Symantec™ ApplicationHA Agent for SAP NetWeaver Configuration Guide

Linux

5.1 Service Pack 2

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Symantec

Symantec™ ApplicationHA Agent for SAP NetWeaver Configuration Guide

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Chapter 1

Introducing the ApplicationHA Agent for SAP NetWeaver

This chapter includes the following topics:

- About the Symantec ApplicationHA agent for SAP NetWeaver
- About installing and removing the ApplicationHA agent for SAP NetWeaver
- Supported software
- How Symantec ApplicationHA makes SAP NetWeaver highly available
- SAP NetWeaver agent functions
- Typical SAP server configuration in a VMware virtualization scenario
- Setting the SAPMonHome attribute
- Executing a customized monitoring program
- Setting up SAP NetWeaver for ApplicationHA

About the Symantec ApplicationHA agent for SAP NetWeaver

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 NetWeaver provides monitoring and control for SAP R/3 and SAP NetWeaver in a virtual machine. The agent for SAP NetWeaver is designed to support a wide range of SAP environments, including the traditional Basis architecture and the SAP J2EE Web Application Server architecture (NetWeaver).

The Symantec ApplicationHA agent for SAP NetWeaver 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 SAP instances are as follows:

- Central instance
- Dialog instance

The agent supports the following SAP Web Application Servers:

- ABAP
- Java
- Java Add-In (ABAP + Java)

About installing and removing the ApplicationHA agent for SAP NetWeaver

When you install or uninstall Symantec ApplicationHA, the ApplicationHA agent for SAP NetWeaver is automatically installed or removed. For more information, see the *Symantec ApplicationHA Installation and Upgrade Guide*.

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 NetWeaver is automatically installed or removed. For more information, see the *Symantec ApplicationHA Agent Pack Installation Guide*.

Supported software

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

Symantec ApplicationHA	■ 5.1 Service Pack 2

VMware ESX and VMware ESXi	■ 4.1 ■ 4.1 U1
Operating Systems	■ Red Hat Enterprise Linux (RHEL) 5 with Update 3 (2.6.18-128.el5 kernel) or later; architecture: x86_64 ■ SUSE Linux Enterprise Server (SLES) 11 Service Pack 1 (2.6.32.12-0.7 kernel) or later; architecture: x86_64 ■ Oracle Enterprise Linux (OEL) 5 with Update 3 (2.6.18-128.0.0.0.1.el5) or later; architecture: x86_64
SAP NetWeaver	■ 2004, 2004s and all support releases (SRx) are supported.

SAP NetWeaver components compatibility matrix

Table 1-1 lists the compatibility matrix for SAP NetWeaver technology components.

Table 1-1 Compatibility matrix for SAP NetWeaver technology components

EP	BW/BI	XI/PI	MDM/MDS	SAP Kernel/SAP Web AS
7.0	7.0	7.0	5.5, 7.1	7.00
-	-	-	2.0	6.40
6.0	3.5	3.0	-	6.40 6.20
-	3.1	-	-	6.20

Table 1-2 lists the compatibility matrix for SAP NetWeaver application components.

Table 1-2 Compatibility matrix for SAP NetWeaver application components

R/3 and Enterprise ECC	SCM/APO	SRM	CRM/EBP	KW	Solution Manager	SAP Kernel/SAP Web AS
6.0 (ERP 2005) 6.0 EhPx	5.0 5.1 (SCM 2007) 7.0	5.0 6.0 (SRM 2007) 7.0	5.0 (CRM 2005) CRM 2007 7.0	-	7.0 (formerly 4.0) 7.0 EhPx	7.00

Table 1-2 Compatibility matrix for SAP NetWeaver application components *(continued)*

R/3 and Enterprise ECC	SCM/APO	SRM	CRM/EBP	KW	Solution Manager	SAP Kernel/SAP Web AS
5.0 (ERP 2004) 4.7x200	4.1	4.0 SR1	4.0	7.0	3.20	6.40 6.20
4.7x110	4.0	4.0 3.1	3.0	-	3.10	6.20
4.6C	3.1	-	-	-	-	4.6D

How Symantec ApplicationHA makes SAP NetWeaver highly available

The Symantec ApplicationHA agent for SAP NetWeaver continuously monitors the SAP instance 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 instance 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 instance. The agent detects application failure if the monitoring routine reports an improper function of the SAP instance processes. When this application failure occurs, the ApplicationHA agent for SAP tries to restart the SAP instance. If it further fails, a virtual machine reboot is triggered. Thus, the agent ensures high availability for the SAP instance.

Note: By default, the ApplicationHA wizard configures any SAP instance for basic monitoring. To enable secondary monitoring, use CLI / Veritas Operations Manager. For more information, See "Setting up detail monitoring for ApplicationHA agent for SAP" on page 39.

SAP NetWeaver 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 instance is not online on the virtual machine.
- Removes any SAP processes that remain because of an unclean shutdown as follows:
  - If the SAP instance is Central or Dialog the `cleanipc` utility gets executed. Otherwise, the agent kills all relevant SAP processes.
  - If the kill.sap file exists in the /usr/sap/SAPSID/InstName/work directory, the function removes the file from the directory.
- Removes the SE and CO locks files from the /usr/sap/SAPSID/InstName/data directory.
- Initiates the standard SAP error log process.
- Starts the SAP O/S Collector that pipes the standard output and standard error messages to the SAP error log file.
- Starts the SAP instance using the `sapstart` command.
- Ensures that the instance is fully initialized.

Offline

The offline 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 instance.
- Waits for the SAP instance to go offline successfully.
- Ensures that no relevant SAP processes are running. If any processes remain, the operation kills the remaining processes using a SIGKILL signal.
- If the `kill.sap` file exists in the /usr/sap/SAPSID/InstName/work directory, the operation removes the file from the directory.
- Removes the SE and CO locks files from the /usr/sap/SAPSID/InstName/data directory.

- If the SAP instance is Central or Dialog the operation executes the `cleanipc` utility.
- Augments the SAP log, with the shutdown information.

Monitor

The monitor function monitors the state of the SAP instance on a configured virtual machine. 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 instance processes are running. For more information about setting the ProcMon attribute, See "Monitoring a SAP instance" on page 21. See "Monitoring an SAP instance" on page 28.
- If the SecondLevelMonitor attribute is greater than 0, the monitor function performs a thorough health check of the SAP instance as follows:
  - For Central or Dialog instances, the function uses the following utilities to perform this check:

Server installation type	SAP utility used
SAP Web Application Server as ABAP	sapinfo and dpmon
SAP Web Application Server as Java	jcmon
SAP Web Application Server as Java Add-In	sapinfo, dpmon, msprot, and jcmon

Note: To enable Second level monitoring, use CLI/Veritas Operations Manager (VOM).

- The monitor function executes a custom monitor utility.
  See "Executing a customized monitoring program" on page 16.

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 instance.

- Ensures that no relevant SAP processes are running. If any processes remain, the operation kills all the remaining processes using a SIGKILL signal.
- If the `kill.sap` file exists in the /usr/sap/SAPSID/InstName/work directory, the operation removes the file from the directory.
- Removes the SE and CO lock files from the /usr/sap/SAPSID/InstName/data directory.
- If the SAP Instance is a Central or Dialog instance, the operation executes the `cleanipc` utility.
- Augments the SAP log.

Typical SAP server configuration in a VMware virtualization scenario

A typical SAP server configuration in a VMware virtualization scenario has the following characteristics:

- The sapmnt directory is installed on shared storage and mounted on the virtual machines via Network File System (NFS).
- The SAP NetWeaver application server instance binaries are installed locally.

Setting the SAPMonHome attribute

The SAPMonHome attribute contains the absolute path to the directory that contains the binary used for second level monitoring process.

The binaries that are used during second level monitoring for different installation types and SAP instances are as follows:

- For ABAP: sapinfo, dpmon
  sapinfo is not a standard binary shipped by SAP with installation media. You need to download the latest rfcsdk kit from the following site:
  http://service.sap.com/swdc -> Support Packages and Patches -> Entry by Application Group -> Additional Components
  For more information on selecting the right RFCSDK for your SAP application, refer to SAP notes 1005832, 825494 and 413708.
  Copy the sapinfo binary and the needed libraries, if any, to SAP Instance specific directory /usr/sap/*SAPSID*/*InstName*/exe.
  Also, ensure that the binaries and the libraries are copied to the SAP system central location /sapmnt/*SAPSID*/exe and the names of the binaries and

libraries are listed in the Instance specific sapcpe binary list file (For example, instance.lst).

- For Java: jcmon
- For Add-In (ABAP + Java): sapinfo, dpmon, msprot, and jcmon

Table 1-3 shows recommended values for the SAPMonHome attribute.

Table 1-3 Recommended values for SAPMonHome attribute

SAP installation type and instance	Format	Value of the SAPMonHome attribute
SAP ABAP	Unicode and non-Unicode	/usr/sap/SAPSID/SYS/exe/run
SAP Java	Unicode	/usr/sap/SAPSID/SYS/exe/run
SAP Java Add-In	Unicode and non-Unicode	/usr/sap/SAPSID/SYS/exe/run

Executing a customized monitoring program

The monitor function can execute a customized monitoring utility to perform an additional SAP server 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 SecondLevelMonitor 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 server instance is online
100 or 1	SAP server instance is offline
99	SAP server instance is unknown
Any other value	SAP server instance is unknown

Setting up SAP NetWeaver for ApplicationHA

Follow the steps below to set up SAP NetWeaver 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 NetWeaver for ApplicationHA.
  See "About installing SAP NetWeaver for ApplicationHA" on page 22.

Chapter 2

Installing and configuring SAP NetWeaver for high availability

This chapter includes the following topics:

- About SAP NetWeaver
- Uniquely identifying SAP server instances for ApplicationHA
- Monitoring a SAP instance
- About installing SAP NetWeaver for ApplicationHA

About SAP NetWeaver

All SAP NetWeaver components (example, BI, XI, EP) run on top of the SAP NetWeaver Application Server.

The following SAP system installations are possible with SAP NetWeaver Application Server (AS):

- SAP NetWeaver Application Server ABAP (ABAP only)
- SAP NetWeaver AS Java (Java only)
- SAP NetWeaver Application Server Add-In (ABAP and Java)

Depending on the SAP NetWeaver component to be installed, the Web Application Server type is determined. For example, SAP NetWeaver EP 6.0 requires a Java stack, hence SAP NetWeaver AS Java (or Add-In) needs to be installed. SAP NetWeaver XI 3.0 requires SAP NetWeaver AS Add-In.

SAP system components

An SAP application instance has multiple services or components which are typically deployed across multiple servers.

SAP identifies the following services as critical to the application environment, representing potential single points of failure:

- Database Instance
- Central Instance (DVEBMGSxx or JCxx)
- Central Services Instance (SCSxx or ASCSxx)
- Enqueue Replication Server (ERSxx)
- Dialog Instance (Dxx or Jxx)
- Network File System (NFS) or Common Internet File System (CIFS) services

Where *xx* takes the value of an SAP Instance number ranging from 00 to 99.

Note: ApplicationHA SAP agent supports only Application Servers (Central and Dialog).

Uniquely identifying SAP server instances for ApplicationHA

For instance running on a virtual machine, the agent must be able to uniquely identify each SAP instance on that system.

Each instance has a unique instance name. The instance names may follow the conventional form. For example, Dialog instances begin with 'D', and Central instances are typically named DVEBMGS.

Instance names often include an instance ID suffix which is an integer between 00-99. For example, a Central instance with an instance ID = 00 may have an instance name of DVEBMGS00.

The SAPSID and InstName form a unique identifier that can identify the processes running for a particular instance.

Some examples of SAP instances are given as follows:

SAP Instance name	SAP Instance type
DVEBMGS00	SAP BASIS Central instance - ABAP
DVBGS01	SAP BASIS Central instance without Enqueue and ABAP Message Server

JC02	SAP Central instance - Java
D05	SAP Dialog instance - ABAP
J06	SAP Dialog instance - Java

Differentiating SAP instances is important to identify an instance.

Monitoring a SAP instance

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

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

Table 2-1 lists valid values of the ProcMon attribute

Table 2-1 Values of ProcMon attribute

SAP installation type	SAP instance type	Value of ProcMon attribute
ABAP	Central	dw ms* ig co se gwrd icman are optional
ABAP	Dialog	dw ig se gwrd icman are optional
Java	Central	jc ig is optional
Java	Dialog	jc ig is optional
Add-In (ABAP +Java)	Central	dw jc ig co se gwrd icman are optional
Add-In (ABAP +Java)	Dialog	dw jc ig se gwrd icman are optional

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 instance as offline, and bypasses further monitor operations.

About installing SAP NetWeaver for ApplicationHA

You can install SAP NetWeaver in the following ways, in a virtual machine.

SAP instance installation	Install the SAP instance binaries on local disk or shared disk.

Note: If SAP binaries are installed on a shared disk, ensure that the shared disks get auto mounted during the operating system boot. For automounting disks, add appropriate entries into /etc/fstab. By default, ApplicationHA does not monitor mount resources. To add mount resources for monitoring, use CLI / Veritas Operation Manager. For more information about mount resource attributes, refer to *Veritas Cluster Server* documentation.

Note: If you specify the virtual hostname and IP address while configuring a SAP Application Server instance for monitoring, then ensure the following: 1) The IP address is correctly plumbed at system bootup, 2) The virtual hostname is pingable from the virtual machine.

When installing SAP NetWeaver on a virtual machine, ensure that the login_id, id_name, group_id, and group_name for the sidadm is the same as the machine running the central instances.

The user sidadm and the group 'sapsys' must be local and not Network Information Service (NIS and NIS+) users.

For more details refer to the product documentation.

Chapter 3

Configuring application monitoring with Symantec ApplicationHA

This chapter includes the following topics:

- About configuring application monitoring with ApplicationHA
- Before configuring application monitoring for SAP
- Configuring application monitoring for SAP

About configuring application monitoring with ApplicationHA

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

Consider the following points before you proceed:

- You configure an application for monitoring on a virtual machine using the Application Monitoring Configuration Wizard.
- The Application Monitoring Configuration Wizard is launched when you click **Configure Application Monitoring** on the ApplicationHA tab of the VMware vSphere Client.
- 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.

- 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 Veritas Cluster Server (VCS) commands.
  For more information read the following technote:
  http://www.symantec.com/docs/TECH159846
- After configuring SAP for monitoring, if you create another SAP application 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

Ensure that you complete the following tasks before configuring application monitoring for SAP 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.
- If you do not have the latest version of ApplicationHA agent for SAP NetWeaver installed, then run the agent pack installer on the virtual machine that you need to monitor.
- 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.

Configuring application monitoring for SAP

Perform the following steps to configure monitoring for SAP on a virtual machine hosted on a VMware vCenter Server managed ESX 4.1 Server.

To configure application monitoring for SAP

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.

3. From the vSphere Client's Management view in the right pane, click the **ApplicationHA** tab.

   The ApplicationHA view displays the status of all the supported applications that are installed on the selected virtual machine.

4. In the ApplicationHA view, click **Configure Application Monitoring**.

   This launches the Application Monitoring Configuration Wizard.

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

   The wizard lists all the supported applications for the system.

6. Select SAP, and then click **Next**.

   The SAP Instance Selection screen appears.

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

8. 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 **View Logs** to check the details of the failure.

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

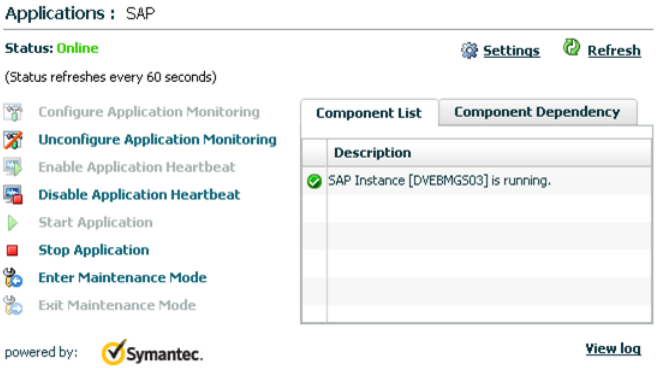
   ---

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

   This completes the application monitoring configuration.

10 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 **ApplicationHA** tab.

The ApplicationHA view appears.

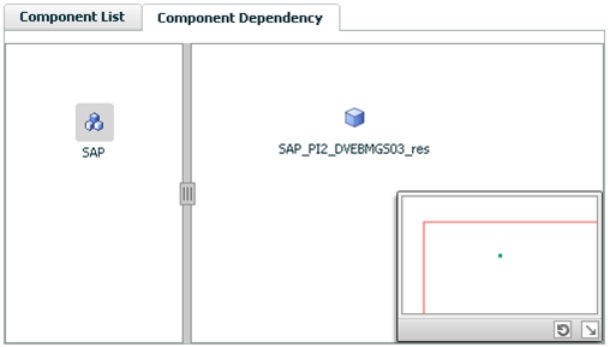


By default, the Component List tab appears. The tab lists each component of the configured application and the status description of each component.

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

11 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, see the *Symantec ApplicationHA User's Guide*.

Chapter 4

Troubleshooting the agent for SAP NetWeaver

This chapter includes the following topics:

- Using the correct software and operating system versions
- Reviewing error log

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:

See "Supported software" on page 10.

Reviewing error log

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

Using SAP server log files

If a SAP server is facing problems, you can access the server log files to further diagnose the problem. The SAP log files are located in the `/usr/sap/SAPSID/InstName/work` directory.

Reviewing ApplicationHA log files

In case of problems while using the agent for SAP, 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 server 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/SAPNW04_A.log`.

Warning: You may consider temporarily increasing the timeout values for SAPNW04 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
- Resource type definition for SAP NetWeaver

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 NetWeaver

After importing the agent types into the cluster, if you save the configuration on your system disk using the `haconf -dump` command, you can find the SAPNW04Types.cf file in the /etc/VRTSvcs/conf/config cluster configuration directory.

An excerpt from this file follows.

```
type SAPNW04 (
static str ArgList[] = { ResLogLevel, State, IState,
EnqSrvResName, EnvFile, InstName, InstType,
MonitorProgram, ProcMon, SAPAdmin, SAPMonHome,
SAPSID, SecondLevelMonitor, StartProfile }
str ResLogLevel = INFO
str EnqSrvResName
str EnvFile
str InstName
```

```
str InstType = CENTRAL
str MonitorProgram
str ProcMon
str SAPAdmin
str SAPMonHome
str SAPSID
int SecondLevelMonitor = 0
str StartProfile
)
```

Attribute definition for SAP NetWeaver agent

Table A-1 shows the required attributes for configuring an SAP NetWeaver instance.

Note: To set or edit the value of any attribute, use CLI /Veritas Operation Manager.

Table A-1 Required attributes

Required attributes	Description
EnvFile	The absolute path to the file that must be sourced with the UNIX shell. You must source this file to set the environment before executing SAP scripts for online, offline, monitor, and clean operations. Supported shell environments are ksh, sh, and csh. **Note:** Ensure that the syntax of this file is in accordance with the user shell that the SAPAdmin attribute specifies. Symantec recommends that you store this file on shared disk so that the file is always available to an online system. Type and dimension: string-scalar Default: "" Example: /usr/sap/ERP/DVEBMGS00/saperp.env

Table A-1 Required attributes *(continued)*

Required attributes	Description
InstName	Identifies a SAP server instance. Review the information about setting this attribute: See "Uniquely identifying SAP server instances for ApplicationHA" on page 20. Type and dimension: string-scalar Default: "" Example: DVEBMGS00
InstType	An identifier that classifies and describes the SAP server instance type. Valid values are: ■ CENTRAL: SAP Central instance ■ DIALOG: SAP Dialog instance **Note:** The value of this attribute is not case-sensitive. Type and dimension: string-scalar Default: CENTRAL Example: DIALOG
ProcMon	The list of SAP processes to monitor. The entries in this list are separated using space and can be specified in any order. Review the information about how the monitor operation uses this attribute: See "Monitoring a SAP instance" on page 21. Type and dimension: string-scalar Default: "" Example: dw se jc

Table A-1 Required attributes *(continued)*

Required attributes	Description
ResLogLevel	The logging detail performed by the agent for the resource. Valid values are: ERROR: Only logs error messages. WARN: Logs above plus warning messages. INFO: Logs above plus informational messages. TRACE: Logs above plus trace messages. TRACE is very verbose and should only be used during initial configuration or for troubleshooting and diagnostic operations. Type and dimension: string-scalar Default: INFO Example: TRACE
SAPAdmin	SAP System administrator for SAPSID. This user name is usually a concatenation of the SAPSID attribute and the adm string 'sidadm'. Storing SAPAdmin in system naming services is not supported, for example: NIS, NIS+ and LDAP servers. The agent operations use this user name to execute their respective core subroutines. Type and dimension: string-scalar Default: "" Example: erpadm
SAPMonHome	The location of the directory that contains the binary used for second level monitoring process. Review the information about setting the SAPMonHome attribute. See "Setting the SAPMonHome attribute" on page 15. Type and dimension: string-scalar Default: "" Example: /usr/sap/ERP/SYS/exe/runU

Table A-1 Required attributes *(continued)*

Required attributes	Description
SAPSID	SAP system name. This attribute must have three alpha-numeric characters, and must begin with an alphabet. The value of this attribute is defined during the SAP installation. Review the information about setting this attribute: See "Uniquely identifying SAP server instances for ApplicationHA" on page 20. Type and dimension: string-scalar Default: "" Example: ERP
StartProfile	The full path to the SAP Instance Start Profile. The Start Profile is found in /usr/sap/*SAPSID*/SYS/profile directory, with the file name START_*InstName_virtualhostname*. The virtual hostname must resolve into a valid IP address. Type and dimension: string-scalar Default: "" Example: /usr/sap/ERP/SYS/profile/START_DVEBMGS00_saperpci

Table A-2 lists the optional attributes.

Table A-2 Optional attributes

Optional attribute	Description
MonitorProgram	Absolute path name of an external, user-supplied monitor executable. Review the information about setting this attribute: ■ See "Executing a customized monitoring program" on page 16. ■ See "Setting the SAPMonHome attribute" on page 15. Type and dimension: string-scalar Default: "" Example 1: /usr/sap/ERP/DVEBMGS00/work/myMonitor.sh Example 2: /usr/sap/ERP/DVEBMGS00/work/myMonitor.sh arg1 arg2

Table A-2 Optional attributes *(continued)*

Optional attribute	Description
SecondLevelMonitor	Used to enable second-level monitoring. Second-level monitoring is a deeper, more thorough state check of the SAP instance. The numeric value specifies how often the monitoring routines must run. 0 means never run the second-level monitoring routines, 1 means run routines every monitor interval, 2 means run routines every second monitor interval, and so on. **Note:** Exercise caution while setting SecondLevelMonitor to large numbers. For example, if the MonitorInterval is set to 60 seconds and the SecondLevelMonitor is set to 100, then sapinfo is executed every 100 minutes, which may not be as often as intended. For maximum flexibility, no upper limit is defined for SecondLevelMonitor. Type and dimension: integer-scalar Example: 1 Default: 0

Appendix B

Detail monitoring

This appendix includes the following topics:

- Setting the PATH variable
- Setting up detail monitoring for ApplicationHA agent for SAP

Setting the PATH variable

SAP NetWeaver 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

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

To enable detail monitoring for SAP

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 SAPMonHome <path to home>
   ```

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

   Note: For more information on SAPMonHome and SecondLevelMonitor attributes, See "Attribute definition for SAP NetWeaver agent " on page 34.

4. Save the configuration and unfreeze the service group.

   ```
   haconf -dump -makero
   ```

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

To disable detail monitoring for SAP

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 SecondLevelMonitor 0
   ```

4. Save the configuration and unfreeze the service group.

   ```
   haconf -dump -makero
   ```

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