

Veritas™ High Availability Agent for SAP NetWeaver Installation and Configuration Guide

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Windows Server 2008 (x64)

6.0

Veritas High Availability Agent for SAP NetWeaver Installation and Configuration Guide

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Introducing the Veritas High Availability Agent for SAP NetWeaver

This chapter includes the following topics:

- [About the High Availability agent for SAP NetWeaver](#)
- [What's new in this release](#)
- [Supported software](#)
- [How the agent makes SAP NetWeaver highly available](#)
- [Agent functions](#)
- [Typical SAP server configuration in a VCS cluster](#)
- [Setting up SAP NetWeaver in a VCS cluster](#)

About the High Availability agent for SAP NetWeaver

Veritas High Availability agents monitor specific resources within an enterprise application, determine the status of these resources, and start or stop them according to external events.

The Veritas agent for SAP NetWeaver provides high availability for SAP R/3 and SAP NetWeaver in a clustered environment.

It 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 agent also support Standalone Enqueue and Enqueue Replication servers in a distributed SAP installation.

The agent for SAP NetWeaver brings SAP instances online, monitors the instances, and bring the instances offline. The agent monitors the system processes and server states, and can shut down the instance in case of a failure.

The agent for SAP NetWeaver supports the following SAP instance types:

- Central instance
- Dialog instance
- Standalone Enqueue server
- Enqueue Replication server

What's new in this release

The enhancements in this release of the agent for SAP NetWeaver are as follows:

- Added support for SAP Master Data Management (MDM) Server components.

Supported software

For information on the software versions that the agent for SAP NetWeaver supports, see the Symantec Operations Readiness Tools (SORT) site:

<https://sort.symantec.com/agents>.

How the agent makes SAP NetWeaver highly available

The Veritas agent for SAP NetWeaver continuously monitors the SAP instance processes to verify that they function properly.

The agent provides the following levels 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 the 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 SAP instance service group fails over to another node in the cluster.

Thus, the agent ensures high availability for SAP instances.

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:

- Validates the values of the agent attributes required to bring the SAP instance online.
- Performs a preliminary check to ensure that the SAP instance is not running already on the specified node in the cluster.
- Starts the SAP Windows service `SAPSAPSID_InstID`, where *InstID* is the last two characters of the `InstName` attribute.
- Starts the SAP instance using the `startsap.exe` utility.
- Ensures that the instance is initialized successfully.

Offline

The offline function performs the following tasks:

- Validates the values of the agent attributes required to bring the SAP instance offline.
- Performs a preliminary check to ensure that the SAP instance is not already offline.
- Stops the SAP instance using the `stopsap.exe` utility.
- Stops the SAP Windows service. `SAPSAPSID_InstID`, where *InstID* is the last two characters of the `InstName` attribute.
- Kills any remaining SAP instance processes to ensure that the instance processes are removed completely.

Monitor

The monitor function performs the following tasks:

- Validates the values of the agent attributes required to monitor the SAP instance.

- Performs a first-level monitor check as follows:
 - The function verifies that the SAP Windows service *SAPSAPSID_InstID* is running, where *InstID* is the last two characters of the *InstName* attribute.
 - Verifies that all processes that the *ProcMon* attribute lists are running.
- If the value of *SecondLevelMonitor* attribute is greater than 0, the monitor function performs a more thorough check of the SAP instance as follows:
 - For an ABAP Central or Dialog instance, the function uses the *sapinfo.exe* utility.

To use second-level monitoring for the ABAP configuration, download the *rfcsdk* file for the *sapinfo.exe* utility. Unzip this file and place the contents on shared storage that is accessible by all the nodes in the cluster.
 - For a Java Central or Dialog instance, the function uses the *jcmon.exe* utility.
 - For an Enqueue or Enqueue Replication server instance, the function uses the *ensmon.exe* utility.
- If the *MonitorProgram* attribute specifies a custom monitor program, the monitor function executes the specified program.

See [“Executing a custom monitor program”](#) on page 88.

Clean

In case of a fault event or an unsuccessful attempt to bring a resource online or offline, the clean function removes any remaining SAP instance processes. The clean function performs the following tasks:

- Uses SAP’s *sapsrvkill.exe* utility to stop all processes of the particular SAP instance.
- Stops *SAPSAPSID_InstID*, the SAP Windows service for the instance.
- The clean function identifies and kills any remaining SAP instance processes using the unique combination of the *SAPSID* attribute and *InstID*, that is the last two characters of the *InstName* attribute. All these processes must also belong to the *SAPServiceSAPSID* or *sapsidadm* user.

Typical SAP server configuration in a VCS cluster

A typical SAP server configuration in a VCS cluster has the following characteristics:

- VCS is installed and configured in a two-node cluster.

- The SAP NetWeaver instance binaries are installed locally on both nodes or on shared disks.
- The Veritas agent for SAP NetWeaver is installed on the both nodes.
- The *drive:\usr\sap* directory is shared with name sapmnt.

Figure 1-1 depicts a configuration where SAP server instance binaries and SYS are installed completely on shared disks.

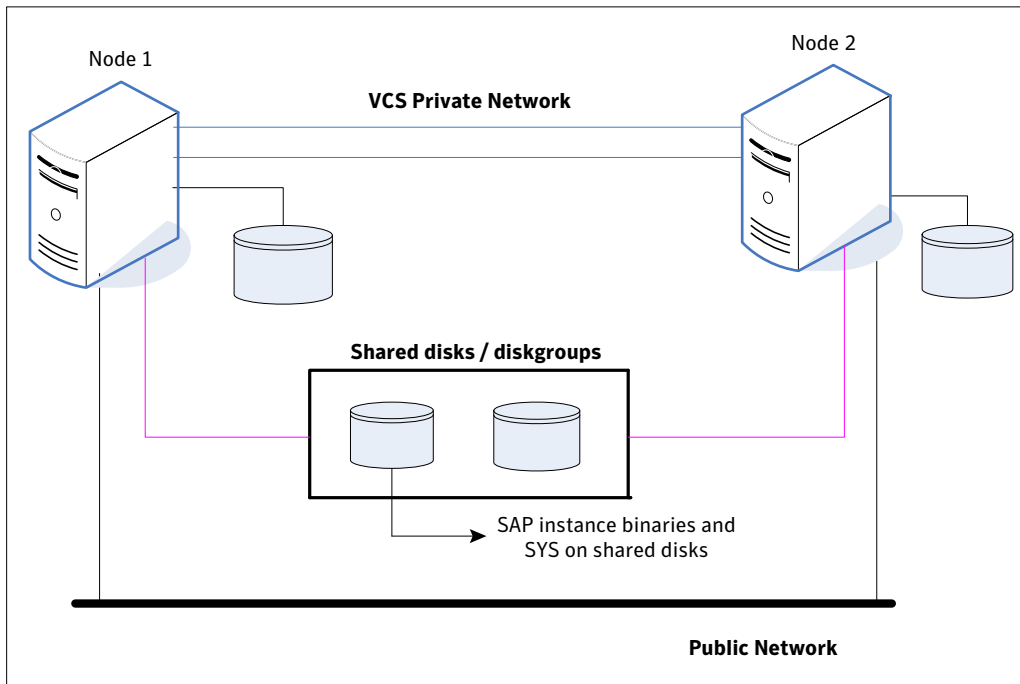
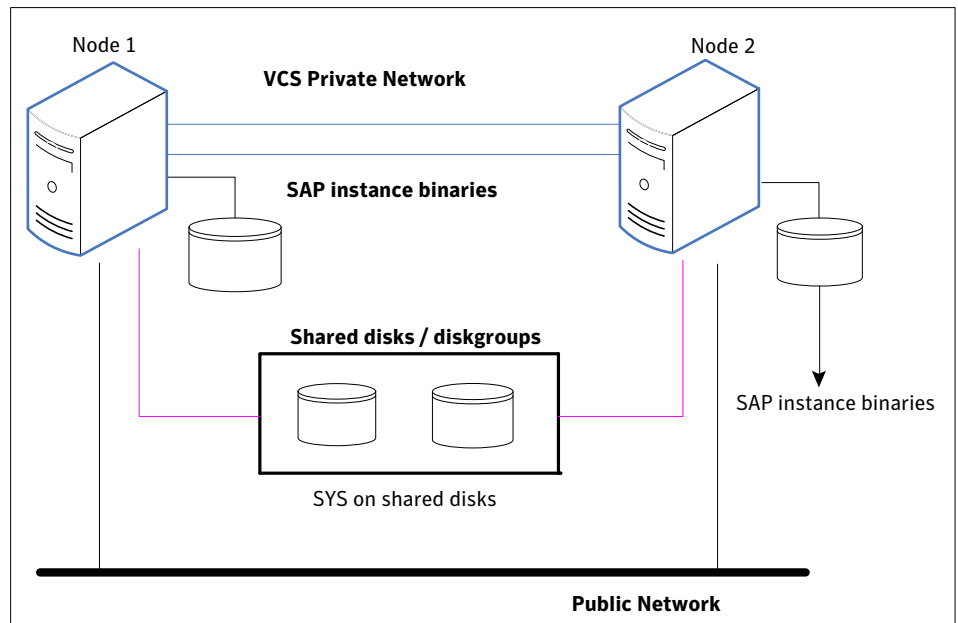


Figure 1-2 depicts a configuration where SAP server instance binaries are installed locally on each node and SYS is installed on shared disks.



Setting up SAP NetWeaver in a VCS cluster

Follow the steps below to set up SAP NetWeaver in a cluster:

- Set up a VCS cluster.
Refer to *Veritas Storage Foundation™ and High Availability Solutions Installation and Upgrade Guide* for more information on installing and configuring VCS.
- Install and configure SAP NetWeaver for High Availability.
- Install the Veritas High Availability agent for SAP NetWeaver.
See [“Installing the VCS agent for SAP NetWeaver”](#) on page 77.
- Configure the service groups for SAP NetWeaver.
See [“About configuring service groups for SAP NetWeaver”](#) on page 91.

Installing and configuring the SAP NetWeaver for high availability

This chapter includes the following topics:

- [About SAP NetWeaver](#)
- [Uniquely identifying SAP server instances](#)
- [Monitoring an SAP instance](#)
- [About installing SAP NetWeaver for high availability](#)
- [About configuring SAP NetWeaver for high availability](#)
- [Setting up SAP systems for clustering](#)
- [Setting up a pre-installed SAP R/3 system](#)
- [Fresh SAP installation: Installing an SAP ABAP system](#)
- [Fresh SAP installation: Installing an SAP Java system](#)
- [Fresh SAP installation: Installing a Java Add-In system \(ABAP + Java\)](#)
- [Fresh SAP installation: Installing SAP MDM Server Components](#)
- [Installing an SAP Enqueue Replication server](#)
- [Clustering an SAP instance](#)
- [Creating and adding domain groups and users](#)
- [Creating and adding local groups and users](#)

- [Creating sapmnt and saploc share directories](#)
- [Configuring the SAP systems on Windows Server 2008](#)

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)
- SAP Netweaver Master Data Management Server

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)
- Windows sapmnt/saploc shares
- Master Data Server (MDSxx)
- Master Data Import Server (MDISxx)
- Master Data Syndicate Server (MDSSxx)
- Master Data Layout Server (MDLSxx)

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

SAP architecture

Table 2-1 lists the different SAP architectures and its components.

Table 2-1 SAP architecture

Architecture	Component	Service	Functions
SAP NetWeaver AS ABAP	Central Instance Dialog Instance	ABAP Dispatcher	<ul style="list-style-type: none">■ Controls program that manages the resources of the R/3 applications.■ Balances assignment of the transaction load to the work processes.■ Manages buffers in main memory.■ Manages connections with the presentation level.■ Organizes the communication processes.
		ABAP Work processes	<ul style="list-style-type: none">■ Acts as a service offered by a server and requested by a client■ Acts as a special program in charge of some specific tasks.
	Central Services Instance	ABAP Enqueue Service	<ul style="list-style-type: none">■ Manages logical locks.■ Ensures server synchronization.
		ABAP Message Service	<ul style="list-style-type: none">■ Central service for cluster internal communication, such as event notifications, broadcasts, exchange of cache content, and so on.■ Provides cluster state information to SAP Web Dispatcher.■ Keeps a list of application servers that can be reached within the system.
	Enqueue Replication Instance	ABAP Enqueue Replication Service	Enables the lock table to be replicated on a second server, the replication server.
SAP NetWeaver AS Java	Central Instance	Java Dispatcher	Receives client requests and forwards them to the server processes accordingly.
		Java Server Processes	Processes the requests and holds the session data.

Table 2-1 SAP architecture (*continued*)

Architecture	Component	Service	Functions
		SDM	The Software Deployment Manager (SDM) is a tool with which you can manage and deploy software packages (Software Deployment Archives and Software Component Archives) that you receive from SAP to the Web AS Java.
	Dialog Instance	Java Dispatcher	Receives client requests and forwards them to the server processes accordingly.
		Java Server Processes	Processes the requests and holds the session data.
	Central Services Instance	Java Enqueue Service	<ul style="list-style-type: none"> ■ Manages logical locks. ■ Ensures server synchronization.
		Java Message Service	<ul style="list-style-type: none"> ■ Acts as a central service for cluster internal communication, such as event notifications, broadcasts, exchange of cache content, and so on. ■ Provides cluster state information to SAP Web Dispatcher. ■ Keeps a list of application servers that can be reached within the system.
	Enqueue Replication Instance	Java Enqueue Replication Service	Enables the lock table to be replicated on a second server, the replication server.
SAP NetWeaver AS Add-In	Central Instance (ABAP and Java)	ABAP Dispatcher	<ul style="list-style-type: none"> ■ Controls program that manages the resources of R/3 applications. ■ Balances the assignments of the transaction load to the work processes. ■ Manages buffer in main memory. ■ Connects to the presentation level. ■ Organizes the communication processes.
		ABAP Work processes	<ul style="list-style-type: none"> ■ Acts as a service offered by a server and requested by a client. ■ Manages the programs that handle specific tasks.
		Java Dispatcher	<ul style="list-style-type: none"> ■ Receives client requests and accordingly forwards them to the server for further processing.

Table 2-1 SAP architecture (*continued*)

Architecture	Component	Service	Functions
		Java Server Processes	<ul style="list-style-type: none"> ■ Handles the client-server processes and maintains the session data.
		SDM	<ul style="list-style-type: none"> ■ Manages the software packages received from SAP and deploys them on Web AS Java.
	Dialog Instance (ABAP and Java)	ABAP Dispatcher	<ul style="list-style-type: none"> ■ Controls the programs that manages the resources of R/3 applications. ■ Balances assignment of the transaction load to the work processes. ■ Manages buffer in main memory. ■ Connection with the presentation level. ■ Organizes the communication processes.
		ABAP Work processes	<ul style="list-style-type: none"> ■ Acts as a service offered by a server and requested by a client. ■ Acts as a special program in charge of some specific tasks.
		Java Dispatcher	Receives client requests and forwards them to the server processes accordingly.
		Java Server Processes	Processes the requests and holds the session data.
	Central Services Instance ABAP	ABAP Enqueue Service	<ul style="list-style-type: none"> ■ Manages logical locks ■ Ensures server synchronization
		ABAP Message Service	<ul style="list-style-type: none"> ■ Acts as a central service for cluster internal communication, such as event notifications, broadcasts, exchange of cache content, and so on. ■ Provides cluster state information to SAP Web Dispatcher ■ Keeps a list of application servers that can be reached within the system.
	Central Services Instance Java	Java Enqueue Service	<ul style="list-style-type: none"> ■ Manages logical locks. ■ Ensures server synchronization.

Table 2-1 SAP architecture (*continued*)

Architecture	Component	Service	Functions
		Java Message Service	<ul style="list-style-type: none"> ■ Acts as a central service for cluster internal communication, such as event notifications, broadcasts, exchange of cache content, and so on. ■ Provides cluster state information to SAP Web Dispatcher ■ Keeps a list of application servers that can be reached within the system.
	Enqueue Replication Instance ABAP	ABAP Enqueue Replication Service	Enables the lock table to be replicated on a second server, the replication server.
	Enqueue Replication Instance Java	Java Enqueue Replication Service	Enables the lock table to be replicated on a second server, the replication server.
SAP NetWeaver MDM	Master Data Server	Master Data Service	Manages the master data in multiple MDM repositories along with catering to various clients across the network.
SAP NetWeaver MDM	Master Data Import Server	Master Data Service	Interacts with the MDM Data Server to perform automated data imports into an MDM repository. It is an automated version of the MDM Import Manager.
SAP NetWeaver MDM	Master Data Syndication Server	Master Data Service	Interacts with the MDM Data Server to perform automated syndication of data from an MDM repository. It is an automated version of the MDM Syndicator.
SAP NetWeaver MDM	Master Data Layout Server	Master Data Service	Works with the MDM Data Server and enables the publication of master data from an MDM repository.

Single Point of Failures (SPOF)

In a distributed SAP environment, the following components are critical for application availability. Hence, these components need to be protected.

- Database Instance
- Central Instance
- Dialog Instance
- Central Services Instance

- SAP Central File System
- SAP Master Data Management

Table 2-2 lists the possibilities to eliminate the single point of failures.

Table 2-2 Possibilities to secure the single point of failures

Single Point of Failure	Technical Possibilities to eliminate the SPOF
Central Database	Switch-over solutions
Central Services	Set up an Enqueue Replication Server controlled by a switch-over solution
Central Instance/Dialog Instance	Switch-over solutions
SAP Central File System	Switch-over solutions
SAP MDM	Switch-over solutions

About SAPCPE

SAPCPE is a generic tool developed by SAP. The SAP startup framework launches this tool before starting the actual instance.

SAPCPE is used in every high availability setup to automate the synchronization of binaries and executables from a central location (`\\SAPGLOBALHOST\sapmnt\SYS\exe\run`) to the instance specific local disks (`drive:\usr\sap\SID\InstName\exe`). The SAPCPE tool requires the list of target files to enable this synchronization.

Uniquely identifying SAP server instances

You can virtualize an SAP instance using a cluster. Using shared disk and virtual IP addresses, you can manage a large set of SAP instances in a single cluster. For example, Dialog and Central instances can run on separate cluster nodes or can run concurrently on a single node.

In cases such as multiple instances running concurrently on a single node, the agent for SAP NetWeaver must be able to uniquely identify each SAP instance on a single host system.

To uniquely identify each SAP instance, set the SAPSID and InstName attributes such that the combined values of SAPSID and the last two characters of InstName are unique for each SAP instance.

Differentiating SAP instances is important when the Agent for SAP NetWeaver must kill the processes of a non-responsive or failed instance. In absence of unique names for each server, the agent may kill processes for more than one SAP instance during a clean operation.

Monitoring an SAP instance

The monitor function 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 function uses this list of processes to scan the process table, and verify that the processes are running successfully.

Table 2-3 contains valid values for the ProcMon attribute.

Table 2-3 Valid values for the ProcMon attribute

SAP usage type	SAP instance type	Value for ProcMon attribute
ABAP	<div><div>■</div>CENTRAL</div> <div><div>■</div>DIALOG</div> <div><div>■</div>ENQUEUE</div> <div><div>■</div>ENQREP</div>	<div>For CENTRAL:</div> <div><div>■</div>Mandatory: disp+work.exe, msg_server.exe</div> <div><div>■</div>Optional: igswd.exe, icman.exe, and gwr.exe</div> <div>Note: msg_server.exe is not applicable for a Central instance, if a Standalone Enqueue server instance is configured.</div> <div>For DIALOG:</div> <div><div>■</div>Mandatory: disp+work.exe</div> <div><div>■</div>Optional: igswd.exe, icman.exe and gwr.exe</div> <div>For ENQUEUE:</div> <div><div>■</div>msg_server.exe</div> <div><div>■</div>enserver.exe</div> <div>For ENQREP</div> <div><div>■</div>enrepserver.exe</div>

Table 2-3 Valid values for the ProcMon attribute (*continued*)

SAP usage type	SAP instance type	Value for ProcMon attribute
Java	<ul style="list-style-type: none"> ■ CENTRAL ■ DIALOG ■ ENQUEUE ■ ENQREP 	<p>For CENTRAL:</p> <ul style="list-style-type: none"> ■ Mandatory: jcontrol.exe ■ Optional: icman.exe <p>For DIALOG:</p> <ul style="list-style-type: none"> ■ Mandatory: jcontrol.exe ■ Optional: icman.exe <p>For ENQUEUE:</p> <ul style="list-style-type: none"> ■ Mandatory: disp+work.exe, jcontrol.exe ■ Optional: igswd.exe, icman.exe and gwrdd.exe <p>For ENQREP</p> <ul style="list-style-type: none"> ■ enrepsvr.exe
Add-In (ABAP + Java)	<ul style="list-style-type: none"> ■ CENTRAL ■ DIALOG ■ AENQUEUE (ABAP) ■ JENQUEUE (Java) ■ AENQREP (REP) ■ JENQREP 	<p>For CENTRAL</p> <ul style="list-style-type: none"> ■ Mandatory: disp+work.exe, msg_server.exe, jcontrol.exe ■ Optional: igswd.exe, icman.exe and gwrdd.exe <p>DIALOG</p> <ul style="list-style-type: none"> ■ Mandatory: disp+work.exe, jcontrol.exe ■ Optional: igswd.exe, icman.exe and gwrdd.exe <p>For AENQUEUE (ABAP)</p> <ul style="list-style-type: none"> ■ msg_server.exe ■ ensvr.exe <p>For JENQUEUE (Java)</p> <ul style="list-style-type: none"> ■ enrepsvr.exe <p>For AENQREP (ABAP)</p> <ul style="list-style-type: none"> ■ msg_server.exe ■ ensvr.exe <p>For JENQREP (Java)</p> <ul style="list-style-type: none"> ■ enrepsvr.exe

Table 2-3 Valid values for the ProcMon attribute (continued)

SAP usage type	SAP instance type	Value for ProcMon attribute
SAP MDM	MDM	<ul style="list-style-type: none">■ MDS.exe for Master Server■ MDIS.exe for Import Server■ MDSS.exe for Syndication Server■ MDLS.exe for Layout server

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

About installing SAP NetWeaver for high availability

You can install SAP NetWeaver in the following ways, in a VCS environment:

SAP instance on shared disk SAP instance binaries are installed on shared disks.

SAP instance on local disk SAP instance binaries are installed locally on each node.

When installing SAP NetWeaver, ensure that the login_name, group_name for the sidadm and SAPServiceSID is the same on all the nodes.

About configuring SAP NetWeaver for high availability

The guidelines for configuring SAP NetWeaver for high availability are as follows:

- In a service group, keep the single point of failure as minimal as possible and watch the application startup time.
- Assign a virtual hostname to the component within the switchover environment. Since the physical hostname changes with the switchover, this is a must have requirement.
- Based on the expected failover time configure the reconnection parameters for all software components and enable its automatic reconnection.
- Configure sapcpe tool to load the executables from central file share to instance specific directory.

Setting up SAP systems for clustering

This topic describes the procedure to install and configure SAP on a Windows system, so that you can cluster the system in a Veritas Cluster Server (VCS) environment.

Symantec recommends installing and clustering a database server for SAP to minimize SAP system downtime. An SAP system downtime may happen due to database unavailability.

In this installation, it is assumed that you are setting up the system on two or more nodes, and clustering these nodes in a VCS environment.

Note: Symantec strongly recommends that a trained SAP consultant be involved in performing the installation procedure.

Setting up a pre-installed SAP R/3 system

If you have a previously installed SAP stem, the system can be of the following types:

- A domain administrator installed the system with a virtual hostname.
- A domain administrator installed the system with a local hostname.
- A local administrator installed the system with a virtual hostname.
- A local administrator installed the system with a local hostname.

For a domain administrator that has installed the SAP system using a virtual hostname.

See [“Clustering an SAP instance”](#) on page 62.

For all other types, perform the following procedures as applicable:

- [Converting a local installation into a domain installation](#)
- [Converting the local environment into a virtual environment](#)

Converting a local installation into a domain installation

If a local administrator has installed the SAP system, convert the installation into a domain installation.

To convert a local installation into a domain installation

- 1 Ensure that the necessary user accounts and user groups such as *sapsidadm*, *SAPserviceSAPSID*, and so on, exist in the domain controller.

For details about creating user accounts and user groups in the domain controller:

See [“Creating and adding domain groups and users”](#) on page 69.

- 2 Add these domain user accounts to the SAP server, and assign these accounts to the group of local administrators for the SAP server.

For details about adding local groups and users:

See [“Creating and adding local groups and users”](#) on page 72.

- 3 The SAP services, such as *SAP<SAPSID>_<xx>* and *SAPOSCol*, use a user to begin execution.

Change the user of these services as follows:

- Stop the SAP system and its services.
- For each service, right-click the service, and select **Properties**.
- In the Service Properties dialog box, click the Logon tab.
- Change the user of the service to the domain user that you created in step [1](#).

- 4 Ensure that the *sapmnt* and *saploc* directories are shared, and are accessible by the domain user.

Perform the following steps in the order presented:

- Right-click the *<drive>:\usr\sap* directory, and select **Properties**.
- In the Properties dialog box, click the Sharing tab.
- Click **Share this folder**.
- Enter *sapmnt* in the Share name field.
- Click **Permissions**.
- In the Permissions for *sapmnt* dialog box, ensure that the Administrators and *SAP_LocalAdmin* user groups have full control for the *sapmnt* directory.
- Click **OK** in the Permissions for *sapmnt* dialog box.
- In the Properties dialog box, click **New Share**.
- In the New Share dialog box, enter *saploc* in the Share name field.
- Click **OK** in the New Share dialog box.

- Click **Permissions**.
 - In the Permissions for saploc dialog box, ensure that the Administrators and SAP_LocalAdmin user groups have full control for the saploc directory.
 - Click **OK** in the Permissions for saploc dialog box.
 - Click **OK** in the Properties dialog box.
- 5 Restart the SAP system and its services.

Converting the local environment into a virtual environment

If the SAP system uses a local hostname, you must convert the local environment of the system into a virtual environment.

Note: Ensure that a domain administrator has installed the SAP installation. If the installation is local, convert the installation into a domain installation.

See [“Converting a local installation into a domain installation”](#) on page 29.

To convert the local environment into a virtual environment

- 1 On all the nodes in the cluster, set the *sapsidadm* user environment variables.
Do the following tasks, in the order presented:
 - Open a command prompt window.
 - At the command prompt, type `runas /profile /user:<domain>\<sapsid>adm regedit`.
 - In the Registry Editor dialog box, click **HKEY_CURRENT_USER > Environment**.
 - Set the environment variables.
See [“Setting the environment variables”](#) on page 34.
- 2 On the drive where SAP is installed, access the DEFAULT.PFL file in the <drive>:\usr\sap\SAPSID\SYS\profile directory.
Do the following tasks, in the order presented:
 - Set the SAPDBHOST parameter as equal to the virtual hostname of the database server.
 - Set any references of the database server as equal to the virtual hostname of the database server.
 - Set all other references of the local hostname as equal to the virtual hostname of the SAP instance.

- 3 On the drive where SAP is installed, access the START profile in the <drive>:\usr\sap\SAPSID\SYS\profile directory.

Do the following tasks, in the order presented:

- Rename the *START_InstName_RealHostname* file to reflect the virtual hostname of the SAP instance.
The filename becomes *START_InstName_VirtualHostname*.
- Set the SAPGLOBALHOST parameter as equal to the virtual hostname of the Central instance.
- Set the SAPLOCALHOST and SAPLOCALHOSTFULL parameters as equal to the virtual hostname of the instance.
- Comment out the SAP commands that initiate the database. The appropriate database agent must initiate the database.
- Change all other references of the local hostname as equal to the virtual hostname of the instance.

- 4 On the drive where SAP is installed, access the instance profile in the <drive>:\usr\sap\SAPSID\SYS\profile directory.

Do the following tasks, in the order presented:

- Rename the *SAPSID_InstName_RealHostname* file to reflect the virtual hostname of the SAP instance.
The filename becomes *SAPSID_InstName_VirtualHostname*.
- Set the SAPGLOBALHOST parameter as equal to the virtual hostname of the Central instance.
- Set the SAPLOCALHOST and SAPLOCALHOSTFULL parameters as equal to the virtual hostname of the instance.
- Change all other references of the local hostname as equal to the virtual hostname of the instance.

- 5 On the drive where SAP is installed, access the igs.xml file in the <drive>:\usr\sap\SAPSID\InstName\igs\conf directory.

Do the following tasks, in the order presented:

- Set the ip parameter in MUX as equal to the virtual hostname of the instance.
- Set the gwhost parameter as equal to the virtual hostname of the instance.
- Change all other references to the local hostname as equal to the virtual hostname of the instance.

- 6 On the drive in which SAP is installed, access the
`<drive>:\usr\sap\<SAPSID>\SYS\exe\run` directory or
`<drive>:\usr\sap\<SAPSID>\InstName\exe` directory.
- 7 Use the `sapstartsrv.exe` command to recreate the Windows service entry.
- 8 Perform either of these steps to recreate the service entry as follows:
 - At the command prompt run the `sapstartsrv.exe` command.
 - In the SAP Service Install/Uninstall dialog box, enter the following values:

SID	<i>SAPSID</i>
NR	<i>InstID</i>
Startprofile	<ul style="list-style-type: none"> ■ For a global host: <code><drive>:\usr\sap\<SAPSID>\SYS\profile\START_ InstName_Virtual_HostName</code> ■ For other hosts: <code>\\<SAPGLOBALHOST>\sapmnt\<SAPSID>\ SYS\profile\START_<InstName>_<Virtual_ HostName></code>
User	<code><SAPAdminDomain>\SAPService<SAPSID></code>
Password	<code><SAPService<SAPSID> password></code>
Startup Type	Manual
Use Environment of user	<code><SAPAdminDomain>\<sapsid>adm</code>

- Click **OK**.
- Create the Windows service entry using the following command:

```
sapstartsrv.exe -r -q -s <SAPSID> -n <InstID> -U\  

<SAPAdminDomain>\SAPService<SAPSID> -P\ <SAPService<SAPSID>  

password> -p
```

- For a global host, add the following lines:

```
<drive>:\usr\sap\<SAPSID>\SYS\profile\START_<InstName>_<V.Ho  

stName> -e <SAPAdminDomain>\<sapsid>adm
```

- For other hosts, add the following lines:

```
\\<SAPGLOBALHOST>\sapmnt\<SAPSID>\SYS\profile\START_<InstNam  

e>_<Virtual_HostName> -e <SAPAdminDomain>\<sapsid>adm
```

9 As and where applicable, backup the following directories by renaming the directories:

```
<drive>:\usr\sap\<SAPSID>\SYS
<drive>:\usr\sap\<SAPSID>\SYS\profile
<drive>:\usr\sap\<SAPSID>\SYS\global
<drive>:\usr\sap\<SAPSID>\<InstName>
```

10 As and where applicable, create and mount a new shared volume for the following mount points:

```
<drive>:\usr\sap\<SAPSID>\SYS
<drive>:\usr\sap\<SAPSID>\SYS\profile
<drive>:\usr\sap\<SAPSID>\SYS\global
<drive>:\usr\sap\<SAPSID>\<InstName>
```

11 Copy the file referenced in step 9 into the new volumes, as and where applicable.

12 On the nodes in the cluster where the files referenced in step 9, were not modified, recreate these directories:

```
<drive>:\usr\sap\<SAPSID>\SYS
<drive>:\usr\sap\<SAPSID>\SYS\profile
<drive>:\usr\sap\<SAPSID>\SYS\global
<drive>:\usr\sap\<SAPSID>\<InstName>
```

The SAP system is now ready for clustering. For details about clustering:
See “Clustering an SAP instance” on page 62.

Setting the environment variables

Table 2-4 lists the environment variables that you need to convert the local environment into a virtual environment.

The database server is a Microsoft SQL database server.

Table 2-4 Environment variables

Parameter name	Parameter type	Data
DBMS_TYPE	REG_SZ	MSS
MSSQL_DBNAME	REG_SZ	<SAPSID>
MSSQL_SCHEMA	REG_SZ	<sapsid>

Table 2-4 Environment variables (*continued*)

Parameter name	Parameter type	Data
MSSQL_SERVER	REG_SZ	<DBHost>\<DBInstance>
PATH	REG_EXPAND_SZ	<Path to all SAP instances' binaries in the SAP system> Separate each instance path with ;.
SAPGLOBALHOST	REG_SZ	<SAPGLOBALHOST>
SAPLOCALHOST	REG_SZ	<SAPLOCALHOST>
TEMP	REG_EXPAND_SZ	C:\WINDOWS\TEMP
TMP	REG_EXPAND_SZ	C:\WINDOWS\TEMP

Note: For Oracle database, configure the the environment variables accordingly.

Fresh SAP installation: Installing an SAP ABAP system

This section describes the procedure to install an SAP system with ABAP architecture in a highly available environment. The procedure assumes that VCS is installed on the system.

Installing an SAP ABAP ASCS instance

This section is applicable for SAP NetWeaver 04s only. Follow these steps to install an SAP ABAP ASCS instance.

To install an SAP ABAP ASCS instance

- 1 Log in as a user that has domain administrator rights.
- 2 Create a VCS Service Group with IP and Lanman resources.

For details about creating VCS Service Groups, refer to the VCS user documentation.
- 3 Before beginning to install the SAP ABAP ASCS instance, bring the Service Group online.

- 4 On the node that has the Service Group online, start the SAP installation.
Do not double-click the `sapinst.exe` file to launch the SAP installation GUI. Use the `SAPINST_USE_HOSTNAME` parameter to launch the SAP installation GUI in a virtual environment. At the command prompt, run this command:


```
<path>\sapinst.exe SAPINST_USE_HOSTNAME=<Virtual Host Name>
```


where:

<Virtual Host Name> is the virtual lanman name that you created in step 2.
- 5 From the installation GUI, select **High-Availability System > Based on AS ABAP > Central Services Instance for ABAP (ASCS)** and follow the instructions to complete the installation.

Installing an SAP ABAP Central instance

Follow these steps to install an SAP ABAP Central instance.

To install an SAP ABAP Central instance

- 1 Log in as a user that has domain administrator rights.
- 2 Create a VCS Service Group with IP and Lanman resources.

For details about creating VCS Service Groups, refer to the VCS user documentation.
- 3 Before beginning to install the Central instance, bring the Service Group online.
- 4 On the node that has the Service Group online, start the SAP installation.
Do not double-click the `sapinst.exe` file to launch the SAP installation GUI. Use the `SAPINST_USE_HOSTNAME` parameter to launch the SAP installation GUI in a virtual environment. At the command prompt, run this command:


```
<path>\sapinst.exe SAPINST_USE_HOSTNAME=<Virtual Host Name>
```


where:

<Virtual Host Name> is the virtual lanman name that you created in step 2.

Follow the instructions in the SAP installation GUI, and complete the SAP Central instance installation.

Installing the SAP Central instance populates the `SAPGLOBALHOST` parameter. This step is not applicable for SAP NetWeaver 04s.

To install an SAP ABAP Central instance for SAP NetWeaver 04s

- 1 Select **High-Availability System > Based on AS ABAP > Central Instance** from the SAP installation GUI and follow the instructions to complete the installation.
- 2 Under **SAP System Parameters**, specify the virtual SCS host name in the Profile Directory field. For example:

```
\\<SAPGLOBALHOST>\sapmnt\<SAPSID>\SYS\profile
```

Installing an SAP ABAP Database instance

On the node where the database is up and running, begin the SAP database instance installation.

Do not double-click the `sapinst.exe` file to launch the SAP installation GUI. Use the `SAPINST_USE_HOSTNAME` parameter to launch the SAP installation GUI in a virtual environment. At the command prompt, run the following command:

```
<path>\sapinst.exe SAPINST_USE_HOSTNAME=<Virtual Host Name>
```

where:

<Virtual Host Name> is the virtual hostname of the system on which the database is running.

Follow the instructions in the SAP installation GUI, and complete the SAP Database instance installation.

Installing an SAP ABAP Dialog instance

Follow these steps to install an SAP ABAP Dialog instance.

To install SAP ABAP Dialog instance

- 1 Log in as a user that has domain administrator rights.
- 2 Create a VCS Service Group with IP and Lanman resources.

For details about creating VCS Service Groups, refer to the VCS user documentation.

- 3 Before beginning to install the Dialog instance, bring the Service Group online.
- 4 On the node that has the Service Group online, start the SAP installation.

Do not double-click the `sapinst.exe` file to launch the SAP installation GUI. Use the `SAPINST_USE_HOSTNAME` parameter to launch the SAP installation GUI in a virtual environment. At the command prompt, run this command:

```
<path>\sapinst.exe SAPINST_USE_HOSTNAME=<Virtual Host Name>
```

where:

<Virtual Host Name> is the virtual lanman name that you created in step 2.

Follow the instructions in the SAP installation GUI, and complete the SAP Dialog instance installation.

To install an SAP ABAP Dialog instance for SAP NetWeaver 04s

- 1 Select **High-Availability System > Based on AS ABAP > Dialog Instance** from the SAP installation GUI and follow the instructions to complete the installation.
- 2 Under SAP System Parameters, specify the virtual SCS host name in the Profile Directory field. For example:

```
\\<SAPGLOBALHOST>\sapmnt\<SAPSID>\SYS\profile
```

For details about clustering:

See “[Clustering an SAP instance](#)” on page 62.

Installing an SAP ABAP Standalone Enqueue server

The Standalone Enqueue server is shipped along with the standard SAP installation, but the `sapinst.exe` file does not install and configure the Enqueue server. You must configure the server separately, after installing the SAP Central instance.

This section is applicable for the versions lesser than SAP NetWeaver 04s.

Assume the following:

- Central instance is `DVEBMGS<xx>`.
- SAP system name is `EC4`.
- Virtual hostnames of the Standalone Enqueue server and application server instances are `SAPEC4ASCS` and `SAPEC4CI` respectively.
- Instance numbers for the Standalone Enqueue server and application server instances are 10 and 12 respectively.

You must first split the Central instance into two instances. For example, split DVEBMGS<xx> into two instances, ASCS<xx> and DVBGS<yy>. The ASCS<xx> instance includes all the centralized components.

The ASCS<xx> instance is an Enqueue server instance, and the DVBGS<yy> instance is an application server instance.

To install and configure a SAP ABAP Standalone Enqueue server

- 1 Make two copies of the start and instance profiles of the Central instance.
- 2 Name the start profiles as follows:
 - START_DVBGS12_SAPC4CI
start profile for an application server instance
 - START_ASCS10_SAPC4ASCS
start profile for a Standalone Enqueue server instance
- 3 In the START_DVBGS12_SAPC4CI profile, do the following:
 - Change the values of the following parameters:

INSTANCE_NAME	DVBGS12
SAPGLOBALHOST	SAPEC4ASCS
SAPLOCALHOST	SAPEC4CI
SAPSYSTEM	12
DIR_INSTANCE	c:\usr\sap\EC4\DVBGS12
DIR_EXECUTABLE	\$(DIR_INSTANCE)\exe
DIR_LIBRARY	\$(DIR_INSTANCE)\exe
DIR_PROFILE	\\SAPEC4ASCS\sapmnt\EC4\SYS\profile
DIR_GLOBAL	\\SAPEC4ASCS\sapmnt\EC4\SYS\global
DIR_CT_RUN	\\SAPEC4ASCS\sapmnt\EC4\SYS\exe\run

- Remove the following lines:

```
_DB=strdbs.cmd
Start_Program_02=immediate $(DIR_EXECUTABLE)\$( _DB) EC4
_MS=msg_server.exe
Start_Program_03=local $(DIR_EXECUTABLE)\$( _MS) pf=$(DIR_PROFILE)\
EC4_DVEBMGS10_SAPC4ASCS
_DW=disp+work.exe
```

```
Start_Program_04=local $(DIR_EXECUTABLE)\$( _DW) pf=$(DIR_PROFILE)\
EC4_DVEBMGS10_SAPC4ASCS
_IGS=igswd.exe
Start_Program_06=local $(DIR_INSTANCE)\igs\bin\$( _IGS)
-dir=$(DIR_INSTANCE)\igs -mode=all -sysname=EC4 -sysno=10
```

■ Add the following lines:

```
_CP=sapcpe.exe
Start_Program_01=immediate $(DIR_EXECUTABLE)\$( _CP)
pf=$(DIR_PROFILE)\EC4_DVBGS12_SAPC4CI
_DW=disp+work.exe
Start_Program_04=local $(DIR_EXECUTABLE)\$( _DW)
pf=$(DIR_PROFILE)\EC4_DVBGS12_SAPC4CI
_IGS=igswd.exe
Start_Program_06=local $(DIR_INSTANCE)\igs\bin\$( _IGS)
-dir=$(DIR_INSTANCE)\igs -mode=all -sysname=EC4 -sysno=12
```

4 In the START_ASCS10_SAPC4ASCS profile, do the following:

■ Change the values of the following parameters:

SAPGLOBALHOST	SAPEC4ASCS
SAPLOCALHOST	SAPEC4ASCS
INSTANCE_NAME	ASCS10
SAPSYSTEM	10
DIR_EXECUTABLE	c:\usr\sap\EC4\ASCS10\exe
DIR_LIBRARY	c:\usr\sap\EC4\ASCS10\exe
DIR_PROFILE	c:\usr\sap\EC4\SYS\profile
DIR_GLOBAL	c:\usr\sap\EC4\SYS\global
DIR_CT_RUN	C:\usr\sap\EC4\SYS\exe\run

■ Remove the following lines:

```
_DB=strdbs.cmd
Start_Program_02=immediate $(DIR_EXECUTABLE)\$( _DB) EC4
_MS=msg_server.exe
Start_Program_03=local $(DIR_EXECUTABLE)\$( _MS)
pf=$(DIR_PROFILE)\EC4_DVEBMGS10_SAPC4ASCS
```



```
_DW=disp+work.exe
Start_Program_04=local $(DIR_EXECUTABLE)\$( _DW)
pf=$(DIR_PROFILE)\EC4_DVEBMGS10_SAPEC4ASCS
_IGS=igswd.exe
Start_Program_06=local $(DIR_INSTANCE)\igs\bin\$( _IGS)
-dir=$(DIR_INSTANCE)\igs -mode=all -sysname=EC4 -sysno=10
```

■ **Add the following lines:**

```
_CP = sapcpe.exe
Start_Program_00 = immediate $(DIR_EXECUTABLE)\$( _CP)
pf=$(DIR_PROFILE)\EC4_ASCS10_SAPEC4ASCS
_MS=msg_server.exe
Start_Program_01=local $(DIR_EXECUTABLE)\$( _MS)
pf=$(DIR_PROFILE)\EC4_ASCS10_SAPEC4ASCS
_EN = ensver.exe
Start_Program_02 = local $(DIR_EXECUTABLE)\$( _EN)
pf=$(DIR_PROFILE)\EC4_ASCS10_SAPEC4ASCS
```

5 Name the instance profiles as follows:

- EC4_DVBGS12_SAPEC4CI
instance profile of the application server instance
- EC4_ASCS10_SAPEC4ASCS
instance profile of the Standalone Enqueue server instance

6 In the EC4_DVBGS12_SAPEC4CI profile, do the following:

- **Change the values of the following parameters:**

INSTANCE_NAME	DVBGS12
SAPSYSTEM	12
SAPGLOBALHOST	SAPEC4ASCS
SAPLOCALHOST	SAPEC4CI
DIR_GLOBAL	\\SAPEC4ASCS\sapmnt\EC4\SYS\global
DIR_PROFILE	\\SAPEC4ASCS\sapmnt\EC4\SYS\profile
DIR_INSTANCE	C:\usr\sap\EC4\DVBGS12
DIR_EXECUTABLE	\$(DIR_INSTANCE)\exe
DIR_CT_RUN	\\SAPEC4ASCS\sapmnt\EC4\SYS\exe\run

```
DIR_TRANS          \\SAPEC4ASCS\sapmnt\trans
```

- Remove the following line.

```
rdisp/wp_no_enq=1
```

- Change the value of PORT in the following line.

```
icm/server_port_0=PROT=HTTP,PORT=8012
```

7 In the EC4_ASCS10_SAPEC4ASCS profile, do the following:

- Change the values of the following parameters:

```
INSTANCE_NAME      ASCS10
SAPGLOBALHOST      SAPEC4ASCS
SAPLOCALHOST       SAPEC4ASCS
SAPSYSTEM          10
```

- Remove the following lines:

```
rdisp/wp_no_dia=2
rdisp/wp_no_btc=2
rdisp/wp_no_vb=1
rdisp/wp_no_vb2=1
rdisp/wp_no_enq=1
rdisp/wp_no_spo=1
PHYS_MEMSIZE=512
DIR_TRANS=C:\usr\sap\trans
icm/server_port_0=PROT=HTTP,PORT=8010
```

- Add the following lines:

```
rdisp/myname = SAPEC4ASCS_EC4_10
enqueue/server/threadcount = 1
ipc/shm_psize_34 = 0
enqueue/table_size = 4096
enqueue/dequeue_wait_answer = FALSE
enqueue/process_location = LOCAL
enqueue/encni/port = 3210
rdisp/enqname = $(rdisp/myname)
enqueue/snapshot_pck_ids = 100
```

```
rdisp/mshost=SAPEC4ASCS  
rdisp/msserv = 3610  
ms/server_port_0=PROT=HTTP, PORT=8110
```

8 In the DEFAULT.PFL file, do the following:

■ Remove the following lines:

```
SAPDBHOST=SAPEC4ASCS  
rdisp/accept_remote_trace_level=0  
rdisp/sna_gateway=SAPEC4ASCS  
rdisp/sna_gw_service=sapgw10  
rslg/collect_daemon/listen_port=37  
rslg/collect_daemon/talk_port=13  
rdisp/bufrefmode=sendoff,exeauto  
dbms/type=mss  
dbs/mss/server=SAPNWDB\SQLINST01  
dbs/mss/schema=ec4  
dbs/mss/dbname=EC4
```

■ Add these lines:

```
SAPDBHOST=SAPNWDB #virtual hostname of the database server  
rdisp/accept_remote_trace_level=0  
rdisp/sna_gateway=SAPEC4CI  
rdisp/sna_gw_service=sapgw12  
rslg/collect_daemon/listen_port=37  
rslg/collect_daemon/talk_port=13  
rdisp/bufrefmode=sendon,exeauto  
dbms/type=mss  
dbs/mss/server=SAPNWDB\SQLINST01  
dbs/mss/schema=ec4  
dbs/mss/dbname=EC4  
enqueue/process_location = REMOTESA  
enqueue/serverhost = SAPEC4ASCS  
enqueue/serverinst = 10  
enqueue/encni/port = 3210
```

The Standalone Enqueue server is now configured and is ready for clustering.
For details about clustering:

See [“Clustering an SAP instance”](#) on page 62.

Installing an SAP ABAP Enqueue Replication server

Follow the instructions here to install and configure an SAP ABAP Enqueue Replication server.

See [“Installing an SAP Enqueue Replication server”](#) on page 58.

Fresh SAP installation: Installing an SAP Java system

This section describes the procedure to install an SAP system with Java architecture in a highly available environment. The procedure assumes that VCS is installed on the system.

Perform the instance installation in the order presented as follows.

Installing an SAP Java Central Services instance

This section explains the steps to install an SAP Java Central Services instance.

To install an SAP Java Central Services instance

- 1 Log in as a user that has domain administrator rights.
- 2 Create a VCS Service Group with IP and Lanman resources.
For details about creating VCS Service Groups, refer to the VCS user documentation.
- 3 Before beginning to install the SAP Java Central Services instance, bring the Service Group online.

- 4 On the node that has the Service Group online, start the SAP installation.

Do not double-click the `sapinst.exe` file to launch the SAP installation GUI. Use the `SAPINST_USE_HOSTNAME` parameter to launch the SAP installation GUI in a virtual environment. At the command prompt, run the following command:

SAP NetWeaver 04s	<code><path>\sapinst.exe</code> <code>SAPINST_USE_HOSTNAME=<Virtual Host Name></code>
Other SAP versions	<code><path>\sapinst.exe</code> <code>SAPINST_USE_HOSTNAME=<Virtual Host Name></code> <code>product_ha.catalog</code>

where:

<Virtual Host Name> is the virtual lanman name that you created in step [2](#).

- 5 From the installation GUI, select one of the following options and follow the instructions to complete the installation.

SAP NetWeaver 04s	High-Availability System > Based on AS Java > Central Services Instance (SCS)
Other SAP versions	SAP Java Central Services Instance

Installing an SAP Java Database instance

This section is applicable for SAP NetWeaver 04s only. Follow these steps to install an SAP Java Database instance.

To install an SAP Java Database instance

- 1 On the node where the database is up and running, begin the SAP database instance installation.

Do not double-click the `sapinst.exe` file to launch the SAP installation GUI. Use the `SAPINST_USE_HOSTNAME` parameter to launch the SAP installation GUI in a virtual environment. At the command prompt, run the following command:

```
<path>\sapinst.exe SAPINST_USE_HOSTNAME=<Virtual Host Name>
```

where:

<Virtual Host Name> is the virtual hostname of the system on which the database is running.

- 2 From the installation GUI, select **High-Availability System > Based on AS Java > Database Instance** and follow the instructions to complete the installation.

Installing an SAP Java Central instance

Ensure that you install an SAP Java Central Services instance before installing a Central instance.

See [“Installing an SAP Java Central Services instance”](#) on page 44.

For SAP NetWeaver 04s, use the following command:

```
<path>\sapinst.exe SAPINST_USE_HOSTNAME=<Virtual Host Name>
```

For other versions, use the following command:

```
<path>\sapinst.exe SAPINST_USE_HOSTNAME=<Virtual Host Name>  
product_ha.catalog
```

Select the option for SAP Java Central instance from the installation GUI, and follow the instructions to complete the installation.

When prompted for the SCS instance host name, enter the virtual host name of the SAP Java Central Services instance.

For SAP NetWeaver 04s, do the following:

- Select **High-Availability System > Based on AS Java > Central Instance** from the SAP installation GUI and follow the instructions to complete the installation.
- Under SAP System Parameters, specify the virtual SCS host name in the Profile Directory field. For example:

```
\\<SAPGLOBALHOST>\sapmnt\<SAPSID>\SYS\profile
```

Installing an SAP Java Dialog instance

This section explains the steps to install an SAP Java Dialog instance.

To install an SAP Java Dialog instance

Install the Java Dialog instance.

See [“Installing an SAP ABAP Dialog instance”](#) on page 37.

For SAP NetWeaver 04s, use the following command:

```
<Path_to_SAPInst>\sapinst.exe SAPINST_USE_HOSTNAME=<Virtual Host Name>
```

For other SAP versions, use the following command:

```
<Path_to_SAPInst>\sapinst.exe SAPINST_USE_HOSTNAME=<Virtual Host Name>  
product_ha.catalog
```

Select the option for SAP Java Dialog instance from the installation GUI, and follow the instructions to complete the installation.

When prompted for the Central instance host name, enter the virtual host name of the SAP Java Central Services instance.

For SAP NetWeaver 04s, do the following:

- Select **High-Availability System > Based on AS Java > Dialog Instance** from the SAP installation GUI and follow the instructions to complete the installation.
- Under SAP System Parameters, specify the virtual SCS host name in the Profile Directory field. For example:

```
\\<SAPGLOBALHOST>\sapmnt\<SAPSID>\SYS\profile
```

For details about clustering:

See [“Clustering an SAP instance”](#) on page 62.

Installing an SAP Java Enqueue Replication server

Follow the instructions to install and configure an SAP Java Enqueue Replication server.

See [“Installing an SAP Enqueue Replication server”](#) on page 58.

Fresh SAP installation: Installing a Java Add-In system (ABAP + Java)

This section describes the procedure to install an SAP system in which a Java Add-In is added to the ABAP architecture in a highly available environment. The procedure assumes that VCS is installed on the system.

Perform the instance installation in the order presented as follows.

Installing an SAP Add-In ASCS instance

This section is applicable for SAP NetWeaver 04s only. Follow the instructions to install an SAP Add-In ASCS instance.

See [“Installing an SAP ABAP ASCS instance”](#) on page 35.

From the installation GUI, select **High-Availability System > Based on AS ABAP and AS Java > Central Services Instance for ABAP (ASCS)** and follow the instructions to complete the installation.

Installing an SAP Add-In SCS instance

This section is applicable for SAP NetWeaver 04s only. Follow the instructions to install an SAP Add-In SCS instance. Use the IP and Lanman resources that you created for the SAP Add-In ASCS instance.

See [“Installing an SAP Add-In ASCS instance”](#) on page 48.

To install an SAP Add-In SCS instance

- 1 Log in as a user that has domain administrator rights.
- 2 Before beginning to install the SAP Add-In SCS instance, bring the Service Group in which the SAP Add-In ABAP instance is installed, online.
- 3 On the node that has the Service Group online, start the SAP installation. Do not double-click the `sapinst.exe` file to launch the SAP installation GUI. Use the `SAPINST_USE_HOSTNAME` parameter to launch the SAP installation GUI in a virtual environment. At the command prompt, run this command:

```
<path>\sapinst.exe SAPINST_USE_HOSTNAME=<Virtual Host Name>
```

where: *<Virtual Host Name>* is the virtual lanman name.

- 4 From the installation GUI, select **High-Availability System > Based on AS ABAP > Central Services Instance (SCS)** and follow the instructions to complete the installation.

Installing an SAP ABAP Central instance for an Add-In system

Follow the instructions to install an SAP ABAP Central instance.

See [“Installing an SAP ABAP Central instance”](#) on page 36.

For SAP NetWeaver 04s, do the following:

- Select **High-Availability System > Based on AS ABAP and AS Java > Central Instance** from the installation GUI, to install an SAP Add-In Central instance.
- Under SAP System Parameters, specify the virtual SCS host name in the Profile Directory field. For example:

```
\\<SAPGLOBALHOST>\sapmnt\<SAPSID>\SYS\profile
```

Installing an SAP ABAP Database instance for an Add-In system

Install an SAP ABAP Database instance.

See [“Installing an SAP ABAP Database instance”](#) on page 37.

For SAP NetWeaver 04s, do the following:

- Select **High-Availability System > Based on AS ABAP and AS Java > Database Instance** from the installation GUI, to install an SAP Add-In Database instance.
- Under SAP System Parameters, specify the virtual SCS host name in the Profile Directory field. For example:

```
\\<SAPGLOBALHOST>\sapmnt\<SAPSID>\SYS\profile
```

Installing a Java Add-In for a Central instance

For SAP NetWeaver 04s, this section is not applicable if you select the High-Availability option while installing the SAP ABAP Central instance for an Add-In system.

After installing the SAP ABAP Central and Database instance, follow these steps to install a Java Add-In for the Central instance.

To install a Java Add-In for a Central instance

- 1 Log in as a user that has domain administrator rights.
- 2 Bring the service group, which you created in the SAP ABAP Central instance for an Add-In system, online.

See [“Installing an SAP ABAP Central instance for an Add-In system”](#) on page 49.

- 3 On the node that has the Service Group online, start the Java Add-In system installation.

Do not double-click the **sapinst.exe** file to launch the SAP installation GUI. Use the `SAPINST_USE_HOSTNAME` parameter to launch the SAP installation GUI in a virtual environment. At the command prompt, run this command:

```
<path>\sapinst.exe SAPINST_USE_HOSTNAME=<Virtual Host Name>
```

where:

<Virtual Host Name> is the virtual lanman name of the SAP Add-In Central instance.

Select **Java Add-In for ABAP > Java System Finalization** from the installation GUI, and follow the instructions to complete the installation.

Installing an SAP ABAP Dialog instance for an Add-In system

Install an SAP ABAP dialog instance.

See [“Installing an SAP ABAP Dialog instance”](#) on page 37.

For SAP NetWeaver 04s, do the following:

- Select **High-Availability System > Based on AS ABAP and AS Java > Dialog Instance** from the installation GUI, to install an SAP Add-In Dialog instance.
- Under SAP System Parameters, specify the virtual SCS host name in the Profile Directory field. For example:

```
\\<SAPGLOBALHOST>\sapmnt\<SAPSID>\SYS\profile
```

Installing a Java Add-In for a Dialog instance

For SAP NetWeaver 04s, this section is not applicable if you select the High-Availability option while installing the SAP ABAP Dialog instance for an Add-In system.

After installing an SAP ABAP Dialog instance, follow these steps to install a Java Add-In for the Dialog instance.

To install a Java Add-In for a Dialog instance

- 1 Bring the dialog instance that you installed in the Java Add-In for a Dialog instance, online.
See [“Installing a Java Add-In for a Dialog instance”](#) on page 50.
- 2 Begin the installation. Do not double-click the `sapinst.exe` file to launch the SAP installation GUI. Use the `SAPINST_USE_HOSTNAME` parameter to launch the SAP installation GUI in a virtual environment. At the command prompt, run this command:

```
<path>\sapinst.exe SAPINST_USE_HOSTNAME=<Virtual Host Name>
```

where:

<Virtual Host Name> is the virtual lanman name of the SAP Add-In Central instance.

Select **Java Add-In for ABAP > Dialog Instance Finalization** from the installation GUI, and follow the instructions to complete the installation.

For details about clustering:

See [“Clustering an SAP instance”](#) on page 62.

Installing an SAP Add-In Standalone Enqueue server

For SAP NetWeaver 04s, this section is not applicable if you select the High-Availability option in the SAP installation GUI. For SAP NetWeaver 04s, the procedure to install an SAP Add-In Standalone Enqueue server is integrated with the SAPInst tool.

For other SAP versions, in an SAP Add-In system, you require the following:

- A Standalone Enqueue server and a message server with ABAP architecture.
- A Standalone Enqueue server and a message server with Java architecture.
This Enqueue server is shipped as part of the SAP installation.

For high availability, you must isolate the ASCS instance. To isolate the ASCS instance, you must split the Central instance into two instances. One instance includes the dialog, update, background, and spool work processes, while the other instance becomes a disconnected ASCS instance, containing the message and the Enqueue servers.

If you restart this disconnected ASCS instance on the Central Services instance host, the instance is relocated on the Central Services instance host.

The remaining instance on the Central instance host must not be renamed as DVBGS<xx>. Renaming this instance may lead to problems with an existing J2EE Add-In system, or with an awaiting J2EE installation. In addition, the path names are firmly connected to various points in the J2EE engine. Therefore, this instance name must not be changed. For more information, refer to SAP note 821904.

Before you install an SAP Add-In Standalone Enqueue server, assume the following:

- The original Central instance is DVEBMGS<xx>, and the instance is split into the following instances:

ASCS<yy>	SAP Add-In Standalone Enqueue server instance
DVEBMGS<xx>	Application server instance

- The value of SAPSID is XI1.
- The virtual host name of the Central and Standalone Enqueue server is SAPXI1ASCS.
- The instance numbers of the Central and Standalone Enqueue server instances are 41 and 42 respectively.

To install and configure an SAP Add-In Standalone Enqueue server

- 1 Make a copy of the start profile of the Central instance.
 Name the start profiles as follows:
 - START_DVEBMGS41_SAPXI1ASCS
 The start profile for the application server instance
 - START_ASCS42_SAPXI1ASCS
 The start profile for the Standalone Enqueue server
- 2 In the START_DVEBMGS41_SAPXI1ASCS profile, do the following:
 - Change the values of the following parameters:

DIR_EXECUTABLE	C:\usr\sap\XI1\SYS\exe\run
DIR_LIBRARY	C:\usr\sap\XI1\SYS\exe\run
DIR_INSTANCE	C:\usr\sap\XI1\DVEBMGS41
DIR_GLOBAL	C:\usr\sap\XI1\SYS\global
DIR_PROFILE	C:\usr\sap\XI1\SYS\profile
DIR_CT_RUN	C:\usr\sap\XI1\SYS\exe\runU

- Remove the following lines:

```
_DB=strdbs.cmd
Start_Program_02=immediate $(DIR_EXECUTABLE)\$( _DB) XI1
_MS=msg_server.exe
Start_Program_03=local $(DIR_EXECUTABLE)\$( _MS)
pf=$(DIR_PROFILE)\XI1_DVEBMGS41_SAPXI1ASCS
```

3 In the START_ASCS42_SAPXI1ASCS profile, do the following:

- Change the values of the following parameters:

SAPGLOBALHOST	SAPXI1ASCS
SAPLOCALHOST	SAPXI1ASCS
INSTANCE_NAME	ASCS42
SAPSYSTEM	42
DIR_EXECUTABLE	C:\usr\sap\XI1\ASCS42\exe
DIR_LIBRARY	C:\usr\sap\XI1\ASCS42\exe
DIR_INSTANCE	C:\usr\sap\XI1\ASCS42
DIR_GLOBAL	C:\usr\sap\XI1\SYS\global
DIR_PROFILE	C:\usr\sap\XI1\SYS\profile
DIR_CT_RUN	C:\usr\sap\XI1\SYS\exe\runU

- Remove the following lines:

```
_DB=strdbs.cmd
Start_Program_02=immediate $(DIR_EXECUTABLE)\$( _DB) XI1
_MS=msg_server.exe
Start_Program_03=local $(DIR_EXECUTABLE)\$( _MS)
pf=$(DIR_PROFILE)\XI1_DVEBMGS41_SAPXI1ASCS
_DW=disp+work.exe
Start_Program_04=local $(DIR_EXECUTABLE)\$( _DW)
pf=$(DIR_PROFILE)\XI1_DVEBMGS41_SAPXI1ASCS
_IGS=igswd.exe
Start_Program_06=local $(DIR_INSTANCE)\igs\bin\$( _IGS)
-dir=$(DIR_INSTANCE)\igs -mode=all -sysname=XI1 -sysno=41
```

- Add the following lines:

```
_CP = sapcpe.exe
Start_Program_00 = immediate $(DIR_EXECUTABLE)\$( _CP)
list:$(DIR_CT_RUN)\instance.lst pf=$(DIR_PROFILE)\
    XI1_ASCS42_SAPXI1ASCS
_MS=msg_server.exe
Start_Program_01=local $(DIR_EXECUTABLE)\$( _MS)
pf=$(DIR_PROFILE)\XI1_ASCS42_SAPXI1ASCS
_EN = ensrver.exe
Start_Program_02 = local $(DIR_EXECUTABLE)\$( _EN)
pf=$(DIR_PROFILE)\XI1_ASCS42_SAPXI1ASCS
```

4 Make a copy of the instance profile of the Central instance.

Name the profiles as follows:

- XI1_DVEBMGS41_SAPXI1ASCS
The instance profile for the Standalone Enqueue server instance
- XI1_ASCS42_SAPXI1ASCS
The instance profile for the application server instance

5 In the XI1_DVEBMGS41_SAPXI1ASCS profile, do the following:

- Change the values of the following parameters:

SAPGLOBALHOST	SAPXI1ASCS
SAPLOCALHOST	SAPXI1ASCS
INSTANCE_NAME	DVEBMGS41
SAPSYSTEM	41
DIR_EXECUTABLE	C:\usr\sap\XI1\SYS\exe\run
DIR_LIBRARY	C:\usr\sap\XI1\SYS\exe\run
DIR_INSTANCE	C:\usr\sap\XI1\DVEBMGS41
DIR_GLOBAL	C:\usr\sap\XI1\SYS\global
DIR_PROFILE	C:\usr\sap\XI1\SYS\profile
DIR_CT_RUN	C:\usr\sap\XI1\SYS\exe\runU

- Remove the following line:

```
rdisp/wp_no_enq = 1
```

- Add the following line:

```
enqueue/serverinst = 42
```

- Change the value of PORT in the following line:

```
ms/server_port_0 = PROT=HTTP, PORT=8142
```

6 In the XI1_ASCS42_SAPXI1ASCS profile, do the following:

- Change the values of the following parameters:

SAPGLOBALHOST	SAPXI1ASCS
SAPLOCALHOST	SAPXI1ASCS
INSTANCE_NAME	ASCS42
SAPSYSTEM	42
DIR_EXECUTABLE	C:\usr\sap\XI1\ASCS42\exe
DIR_GLOBAL	C:\usr\sap\XI1\SYS\global
DIR_PROFILE	C:\usr\sap\XI1\SYS\profile
DIR_CT_RUN	C:\usr\sap\XI1\SYS\exe\runU

- Remove the following lines:

```
rdisp/wp_no_dia = 2
rdisp/wp_no_btc = 2
rdisp/wp_no_vb = 1
rdisp/wp_no_vb2 = 1
rdisp/wp_no_enq = 1
rdisp/wp_no_spo = 1
PHYS_MEMSIZE = 512
DIR_TRANS = C:\usr\sap\trans
rdisp/start_icman = TRUE
icm/server_port_0 = PROT=HTTP,PORT=8041
exe/j2ee = $(DIR_INSTANCE)/j2ee/os_libs/jcontrol.exe
rdisp/j2ee_start_control = 1
rdisp/j2ee_start = 1
rdisp/j2ee_timeout = 600
rdisp/frfc_fallback = on
icm/HTTP/j2ee_0 = PREFIX=/,HOST=localhost,CONN=0-500,PORT=54100
jstartup/trimming_properties = off
```

```
jstartup/protocol = on
exe/jlaunch = $(DIR_INSTANCE)/j2ee/os_libs/jlaunch.exe
jstartup/vm/home = C:\Program Files\j2sdk1.4.2_10
INSTANCE_PROPERTIES =
$(DIR_INSTANCE)/j2ee/cluster/instance.properties
SDM_PROPERTIES = $(DIR_INSTANCE)/SDM/program/config/
sdm_jstartup.properties
jstartup/instance_properties =
$(INSTANCE_PROPERTIES);$(SDM_PROPERTIES)
ms/server_port_0 = PROT=HTTP, PORT=8141
```

■ Add the following lines:

```
rdisp/msserv = 3642
enqueue/table_size = 4096
enqueue/dequeue_wait_answer = FALSE
enqueue/serverinst = 42
enqueue/process_location = LOCAL
enqueue/encni/port = 3242
rdisp/myname = SAPXI1ASCS_XI1_42
rdisp/enqname = $(rdisp/myname)
enqueue/snapshot_pck_ids = 100
ms/server_port_0 = PROT=HTTP, PORT=8142
enqueue/server/threadcount = 1
ipc/shm_psize_34 = 0
```

7 In the DEFAULT.PFL file, do the following:

- Make SAPDBHOST equal to SAPNWDB, the virtual host name of the database server.
- Change the value of PORT in this line.

```
ms/server_port_0= PROT=HTTP, PORT=8142
```

■ Add the following lines:


```
enqueue/process_location= REMOTESA  
enqueue/serverhost= SAPXI1ASCS  
enqueue/serverinst= 42
```

- 8 Go to the following services file, and change the value of the message server port for the sapmsXI1 service to 3642/tcp:

Windows 2003 c:\WINDOWS\system32\drivers\etc\services

Windows 2008 C:\WINDOWS\system32\drivers\etc\services

The Java Add-In Enqueue server instance is configured and is ready for clustering.

See [“Clustering an SAP instance”](#) on page 62.

Installing and configuring an SAP Add-In Enqueue Replication server

Perform the following instructions to install and configure an SAP Add-In Enqueue Replication server for an ABAP system.

See [“Installing an SAP Enqueue Replication server”](#) on page 58.

Perform the following instructions to install and configure an SAP Add-In Enqueue Replication server for a Java System.

See [“Installing an SAP Enqueue Replication server”](#) on page 58.

Fresh SAP installation: Installing SAP MDM Server Components

This section describes the procedure to install an SAP system with MDM Server components in a highly available environment. The procedure assumes that VCS is installed on the system.

Install the following servers as SAP ABAP MDM Server instances:

1. SAP Master Data Server
2. SAP Master Data Import Server
3. SAP Master Data Syndication Server
4. SAP Master Data Layout Server

To install SAP MDM instances

- 1 Log in as a user that has domain administrator rights.
- 2 Create a VCS service group with IP and Lanman resources.
For details about creating VCS service groups, refer to the *Veritas Cluster Server Administrator's Guide*.
- 3 Bring the specific service group online.
- 4 Start the SAP installation on the node where the service group is online.

Note: Use the `SAPINST_USE_HOSTNAME` parameter to launch the SAP installation. Do not double-click the `sapinst.exe` file to launch the SAP installation GUI.

- 5 Change to the MDM media directory at the command prompt and run the following command.

```
path\sapinst.exe SAPINST_USE_HOSTNAME=Virtual Host Name
```

where: *Virtual Host Name* is the virtual Lanman name that you created in step 2.

- 6 Follow the instructions in the SAP installation GUI, and complete the installation of SAP MDM instances.

To install an SAP MDM instance for SAP NetWeaver MDM Servers other than Master Data Server

- 1 Select `Distributed System > Based on Server Type > Master Data Server Instance` from the SAP installation GUI and follow the instructions to complete the installation.
- 2 For other MDM Server Instances under SAP System Parameters, specify the virtual Master Data Server host name in the Profile Directory field.

For example: `\\<SAPGLOBALHOST>\sapmnt\<SAPSID>\SYS\profile`.

Installing an SAP Enqueue Replication server

For a highly available clustering system, you must configure an Enqueue Replication server along with a Standalone Enqueue server.

Note: Before configuring the Enqueue Replication server, refer to SAP Note 1018968.

Before installing an Enqueue Replication server, install the Standalone Enqueue server depending on the type of system as follows:

- For an SAP ABAP system
See [“Installing an SAP ABAP Standalone Enqueue server”](#) on page 38.
- For an SAP Add-In system
See [“Installing an SAP Add-In Standalone Enqueue server”](#) on page 51.
- For an SAP Java system, you must install an SAP Java Central Services instance
See [“Installing an SAP Java Central Services instance”](#) on page 44.

Before you install the SAP Enqueue Replication Server, assume the following:

- The value of the SAPSID attribute is <sapsid>.
- The virtual hostname of the Standalone Enqueue server is <enq_server>.
For an SAP Java system, consider <enq_server> as the SAP Java Central Services instance.
- The virtual hostname of the Enqueue Replication server is <rep_server>.
- The instance number of the Standalone Enqueue server is <xx>.
For an SAP Java system, consider <xx> as the instance number of the SAP Java Central Services instance.
- The instance number of the Enqueue Replication server is <yy>.
Ensure that the instance numbers for the shared memory segments of the Standalone Enqueue server and the Enqueue Replication server are the same. In case of a Standalone Enqueue server failure, this similarity facilitates the Enqueue lock table takeover.

To install and configure an SAP Enqueue Replication Server

- 1 Add the following line in the <sapsid>_(A)SCS<xx>_<enq_server> profile:

```
enqueue/server/replication = true
```

Restart the (A)SCS<xx> instance for the changes to take effect.

- 2 Make a copy of the START_(A)SCS<xx>_<enq_server> start profile, and rename the copy as START_REP<yy>_<rep_server>. This profile is the start profile for the Enqueue Replication server instance.
- 3 In the START_REP<yy>_<rep_server> profile, do the following:
 - Change the values of the following parameters.

SAPSYSTEM	<yy>
SCSID	<xx>

INSTANCE_NAME	REP<yy>
SAPGLOBALHOST	<enq_server>
SAPLOCALHOST	<rep_server>
DIR_INSTANCE	<drive>:\usr\sap\<sapsid>\INSTANCE_NAME
DIR_EXECUTABLE	<drive>:\usr\sap\<sapsid>\INSTANCE_NAME\exe
DIR_LIBRARY	<drive>:\usr\sap\<sapsid>\INSTANCE_NAME\exe
DIR_PROFILE	\\<enq_server>\sapmnt\<sapsid>\SYS\profile
DIR_GLOBAL	\\<enq_server>\sapmnt\<sapsid>\SYS\global

■ Remove the following lines:

```
_CP = sapcpe.exe
Start_Program_00 = immediate $(DIR_EXECUTABLE)\$( _CP)
pf=$(DIR_PROFILE)\<sapsid>_(A)SCS<xx>_<enq_server>
_MS=msg_server.exe
Start_Program_01=local $(DIR_EXECUTABLE)\$( _MS)
pf=$(DIR_PROFILE)\<sapsid>_(A)SCS<xx>_<enq_server>
_EN = ensrver.exe
Start_Program_02 = local $(DIR_EXECUTABLE)\$( _EN)
pf=$(DIR_PROFILE)\<sapsid>_(A)SCS<xx>_<enq_server>
```

■ Add the following lines:

```
_CP = sapcpe.exe
Start_Program_00 = immediate $(DIR_EXECUTABLE)\$( _CP)
pf=$(DIR_PROFILE)\<sapsid>_REP<yy>_<rep_server>
_ER = enrepserver.exe
Start_Program_01 = local $(DIR_EXECUTABLE)\$( _ER)
pf=$(DIR_PROFILE)\<sapsid>_REP<yy>_<rep_server> NR=$(SCSID)
```

- 4 Make a copy of the <sapsid>_(A)SCS<xx>_<enq_server> instance profile, and rename the copy as <sapsid>_REP<yy>_<rep_server>. This profile is the instance profile for the Enqueue Replication server instance.
- 5 In the <sapsid>_REP<yy>_<rep_server> profile, do the following:

■ Change the values of the following parameters:

SAPSYSTEM	<yy>
-----------	------

SCSID	<xx>
INSTANCE_NAME	REP<yy>
DIR_GLOBAL	\\<enq_server>\sapmnt\<sapsid>\SYS\global
DIR_PROFILE	\\<enq_server>\sapmnt\<sapsid>\SYS\profile
DIR_EXECUTABLE	<drive>:\usr\sap\<sapsid>\REP<yy>\exe
DIR_CT_RUN	\\<enq_server>\sapmnt\<sapsid>\SYS\exe\run
SAPGLOBALHOST	<enq_server>
SAPLOCALHOST	<rep_server>
SAPLOCALHOSTFULL	<rep_server>

■ Remove the following lines:

```
rdisp/myname = <enq_server>_<sapsid>_<xx>
enqueue/server/replication = true
enqueue/server/threadcount = 1
ipc/shm_psize_34 = 0
enqueue/table_size = 4096
enqueue/deque_wait_answer = FALSE
enqueue/process_location = LOCAL
enqueue/encni/port = 3210
rdisp/enqname = $(rdisp/myname)
enqueue/snapshot_pck_ids = 100
rdisp/mshost=<enq_server>
rdisp/msserv = 3610
ms/server_port_0=PROT=HTTP, PORT=8110
```

■ Add the following lines:

```
enqueue/process_location = REMOTESA
enqueue/serverhost = <enq_server>
enqueue/serverport = 32$(SCSID)
enqueue/serverinst = $(SCSID)
enqueue/enrep/poll_interval = 0
enqueue/enrep/poll_timeout = 120
enqueue/enrep/inactive_action = sleep
```

6 Create the following directory structure:

```
<drive>:\usr\sap\<sapsid>\REP<yy>\exe  
<drive>:\usr\sap\<sapsid>\REP<yy>\log  
<drive>:\usr\sap\<sapsid>\REP<yy>\data  
<drive>:\usr\sap\<sapsid>\REP<yy>\work
```

7 From the (A)SCS instance directory, copy all binaries into the
<drive>:\usr\sap\<sapsid>\REP<yy>\exe directory.

8 In the <drive>:\usr\sap\<sapsid>\REP<yy>\exe directory, create an sapcpe.exe
list file. Name the list file as rep.lst.

The rep.lst file must contain the names of all the binary files in this directory.
The list file must also include an entry as rep.lst.

9 Use the sapstartsrv.exe command to create an SAP Windows Service for the
Enqueue Replication server instance.

Start the SAP instance for the Enqueue Replication server. Ensure that the
instance is running successfully.

The SAP instance is now ready for clustering.

See [“Clustering an SAP instance”](#) on page 62.

Clustering an SAP instance

This section describes the procedure for clustering an SAP instance.

This procedure involves the following steps:

- Install the appropriate Windows Resource kit.
- Add the %WINDIR%\SapCluster directory to the path variable of the user
sapsidadm.

In an SAP cluster installation, an additional directory, %WINDIR%\SapCluster,
is created under the system directory. This directory contains all the SAP files
that the cluster nodes require. These files are database tools and program files
that the operating system monitors and SAPOsCol uses. They are independent
of the node that the SAP instance is running on.

- Configure the node that hosts the SAP Central Service Instance ([A]SCS) or
Central Instance based on SAPGLOBALHOST parameter, and then configure
all other nodes that you want to cluster.

Configuring the first node in the cluster

On the node in the cluster on which you installed SAP the first time, you must perform the following steps:

- Copy the required tools in to the SAPCluster directory.
- Set the SAPService to manual.
- Ensure that the SAPOsCol service is started from the SAPCluster directory.
- Create the cluster service group for SAP instance.

These steps are explained in detail in the following sections.

To configure the first node in the cluster

- 1 Stop the SAP Central Services Instance or the Central instance based on SAPGLOBALHOST.
- 2 Add the following lines in the start and instance profiles of the Central instance:

```
DIR_INSTALL = <DISK>:\usr\sap\SID\SYS
DIR_INSTANCE = <DISK>:\usr\sap<SAPSID>\<InstName>
SAPLOCALHOST = <InstanceVirtualHostName>
SAPLOCALHOSTFULL = <InstanceVirtualHostName>
```

- 3 In the start profile, make AUTOSTART as equal to 0.
- 4 Create the following directory:

```
%windir%\SapCluster
```

- 5 From the <disk>:\usr\sap<SAPSID>\<InstName>\exe directory, copy the following files into the %windir%\SapCluster directory:

```
sapevents.dll
sapntchk.exe
saposcol.exe
sapstartsrv.exe
```

- 6 Change the <sapsid>adm user environment as follows:

- At the command prompt, type `runas /profile /user:<domain>\<sapsid>adm regedit.`
- In the Registry Editor screen, click **HKEY_CURRENT_USER > Environment**.
- Change the value of PATH to %PATH%;%windir%\SapCluster.

7 Stop the following SAP services:

```
saposccl  
SAP<SAPSID>_<No.>
```

8 Change the SAP service configuration by running the following command from the command prompt:

```
sc config saposccl binPath= "%windir%\SapCluster\saposccl  
service"
```

9 Configure the SAP<SAPSID>_<No.> service as follows:

- At the command prompt, go to the %windir%\SapCluster\ directory.
- Run the `sapstartsrv.exe` command.
- In the SAP Service Install/Uninstall dialog box, select **Register COM Typelibrary only** in the Operation field.
- Click **OK**.
- Click **Start > Run**.
- Enter `services.msc` in the Open field.
- In the Services dialog box, right-click the SAP<SAPSID>_<No.> service, and select **Properties**.
- Select Manual in the Startup type field.
- Click **OK**.
- Quit the Services dialog box.

10 Create the following registry keys:

- At the command prompt, type `runas /profile
/user:<domain>\<sapsid>adm regedit`.
- In the Registry Editor screen, click **HKEY_LOCAL_MACHINE > System
> CurrentControlSet > Services > EventLog > Application**.
- Create registry keys, SAPOsCol and SAP<SAPSID>_<No.>.
- Assign the following values to the registry entries of SAPOsCol and SAP<SAPSID>_<No.>:

TypesSupported	Type: REG_DWORD
	Data: 7

EventMessageFile	Type: REG_EXPAND_SZ
	Data: %windir%\SapCluster\SAPEVENTS.DLL

Configuring all other nodes in the cluster

Activities on all other nodes in the cluster involve the following steps:

- Create required users and groups.
- Copy the required tools in the SAPCluster directory.
- Set the system and user environment.
- Enter the required port numbers in the Windows services files.
- Create the SAPService and SAPOsCol services.

These steps are explained in detail in the following procedure.

To configure all other nodes in the cluster

- 1 Create local groups, SAP_<SAPSID>_LocalAdmin and SAP_LocalAdmin.
- 2 Add the SAP_<SAPSID>_GlobalAdmin domain group to these local groups.
- 3 Add the SAP_<SAPSID>_GlobalAdmin domain group to the local Administrators group.

For details about creating and adding new local groups and users:

See [“Creating and adding local groups and users”](#) on page 72.

- 4 Click **Start > Programs > Administrative Tools > Local Security Policy > Local Policies > User Right Assignment**.
- 5 Add the following privileges for the <sapsid>adm user.

```
Act as a part of the Operating System (SeTcbPrivilege)
Replace a process-level token (SeAssignPrimaryTokenPrivilege)
Adjust memory quotas for a process for Windows Server 2003
(SeIncreaseQuotaPrivilege)
```

- 6 Add the following privileges for the SAPService<SAPSID> user.

```
Log on as a Service (SeServiceLogonRight )
Access this computer from the network (SeNetworkLogonRight)
Deny Logon Locally and Deny Log on through Terminal Services
(SeDenyInteractiveLogOnRight)
```

- 7 Change the <sapsid>adm user environment as follows:

- At the command prompt, enter `runas /profile /user:<domain>\<sapsid>adm regedit`.
 - In the Registry Editor dialog box, click **HKEY_CURRENT_USER > Environment**.
 - Create the user environment.
 See [“Configuring the first node in the cluster”](#) on page 63.
- 8** From the first node in the cluster, copy the following service entries for the SAP instance, from the services file in the `%windir%\system32\drivers\etc` directory to the corresponding services file on all other nodes in the cluster:

```
sapdp<No.>      32<No.>/tcp # SAP System Dispatcher Port
sapdp<No.>s      47<No.>/tcp # SAP System Dispatcher Security Port
sapgw<No.>      33<No.>/tcp # SAP System Gateway Port
sapgw<No.>s      48<No.>/tcp # SAP System Gateway Security Port
sapms<SAPSID> 36<No.>/tcp # SAP System Message Port
```

Typically, the value of `<No.>` is the value of `InstID`.

- 9** Move the Service Group from the first node to the node that you are currently configuring.
- 10** Create the following directory:

```
%windir%\SapCluster
```

- 11** From the `<disk>:\usr\sap\<SAPSID>\<InstName>\exe` directory, copy these files into the `%windir%\SapCluster` directory.

```
sapevents.dll
sapntchk.exe
saposcol.exe
sapstartsrv.exe
```

- 12** Ensure that the `<drive>:\usr\sap` directory is shared with the names, `sapmnt` and `saploc`.

See [“Converting a local installation into a domain installation”](#) on page 29.

- 13** Create the `saposcol` service by running the following command at the command prompt:

```
sc create saposcol binPath= "%windir%\SapCluster\saposcol
service" start= auto obj= <domain>\SAPService<SAPSID> password=
<password_of_SAPService<SAPSID>> [DisplayName= SAPOsCol]
```

14 Create the SAP<SAPSID>_<No.> service as follows:

- At the command prompt, go to the
<drive>:\usr\sap\<SAPSID>\<InstName>\exe directory.
- Run the `sapstartsrv.exe` command.
- In the SAP Service Install/Uninstall dialog box, enter the following values:

SID	<SAPSID>
NR	<InstanceNumber>
StartProfile	If SAPLOCALHOST=SAPGLOBALHOST, the value is <drive>:\usr\sap\<SAPSID>\profile\START_ <InstName>_<VirtualHostName> Else, the value is \\SAPGLOBALHOST\sapmnt\<SAPSID>\SYS\ profile\START_<InstName>_<VirtualHostName>
User	<domain>\SAPService<SAPSID>
Password	<SAPService<SAPSID> password>
Startup type	manual
Use Environment of User	<domain>\<sapsid>adm

- Click **OK**.

15 Reregister type library as follows:

- At the command prompt, go to the %windir%\SapCluster directory.
- Run the `sapstartsrv.exe` command.
- In the SAP Service Install/Uninstall dialog box, select **Register COM Typelibrary Only** in the Operation field.
- Click **OK**.

16 Create registry entries for the SAP<SAPSID>_<No.> and saposcol services.

See [“Configuring the first node in the cluster”](#) on page 63.

17 If an SAP Microsoft Management Console (MMC) is not configured on the node, register SAP MMC using the following steps:

- Access the <DVD>:\SAPINST\NT\<platform>\MMC directory.

For SAP NetWeaver 04s, access the presentation DVD and go to the
\\SAPINST\NT\<platform>\MMC directory.

- Extract the SAPMMCU.SAR (Unicode) archive.

```
sapcar -xvf  
"<DVD>:\SAPINST\NT\<platform>\MMC\SAPMMCU.SAR"
```

- Copy the extracted files to the %windir%\system32 directory.
If you are unable to copy librfc32u.dll, stop the SAP<SAPSID>_<No.>
service, and try again.
- Register all sapmmc*.dlls at the command prompt using this command
for each file.

```
%windir%\system32\regsvr32 <dll_file_name>
```

- Create a desktop shortcut for %windir%\system32\sapmmc.msc.

Clustering an SAP Add-In instance

Note: This section is not applicable for SAP NetWeaver 04s.

For an SAP Add-In system, clustering the Central instance and the Enqueue servers in different Service Groups is not possible. The path names and virtual hostnames are firmly connected to various points in the J2EE engine and therefore, you must not change the instance names and the virtual hostnames.

But when you cluster the Central instance and the Enqueue servers in the same Service Group, the down time increases whenever the Enqueue server fails. This increase is because the Central instance takes more time to shut down or restart. Another drawback is that whenever the Enqueue server fails, all user sessions connected to the Central instance are lost.

To resolve this issue, configure the Central instance outside the cluster environment. If you want to conduct SDM deployment tasks, bring the Central instance online manually, on the same node on which the Service Group including the Enqueue servers is online. For all user operations, you can additionally install and use a dedicated Dialog instance.

Note: If you are clustering the Central instance, Symantec recommends that you cluster the Central instance, Java Central Services instance, and ABAP Standalone Enqueue server instance in the same Service Group. Symantec also recommends that you cluster the Enqueue Replication servers for ABAP and Java for an Add-In system in a single Service Group. Such a high availability configuration facilitates failover to another node in the cluster if a fault occurs.

For clustering this instance:

See [“Clustering an SAP instance”](#) on page 62.

Creating and adding domain groups and users

If you do not have domain administrator rights, you can perform the SAP instance installation and configuration as a domain user who is a member of the local administrator group.

User accounts

The SAPIInst tool creates the following accounts for the SAP system administrator:

<sapsid>adm	This user account is the SAP system administrator account. This account enables interactive administration of the system.
SAPService<SID>	<p>This user account is required to start the SAP system. This account has the local user right to log on as a service.</p> <p>The advantage of setting up this additional account is that this account does not allow interactive logon. Therefore, abuse of the account can be prevented. You need not set an expiry date for the password and you can skip selecting the User must change password at next logon option.</p>

Groups

The SAPIInst tool creates the following groups during domain installation:

- **SAP_<SAPSID>_GlobalAdmin**
This global group is a domain level SAP administration group for organizing SAP system administrators. This global group groups together the users at the domain level so that they can be placed in appropriate local groups.
- **SAP_<SAPSID>_LocalAdmin**
Local groups are created and maintained on an application server. A local group has rights only to the system on which the group is located.

The system on which the local group is located is part of a particular domain. The local group can contain users and global groups from this domain.

- **SAP_LocalAdmin**

Though this group is created on all hosts, creating this group on the transport host is necessary. Members of this group have full control over the transport directory, \usr\sap\trans. This directory allows transports to take place between systems.

The SAP_<SAPSID>_GlobalAdmin groups of all the SAP systems that are part of the transport infrastructure are added to the SAP_LocalAdmin group. Therefore, the <sapsid>adm and SAPService<SAPSID> users of all systems in the transport infrastructure are members of the SAP_LocalAdmin group. These users have the rights necessary to initiate and execute transports.

Adding groups

This section describes the procedure to add new domain groups and users. You can perform this procedure as a domain administrator only.

To create the SAP_<SAPSID>_GlobalAdmin Global group

- 1 Log in as a domain administrator.
- 2 Click **Start > Programs > Administrative Tools > Active Directory Users and Computers**.

If you are unable to find the following options:

- Click **Start > Run**.
- Enter mmc in the Open field.
- In the Console window, click **File > Add/Remove Snap-in**.
- In the Add/Remove Snap-in dialog box, click **Add**.
- In the Add Standalone Snap-in dialog box, select **Active Directory Users and Computers**.
- Click **Add**.
- Click **OK**.

- 3 In the Active Directory Users and Computers dialog box, right-click **Users**, and select **New > Group**.

- 4 In the New Object - Group dialog box, enter the following values:

Group Name	SAP_<SAPSID>_GlobalAdmin
	Specify this value using the exact and correct uppercase and lowercase.
Group scope	Global
Group type	Security

- 5 Click **OK**.

To create SAP system users, <sapsid>adm and SAPService<SAPSID>

- 1 In the Active Directory Users and Computers dialog box, right-click **Users**, and select **New > User**.
- 2 In the New Object - User dialog box, enter the following values for <sapsid>adm:

First name	NA
Initials	NA
Last name	NA
Full name	<sapsid>adm
User logon name	<sapsid>adm

- 3 In the New Object - User dialog box, enter the following values for SAPService<SAPSID>:

First name	NA
Initials	NA
Last name	NA
Full name	SAPService<SAPSID>
User logon name	SAPService<SAPSID>

- 4 Click **Next**.
- 5 Enter the password and confirm the password.

- 6 Select **Password never expires**.
Ensure that no other option is selected.
- 7 Click **Next**.
- 8 Click **Finish**.

To add the <sapsid>adm user to the SAP_<SAPSID>_GlobalAdmin Group

- 1 In the Active Directory Users and Computers dialog box, double-click <sapsid>adm under Users.
- 2 In the <sapsid>adm Properties dialog box, click **Member > Add**.
- 3 In the Select Groups dialog box, select SAP_<SAPSID>_GlobalAdmin.
- 4 Click **Add**.
By default, this user is also a member of the Domain Users group.
- 5 Click **OK** twice.

To add the SAPService<SAPSID> user to the SAP_<SAPSID>_GlobalAdmin Group

- 1 In the Active Directory Users and Computers dialog box, double-click SAPService<SAPSID> under Users.
- 2 In the SAPService<SAPSID> dialog box, click **Member > Add**.
- 3 In the Select Groups dialog box, select SAP_<SAPSID>_GlobalAdmin.
- 4 Click **Add**. SAP_<SAPSID>_GlobalAdmin appears in the Member of list.
- 5 This user must not be a member of the Domain Users group.
Remove the user from the Domain Users group as follows:
 - From the Member of list, select SAP_<SAPSID>_GlobalAdmin.
 - Select Set Primary Group.
 - Select Domain Users.
 - Click **Remove** to delete the Domain Users group from the Member of list.
- 6 Click **OK**.
- 7 Exit the Active Directory Users and Computers dialog box.

Creating and adding local groups and users

This section describes the procedure to add new local groups and users.
Assume that you are adding a local group, SAP_<SAPSID>_LocalAdmin.

To create a local group

- 1 Click **Start > Control Panel > Administrative tools > Computer Management**.
- 2 In the Computer Management dialog box, select **Local Users and Groups**.
- 3 Right-click **Group**, and select **New Group**.
- 4 In the New Group dialog box, enter SAP_<SAPSID>_LocalAdmin in the **Group name** field.
- 5 Click **Add**.
- 6 In the Select Users, Computers, or Groups dialog box, enter <domain>\SAP_<SAPSID>_GlobalAdmin in the Object names field.
- 7 Click **OK** in the Select Users, Computers, or Groups dialog box.
SAP_<SAPSID>_LocalAdmin appears in the New Group dialog box.
- 8 Click **OK** in the New Group dialog box.

To add a domain group to a local group

- 1 Click **Start > Control Panel > Administrative tools > Computer Management**.
Assume that you are adding the domain group, SAP_<SAPSID>_GlobalAdmin to the local Administrators group.
- 2 In the Computer Management Console, select **Local Users and Groups > Groups**.
- 3 In the right panel, double-click **Administrators**.
- 4 In the Administrators Properties dialog box, click **Add**.
- 5 In the Select Users, Computers, or Groups dialog box, enter <domain>\SAP_<SAPSID>_GlobalAdmin in the Object names field.
- 6 Click **OK** in the Select Users, Computers, or Groups dialog box.
- 7 Click **OK** in the Administrators Properties dialog box.

Creating sapmnt and saploc share directories

Ensure that the sapmnt and saploc directories are shared, and are accessible by the SAP system Administrator.

To create the sapmnt and saploc share directories on Windows Server 2003

- 1 Right-click the *drive*:\usr\sap directory, and select **Properties**.
- 2 In the Properties dialog box, click the **Sharing** tab.
- 3 Click **Share this folder**.

- 4 Enter sapmnt in the Share name field.
- 5 Click **Permissions**.
- 6 In the Permissions for sapmnt dialog box, ensure that the Administrators and SAP_LocalAdmin user groups have full control for the sapmnt directory.
- 7 Click **OK** in the Permissions for sapmnt dialog box.
- 8 In the Properties dialog box, click **New Share**.
- 9 In the New Share dialog box, enter saploc in the Share name field.
- 10 Click **OK** in the New Share dialog box.
- 11 Click **Permissions**.
- 12 In the Permissions for saploc dialog box, ensure that the Administrators and SAP_LocalAdmin user groups have full control for the saploc directory.
- 13 Click **OK** in the Permissions for saploc dialog box.
- 14 Click **OK** in the Properties dialog box.

To create the sapmnt and saploc share directories on Windows Server 2008

- 1 Right-click the *drive:\usr\sap* directory, and select properties.
- 2 On the Properties dialog box, click the **Sharing** tab.
- 3 Click **Advanced Sharing**.
- 4 Select **Share this folder** option.
- 5 Enter *sapmnt* in the Share name field.
- 6 Click **Permissions**.
- 7 In the Permissions for sapmnt dialog box, ensure that the Administrators and SAP_LocalAdmin user groups have full control for the sapmnt directory.
- 8 Click **OK** in the Permissions for sapmnt dialog box.
- 9 In the Properties dialog box, click Advanced Sharing.
- 10 On the Advanced Sharing dialog box, click **Add**.
- 11 On the New Share dialog box, enter *saploc* in the Share name field.
- 12 Click **OK** in the New Share dialog box.
- 13 Click **Permissions**.
- 14 In the Permissions for saploc dialog box, ensure that the Administrators and SAP_LocalAdmin user groups have full control for the saploc directory.
- 15 Click **OK** in the Permissions for saploc dialog box.
- 16 Click **OK** in the New Share dialog box.

17 Click **OK** in the Advanced Sharing dialog box.

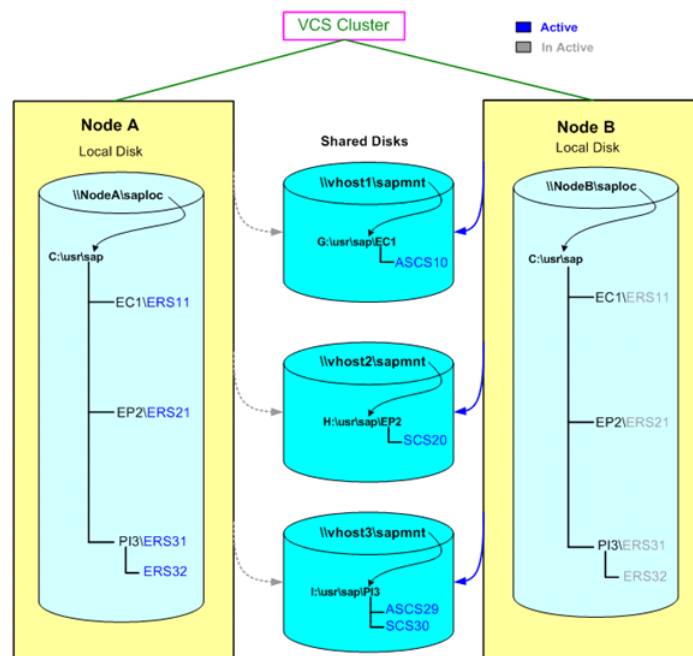
18 Click **Close** in the Properties dialog box.

Configuring the SAP systems on Windows Server 2008

The File Share feature functions differently on Windows Server 2008, as compared to Windows Server 2003. On Windows Server 2008, you can only access file shares pointing to local disks with the physical computer name. To be able to define file shares pointing to shared disks, a “client access point” (one IP address associated with one network name cluster resource) must already exist in the failover cluster service group to which the shared disk belongs. Since you can only access file shares pointing to shared disks with the network name that belongs to the same failover cluster service group, you can create multiple file shares with the same file share name (for example, sapmnt) in a failover cluster environment, assuming the file shares belong to different cluster service groups.

Figure 2-1 shows a typical SAP system installation on a Windows Server 2008 system under VCS environment.

Figure 2-1 Typical SAP system installation (using multiple sapmnt file shares) on a Windows Server 2008 system under VCS environment



For sample service group configurations on Windows Server 2008,

See [“Sample service group configurations for SAP system on Windows Server 2008”](#) on page 127.

Installing, upgrading, and removing the agent for SAP NetWeaver

This chapter includes the following topics:

- [Before you install the agent for SAP NetWeaver](#)
- [Installing the VCS agent for SAP NetWeaver](#)
- [Removing the VCS agent for SAP NetWeaver](#)
- [Upgrading the agent for SAP NetWeaver](#)

Before you install the agent for SAP NetWeaver

You must install the agent on all the systems that will host an SAP Service Group.

Ensure that you meet the following prerequisites before installing the agent for SAP NetWeaver:

- Install and configure Veritas Cluster Server.
- Remove any previous version of this agent.
See [“Removing the VCS agent for SAP NetWeaver”](#) on page 78.

Installing the VCS agent for SAP NetWeaver

Note: Ensure that you have uninstalled the previous version of this agent, if installed.

Also note that the agents for both, SAP NetWeaver and SAP WebAS are combined in a single package. Thus, if you install either of the agent, the other agent gets installed by default.

To install the VCS agent for SAP NetWeaver

- 1
- Log on to any node in the cluster.
- Ensure that the logged on user has the domain administrative privileges.
- 2
- Download the Agent Pack from the Symantec Operations Readiness Tools (SORT) site: <https://sort.symantec.com/agents>.
- You can download the complete Agent Pack tar file or the individual agent tar file.
- 3
- Uncompress the file to a temporary location.
- 4
- If you downloaded the complete Agent Pack tar file, navigate to the directory containing the package for the platform running in your environment.

Windows 2003 (IA64)	cd1\windows\w2k3IA64\vcs\application\sapnw_agent\ vcs_version\version_agent\Pkgs
Windows 2003 (x64)	cd1\windows\w2k3x64\vcs\application\sapnw_agent\ vcs_version\version_agent\Pkgs
Windows 2008 (x64)	cd1\windows\w2k8x64\vcs\application\sapnw_agent\ vcs_version\version_agent\Pkgs

- 5
- Double-click **vrtsvcssap.msi**.
- 6
- Follow the instructions that the install program provides, to complete the installation of Veritas agent for SAP server.

Removing the VCS agent for SAP NetWeaver

Perform the following procedure to uninstall the agent for SAP NetWeaver from a cluster. Perform these steps while the cluster is active.

Note: The agent for SAP NetWeaver and SAP WebAS are combined in a single package. Thus, removing one agent package will remove the other by default.

To uninstall the VCS agent for SAP NetWeaver

- 1 Ensure that all clustered SAP resources are offline.
- 2 From the cluster, remove all the resources that use the agents for SAP NetWeaver.
- 3 Perform the following steps on each node from which you want to uninstall the agent. Ensure that you have a user with administrative privileges.
 - Click **Start > Settings > Control Panel**.
 - ■ On Windows 2003: Navigate to **Add/Remove Programs**
 - On Windows 2008 : Navigate to **Programs and Features**
 - On Windows 2008R2 : Navigate to **Programs>Programs and Features**
 - From the list of programs, select **vrtsvcssap.msi**.
- 4 Click **Change/Remove**.
- 5 Follow the instructions that the uninstall program provides, to complete the uninstallation of the agents for SAP NetWeaver.

Upgrading the agent for SAP NetWeaver

Perform the following steps to upgrade the agent with minimal disruption, in a VCS environment.

To upgrade the agent in a VCS environment

- 1 Login as domain administrator.
- 2 Verify that your path is *drive:\Program Files\Veritas\Cluster Server\bin*
- 3 Persistently freeze all the service groups that host the application.
`C:\> hagrpf -freeze GroupName -persistent`
- 4 Stop the cluster services forcibly.
`C:\> hactop -all -force`
- 5 Ensure that the agent operations are stopped on all the nodes.
- 6 Take a back up of the `main.cf` and `types.cf`

```
C:\> copy drive:\> Program Files\Veritas\Cluster  
Server\conf\config\main.cf drive:\>backup\main.cf
```

```
C:\> copy drive:\> Program Files\Veritas\Cluster  
Server\conf\config\types.cf drive:\>backup\types.cf
```

- 7 Uninstall the agent package from all the nodes.
See [“Removing the VCS agent for SAP NetWeaver”](#) on page 78.
- 8 Install the new agent on all the nodes.
See [“Installing the VCS agent for SAP NetWeaver”](#) on page 77.
- 9 Navigate to *drive:\>* Program Files\Veritas\Cluster Server\conf\config\types.cf file and verify if any duplicate type definitions exists for Weblogic on all the nodes.

If duplicate type definitions exist, remove old type definition from types.cf file and save the file.

Note: To identify the old type definition, compare the new type definition file with the old (backed up) types.cf file.

- 10 Check for the changes in the resource values required, if any, due to the new agent types definition.

Note: To note the list of changed attributes, compare the new type definition file with the old type definition file.

- 11 Start VCS on all nodes in the cluster.

```
C:\> hstart
```

- 12 Start the agent on all nodes, if not started.

```
C:\> haagent -start SAPNW04 -sys SystemName
```

Optionally, start the SAPWebAS agent,

```
C:\> haagent -start SAPWebAS -sys SystemName
```

- 13 Unfreeze the service groups once all the resources come to an online steady state.

```
C:\> hagr -unfreeze GroupName -persistent
```


Configuring the agent for SAP NetWeaver

This chapter includes the following topics:

- [About configuring the agent for SAP NetWeaver](#)
- [Agent attributes for SAP NetWeaver](#)
- [Setting the SAPMonHome attribute](#)
- [Configuring the execution period for agent functions](#)
- [Executing a custom monitor program](#)

About configuring the agent for SAP NetWeaver

To provide high availability for SAP components in the VCS environment, you must first configure the VCS resources of type SAPNW04.

After installing the Agents for SAP NetWeaver, you can create and configure SAP resources. Before you configure a resource, review the attributes table that describes the SAPNW04 resource type and its attribute definitions.

See [“Agent attributes for SAP NetWeaver”](#) on page 81.

Agent attributes for SAP NetWeaver

[Table 4-1](#) shows the required attributes for configuring an SAP instance.

Table 4-1 Required Attributes

Required attributes	Description
EnqSrvResName	<p>Name of the VCS resource that is running the Standalone Enqueue server instance or SAP Central Services. The Enqueue Replication server instance uses this attribute to query the state of the resource that is running the Standalone Enqueue server instance, whenever a fault occurs.</p> <p>The preonline trigger script also uses this attribute in case of a Standalone Enqueue server fail over. The script uses this attribute to identify the appropriate node on which the Enqueue Replication server instance is running.</p> <p>Type and dimension: string-scalar</p> <p>Default: ""</p> <p>Example: SAPEC4ASCS_srv</p>
EPPProgramTimeout	<p>The amount of time reserved for graceful clean-up activities that the clean operation performs on an SAP instance, before returning control to the VCS engine.</p> <p>See “Configuring the execution period for agent functions” on page 88.</p> <p>Type and dimension: integer-scalar</p> <p>Default: 10</p> <p>Example: 20</p>
InstName	<p>Uniquely identifies an SAP server instance, along with the SAPSID attribute. The last two characters of this attribute specify the value of the InstID attribute. The InstID and SAPSID attributes together uniquely identify an SAP instance.</p> <p>Some examples include the following:</p> <ul style="list-style-type: none"> ■ DVEBMGS00: SAP BASIS Central instance ■ DVBGS02 : SAP BASIS Central instance minus Enqueue and Message servers ■ ASCS03: SAP ABAP Standalone Enqueue server ■ REP04: SAP ABAP Enqueue Replication server ■ D05: SAP ABAP Dialog instance ■ JC06: SAP Java Central instance ■ SCS07: SAP Java Central Services instance ■ J08: SAP Java Dialog instance ■ ERS10: SAP Enqueue Replication server <p>See “Uniquely identifying SAP server instances” on page 25.</p> <p>Type and dimension: string-scalar</p> <p>Example: DVEBMGS00</p> <p>Default: ""</p>

Table 4-1 Required Attributes (*continued*)

Required attributes	Description
InstProfile	<p>Full path to the instance profile of the SAP server instance. SAP Java instances, Enqueue Replication server instances, and Standalone Enqueue server instances use this attribute during second-level monitoring.</p> <p>Typically, the instance profile is located in the <drive>:\usr\sap\SAPSID\SYS\profile directory. The format of the profile name is <i>SAPSID_InstName_VIRTUAL_HOSTNAME</i>. Path names following the Unified Naming Convention (UNC) are also valid for this attribute.</p> <p>Type and dimension: string-scalar</p> <p>Default: ""</p> <p>Example 1: c:\usr\sap\EP1\SYS\profile\EP1_SCS02_SAPEP1SCS</p> <p>Example 2: \\SAPEP1SCS\sapmnt\EP1\SYS\profile\EP1_REP03_SAPEP1REP</p> <p>Example 3: \\SAPEP1SCS\sapmnt\EP1\SYS\profile\EP1_JC00_SAPEP1CI</p>
InstType	<p>SAP server instance type. Valid values include the following:</p> <ul style="list-style-type: none"> ■ CENTRAL: SAP Central instance ■ DIALOG: SAP Dialog instance ■ ENQUEUE: SAP Standalone Enqueue server instance ■ ENQREP: SAP Enqueue Replication server instance ■ AENQUEUE: SAP Standalone Enqueue server instance Add-In (ABAP) ■ AENQREP: SAP Enqueue Replication server instance Add-In (ABAP) ■ JENQUEUE: SAP Central Services instance Add-In (Java) ■ JENQREP: SAP Enqueue Replication server instance Add-In (Java) ■ MDM: SAP MDM instance <p>Type and dimension: string-scalar</p> <p>Default: CENTRAL</p> <p>Example: DIALOG</p>
ProcMon	<p>The list of SAP processes that the monitor function must monitor during a first-level check of an SAP instance.</p> <p>See “Monitoring an SAP instance” on page 26.</p> <p>Type and dimension: vector</p> <p>Default: ""</p> <p>Example: disp+work.exe msg_server.exe</p>

Table 4-1 Required Attributes (*continued*)

Required attributes	Description
ResLogLevel	<p>The logging detail performed by the Agent for SAP NetWeaver for the resource. Valid values include the following:</p> <p>INFO: Logs error messages.</p> <p>TRACE: Logs error and trace messages. TRACE is very verbose and should only be used during initial configuration or for troubleshooting and diagnostic operations.</p> <p>Type and dimension: string-scalar</p> <p>Default: INFO</p> <p>Example: TRACE</p>
SAPAdmin	<p>Windows user name used to start the SAP instance. This user must be dedicated to all the SAP instances within an SAP system. The format is <i>sapsidadm</i>.</p> <p>Note: Do not include the domain name when specifying this attribute. Use the SAPAdminDomain attribute to specify domain information.</p> <p>Type and dimension: string-scalar</p> <p>Default: ""</p> <p>Example: ec4adm</p>
SAPAdminDomain	<p>Windows domain name to which the SAPAdmin user belongs.</p> <p>Note: If SAPAdmin does not belong to a Windows domain, use the cluster localization settings to specify the local computer name for each system.</p> <p>Type and dimension: string-scalar</p> <p>Default: ""</p> <p>Example: VRTSGPS</p>
SAPAdminPassword	<p>Password for the SAPAdmin user.</p> <p>Use the <code>vcsencrypt -agent</code> command to encrypt the password. If you are using the VCS GUI, the GUI automatically encrypts the password.</p> <p>Type and dimension: string-scalar</p> <p>Default: ""</p> <p>Example: vxfgh28skbsj</p>

Table 4-1 Required Attributes (*continued*)

Required attributes	Description
SAPHost	<p>Virtual IP host name (LANMAN name) under which the SAP instance is to run.</p> <p>Type and dimension: string-scalar</p> <p>Default: ""</p> <p>Example: sap04smcscaw</p>
SAPHome	<p>The absolute path to the SAP base directory. This attribute is used to locate programs that the Agent for SAP NetWeaver uses for start, stop, and clean functions.</p> <p>Type and dimension: string-scalar</p> <p>Default: ""</p> <p>Example 1: c:\usr\sap\EC4\SYS\exe\run</p> <p>Example 2: c:\usr\sap\EC4\ASCS01\exe</p>
SAPMonHome	<p>The directory that defines the location of the sapinfo.exe, jcmmon.exe, or ensmon.exe commands. The agent for SAP NetWeaver uses these commands for second-level monitoring.</p> <p>This functionality is not a part of the base SAP installation. Hence, the value of this attribute may be different from the SAPHome attribute.</p> <p>See “Setting the SAPMonHome attribute” on page 87.</p> <p>Type and dimension: string-scalar</p> <p>Default: ""</p> <p>Example: C:\usr\sap\sapinfo\rfcsdk\bin</p>
SAPServiceUser	<p>Windows user name used to start the SAP Windows service for an SAPSID. This user must be dedicated to all the SAP services under one SAP system, and must not be used by any other SAP service or instance under a different SAP system, even in the same cluster.</p> <p>Note: Do not include the domain name in the value for this attribute. Use the SAPAdminDomain attribute to specify domain information.</p> <p>Type and dimension: string-scalar</p> <p>Default: ""</p> <p>Example: SAPServiceEC4</p>

Table 4-1 Required Attributes (*continued*)

Required attributes	Description
SAPSID	<p>SAP system name. This attribute starts with an alphabetic character and is exactly 3 characters in length. Ensure that the alphabetic characters used in this attribute are in uppercase only. SAPSID is defined during the SAP installation.</p> <p>See “Uniquely identifying SAP server instances” on page 25.</p> <p>Type and dimension: string-scalar</p> <p>Default: ""</p> <p>Example: EC4</p>

[Table 4-2](#) shows the optional attributes for configuring an SAP instance.

Table 4-2 Optional attributes

Optional attributes	Description
MonitorProgram	<p>The full pathname and command-line arguments for an externally provided monitor program.</p> <p>See “Executing a custom monitor program” on page 88.</p> <p>Type and dimension: string-scalar</p> <p>Default: ""</p> <p>Example 1: <drive>:\usr\sap\EC4\ASCS00\work\myMonitor.exe</p> <p>Example 2: <drive>:\usr\sap\EC4\ASCS00\work\myMonitor.exe arg1 arg2</p>
SecondLevelMonitor	<p>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.</p> <p>Based on the type of installation, the agent uses the SAP supplied sapinfo.exe, jcmmon.exe, or ensmon.exe commands to perform second-level monitoring.</p> <p>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.exe is executed every 100 minutes, which may not be as often as intended. For maximum flexibility, no upper limit is defined for SecondLevelMonitor.</p> <p>Type and dimension: integer-scalar</p> <p>Default: 0</p> <p>Example: 1</p>

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
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 *drive\usr\sap\SAPSID\InstName\exe*
Also, ensure that the sapinfo binaries and the libraries are copied to *\\SAPGLOBALHOST\sapmnt\SAPSID\SYS\exe\run* and the names of the binaries and libraries are listed in the instance specific sapcpe binary list.
- For Java: jcmmon
- For Add-In (ABAP + Java): sapinfo, jcmmon
- For Enqueue and Enqueue Replication Server: ensmon

Table 4-3 shows recommended values for the SAPMonHome attribute.

Table 4-3 Recommended values for SAPMonHome attribute

SAP installation type and instance	Format	Value of the SAPMonHome attribute
SAP ABAP For all instances	Unicode and non-Unicode	<i>drive\usr\sap\SAPSID\SYS\exe\run</i>
SAP Java For all instances	Unicode	<i>drive\usr\sap\SAPSID\SYS\exe\run</i>
SAP Java Add-In When InstType is equal to CENTRAL, DIALOG, AENQUEUE, or AENQREP	Unicode and non-Unicode	<i>drive\usr\sap\SAPSID\SYS\exe\run</i>
SAP Java Add-In When InstType is equal to JENQUEUE or JENQREP	Unicode and non-Unicode	<i>drive\usr\sap\SAPSID\SYS\exe\runU</i>

Configuring the execution period for agent functions

An agent function is allocated an execution period using the respective time-out attributes: `OnlineTimeout`, `OfflineTimeout`, `MonitorTimeout`, and `CleanTimeout`.

If an agent function executes a program, for example `sapinfo.exe`, the program must execute within the allocated execution period. If the program is unable to execute within the allocated period, the agent function cancels and terminates the execution of the program.

The agent function requires an allocated time to gracefully exit and terminate a program. The `EPPProgramTimeout` attribute specifies the period in which the agent function can cancel a running program.

For example, if `EPPProgramTimeout` is set to 10 and `MonitorTimeout` is set to 60, the monitor function cancels a program execution if the program does not complete within 50 seconds of the start of the monitor function.

Executing a custom monitor program

The monitor function executes a custom monitor program to perform a user-defined SAP instance server state check.

The monitor function executes the `MonitorProgram` if the following conditions are true:

- The `MonitorProgram` attribute value is set to a valid executable program.
- The first level process check indicates that the SAP server instance is online.
- The `SecondLevelMonitor` attribute is either set to 0 (false), or `SecondLevelMonitor` is set to 1 (true) and the second-level check indicates that the SAP server instance is online.

This feature allows cluster administrators to define custom programs that can further determine the state of the SAP server.

The monitor operation interprets the program 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

To ensure that the custom monitor program is always available to the agent application, Symantec recommends storing the file in a directory that is available on an online SAP system.

Configuring the service groups for SAP server

This chapter includes the following topics:

- [About configuring service groups for SAP NetWeaver](#)
- [Before configuring the service groups for SAP server](#)
- [Configuring service groups for SAP NetWeaver](#)
- [About the configuration process](#)
- [Configuring the VCS preonline trigger](#)

About configuring service groups for SAP NetWeaver

Configuring the SAP NetWeaver service group involves creating the SAP service group, its resources, and defining attribute values for the configured resources. You must have administrator privileges to create and configure a service group.

You can configure the service groups using one of the following:

- The Cluster Manager (Java console)
- Veritas Operations Manager
- The command-line

See [“Configuring service groups for SAP NetWeaver”](#) on page 92.

Before configuring the service groups for SAP server

Before you configure the SAP server service group, you must perform the following:

- Verify that VCS is installed and configured on all nodes in the cluster where you will configure the service group.
Refer to *Veritas Storage Foundation™ and High Availability Solutions Installation and Upgrade Guide* for more information on installing and configuring VCS.
- Verify that SAP NetWeaver 7.10 is installed and configured identically on all nodes in the cluster.
See [“About installing SAP NetWeaver for high availability”](#) on page 28.
See [“About configuring SAP NetWeaver for high availability”](#) on page 28.
- Verify that the Veritas agent for SAP server is installed on all nodes in the cluster.
See [“Installing the VCS agent for SAP NetWeaver”](#) on page 77.

Configuring service groups for SAP NetWeaver

While setting up a cluster, you must always ensure that the cluster has some spare capacity to handle the SAP NetWeaver failover scenarios. For example, in case of a backend database failure, the cluster must be able to run another database instance in conjunction with other running applications.

See *Veritas Storage Foundation™ and High Availability Solutions Installation and Upgrade Guide*

The cluster should be able to provide application failover by encapsulating the resources required for an application into a service group. A service group is a virtualized application that can switch between the cluster nodes. It contains a set of dependent resources, such as disk groups, disk volumes, file systems, IP addresses, NIC cards, and dependent application processes. It also includes logic about the dependencies between the application components.

These service groups should thus be configured such that the cluster can start, stop, monitor, and switch the service groups between the nodes, depending upon the server faults or resource faults. An administrator should also be proactively able to move a service group between cluster nodes to perform preventative maintenance or apply patches.

Perform the following steps to add a service group for SAP NetWeaver

- 1** Change the cluster configuration to read/write mode.

```
C:\> haconf -makerw
```

- 2** Create a service group for SAP NetWeaver.

```
C:\> hagrps -add SAP70-ERPASCS
```

For more details refer to, *Veritas Cluster Server Administrator's Guide*

- 3** Modify the SystemList attribute for the group, to add systems.

```
C:\> hagrps -modify SAP70-ERPASCS SystemList vcswin74 0 vcswin75  
1
```

- 4** Create resources for NIC, IP, Lanman, VMDg and MountV in the service group.

```
C:\> hares -add SAP70-ERPASCS_nic NIC SAP70-ERPASCS
```

```
C:\> hares -add SAP70-ERPASCS_ip IP SAP70-ERPASCS
```

```
C:\> hares -add SAP70-ERPASCS_lanman Lanman SAP70-ERPASCS
```

```
C:\> hares -add SAP70-ERPASCS_mnt MountV SAP70-ERPASCS
```

```
C:\> hares -add SAP70-ERPASCS_vmdg VMDg SAP70-ERPASCS
```

For more details on creating and modifying resource attributes for NIC, IP, Lanman, VMDg and MountV refer to, *Veritas Cluster Server Bundled Agents Reference Guide*.

- 5** Create links between the resources.

```
C:\> hares -link SAP70-ERPASCS_ip SAP70-ERPASCS_nic
```

```
C:\> hares -link SAP70-ERPASCS_lanman SAP70-ERPASCS_ip
```

```
C:\> hares -link SAP70-ERPASCS_mnt SAP70-ERPASCS_vmdg
```

- 6** Create SAPNW04 resource for SAP Netweaver.

```
C:\> hares -add SAP70-ERPASCS_ascs SAPNW04 SAP70-ERPASCS
```

Based on the SAP instance you are clustering, modify the resource attributes.

For more information on agent attributes,

See [“Agent attributes for SAP NetWeaver”](#) on page 81.

- 7** Create resource dependencies for SAPNW04 resource.

The SAPNW04 resource depends on the Lanman and MountV resources.

```
C:\> hares -link SAP70-ERPASCS_ascs SAP70-ERPASCS_lanman
```

```
C:\> hares -link SAP70-ERPASCS_ascs SAP70-ERPASCS_mnt
```

8 Verify the final resource dependencies for SAP server group.

Group	Parent	Child
SAP70-ERPASCS	SAP70-ERPASCS_ascs	SAP70-ERPASCS_lanman
SAP70-ERPASCS	SAP70-ERPASCS_ascs	SAP70-ERPASCS_mnt
SAP70-ERPASCS	SAP70-ERPASCS_ip	SAP70-ERPASCS_nic
SAP70-ERPASCS	SAP70-ERPASCS_lanman	SAP70-ERPASCS_ip
SAP70-ERPASCS	SAP70-ERPASCS_mnt	SAP70-ERPASCS_vmdg

9 Save the cluster configuration.

```
C:\> haconf -dump -makero
```

About the configuration process

While various methods and procedures can be used to install and configure the service groups in an SAP server, Symantec recommends the following general process:

- Allocate shared disk resource for the SAP node
Symantec recommends installing each SAP node to be clustered on a separate, dedicated shared disk resource (e.g. LUN). Work with the appropriate administrative group in your organization to obtain a shared disk resource for the SAP node.
- Create disk group, volumes, and a file system
A disk group contains volumes and file system (mount resource). All SAP R/3 directories are placed in these volumes.
Create a disk group, volumes, and a file systems using the shared disk resources allocated for the SAP node.
You can use the Veritas Volume Manager to create the disk group, volumes, and file system.

Obtaining a dedicated virtual IP address and host name

Obtain a dedicated virtual IP address and host name for the SAP node IP network configuration. The SAP instance uses this network address and host name exclusively, and is regardless of the system in the cluster running the instance.

Note: Ensure that you map the virtual IPs in the DNS, or the hosts file on each system.

Creating cluster service group and supporting resources

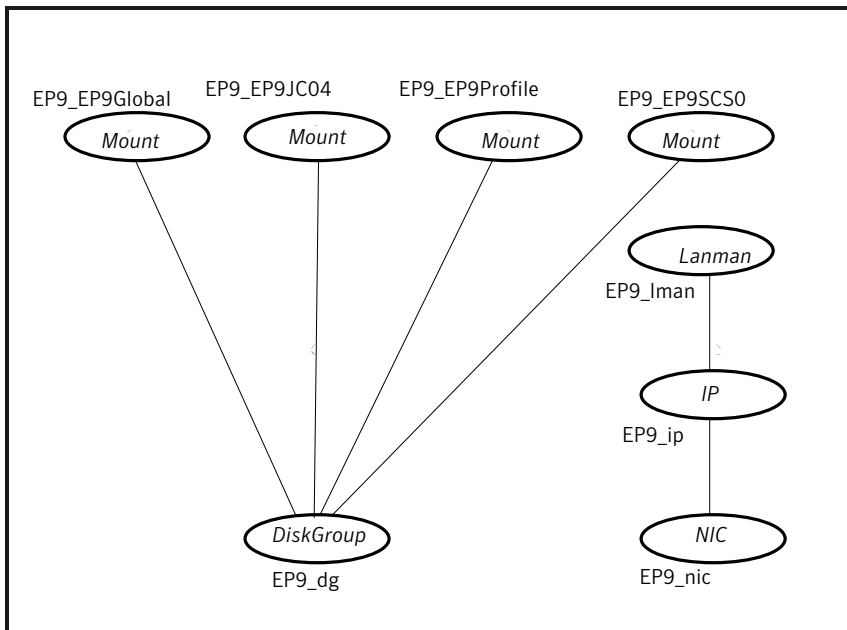
Create a cluster service group that contains the resources supporting the SAP node. Create appropriate cluster resources.

Create links to place the shared disk and networking objects, that were previously placed under the cluster control.

Test the Service Group configuration by placing it online.

Figure 5-1 shows a sample service group configuration.

Figure 5-1 Sample service group configuration



Installing the software for the SAP instance

See “[Setting up SAP systems for clustering](#)” on page 29.

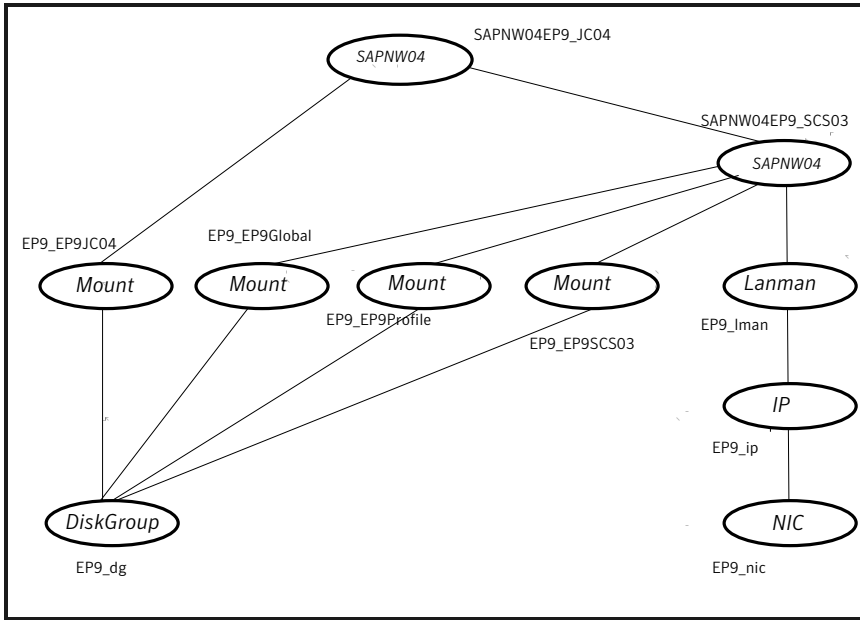
Ensure that SAP runs successfully on all nodes of the cluster before placing the SAP instance under the cluster control.

Placing the SAP instance under cluster control

After the SAP installation is complete, create a cluster resource using the agent for SAP NetWeaver.

Figure 5-2 shows a service group in which the SAP instance is under the cluster control.

Figure 5-2 SAP instance under cluster control



Configuring the VCS preonline trigger

The behavior of the SAP Standalone Enqueue and SAP Enqueue Replication servers in a clustered environment has the following requisites:

- If a Standalone Enqueue server instance fails, the server must fail over to the node where the Enqueue Replication server instance is online.
The Standalone Enqueue server instance examines the shared memory, and locates a replicated copy of the lock state table. The instance uses the replicated copy to initialize the original lock state table.
After the Standalone Enqueue server instance initiates its internal lock buffer, the Replication server instance must go down and must switch to another node in the cluster.
- If the Enqueue Replication server instance fails, the instance must fail over to such a node in the cluster that does not have an Enqueue server instance in ONLINE state.

To facilitate proper failover behavior, you must configure the VCS preonline trigger. The VCS preonline trigger calls an external preonline trigger utility, `sapnw04preonline.exe`. The initiated preonline trigger performs the steps necessary for correct failover behavior of the Enqueue servers. The `sapnw04preonline.exe` utility is located in the `%VCS_HOME%\bin\SAPNW04` directory.

To configure the VCS preonline trigger script, perform the following steps:

Step 1: Navigate to the `%VCS_HOME%\bin\Trigger` directory.

Step 2: Add the following lines to the preonline file:

If you are configuring the preonline file for the first time, this file may not exist. You can thus skip this step.

```
#-----
# Start sapnw04 preonline trigger.
#-----
# Perl preonline.pl <system> <group> <whyonlining>
<systemwhereloggroupfaulted>
my $system = $ARGV[0];
my $group = $ARGV[1];
my $whyonlining = $ARGV[2];
my $systemwhereloggroupfaulted = undef;
my $sArgs = join(' ', @ARGV);
VCSAG_LOG_MSG("I", "Arguments [$sArgs]", 15041);
if(defined $ARGV[3]) {
    $systemwhereloggroupfaulted = $ARGV[3];
}
$SAPPreOnlineTrigger =
sprintf("%s\\bin\\SAPNW04\\sapnw04preonline.exe", $vcs_home);
VCSAG_LOG_MSG("I", "The trigger command is
[$SAPPreOnlineTrigger]", 15041);
if(defined $systemwhereloggroupfaulted)
{
    VCSAG_LOG_MSG("I", "The group is faulted on syetem =
[$systemwhereloggroupfaulted]", 15042);
    $CMD = sprintf("%s\\%s\\%s %s %s %s", $SAPPreOnlineTrigger,
    $system, $group, $whyonlining, $systemwhereloggroupfaulted);
}
else {
    $CMD = sprintf("%s\\%s\\%s %s %s %s", $SAPPreOnlineTrigger, $system,
    $group, $whyonlining);
}
system($CMD);
my $exit_value = $? >> 8;
```

```
VCSAG_LOG_MSG("I", "The exit code from the trigger:
[$exit_value].", 15046, $exit_value);
if($exit_value == 0) {
VCSAG_LOG_MSG("I", "The PreOnline Trigger for SAP excuted
succesfully.", 15046);
exit;}elseif($exit_value == 1) {
VCSAG_LOG_MSG("I", "The PreOnline Trigger for SAP FAILED.",
15047);
exit;
}
else {
VCSAG_LOG_MSG("I", "Unknown PreOnline trigger.", 15048);
}
#-----
# End sapnw04 preonline trigger.
#-----
.
.
# give control back to HAD.
if (defined $ARGV[3]) {
    \"$vcs_home\\bin\\hagrp\" -online -nopre $ARGV[1] -sys
$ARGV[0] -checkpartial $ARGV[3]`;
    exit;
}
    \"$vcs_home\\bin\\hagrp\" -online -nopre $ARGV[1] -sys
$ARGV[0]`;
    exit;
```

Step 3: If the preonline file does not exist, copy the sample preonline trigger file from the %VCS_HOME%\bin\Sample_Triggers directory, in to the %VCS_HOME%\bin\Triggers directory. Revert back to step 2 to step to make changes in the preonline file.

A sample_sapnw04preonline file is also available in the %VCS_HOME%\bin\Sample_Triggers directory. You can copy this file in the %VCS_HOME%\bin\Triggers directory, rename the file to preonline, and use this file.

Step 4: Set the preonline trigger attribute to true for the Service Groups to which the Standalone Enqueue server and Enqueue Replication server instances belong.

```
C:\> hagrp -modify service_group PreOnline 1
```

For VCS 5.1 and later

```
C:\> hagrp -modify service_group PreOnline 1 -sys SystemName
```

The preonline script is now configured to facilitate Enqueue server behavior. You can view the logs in the VCS engine log, engine_A.log.

Note: Once the PreOnline trigger is configured, you may see unexpected behavior while manually switching or performing online operations on the Enqueue Replication service group. This behavior is a result of the control logic within the PreOnline trigger that protects the Enqueue lock table. For system maintenance, if you prefer to perform manual operations on the service groups, you can do so by disabling the PreOnline trigger as follows:

```
C:\> hagr -modify service_group PreOnline 0
```

For VCS 5.1 and later

```
C:\> hagr -modify service_group PreOnline 0 -sys SystemName
```

Troubleshooting the agent for SAP NetWeaver

This chapter includes the following topics:

- [Using correct software and operating system versions](#)
- [Meeting prerequisites](#)
- [Configuring SAP server resources](#)
- [Checks for an SAP Add-In system](#)
- [Starting the SAP server outside a cluster server](#)
- [Common Problems with Veritas agent for SAP server](#)
- [Reviewing SAP NetWeaver agent log files](#)
- [Using trace level logging](#)

Using 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:

Meeting prerequisites

Before installing the Veritas agent for SAP NetWeaver, double check that you meet the prerequisite requirements. For a list of prerequisites:

See [“Before you install the agent for SAP NetWeaver”](#) on page 77.

Configuring SAP server resources

Before using an SAP server resource, ensure that you configure the agent attributes correctly. For more information,

See [“Agent attributes for SAP NetWeaver”](#) on page 81.

Checks for an SAP Add-In system

For an SAP Java Add-In instance, you must perform the following checks before further investigations:

- The SAP resources running the ABAP and Java Standalone Enqueue server instances, must be in the same Service Group as the SAP Central instance.
- The SAP resources running the ABAP and Java Enqueue Replication server instances, must be in the same Service Group.
- For the Standalone Enqueue server instances, the value of the InstType attribute must not be ENQUEUE.

The values must be as follows:

- For ABAP: AENQUEUE
- For Java: JENQUEUE

- For the Enqueue Replication server instances, the value of the InstType attribute must not be ENQREP.

The values must be as follows:

- For ABAP: AENQREP
- For Java: JENQREP

- Ensure the following:
 - The EnqSrvResName attribute of the ABAP Enqueue Replication server instance is set to the VCS resource that is running the corresponding ABAP Standalone Enqueue server instance.
 - The EnqSrvResName attribute of the Java Enqueue Replication server instance is set to the VCS resource that is running the corresponding Java Standalone Enqueue server instance.

Starting the SAP server outside a cluster server

If you face problems while working with a resource, you must disable the resource within the cluster framework. A disabled resource is not under the control of the

cluster framework, and so you can test the SAP server independent of the cluster framework. Refer to the cluster documentation for information about disabling a resource.

You can then restart the SAP server outside the cluster framework.

Note: Use the same parameters that the resource attributes define within the cluster framework while restarting the resource outside the framework.

Follow one of these procedures to restart the SAP resource outside the framework.

To restart the SAP instance outside the framework using SAP MMC

- 1 Log in to the system as a *sapsidadm* user.
- 2 Use the SAP Microsoft Management Console (MMC) to start the SAP instance.
 Ensure that the SAP instance starts successfully. Then attempt to start the instance inside the cluster framework.

To restart the SAP instance outside the framework from the command prompt

- 1 Start the SAP Windows service for the SAPSAPSID_XX instance.
- 2 Use the startsap.exe utility to start the SAP instance:

```
startsap.exe name=SAPSID nr=InstID
sapdiahost=virtual_hostname
```

Common Problems with Veritas agent for SAP server

This section describes some problems that you may face while working with the Veritas Agent for SAP server in a VCS environment.

Unable to install the Veritas Agent for SAP NetWeaver

If you are not able to install the Veritas Agent for SAP NetWeaver, check to see if previous versions of the agent are present in the system. If present, remove the older agents and attempt to install the agent again.

Also, ensure that you go through the prerequisites before installing SAP NetWeaver.

See [“Before you install the agent for SAP NetWeaver”](#) on page 77.

Agent installation terminates with an error

If the installation process terminates with the error "The InstallScript engine on this machine is older than the version required to run this setup", install the InstallShield driver 10 or later and begin with the installation process again.

Unable to see an entry in the SAP MMC for an SAP instance

If you cannot see any entry for an SAP instance in the SAP MMC, you must re-register the SAP services.

To re-register the SAP services

- 1 At the command prompt, go to the %windir%\SapCluster directory.
- 2 Run the sapstartsrv.exe command.
- 3 In the SAP Service Install/Uninstall dialog box, select **Register COM Typelibrary Only** in the Operation field.

You must re-register the SAP services as described here whenever a change in the SAP service registration occurs.

The agent for SAP server fails to bring online an SAP instance resource through VCS

Attempt to start the SAP resource outside the VCS environment to ensure that the resource is working properly.

See [“Starting the SAP server outside a cluster server”](#) on page 102.

You can also view the log files to further diagnose the problem.

See [“Reviewing SAP NetWeaver agent log files”](#) on page 108.

Unable to connect: DB connection failed

Ensure that the database is up and running successfully. If the database is not functional, start the database. If applicable, start the client also. Then attempt to reconnect.

SAP instance does not come online, and the startsap.exe command exits with exit code -1

Check the SAP MMC to ensure that the entry for this SAP instance is present. If the entry is not present, add the SAP instance in the SAP MMC.

See [“Unable to see an entry in the SAP MMC for an SAP instance”](#) on page 104.

Then attempt to bring the SAP instance online.

In case of an Enqueue server failure, the Enqueue server instance fails to take over the lock table from the Enqueue Replication server instance

If the Enqueue Replication server instance does not recognize the correct Enqueue server instance, this problem may occur. Ensure that the value of InstID passed to the Enqueue Replication server process, enrepserver.exe in the start profile, belongs to the correct Enqueue server instance.

The ensmon.exe command returns exit code 4 for a Enqueue server instance

If the Enqueue Replication server is not configured or is not online, this problem occurs. Ensure that if the Enqueue Replication server is configured, the instance is online.

If the Enqueue Replication server instance is not configured, disable the replication parameter in the Instance profile of the Enqueue server instance:

```
enqueue/server/replication = false
```

The return code of the ensmon.exe command is 8 for an Enqueue Replication server instance

The return code indicates that the Enqueue server instance is down. When the Enqueue server instance fails, the ensmon.exe command returns this code when the instance is switching over to the Enqueue Replication server instance to take over the instate lock table.

Check the state of the Enqueue server instance.

Enqueue Replication server does not terminate after enqueue failover

This problem occurs due to a race condition between the Enqueue and the Replication servers. To resolve the problem, make sure that your enrepserver.exe is at the following patch level or a level later to it.

```
7.00: 98
6.40: 171
```

For more information refer to, SAP Note 1018968

The Standalone Enqueue server instance does not fail over to the correct Enqueue Replication server instance

This problem occurs if the preonline script is not configured properly. To configure the preonline script:

See [“Configuring the VCS preonline trigger”](#) on page 96.

This problem also occurs if the InstType attribute is not set properly. Ensure that the values of this attribute matches correctly.

[Table 6-1](#) shows the values for InstType attribute.

Table 6-1 Values for InstType attribute

Value of InstType for a Standalone Enqueue server instance	Corresponding value of InstType for an Enqueue Replication server instance
ENQUEUE	ENQREP
AENQUEUE	AENQREP
JENQUEUE	JENQREP

If the Enqueue Replication server instance faults, the instance is failing over to the node on which the Standalone Enqueue server instance is online

Whenever an Enqueue Replication server instance faults, it must never fail over to the node on which the corresponding Standalone Enqueue server instance is online. This problem occurs if the preonline script is not configured properly to take care of this failover behavior. To correctly configure the preonline script:

See [“Configuring the VCS preonline trigger”](#) on page 96.

This problem may also occur if the InstType attribute for both the server instances do not match correctly. Ensure that the values match correctly.

[Table 6-2](#) shows the values for InstType attribute.

Table 6-2 Matching values for InstType attribute

Value of InstType for a Enqueue Replication server instance	Corresponding value of InstType for a Standalone Enqueue server instance
ENQREP	ENQUEUE
AENQREP	AENQUEUE

Table 6-2 Matching values for InstType attribute (*continued*)

Value of InstType for a Enqueue Replication server instance	Corresponding value of InstType for a Standalone Enqueue server instance
JENQREP	JENQUEUE

In case of a resource fault, the Service Group does not fail over

If the resource is not set to critical, the Service Group may not fail over. To resolve the issue, set the resource to critical.

Unable to uninstall an older or current version of the Veritas Agent for SAP NetWeaver

If you are attempting to uninstall an existing Veritas Agent for SAP NetWeaver, ensure that you remove all configured SAP resources, before proceeding to remove the agent.

See “[Removing the VCS agent for SAP NetWeaver](#)” on page 78.

Agent fails to start after installation

Ensure that you have installed Visual Studio 8 redistributable for Visual studio runtime on your system. Since the agent is compiled with Microsoft.VC80.CRT version='8.0.50727.762', it fails to start if Visual Studio 8 redistributable is not installed.

To verify if Visual Studio 8 redistributable is installed, access <system drive>:\WINDOWS\WinSxS. If a folder similar to <arch>_Microsoft.VC80.CRT_<random_number>_8.0.50727.762_<random_number> exists, it confirms that the required redistributable is installed.

For example,

amd64_Microsoft.VC80.CRT_1fc8b3b9a1e18e3b_8.0.50727.762_x-ww_9d1c6ce0

In case if the redistributable is not installed, download the Visual studio re-distributables for VS 2005 SP1 with version VC80.CRT_8.0.50727.762 from the Microsoft site:

For x64 (amd64)

<http://www.microsoft.com/downloads/details.aspx?familyid=EB4EBE2D-33C0-4A47-9DD4-B9A6D7BD44DA&displaylang=en>

For IA64 (Intel64)

<http://www.microsoft.com/downloads/details.aspx?familyid=747AAD7C-5D6B-4432-8186-85DF93DD51A9&displaylang=en>

Reviewing SAP NetWeaver agent log files

If you are facing problems while using the Veritas agent for SAP NetWeaver or an SAP server instance, refer to the following sections to access the relevant files for information about the issue.

Using SAP instance log files

In case of problems while using the Veritas Agent for SAP NetWeaver, you can access the SAP instance log files for more information. These log files are located in the *drive:\usr\sap\SAPSID\InstName\work* directory.

Using SAP log files

If an SAP server is facing problems, you can access the agent log files to further diagnose the problem. The log file is *drive:\Program Files\VERITAS\Cluster Server\log\SAPNW04_A.txt*.

Using trace level logging

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

If you set ResLogLevel to TRACE, a very high volume of messages is produced. Symantec recommends that you must localize the ResLogLevel attribute for particular resource only.

Note: You may consider to temporarily increase the timeout values for SAPNW04 for debugging purposes. After the debugging process is complete, you can revert to the original timeout values.

To localize ResLogLevel attribute for a resource

- 1 Identify the resource for which you want to enable detailed logging.
- 2 At the command prompt, 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** Test the identified resource. The operation reproduces the problem that you are attempting to diagnose.

- 5** Set the ResLogLevel attribute back to INFO for the identified resource:

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

- 6** Review the contents of the VCS engine output log file.

You can also use the Java GUI to localize the ResLogLevel attribute. For more information, refer to the VCS documentation.

Sample Configurations

This appendix includes the following topics:

- [About the sample configuration for the agent for SAP NetWeaver](#)
- [Sample agent type definition](#)
- [Sample resource configuration](#)
- [Sample service group configuration for ABAP and Java architectures](#)
- [Sample service group configuration for Add-in \(ABAP + Java \) installation type](#)
- [Sample service group configurations for SAP system on Windows Server 2008](#)
- [Sample service group dependency for SAP NetWeaver](#)

About the sample configuration for the agent for SAP NetWeaver

The sample configuration depicts the resource types, resources, and resource dependencies within the service group. Review these dependencies carefully before configuring the agent for SAP NetWeaver. For more information about these resource types, see the *Veritas Cluster Server Bundled Agents Reference Guide*.

Sample agent type definition

The sample agent type definition for SAP NetWeaver is as follows:

```
type SAPNW04 (  
    static i18nstr ArgList[] = { SAPSID, SecondLevelMonitor,  
    EPPProgramTimeout, SAPHome, SAPMonHome, SAPHost, ProcMon,  
    SAPServiceUser, SAPAdminDomain, SAPAdmin, SAPAdminPassword,
```

```

ResLogLevel, InstType, InstName, InstProfile, EnqSrvResName,
MonitorProgram }
    str SAPSID
    int SecondLevelMonitor
    int EPPProgramTimeout = 10
    str SAPHome
    str SAPMonHome
    str SAPHost
    str ProcMon[]
    str SAPServiceUser
    str SAPAdminDomain
    str SAPAdmin
    str SAPAdminPassword
    str ResLogLevel = INFO
    str InstType = CENTRAL
    str InstName
    str InstProfile
    str EnqSrvResName
    str MonitorProgram
)

```

Sample resource configuration

For some values of the InstType attribute, corresponding sample main.cf files are as follows.

InstType is equal to ENQUEUE

The sample main.cf file is as follows.

```

SAPNW04 SAPEC4ASCS_sap
(
    Critical = 0
    SAPSID = EC4
    SecondLevelMonitor = 5
    SAPHome = "C:\\usr\\sap\\EC4\\ASCS10\\exe"
    SAPMonHome = "C:\\usr\\sap\\EC4\\ASCS10\\exe"
    SAPHost = SAPEC4ASCS
    ProcMon = { "enserver.exe", "msg_server.exe" }
    SAPServiceUser = SAPServiceEC4
    SAPAdminDomain = ISV-DOMAIN
    SAPAdmin = ec4adm
    SAPAdminPassword = IWOUlWlQIoJOkOL
)

```



```

        InstType = AENQUEUE
        InstName = ASCS10
        InstProfile =
"C:\\usr\\sap\\EC4\\SYS\\profile\\EC4_ASCS10_SAPC4ASCS"
    )

```

InstType is equal to CENTRAL

The sample main.cf file is as follows.

```

SAPNW04 SAPEC4CI_sap
(
    Critical = 0
    SAPSID = EC4
    SAPHome = "C:\\usr\\sap\\EC4\\DVBGS12\\exe"
    SAPMonHome = "C:\\usr\\sap\\EC4\\sapinfo\\rfcsdk\\bin"
    SAPHost = SAPEC4CI
    ProcMon = { "disp+work.exe" }
    SAPServiceUser = SAPServiceEC4
    SAPAdminDomain = ISV-DOMAIN
    SAPAdmin = ec4adm
    SAPAdminPassword = BPHnEPeJBhCHdHE
    InstName = DVBGS12
    InstType = CENTRAL
    InstProfile = "\\SAPEC4ASCS\\sapmnt\\EC4\\SYS\\profile\\
\\EC4_DVBGS12_SAPC4CI"
)

```

InstType is equal to ENQREP

The sample main.cf file is as follows.

```

SAPNW04 SAPEC4REP_sap
(
    Critical = 0
    SAPSID = EC4
    SecondLevelMonitor = 1
    SAPHome = "C:\\usr\\sap\\EC4\\REP11\\exe"
    SAPMonHome = "C:\\usr\\sap\\EC4\\REP11\\exe"
    SAPHost = SAPEC4REP
    ProcMon = { "enrepserver.exe" }
    SAPServiceUser = SAPServiceEC4
    SAPAdminDomain = ISV-DOMAIN
    SAPAdmin = ec4adm
)

```

```

        SAPAdminPassword = HVNtKVkPHnINjNK
        InstType = AENQREP
        InstName = REP11
        InstProfile =
"\\\\\\SAPEC4ASCS\\sapmnt\\EC4\\SYS\\profile\\EC4_REP11_SAPEC4REP"
        EnqSrvResName = SAPEC4ASCS_sap
    )

```

InstType is equal to DIALOG

The sample main.cf file is as follows:

```

SAPNW04 SAPEC4DI_sap
(
    Critical = 0
    SAPSID = EC4
    SAPHome = "C:\\usr\\sap\\EC4\\D13\\exe"
    SAPMonHome = "C:\\usr\\sap\\EC4\\sapinfo\\rfcsdk\\bin"
    SAPHost = SAPEC4DI
    ProcMon = { "disp+work.exe" }
    SAPServiceUser = SAPServiceEC4
    SAPAdminDomain = ISV-DOMAIN
    SAPAdmin = ec4adm
    SAPAdminPassword = BPHnEPeJBhCHdHE
    InstName = D13
    InstType = DIALOG
    InstProfile = "\\\SAPEC4ASCS\\sapmnt\\EC4\\SYS\\
\\profile\\EC4_D13_SAPEC4DI"
)

```

InstType is equal to MDM

The sample main.cf file is as follows:

```

group SAP_MDIS (
    SystemList = { SAPVM21 = 0, SAPVM22 = 1 }
)

IP SAP_MDIS03-IP (
    Critical = 0
    Address = "10.209.69.191"
    SubNetMask = "255.255.252.0"
    MACAddress @SAPVM21 = "00:50:56:B7:18:36"
    MACAddress @SAPVM22 = "00:50:56:B7:21:C3"
)

```

```
)

Lanman SAP_MDIS03-Lanman-sapmdis (
  Critical = 0
  VirtualName = sapmdis
  IPResName = SAP_MDIS03-IP
)

MountV MDIS_MNT (
  Critical = 0
  MountPath = "C:\\usr\\sap\\MDM\\MDIS03"
  VolumeName = MDIS_VOL
  VMDGResName = SAP_MDIS_DG
)

NIC SAP_MDIS03-NIC (
  Critical = 0
  MACAddress @SAPVM21 = "00:50:56:B7:18:36"
  MACAddress @SAPVM22 = "00:50:56:B7:21:C3"
)

SAPNW04 SAP_MDIS03_Res (
  Critical = 0
  SAPSID = MDM
  SAPHome = "c:\\usr\\sap\\MDM\\MDIS03\\exe"
  SAPMonHome = "c:\\usr\\sap\\MDM\\MDIS03\\exe"
  SAPHost = sapmdis
  ProcMon = { "mdis.exe" }
  SAPServiceUser = SAPServiceMDM
  SAPAdminDomain = isv-domain
  SAPAdmin = mdmadm
  SAPAdminPassword = gumSjuJogMhmImjMkmL
  InstType = MDM
  InstName = MDIS03
  InstProfile = "C:\\usr\\sap\\MDM\\SYS\\profile\\MDM_MDIS03_sapmdis"
)

VMDg SAP_MDIS_DG (
  Critical = 0
  DiskGroupName = MDIS_DG
)

SAP_MDIS03-IP requires SAP_MDIS03-NIC
```

```

SAP_MDIS03-Lanman-sapmdis requires SAP_MDIS03-IP
MDIS_MNT requires SAP_MDIS_DG
SAP_MDIS03_Res requires MDIS_MNT
SAP_MDIS03_Res requires SAP_MDIS03-Lanman-sapmdis

```

```

// resource dependency tree
//
// group SAP_MDIS
// {
//   SAPNW04 SAP_MDIS03_Res
//   {
//     MountV MDIS_MNT
//     {
//       VMDg SAP_MDIS_DG
//     }
//     Lanman SAP_MDIS03-Lanman-sapmdis
//     {
//       IP SAP_MDIS03-IP
//       {
//         NIC SAP_MDIS03-NIC
//       }
//     }
//   }
// }

```

```

group SAP_MDLS (
  SystemList = { SAPVM21 = 0, SAPVM22 = 1 }
)

```

```

IP SAP_MDLS05-IP (
  Address = "10.209.69.193"
  SubNetMask = "255.255.252.0"
  MACAddress @SAPVM21 = "00:50:56:B7:18:36"
  MACAddress @SAPVM22 = "00:50:56:B7:21:C3"
)

```

```

Lanman SAP_MDLS05-Lanman-sapmdls (
  Critical = 0
  VirtualName = sapmdls
  IPResName = SAP_MDLS05-IP
)

```

```
MountV MDLS_MNT (  
  MountPath = "C:\\usr\\sap\\MDM\\MDLS05"  
  VolumeName = MDLS_VOL  
  VMDGResName = SAP_MDLS_DG  
)  
  
NIC SAP_MDLS05-NIC (  
  Critical = 0  
  MACAddress @SAPVM21 = "00:50:56:B7:18:36"  
  MACAddress @SAPVM22 = "00:50:56:B7:21:C3"  
)  
  
SAPNW04 SAP_MDLS_Res (  
  Critical = 0  
  SAPSID = MDM  
  SecondLevelMonitor = 1  
  SAPHome = "c:\\usr\\sap\\MDM\\MDLS05\\exe"  
  SAPMonHome = "c:\\usr\\sap\\MDM\\MDLS05\\exe"  
  SAPHost = sapmdls  
  ProcMon = { "mdls.exe" }  
  SAPServiceUser = SAPServiceMDM  
  SAPAdminDomain = isv-domain  
  SAPAdmin = mdmadm  
  SAPAdminPassword = gumSjuJogMhmImjMkmL  
  ResLogLevel = TRACE  
  InstType = MDM  
  InstName = MDLS05  
  InstProfile = "C:\\usr\\sap\\MDM\\SYS\\profile\\MDM_MDLS05_sapmdls"  
)  
  
VMDg SAP_MDLS_DG (  
  DiskGroupName = MDLS_DG  
)  
  
SAP_MDLS05-IP requires SAP_MDLS05-NIC  
SAP_MDLS05-Lanman-sapmdls requires SAP_MDLS05-IP  
MDLS_MNT requires SAP_MDLS_DG  
SAP_MDLS_Res requires MDLS_MNT  
SAP_MDLS_Res requires SAP_MDLS05-Lanman-sapmdls  
  
// resource dependency tree
```

```
//
// group SAP_MDLS
// {
//   SAPNW04 SAP_MDLS_Res
//   {
//     MountV MDLS_MNT
//     {
//       VMDg SAP_MDLS_DG
//     }
//     Lanman SAP_MDLS05-Lanman-sapmdls
//     {
//       IP SAP_MDLS05-IP
//       {
//         NIC SAP_MDLS05-NIC
//       }
//     }
//   }
// }

group SAP_MDS02 (
  SystemList = { SAPVM21 = 0, SAPVM22 = 1 }
)

IP SAP_MDS02-IP (
  Critical = 0
  Address = "10.209.69.190"
  SubNetMask = "255.255.252.0"
  MACAddress @SAPVM21 = "00:50:56:B7:18:36"
  MACAddress @SAPVM22 = "00:50:56:B7:21:C3"
)

Lanman SAP_MDS02-Lanman-sapmds (
  Critical = 0
  VirtualName = sapmds
  IPResName = SAP_MDS02-IP
)

MountV MDS_MNT (
  Critical = 0
  MountPath = "C:\\usr\\sap\\MDM\\MDS02"
  VolumeName = MDS_VOL
  VMDGResName = SAP_MDS_DG
```

```
)

NIC SAP_MDS02-NIC (
    Critical = 0
    MACAddress @SAPVM21 = "00:50:56:B7:18:36"
    MACAddress @SAPVM22 = "00:50:56:B7:21:C3"
)

SAPNW04 SAP_MDS02_Res (
    Critical = 0
    SAPSID = MDM
    SecondLevelMonitor = 1
    SAPHome = "c:\\usr\\sap\\MDM\\MDS02\\exe"
    SAPMonHome = "c:\\usr\\sap\\MDM\\MDS02\\exe"
    SAPHost = sapmds
    ProcMon = { "MDS.exe" }
    SAPServiceUser = SAPServiceMDM
    SAPAdminDomain = isv-domain
    SAPAdmin = mdmadm
    SAPAdminPassword = gumSjuJogMhmImjMkmL
    ResLogLevel = TRACE
    InstType = MDM
    InstName = MDS02
    InstProfile = "C:\\usr\\sap\\MDM\\SYS\\profile\\MDM_MDS02_sapmds"
)

VMDg SAP_MDS_DG (
    Critical = 0
    DiskGroupName = MDS_DG
    ForceImport = 1
)

SAP_MDS02-IP requires SAP_MDS02-NIC
SAP_MDS02-Lanman-sapmds requires SAP_MDS02-IP
MDS_MNT requires SAP_MDS_DG
SAP_MDS02_Res requires MDS_MNT
SAP_MDS02_Res requires SAP_MDS02-Lanman-sapmds

// resource dependency tree
//
// group SAP_MDS02
// {
```

```
// SAPNW04 SAP_MDS02_Res
//      {
//      MountV MDS_MNT
//      {
//      VMDg SAP_MDS_DG
//      }
//      Lanman SAP_MDS02-Lanman-sapmds
//      {
//      IP SAP_MDS02-IP
//
```

Sample service group configuration for ABAP and Java architectures

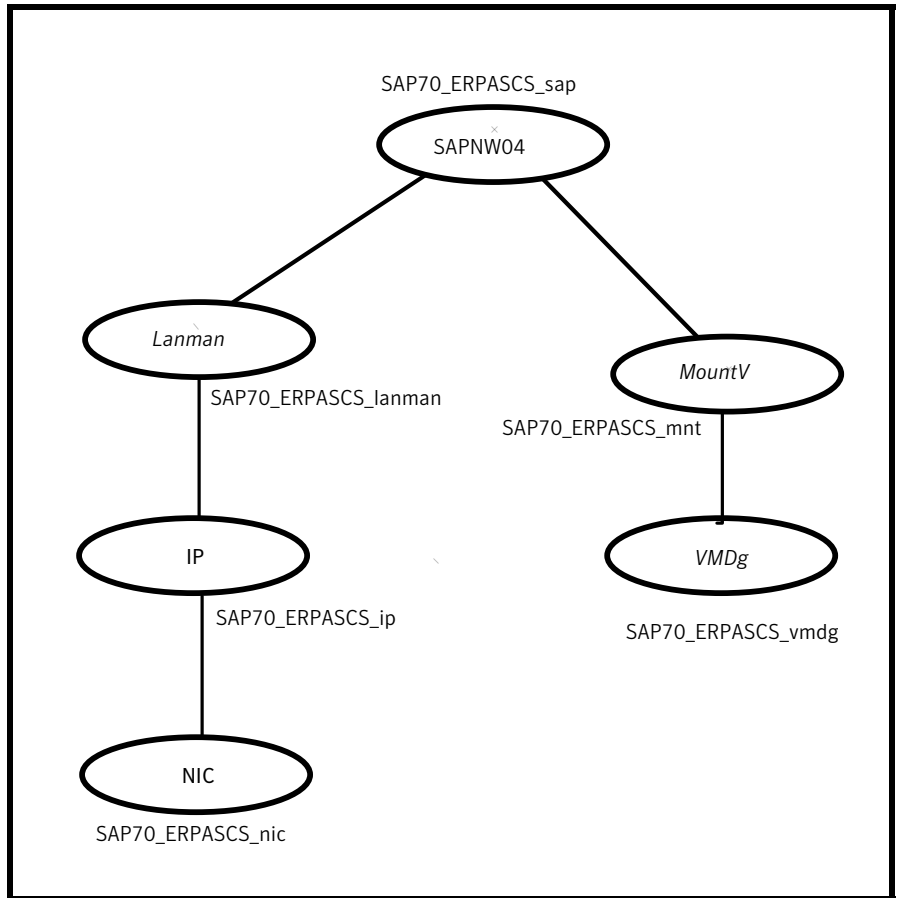
The service group configuration in a cluster depends on some common characteristics that must be a part of the configuration design.

These characteristics include the following:

- The SAP Central instance server or the Enqueue server must be dependent on the database server.
- Each SAP instance (Central, Dialog, Enqueue, and Enqueue Replication) should have a separate virtual IP address assigned to facilitate network transparency.
- Each SAP instance (Central, Dialog, Enqueue and Enqueue Replication) should be placed on shared disk to facilitate cluster node transparency.
- Common file systems to include the profile, global and transaction file systems should be managed from one or more shared disk objects. These systems must be available to the SAP instance via UNC path with SAPGLOBALHOST.

[Figure A-1](#) shows a sample service group configuration for Enqueue (Central Service) instance.

Figure A-1 Service group configuration for Enqueue instance



[Figure A-2](#) shows a sample service group configuration for Dialog instance

Figure A-2 Service group configuration for Dialog instance

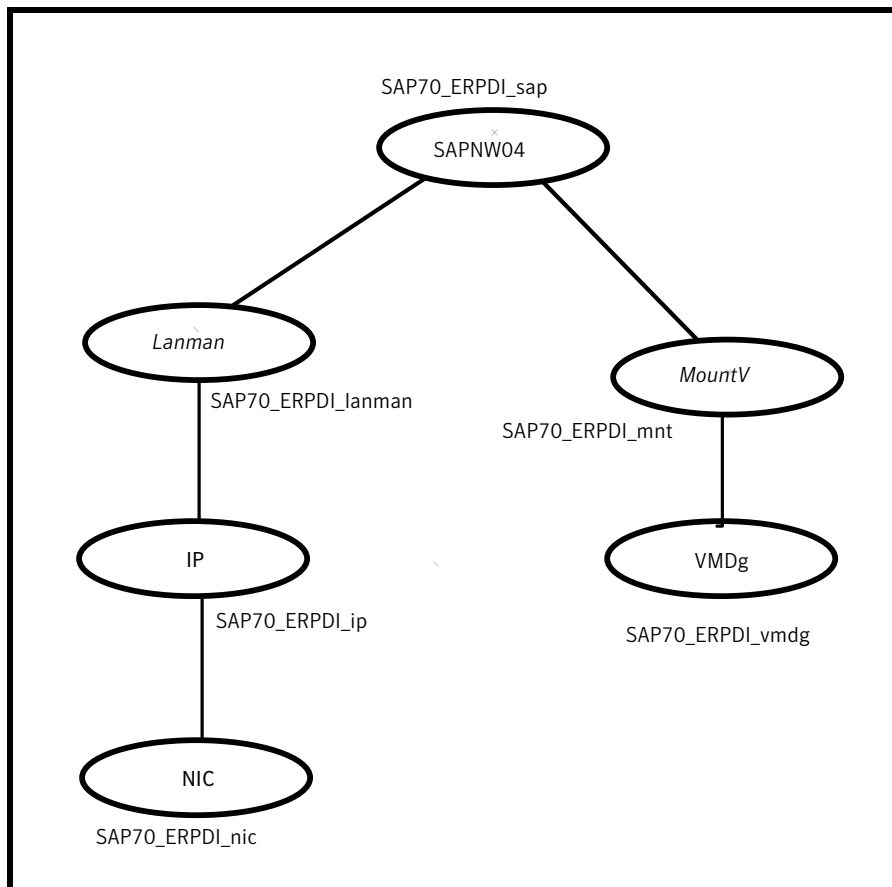


Figure A-3 shows a sample service group configuration for Central instance.

Figure A-3 Service group configuration for Central instance

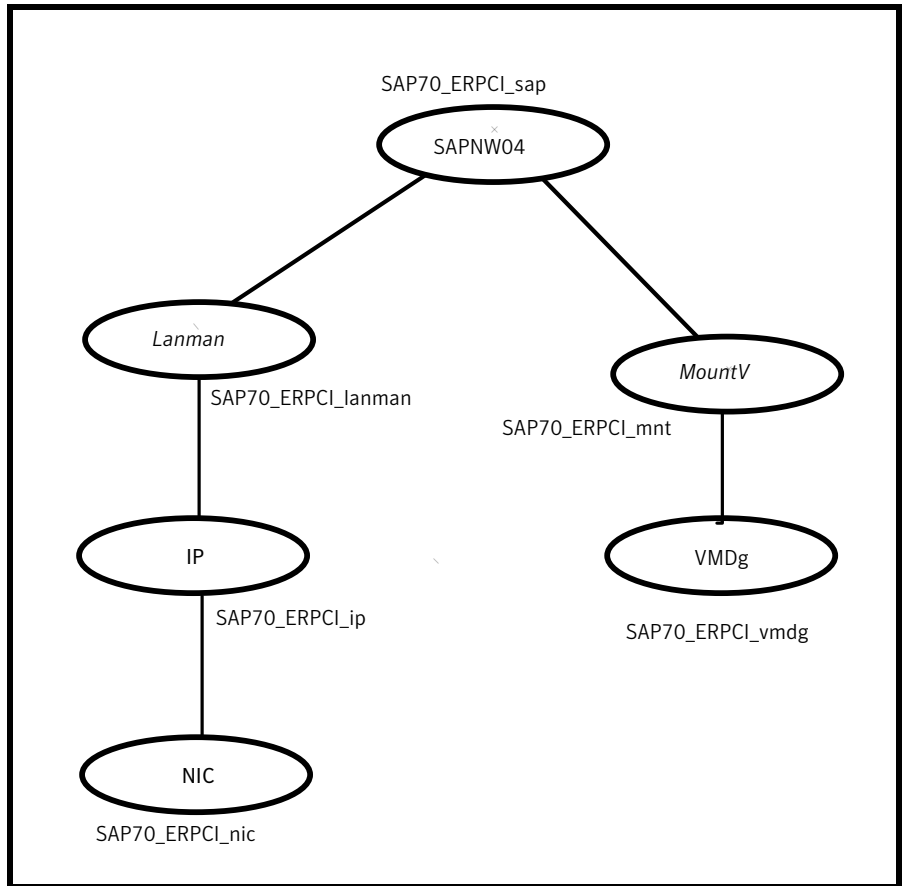
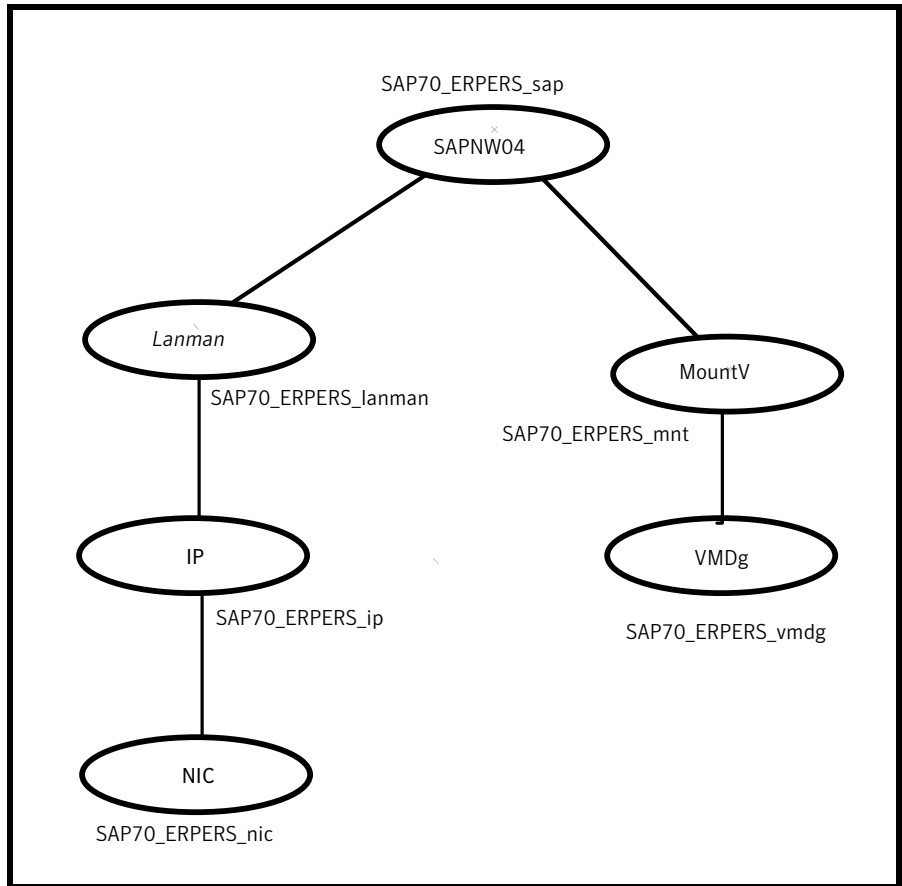


Figure A-4 shows a sample service group configuration for Enqueue Replication Server instance.

Figure A-4 Service group configuration for Enqueue Replication Server instance



Sample service group configuration for Add-in (ABAP + Java) installation type

The characteristics of the configuration design for this installation type are as follows:

- The Central instance server, and Java and ABAP Enqueue Server Service Group must be globally dependent on the database server Service Group.
- The Java and ABAP Enqueue servers and the Central instance optionally configured in one Service Group.

Note: Symantec recommends to configure the Enqueue Servers and Central instance in separate service groups.

- If Enqueue Servers are configured on different service groups, the ABAP and Java Enqueue Replication servers must be configured in two different service groups.
- To facilitate the network transparency,
 - Each SAP server that hosts a Central or Dialog instance must have a separate virtual IP address.
 - The ABAP and Java Enqueue Server, and the Central instance optionally have the same Virtual IP address.

Note: Symantec recommends to have two different virtual IPs for Enqueue Servers and Central instance.

- The ABAP and Java Enqueue Replication servers must have different virtual IP address, if they are configured in different service groups.
- To facilitate cluster node transparency, each SAP server that hosts a Central, Dialog, ABAP Enqueue, Java Enqueue, Java and ABAP Enqueue Replication instances must be placed on shared disk.
- Common file systems that include profile, global, and transaction file systems must be managed from one or more shared disk objects. These systems must be available to the SAP application through UNC path via SAPGLOBALHOST.

Figure A-5 shows a sample service group configuration for Enqueue (Central Services) instances for Add-In

Figure A-5 Enqueue (Central Services) instance for Add-In

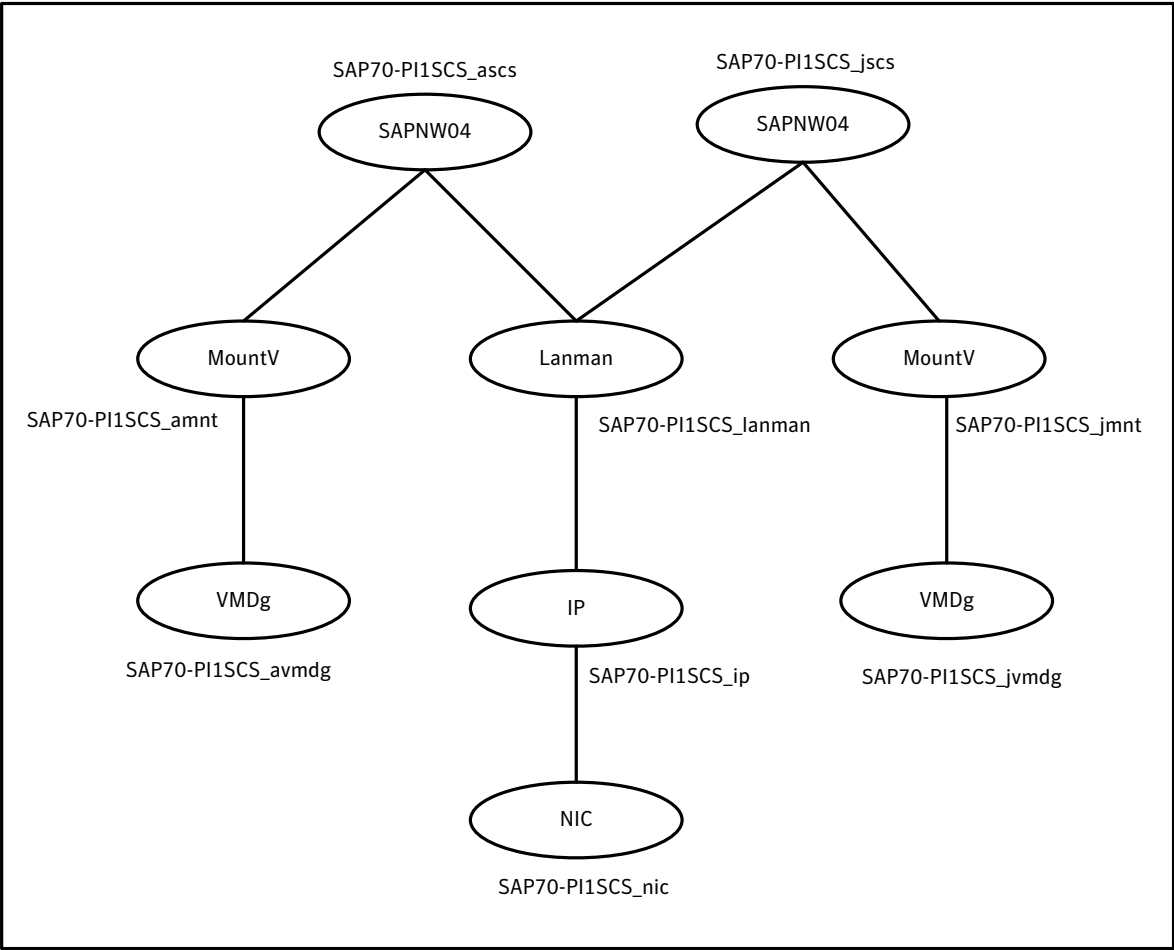
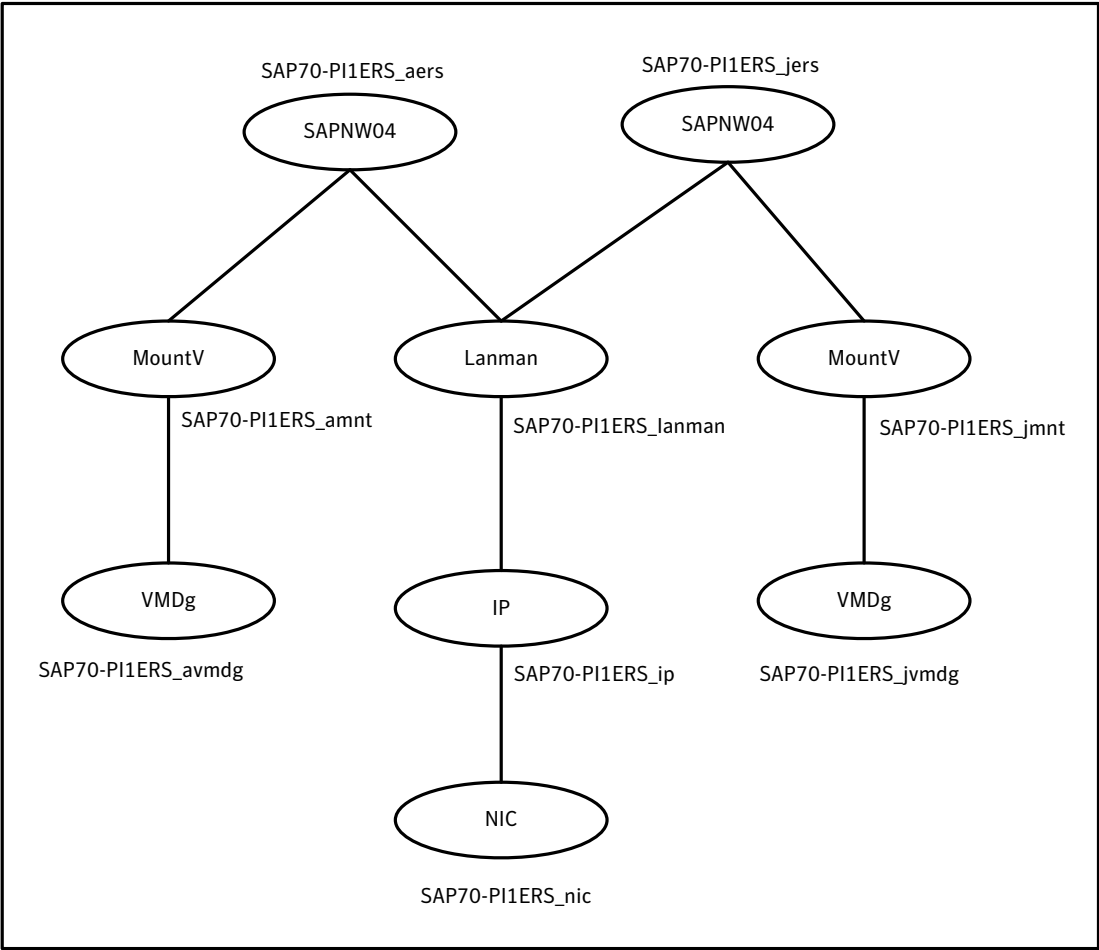


Figure A-6 shows a sample service group configuration for Enqueue Replication instances for Add-In

Figure A-6 Enqueue Replication instance for Add-In



Sample service group configurations for SAP system on Windows Server 2008

This section provides the sample service group configurations and resource dependency diagrams for SAP systems on Windows Server 2008.

Sample configuration for SAP Central Services Instances service group for Add-In installation Usage Type

This section provides the VCS main.cf for SAP Central Services Instances service group for Add-In installation Usage Type.

```
group SAP-PI3SCS (
  SystemList = { SysA = 0, SysB = 1 }
)
FileShare SAP-PI3SCS_sapmnt_FS (
  PathName = "\\usr\sap"
  ShareName = sapmnt
  LanmanResName = SAP-PI3SCS_Lanman
  MountResName = SAP-PI3SCS_H_MountV
  UserPermissions = { "'SAP_LocalAdmin'" = FULL_CONTROL,
    "'Administrators'" = FULL_CONTROL,
    "'SYMCORP\\SAP_PI3_GlobalAdmin'" = FULL_CONTROL,
    "'SAP_PI3_LocalAdmin'" = FULL_CONTROL }
)
IP SAP-PI3SCS_IP (
  Address = "10.209.70.30"
  SubNetMask = "255.255.252.0"
  MACAddress = "00-15-17-63-45-92"
)
Lanman SAP-PI3SCS_Lanman (
  VirtualName = sappi3scs
  IPResName = SAP-PI3SCS_IP
)
MountV SAP-PI3ASCS_MountV (
  MountPath = "I:\\usr\sap\PI3\ASCS29"
  VolumeName = PI3ASCS_vol
  VMDGResName = SAP-PI3ASCS_VMDg
)
MountV SAP-PI3SCS_MountV (
  MountPath = "I:\\usr\sap\PI3\SCS30"
  VolumeName = PI3SCS_vol
  VMDGResName = SAP-PI3SCS_VMDg
)
MountV SAP-PI3SCS_I_MountV (
  MountPath = "I:"
  VolumeName = PI3SCS_I_vol
  VMDGResName = SAP-PI3SCS_I_VMDg
)
```



```

MountV SAP-PI3SYS_MountV (
    MountPath = "I:\\usr\\sap\\PI3\\SYS"
    VolumeName = PI3SYS_vol
    VMDGResName = SAP-PI3SYS_VMDg
)
NIC SAP-PI3SCS_NIC (
    MACAddress = "00-15-17-63-45-92"
)
SAPNW04 SAP-PI3ASCS_SAPNW04 (
    SAPSID = PI3
    SAPHome = "I:\\usr\\sap\\PI3\\ASCS29\\exe"
    SAPMonHome = "I:\\usr\\sap\\PI3\\ASCS29\\exe"
    SAPHost = sappi3scs
    ProcMon = { "msg_server.exe", "enserver.exe" }
    SAPServiceUser = SAPServicePI3
    SAPAdminDomain = SYMCORP
    SAPAdmin = pi3adm
    SAPAdminPassword = AFk141nmqdaou
    InstType = ENQUEUE
    InstName = ASCS29
    InstProfile = "I:\\usr\\sap\\PI3\\SYS\\profile\\PI3_ASCS29_sappi3scs"
)
SAPNW04 SAP-PI3SCS_SAPNW04 (
    SAPSID = PI3
    SAPHome = "I:\\usr\\sap\\PI3\\SCS30\\exe"
    SAPMonHome = "I:\\usr\\sap\\PI3\\SCS30\\exe"
    SAPHost = sappi3scs
    ProcMon = { "msg_server.exe", "enserver.exe" }
    SAPServiceUser = SAPServicePI3
    SAPAdminDomain = SYMCORP
    SAPAdmin = pi3adm
    SAPAdminPassword = AFk141nmqdaou
    InstType = ENQUEUE
    InstName = SCS30
    InstProfile = "I:\\usr\\sap\\PI3\\SYS\\profile\\PI3_SCS30_sappi3scs"
)
VMDg SAP-PI3SCS_I_VMDg (
    DiskGroupName = PI3SCS_I_dg
)
VMDg SAP-PI3ASCS_VMDg (
    DiskGroupName = PI3ASCS_dg
)
VMDg SAP-PI3SCS_VMDg (

```

```

        DiskGroupName = PI3SCS_dg
    )
    VMDg SAP-PI3SYS_VMDg (
        DiskGroupName = PI3SYS_dg
    )
    SAP-PI3SCS_sapmnt_FS requires SAP-PI3SCS_Lanman
    SAP-PI3SCS_sapmnt_FS requires SAP-PI3SCS_I_MountV
    SAP-PI3SCS_IP requires SAP-PI3SCS_NIC
    SAP-PI3SCS_Lanman requires SAP-PI3SCS_IP
    SAP-PI3ASCS_MountV requires SAP-PI3SCS_I_MountV
    SAP-PI3ASCS_MountV requires SAP-PI3ASCS_VMDg
    SAP-PI3SCS_MountV requires SAP-PI3SCS_I_MountV
    SAP-PI3SCS_MountV requires SAP-PI3SCS_VMDg
    SAP-PI3SCS_I_MountV requires SAP-PI3SCS_I_VMDg
    SAP-PI3SYS_MountV requires SAP-PI3SCS_I_MountV
    SAP-PI3SYS_MountV requires SAP-PI3SYS_VMDg
    SAP-PI3ASCS_SAPNW04 requires SAP-PI3SCS_sapmnt_FS
    SAP-PI3ASCS_SAPNW04 requires SAP-PI3ASCS_MountV
    SAP-PI3ASCS_SAPNW04 requires SAP-PI3SYS_MountV
    SAP-PI3SCS_SAPNW04 requires SAP-PI3SCS_sapmnt_FS
    SAP-PI3SCS_SAPNW04 requires SAP-PI3SCS_MountV
    SAP-PI3SCS_SAPNW04 requires SAP-PI3SYS_MountV

```

resource dependency tree

```

group SAP-PI3SCS
{
    SAPNW04 SAP-PI3ASCS_SAPNW04
    {
        FileShare SAP-PI3SCS_sapmnt_FS
        {
            Lanman SAP-PI3SCS_Lanman
            {
                IP SAP-PI3SCS_IP
                {
                    NIC SAP-PI3SCS_NIC
                }
            }
        }
        MountV SAP-PI3SCS_I_MountV
        {
            VMDg SAP-PI3SCS_I_VMDg
        }
    }
}

```

```

MountV SAP-PI3ASCS_MountV
{
    MountV SAP-PI3SCS_I_MountV
    {
        VMDg SAP-PI3SCS_I_VMDg
    }
    VMDg SAP-PI3ASCS_VMDg
}
MountV SAP-PI3SYS_MountV
{
    MountV SAP-PI3SCS_I_MountV
    {
        VMDg SAP-PI3SCS_I_VMDg
    }
    VMDg SAP-PI3SYS_VMDg
}
}
SAPNW04 SAP-PI3SCS_SAPNW04
{
    FileShare SAP-PI3SCS_sapmnt_FS
    {
        Lanman SAP-PI3SCS_Lanman
        {
            IP SAP-PI3SCS_IP
            {
                NIC SAP-PI3SCS_NIC
            }
        }
        MountV SAP-PI3SCS_I_MountV
        {
            VMDg SAP-PI3SCS_I_VMDg
        }
    }
    MountV SAP-PI3SCS_MountV
    {
        MountV SAP-PI3SCS_I_MountV
        {
            VMDg SAP-PI3SCS_I_VMDg
        }
        VMDg SAP-PI3SCS_VMDg
    }
    MountV SAP-PI3SYS_MountV
    {

```

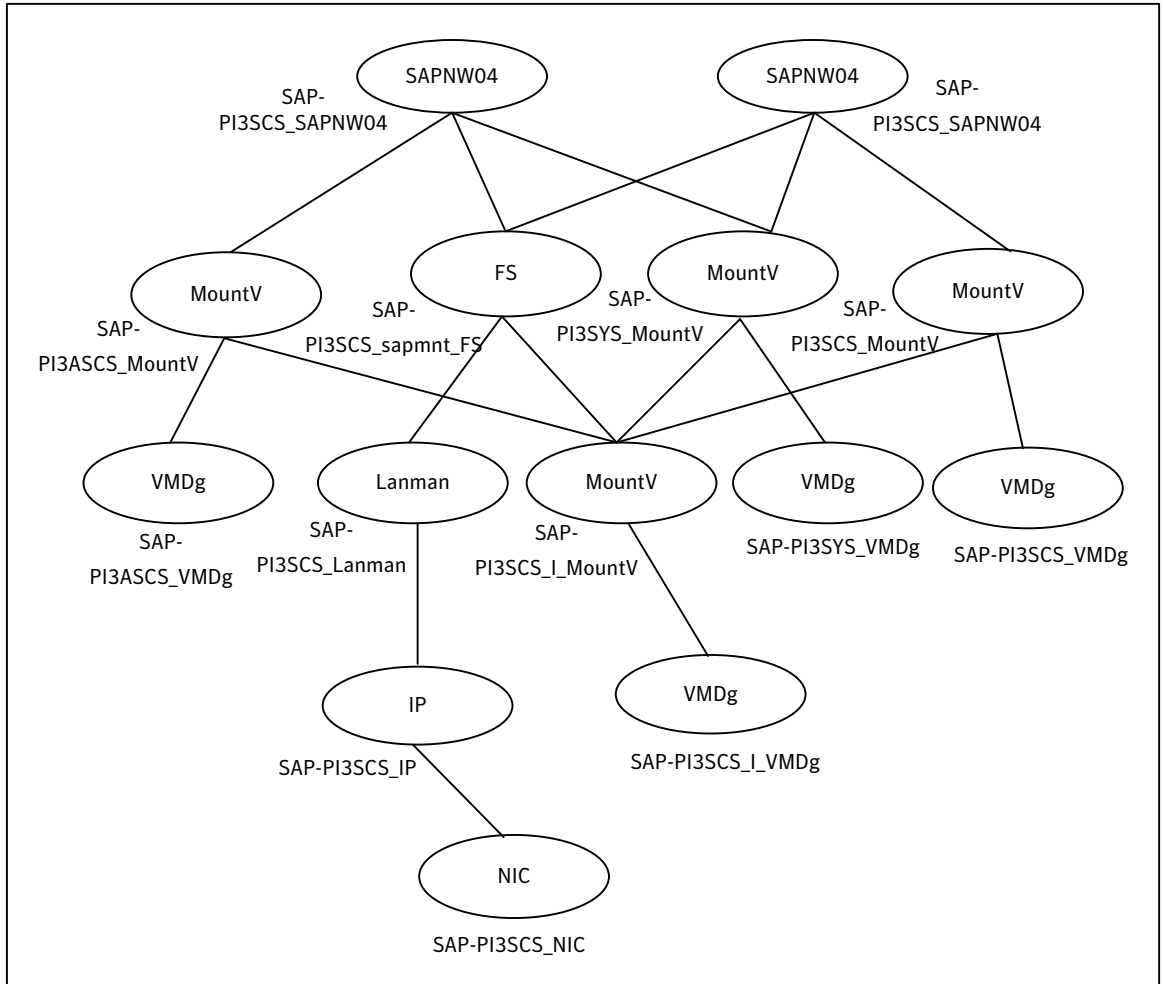
```
MountV SAP-PI3SCS_I_MountV
{
    VMDg SAP-PI3SCS_I_VMDg
}
VMDg SAP-PI3SYS_VMDg
}
}
```

Sample resource dependency for SAP Central Services Instances service group for Add-In installation usage type

[Figure A-7](#) shows the sample resource dependency diagram for SAP Central Services Instances service group for Add-In installation Usage Type on a Windows 2008 Server.

Figure A-7

Sample resource dependency diagram for SAP Central Services Instances service group for Add-In installation Usage Type on a Windows 2008 Server



Sample configuration for SAP Enqueue Replication Server Instances service group for Add-In installation Usage Type

```

group SAP-PI3ERS (
  SystemList = { SysA = 0, SysB = 1 }
)
IP SAP-PI3ERS_IP (

```

```

Address = "10.209.70.31"
SubNetMask = "255.255.252.0"
MACAddress = "00-15-17-63-45-92"
)
Lanman SAP-PI3ERS_Lanman (
  VirtualName = sappi3ers
  IPResName = SAP-PI3ERS_IP
)
MountV SAP-PI3AERS_MountV (
  MountPath = "C:\\usr\\sap\\PI3\\ERS31"
  VolumeName = PI3AERS_vol
  VMDGResName = SAP-PI3AERS_VMDg
)
MountV SAP-PI3ERS_MountV (
  MountPath = "C:\\usr\\sap\\PI3\\ERS32"
  VolumeName = PI3ERS_vol
  VMDGResName = SAP-PI3ERS_VMDg
)
NIC SAP-PI3ERS_NIC (
  MACAddress = "00-15-17-63-45-92"
)
SAPNW04 SAP-PI3AERS_SAPNW04 (
  SAPSID = PI3
  SAPHome = "C:\\usr\\sap\\PI3\\ERS31\\exe"
  SAPMonHome = "C:\\usr\\sap\\PI3\\ERS31\\exe"
  SAPHost = sappi3ers
  ProcMon = { "enrepserver.exe" }
  SAPServiceUser = SAPServicePI3
  SAPAdminDomain = SYMCORP
  SAPAdmin = pi3adm
  SAPAdminPassword = AFkl41nmqdaou
  InstType = ENQREP
  InstName = ERS31
  InstProfile = "\\sappi3scs\\sapmnt\\PI3\\SYS\\
profile\\PI3_ERS31_sappi3ers"
  EnqSrvResName = SAP-PI3ASCS_SAPNW04
)
SAPNW04 SAP-PI3ERS_SAPNW04 (
  SAPSID = PI3
  SAPHome = "C:\\usr\\sap\\PI3\\ERS32\\exe"
  SAPMonHome = "C:\\usr\\sap\\PI3\\ERS32\\exe"
  SAPHost = sappi3ers
  ProcMon = { "enrepserver.exe" }

```

```

SAPServiceUser = SAPServicePI3
SAPAdminDomain = SYMCORP
SAPAdmin = pi3adm
SAPAdminPassword = AFk141nmqdaou
InstType = ENQREP
InstName = ERS32
InstProfile = "\\.\sappi3scs\sapmnt\PI3\SYS\
profile\PI3_ERS32_sappi3ers"
EnqSrvResName = SAP-PI3SCS_SAPNW04
)
VMDg SAP-PI3AERS_VMDg (
  DiskGroupName = PI3AERS_dg
)
VMDg SAP-PI3ERS_VMDg (
  DiskGroupName = PI3ERS_dg
)
SAP-PI3ERS_IP requires SAP-PI3ERS_NIC
SAP-PI3ERS_Lanman requires SAP-PI3ERS_IP
SAP-PI3AERS_MountV requires SAP-PI3AERS_VMDg
SAP-PI3ERS_MountV requires SAP-PI3ERS_VMDg
SAP-PI3AERS_SAPNW04 requires SAP-PI3AERS_MountV
SAP-PI3AERS_SAPNW04 requires SAP-PI3ERS_Lanman
SAP-PI3ERS_SAPNW04 requires SAP-PI3ERS_MountV
SAP-PI3ERS_SAPNW04 requires SAP-PI3ERS_Lanman

// resource dependency tree
//
// group SAP-PI3ERS
// {
//   SAPNW04 SAP-PI3AERS_SAPNW04
//   {
//     MountV SAP-PI3AERS_MountV
//     {
//       VMDg SAP-PI3AERS_VMDg
//     }
//     Lanman SAP-PI3ERS_Lanman
//     {
//       IP SAP-PI3ERS_IP
//       {
//         NIC SAP-PI3ERS_NIC
//       }
//     }
//   }
// }

```

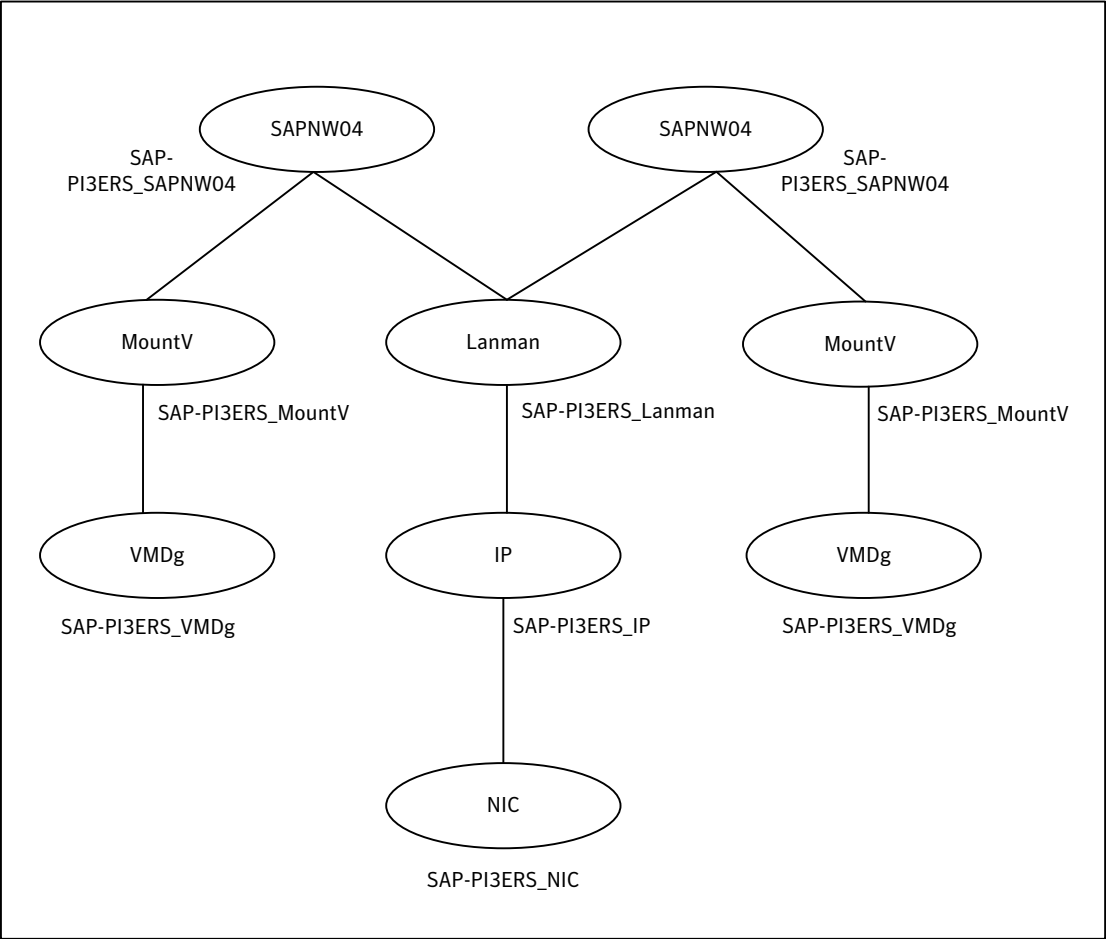
```
// SAPNW04 SAP-PI3ERS_SAPNW04
//      {
//      MountV SAP-PI3ERS_MountV
//      {
//      VMDg SAP-PI3ERS_VMDg
//      }
//      Lanman SAP-PI3ERS_Lanman
//      {
//      IP SAP-PI3ERS_IP
//      {
//      NIC SAP-PI3ERS_NIC
//      }
//      }
//      }
// }
```

Sample resource dependency for SAP Enqueue Replication Server Instances service group for Add-In installation Usage Type

[Figure A-8](#) shows the sample resource group dependency for SAP Enqueue Replication Server Instances service group for Add-In installation Usage Type.

Figure A-8

Sample resource group dependency for SAP Enqueue Replication Server Instances service group for Add-In installation Usage Type

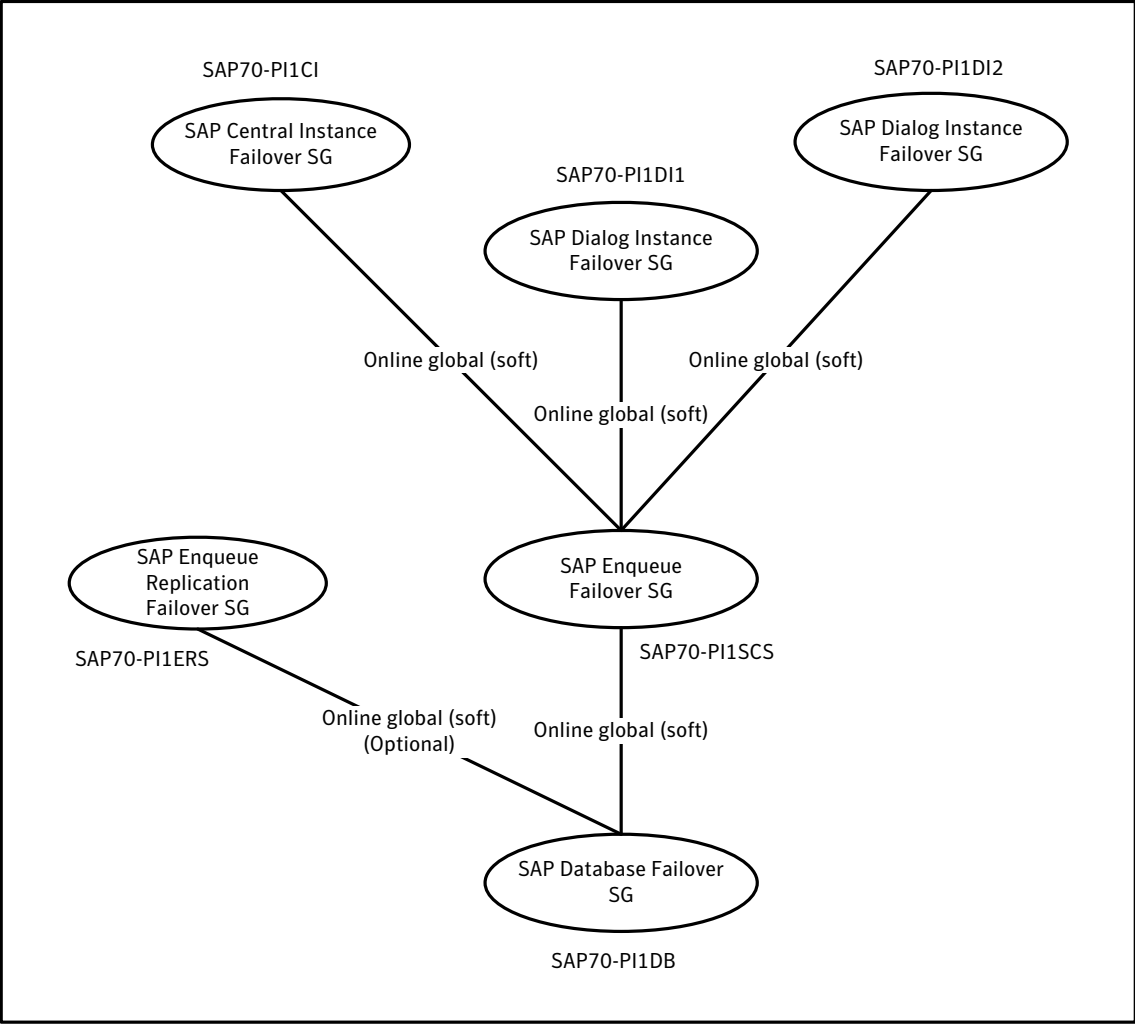


Sample service group dependency for SAP NetWeaver

Figure A-9 shows the sample service group dependency for SAP NetWeaver

Figure A-9

Sample service group dependency



Changes introduced in Past releases

This appendix includes the following topics:

- [Changes introduced in the past releases](#)

Changes introduced in the past releases

The changes introduced in the past releases of the agent for SAP NetWeaver are as follows:

- Added support for SAP Kernel 7.2
- Added support for Storage Foundation and High Availability Solutions 6.0 for Windows.
- Added support for Gateway, Internet Graphics Server (IGS) and Internet Communication Manager (ICM) processes.
- Added support for NETBIOS domain names (old domains) for SAPAdminDomain attribute.
- Package is modified to install both SAPNW04 and SAPWebAS agents.
- Added support for Windows Server 2008 (x64)
- Added support for SFWha 5.1 SP1
- Added support for Secure cluster
- Support for different passwords for SAPServiceUser and SAPAdmin users.
- Added support for VCS 5.1 on Microsoft Windows Server 2003 (x64) and IA64
- Added support for Instance IDs 97, 98 and 99

- Added support for local system user accounts for SAPAdmin and SAPServiceUser attributes

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