directives". Solution Manager flags the instrumentation files according to the available software on the managed system (see image next page).
NOTE: What you see here is NOT the current effective instrumentation but the proposed instrumentation that is applied with the setup run.
9. Finally, hit "Apply" to perform the necessary changes in the agent configuration. Agent config files will be adapted and the Java VM parameters will be set as required for the managed system.
10. If the setup was successful, restart the managed system at your convenience, e.g. in the next maintenance window. After the restart, the agent will be active and should show up in the CA APM UIs.

Introscope Agent Setup

Select the Introscope Agent version and profile that you want to apply to the selected J2EE nodes.

Instrumentation Version: ISAGENT.10.5.2.27-2017-11-14
 Instrumentation Profile: IntroscopeAgent.profile

Autoprobe Directives

Autoprobe Directives Selection

Optional autoprobe directives may also be selected.

Selected	Directive	Comment	Delete	Download
<input checked="" type="checkbox"/>	sap_typical.jar	Main instrumentation set for SAP Netweaver. Includes support for generic Netweaver functionality, like database, JCO, Web Services.		
<input type="checkbox"/>	sap_ep.jar	Portal specific instrumentation.		
<input type="checkbox"/>	sap_ep_views.jar	Portal instrumentation: One node per iView - should be preferred for installations with many roles or when collaboration rooms are used. Requires sap_ep.jar		
<input type="checkbox"/>	sap_ep_views_rolename.jar	Portal instrumentation: One node per iView/rolename combination - may lead to a high number of metrics for portals with a lot of content. Requires sap_ep.jar		
<input type="checkbox"/>	sap_xi_typical.jar	Default and mandatory instrumentation file for PI.		
<input type="checkbox"/>	sap_xi_adapters.jar	Extended instrumentation for PI adapters		
<input type="checkbox"/>	sap_xi_passport.jar	Extended PI instrumentation to detect passport propagation.		
<input type="checkbox"/>	sap_xi_full.jar	Extended instrumentation for PI. Some of these metrics might have a performance impact.		
<input type="checkbox"/>	sap_bo_enterprise.jar	SAP Business Objects Enterprise instrumentation 3.x.		
<input type="checkbox"/>	sap_boe_webapp.jar	SAP Business Objects Enterprise Web Application instrumentation 4.0.		
<input checked="" type="checkbox"/>	sap_sapvm.jar	SAP JVM and Netweaver 7.1 specific instrumentation. Only activate this if SAP JVM is actually used.		
<input checked="" type="checkbox"/>	sap_smd.jar	Solution Manager Diagnostics instrumentation for self-monitoring.		
<input type="checkbox"/>	sap_duet.jar	SAP Duet specific instrumentation		
<input type="checkbox"/>	sap_mdm.jar	Additional SAP MasterDataManagement Java API instrumentation to measure performance of outgoing calls to MDM Server. Enable if the SAP J2EE Engine performs calls to MDM Server.		
<input type="checkbox"/>	sap_compliance.jar	SAP Compliance (SAP GRC, SAP EC, SAP REACH, ...)		
<input type="checkbox"/>	sap_epm.jar	SAP EPM (SAP SSM, ...)		
<input type="checkbox"/>	sap_retail.jar	SAP Retail (SAP POS, SAP Triversity...)		
<input type="checkbox"/>	sap_srm_crm.jar	SAP SRM & SAP CRM (SAP Convergent Charging, SAG Frictionless e-Commerce, ...)		
<input type="checkbox"/>	sap_manufacturing.jar	SAP Manufacturing (SAP SAP Manufacturing Execution, SAP xMII, ...)		
<input type="checkbox"/>	sap_partner.jar	Additional instrumentation for SAP partner products (see SAP Note 1579474)		

Apply Cancel

Manual Installation of the CA APM Agent 10.7

This section describes the **manual** configuration of CA APM (Introscope) bytecode agent for Java. These steps are only required if the automated installation, described in the previous section, could not be applied. The following instructions are valid for Netweaver versions 7.1 and higher.

The instructions in the following section work on both Windows and Unix systems, but the examples show Windows convention (backslashes in the paths).

Note: Always use forward slashes (/) as path separators for CA APM (Introscope) config files and for JVM parameters on all platforms including Windows. This avoids the need to escape the Windows path separator backslash (\) by doubling it.

The following steps are required to install and configure the CA APM (Introscope) Agent to report information to the Enterprise Manager:

1. Extract the CA APM (Introscope) Agent files
2. Configure the CA APM (Introscope) Agent
3. Introscope-enable the application code by setting Java VM parameters

Extract the CA APM (Introscope) Agent

To install the CA APM (Introscope) Agent:

1. Extract the agent installer file `ISAGNTJ5STD*.zip` into the Netweaver CCMS directory, usually: `<drive>:\usr\sap\ccms`.
2. Confirm the Agent was installed correctly by checking for the existence of the `wily` directory in the `<drive>:\usr\sap\ccms` directory.

Configuring CA APM (Introscope) Agent Settings

The following section details how to configure the CA APM (Introscope) Agent. The Agent configuration settings are found by default in the file

`<drive>:\usr\sap\ccms\wily\core\config\IntroscopeAgent.profile`. This guide will refer to the file `IntroscopeAgent.profile` as the **Agent profile**. Note that this file contains SAP-specific customization. Furthermore, depending on the monitored solution you need to choose different profiles:

Choose the Right Agent Profile

SAP provides agent profiles for different use cases. For all applications running on the SAP Netweaver use `IntroscopeAgent.profile`. Other profiles for IBM WebSphere Application Servers, Oracle WebLogic Application Servers and Tomcat are available. All profiles adhere to the name pattern `IntroscopeAgent*.profile`.

File Name	Applications Covered
<code>IntroscopeAgent.profile</code>	SAP Netweaver (Java stack)
<code>IntroscopeAgent_tomcat.profile</code>	Tomcat 4.1.x and higher
<code>IntroscopeAgent_websphere.profile</code>	IBM WebSphere Application Server 6 and 7
<code>IntroscopeAgent_weblogic.profile</code>	Oracle WebLogic Server 9.0.x, 9.2, 10.x, 10.3.x, 12c
<code>IntroscopeAgent_smp.profile</code>	SAP Mobile Platform
<code>IntroscopeAgent_smdagent.profile</code>	SAP Diagnostics Agent
<code>IntroscopeAgent_hilo.profile</code>	SAP Visual Intelligence
<code>IntroscopeAgent_sapcm.profile</code>	SAP Partner Product Convergent Mediation by DigitalRoute
<code>IntroscopeAgent_hadoop.profile</code>	SAP Hadoop

You will need to configure the host name or IP address and port of the machine where the Enterprise Manager resides.

To configure the CA APM (Introscope) Agent:

1. Open the Agent profile, e.g. file
`<drive>:\usr\sap\ccms\wily\core\config\IntroscopeAgent.profile`
2. Locate the property, `agentManager.url.1`

Enter either the host name or IP address of the machine where Enterprise Manager resides followed by @ plus agent port (default is 6001).

Example: `agentManager.url.1=localhost@6001`

3. Save changes to the Agent profile.

Choose the Right Instrumentation Packages

The instrumentation is split into several JAR packages. You can customize the list of packages by modifying the property `introscope.autoprobe.directivesFile`. By default, the following packages are active:

```
introscope.autoprobe.directivesFile=sap_typical.jar,sap_ep.jar,sap_ep_iview
s.jar,sap_xi_typical.jar
```

This instrumentation covers standard SAP Netweaver (e.g. Servlets, database/JDBC, JCO/RFC, web services, user management, etc.), Portal, and PI functionality. There are additional instrumentation sections which are not active by default. You can add entries to the property, separated by comma:

sap_typical.jar	Main instrumentation set for SAP Netweaver. Includes support for generic Netweaver functionality, like database, JCO, Web Services. This jar is always mandatory.
sap_sapvm.jar	For SAP Netweaver 7.10 and higher with JDK5 or higher. Specific instrumentation, e.g. memory allocation. Do not activate for Java 1.4!
sap_bo_enterprise.jar	SAP Business Objects Enterprise 3.x instrumentation
sap_boe_webapp.jar	SAP Business Objects Enterprise 4.x instrumentation
sap_ep.jar	SAP Portal specific instrumentation
sap_ep_iviews.jar	SAP Portal instrumentation: One node per iView - should be preferred for installations with many roles or when collaboration rooms are used. Requires sap_ep.jar
sap_ep_iviews_rolename.jar	Re-activate metrics for each iView/rolename combination. Activate only one of these 2: sap_ep_iviews.jar or sap_ep_iviews_rolename.jar!
sap_duet.jar	SAP Duet specific instrumentation
sap_hybris.jar	Instrumentation for Hybris.
sap_smp.jar	Instrumentation for SAP Mobile Platform.
sap_omnichannelbanking.jar	SMP instrumentation extension for Omni Channel Banking
sap_xi_typical.jar	Default and mandatory instrumentation file for PI
sap_xi_adapters.jar	Extended instrumentation for PI adapters.
sap_xi_passport.jar	Extended PI instrumentation to detect passport propagation.
sap_xi_full.jar	Extended instrumentation for PI. Some of these metrics might have a performance impact
sap_smd.jar	Solution Manager self-monitoring
sap_mdm.jar	SAP Master Data Management
sap_compliance.jar	SAP Compliance (SAP GRC, SAP EC, SAP REACH, ...)
sap_epm.jar	SAP EPM (SAP SSM, ...) instrumentation
sap_retail.jar	SAP Retail (SAP POS, SAP Triversity...)
sap_hilo.jar	SAP Visual Intelligence instrumentation

sap_srm_crm.jar	SAP SRM & SAP CRM (SAP Convergent Charging, SAG Frictionless e-Commerce, ...)
sap_manufacturing.jar	SAP Manufacturing (SAP SAP Manufacturing Execution, SAP xMII, ...)
Sap_hadoop.jar	SAP Hadoop instrumentation
sap_partner.jar	Instrumentation for SAP partner products. See SAP Note 1852015.
sap_tomcat_typical.jar	Default and mandatory instrumentation file for Apache Tomcat
sap_tomcat_full.jar	Extended instrumentation for Apache Tomcat
sap_websphere_typical.jar	Default and mandatory instrumentation file for IBM WebSphere Application Servers
sap_websphere_full.jar	Extended instrumentation for IBM WebSphere Application Servers
sap_weblogic_typical.jar	Default and mandatory instrumentation file for Oracle WebLogic Server
sap_cem_integration.jar	Instrumentation for integration with CA product CEM (only for SED)

Check the Agent Log File Location

By default, the CA APM (Introscope) agents write log files to the subdirectory `logs` of the agent installation (e.g. `<drive>:\usr\sap\ccms\wily\logs`). On Unix systems, make sure that the monitored systems (user `sidadm`) have read and write access to this directory (write permission for group `sapsys`). As an alternative, you can change the properties `introscope.autoprobe.logfile` and `log4j.appender.logfile.File` to some other directories where the monitored systems have write access.

Activating the Agent: Set Java VM Parameters

You have to add Java VM options to enable the agent. Typically, you will only want to activate the agent on the SAP J2EE *server* nodes, not on dispatchers.

Note that for class path and directory paths, you can use forward slashes (/) on all platforms, even on Windows. For SAP J2EE 6.40, you even cannot use backslash (\) on Windows. Furthermore, note the difference between Unix and Windows in the class path: The entries are separated by `;` on Windows, but by `:` on Unix.

Agent Name

You should assign a unique name to each SAP J2EE node that is Introscope-enabled. This so-called agent name is assigned by an additional Java VM option (referred to as `<AgentName>` below). SAP suggests the following naming convention for the agent name. This is also generated by the automated setup via Solution Manager Diagnostics:

<AgentName>=SID_Instance_Nodename

Where the placeholders mean the following:

Placeholder	Explanation	Examples
SID	SystemID	EPP, EPQ, EPD
Instance	Name of the instance	JC00, J01, DVEBMGS00
Nodename	J2EE node name / directory	server0, server1, ...

Example for AgentName: EPP_J01_server0

Note: It is not necessary to integrate the host name into the agent name, since the host name is assigned automatically to the agent.

Using a unique naming convention for all agent installations helps to group agents that belong to the same installation together.

Set Java VM Parameters for Netweaver versions based on the Java 5 VM or higher (Netweaver 7.10 and up)

For Netweaver 7.1 and up there are no node-specific Java VM parameters. For this reason, the *nodename* part of the agent name must be calculated dynamically by using the variable `$(elem/Name)`. At run time, this will be filled in with the node name. In the example below, variables are also used for the SID and the instance name. They will be replaced automatically if you use the string exactly as written below.

Example: Enter `${SYSTEM_NAME}_${INSTANCE_NAME}$(elem/Name)` in the Configtool. For the first node, it will be replaced with e.g. EPP_JC00_server0.

1. Run the SAP J2EE Configtool.
2. Navigate to **Instance/VM Parameters/System** and enter the following new parameters (Windows example):

Name	Value
com.wily.introscope.agent.agentName	<code>\${SYSTEM_NAME} \${INSTANCE_NAME} \$(elem/Name)</code>
com.wily.introscope.agentProfile	<code><drive>:/usr/sap/ccms/wily/core/config/IntroscopeAgent.profile</code>

3. Navigate to **Instance/VM Parameters/Additional** and enter the following new java parameter (Windows example):

`-javaagent:<drive>:/usr/sap/ccms/wily/Agent.jar`

Note that for Netweaver on Windows, the slashes for these java parameters must go forwards.

Unix example:

Instance/VM Parameters/System:

Name	Value
com.wily.introscope.agent.agentName	\${SYSTEM_NAME} \${INSTANCE_NAME} \${elem/Name]
com.wily.introscope.agentProfile	/usr/sap/ccms/wily/core/config/IntroscopeAgent.profile

Instance/VM Parameters/Additional:

Name
-javaagent:/usr/sap/ccms/wily/Agent.jar

4. Click the disk button to save.
5. Repeat steps 2 - 4 for each instance.
6. Restart the SAP instance.
7. To verify that Config tool changes were made, open the file:

`<drive>:\usr\sap\<SID>\<instance>\j2ee\cluster\instance.properties`

8. Check for a line beginning with `ID<server_id>.JavaParameters`, and see if it contains the lines you entered in the step above.

Set Java VM Parameters for Tomcat

The procedure to add JVM options for Tomcat Server to enable CA APM is described in SAP Note [1438005](#).

Set Java VM Parameters for IBM WebSphere Application Server

The procedure to add JVM options for IBM WebSphere Application Server to enable CA APM is described in SAP Note [1418638](#).

Checking that the Agent is Running

1. Check that the SAP J2EE nodes start up correctly after the restart and that the J2EE applications are available as before.
2. Search for an Agent log file in the logs subdirectory of the CA APM (Introscope) agent directory, e.g., in the directory <drive>:\usr\sap\ccms\wily\logs. The file will be named IntroscopeAgent.<AgentName>.log, where <AgentName> is the name that you assigned via the JVM parameter above. Open the text file with a text editor and check the last lines. You will probably find warnings that the connection to the Enterprise Manager failed – since you have not yet started the Enterprise Manager.

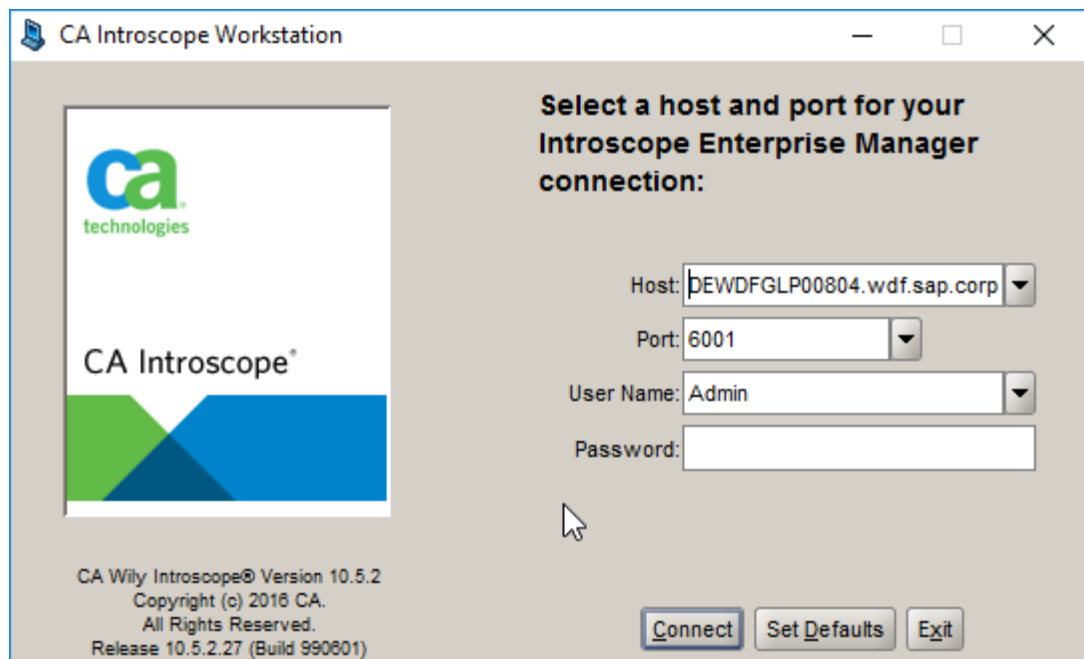
The last few lines of the agent log file should similar to the following:

```
[INFO] [IntroscopeAgent.IsengardServerConnectionManager] Connected Agent to the
Introscope Enterprise Manager at
emhost:6001,com.wily.isengard.postofficehub.link.net.DefaultSocketFactory. Host =
"emhost", Process = "SAP Netweaver", Agent Name = "EPP_JC00_server0".
```

Check that the Agent is Running

Launch the CA APM Workstation to check if the data provided by the agent arrives at the Enterprise Manager. For this purpose, launch the Workstation in a browser with e.g. <http://emhost:8081/workstation>

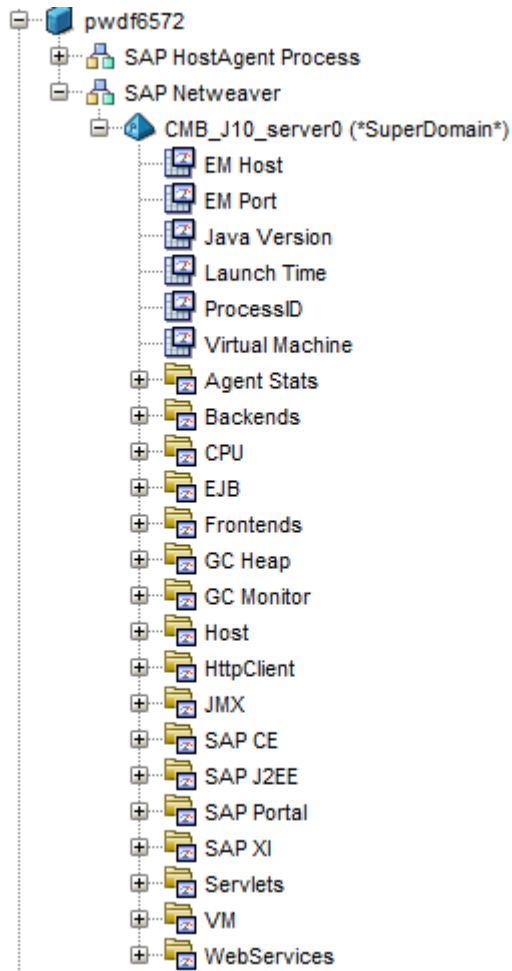
You should get a login prompt as shown below. Use login credentials from the table in Chapter 1 to authenticate. As an alternative, you can also launch a Workstation that you explicitly installed or WebView (e.g. <http://emhost:8081/webview>).



Open the *Investigator* (*Workstation* menu → *New Investigator*) to display a tree of all connected hosts and agents. Click the plus signs to open subtrees. For each connected agent, you should find a subtree **SuperDomain** → *host* → *SAP Netweaver* → *AgentName* in the Investigator that looks similar to the screenshot below. Depending on the type of the managed system, some tree nodes may be missing.

Please check the following:

- If your managed system is running SAP J2EE, you should at least have tree node SAP J2EE.
- Some tree nodes will only appear after first use. For example, Servlets will only appear after the first servlet has been executed.



5 Workstation Installation

If you decide to explicitly install the CA APM Workstation on Client PCs, proceed as described in this section. Note that the workstation can always be downloaded on demand from the Enterprise Manager using Java WebStart, as described in Chapter 1.

Installers are available for the following platforms:

- Windows 32bit
- Windows x86_64
- Linux 32bit
- Linux x86_64

The installation is described here for Windows. If you want to install it on Linux, remember to set the DISPLAY before launching the installer.

1. Extract the downloaded Workstation installer from file `WILYWORK*.zip`.
2. Launch the installer. If you keep the file `installer.properties` in the directory where you launch the installer, the installation will proceed silently. Alternatively, remove the file `installer.properties`. Then you will be guided through the installation by a wizard.
 - a. (Silent installation) By default, the installation will be placed in the folder `c:\usr\sap\ccms\apmintroscope`. If desired, pass a different target directory as a command line parameter:


```
introscopeWorkstation10.7.0.307windowsSAP.exe
-DUSER_INSTALL_DIR=d:/usr/sap/some/dir
```
 - b. (installation with wizard) Select a target installation directory of your choice. Keep *No* for *Configure VM Settings* and enter the host name of the Enterprise Manager in the field *Workstation Default Host*. Finally, click *Install* to launch the installation.
3. Launch the Workstation:
 - a. via the Start Menu: CA APM → Introscope 10.7.0.307 → Introscope Workstation
 - b. by directly starting the file `Introscope Workstation.exe` in the installation directory.

6 Additional Installation Options

This chapter covers additional customizing steps of the CA APM Installation:

- [Changing the agent port from 6001 to other values](#)
- [Uninstalling CA APM](#)
- [Setting up domains](#)
- [User Management](#)
- [Enable Single Sign On from Solution Manager](#)
- [Enterprise Manager Cluster Setup](#)

➤ Change the Agent Port

The Enterprise Manager by default listens on TCP port 6001 for agent connections. You can change this value to any desired port:

1. Open the file, `<EM_Home>/config/IntroscopeEnterpriseManager.properties`.
2. Change the value of property `introscope.enterprisemanager.port.channell` to the desired port.
3. Save changes and close the file.
4. Remember to change the property in the `IntroscopeAgent.profile` to the same port.

➤ Uninstalling CA APM

Uninstalling CA APM (Introscope) Agents

1. Remove the Java VM options for CA APM from the J2EE nodes that you instrumented before. The following options should be removed:
 - a. `-javaagent:<some path>/wily/Agent.jar`
 - b. `-Dcom.wily.introscope.agentProfile=<some path>/wily/core/config/IntroscopeAgent.profile`
 - c. `-Dcom.wily.introscope.agent.agentName=<AgentName>`
2. Restart the affected J2EE instances for the changes to become effective.
3. Delete the directory `<some path>/wily` (or wherever you put the agent files).

Uninstalling the Enterprise Manager

1. Windows only: Call the batch file EMCtrl64.bat to remove the Windows Service
2. Windows only: Call the wizard to uninstall CA APM: Start → Control Panel → Add or Remove Programs; Select Introscope and click change/remove to launch the Wizard. Click Next to continue the uninstall.
3. Remove any remaining files from /usr/sap/ccms/apmintroscope.

➤ Setting up CA APM Domains

CA APM (Introscope) agents can be organized into so-called domains. You can use this feature to group agents which are correlated, e.g. belonging to the same domain.

Domains are defined in the Enterprise Manager by the configuration file `<EM_HOME>/config/domains.xml`. By default, there is only one domain, the `SuperDomain`, which contains all agents. You can pick agents for a domain based on the host name and on the agent name. Too many domains may, however, impact the Enterprise Manager performance since the management modules are replicated for each domain. For this reason, make sure you do not have more than 10 domains.

Example: Assume you want to create two domains EPP and EPQ for the productive and the QA Enterprise Portal. Your agent names contain the System id (also EPQ, EPP).

Step 1: Adapt the domains.xml file on the Enterprise Manager:

```
<?xml version="1.0" encoding="UTF-8"?>
<domains xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:
noNamespaceSchemaLocation="domains0.2.xsd" version="0.2">
  <domain name="EPP" description="Productive Enterprise Portal">
    <agent mapping=".*EPP.*"/>
    <grant user="Admin" permission="read"/>
  </domain>
  <domain name="EPQ" description="Enterprise Portal QA System">
    <agent mapping=".*EPQ.*"/>
    <grant user="Admin" permission="read"/>
    <grant user="Admin" permission="run_tracer"/>
  </domain>
  <SuperDomain>
    <agent mapping="(.)"/>
    <grant user="Admin" permission="read"/>
    <grant user="Admin" permission="run_tracer"/>

    <grant user="Guest" permission="read"/>
    <grant user="sapsupport" permission="full"/>
  </SuperDomain>
</domains>
```

Step 2: Replicate the management modules:

Step 2a: In the directory `<EM_HOME>/config/modules`, create one subdirectory for each domain. The folder name must be the domain name (in the example, folders EPP, EPQ).

Step 2b: copy all management modules from `<EM_HOME>/config/modules` to each subdirectory.

Step 3: Restart the Enterprise Manager to activate the changes.

Step 4: Check the Investigator in Workstation or WebView to see if the domains appear and if the agents are assigned to the right domain.

Note that the SuperDomain must always be the last entry in the domains file.

➤ User Management

User accounts must be maintained in the file `users.xml`, located in the subdirectory `<EM_HOME>/config/` of the Enterprise Manager. Permissions are controlled by the file `domains.xml` in the same directory. To create a new user `X` with password `Y`, proceed as follows:

1. Generate the SHA-encoded password by the script `tools/SHA2Encoder`:

```
SHA2Encoder Y
```

```
Y:57cec4137b614c87cb4e24a3d03a3e0
```

2. Add a new line to `users.xml` before the final `</users>` line, using the generated password string (the part after ``:``) as password:

```
<user name="X" password="
  abcdef15bcd349db90dfce73e1256e881c4416fc1f2d3a4946418349d9a"
 />
```

3. Add permissions for the user to the Superdomain in the `domains.xml` file:

```
<grant user="X" permission="read" />
<grant user="X" permission="run_tracer" />
<grant user="X" permission="historical_agent_control" />
<grant user="X" permission="live_agent_control" />
```

Note:

- All XML tags are case-sensitive.
- If there are any syntax or other errors in the `domains.xml` file, the Enterprise Manager does not start

Available Permissions

read

Users or groups can view all agents and business logic in the domain.

This permission includes tasks such as:

- Viewing Investigator tree (which shows agents in the domain user has access to)

- Viewing dashboards in the Console
- Viewing metric and element data in the Investigator Preview pane, including default Top N Filtered Views for certain resources in the Investigator tree
- Viewing any management module, agent, or element settings
- Viewing alert messages
- Refreshing historical data in a historical Data Viewer, and zoom in and out
- Changing historical date range options for historical Data Viewer
- Showing/Hiding metrics in a graph
- Moving metrics in a Data Viewer to the back or front
- Changing group and user preferences (setting a home dashboard, displaying management module names with dashboard names)

Note: Users or groups with read permission are able to see all commands in the Workstation. However, the commands that they do not have access to are disabled.

write

A user or group with write permission can do everything permitted by read permission can, and can also:

- view all agents and business logic in the domain
- create and edit dashboards (Please see SAP Note [2451758](#) about SED.)
- edit all monitoring logic in a domain (Please see SAP Note [2451758](#) about SED.)

run_tracer

Users or groups can start a Transaction Trace session for an agent.

Note: This permission also requires the assignment of read permission.

historical_agent_control

Users or groups can mount and unmount agent/s.

Note: This permission also requires the assignment of read permission.

live_agent_control

Users or groups can shut off reporting for metrics, resources, and agents within a domain

Note: This permission also requires the assignment of read permission.

dynamic_instrumentation

User or group can perform dynamic instrumentation.

For information about dynamic instrumentation, see the CA APM Introscope Java Agent Guide or CA APM Introscope .NET Agent Guide.

thread_dump

User or group can see and use the Thread Dumps tab.

For information about using and configuring thread dumps, see the CA APM Workstation Guide and the CA APM (Introscope) Java Agent Guide.

Note: This permission must include an underscore "_" between "thread" and "dump".

full

Users or groups have all possible permissions for the domain.

Note: If you do not have a full license for CA APM, you cannot use permission="full" or "write" here! Please see SAP Note [2451758](#) about SED.

➤ Enable Single Sign On from Solution Manager

The Enterprise Manager web server can accept single sign on tickets from Solution Manager systems. To enable this feature, the certificates from the ABAP / Java stack of the Solution Manager system have to be copied to the directory <EM_HOME>/sap/TrustedCerts in the Enterprise Manager. Currently, no automated procedure is available to perform these steps. For jump-in from Solution Manager Diagnostics, only the Java certificate have to be exported.

Copy the Certificate from the Java Stack

1. Open SAP NetWeaver Administrator (NWA)
2. Navigate to Configuration → Security -> Certificates and keys
3. Choose Key Storage *TicketKeystore* and View Entry *SAPLogonTicketKeypair-cert*
4. Choose the *Export Entry* button.

Copy the Certificate from the ABAP Stack

1. Call transaction STRUST
2. Double click the "Own Certificate" in the System PSE part of the screen such that it appears in the Certificate pane.
3. Click export to save the certificate as <hostname>.der.

Add the Certificates to the Enterprise Manager

Copy the exported certificates to the Enterprise Manager directory `<EM_HOME>/sap/TrustedCerts`. No restart is required. All authenticated users will be mapped to the CA APM user *Admin*.

➤ Enterprise Manager Cluster Setup

If the scalability limit of a single Enterprise Manager (clustering mode: **Standalone**) is reached, you have to set up additional EMs. You can either keep each EM isolated and connect it to Solution Manager, or connect multiple EMs to a cluster, appearing virtually as one EM. In this cluster, an additional EM acts as “Manager of Managers” (**MOM**). Only the MOM accepts Workstation and Solution Manager connections, whereas the other EMs in the cluster act as “**Collectors**”. Only collectors accept agent connections. To configure an EM cluster, proceed as follows:

1. Make sure the prerequisites are met:
 - a. Strict clock synchronization between all involved hosts (e.g. via NTP).
 - b. Fast LAN connection between all EMs
2. Configure the collector EMs.
In `<EM_HOME>/config/IntroscopeEnterpriseManager.properties`, set `introscope.enterprisemanager.clustering.mode=Collector`
3. Configure the MOM.
In `<EM_HOME>/config/IntroscopeEnterpriseManager.properties`, set `introscope.enterprisemanager.clustering.mode=MOM`

List connection data for all collector EMs, e.g.

```
introscope.enterprisemanager.clustering.login.em1.host=myhost1
introscope.enterprisemanager.clustering.login.em1.port=6001
introscope.enterprisemanager.clustering.login.em1.publickey=internal/server
/EM.public
introscope.enterprisemanager.clustering.login.em2.host=myhost2
introscope.enterprisemanager.clustering.login.em2.port=6001
introscope.enterprisemanager.clustering.login.em2.publickey=internal/server
/EM.public
```

Available Cluster Modes

StandAlone: Enterprise Manager runs in the stand alone mode

Collector: Enterprise Manager runs as a Collector

MOM: Enterprise Manager runs as a Manager

CDV: Enterprise Manager runs as a Cross-Cluster Data Viewer (not supported by Solution Manager)

Cluster Tuning

After setting up the cluster tuning should be done according to <http://wiki.scn.sap.com/wiki/display/TechOps/Performance+Tuning+for+EM+cluster>.