Novell Virtualization Technology

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GETTING STARTED WITH VIRTUALIZATION

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About This Guide

This guide describes and explains the components and technologies you need to understand to set up and manage a Xen-based virtualization environment. It contains the following sections:

- Chapter 1, “Introduction to Xen Virtualization,” on page 9
- Chapter 2, “Setting Up a Virtual Machine Host,” on page 13
- Chapter 3, “Setting Up Virtual Machines,” on page 19
- Chapter 4, “Managing a Virtualization Environment,” on page 31

Audience

This guide is intended for system administrators.

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Additional Documentation

- Novell Virtualization Technology (http://www.novell.com/documentation/vmserver/)

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In this documentation, a greater-than symbol (>) is used to separate actions within a step and items within a cross-reference path.

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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 forward slash to reflect the Linux convention. Users of platforms that require a backslash, such as Linux or UNIX*, should use backslashes as required by the software.

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Introduction to Xen Virtualization 1

This chapter introduces and explains the components and technologies you need to understand to set up and manage a Xen-based virtualization environment.

- Section 1.1, “Basic Components,” on page 9
- Section 1.2, “Understanding Virtualization Modes,” on page 10
- Section 1.3, “Xen Virtualization Architecture,” on page 10
- Section 1.4, “About the Virtual Machine Host,” on page 11
- Section 1.5, “What’s Next,” on page 12

For the latest Novell® virtualization documentation, see Novell Virtualization Technology (http://www.novell.com/documentation/vmserver/).

1.1 Basic Components

The basic components of a Xen-based virtualization environment are the *Xen hypervisor*, the *host desktop environment*, any number of other *Xen-based virtual machines*, and the tools, commands, and configuration files that let you manage virtualization. Collectively, the physical computer running all these components is referred to as a *virtual machine host* because together these components form a platform for hosting virtual machines.

The Xen Hypervisor

The Xen hypervisor, sometimes referred to generically as a virtual machine monitor, is an open-source software program that coordinates the low-level interaction between virtual machines and physical hardware.

The Host Desktop Environment

The virtual machine host’s desktop environment, also referred to as *domain 0*, is comprised of several components, such as:

- The SUSE Linux operating system, which gives the administrator a graphical desktop and command line environment to manage the virtual machine host components and its virtual machines.

  NOTE: The term “host desktop” is used to refer to the domain 0 management environment, even though the SUSE Linux operating system might be running in command line interface mode with no graphical desktop.

- The xend daemon (xend), which stores configuration information about each virtual machine and controls how virtual machines are created and managed.
- A modified version of QEMU, which is an open-source software program that emulates a full computer system, including a processor and various peripherals. It provides the ability to host operating systems in full virtualization mode.

Xen-Based Virtual Machines

A Xen-based virtual machine, also referred to as a *domain*, consists of the following components:

- At least one virtual disk that contains a bootable operating system. The virtual disk can be based on a file, partition, volume, or other type of block device.
- Virtual machine configuration information, which can be modified by exporting a text-based configuration file from xend or through Virtual Machine Manager.

Management Tools, Commands, and Configuration Files

There are a combination of GUI tools, commands, and configuration files to help you manage and customize your virtualization environment.

1.2 Understanding Virtualization Modes

Guest operating systems are hosted on virtual machines in either full virtualization mode or paravirtual mode. Each virtualization mode has advantages and disadvantages.

- Full virtualization mode lets virtual machines run unmodified operating systems, such as Windows* Server 2003 and Windows XP, but requires the computer running as the virtual machine host to support hardware-assisted virtualization technology, such as AMD* Virtualization or Intel* Virtualization Technology.

  Some guest operating systems hosted in full virtualization mode, can be configured to run SUSE Linux Enterprise Virtual Machine Drivers instead of operating-system-specific drivers. Running virtual machine drivers improves performance dramatically in guest operating systems, such as Windows XP and Windows Server 2003. For more information, see "Virtual Machine Driver Pack for Windows".

- Paravirtual mode does not require the host computer to support hardware-assisted virtualization technology but does require its operating system to be modified for the virtualization environment. Typically, operating systems running in paravirtual mode enjoy better performance than those requiring full virtualization mode.

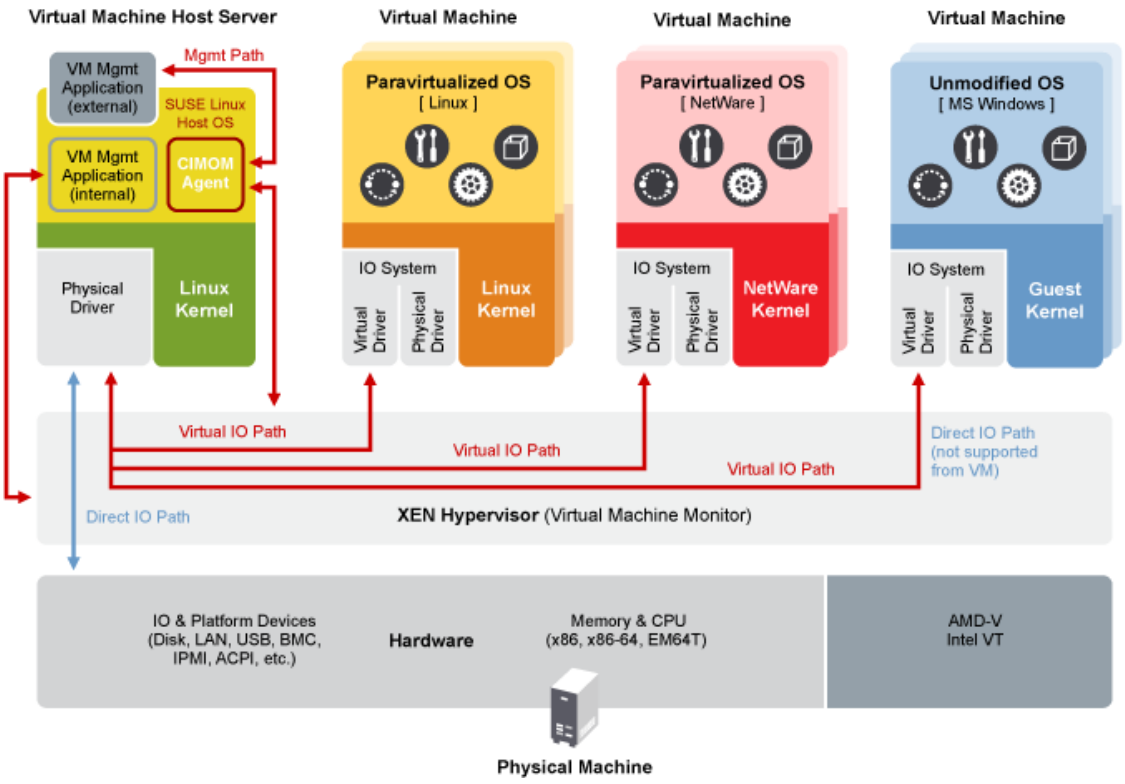
  Operating systems currently modified to run in paravirtual mode are referred to as *paravirtualized operating systems* and include SUSE Linux Enterprise Server 10 and NetWare® 6.5 SP7.

1.3 Xen Virtualization Architecture

The following graphic depicts a virtual machine host with three virtual machines. The Xen hypervisor is shown as running directly on the physical hardware platform.

Above the Xen hypervisor layer, there are four virtual machines.

Figure 1-1 *Virtualization Architecture*



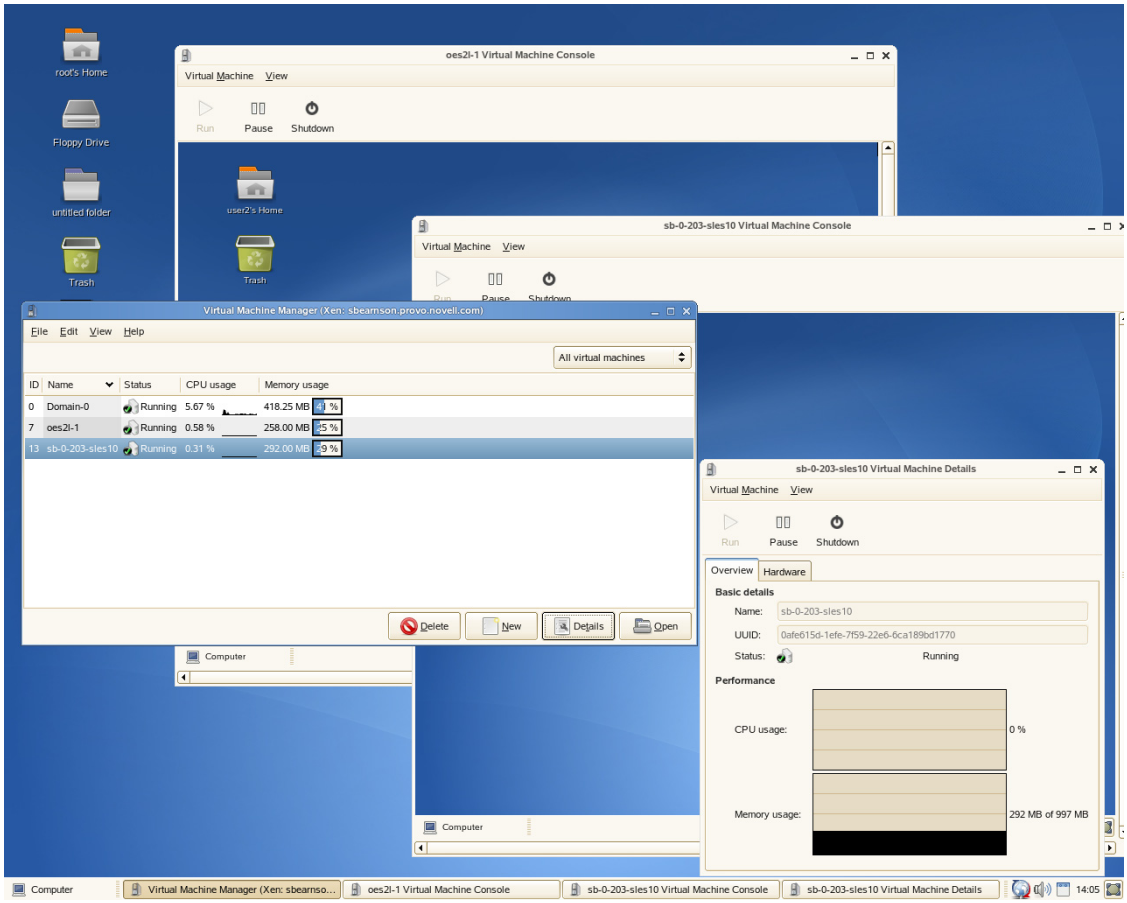
On the left, the virtual machine host's desktop (domain 0) is shown running the SUSE Linux operating system. The two virtual machines in the middle are shown running paravirtualized operating systems. The virtual machine on the right shows a fully virtual machine running an unmodified operating system, such as Windows Server 2003 or Windows XP.

1.4 About the Virtual Machine Host

After you install the virtualization components and reboot the computer, the GRUB boot loader menu should display a Xen menu option. Selecting the Xen menu option loads the virtualization components and starts the host desktop (domain 0) running the SUSE Linux operating system.

Running on domain 0, the SUSE Linux operating system displays the installed text console or desktop environment, such as GNOME* or KDE. When opened, each virtual machine is displayed in its own window.

Figure 1-2 *Desktop Showing Virtual Machine Manager and Virtual Machines*



1.5 What's Next

- Chapter 2, "Setting Up a Virtual Machine Host," on page 13
- Chapter 3, "Setting Up Virtual Machines," on page 19
- Chapter 4, "Managing a Virtualization Environment," on page 31

Setting Up a Virtual Machine Host 2

This section documents how to set up and use Open Enterprise Server 2 Linux* as a virtual machine host.

- Section 2.1, “Virtual Machine Host Requirements,” on page 13
- Section 2.2, “Best Practices and Suggestions,” on page 15
- Section 2.3, “Installing the Host Software,” on page 15
- Section 2.4, “Starting the Virtual Machine Host,” on page 17
- Section 2.5, “What’s Next,” on page 18

For the latest Novell® virtualization documentation, see Novell Virtualization Technology (http://www.novell.com/documentation/vmserver/).

2.1 Virtual Machine Host Requirements

The following sections list the system and software requirements for running virtualization.

- Section 2.1.1, “Hardware Requirements,” on page 13
- Section 2.1.2, “Software Requirements,” on page 14

2.1.1 Hardware Requirements

In most cases, the hardware requirements for the virtual machine host are the same as those for the SUSE® Linux operating system, but additional CPU, disk, memory, and network resources should be added to accommodate the resource demands of all planned virtual machines.

TIP: Remember that virtual machines, just like a physical machines, perform better when they run on faster processors and have access to more system memory.

The following table lists the minimum hardware requirements for running OES 2 NetWare® with a NetWare virtual machine.

Table 2-1 *Hardware Requirements*

System Component	Minimum Requirements	Recommended Requirements
Computer	Server-class computer with Pentium* II or AMD* K7 450 MHz processor	Server-class computer with Pentium III, Pentium III Xeon*, Pentium 4, Intel Xeon 700 MHz, AMD K8 CPUs (Athlon* 64 and Opteron*), Intel EM64T or higher processor.
Memory	512 MB of RAM for the host	512 MB
	512 MB of RAM for each NetWare virtual machine	1 GB of RAM

System Component	Minimum Requirements	Recommended Requirements
Free Disk Space	7 GB of available, unpartitioned disk space for the host. 3.7 GB of available, unpartitioned disk space for each NetWare virtual machine	7 GB or more of available, unpartitioned disk space for the host. 10 GB or more of available, unpartitioned disk space. Additional disk space might be required depending on which OES components are selected and how they are used.
CD-ROM Drive	4X CD-ROM drive	48X CD-ROM drive
Hard Drive	20 GB	
Network Board	Ethernet 100 Mbps	
IP Address	◆ One IP address on a subnet for the host ◆ One IP address on a subnet for each NetWare virtual machine ◆ Subnet mask ◆ Default gateway	
Mouse	N/A	USB or PS/2
Server Computer BIOS	If you are doing a CD-ROM installation, prepare the BIOS on your server computer so that it boots from the CD-ROM drive first.	

2.1.2 Software Requirements

Xen virtualization technology is available in SUSE Linux products based on code path 10 and later. Code path 10 products include Open Enterprise Server 2 Linux, SUSE Linux Enterprise Server 10, SUSE Linux Enterprise Desktop 10, and OpenSUSE® 10.x.

The virtual machine host requires the following software packages and their dependencies to be installed:

- kernel-xen
- xen
- xen-tools
- xen-tools-ioemu (required for full-virtualization mode)
- kernel-xenpae (used instead of kernel-xen, this package is required to enable a 32-bit virtual machine host to access memory over 3 GB)
- yast2-vm (You should install the newest version available)

Updates are available through your update channel. Make sure to update to the most recent packages available.

2.2 Best Practices and Suggestions

When installing and configuring the host's SUSE Linux Enterprise operating system, be aware of the following best practices and suggestions:

- Set limits for the maximum and minimum amount of system memory to allocate to the host operating system (domain 0). For instructions, see "Managing Domain 0 Memory".
- Disable powersave functionality on the host and all guest operating systems. On the host computer and other Linux computers, you can use the `chkconfig powersaved off` command.
- Close Virtual Machine Manager if you are not actively using it and restart it when needed. Closing Virtual Machine Manager does not affect the state of virtual machines.

  If left running, Virtual Machine Manager incrementally consumes domain 0 memory. With diminishing system memory in domain 0, virtual machine performance slows and then out-of-memory error messages start to appear in domain 0 and all virtual machines. Closing Virtual Machine Machine manager releases the additional memory it consumed.

2.3 Installing the Host Software

The virtualization software can be installed during the initial installation of SUSE Linux Enterprise software or added to a computer already running the operating system.

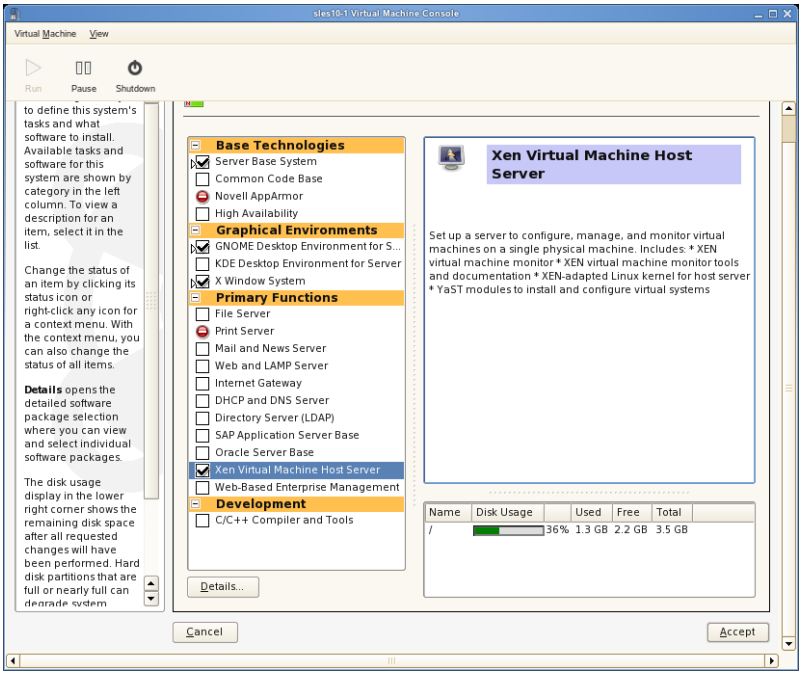
Remember, for best performance, only those applications and processes required for virtualization should be installed on the virtual machine host.

- Section 2.3.1, "Installing Virtualization Software when Installing the SUSE Linux Enterprise Operating System," on page 15
- Section 2.3.2, "Setting Up OES 2 Linux as a Virtual Machine Host," on page 17

2.3.1 Installing Virtualization Software when Installing the SUSE Linux Enterprise Operating System

1. Start the installation of the SUSE Linux Enterprise operating system.
2. On the *Language* page, select the language you want to use, then click *Next*.
3. On the *Media Check* page, click *Start Check* to ensure that your installation media is valid. When the media check is finished, click *Next*.
4. On the *License Agreement* page, review and accept the agreements and click *Next*.
5. On the *Installation Mode* page, click *New Installation*, then click *Next*.
6. On the *Clock and Time Zone* page, select the appropriate settings, then click *Next*.
7. On the *Installation Settings* page, edit the settings of the Software category by clicking the *Software* title.

The *Software Selection and System Tasks* page appears.



8 In the *Primary Functions* category, select the *Xen Virtual Machine Host Server* check box.

9 Select or remove additional software to meet your specific configuration requirements.

It is recommended that you select only the software and system tasks required for the virtualization environment. Running additional services, such as Web servers, mail servers, or print servers directly in the management domain (domain 0) affects the performance of all hosted virtual machines.

For best performance, deselect all but the following items:

- *Server Base System*
- *GNOME Desktop Environment for Server*
- *X Window System (required for graphical user interface)*
- *Xen Virtual Machine Host Server*

10 Follow the on-screen instructions to complete the installation program.

11 On the Installation Complete page, deselect *Clone This System for Autoyast*, then click *Finish*.

12 When the system boots up, enter a username and password as prompted.

13 Configure Network Time Protocol (NTP) on the host.

13a Open YaST and select *Network Services* > *NTP Configuration*.

13b Select the option to automatically start the NTP daemon during boot. Provide the IP address of an existing NTP time server, then click *Finish*.

The Xen software is now installed on the computer. Continue to Section 2.4, “Starting the Virtual Machine Host,” on page 17.

2.3.2 Setting Up OES 2 Linux as a Virtual Machine Host

If you are installing OES 2 Linux as an Add-on product to SLES 10, see *OES 2: Linux Installation Guide* for more information.

The only supported services for an OES 2 Linux virtual machine host are:

- Novell Linux User Management
- Novell Storage Management Services™
- Novell Cluster Services®

If the computer is already running Open Enterprise Server 2 Linux, use one of the following methods from the desktop or command line interface to install the virtualization software.

- From the desktop, run *YaST* > *Virtualization* > *Install Hypervisor and Tools*. Complete any on-screen instructions that appear and restart the computer.
- From a command line interface, enter `yast2 xen`. Complete the on-screen instructions and restart the computer.
- Copy the Xen virtualization packages to the computer. From a command line interface, enter `rpm -U package_names` to install the packages. Complete the on-screen instructions and restart the computer.

  NOTE: If you use the `rpm` command, you can safely ignore any messages stating "`Cannot determine dependencies of module edd`." The message might be repeated two or three times during installation.

  After the Xen software is installed, restart the computer and continue to Section 2.4, "Starting the Virtual Machine Host," on page 17.

2.4 Starting the Virtual Machine Host

If virtualization software is correctly installed, the computer boots to display the GRUB boot loader with a *Xen* option on the menu. Select this option to start the virtual machine host.

You can manually edit the boot loader to select the Xen option by default.

1. Log in as the `root` user.
2. In YaST, click *System* > *Boot Loader*.
3. Change the default boot to the *Xen* label, then click *Set as Default*.
4. Click *Finish*.
5. Reboot the system by clicking *Computer* > *Log out* > *Log out*. Then click *Reboot* and enter the root password.

If the GRUB boot loader does not display or the *Xen* option is not on the menu, review the steps for installation and verify that the GRUB boot loader has been updated.

After booting, the management virtual machine starts and displays its graphical desktop environment. If you did not install a graphical desktop, the command line environment appears.

For more information about managing virtual machines, see Chapter 4, "Managing a Virtualization Environment," on page 31.

2.5 What's Next

After you have set up your virtual machine host, you are ready to create a virtual machine. See Chapter 3, "Setting Up Virtual Machines," on page 19 for more information.

Setting Up Virtual Machines 3

This section provides a basic introduction to virtual machines.

- Section 3.1, “Introduction,” on page 19
- Section 3.2, “System Requirements,” on page 19
- Section 3.3, “Virtual Machine System Architectures,” on page 19
- Section 3.4, “Prerequisites,” on page 19
- Section 3.5, “Creating a Virtual Machine,” on page 20
- Section 3.6, “What’s Next,” on page 29

For the latest Novell® virtualization documentation, see the Novell Virtualization Technology (http://www.novell.com/documentation/vmserver/) Web site.

3.1 Introduction

A virtual machine is comprised of data and operating system files that define the virtual environment. Virtual machines are hosted and controlled by the virtual machine host.

This section provides generalized instructions for installing virtual machines. See the *Virtualization: Guest Operating System Guide* for detailed information regarding installation and management issues for the OS you are installing.

3.2 System Requirements

Virtual machines have few if any requirements above those required to run the operating system. If the operating system has not been optimized for the virtual machine host environment, the unmodified OS can run only on hardware-assisted virtualization computer hardware, in full virtualization mode, and requires specific device drivers to be loaded.

You should be aware of any licensing issues related to running a single licensed copy of an operating system on multiple virtual machines. Consult the operating system license agreement for more information.

3.3 Virtual Machine System Architectures

The virtual machine host can emulate x86-32 bit and x86-64 bit architectures only. It does not emulate other system architectures such as Itanium*, or IBM* POWER (formerly IBM iSeries and IBM pSeries systems).

3.4 Prerequisites

Before creating a virtual machine, you need the following:

- If you want to use an automated installation file (AutoYaST, NetWare® Response File, or RedHat Kickstart), you should create and download it to a directory on the host machine server or make it available on the network.

- For NetWare virtual machines, you need a static IP address for each virtual machine you create.
- If you are installing Open Enterprise Server (OES) 2 Linux, you need a network installation source for OES 2 Linux software including the SUSE® Linux Enterprise Server (SLES) 10 SP1 media and the OES 2 Linux add-on CD. For procedures to create the installation sources, see "Setting Up the Server Holding the Installation Sources" in the *SUSE Linux Enterprise Server 10 Installation and Administration Guide* (http://www.novell.com/documentation/sles10/sles_admin/data/sec_deployment_remoteinst_instserver.html#sec_deployment_remoteinst_instserver)

3.5 Creating a Virtual Machine

The Create Virtual Machine Wizard helps you through the steps required to create a virtual machine and install its operating system. The information that follows is generalized for installing any operating system. In addition to these instructions, you should consult the *Virtualization: Guest Operating System Guide* for information specific to the operating system you are installing.

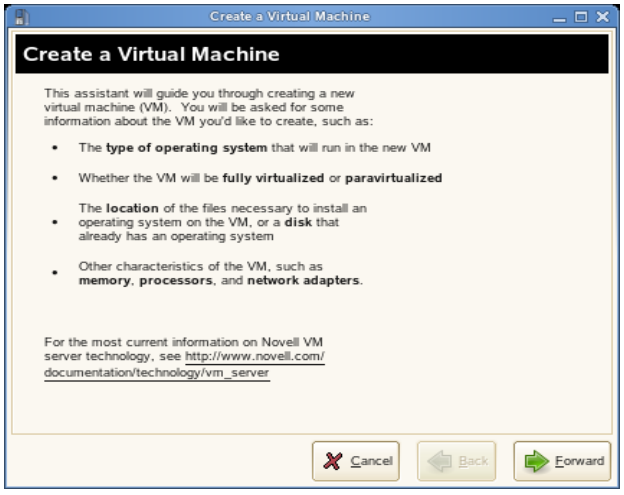
Launch the Create Virtual Machine Wizard by using one of the following methods:

- From the virtualization host server desktop, click *YaST* > *Viritualization* > *Create Virtual Machine*

  If YaST doesn't appear in your list of applications, you can run it by logging in as `root` and entering `YaST2` at a terminal.
- From within Virtual Machine Manager, click *New*.
- At the command line, enter `vm-install`.

If the wizard does not appear or the `vm-install` command does not work, review the process of installing and starting the virtualization host server. The virtualization software might not be installed properly.

Figure 3-1 *Create a Virtual Machine Wizard*



The following sections walk you through the pages of the wizard and provide information to help you configure the installation:

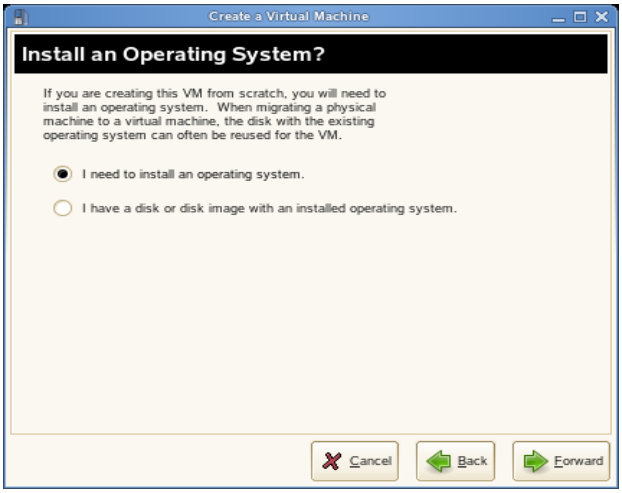
- Section 3.5.1, "Installing an Operating System," on page 21

- Section 3.5.2, “Summary,” on page 22
- Section 3.5.3, “Virtualization Method,” on page 23
- Section 3.5.4, “Name of Virtual Machine,” on page 23
- Section 3.5.5, “Hardware,” on page 23
- Section 3.5.6, “Graphics,” on page 25
- Section 3.5.7, “Disks,” on page 26
- Section 3.5.8, “Network Adapters,” on page 27
- Section 3.5.9, “Operating System Installation,” on page 28
- Section 3.5.10, “Continuing the Installation,” on page 29

3.5.1 Installing an Operating System

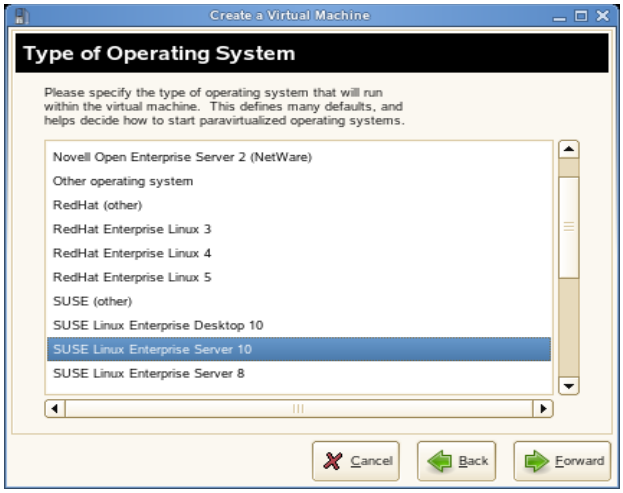
You can choose to run an installation program or choose a disk or disk image that already has an installed and bootable operating system.

Figure 3-2 *Installing an Operating System*



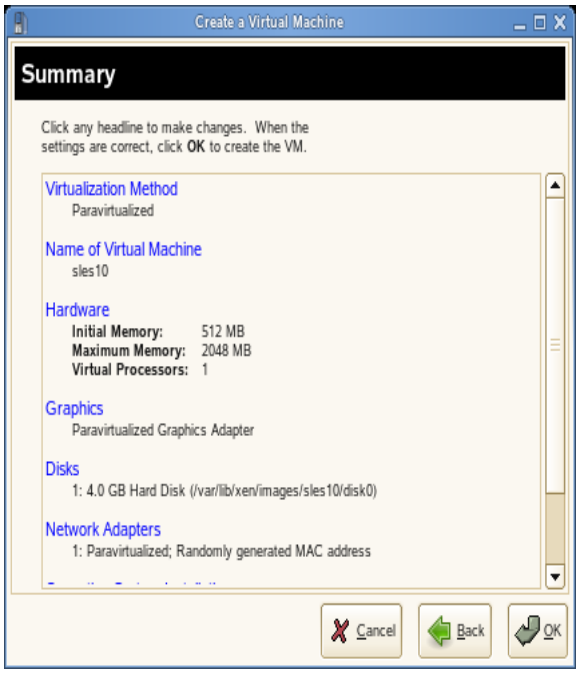
If you choose to run an installation program, you are presented with a list of operating systems. Select the one you want to install.

Figure 3-3 *Type of Operating System*



3.5.2 Summary

Figure 3-4 *Summary*



The Summary page shows you a summary of the virtual machine you are creating. You can click on any of the headings to edit the information. As you edit the information in the Summary, consult the *Virtualization: Guest Operating System Guide* for instructions specific to the operating system you are installing. The *Guest Operating System Guide* provides information for the following types of virtual machines:

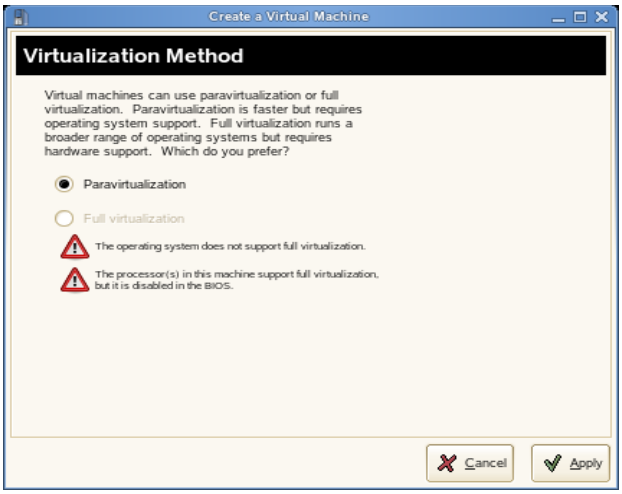
- "NetWare Virtual Machines"
- "OES Linux Virtual Machines"

- “SUSE Linux Virtual Machines”
- “Windows Virtual Machines”
- “Red Hat Virtual Machines”

3.5.3 Virtualization Method

The Virtualization Method page allows you to select the type of virtualization you want to implement.

Figure 3-5 *Virtualization Method*



If your computer supports hardware-assisted virtualization, you can create a virtual machine that runs in fully virtual mode. If you are installing an operating system that is modified for virtualization, you can create a virtual machine that runs in paravirtual mode. For more information about virtualization modes, see Section 1.2, “Understanding Virtualization Modes,” on page 10.

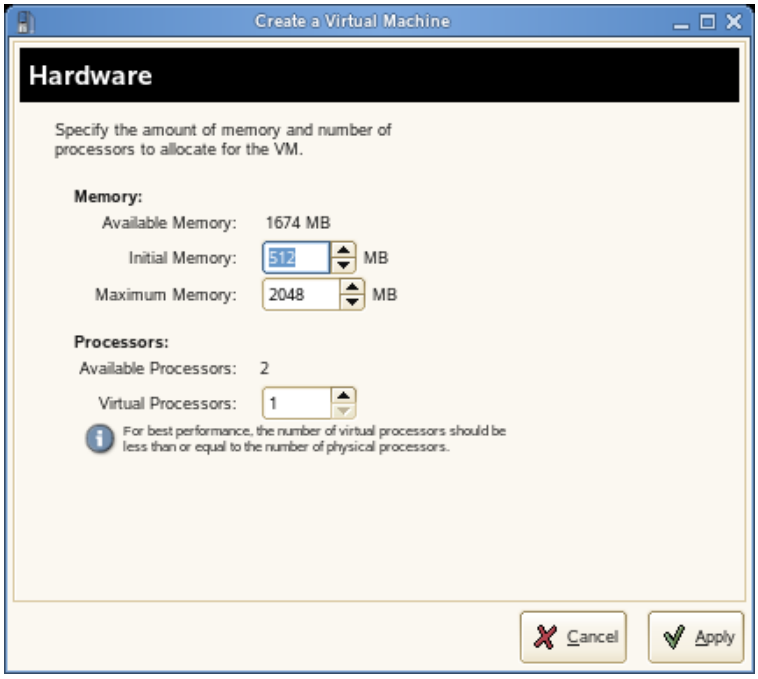
3.5.4 Name of Virtual Machine

Each virtual machine must have a unique name. The name entered on this page is used to create and name the virtual machine’s configuration file. The configuration file contains parameters that define the virtual machine and is saved to the `/etc/xen/vm/` directory.

3.5.5 Hardware

The Hardware page allows you to specify the amount of memory and number of virtual processors for your virtual machine.

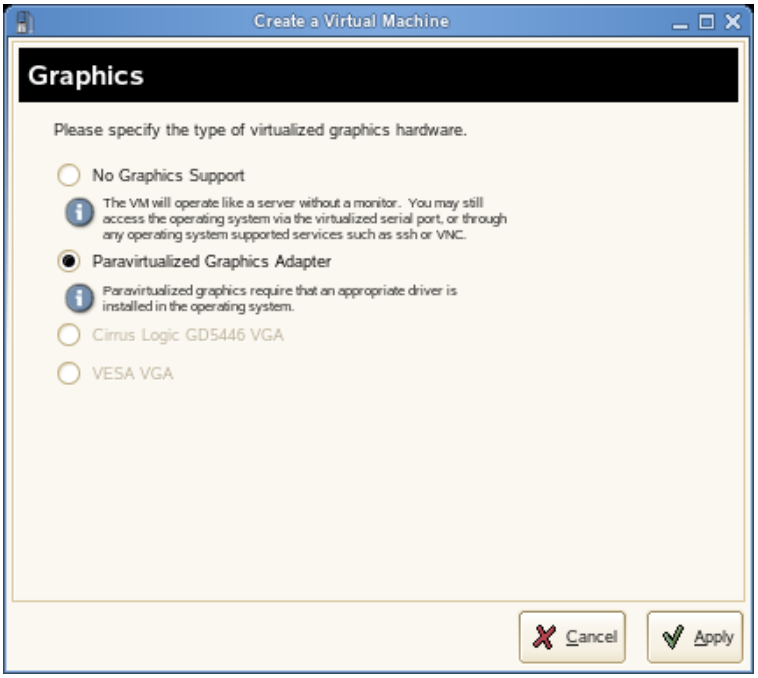
Figure 3-6 *Hardware*



- **Initial Memory:** The amount of memory initially allocated to the virtual machine (specified in megabytes).
- **Maximum Memory:** The largest amount of memory the VM will ever need.
- **Virtual Processors:** If desired, you can specify that the virtual machine has more virtual CPUs than the number of physical CPUs. You can specify up to 32 virtual CPUs: however, for best performance, the number of virtual processors should be less than or equal to the number of physical processors.

3.5.6 Graphics

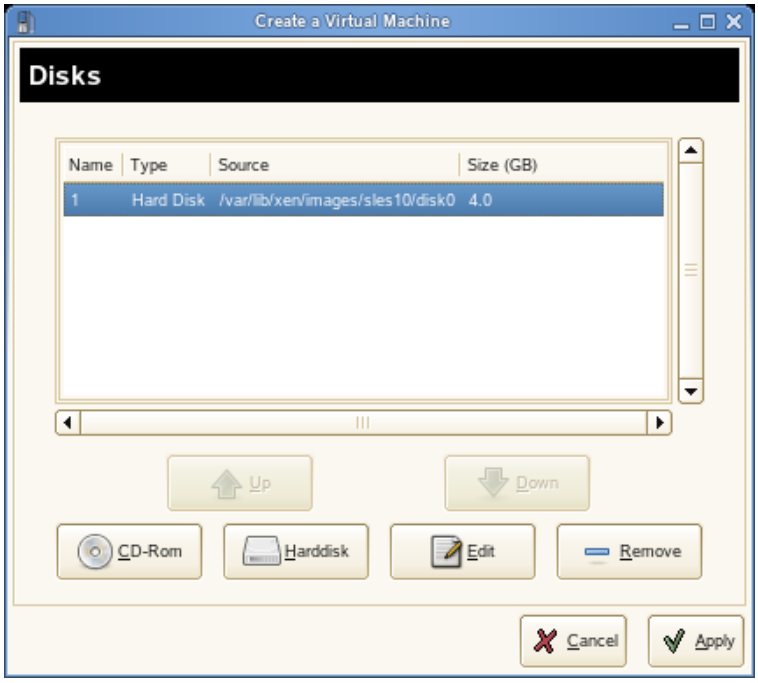
Figure 3-7 *Graphics*



- **No Graphics Support:** The virtual machine operates like a server without a monitor. You can access the operating system through operating system supported services, such as SSH or VNC.
- **Paravirtualized Graphics Adapter:** Requires that an appropriate graphics driver is installed in the operating system.

3.5.7 Disks

Figure 3-8 *Disks*



A virtual machine must have at least one virtual disk. Virtual disks can be:

- File backed, which means that the virtual disk is a single image file on a larger physical disk.
- A sparse image file, which means that the virtual disk is a single image file, but the space is not pre-allocated.
- Configured from a block device, such as an entire disk, partition, or volume.

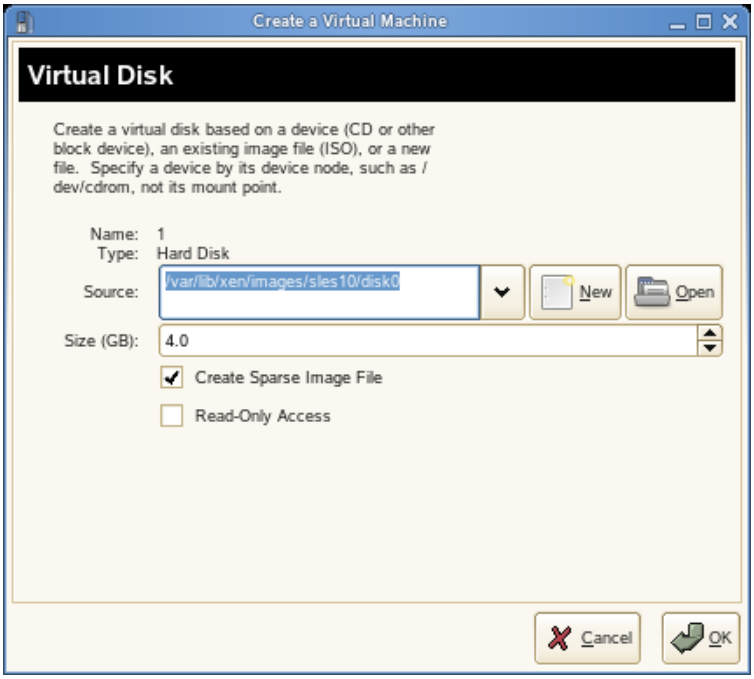
For best performance, create each virtual disk from an entire disk or a partition. For the next best performance, create an image file but do not create it as a sparse image file. A virtual disk based on a sparse image file delivers the most disk-space flexibility but the slowest installation and disk access speeds.

By default, a single, file-backed 4 GB virtual disk is created as a sparse image file in `/var/lib/xen/images/`*`vm_name`* where *vm_name* is the name of the virtual machine. You can change this configuration to meet your specific requirements.

Editing the Properties of a Virtual Disk

When creating the virtual disk, you can click *Edit* to edit its properties to meet your specific configuration requirements.

Figure 3-9 *Virtual Disk*



- **Type:** Virtual disks have drive designations that use Linux device naming conventions, such as hda. The designation dictates how the virtual disk appears to the virtual machine. For example, a virtual drive designated as hda appears to the virtual machine as the first disk device. Paravirtual disks appear as generic disks (not IDE, SCSI, etc.). Fully virtualized disks appear to the guest as IDE. In all cases, naming is left up to the guest OS.
- **Source:** Depending on your specific requirements, you might need to change the location where the disk image file is created and stored, or specify which disk, partition, or volume to use.
- **Sparse Image File:** A virtual disk based on a sparse image file does not consume the entire amount of disk space specified but uses disk space only as needed. This is a good option for quickly creating virtual disks, but for best performance, you might want to “pre-allocate” the disk space by deselecting *Create Sparse Image File*.
- **Read-Only Access:** A virtual disk can be safely shared among multiple virtual machines only if every use of the virtual disk is marked as Read Only.

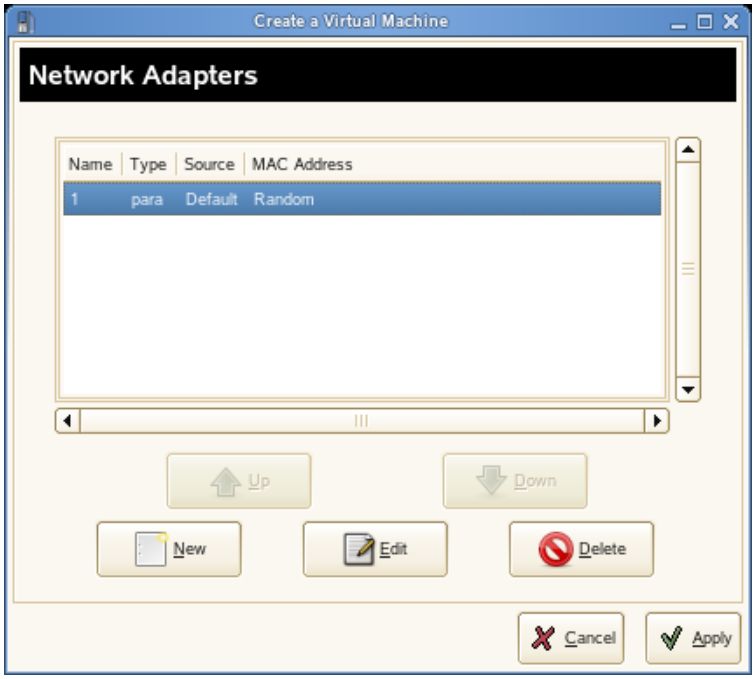
Additional Virtual Disks

A virtual machine can have more than one virtual disk. When creating a virtual machine, you can create additional virtual disks based on files or specify existing disk images or block devices as additional virtual disks.

3.5.8 Network Adapters

By default, a single virtual network card is created for the virtual machine. It has a randomly generated MAC address that you can change to fit your desired configuration. You can also create additional virtual network cards. In paravirtual machines, virtual network cards communicate by using a generic network card driver compatible with Xen.

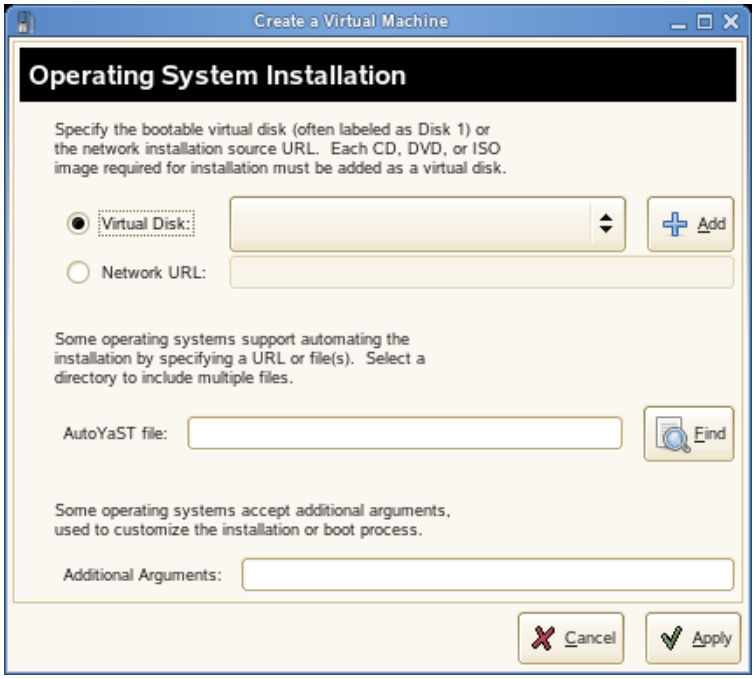
Figure 3-10 *Network Adapters*



3.5.9 Operating System Installation

The Operating System Installation page allows you to specify the installation source.

Figure 3-11 *Operating System Installation*



The operating system can be installed from a CD/DVD device or an ISO image file. In addition, if you are installing a SUSE Linux operating system, you can install the operating system from a network installation source.

If you are installing a paravirtual machine's operating system from CD, you should remove the virtual CD reader from the virtual machine after completing the installation because the virtual machine assumes that the original CD is still in the CD reader, even if it is ejected. If it is ejected, the virtual machine cannot access the CD (or any other newly inserted CD) and receives I/O errors.

For instructions on removing the virtual CD reader, see "Virtual CD Readers" in *Virtualization: Configuration Options and Settings* for more information.

If the installation program is capable of recognizing an installation profile, response file, or script, you can automate the installation settings by specifying the location of the profile, response file, or script you want to use. For example, SUSE Linux uses an AutoYaST profile, NetWare uses a NetWare Response File, and Red Hat uses a Kisckstart file to move through the installation screens with no interaction.

You can also pass instructions to the kernel at install time by entering parameters for the *Additional Arguments* field.

For example, on SUSE Linux, if you wanted to specify the parameters for an IP address of 192.35.1.10, a netmask of 255.255.255.0, a gateway of 192.35.1.254 for the virtual server, and use SSH to access installation, you could enter the following parameters in the *Additional Argument* field:

```
hostip=192.35.1.10 netmask=255.255.255.0
gateway=192.35.1.254 usessh=1 sshpassword=password
```

When you have finished entering all the information in the Operating System Installation page, click *Apply* to return to the Summary page.

3.5.10 Continuing the Installation

If all the information on the Summary page is correct, click *OK* to create the virtual machine. A TightVNC screen appears and at this point you begin the installation of your OS. From this point on, follow the regular installation instructions for installing your OS and consult the *Virtualization: Guest Operating System Guide* for any instructions that might be different for installing your OS in a virtualized environment.

3.6 What's Next

When you have created the virtual machine and installed the operating system, you are ready to run the virtual machine. See Chapter 4, "Managing a Virtualization Environment," on page 31 for additional information on managing your virtual machines.

Managing a Virtualization Environment

4

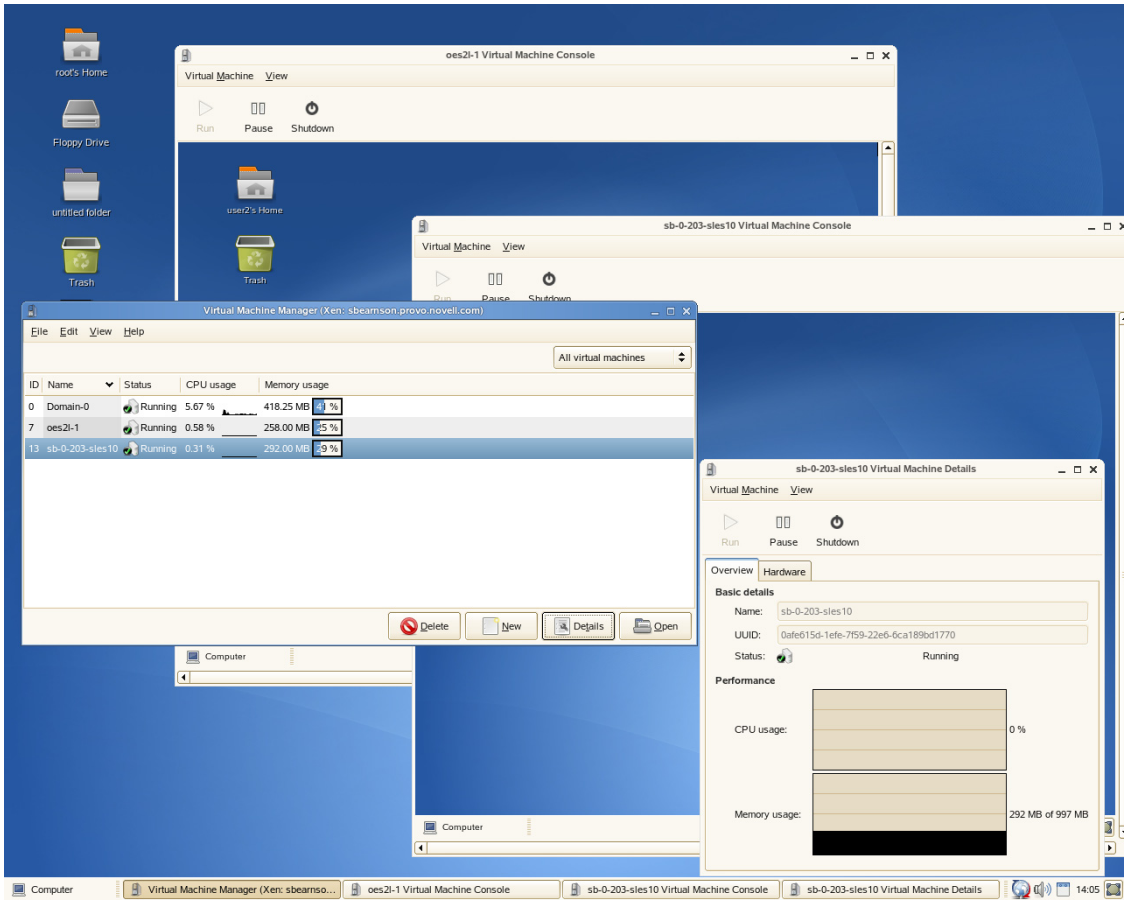
This chapter includes the following sections:

- Section 4.1, “Virtualization Tools, Commands, and Configuration Files,” on page 31
- Section 4.2, “Virtual Machine Manager,” on page 32
- Section 4.3, “The vm-install Command,” on page 34
- Section 4.4, “Controlling the Host by Modifying xend Settings,” on page 35
- Section 4.5, “Configuring a Virtual Machine by Modifying its xend Settings,” on page 36
- Section 4.6, “The xm Command,” on page 36

4.1 Virtualization Tools, Commands, and Configuration Files

Graphical utilities, text-based commands, and modified configuration files are methods you can choose from to manage your virtualization environment.Virtual Machine Manager is a graphical utility available in YaST that can be launched from the virtual machine host desktop.

Figure 4-1 *Desktop Showing Virtual Machine Manager and Virtual Machines*



From a command line interface on the virtual machine host, you can use the vm-install program and `xm` commands to create and manage virtual machines. You can also edit configuration files to change the settings of the virtual machine host or a virtual machine.

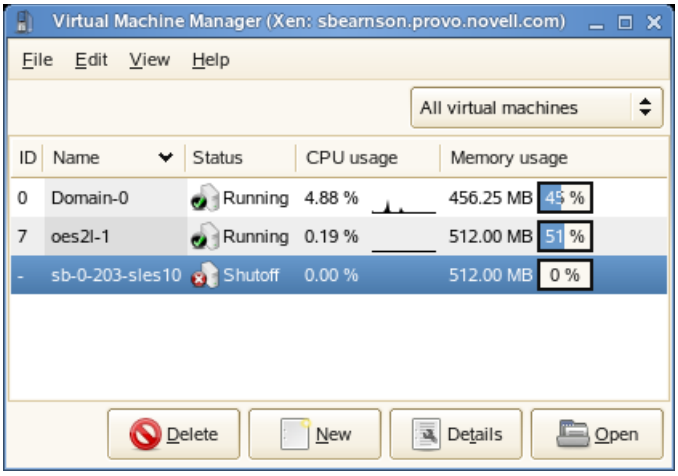
4.2 Virtual Machine Manager

From the desktop of the management virtual machine, the YaST Virtual Machine Manager provides a graphical user interface you can use to create and manage virtual machines.

NOTE: Close Virtual Machine Manager if you are not actively using it and restart it when needed. Closing Virtual Machine Manager does not affect the state of virtual machines.

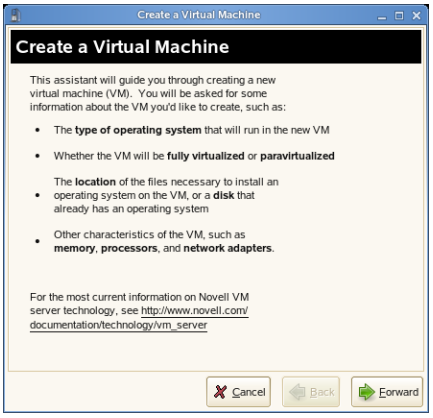
If left running, Virtual Machine Manager incrementally consumes domain 0 memory. With diminishing system memory in domain 0, virtual machine performance slows and then out-of-memory error messages start to appear in domain 0 and all virtual machines. Closing Virtual Machine Machine manager releases the additional memory it consumed.

Figure 4-2 *Virtual Machine Manager Main Console*



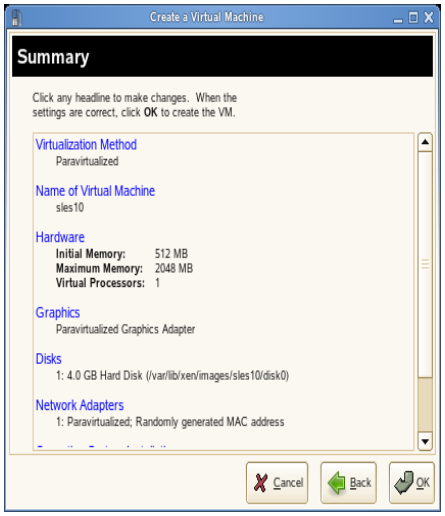
- Selecting a virtual machine and clicking *Open* displays the virtual machine window showing the virtual machine's current state.
- Clicking *Run* on the virtual machine window boots the virtual machine and displays the user interface or text console running on the virtual machine.
- Selecting a virtual machine and clicking *Details* lets you view performance and configure hardware details associated with the virtual machine.
- Clicking *New* in Virtual Machine Manager launches the *Create Virtual Machine Wizard*, which walks you through the steps required to set up a virtual machine.

Figure 4-3 *Create Virtual Machine Wizard Welcome Screen*



The wizard guides you through the process of defining the virtual machine settings and installing the operating system.

Figure 4-4 *Virtual Machine Summary Screen*

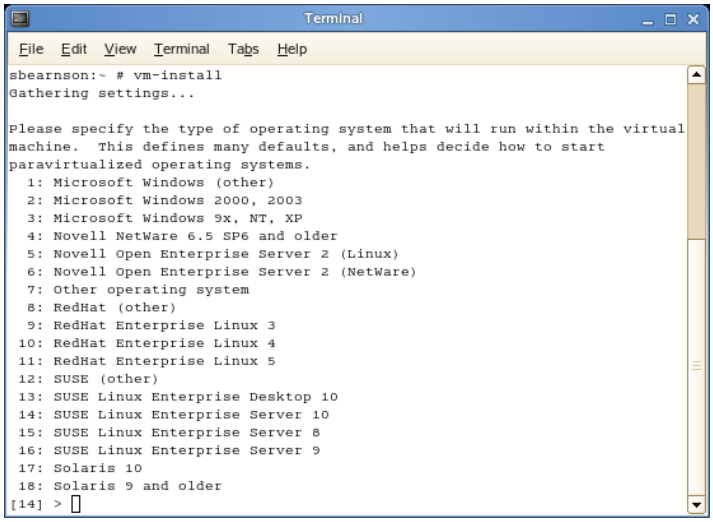


After specifying the settings on the *Summary* screen, the wizard starts the virtual machine and launches the operating system installation program, which guides you through the process of installation.

4.3 The vm-install Command

In an environment without a graphical user interface, you can launch and run a text version of the Create Virtual Machine Wizard by entering `vm-install` at the command line. The text version guides you through the same process presented in the GUI version.

Figure 4-5 *Create Virtual Machine Wizard Command Line Interface*

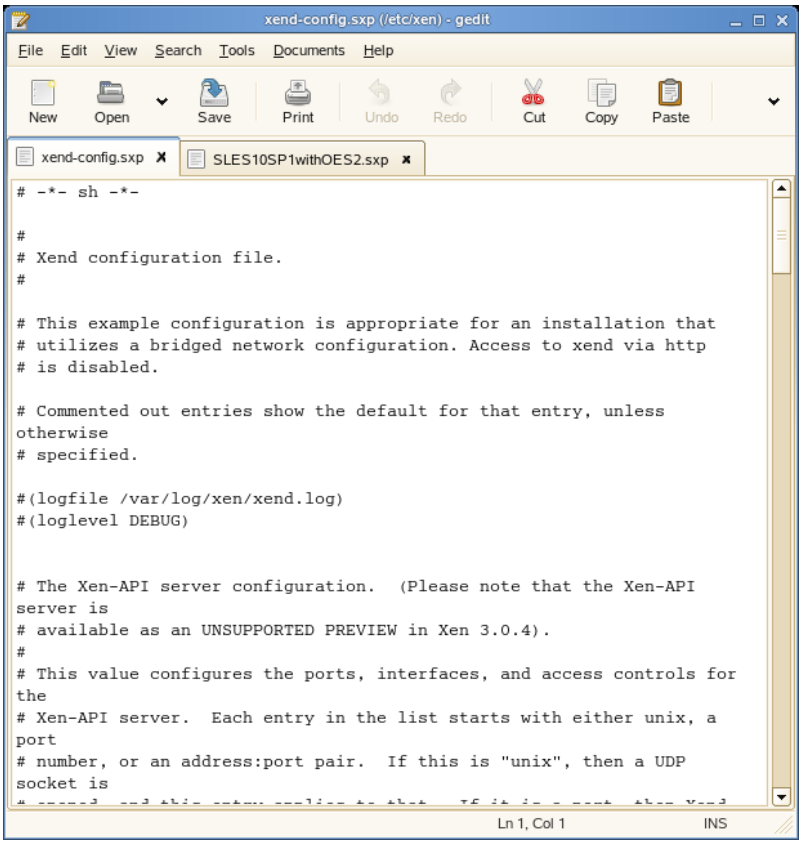


4.4 Controlling the Host by Modifying xend Settings

An important component of the virtual machine host software is the xend daemon. It controls how the virtual machine host performs management functions and stores settings that relate to virtual machines. By modifying the xend configuration file, you can customize the host to meet your specific virtualization requirements.

To modify the xend configuration file, use a text editor to edit the `/etc/xen/xend-config.sxp` file from the management virtual machine's desktop.

Figure 4-6 *Editing the xend-config.sxp File*



After making changes, xend must be restarted for the changes to take effect on the virtual machine host. To restart the xend daemon, enter `service xend restart`

You might also find the following commands useful.

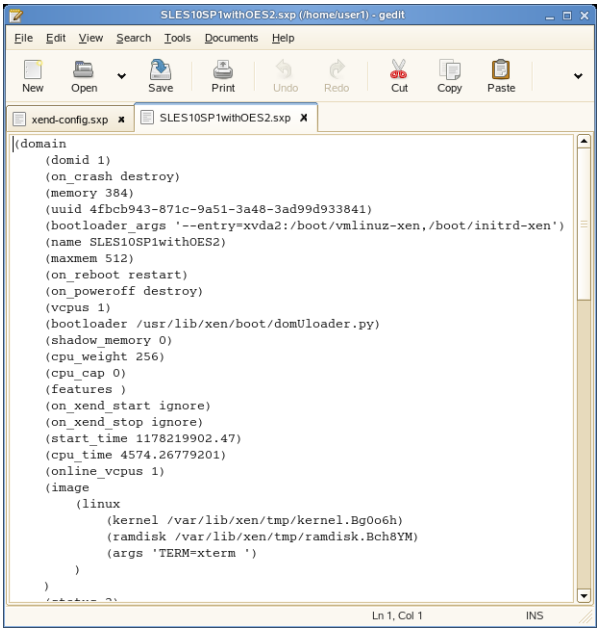
- To check the status of the xend daemon, enter `service xend status`
- To start the xend daemon, enter `service xend start`
- To stop the xend daemon, enter `service xend stop`

4.5 Configuring a Virtual Machine by Modifying its xend Settings

You can modify a virtual machine's settings by modifying its xend configuration information. A virtual machine's configuration information is stored in the xend database and can be exported to a file, modified to meet your specific virtualization requirements, and then re-imported back into the xend database.

1. In a terminal on the management virtual machine desktop, enter `xm list -l` *`name`* `>` *`filename`* to export a virtual machine's settings from xend to a file.
   - *`name`* is the virtual machine name
   - *`filename`* is the name you specify as the filename
2. Use a text editor to make and save any desired changes.

Figure 4-7 *Editing a Virtual Machine's Configuration File*



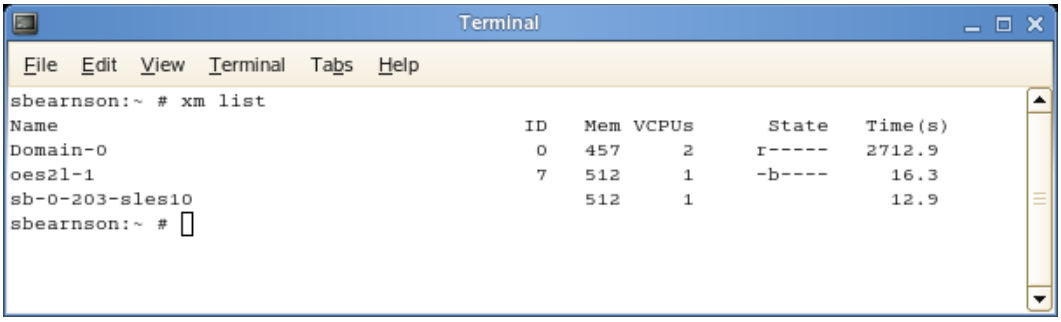
3. At the command line, enter `xm new -F` *`filename`* to import the new settings into the xend database.
4. Enter `xm start` *`vm_name`* to start the virtual machine with the new settings.

NOTE: It is no longer recommended that you edit the initial creation files stored in `etc/xen/vm`, which are used only during the creation of a new virtual machine.

4.6 The `xm` Command

The `xm` command lets you manage and view the status of virtual machines. For example, the `xm list` command displays the status of all virtual machines.

Figure 4-8 *xm list Command*



Other useful `xm` commands include:

- `xm start` starts a virtual machine
- `xm reboot` reboots a virtual machine
- `xm destroy` immediately terminates a virtual machine
- `xm block-list` displays all virtual block devices attached to a virtual machine

For a complete list of `xm` command parameters, enter `xm help` at the command line.