

# Novell ZENworks® Orchestrator

1.3

June 9, 2008

HIGH AVAILABILITY  
CONFIGURATION GUIDE

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# About This Guide

This *High Availability Configuration Guide* provides the information for installing and configuring Novell® ZENworks® Orchestrator 1.3 in a High Availability environment. The guide provides information about the components and configuration steps necessary for preparing this environment, including instructions for configuring the ZENworks Orchestrator Server in a cluster. The guide also provides some information regarding the behaviors you can expect from ZENworks Orchestrator in various failover scenarios. The guide is organized as follows:

- ♦ [Chapter 1, “Preparing ZENworks Orchestrator for High Availability Support,” on page 9](#)
- ♦ [Chapter 2, “Orchestrator Failover Behaviors in a High Availability Environment,” on page 35](#)

## Audience

This guide is intended for data center managers and IT or Operations administrators. It assumes that users of the product have the following background:

- ♦ General understanding of network operating environments and systems architecture.
- ♦ Knowledge of basic UNIX\* shell commands and text editors.

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## Documentation Updates

For the most recent updates of this *High Availability Guide*, visit the [ZENworks Orchestrator 1.3 Web site](http://www.novell.com/documentation/zen_orchestrator13/) ([http://www.novell.com/documentation/zen\\_orchestrator13/](http://www.novell.com/documentation/zen_orchestrator13/)).

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When a single pathname can be written with a backslash for some platforms or a forward slash for other platforms, the pathname is presented with a backslash. Users of platforms that require a forward slash, such as Linux\* or UNIX, should use forward slashes as required by your software.



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# Preparing ZENworks Orchestrator for High Availability Support

# 1

Ensuring maximum service-level availability and data protection is paramount to enterprise IT infrastructure. Automated failure detection and recovery prevents downtime, and reduces the financial and operational impact of outages to the business. Highly available infrastructure is a key requirement for IT decision makers.

The Novell® ZENworks® Orchestrator Server is a critical component of your enterprise infrastructure: it continuously monitors and manages physical servers and virtual machines (VMs); and provides high availability for virtual machines by automatically restarting them on alternate physical servers should the server they are running on become unavailable (either due to planned or unplanned outage). Therefore, the Orchestrator Server itself must be highly available.

In ZENworks Orchestrator, High Availability (HA) services are provided by a specialized set of applications that run on SUSE Linux Enterprise Server (SLES10). Heartbeat2 is HA clustering software that provides multi-node failover and service-level health monitoring for Linux-based services. Heartbeat monitors both physical servers and the services running on them, and automatically restarts services if they fail.

This guide describes how to configure ZENworks Orchestrator in a Heartbeat2 cluster and how to provide both service-level restart for the Orchestrator server and failover between the physical servers of a Linux cluster to ensure that ZENworks Orchestrator remains available and responsive to the infrastructure that it manages.

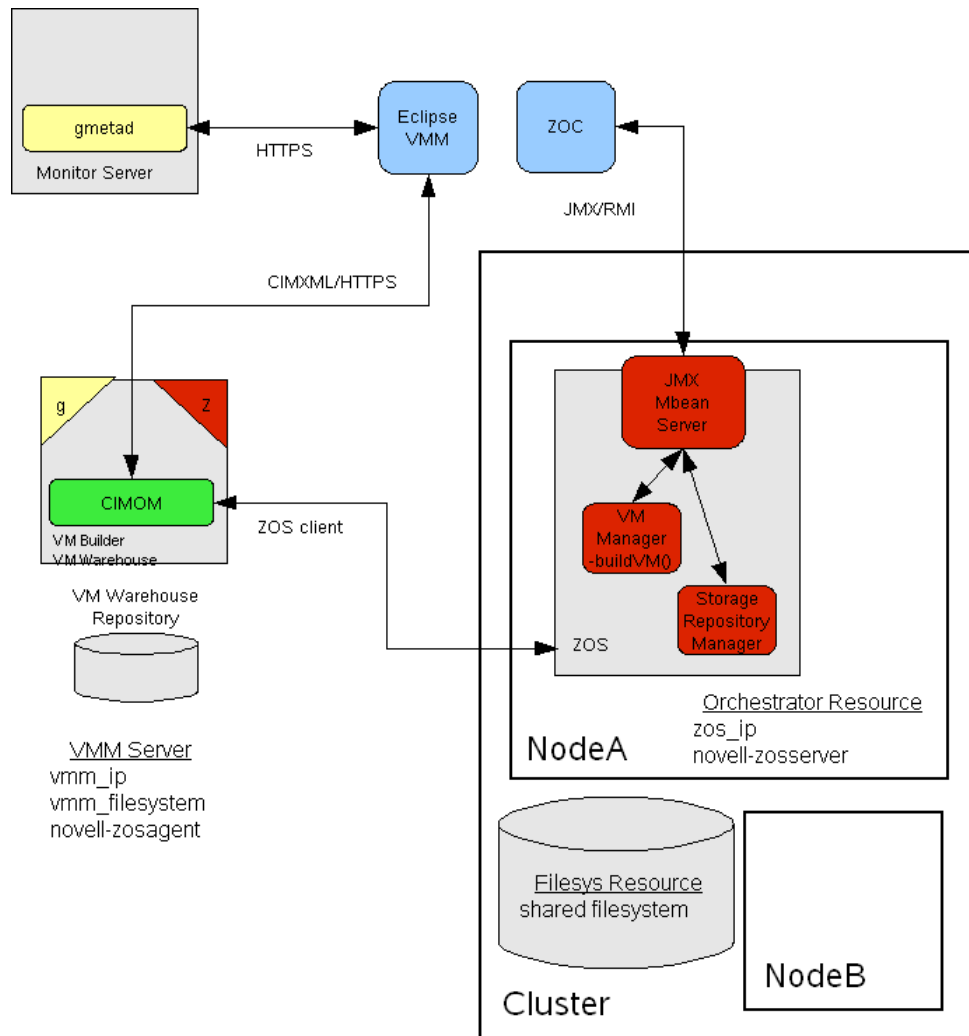
This section includes the following information:

- ♦ [Section 1.1, “Overview,” on page 9](#)
- ♦ [Section 1.2, “Installing ZENworks Orchestrator to a High Availability Environment,” on page 10](#)

## 1.1 Overview

The following figure illustrates how Novell® ZENworks® Orchestrator is configured for use in a high availability environment once the High Availability infrastructure is in place.

**Figure 1-1** The ZENworks Server in a Clustered, High Availability Environment with Virtual Machine Management and Monitoring Outside the Cluster



## 1.2 Installing ZENworks Orchestrator to a High Availability Environment

This section includes information to help you install ZENworks Orchestrator Server components in a High Availability environment. The sequence below is the supported method for configuring this environment.

1. [Section 1.2.1, “Meet the Prerequisites,” on page 11](#)
2. [Section 1.2.2, “Install the High Availability Pattern for SLES 10,” on page 12](#)
3. [Section 1.2.3, “Configure Nodes with Time Synchronization and Install Heartbeat to Each Node,” on page 13](#)
4. [Section 1.2.4, “Set Up OCFS2,” on page 14](#)
5. [Section 1.2.5, “Install and Configure ZENworks Orchestrator on the First Clustered Node,” on page 15](#)

6. [Section 1.2.6, “Run the High Availability Configuration Script,” on page 26](#)
7. [Section 1.2.8, “Create the Cluster Resource Group,” on page 27](#)
8. [Section 1.2.7, “Install and Configure Orchestrator Server Packages on Other Nodes in the Cluster for High Availability,” on page 27](#)
9. [Section 1.2.9, “Test the Failover of the ZENworks Orchestrator Server in a Cluster,” on page 28](#)
10. [Section 1.2.10, “Install and Configure other ZENworks Orchestrator Components to the High Availability Grid,” on page 29](#)

---

**NOTE:** Upgrading from earlier versions of ZENworks Orchestrator (including an earlier installation of version 1.3) to a high availability environment is not supported.

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If you plan to use ZENworks Virtual Machine Management in a high availability environment, see [Section 1.2.10, “Install and Configure other ZENworks Orchestrator Components to the High Availability Grid,” on page 29](#) and [Section 1.2.11, “Creating an NFS Share for VM Management to Use in a High Availability Environment,” on page 30](#).

## 1.2.1 Meet the Prerequisites

The environment where ZENworks Orchestrator Server is installed must meet the hardware and software requirements for high availability. This section includes the following information to help you understand those requirements.

- ◆ [“Hardware Requirements for Creating a High Availability Environment” on page 11](#)
- ◆ [“Software Requirements for Creating a High Availability Environment” on page 12](#)

### Hardware Requirements for Creating a High Availability Environment

The following hardware components are required for creating a high availability environment for ZENworks Orchestrator:

- ◆ A minimum of two SLES 10 SP1 (or greater) physical servers, each having dual Network Interface Cards (NICs). These servers are the nodes of the cluster where the ZENworks Orchestrator Server is installed and are a key part of the high availability infrastructure.
- ◆ A Fibre Channel or iSCSI Storage Area Network (SAN)
- ◆ A STONITH device, to provide node fencing. A STONITH device is a power switch which the cluster uses to reset nodes that are considered dead. Resetting non-heartbeating nodes is the only reliable way to ensure that no data corruption is performed by nodes that hang and only appear to be dead. For more information about setting up STONITH, see, the [Configuring Stonith](http://www.novell.com/documentation/sles10/heartbeat/data/b8nrk15.html) (<http://www.novell.com/documentation/sles10/heartbeat/data/b8nrk15.html>) section of the [SLES 10 Heartbeat Guide](http://www.novell.com/documentation/sles10/heartbeat/data/heartbeat.html) (<http://www.novell.com/documentation/sles10/heartbeat/data/heartbeat.html>).

## Software Requirements for Creating a High Availability Environment

The following software components are required for creating a high availability environment for ZENworks Orchestrator:

- ◆ The High Availability pattern on the SLES 10.x RPM install source, which includes
  - ◆ The Heartbeat v2 software package, a high-availability resource manager that supports multinode failover. This should include all available online updates installed to all nodes that will be part of the Heartbeat cluster.
  - ◆ The Oracle Cluster File System 2 (OCFS2), a parallel cluster file system that offers concurrent access to a shared file system. See [Section 1.2.4, “Set Up OCFS2,” on page 14](#) for more information.

SLES 10.x integrates these open source storage technologies (Heartbeat 2 and OCFS) in a High Availability installation pattern, which, when installed and configured, is known as the Novell High Availability Storage Infrastructure. This combined technology automatically shares cluster configuration and coordinates cluster-wide activities to ensure deterministic and predictable administration of storage resources for shared-disk-based clusters.
- ◆ DNS installed on the nodes of the cluster for resolving the cluster hostname to the cluster IP.
- ◆ ZENworks Orchestrator Server installed on all nodes of the cluster (a two or three node configuration is recommended)
- ◆ (optional) VM Builder/VM Warehouse Server installed on a non-clustered server (for more information, see [Section 1.2.10, “Install and Configure other ZENworks Orchestrator Components to the High Availability Grid,” on page 29](#)).
- ◆ (optional) Orchestrator Monitoring Server installed on a non-clustered server (for more information, see [Section 1.2.10, “Install and Configure other ZENworks Orchestrator Components to the High Availability Grid,” on page 29](#)).

### 1.2.2 Install the High Availability Pattern for SLES 10

The High Availability install pattern is included in the distribution of SLES 10 and later. Use YaST2 (or the command line, if you prefer) to install the packages that are associated with the high availability pattern to each physical node that is to participate in the ZENworks Orchestrator cluster.

---

**NOTE:** The High Availability pattern is included on the SLES 10 install source, not the ZENworks Orchestrator install source.

---

The packages associated with high availability include:

- ◆ drbd (Distributed Replicated Block Device)
- ◆ EVMS high availability utilities
- ◆ The Heartbeat subsystem for high availability on SLES
- ◆ Heartbeat CIM provider
- ◆ A monitoring daemon for maintaining high availability resources that can be used by Heartbeat
- ◆ A plug-in and interface loading library used by Heartbeat
- ◆ An interface for the STONITH device
- ◆ OCFS2 GUI tools

- ◆ OCFS2 Core tools

For more information, see *Installing and Removing Software* ([http://www.novell.com/documentation/sles10/sles\\_admin/data/sec\\_yast2\\_sw.html](http://www.novell.com/documentation/sles10/sles_admin/data/sec_yast2_sw.html)) in the *SLES 10 Installation and Administration Guide*.

### 1.2.3 Configure Nodes with Time Synchronization and Install Heartbeat to Each Node

When you have installed the High Availability packages to each node of the cluster, you need to configure the Network Timing Protocol (NTP) and Heartbeat 2 clustering environment on each physical machine that participates in the cluster.

- ◆ “Configuring Time Synchronization” on page 13
- ◆ “Configuring Heartbeat 2” on page 13

#### Configuring Time Synchronization

To configure time synchronization, you need to configure the nodes in the cluster to synchronize to a time server outside the cluster. The cluster nodes use the time server as their time synchronization source.

NTP is included as a network service in SLES 10 SP1. Use the [time synchronization instructions](http://www.novell.com/documentation/sles10/heartbeat/data/b5ez1wc.html) (<http://www.novell.com/documentation/sles10/heartbeat/data/b5ez1wc.html>) in the *SLES 10 Heartbeat Guide* to help you configure each cluster node with NTP.

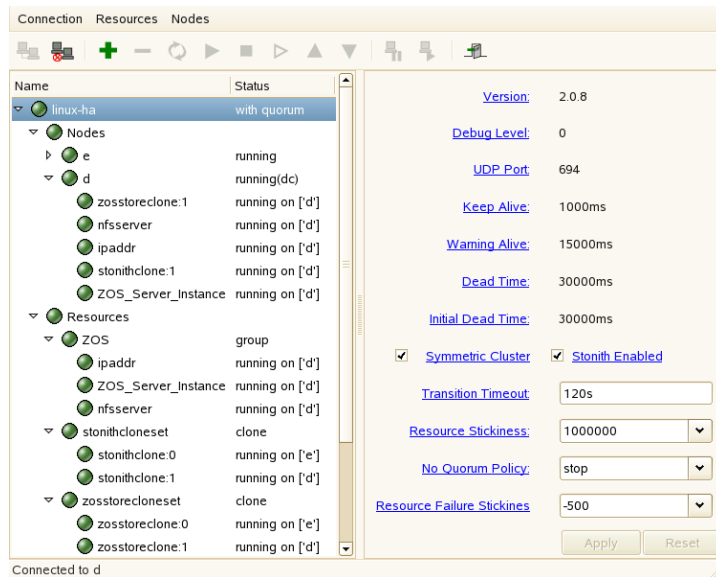
#### Configuring Heartbeat 2

Heartbeat 2 is an open source server clustering system that ensures high availability and manageability of critical network resources including data, applications, and services. It is a multinode clustering product for Linux that supports failover, failback, and migration (load balancing) of individually managed cluster resources.

Heartbeat packages are installed with the `High Availability` pattern on the SLES 10 SP1 install source. For detailed information about configuring Heartbeat 2, see the [installation and setup instructions](http://www.novell.com/documentation/sles10/heartbeat/index.html?page=/documentation/sles10/heartbeat/data/b3ih73g.html) (<http://www.novell.com/documentation/sles10/heartbeat/index.html?page=/documentation/sles10/heartbeat/data/b3ih73g.html>) in the *SLES 10 Heartbeat Guide* (<http://www.novell.com/documentation/sles10/heartbeat/data/heartbeat.html>).

An important value you need to specify in order for Heartbeat to be enabled for High Availability is configured in the *Transition Timeout* field on the settings page of the Heartbeat console (`hb_gui`).

**Figure 1-2** The Main Settings Page in the Heartbeat2 Graphical Interface



The value in this field controls how long Heartbeat waits for services to start. The default value is 20 seconds. The ZENworks Orchestrator Server requires more time than this to start. We recommend that you specify the value in this field at 120s. More time might be required if your Orchestrator grid is very large.

## 1.2.4 Set Up OCFS2

OCFS2 is a general-purpose journaling file system that is fully integrated in the Linux 2.6 kernel and later and shipping with SLES 10.x. OCFS2 allows you to store application binary files, data files, and databases on devices in a SAN. All nodes in a cluster have concurrent read and write access to the file system. A distributed lock manager helps prevent file access conflicts. OCFS2 supports up to 32,000 subdirectories and millions of files in each directory. The O2CB cluster service (a driver) runs on each node to manage the cluster.

To set up the high availability environment for ZENworks Orchestrator, you need to first install the High Availability pattern in YaST (this includes the `ocfs2-tools` and `ocfs2console` software packages) and configure the Heartbeat 2 cluster management system on each physical machine that participates in the cluster, and then provide a SAN in OCFS2 where the Orchestrator files can be stored. For information on setting up and configuring OCFS2, see the [Oracle Cluster File System 2](http://www.novell.com/documentation/sles10/sles_admin/data/ocfs2.html) ([http://www.novell.com/documentation/sles10/sles\\_admin/data/ocfs2.html](http://www.novell.com/documentation/sles10/sles_admin/data/ocfs2.html)) section of the *SLES 10 Administration Guide*.

### Shared Storage Requirements for Creating a High Availability Environment

If you want data to be highly available, we recommend that you set up a Fibre Channel Storage Area Network (SAN) to be used by your ZENworks Orchestrator cluster.

SAN configuration is beyond the scope of this document. For information about setting up a SAN, see the [Oracle Cluster File System 2](http://www.novell.com/documentation/sles10/sles_admin/data/ocfs2.html) ([http://www.novell.com/documentation/sles10/sles\\_admin/data/ocfs2.html](http://www.novell.com/documentation/sles10/sles_admin/data/ocfs2.html)) documentation in the *SLES 10 Administration Guide*.

---

**IMPORTANT:** ZENworks Orchestrator requires a specific mount point for file storage on the SAN. Use `/zos` (in the root directory) for this mount point.

---

## 1.2.5 Install and Configure ZENworks Orchestrator on the First Clustered Node

This section includes information about two possible scenarios for preparing to use ZENworks Orchestrator in an HA environment:

- ♦ “Installing the Orchestrator Server YaST Patterns on the Node” on page 15
- ♦ “Running the Orchestrator Installation/Configuration Script” on page 16

### Installing the Orchestrator Server YaST Patterns on the Node

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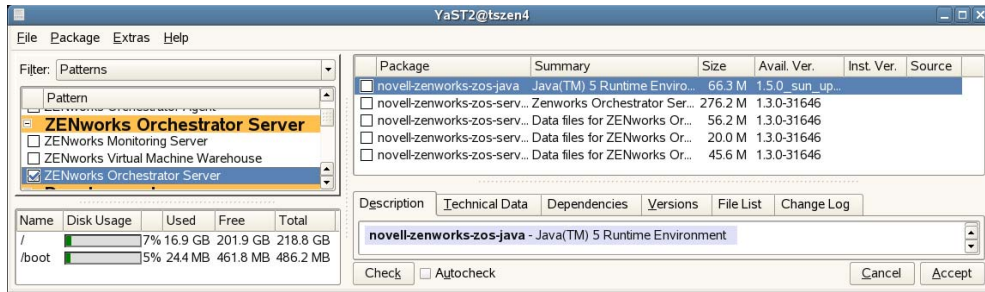
**NOTE:** As you prepare to install ZENworks Orchestrator 1.3 and use it in a high availability environment, make sure that the requirements to do so are met. For more information, see “[Planning the Installation](#)” in the *Novell ZENworks Orchestrator 1.3 Installation and Getting Started Guide*.

---

The ZENworks Orchestrator Server (Orchestrator Server) is supported on SUSE® Linux Enterprise Server 10 Service Pack 1 (SLES 10 SP1) only.

To install the ZENworks Orchestrator Server packages on the first node of the cluster:

- 1** Download the appropriate ZENworks Orchestrator Server ISO (32-bit or 64-bit) to an accessible network location.
- 2** (Optional) Create a DVD ISO (32-bit or 64-bit) that you can take with you to the machine where you want to install it or use a network install source.
- 3** Install ZENworks Orchestrator software:
  - 3a** Log in to the target SLES 10 SP1 server as `root`, then open YaST2.
  - 3b** In the YaST Control Center, click *Software*, then click *Add-on Product* to display the Add-on Product Media dialog box.
  - 3c** In the Add-on Product Media dialog box, select the ISO media (*Local Directory* or *DVD*) to install.
    - 3c1** (Conditional) Select *DVD*, click *Next*, insert the DVD, then click *Continue*.
    - 3c2** (Conditional) Select *Local Directory*, click *Next*, select the *ISO Image* check box, browse to ISO on the file system, then click *OK*.
  - 3d** Read and accept the license agreement, then click *Next* to display YaST2.
  - 3e** In the YaST2 *Filter* drop-down menu select *Patterns* to display the install patterns available on the ZENworks Orchestrator ISO.



- 3f** Select only the ZENworks Orchestrator Server installation pattern for installation on the first node. This pattern is the gateway between enterprise applications and resource servers. The Orchestrator Server manages computing nodes (resources) and the jobs that are submitted from applications to run on these resources.

---

**TIP:** If not already selected by default, you need to select the packages that are in the ZENworks Orchestrator Server pattern.

---

- 3g** Click *Accept* to install the packages.

### Running the Orchestrator Installation/Configuration Script

Use the following procedure to finish the initial installation and configuration script for the first node in the cluster.

- 1** Configure the ZENworks Orchestrator Server components that you have installed. You can use one of two information gathering methods to perform the configuration:
  - ◆ The Orchestrator product (text-based) configuration script. If you use this method, continue with **Step 1a**.
  - ◆ The GUI Configuration Wizard, which might be more user-friendly. If you use this method, skip to **Step 1b**.

---

**TIP:** Although the text-based configuration process detects which RPM patterns are installed, the GUI Configuration Wizard requires that you specify which components are to be configured.

---

- 1a** (Conditional) Run the Orchestrator product configuration script.

**1a1** Make sure you are logged in as `root` to run the configuration script.

**1a2** Run the script, as follows:

```
/opt/novell/zenworks/orch/bin/config
```

When the script runs, the following information is initially displayed:

```
Welcome to Novell ZENworks Orchestrator.
```

```
This program will configure Novell ZENworks Orchestrator 1.3
```

```
Select whether this is a new install or an upgrade
```

```
i) install
u) upgrade
```

```
- - - - -
```



Selection [install]:

- 1a3** Press Enter (or enter `i`) to accept as a new installation and to display the next part of the script.

Select products to configure

```
#  selected  Item
1)   no      ZENworks Monitoring Service (not installed)
2)   yes     ZENworks Orchestrator Server
3)   no      ZENworks Orchestrator Agent (not installed)
4)   no      ZENworks Orchestrator VM Builder (not
installed)
5)   no      ZENworks Orchestrator VM Warehouse (not
installed)
```

Select from the following:

```
1 - 5) toggle selection status
a) all
n) none
f) finished making selections
q) quit -- exit the program
```

Selection [finish]:

- 1a4** Because you installed only the ZENworks Orchestrator Server, no other products need to be selected.

---

**IMPORTANT:** If you happened to install the VM Builder or the VM Warehouse on this server, do not configure them on this server.

---

Press Enter (or enter `f`) to finish the default selection and to display the next part of the script.

Gathering information for ZENworks Orchestrator Server configuration. . .

Select whether this is this a standard or high-availability server configuration

```
s) standard
h) ha
- - - - -
```

Selection [standard]:

- 1a5** Enter `h` to specify that this is a High Availability server configuration and to display the next part of the script.

- 1a6** Enter the fully-qualified cluster hostname or the IP address that is used for configuring the Orchestrator Server instance in a High Availability cluster.

The configuration script binds the IP address of the cluster to this server.

- 1a7** Enter a name for the Orchestrator grid.

This grid is an administrative domain container that contains all of the objects in your network or data center that the Orchestrator monitors and manages, including users,

resources, and jobs. The grid name is displayed at the root of the tree in the Explorer Panel of the Orchestrator Console.

**1a8** Enter a name for the ZENworks Orchestrator Administrator user.

This name is used to log in as the administrator of the ZENworks Orchestrator Server and the objects it manages.

**1a9** Enter a password for the ZENworks Orchestrator Administrator user, then retype the password to validate it.

**1a10** Choose whether to enable an audit database by entering either *y* or *n*.

ZENworks Orchestrator can send audit information to a relational database (RDBMS). If you enable auditing, you will need access to an RDBMS. If you use a PostgreSQL database, you can configure it for use with Orchestrator auditing at this time. If you use a different RDBMS, you will have to configure it separately for use with Orchestrator.

**1a11** Specify the full path to file containing the license key you received from Novell.

**Example:** `opt/novell/zenworks/zos/server/license/key.txt`

**1a12** Specify the port you want the Orchestrator Server to use for the User Portal interface: an access to Orchestrator for users to manage jobs.

---

**NOTE:** If you plan to use ZENworks Monitoring outside your cluster, we recommend that you do not use the default port, 80.

---

**1a13** Specify a port that you want to designate for the Administrator Information page. this page includes links to product documentation, agent and client installers, and product tools to help you understand and use the product. The default port is 8001.

**1a14** Specify a port to be used for communication between the Orchestrator Server and the Orchestrator Agent. The default port is 8100.

**1a15** Specify (*yes* or *no*) whether you want the Orchestrator Server to generate a PEM-encoded TLS certificate for secure communication between the server and the agent. If you choose not to generate a certificate, you need to provide the location of an existing certificate and key.

**1a16** Specify the password to be used for the VNC on Xen hosts, then verify that password.

**1a17** Specify whether to view (*yes* or *no*) or change (*yes* or *no*) the information you have supplied in the configuration script.

If you are satisfied with the summary of information (that is, you choose not to change it) and specify that choice, the configuration launches.

If you decide to change the information, the following choices are presented in the script:

```
Select the component that you want to change
```

```
1) ZENworks Orchestrator Server
- - - - -
d) Display Summary
f) Finish and Install
```

- ◆ Specify 1 if you want to reconfigure the server.
- ◆ Specify d if you want to review the configuration summary again.

- ◆ Specify `f` if you are satisfied with the configuration and want to install using the specifications as they are.

**1b** (Conditional) Run the GUI Configuration Wizard.

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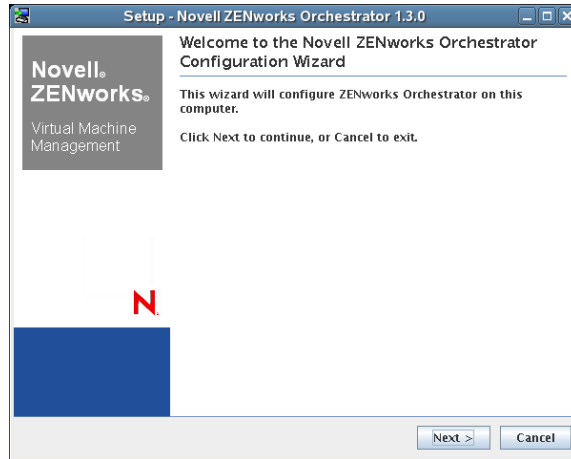
**NOTE:** If you have already run the text-based configuration explained in [Step 1a on page 16](#), do not use the GUI Configuration Wizard.

---

**1b1** Run the script for the ZENworks Orchestrator Configuration Wizard as follows:

```
/opt/novell/zenworks/orch/bin/guiconfig
```

The GUI Configuration Wizard launches.

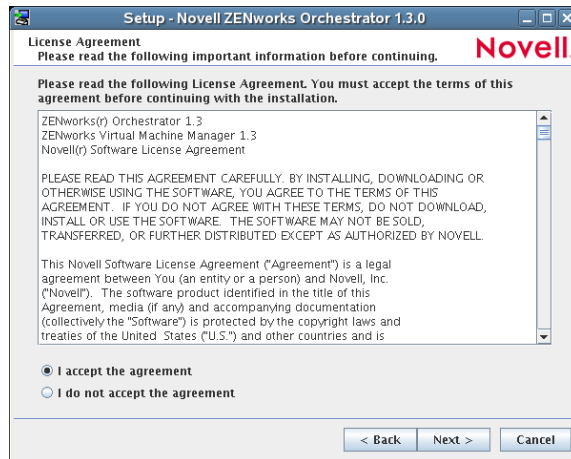


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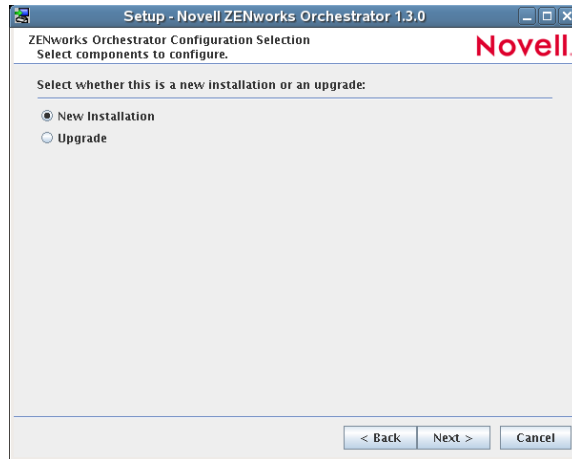
**IMPORTANT:** If you only have a keyboard to navigate through the pages of the GUI Configuration Wizard, use the Tab key to shift the focus to a control you want to use (for example, a *Next* button), then press the space bar to activate that control.

---

**1b2** Click *Next* to display the license agreement.

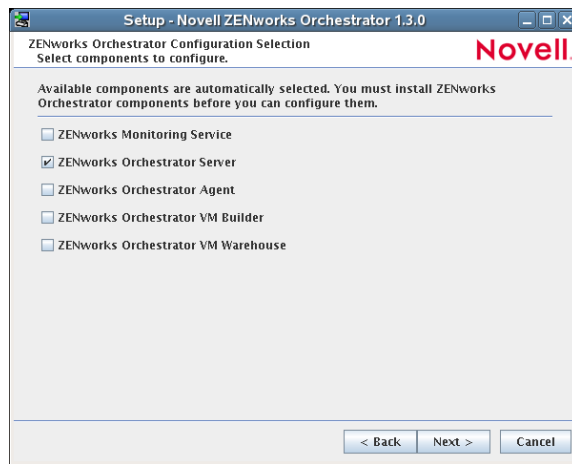


**1b3** Accept the agreement, then click Next to display the installation type page.



**1b4** Select *New Installation*, then click *Next* to display the ZENworks Orchestrator components page.

**1b5** Select *New Installation*, then click *Next* to display the ZENworks Orchestrator components page.



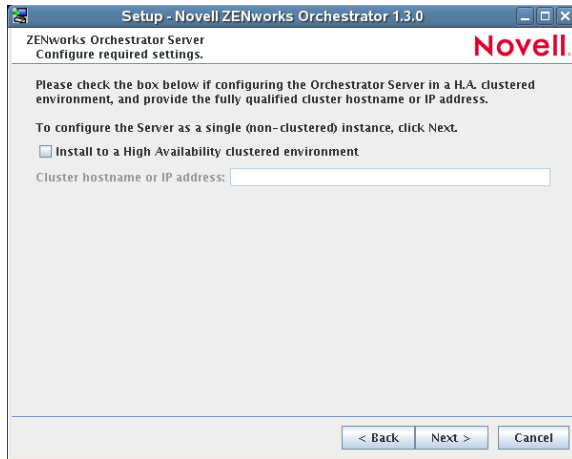
The components page lists the ZENworks Orchestrator components that are available for configuration (already installed). By default, only the installed components (the ZENworks Orchestrator Server, in this case) are selected for configuration.

---

**NOTE:** If other Orchestrator patterns were installed by mistake, make sure that you deselect them now. As long as these components are not configured for use, there should be no problem with the errant installation.

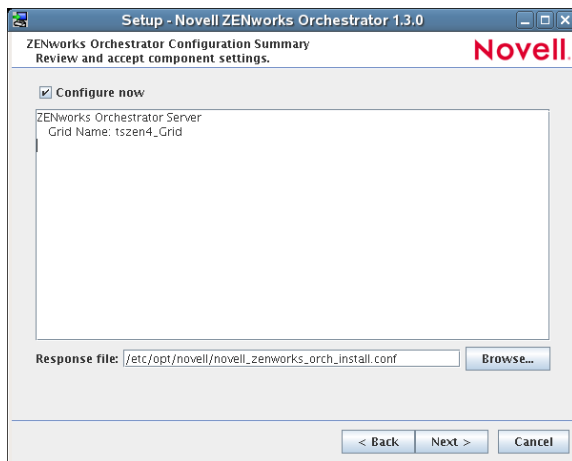
---

**1b6** Click *Next* to display the High Availability configuration page.



- 1b7** Select *Install to a High Availability clustered environment* to configure the server for high availability, then enter the hostname or IP address of the cluster in the *Cluster hostname or IP address* field.
- 1b8** Click *Next* on the succeeding pages and provide information for the wizard to use during the configuration process. You can refer to the information in [Table 1-1, “Orchestrator Configuration Information,”](#) on page 24 for details about the configuration data that you need to provide. The GUI Configuration Wizard uses this information to build a response file that is consumed by the setup program inside the GUI Configuration Wizard.

When you have finished answering the configuration questions in the wizard, the ZENworks Orchestrator Configuration Summary page is displayed.




---

**IMPORTANT:** Although this page of the wizard lets you navigate using the Tab key and spacebar, you need to use the Shift+Tab combination to navigate past the summary list. Click *Back* if you accidentally enter the summary list and re-enter the page to navigate to the control buttons.

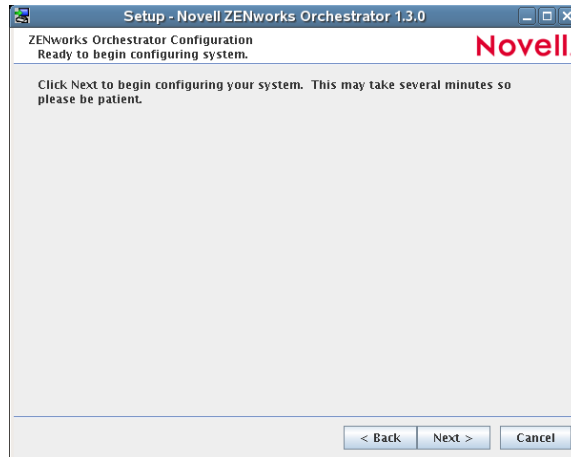
---

By default, the *Configure now* check box on this page is selected. If you accept the default of having it selected, the wizard starts ZENworks Orchestrator and applies the configuration settings.

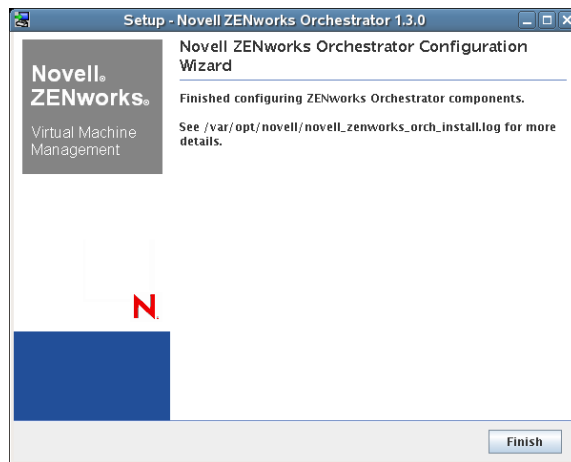
If you deselect the check box, the wizard writes out the configuration file to `/etc/opt/novell/novell_zenworks_orch_install.conf` without starting Orchestrator or applying the configuration settings. You can use this saved `.conf` file to start the Orchestrator Server and apply the settings. Do this either by running the configuration script manually or by using an installation script. Use the following command to run the configuration script:

```
/opt/novell/zenworks/orch/bin/config -rs  
<path_to_config_file>
```

**1b9** Click *Next* to display the following wizard page.



**1b10** Click *Next* to launch the configuration script. When the configuration is finished, the following page is displayed:



**1b11** Click *Finish* to close the configuration wizard.

- 2 Open the configuration log file (`/var/opt/novell/novell_zenworks_orch_install.log`) to make sure that the components were correctly configured.

You might want to change the configuration if you change your mind about some of the parameters you provided in the configuration process. To do so, you can rerun the configuration and change your responses during the configuration process.

The configuration script performs the following functions in sequence on the ZENworks Orchestrator:

1. Binds the cluster IP on this server by issuing the following command internally:

```
IPAddr2 start <IP_address_you_provided>
```

---

**IMPORTANT:** Make sure you configure DNS to resolve the cluster hostname to the cluster IP.

---

2. Configures the Orchestrator Server.
3. Shuts down the Orchestrator Server because you specified that this is a High-Availability configuration
4. Unbinds the cluster IP on this server by issuing the following command internally:

```
IPAddr2 stop <IP_address_you_provided>
```

When these steps are completed, the first node of the Orchestrator Server cluster is set up.

### ZENworks Orchestrator Configuration Information

The following table includes the information required by the ZENworks Orchestrator configuration (`config`) and the configuration wizard (`guiconfig`) when configuring the Orchestrator Server component for High Availability. The information is organized in this way to make it readily available. The information is listed in the order that it is requested by the configuration script or wizard.

**Table 1-1** *Orchestrator Configuration Information*

Configuration Information	Explanation
Orchestrator Server	<p>Because the ZENworks Orchestrator Server must always be installed for a full Orchestrator system, the following questions are always asked when you have installed server patterns prior to the configuration process:</p> <ul style="list-style-type: none"><li>◆ <b>ZENworks Orchestrator Administrator user:</b> Create an Administrator user for ZENworks Orchestrator.<ul style="list-style-type: none"><li>◆ Default = none</li><li>◆ The name you create here is required when you access the ZENworks Orchestrator Console or the <code>zosadmin</code> command line interface.</li><li>◆ You should remember this username for future use.</li></ul></li><li>◆ <b>ZENworks Orchestrator Administrator password:</b> Specify the password for &lt;Administrator user&gt;<ul style="list-style-type: none"><li>◆ Default = none</li><li>◆ This password you create here is required when you access the ZENworks Orchestrator Console or the <code>zosadmin</code> command line interface.</li><li>◆ You should remember this password for future use.</li></ul></li><li>◆ <b>ZENworks Orchestrator grid name:</b> Select a name for the Orchestrator grid.<ul style="list-style-type: none"><li>◆ Default = <code>hostname_grid</code></li><li>◆ A grid is an administrative domain container holding all of the objects in your network or data center. The Orchestrator monitors and manages these objects, including users, resources, and jobs.</li><li>◆ The grid name you create here is displayed as the name for the container placed at the root of the tree in the Explorer panel of the Orchestrator console.</li></ul></li><li>◆ <b>Audit Database:</b> Do you want to install the audit database?<ul style="list-style-type: none"><li>◆ Default = <code>no</code>. We recommend that you do not install the audit database on this server.</li></ul></li><li>◆ <b>License file:</b> Specify the full path to the license file.<ul style="list-style-type: none"><li>◆ Default = none</li><li>◆ A license key is required to use this product. You should have received this key from Novell, then you should have subsequently copied it to the network location that you specify here. Be sure to include the name of the license file in the path.</li><li>◆ A Novell license key for ZENworks Orchestrator High Performance Computing (HPC) differs from the Novell license key for ZENworks Orchestrator Virtual Machine Management. If you purchased the Orchestrator HPC license and provide it here, none of the Orchestrator VM Management functionality will be visible or available. If you purchase the ZENworks Orchestrator Virtual Machine Management license, HPC functionality is also visible and available.</li></ul></li></ul>



Configuration Information	Explanation
Orchestrator Server (continued)	<ul style="list-style-type: none"> <li>◆ <b>User Portal<sup>1</sup></b>: Specify the User Portal port. <ul style="list-style-type: none"> <li>◆ Default = 8080 (if ZENworks Monitoring is installed) or 80 (if ZENworks Monitoring is not installed).</li> <li>◆ Because Apache uses port 80 for ZENworks Monitoring, it forwards non-monitoring requests to the Orchestrator Server on the port you specify here.</li> </ul> </li> <li>◆ <b>Administrator Information port<sup>1</sup></b>: Specify the Administrator Information page port. <ul style="list-style-type: none"> <li>◆ Default = 8001</li> <li>◆ Port 8001 on the ZENworks Server provides access to an Administrator Information page that includes links to product documentation, agent and client installers, and product tools to help you understand and use the product. Specify another port number if 8001 is reserved for another use on this server.</li> </ul> </li> <li>◆ <b>Agent Port<sup>1</sup></b>: Specify the Agent port. <ul style="list-style-type: none"> <li>◆ Default = 8100</li> <li>◆ Port 8100 is used for communication between the Orchestrator Server and the Orchestrator Agent. Specify another port number if 8100 is reserved for another use.</li> </ul> </li> <li>◆ <b>TLS Certificate and Key<sup>1</sup></b>: Generate a TLS certificate and key? <ul style="list-style-type: none"> <li>Specify the full path to the TLS server certificate.</li> <li>Specify the full path to the TLS server private key.</li> <li>◆ Default = <code>yes</code> (the Orchestrator Server must generate a certificate and key for authentication)</li> <li>◆ A PEM-encoded TLS certificate and key is needed for secure communication between the Orchestrator Server and Orchestrator Agent.</li> <li>◆ If you respond with <code>no</code>, you need to provide the location of an existing certificate and key.</li> </ul> </li> <li>◆ <b>TLS Server Certificate<sup>2</sup></b>: Specify the full path to the TLS server certificate. <ul style="list-style-type: none"> <li>◆ Default = <code>/etc/ssl/servercerts/servercert.pem</code></li> <li>◆ Specify the path to the existing TLS certificate.</li> </ul> </li> <li>◆ <b>TLS Server Key<sup>2</sup></b>: Specify the full path to the TLS server private key. <ul style="list-style-type: none"> <li>◆ Default = <code>/etc/ssl/servercerts/serverkey.pem</code></li> <li>◆ Specify the path to the existing TLS private key.</li> </ul> </li> <li>◆ <b>Xen VNC password</b>: Set the password that will be used for VNC on Xen virtualization hosts. You will need this password when logging into virtual machines using VNC.</li> </ul>

Configuration Information	Explanation
Configuration Summary	<p>When you have completed the configuration process, you have the option of viewing a summary of the configuration information.</p> <ul style="list-style-type: none"> <li>◆ <b>View summary:</b> Do you want to view summary information? <ul style="list-style-type: none"> <li>◆ Default = <code>yes</code></li> <li>◆ Answering <code>yes</code> to this question displays a list of all the Orchestrator components you have configured and the information with which they will be configured.</li> <li>◆ Answering <code>no</code> to this question starts the configuration program.</li> </ul> </li> <li>◆ <b>Configuration information change:</b> Do you want to make changes? <ul style="list-style-type: none"> <li>◆ Default = <code>no</code></li> <li>◆ Answering <code>yes</code> to this question restarts the configuration process so that you can make changes to the configuration information.</li> <li>◆ Answering <code>no</code> to this question starts the configuration program.</li> </ul> </li> </ul>

<sup>1</sup> This configuration parameter is considered an advanced setting for the Orchestrator Server in the ZENworks Orchestrator Configuration Wizard. If you select the *Configure Advanced Settings* check box in the wizard, the setting is configured with normal defaults. Leaving the check box deselected lets you have the option of changing the default value.

<sup>2</sup> This configuration parameter is considered an advanced setting for the Orchestrator Server in the ZENworks Orchestrator Configuration Wizard. If you select the *Configure Advanced Settings* check box in the wizard, this parameter is listed, but default values are provided only if the previous value is manually set to *no*.

## 1.2.6 Run the High Availability Configuration Script

Before you run the High Availability Configuration Script, make sure that you have installed the ZENworks Orchestrator Server to a single node of your high availability cluster. For more information, see [Section 1.2.5, “Install and Configure ZENworks Orchestrator on the First Clustered Node,” on page 15](#).

---

**IMPORTANT:** The High Availability Configuration Script asks for the mount point on the Fibre Channel SAN. Make sure that you have that information (`/zos`) before you run the script.

---

The high availability script, `zos_server_ha_post_config`, is located in `/opt/novell/zenworks/orch/bin` with the other configuration tools. You need to run this script on the first node of the cluster (that is, the node where you installed ZENworks Orchestrator Server) as the next step in setting up ZENworks Orchestrator to work in a high availability environment.

The script performs the following functions:

- ◆ Verifies that the Orchestrator Server is not running
- ◆ Moves the Orchestrator files to shared storage (first node of the cluster)
- ◆ Creates symbolic links pointing to the location of shared storage (all nodes of the cluster)

The High Availability Configuration Script must be run on all nodes of the cluster. Make sure that you follow the prompts in the script exactly; do not misidentify a secondary node in the cluster as the primary node.

## 1.2.7 Install and Configure Orchestrator Server Packages on Other Nodes in the Cluster for High Availability

When you have followed the steps to set up the primary node in your planned cluster, you need to set up the other nodes that you intend to use for failover in that cluster. Use the following sequence as you set up other cluster nodes (the sequence is nearly identical to setting up the primary node):

1. Make sure that the SLES 10 SP1 nodes have the High Availability pattern. For information, see [Section 1.2.2, “Install the High Availability Pattern for SLES 10,”](#) on page 12.
2. Make sure that the SLES 10 SP1 nodes have been configured with time synchronization. For information, see [Section 1.2.3, “Configure Nodes with Time Synchronization and Install Heartbeat to Each Node,”](#) on page 13.
3. Set up OCFS2 on each node so that the nodes can communicate with the SAN, making sure to designate `/zos` as the shared mount point. For more information, see [Section 1.2.4, “Set Up OCFS2,”](#) on page 14.
4. Install ZENworks Orchestrator Server packages on this node. Use the steps as described in [“Installing the Orchestrator Server YaST Patterns on the Node”](#) on page 15.

---

**NOTE:** Do not run the initial configuration script (`config` or `guiconfig`) on any other node than the primary node.

---

5. Copy the license file (`key.txt`) from the first node to the `/opt/novell/zenworks/zos/server/license/` directory on this node.
6. Run the High Availability Configuration script on this node, as described in [“Run the High Availability Configuration Script”](#) on page 26. This creates the symbolic link to the file paths of the SAN.

When you have installed and configured other nodes in the cluster, you are ready to test the failover of the ZENworks Orchestrator Server in the high-availability cluster.

## 1.2.8 Create the Cluster Resource Group

The resource group creation script, `zos_server_ha_resource_group`, is located in `/opt/novell/zenworks/orch/bin` with the other configuration tools. You can run this script on the first node of the cluster to set up the cluster resource group. If you want to set up the resource group using Heartbeat (GUI console or command line tool), running the script is optional.

The script performs the following functions:

- ◆ Obtains the DNS name from the ZENworks Orchestrator configuration file.
- ◆ Creates the cluster resource group.
- ◆ Configures resource stickiness to avoid unnecessary failbacks.

The `zos_server_ha_resource_group` script prompts you for the IP address of the Orchestrator Server cluster. The script then adds this address to a Heartbeat2 Cluster Information

Base (CIB) XML template called `cluster_zos_server.xml` and uses the following command to create the cluster resource group:

```
/usr/sbin/cibadmin -o resources -C -x $XMLFILE
```

The CIB XML template is located at `/opt/novell/zenworks/`  
`orch/bin/ha/cluster_zos_server.xml`. An unaltered template sample is shown below:

```
<group id="ZOS_Server">
  <primitive id="ZOS_Server_Cluster_IP" class="ocf" type="IPAddr2"
  provider="heartbeat">
    <instance_attributes>
      <attributes>
        <nvpair name="ip"
value="$CONFIG_ZOS_SERVER_CLUSTER_IP"/>
      </attributes>
    </instance_attributes>
  </primitive>
  <primitive id="ZOS_Server_Instance" class="lsb" type="novell-
zosservice" provider="heartbeat">
    <instance_attributes id="zos_server_instance_attrs">
      <attributes>
        <nvpair id="zos_server_target_role" name="target_role"
value="started"/>
      </attributes>
    </instance_attributes>
    <operations>
      <op id="ZOS_Server_Status" name="status"
description="Monitor the status of the ZOS service" interval="60"
timeout="15" start_delay="15" role="Started" on_fail="restart"/>
    </operations>
  </primitive>
</group>
```

The template shows that a cluster resource group comprises these components:

- ◆ The ZENworks Orchestrator Server
- ◆ The ZENworks Orchestrator Server cluster IP address
- ◆ The NFS Server
- ◆ A Dependency on the cluster file system resource group that you already created
- ◆ Resource stickiness to avoid unnecessary failbacks

When you have installed and configured the nodes in the cluster and created a cluster resource group, use the Heartbeat tools to start the cluster resource group. You are then ready to test the failover of the ZENworks Orchestrator Server in the high-availability cluster.

## 1.2.9 Test the Failover of the ZENworks Orchestrator Server in a Cluster

You can optionally simulate a failure of the Orchestrator Server by powering off or performing a shutdown of the server. After approximately 30 seconds, the clustering software detects that the

primary node is no longer functioning, binds the IP address to the failover server, then starts the failover server in the cluster.

Access the ZENworks Orchestrator Administrator Information Page to verify that the Orchestrator Server is installed and running (stopped or started). Use the following URL to open the page in a Web browser:

```
http://DNS_name_or_IP_address_of_cluster:8001
```

The Administrator Information page includes links to separate installation programs (installers) for the ZENworks Orchestrator Agent (Orchestrator Agent) and the ZENworks Orchestrator Clients (Orchestrator Clients). The installers are used for various operating systems.

## 1.2.10 Install and Configure other ZENworks Orchestrator Components to the High Availability Grid

To install and configure other ZENworks Orchestrator components ( including the Orchestrator Agent, the Monitoring Agent, the Monitoring Server, the VM Builder, or the VM Warehouse) on servers that authenticate to the cluster, you need to do the following:

- ◆ Determine which components you want to install, remembering these dependencies
  - ◆ All non-agent Orchestrator components must be installed to a SLES 10 SP1 server, a RHEL 4 server, or a RHEL 5 server.
  - ◆ The ZENworks Orchestrator Agent must be installed to a SLES 10 SP1 server, a RHEL 4 server, a RHEL 5 server, or a Windows (NT, 2000, XP) server.
  - ◆ A VM Warehouse must be installed on the same server as a VM Builder. A VM Builder can be installed independent of the VM Warehouse on its own server.
- ◆ Use Yast2 to install the Orchestrator packages of your choice to the network server resources of your choice. For more information, see “[Installing and Configuring ZENworks Orchestrator Components](#)” or “[Installing the VM Management Console](#)” in the *Novell ZENworks Orchestrator 1.3 Installation and Getting Started Guide*.

If you want to, you can download the Orchestrator Agent or clients from the Administrator Information page and install them to a network resource as directed in “[Independent Installation of the Agent and Clients](#)” in the *Novell ZENworks Orchestrator 1.3 Installation and Getting Started Guide*.

- ◆ Run the text-based configuration script or the GUI Configuration Wizard to configure the Orchestrator components you have installed (including any type of installation of the agent). As you do this, you will need to remember the hostname of the Orchestrator server (that is, the primary Orchestrator Server node), and the administrator name and password of this server. For more information, see “[Installing and Configuring ZENworks Orchestrator Components](#)” or “[Installing the VM Management Console](#)” in the *Novell ZENworks Orchestrator 1.3 Installation and Getting Started Guide*.

It is important to understand that virtual machines under the management of ZENworks Orchestrator are also highly available — the loss of a host causes ZENworks Orchestrator to re-provision it elsewhere. This is true as long as the constraints in Orchestrator allow it to re-provision (for example, if the virtual machine image is on shared storage).

---

**IMPORTANT:** If you want to use Virtual Machine Management (that is, the VM Warehouse and the VM Builder) in your High Availability environment, you need to further configure the

environment to cache the VM images. For more information, see [Section 1.2.11, “Creating an NFS Share for VM Management to Use in a High Availability Environment,”](#) on page 30.

## 1.2.11 Creating an NFS Share for VM Management to Use in a High Availability Environment

Use the following procedure to create an NFS share when the VM Warehouse and Builder are installed on a machine outside of the cluster, where the ZENworks Orchestrator Server is installed.

**IMPORTANT:** You must execute these steps after you run the High Availability Configuration Script (see [Section 1.2.6, “Run the High Availability Configuration Script,”](#) on page 26) on all nodes of the cluster.

**1** Create the required directories on one node in the cluster where the Orchestrator Server is installed.

**1a** At the command line, run the following command:

```
mkdir /zos/server/dataGrid/files/warehouse/import
```

**1b** At the command line, run the following command:

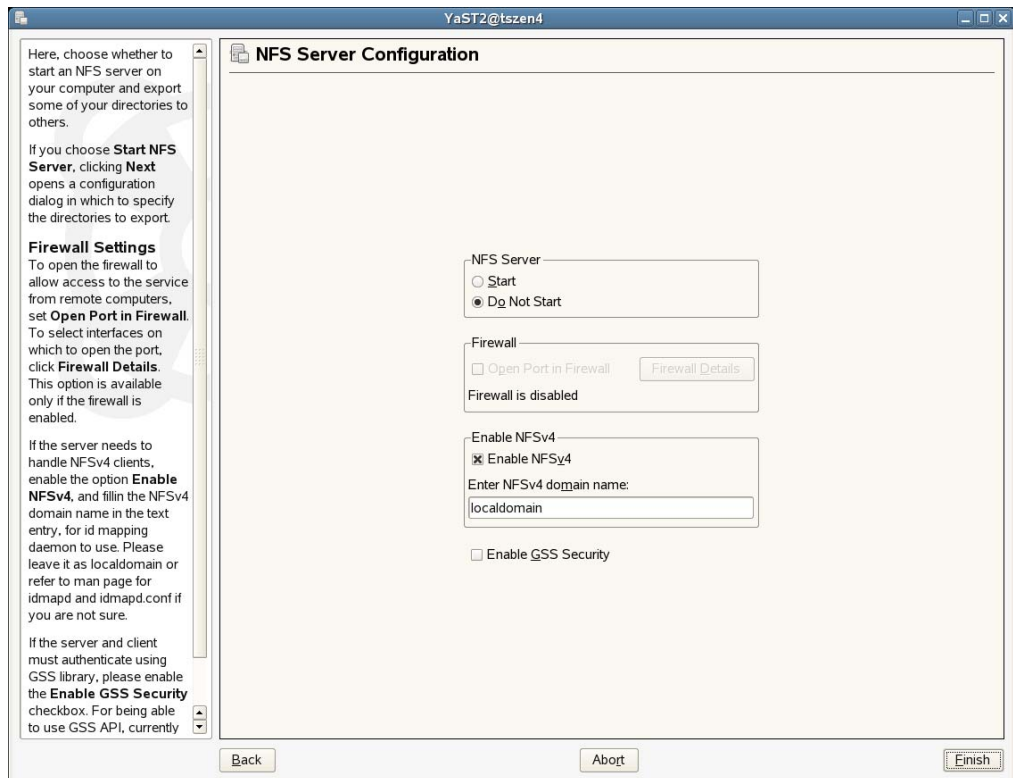
```
mkdir /zos/server/dataGrid/files/warehouse/export
```

**2** Start the NFS Server on each node in the cluster where the Orchestrator Server is installed.

**2a** At the command line, run the following command:

```
yast2 nfs_server
```

The NFS Server Configuration utility is displayed.



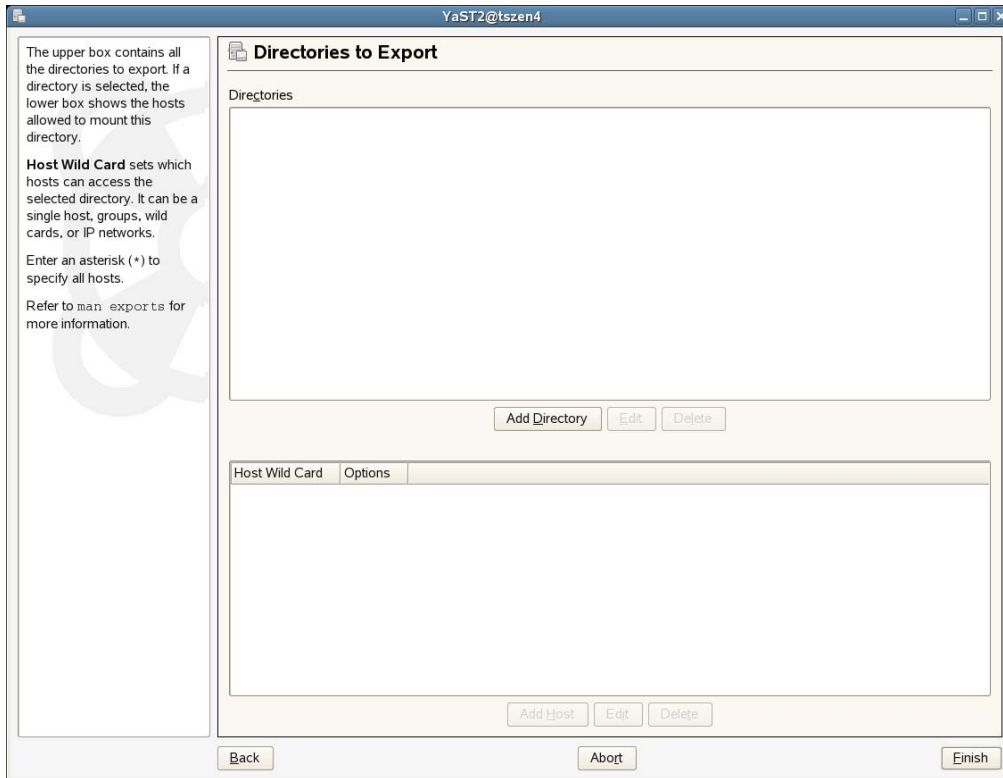
---

**NOTE:** Make sure that the firewall is disabled. If it is enabled, select the *Open Port in Firewall* check box.

Do not select *Enable GSS Security*.

---

- 2b** In the NFS Server Configuration utility, select *Start*, deselect *Enable NFSv4*, then click *Next* to display the Directories to Export page.



- 2c** On the Directories to Export page, click *Add Directory*, add `/zos/server/dataGrid/files/warehouse` as the directory path, then click *OK* to display a browser popup box.

- 2d** In the popup box, fill in the fields:

**Host Wild Card:** Enter the IP address of the VM Warehouse Server.

**Options:** Edit the options string so that it appears as `rw, sync, no_root_squash`

- 2e** Click *Finish* to save the configuration and start the NFS Server.

- 3** At the command line on each node in the cluster where the Orchestrator Server is installed, use the following commands to turn off the NFS Server and NFS boot:

```
chkconfig nfsserver off
chkconfig nfsboot off
```

- 4** Create the following script and run it on each node in the cluster where the Orchestrator Server is installed:

```
if [ -d /zos/nfs ]
then
rm -rf /var/lib/nfs
```

```

else
mv /var/lib/nfs /zos/
fi
ln -sf /zos/nfs /var/lib
sed -i s"/OPTIONS=\" -q\"/OPTIONS=\" -q -v $cluster_IP_address\"/"
/etc/init.d/nfsboot

```

---

**NOTE:** Remember to add the cluster IP address in the script on the line indicated.

---

- 5** On only one of the nodes in the cluster where the ZENworks Orchestrator is installed, set up the NFS High Availability Service. The cluster must be running when you do this.

**5a** From the command line of this server, run the following command:

```
cat > /root/nfs.xml <<EOF
```

The result is a display of the `nfs.xml` file:

```

<group id="ZOS_Server">
<primitive id="nfsserver" class="lsb" type="nfsserver"
provider="heartbeat">
</primitive>
</group>
EOF

```

**5b** From the command line of this server, run the following command:

```
cibadmin -U -x /root/nfs.xml
```

- 6** Install the VM Warehouse/Builder component on a resource that is not inside the cluster. For more information on installing and configuring this component, see “[Installing and Configuring ZENworks Orchestrator Components](#)” or “[Installing the VM Management Console](#)” in the *Novell ZENworks Orchestrator 1.3 Installation and Getting Started Guide*.
- 7** Mount the VM Warehouse share located inside the cluster using one of the following methods.

**7a** (Method 1) On the command line of the VM Warehouse/Builder Server, run the following command:

```

yast2 nfs add spec="<cluster_IP_address>:/zos/server/
dataGrid/files/warehouse" file="/var/opt/novell/zenworks/
zos/server/dataGrid/files/warehouse"

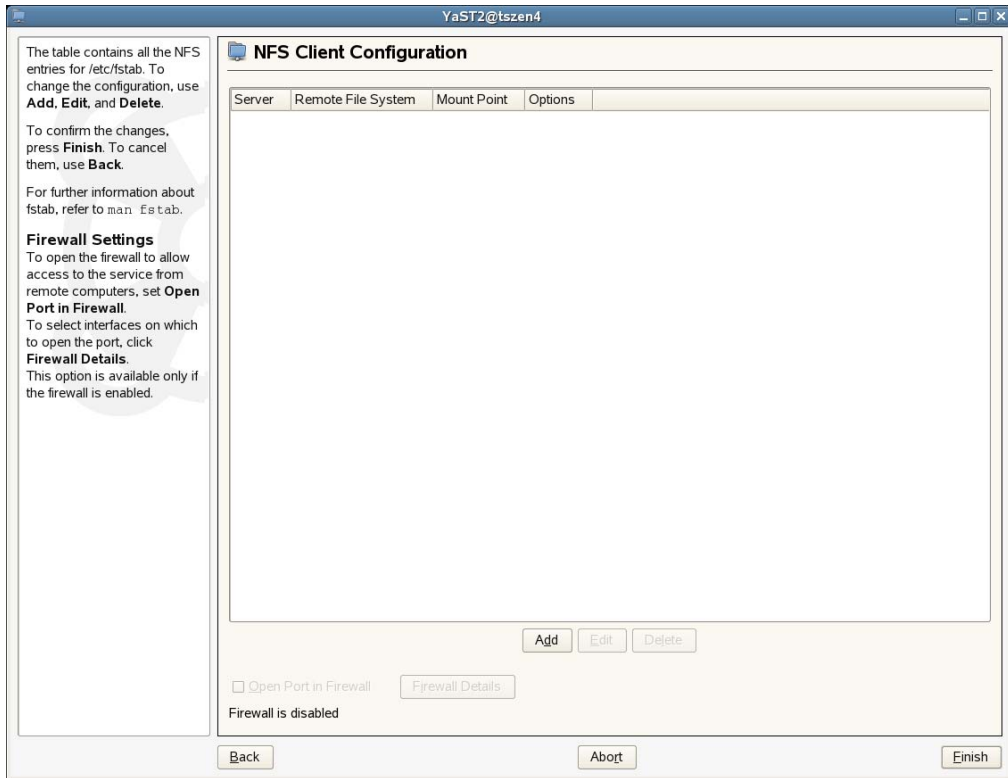
```

**7b** (Method 2) On the command line of the VM Warehouse/Builder Server, run the following command:

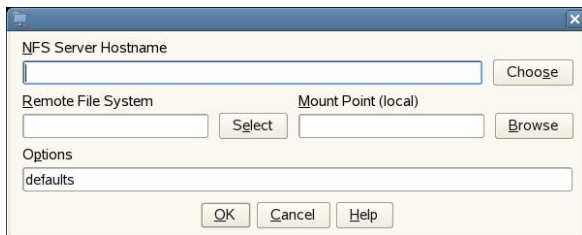
```
yast2 nfs
```

This command displays the NFS Client Configuration utility.





**7c** In the NFS Client Configuration utility, click *Add* to open a dialog box you can use to specify the share information.



**7d** In the dialog box, fill in two of the fields:

**NFS Server Hostname:** Enter the IP Address of the High Availability cluster, for example:

`10.255.255.255`

**Remote File System:** Enter the name of the remote file system (that is, the shared directory) you created:

`/zos/server/dataGrid/files/warehouse`

**Mount Point (local):** Enter the local mount point:

`/var/opt/novell/zenworks/zos/server/dataGrid/files/warehouse`

**7e** Click *OK*, then click *Finish*.

---

**NOTE:** For information about creating an NFS Share for the VM Warehouse/Builder in a non-clustered environment, see **Step 9** in “**Installation and Configuration Steps**” in the *Novell ZENworks Orchestrator 1.3 Installation and Getting Started Guide*.

---

# Orchestrator Failover Behaviors in a High Availability Environment

# 2

This section includes information to help you understand the failover behavior Novell® ZENworks® Orchestrator Server in a high availability environment.

- ◆ [Section 2.1, “Use Case 1: Orchestrator Server Failover,” on page 35](#)
- ◆ [Section 2.2, “Use Case 2: Orchestrator Server Failover and Failback -- Agent Behavior,” on page 35](#)
- ◆ [Section 2.3, “Use Case 3: Orchestrator Server Failover and Failback -- VM Warehouse Behavior,” on page 35](#)
- ◆ [Section 2.4, “Use Case 4: Orchestrator Server Failover and Failback -- VM Builder Behavior,” on page 36](#)
- ◆ [Section 2.5, “Use Case 5: Orchestrator Server Failover and Failback -- Orchestrator Monitoring Behavior,” on page 36](#)

## 2.1 Use Case 1: Orchestrator Server Failover

If the primary node in the ZENworks Orchestrator cluster fails, you should see a job restart on another Orchestrator Server in the cluster. The job must have been flagged as restartable. For more information, see [Section 1.2.9, “Test the Failover of the ZENworks Orchestrator Server in a Cluster,” on page 28](#)).

## 2.2 Use Case 2: Orchestrator Server Failover and Failback -- Agent Behavior

If the primary node in the ZENworks Orchestrator cluster fails, the Orchestrator agent sees this server go down and then reauthenticates with a secondary Orchestrator node as it takes over responsibilities of the cluster.

## 2.3 Use Case 3: Orchestrator Server Failover and Failback -- VM Warehouse Behavior

There are two VM Warehouse operations that interact with the ZENworks Orchestrator Server:

- ◆ Importing a VM into the Warehouse using the Orchestrator Console or the VM Management Console.
- ◆ Exporting a VM from the Warehouse using the Orchestrator Console or the VM Management Console.

Both the Import and the Export are accomplished with an Orchestrator job, so the behavior is the same as for the VM Build jobs. When the Orchestrator server fails, the Import/Export job is canceled (with cleanup). When the Orchestrator Server restarts, the controlling job restarts in order to clean up residual objects.

The Import/Export is displayed in the VM Management Console and in the Orchestrator Console as “Canceled.” You will need to restart the Import/Export action in either of these consoles.

## **2.4 Use Case 4: Orchestrator Server Failover and Failback -- VM Builder Behavior**

If the Orchestrator Server fails, any VM builds in progress are canceled and potentially incomplete residual artifacts of the build are cleaned up. When the Orchestrator Server restarts or when it fails over in the cluster (the server operates identically in these scenarios), the job controlling the VM build restarts and runs briefly. The purpose of this brief run is to clean up residual objects in the Orchestrator model.

## **2.5 Use Case 5: Orchestrator Server Failover and Failback -- Orchestrator Monitoring Behavior**

The ZENworks Orchestrator Monitoring Server is installed on a separate server outside the high availability ZENworks Orchestrator cluster. The Monitoring Agents report data to the Monitoring Server and the VM Management Console provides access to the charts created from the monitoring data. If a monitoring agent is installed on an Orchestrator Server and if that server goes down, the server is displayed as “Down” in the VM Management Console (Monitoring view).

# High Availability Best Practices

# 3

This section includes information that might be useful to Novell® ZENworks® Orchestrator users in High Availability environments. We anticipate that the contents of the section will expand as the product is adopted and deployed. We encourage your contributions to this document. All comments are tested and approved by product engineers before they appear in this section.

- ◆ [Section 3.1, “Jobs Using scheduleSweep\(\) Might Need a Start Constraint,” on page 37](#)

## 3.1 Jobs Using scheduleSweep() Might Need a Start Constraint

If you write a custom job that uses the `scheduleSweep()` JDL function to schedule joblets and that are either 1) marked as restartable in a High Availability failover situation or 2) scheduled through the Job Scheduler to run at server startup, the job might fail to schedule any joblets and is easily noticeable with a 0 second run time. This is because `scheduleSweep()`, by default, creates joblets only for online nodes.

If the Job runs during failover, resources might not be immediately available, so the job ends immediately.

To keep the Job from running until a resource is online, you can use a start constraint. For example, you could add the following to the job policy:

```
<constraint type="start" >
  <gt fact="jobinstance.matchingresources" value="0" />
</constraint>
```

If you implement this constraint, the Job is queued (not started) until at least one resource matches the policy resource constraint.

As alternatives to using the constraint approach, you can:

- ◆ Code in a waiting interval for the required Agents in your Job
- ◆ Avoid using the `scheduleSweep()` function, using instead the `schedule()` API for creating Joblets
- ◆ Choose an alternative set of resources to consider for the `scheduleSweep()`. For more information, see the “[ScheduleSpec](#)” API for more details.

For more information about using constraints, see “[Working with Facts and Constraints](#)” in the *Novell ZENworks Orchestrator 1.3 Developer Guide and Reference*.