Symantec™ ApplicationHA 6.2 Agent for SAP HANA Configuration Guide - Linux on VMware

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Symantec

Symantec™ ApplicationHA Agent for SAP HANA Configuration Guide

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Contents

Chapter 1

Introducing the ApplicationHA Agent for SAP HANA

This chapter includes the following topics:

About the Symantec ApplicationHA agent for SAP HANA

The Symantec ApplicationHA agents monitor specific resources within an enterprise application. They determine the status of resources and start or stop them according to external events.

The Symantec ApplicationHA agent for SAP HANA provides high availability for SAP HANA database in a virtual machine. The agent brings SAP instances online, monitors the instances, and brings the instances offline. The agent monitors the

system processes and server states, and can shut down the server in case of a fault.

The agent supports the SAP HANA database instance.

The agent supports the following deployments of SAP HANA systems:

- Single-node SAP HANA systems

About installing and removing the ApplicationHA agent for SAP HANA

When you run the installer or uninstall program that accompanies the quarterly Agent Pack release of High Availability agents from Symantec, the latest version of the ApplicationHA agent for SAP HANA is automatically installed or removed. For more information, refer to the *Symantec ApplicationHA Agent Pack Installation Guide*.

Supported software

The Symantec ApplicationHA agent for SAP HANA supports the following software versions:

- Symantec ApplicationHA agent for SAP HANA can be installed and run inside virtual machines that have Symantec ApplicationHA 6.2 installed.
- The following versions of the Veritas Operations Manager components are supported:
  - Veritas Operations Manager Management Server 6.0 or later
  - Veritas Operations Manager managed host for Linux: 6.0 or later

Supported VMware versions

The following VMware Servers and management clients are currently supported:

- VMware ESX Server version 4.1 Update 3, 5.0 Update 2, and 5.1
- VMware ESXi Server version 5.0 Update 2, 5.1 Update 1 and 5.5
- VMware vCenter Server version 4.1 Update 2, 5.0, 5.1, and.5.5

  Note: VMware Fault Tolerance is not supported in case of vCenter Server 4.1

- VMware vSphere Client version 4.1 Update 2, 5.0, 5.1, and 5.5

- VMware vCenter Site Recovery Manager (SRM) 5.0 and 5.1

Note: SAP supports only certain VMware versions for use with SAP HANA. For VMware versions supported with SAP HANA, refer to the SAP documentation.

Supported guest operating systems for SAP HANA

The following operating systems are supported for SAP HANA.

- SUSE Linux Enterprise Server (SLES) 11 SP2
- SUSE Linux Enterprise Server (SLES) for SAP Applications 11 SP2 and SP3
- Red Hat Enterprise Linux (RHEL) 6.5 for SAP HANA

Note: 64-bit operating systems are only supported.

For more information on the supported software refer to Symantec Operations Readiness Tool (SORT):

https://sort.symantec.com/agents

If your system is running a lower level of either Red Hat Enterprise Linux or SUSE Linux Enterprise Server, as indicated in the above list, you must upgrade it before attempting to install Symantec ApplicationHA. Please refer SAP documentation for more information on upgrading or reinstalling your system.

Symantec supports only Red Hat, and SUSE distributed kernel binaries.

Symantec products operate on subsequent kernel and patch releases provided the operating systems maintain kernel ABI (application binary interface) compatibility.

How Symantec ApplicationHA makes SAP HANA highly available

The Symantec ApplicationHA agent for SAP HANA continuously monitors the SAP HANA instances processes to verify that they function properly.

The agent provides the following level of application monitoring:

- Primary or Basic monitoring
  This mode has Process check and Health check monitoring options. With the default Process check option, the agent verifies that the SAP HANA instances processes are present in the process table. Process check cannot detect whether processes are in hung or stopped states.

- Secondary or Detail monitoring
  In this mode, the agent runs a utility to verify the status of an SAP HANA instance. The agent detects application failure if the monitoring routine reports an improper function of the SAP HANA instance processes. When this application failure occurs, the ApplicationHA agent for SAP tries to restart the SAP HANA instances. If it further fails, a virtual machine reboot is triggered. Thus, the agent ensures high availability for the SAP HANA instances.

Note: By default, the ApplicationHA wizard configures SAP HANA instances for basic monitoring. To enable secondary monitoring, use CLI / Veritas Operations Manager.

SAP HANA agent functions

The agent consists of resource type declarations and agent executables. The agent executables are organized into online, offline, monitor, and clean functions.

Online

The online function performs the following tasks:

- Performs a preliminary check to ensure that the SAP HANA instance is not online on the specified node in the cluster.
- Removes any SAP HANA processes that remain because of an unclean shutdown for resources with the sapstartsrv ProcMon. The SAP processes are removed as follows:
  - The `cleanipc` utility gets executed. Otherwise, the agent kills all relevant SAP HANA processes.
- Starts the sapstartsrv process for the Web-based SAP Management console.
- Starts the SAP HANA instance using the `sapcontrol` command.
- Ensures that the instance is fully initialized.

Offline

The offline function performs the following tasks:

- Checks if the SAP HANA instance is already offline.
- Executes the `sapcontrol` command to stop the relevant instance process.
- Waits for the SAP HANA instance to go offline successfully.

- Ensures that no relevant SAP HANA processes are running. If any processes remain, the operation kills the remaining processes using a SIGKILL signal.
- Executes the `cleanipc` utility for resources with sapstartsrv ProcMon.

Monitor

The monitor function monitors the state of the SAP HANA instance on all nodes in the cluster. The function performs the following tasks:

- Depending upon the search criteria that the ProcMon attribute specifies, the monitor function scans the process table to verify that the SAP HANA instance processes are running. For more information about setting the ProcMon attribute:
  The agent also supports IMF in the first level check. IMF enables intelligent resource monitoring. You can use the MonitorFreq key of the IMF attribute to specify the frequency at which the agent invokes the monitor function.
- If the LevelTwoMonitorFreq attribute is greater than 0, the monitor function performs a thorough health check of the SAP HANA instance using the `sapcontrol` utility.
- The monitor function executes a custom monitor utility.

Clean

The clean function performs the following tasks:

- Sends a SIGINT signal to the `sapstart` process, if the process exists. Otherwise, the function sends a SIGINT signal to all running processes that are relevant to the specified SAP HANA instance.
- Ensures that no relevant SAP HANA processes are running. If any processes is running, the operation kills all the remaining processes using the SIGKILL signal.
- Executes the `cleanipc` utility for resources with the sapstartsrv ProcMon.

imf_init

This function initializes the SAP HANA agent to interface with the AMF kernel driver, which is the IMF notification module for the agent for SAP HANA. This function runs when the agent starts up.

imf_getnotification

This function gets notifications about resource state changes. This function runs after the agent initializes with the AMF kernel module. This function continuously waits for notification and takes action on the resource upon notification.

imf_register

This function registers or unregisters resource entities with the AMF kernel module. This function runs for each resource after the resource goes into a steady online or offline state.

Executing a customized monitoring program

The monitor function can execute a customized monitoring utility to perform an additional SAP HANA instance state check.

The monitor function executes the utility specified in the MonitorProgram attribute if the following conditions are satisfied:

- The specified utility is a valid executable file.
- The first-level process check indicates that the SAP server instance is online.
- The LevelTwoMonitorFreq attribute is either set to 0 or 1, and the second-level check indicates that the SAP server instance is online.
- The LevelTwoMonitorFreq attribute is set to greater than 1, but the second-level check is deferred for this monitoring cycle.

The monitor function interprets the utility exit code as follows:

110 or 0	SAP HANA instance is online
100 or 1	SAP HANA instance is offline
99	SAP HANA instance is unknown
Any other value	SAP HANA instance is unknown

To ensure that the customized utility is always available to the agent, recommends storing the file in a shared directory that is available on an online node.

Setting up SAP HANA for ApplicationHA

Follow the steps below to set up SAP HANA in virtualization scenario for ApplicationHA:

- Set up a virtualization environment for ApplicationHA. Refer to the *Symantec ApplicationHA Installation and Upgrade Guide* for more information on installing and configuring ApplicationHA.
- Install and configure SAP HANA for ApplicationHA.
  See "About SAP HANA" on page 15.

Chapter 2

Installing and configuring SAP HANA for high availability

This chapter includes the following topics:

About SAP HANA

SAP HANA is a modern, in-memory database and platform that can be deployed on premise or cloud. The SAP HANA platform is a flexible data source and in-memory data platform that allows users to analyze large volumes of data in real time. It also acts as a development platform that provides infrastructure and tools for building high-performance applications based on SAP HANA Extended Application Services (SAP HANA XS).

It is the foundation of various SAP HANA editions, such as the SAP HANA Platform Edition, which provides core database technology, and the SAP HANA Enterprise Edition, which bundles additional components for data provisioning. The SAP HANA Platform Edition integrates a number of SAP components, such as the SAP HANA database, SAP HANA studio, and SAP HANA clients.

Uniquely identifying SAP HANA instances

For multiple instances running concurrently on a single node, the agent must be able to uniquely identify each SAP HANA database instance on that system.

Each instance has a unique instance name (InstName) and SAP System ID (SID). The instance names may follow the conventional form. For example, SAP HANA database instance are typically named HDB. The SAPSID and InstName form a unique identifier that can identify the processes running for a particular instance.

Instance names often include an instance ID suffix which is an integer between 00-99. For example, a SAP HANA database instance with an instance ID = 06 may have an instance name of HDB06.

Some examples of SAP HANA instance is given as follows:

InstName	InstType
HDB06	SAP HANA Database Instance

Differentiating SAP HANA database instances is important to identify each instance uniquely. When the agent kills the processes of a non-responsive or failed instance in the absence of unique names for each server, the agent may kill processes for more than one SAP HANA database instance during a clean operation.

Prerequisites for installing SAP HANA with Symantec ApplicationHA

The following criteria must be set while installing SAP HANA instances:

- SAP HANA instance must be installed with the host name of the virtual machine.
- SAP HANA instance must be installed with the default path (/hana/shared).

Note: For information on installing SAP HANA, refer to SAP documentation.

Monitoring an SAP HANA instance

The monitor operation performs the process-level check to ensure proper functioning of an SAP HANA instance.

The ProcMon attribute specifies the processes that must be running successfully for a particular SAP HANA instance. The monitor operation uses this list of processes to scan the process table, and verify that the processes are running successfully. Setting the ProcMon attribute is optional.

The following are the valid values of the ProcMon attribute.

- sapstartsrv
- hdbstatisticsserver
- hdbpreprocessor
- hdbcompileserver
- hdbxsengine
- sapwebdisp_hdb
- hdbwebdispatcher

By default, the agent monitors the sapstart, hdb.sap, and hdbnameserver processes.

The sapstartsrv process should not be specified with any other *hdb* processes.

The monitor operation takes a snapshot of the running processes table. The operation compares the processes that the ProcMon attribute specifies, to the set of running UNIX processes. If any process is missing, the operation declares the SAP HANA instance as offline and bypasses further monitor operations.

Chapter 3

Configuring application monitoring with Symantec ApplicationHA for SAP HANA

This chapter includes the following topics:

About configuring application monitoring with ApplicationHA

This chapter describes the steps to configure application monitoring with ApplicationHA in a virtualization environment.

Consider the following points before you proceed:

- You configure an application for monitoring on a virtual machine using the Symantec ApplicationHA Configuration Wizard.
- You can launch the Symantec ApplicationHA Configuration Wizard from the VMware vSphere Client or from the Veritas Operations Manager Management

Server console. See "Launching the Symantec ApplicationHA Configuration Wizard" on page 20.

- In this release, the wizard allows you to configure monitoring for only one application per virtual machine.
  To configure another application using the wizard, you must first unconfigure the existing application monitoring.

Note: For restrictions regarding installations of additional applications or SAP HANA instances to a virtual machine running an SAP HANA instance, refer to the SAP documentation.

- After you have configured monitoring for an application using the wizard, you can configure monitoring for other applications residing in the same virtual machine, using Symantec Cluster Server (VCS) commands.
  For more information read the following technote:
  http://www.symantec.com/docs/TECH159846
- After configuring SAP HANA for monitoring, if you create another SAP HANA server instance, these new components are not monitored as part of the existing configuration.
  In such a case, you must first unconfigure the existing configuration and then reconfigure the application using the wizard. You can then select all the instances for monitoring.

Before configuring application monitoring for SAP HANA

Ensure that you complete the following tasks before configuring application monitoring for SAP HANA on a virtual machine:

- Install ApplicationHA Console.
- Install ApplicationHA guest components on the virtual machine that you need to monitor.
- Install VMware Tools on the virtual machine. Install a version that is compatible with VMware ESX server.
- Install the VMware vSphere Client.
- Assign ApplicationHA - Configure Application Monitoring (Admin) privileges to the logged-on user on the virtual machine where you want to configure application monitoring.

- Install the application and the associated components that you wish to monitor on the virtual machine.
- If you have configured a firewall, ensure that your firewall settings allow access to ports used by ApplicationHA installer, wizards, and services.
  Refer to the *Symantec ApplicationHA Installation and Upgrade Guide* for a list of ports and services used.

Launching the Symantec ApplicationHA Configuration Wizard

You can launch the Symantec ApplicationHA Configuration Wizard using:

- VMware vSphere Client:
- Veritas Operations Manager (VOM) Management Server console:

To configure application monitoring for SAP HANA

1. Launch the VMware vSphere Client and connect to the VMware vCenter Server that hosts the virtual machine.

   The vSphere Client is used to configure and control application monitoring.
2. From the vSphere Client's Inventory view in the left pane, select the virtual machine where you want to configure application monitoring for SAP HANA.
3. From the vSphere Client's Management view in the right pane, click the **Symantec High Availability** tab.

   The Symantec High Availability view displays the status of all the supported applications that are installed on the selected virtual machine.
4. In the Symantec High Availability view, click **Configure Application Monitoring**.

   This launches the Symantec ApplicationHA Configuration Wizard.

To launch the wizard from the VOM Management Server console

1. Log on to the VOM Management Server console.
2. Select the Server perspective and expand Manage in the left pane.
3. Expand the Organization, or Uncategorized Hosts to navigate to the virtual machine.

4 Right-click the required virtual machine, and then click **Manage ApplicationHA**.

The Veritas High Availability view appears.

5 Click **Configure Application Monitoring**.

This launches the Symantec ApplicationHA Configuration Wizard.

Configuring application monitoring for SAP HANA

Perform the following steps to configure monitoring for SAP HANA on a virtual machine.

To configure application monitoring for SAP HANA

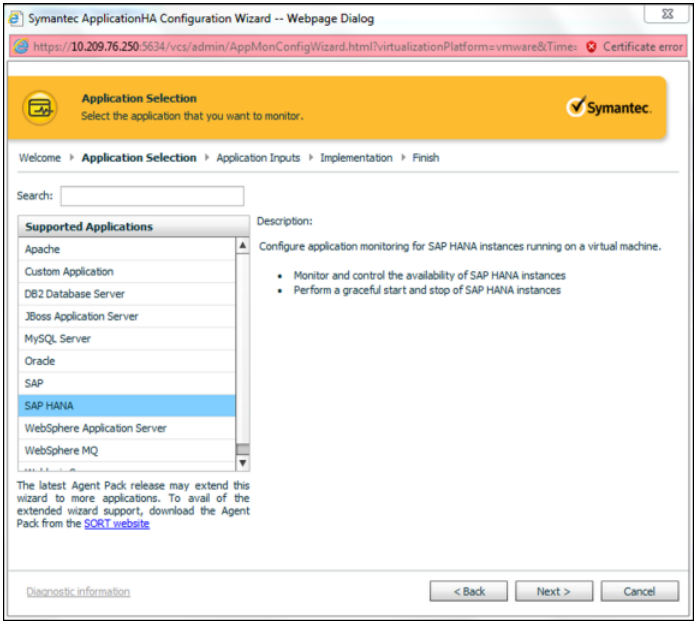
1 Launch the Symantec ApplicationHA Configuration Wizard.

2 Review the information on the Welcome screen and then click **Next**.

The wizard lists all the supported applications for the system.

3 Select SAP HANA, and then click **Next**.

The SAP HANA Instance Selection screen shows SAP HANA instances.



4 Select the SAP HANA instances that you want to monitor and then click **Next**.

5 The wizard performs the application monitoring configuration tasks. The ApplicationHA Configuration screen displays the status of each task.

After all the tasks are complete, click **Next**.

Note: If the configuration tasks fail, click **Diagnostic information** to check the details of the failure.

You then have to run the wizard again to configure the application monitoring.

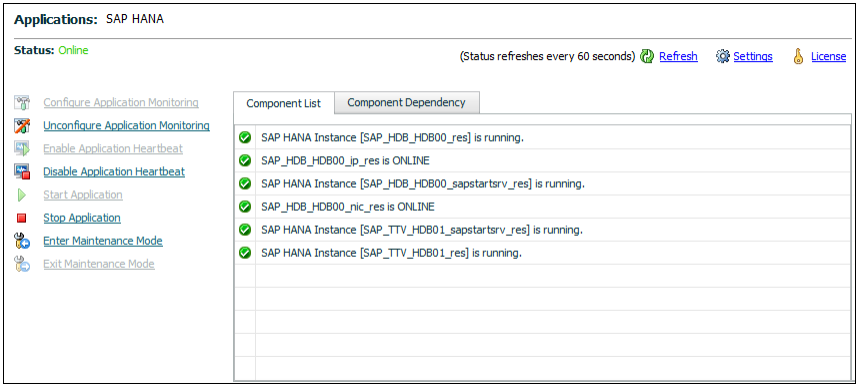
---

6 Click **Finish** to complete the wizard.

This completes the application monitoring configuration.

7 To view the status of the configured application on a virtual machine, in the inventory view of the vSphere Client, click the appropriate virtual machine, and then click the **Symantec High Availability** tab.

The Symantec High Availability view appears.

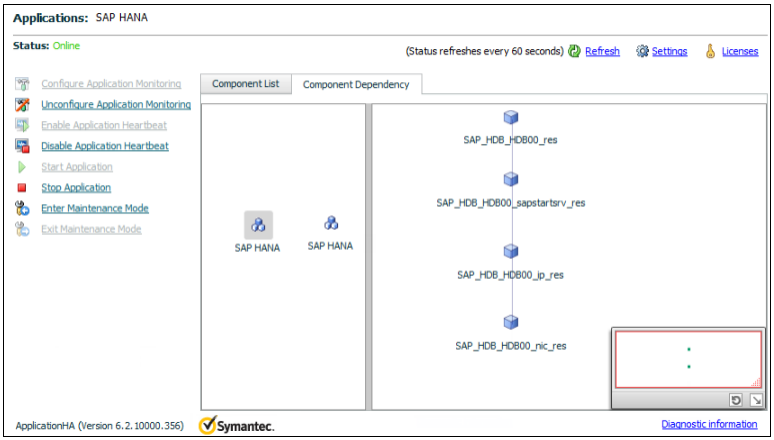


By default, the Component List tab appears. The tab lists each component of the configured application and the status description of each component.

For more information on viewing and administering applications by using the vSphere Client, refer to the *Symantec ApplicationHA User's Guide*.

8 To view component dependency for the monitored application, click the **Component Dependency** tab.

The component dependency graph appears.



The graph illustrates the dependencies between a selected component group (an application or a group of inter-related components) and its components for the configured application. The left pane displays component groups and/or configured applications. The right pane displays components of the selected component group or application.

For more information on viewing component dependency for any configured application, refer to the *Symantec ApplicationHA User's Guide*.

Chapter 4

Troubleshooting the agent for SAP HANA

This chapter includes the following topics:

Using the correct software and operating system versions

Ensure that no issues arise due to incorrect software and operating system versions. For the correct versions of operating system and software to be installed on the resource systems refer to SORT:

https://sort.symantec.com/agents

Reviewing error log

If you face problems while using the agent for SAP HANA, use the log files described in this section to investigate the problems.

Using SAP HANA trace files

If a SAP HANA instance is facing problems, you can access the server trace files to further diagnose the problem. The SAP HANA trace files are located in the `/usr/sap/<SAPSID>/<InstName>/<hostname>/trace` directory.

For example:

```
/usr/sap/HDB/HDB00/saphana2/trace
```

Reviewing ApplicationHA log files

In case of problems while using the agent for SAP HANA, you can access log files. The ApplicationHA log files are located in the `/var/VRTSvcs/log` directory.

Using trace level logging

The ResLogLevel attribute controls the level of logging that is written in a cluster log file for each SAP HANA resource. You can set this attribute to TRACE, which enables very detailed and verbose logging.

Note: The TRACE level logs are generated locally at the location `/var/VRTSvcs/log/SAPHDB_A.log`.

Warning: You may consider temporarily increasing the timeout values for SAPHDB for debugging purposes. After the debugging process is complete, you can revert back to the original timeout values. To change the timeout value, use CLI/Veritas Operation Manager. For more information, refer to the Veritas Cluster Server documentation.

To localize ResLogLevel attribute for a resource

1. Identify the resource for which you want to enable detailed logging.
2. Localize the ResLogLevel attribute for the identified resource:

   ```
   # hares -local Resource_Name ResLogLevel
   ```

3. Set the ResLogLevel attribute to TRACE for the identified resource:

   ```
   # hares -modify Resource_Name ResLogLevel TRACE -sys SysA
   ```

4. Note the time before you begin to operate the identified resource.
5. Test the identified resource. The function reproduces the problem that you are attempting to diagnose.
6. Note the time when the problem is reproduced.

7 Set the ResLogLevel attribute back to INFO for the identified resource:

```
# hares -modify Resource_Name ResLogLevel INFO -sys SysA
```

8 Review the contents of the log file. Use the time noted in Step 4 and Step 6 to diagnose the problem.

You may also contact your support provider for more help.

Appendix A

Resource type definitions

This appendix includes the following topics:

About the resource type and attribute definitions

The resource type represents the configuration definition of the agent and specifies how the agent is defined in the configuration file. The attribute definitions describe the attributes associated with the agent. The required attributes describe the attributes that must be configured for the agent to function.

Resource type definition for SAP HANA

After importing the agent type file into the cluster, if you save the configuration on your system disk using the `haconf -dump` command, you can find the SAPHDBTypes.cf file in the `/etc/VRTSvcs/conf/config` cluster configuration directory.

An excerpt from this file is as follows:

```
type SAPHDB (
   static int IMF{} = { Mode=2, MonitorFreq=5, RegisterRetryLimit=3 }
   static str IMFRegList[] = { InstProfile }
   static str AgentDirectory = "/opt/VRTSagents/ha/bin/SAPHDB"
   static str AgentFile = "/opt/VRTSvcs/bin/Script60Agent"
   static keylist SupportedActions = { GetReplicationStatusInfo }
   static str ArgList[] = { ResLogLevel, State, IState,
                            EnvFile, InstProfile, ProcMon,
                            SystemReplicationMode, SystemReplication,
```

```
                        TakeOverInInactiveState,
                        DifferenceInTimestamp, MonitorProgram }
    static boolean AEPTimeout = 1
    str ResLogLevel = INFO
    str EnvFile
    str InstProfile
    str ProcMon
    str SystemReplicationMode
    boolean SystemReplication = 0
    boolean TakeOverInInactiveState = 0
    int DifferenceInTimestamp = 65535
    str MonitorProgram
)
```

Appendix B

Detail monitoring

This appendix includes the following topics:

Setting the PATH variable

VCS commands reside in the `/opt/VRTS/bin` directory. Add this directory to your PATH environment variable.

To set the PATH variable

- Perform one of the following steps:

  For the Bourne Shell (sh or ksh), type:

  ```
  $ PATH=/opt/VRTS/bin:$PATH; export PATH
  ```

  For the C Shell (csh or tcsh), type:

  ```
  $ setenv PATH :/opt/VRTS/bin:$PATH
  ```

Setting up detail monitoring for ApplicationHA agent for SAP HANA

This section describes the procedure to enable and disable detail monitoring for SAP HANA.

To enable detail monitoring for SAP HANA

1. Make the ApplicationHA configuration writable:

   ```
   haconf -makerw
   ```

2. Freeze the service group to avoid automated actions by ApplicationHA in case of an incomplete configuration:

   ```
   hagrp -freeze SAP_<SAPSID>_SG
   ```

3. Enable detail monitoring for SAP resources by using the following ApplicationHA commands:

   ```
   hares -override SAP_<SAPSID>_res LevelTwoMonitorFreq

   hares -modify SAP_<SAPSID>_res LevelTwoMonitorFreq <frequency>
   ```

4. Save the configuration and unfreeze the service group.

   ```
   haconf -dump -makero

   hagrp -unfreeze SAP_<SAPSID>_SG
   ```

To disable detail monitoring for SAP HANA

1. Make the ApplicationHA configuration writable:

   ```
   haconf -makerw
   ```

2. Freeze the service group to avoid automated actions by ApplicationHA in case of an incomplete configuration:

   ```
   hagrp -freeze SAP_<SAPSID>_SG
   ```

3. Enable detail monitoring for SAP resources by using the following ApplicationHA commands:

   ```
   hares -modify SAP_<SAPSID>_res LevelTwoMonitorFreq 0
   ```

4. Save the configuration and unfreeze the service group.

   ```
   haconf -dump -makero

   hagrp -unfreeze SAP_<SAPSID>_SG
   ```