

Installation Planning Guide

NetIQ Cloud Manager 2.1.1

June 20, 2012



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About This Guide

This guide provides the information you need as you plan the installation and configuration of a NetIQ Cloud Manager system. It includes the following sections:

- ♦ Chapter 1, “Installation Checklist,” on page 7
- ♦ Chapter 2, “Choosing the Installation Packages and Where to Install Them,” on page 11
- ♦ Chapter 3, “Cloud Manager System Requirements,” on page 19
- ♦ Chapter 4, “Requirements and Cloud Manager Support for the Virtual Environment,” on page 25

Audience

The information in this guide is intended for anyone who needs to install and configure NetIQ Cloud Manager software. This user should be an experienced Linux system administrator who has the following:

- ♦ Familiarity with and administrative rights to an authentication LDAP directory (Microsoft Active Directory or Novell eDirectory).
- ♦ A working knowledge of PostgreSQL databases.
- ♦ An understanding of security issues related to mutual authentication between services and SSL certificates.
- ♦ Experience in Linux and Windows system operation.
- ♦ Familiarity with virtual machine technology and data center operations.

Feedback

We want to hear your comments and suggestions about this manual and the other documentation included with this product. Please use the User Comments feature at the bottom of each page of the online documentation, or go to www.novell.com/documentation/feedback.html (<http://www.novell.com/documentation/feedback.html>) and enter your comments there.

Additional Documentation

For other NetIQ Cloud Manager 2.x documentation, see the [NetIQ Cloud Manager 2.x documentation site](http://www.novell.com/documentation/cloudmanager2) (<http://www.novell.com/documentation/cloudmanager2>).

1 Installation Checklist

To ensure that you successfully install and configure NetIQ Cloud Manager, you should follow the installation checklist provided below. Each task provides brief information and a reference to where you can find more complete details.

Task	Details
<input type="checkbox"/> Review Cloud Manager concepts and terminology	<p>NetIQ Cloud Manager includes functionality and components you need to understand to successfully install, configure, maintain, and use the product. Cloud Manager also interacts with other products such as hypervisors and directory services.</p> <p>If you are not already familiar with Novell Cloud Manager concepts and its interaction with these other products, see NetIQ Cloud Manager 2.1.1 Introduction.</p>
<input type="checkbox"/> Virtualize your physical datacenter	<p>If you have not already applied a virtualization infrastructure to your physical datacenter, you need to implement a hypervisor technology. NetIQ Cloud Manager supports SUSE Linux Xen, Citrix Xen, VMware vSphere (vCenter), and Microsoft Hyper-V hypervisors and the Amazon EC2 virtual environment.</p>
<input type="checkbox"/> Review the supported Cloud Manager environments and software installation requirements	<p>See Chapter 3, "Cloud Manager System Requirements," on page 19 and Chapter 4, "Requirements and Cloud Manager Support for the Virtual Environment," on page 25.</p>
<input type="checkbox"/> Prepare for Orchestration components installation.	<p>Some security certificate and licensing tasks must take place before you begin installing Orchestration components.</p> <p>See "Orchestration Components Preinstallation Tasks" in the NetIQ Cloud Manager 2.1.1 Orchestration Installation Guide.</p>
<input type="checkbox"/> Install the Cloud Manager Orchestration Server, the Orchestration Console, and the Orchestration Agent	<p>The Cloud Manager Orchestration Server communicates with its Orchestration Agents. These agents establish communication with your virtualization infrastructure (hypervisor technology). With this link in place, the Cloud Manager Orchestration Server utilizes specialized provisioning adapter jobs to automate the provisioning, management, and deprovisioning of virtual machines.</p> <p>There are some alternative methods you can use for installing these components. See "Installing Cloud Manager Orchestration Components" in the NetIQ Cloud Manager 2.1.1 Orchestration Installation Guide.</p>

Task	Details
<input type="checkbox"/> Configure the Cloud Manager Orchestration components	<p>Although you could install the Cloud Manager Application components while you have the installation media mounted on the SUSE server, it's not likely that Application and Orchestration components will be installed on the same server. For this reason, you should configure the packages you have installed for the Orchestration components. These configuration tasks include:</p> <ul style="list-style-type: none"> ◆ configuring the Orchestration Server ◆ configuring the Orchestration Agent ◆ creating a resource account in the Orchestration Console ◆ getting provisioning adapters running for VM discovery ◆ configuring the Orchestration Web service to connect to the Cloud Manager Application Server <p>See “Configuring Cloud Manager Orchestration Components”, “Creating a Resource Account”, “Configuring Orchestration Provisioning Adapters” and “Configuring Connections to the Cloud Manager Application Server” in the <i>NetIQ Cloud Manager 2.1.1 Orchestration Installation Guide</i>.</p> <p>NOTE: Although you might not need some of the advanced functionality in Orchestration components, you might be interested in the advanced configuration tasks detailed in “Advanced Agent Installation Methods” in the <i>NetIQ Cloud Manager 2.1.1 Orchestration Installation Guide</i>.</p>
<input type="checkbox"/> Prepare for Cloud Manager installation	<p>Before installing and configuring Cloud Manager, you need to prepare a remote database for storing Cloud Manager data. See “Configuring the PostgreSQL Database Connection and Credentials” in the <i>NetIQ Cloud Manager 2.1.1 Application Server Installation Guide</i>.</p> <p>You also need to decide which method you want to use to authenticate your users in the Cloud Manager system. The authentication method you use depends on the external authentication source or sources you have already implemented in your data center environment. The sources supported by NetIQ Cloud Manager include:</p> <ul style="list-style-type: none"> ◆ LDAP (Active Directory or eDirectory) ◆ Novell Cloud Security Services (NCSS) ◆ LDAP and NCSS combined ◆ Novell Access Manager (NAM) <p>There are required tasks you need to perform and information you need to gather for to prepare your chosen authentication source to support Cloud Manager authentication and configuration.</p> <p>See “Using the Cloud Manager Application Server Configuration Tool” in the <i>NetIQ Cloud Manager 2.1.1 Application Server Installation Guide</i>.</p>
<input type="checkbox"/> Install the Cloud Manager Application Server and its console.	<p>The Cloud Manager Application Server provides the interface through which users request virtual resources. Requests are communicated to the Orchestration Server, which performs the required virtualization operations in conjunction with your hypervisor technology.</p> <p>See “Installing Cloud Manager Application Server Components” in the <i>NetIQ Cloud Manager 2.1.1 Application Server Installation Guide</i>.</p>

Task	Details
<input type="checkbox"/> Configure the Cloud Manager system	<p>After installation, you must complete several configuration tasks before Cloud Manager can be used, including</p> <ul style="list-style-type: none">◆ configuring the Cloud Manager Application Server authentication source connections◆ configuring the Cloud Manager Application Server database connection <p>See “Using the Cloud Manager Application Server Configuration Tool” in the NetIQ Cloud Manager 2.1.1 Application Server Installation Guide.</p>

After you’ve completed the installation and configuration of both the Orchestration components and the Cloud Manager system, continue with [Cloud Setup](#) in the [NetIQ Cloud Manager 2.1.1 Cloud Administrator Guide](#) to start populating your Cloud Manager Application Server and Application Console with components to enable users to provision their own business services.

2 Choosing the Installation Packages and Where to Install Them

NetIQ Cloud Manager is comprised of a number of different RPMs that are bundled in different installation patterns, all of which are available on the installation media you [download from Novell \(http://download.novell.com\)](#), an Attachmate Group associate of NetIQ. Your NetIQ sales representative provides the URL to the media download site, along with the license key you purchased.

NOTE: If you install or configure Cloud Manager components by using a trial key, the product behaves normally for 90 days, although the trial key controls the number of users and managed nodes you can configure. For fully supported functionality, product components require a purchased license key. Contact your NetIQ Sales Representative or a Certified NetIQPartner for purchase information.

The RPMs in the install patterns must be installed to a [supported version](#) of SUSE Linux Enterprise Server (SLES) 10 or 11. The installation uses the *Add-On Products* utility that is available in SUSE's YaST program.

After the initial installation and configuration, installers for some Cloud Manager Orchestration components for other operating systems become available in the Orchestration filesystem.

You can install the Cloud Manager component patterns on machines in your data center according to your own criteria. The information in this section can help you decide which Cloud Manager patterns you want to install and the machines in your data center where you want to install them.

- ◆ [Section 2.1, "NetIQ Cloud Manager Installation Pattern," on page 11](#)
- ◆ [Section 2.2, "Cloud Manager Orchestration Server Install Pattern," on page 12](#)
- ◆ [Section 2.3, "Cloud Manager Monitoring Server Pattern," on page 13](#)
- ◆ [Section 2.4, "Cloud Manager Orchestration Agent Pattern," on page 14](#)
- ◆ [Section 2.5, "Orchestration Console Install Pattern," on page 15](#)
- ◆ [Section 2.6, "Monitoring Agent Install Pattern," on page 16](#)

2.1 NetIQ Cloud Manager Installation Pattern

Description: The NetIQ Cloud Manager installation pattern consists of packages for the Cloud Manager Application Server and its Web console. This server communicates with Cloud Manager Orchestration Servers to provide instructions for provisioning, managing, and removing workloads. It also performs user authentication with the LDAP server or Novell Cloud Security Services.

The server requires initial configuration after installation to establish authentication with LDAP, Novell Cloud Security Services, or Novell Access Manager. The configuration also establishes communication with the Cloud Manager Orchestration Server and its console.

Packages in the Pattern: The table below lists the RPMs in the NetIQ Cloud Manager pattern.

Table 2-1 NetIQ Cloud Manager Packages

Install Pattern [Short Name]	Default Packages Installed	Additional Required Patterns	Additional Recommended Patterns	Server /Agent
NetIQ Cloud Manager [cloudmanager]	netiq-cloudmanager postgresql-server			S

You can obtain more information about these patterns and packages in the YaST utility when you have mounted the product ISO.

Installation recommendations: Your server might be capable of handling tasks in addition to its Cloud Manager tasks. However, we strongly recommend that you install the Cloud Manager Server software on a dedicated server to ensure optimal performance. For example, you might not want the same server to host the Cloud Manager Orchestration Server or Novell eDirectory.

Although not mandatory, we recommend that you install and configure the Orchestration Server before you install and configure the application components.

2.2 Cloud Manager Orchestration Server Install Pattern

Description: This server receives workload instructions from the Cloud Manager Application Server and directs the creation and management of those workloads by the virtual infrastructure. Depending on the size of your virtual infrastructure, you might have one or many Orchestration Servers.

The server requires configuration after installation. To perform the initial configuration, you can use a text interface at the Linux console (`./config`) or a GUI configuration wizard (`./guiconfig`).

Packages in the Pattern: The table below lists the RPMs in the Orchestration Server pattern.

Table 2-2 *Orchestration Server Packages*

Install Pattern [Short Name]	Default Packages Installed	Additional Required Patterns [short name]	Additional Recommended Patterns	Server /Agent
Orchestration Server [zw_zos_server]	novell-pso-ws	[zw_orch_config]	[zw_mon_server]	S
	novell-zenworks-orch-config		[zw_zos_clients]	
	novell-zenworks-orch-config-gui			
	novell-zenworks-zos-java			
	novell-zenworks-zos-server			
	novell-zenworks-zos-server-data-agent			
	novell-zenworks-zos-server-data-clients			
	novell-zenworks-zos-server-data-jre			

You can obtain more information about these patterns in the YaST utility when you have mounted the product ISO.

NOTE: Orchestration Server patterns are labeled version 3.1.1 in the NetIQ Cloud Manager 2.1.1 release.

Installation recommendations: Although the machine where you install this server might be capable of handling tasks in addition to the tasks an Orchestration Server performs for Cloud Manager, we strongly recommend that you install the Orchestration Server software on a dedicated server to ensure optimal performance. For example, you might not want the server to host the Cloud Manager Application Server or Novell eDirectory.

NOTE: Although you can install the Orchestration Server on a Virtual Machine, do not try to manage that VM through the Orchestration Console or other Orchestration Clients.

Further, be advised that Installing the server on a VM slows down the performance of the product.

Although not mandatory, we recommend that you install and configure the Orchestration Server before you install and configure the Cloud Manager application components.

2.3 Cloud Manager Monitoring Server Pattern

Description: The Cloud Manager Monitoring Server is an Apache Web server that uses open source Ganglia monitors defined performance data on network resources in a time period you can define.

This server requires configuration after installation. To perform the initial configuration, you can use a text interface at the Linux console (`./config`) or a GUI configuration wizard (`./guiconfig`).

Packages in the Pattern: The table below lists the RPMs in the Orchestration Server pattern.

Table 2-3 *Orchestration Server Packages*

Install Pattern [Short Name]	Default Packages Installed	Additional Required Patterns [short name]	Additional Recommended Patterns	Server /Agent
Monitoring Server	libconfuse0	[zw_mon_agent]		S
[zw_mon_server]	novell-zenworks-monitor-gmetad novell-zenworks-monitor-web novell-zenworks-orch-config novell-zenworks-orch-config-gui	[zw_orch_config]		

You can obtain more information about these patterns and packages in the YaST utility when you have mounted the product ISO.

NOTE: Monitoring Server patterns are all version 3.1.1 in the NetIQ Cloud Manager 2.1.1 release.

Installation recommendations: You can install this server on the same machine with the Orchestration Server, or you can choose any other server with access to the Monitoring Agents.

2.4 Cloud Manager Orchestration Agent Pattern

Description: The Cloud Manager Orchestration Agent provides communication between the Orchestration Server and the VM hosts managed by the server. The agent is installed on the VM hosts that run as nodes under the management of the Orchestration Server.

The agent requires configuration after installation. To perform the initial configuration, you can use a text interface at the Linux console (`./config`) or a GUI configuration wizard (`./guiconfig`).

You can also install the agent from a Windows installation program or use the Linux pattern files to install to RHEL machines. For more information, see “[Advanced Agent Installation Methods](#)” in the *NetIQ Cloud Manager 2.1.1 Orchestration Installation Guide*.

Packages in the Pattern: The table below lists the RPMs in the Orchestration Agent pattern.

Table 2-4 *Orchestration Server Packages*

Install Pattern [Short Name]	Default Packages Installed	Additional Required Patterns [short name]	Additional Recommended Patterns	Server /Agent
Orchestration Agent [zw_zos_agent]	fuse cabextract chntpw novell-zenworks-orch-config novell-zenworks-orch-config-gui novell-zenworks-zos-agent novell-zenworks-zos-java ntfs-3g python-pywbem	[zw_orch-config]	[zw_mon_agent]	A

You can obtain more information about these patterns inside the YaST utility when you have mounted the product ISO.

NOTE: Orchestration Agent patterns are labeled version 3.1.1 in the NetIQ Cloud Manager 2.1.1 release.

Installation recommendations: Installing the Cloud Manager Orchestration Agent on the same machine with the Orchestration Server is not supported.

If you are installing the agent to a vSphere environment, you can install the agent either locally on the vCenter Server (the vCenter appliance is not supported), or on a dedicated system (virtual or physical) as long as the OS in that system is [supported](#) for the Orchestration Agent.

If you want to support virtual resource management in multiple vSphere environments, NetIQ recommends you deploy an Orchestration Agent on a dedicated system. For more information, see [“Orchestration Provisioning Adapter Information”](#) in the *NetIQ Cloud Manager 2.1.1 VM Orchestration Reference*.

2.5 Orchestration Console Install Pattern

Description: The Cloud Manager Orchestration Server Console is a java-based thick client that administers the functionality of the Orchestration Server from any SLES 10 or SLES 11 server, or SLED 11 or a Windows (XP, Windows 7, or Vista) desktop on the same network with the Orchestration Server. Before you can perform any Orchestration Server management functions, such as creating user accounts and managing activities of the server, you need to install the Orchestration Console. The console is a thick desktop client designed for administrative tasks including infrastructure management (for example, managing computing resources) and monitoring. You can install the console on the server itself or on another network computer.

This pattern includes both a GUI console and two ommand line interface tools. These clients let you troubleshoot, initiate, change, or shut down server functions for the Orchestration Server and its computing resources. For information about the client tools, see the [NetIQ Cloud Manager 2.1.1 Orchestration Console Reference](#) and the [NetIQ Cloud Manager 2.1.1 Orchestration Server Command Line Reference](#).

Packages in the Pattern: The table below lists the RPMs in the Orchestration Console pattern.

Table 2-5 Orchestration Console Packages

Install Pattern [Short Name]	Default Packages Installed	Additional Required Patterns [short name]	Additional Recommended Patterns	Server /Agent
Orchestration Agent [zw_zos_clients]	novell-zenworks-zos-clients novell-zenworks-zos-java			S or A

You can obtain more information about these patterns inside the YaST utility when you have mounted the product ISO.

NOTE: The Orchestration Console pattern is labeled version 3.1.1 in the NetIQ Cloud Manager 2.12.1.1 release.

The Orchestration Console and Clients are available as a downloadable Windows installation program (.exe file) in the ISO images (32-bit or 64-bit). For information about using this program, see “[Alternative Installation Methods for the Orchestration Console and Clients](#)” in the [NetIQ Cloud Manager 2.1.1 Orchestration Installation Guide](#).

Installation recommendations: No other Cloud Manager components need to be installed on the machine where you install the console and clients. Provided that the machine where you install the clients can connect with Orchestrate Servers in your data center, where you install the clients is at your discretion.

2.6 Monitoring Agent Install Pattern

Description: The Cloud Manager Monitoring Agent can be installed on a server where any other Orchestration pattern is installed, or independently on a SLES or Windows server. The agent installation lays down the Ganglia Agent on each monitored node to collect performance metrics and send the data to the Cloud Manager Monitoring Server.

The agent requires configuration after installation. To perform the initial configuration, you can use a text interface at the Linux console (./config) or a GUI configuration wizard (./guiconfig).

You can also install the agent from a Windows installation program or use the Linux pattern files to install to RHEL machines. For more information, see “[Alternative Installation Methods for the Cloud Manager Monitoring Agent](#)” in the [NetIQ Cloud Manager 2.1.1 Orchestration Installation Guide](#).

Packages in the Pattern: The table below lists the RPMs in the Monitoring Agent pattern.

Table 2-6 *Orchestration Server Packages*

Install Pattern [Short Name]	Default Packages Installed	Additional Required Patterns [short name]	Additional Recommended Patterns	Server /Agent
Monitoring Agent [zw_mon_agent]	libconfuse0 novell-zenworks-monitor-gmond novell-zenworks-orch-config novell-zenworks-orch-config-gui	[zw_orch_config]		A

You can obtain more information about these patterns and packages in the YaST utility when you have mounted the product ISO.

NOTE: Monitoring Agent patterns are all version 3.1.1 in the NetIQ Cloud Manager 2.12.1.1 release.

Installation recommendations: If you select the Orchestration Agent pattern, the Monitoring Agent pattern is selected by default. This is only a recommended dependence (most users install both components together) and is not binding. The autoselection is made for your convenience.

Although this agent can be installed using YaST, you can also install it from pattern files located on the ISO image. For more information about these patterns, see [“Monitoring Agent Installation Pattern Files for Linux”](#) in the *NetIQ Cloud Manager 2.1.1 Orchestration Installation Guide*.

3 Cloud Manager System Requirements

Before you begin installing the NetIQ Cloud Manager, you need to compare your system resources with the requirements of the product. This section includes information to help you with that evaluation so that you can adequately plan for the installation. The following subsections are included:

- ◆ [Section 3.1, “Cloud Manager Orchestration Server Requirements,” on page 19](#)
- ◆ [Section 3.2, “Cloud Manager Orchestration Agent Requirements,” on page 22](#)
- ◆ [Section 3.3, “Cloud Manager Application Server Requirements,” on page 22](#)
- ◆ [Section 3.4, “Cloud Manager Application Console Requirements,” on page 23](#)

3.1 Cloud Manager Orchestration Server Requirements

The network machine where you install Cloud Manager Server software must meet the following requirements:

Table 3-1 Orchestration Server Requirements

Item	Requirement
Operating System	One of the following platforms can be used: <ul style="list-style-type: none">◆ SUSE Linux Enterprise Server 11 Service Pack 1 (SLES 11 SP1) on the 64-bit (x86-64) architecture (Intel and AMD Opteron processors)◆ SUSE Linux Enterprise Server 11 Service Pack 2 (SLES 11 SP2) on the 64-bit (x86-64) architecture (Intel and AMD Opteron processors)◆ SUSE Linux Enterprise Server 10 (SLES 10) Service Pack 4 (SP4) on the 64-bit (x86-64) architecture (Intel and AMD Opteron processors)
Hardware	<ul style="list-style-type: none">◆ Processor: 2.5 GHz 64-bit, or equivalent AMD or Intel processor (minimum); Dual-Core, 2.5 GHz (or greater) 64-bit (recommended)◆ RAM: 3 GB minimum; 4 GB recommended◆ Disk Space: 350 MB minimum for installing; 1 GB recommended for managing fewer than 100 resources.
Hostname Resolution	The server must resolve device hostnames by using a method such as DNS (recommended).
IP Address	The server must have a static IP address or a permanently leased DHCP address.

Other important requirements you might need to know about the Orchestration Server are included in the following sections:

- ♦ [Section 3.1.1, “Required Network Resources for the Cloud Manager Orchestration Server,” on page 20](#)
- ♦ [Section 3.1.2, “Required Network Resources for the Cloud Manager Orchestration Web Server,” on page 21](#)

3.1.1 Required Network Resources for the Cloud Manager Orchestration Server

The Orchestration Server must allow traffic on TCP ports 80, 8001, 8100, 8101 (these four ports are configurable), and UDP and TCP port 1099 (mandatory).

- ♦ Port 8001 is used for communication with the Administrator Information page.
- ♦ Port 8100 is used with a custom protocol for communication with the Orchestration Agent and for invoking the zos command line interface or opening the Java Developer’s toolkit.
- ♦ Port 8101 is also used for invoking the zos command line interface or opening the Java Developer’s toolkit by using TLS.
- ♦ Port 1099 is used with RMI for invoking the zosadmin command line interface or for running the Orchestration Console.

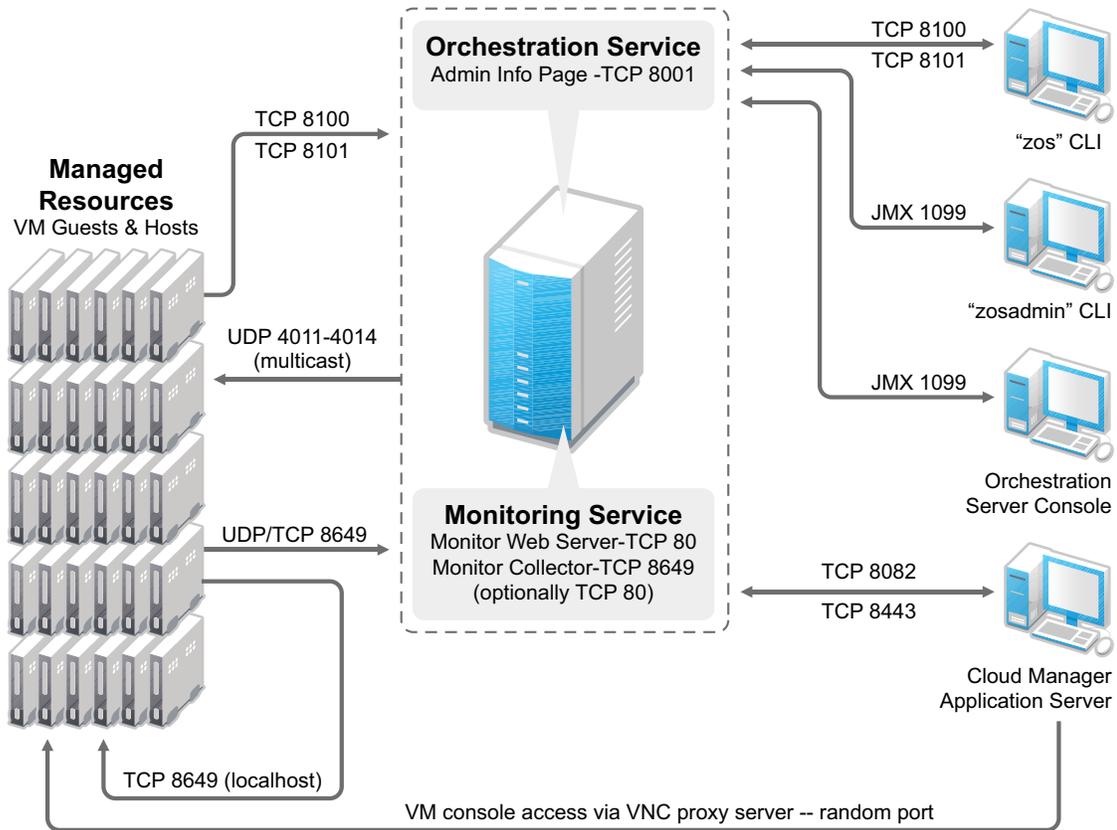
Monitored systems (physical and virtual) send metrics to the Monitoring Server on UDP port 8649. The Monitoring Server is installed on the same system as the Cloud Manager Orchestration Server.

Connections to VM consoles are accommodated through a VNC client. Typically, this means TCP port 5900 for the first VM on a VM host, 5901 for the second, and so on. These connections go to the VM host, exposing the console on behalf of the VM.

Datagrid multicast file transfers use UDP ports 4011-4014. UDP port 4000 is used as a datagrid multicast request port and a control channel port. Multicast groups for datagrid multicast-based file transfers are 239.192.10.10-14.

The following illustration shows these relationships:

Figure 3-1 Required Network Resources for the Cloud Manager Orchestration Server



3.1.2 Required Network Resources for the Cloud Manager Orchestration Web Server

The Cloud Manager Orchestration Web Service exposes a RESTful interface used by the Cloud Manager Application Server to communicate with the Cloud Manager Orchestration Server through ports 8082 and 8443.

3.2 Cloud Manager Orchestration Agent Requirements

The physical or virtual machine where you install the Orchestration Agent must meet the following minimum requirements:

Table 3-2 Orchestration Agent Requirements

Item	Requirement
Operating System	Linux machines: <ul style="list-style-type: none">◆ SUSE Linux Enterprise Server 10 SP4 (64-bit)◆ SUSE Linux Enterprise Server 11 SP2 (64-bit)◆ Red Hat Enterprise Linux 5 (latest update, 64-bit)◆ Red Hat Enterprise Linux 6 (latest update, 64-bit) Windows machines: <ul style="list-style-type: none">◆ Windows Server 2003 (latest SP, 64-bit)◆ Windows Server 2003 R2 (latest SP, 64-bit)◆ Windows Server 2008 R2 SP1 (64-bit)◆ Windows Server 2008 R2 (latest SP, 64-bit)◆ Windows Server 2008 R2 (latest SP, with HyperV role, 64-bit)
Hardware	The Orchestration Agent does not require a minimum hardware configuration other than a minimum recommended disk space of 100 MB.
TCP Ports	The computing node communicates with the Orchestration Server over a custom protocol. The server listens for the agent on port 8100 and 8101 (port 8101 is for secure agent connections). Network firewalls need to allow outgoing agent connections to these ports on the server.

If you are installing the agent to a vSphere environment, you can install the agent either locally on the vCenter Server (the vCenter appliance is not supported), or on a dedicated system (virtual or physical) as long as the OS in that system is supported for the Orchestration Agent.

3.3 Cloud Manager Application Server Requirements

The Cloud Manager Application Server requires the following:

Item	Requirement
Operating System	Any of the following: <ul style="list-style-type: none">◆ SLES 11 SP2 (64-bit): SUSE Linux Enterprise Server 11 Service Pack 2 on the 64-bit (x86-64) architecture (Intel and AMD Opteron processors)

Item	Requirement
Hardware	<p>If the Cloud Manager Application Server is the only application, the following are minimum requirements:</p> <ul style="list-style-type: none"> ◆ Xeon dual-core or higher ◆ 20 GB disk space ◆ 4 GB RAM <p>If the Cloud Manager Application Server and Cloud Manager Orchestration Server are on the same server, the following are minimum requirements:</p> <ul style="list-style-type: none"> ◆ 4 Pentium-class CPU cores ◆ 40 GB disk space ◆ 4 GB RAM
Database	PostgreSQL (included with SLES)
TCP Ports	<p>The following ports are used by the Cloud Manager Application Server. The ports (or their substitutes if not using the defaults) must be open for both inbound and outbound communication:</p> <ul style="list-style-type: none"> ◆ 8061 - ESB HTTP port ◆ 8102 - Karaf SSH port ◆ 8181 - Karaf Management Console port ◆ 8182 - Jetty HTTP default port ◆ 8183 - Jetty HTTPS default port ◆ 10990 - RMI Registry port ◆ 61613 - Active MQ Stomp port ◆ 61616 - Active MQ Openwire port
VNC Ports	<p>By default, a VNC proxy port is chosen at random, however the port can be set by the Cloud Administrator in the Configuration page of the Cloud Manager Web Console. There is also an option for an external proxy to offload the traffic from the Cloud Manager Application Server.</p> <p>For more information, see “Configuring Remote Console Access to Workloads” in the <i>NetIQ Cloud Manager 2.1.1 Cloud Administrator Guide</i>.</p>
LDAP Directory Service	<p>The Cloud Manager Application Server authenticates users by using an LDAP directory. The directory must be either of the following:</p> <ul style="list-style-type: none"> ◆ Microsoft Active Directory ◆ Novell eDirectory

3.4 Cloud Manager Application Console Requirements

The Cloud Manager Application Console is a Web-based application that requires the following:

Item	Requirement
Web Browser	Any of the following: <ul style="list-style-type: none">◆ Internet Explorer 9.0 and later: Supported on Windows 7 (64-bit)◆ Mozilla Firefox 7.x and later: Supported on Windows 7 (64-bit)
Display Resolution	The minimum requirement is 1024 x 768 with the browser in Full Screen mode (F11)
Pop-Up Blocker	Allow pop-ups from the Cloud Manager Application Server to enable the Help system

4 Requirements and Cloud Manager Support for the Virtual Environment

- ◆ [Section 4.1, “Requirements for Machines Designated as VM Hosts,”](#) on page 25
- ◆ [Section 4.2, “Supported VMs,”](#) on page 26

4.1 Requirements for Machines Designated as VM Hosts

We recommend that computers designated as VM hosts in your data center be able to host the VM and run it according to designated parameters of the specific VM. The processor architecture must match the designated VM’s processor in architecture, although not in version number. In order for a machine to serve as a host machine, it must also have a hypervisor installed along with the operating system.

Table 4-1 *Minimum and Recommended Hardware Requirements for VM Host Machines*

Host Operating System	Minimum Requirements	Recommended Hardware
SLES 11 SP2	<ul style="list-style-type: none">◆ x86_64◆ 2 GB RAM◆ 30 GB hard drive space	<ul style="list-style-type: none">◆ x86_64◆ 4+ GB RAM◆ 100+ GB hard drive space
SLES 11 SP1	<ul style="list-style-type: none">◆ x86 or x86_64◆ 2 GB RAM◆ 30 GB hard drive space	<ul style="list-style-type: none">◆ x86 or x86_64◆ 4+ GB RAM◆ 100+ GB hard drive space
SLES 10 SP4	<ul style="list-style-type: none">◆ x86_64◆ 2 GB RAM◆ 30 GB hard drive space	<ul style="list-style-type: none">◆ x86_64◆ 4+ GB RAM◆ 100+ GB hard drive space
Windows Server 2008 R2 enabled with Hyper-V	<ul style="list-style-type: none">◆ 1GHz (x86 processor) or 1.4GHz (x64 processor)◆ 512MB RAM◆ 10 GB hard drive space	<ul style="list-style-type: none">◆ 2+ GHz◆ 2+ GB RAM◆ 40+ GB hard drive space

4.2 Supported VMs

The following table lists the virtual machine technologies or hypervisors, the host operating system for these technologies, the guest operating systems (also known as virtual machines (VMs) or “workloads”) supported by these technologies, and the provisioning adapter job available in the Cloud Manager Orchestration Server that is used to provision and manage the life cycle of the VMs.

Extensive information about [RHEL 6 VM support](#) in Cloud Manager is also provided in this section.

For more detail about the life cycle management capabilities of Cloud Manager Orchestration, see “[Configuring Orchestration Provisioning Adapters](#)” in the *NetIQ Cloud Manager 2.1.1 Orchestration Installation Guide*.

Table 4-2 VM Technologies with Supported Host Operating Systems, Guest Operating System, and Provisioning Adapter

Hypervisor or Virtualization Technology	Host Operating System (that is, “VM Hosts”)	Guest Operating System (that is, “VMs” or “Workloads”)	Orchestration Provisioning Adapter
<ul style="list-style-type: none"> ◆ VMware vSphere 4 ◆ VMware vSphere 5 ESXi Only 	Subject to the VMware support matrix	<ul style="list-style-type: none"> ◆ SLES 10 SP3 ◆ SLES 10 SP4 ◆ SLES 11 (latest SP) ◆ RHEL 5 (latest SP) ◆ RHEL 6¹ ◆ Windows Server 2003 R2 (latest SP) ◆ Windows Server 2008 R2 (latest SP) 	vsphere
Citrix XenServer 5.6	Citrix XenServer	<ul style="list-style-type: none"> ◆ Windows Server 2008 R2 (latest SP) ◆ Windows Server 2003 R2 (latest SP) ◆ SLES 10 SP4 ◆ SLES 11 (latest SP) ◆ RHEL 5 (latest SP) ◆ RHEL 6 (latest SP) 	xenserver
Microsoft Hyper-V ⁴	Windows Server 2008 R2 with Hyper-V enabled	<ul style="list-style-type: none"> ◆ Windows Server 2008 R2 (latest SP) ◆ Windows Server 2003 R2 (latest SP) 	hyperv

Hypervisor or Virtualization Technology	Host Operating System (that is, “VM Hosts”)	Guest Operating System (that is, “VMs” or “Workloads”)	Orchestration Provisioning Adapter
<ul style="list-style-type: none"> ◆ SUSE Xen 4.0 	<ul style="list-style-type: none"> ◆ SLES 11 (latest SP) 	<ul style="list-style-type: none"> ◆ SLES 10 (latest SP) ◆ SLES 11 (latest SP) ◆ RHEL 5 (latest SP) ◆ RHEL 6 (latest SP)¹ ◆ Windows Server 2003 R2 (latest SP)² ◆ Windows Server 2008 R2 (latest SP)² 	xen
Kernel-based Virtual Machine for Linux (KVM)	SLES 11 SP1 or SP2 running libvirt 0.7.6 or greater	Subject to the published KVM support matrix (http://www.linux-kvm.org/page/Guest_Support_Status)	kvm

¹ For more information about RHEL 6 VM support, see [Section 4.2.1, “RHEL 6 VM Support,” on page 27](#).

² Windows VMs running on the Xen hypervisor require a VM host CPU with the Intel VT or AMD-V technology available and enabled.

⁴ A complete listing of guest OS support for the Hyper-V hypervisor is available at the [Microsoft TechNet Web site \(http://technet.microsoft.com/en-us/library/cc794868\(WS.10\).aspx\)](http://technet.microsoft.com/en-us/library/cc794868(WS.10).aspx) and at the [Windows Server 2008 Hyper-V product page \(http://www.microsoft.com/windowsserver2008/en/us/hyperv-supported-guest-os.aspx\)](http://www.microsoft.com/windowsserver2008/en/us/hyperv-supported-guest-os.aspx). This matrix shows only those guest OS’s supported by Cloud Manager.

4.2.1 RHEL 6 VM Support

You need to be aware of the following limitations of Red Hat Enterprise Linux 6 VMs in the NetIQ Cloud Manager environment:

- ◆ Although RHEL uses LVM partitioning by default, we recommend that you do not use it. You need to change the partitioning method manually.
- ◆ SLES 11 hosts can mount the ext4 file system if you load the proper kernel module on the host. You can do this by entering the following command at the command line of the SLES 11 host:

```
modprobe -allow-unsupported ext4
```

To allow the ext4 module to be loaded at boot time:

1. Edit the `/etc/modprobe.d/unsupported-modules` file and set `allow_unsupported_modules` to 1.
2. Edit `/etc/sysconfig/kernel` and add `ext4` to the `MODULES_LOADED_ON_BOOT` variable.

These procedures work only on SLES 11 kernel, not the SLES 10 kernel.

Making these changes could make the system unavailable for support. The `unsupported-modules` text file states:

“Every kernel module has a ‘supported’ flag. If this flag is not set, loading this module taints your kernel. You will not get much help with a kernel problem if your kernel is marked as tainted. In this case you firstly have to avoid loading of unsupported modules.”

- ♦ Discovered RHEL 6 VMs show appropriate fact values. For example, the value for the `resource.os.type` fact is `rhel6`. The value for `resource.os.vendor.string` is `Red Hat Enterprise Linux Server release 6.0 (Santiago)` and the value for `resource.os.vendor.version` is `6`.
 - ♦ RHEL 6 uses the `udev` service, which testing has shown renames the network interfaces on a cloned VM and causes configuration errors. To turn off the `udev` service so that network configuration can work with personalization,
- 1 In the file structure of the template VM, open the `/etc/udev/rules.d/70-persistent-net.rules` file and remove all its lines.
 - 2 In the file structure of the template VM, open the `/lib/udev/write_net_rules` file and comment (that is, add a `#` sign preceding the code) the line that looks similar to this:

```
write_rule "$match" "$INTERFACE" "$COMMENT"
```

NOTE: Editing the template VM files assures that all its clones will work properly.
