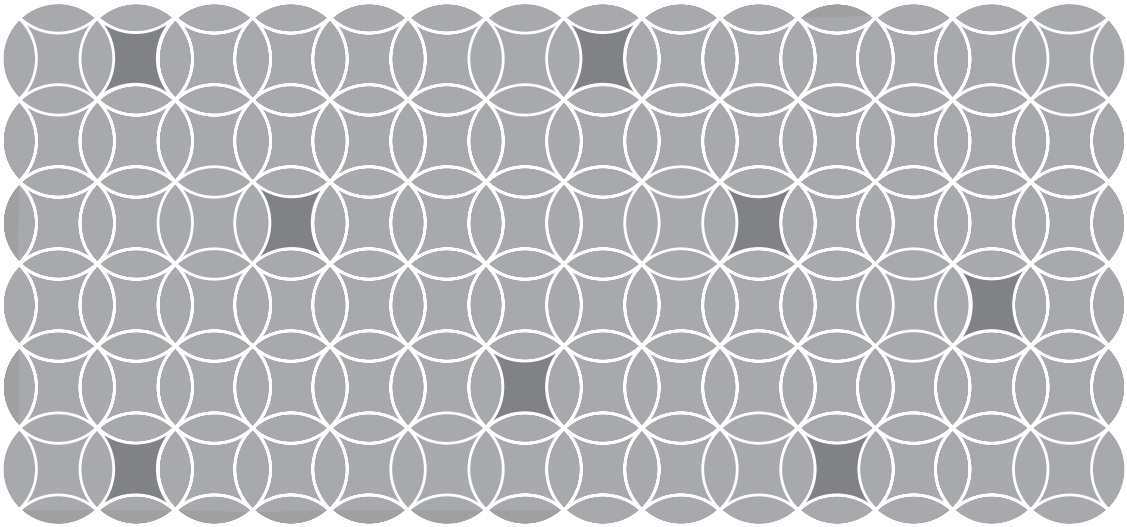
VMware® Lab Manager User's Guide

VMware Lab Manager 2.4



vmware®

VMware® Lab Manager User's Guide
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Contents

Preface

This preface provides information about the *VMware Lab Manager User's Guide* and links to VMware® technical support and educational resources.

This preface contains the following topics:

About This Book

The *VMware Lab Manager User's Guide* provides detailed information about the VMware Lab Manager system and its components, commands, operations, configuration, and user interface.

Intended Audience

The guide is intended for experienced developers and testers of software applications. This document assumes the user has some familiarity with these topics:

- Virtual machine technology
- Basic concepts of distributed, multitiered systems
- Current development and testing practices
- Windows and Linux operating systems

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Conventions

Table P-1 illustrates the typographic conventions used in this manual.

Table P-1. Conventions in this Manual

Style	Elements
Blue (online only)	Cross-references and email addresses
Blue boldface (online only)	Links
Black boldface	User interface elements such as button names and menu items
`Monospace`	Commands, filenames, directories, and paths
`Monospace bold`	User input
Italic	Document titles, glossary terms, and occasional emphasis
< Name >	Variable and parameter names

Technical Support and Education Resources

The following sections describe the technical support resources available to you.

Self-Service Support

Use the VMware Technology Network (VMTN) for self-help tools and technical information:

- Product information – **http://www.vmware.com/products/**
- Technology information – **http://www.vmware.com/vcommunity/technology**
- Documentation – **http://www.vmware.com/support/pubs**
- VMTN Knowledge Base – **http://www.vmware.com/support/kb**
- Discussion forums – **http://www.vmware.com/community**
- User groups – **http://www.vmware.com/vcommunity/usergroups.html**

For more information about the VMware Technology Network, go to **http://www.vmtn.net**.

Online and Telephone Support

Use online support to submit technical support requests, view your product and contract information, and register your products. Go to **http://www.vmware.com/support**.

Customers with appropriate support contracts should use telephone support for the fastest response on priority 1 issues. Go to **http://www.vmware.com/support/phone_support.html**.

Support Offerings

Find out how VMware support offerings can help meet your business needs. Go to **http://www.vmware.com/support/services**.

VMware Education Services

VMware courses offer extensive hands-on labs, case study examples, and course materials designed to be used as on-the-job reference tools. For more information about VMware Education Services, go to **http://mylearn1.vmware.com/mgrreg/index.cfm**.

1 Introducing Lab Manager

VMware Lab Manager provides a robust solution for managing virtual machines in a test lab. Lab Manager does not assume extensive knowledge of virtualization and allows software developers and QA engineers to quickly provision, share, and tear down multimachine test cases or configurations.

Specifically, Lab Manager streamlines the setup, capture, storage, and sharing of multimachine software configurations in virtualized environments. You can use a self-service interface and library from which users can access virtual machine images to deploy across multiple servers.

This chapter covers these topics:

Lab Manager Components

Figure 1-1 illustrates the components of Lab Manager.

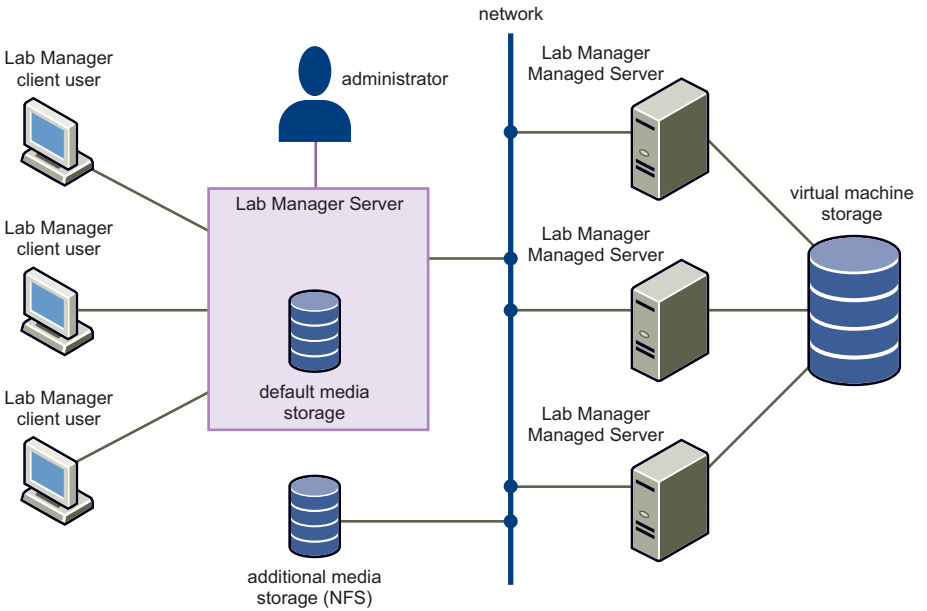

Figure 1-1. Lab Manager Components

Lab Manager Server – A server that provides Web and SOAP interfaces for the Lab Manager system. Lab Manager Server manages and deploys configurations against a pool of Managed Server systems.

Lab Manager Managed Server – A server running VMware ESX Server and Managed Server software. The Lab Manager Server uses the Managed Server to deploy configurations and their virtual machines. You can have multiple Managed Server systems.

Lab Manager storage server – Storage for virtual machines (for example, an ESX Server SAN) and storage primarily for media (CD and floppy images). You can have multiple storage servers.

Lab Manager client user – Clients who can use the Lab Manager Web console and the Lab Manager SOAP API. From a Windows machine, clients can access the Lab Manager Web console with Internet Explorer 5.5 or higher. (Experimental Firefox support is available.)

- **Lab Manager Web console** – The browser-based console that enables management for all testing activities, regardless of physical location. You can access this component using standard HTTP protocols.

  Use the Lab Manager Web console to organize groups of virtual machines into configurations based on machine templates, to store configurations and their state in libraries, and to quickly copy and use multiple copies of library configurations simultaneously without requiring knowledge of the networking environment. Copies of library configurations are available within seconds.

  When you check out a library configuration, the configuration retains the network profile (IP address, name, MAC address, security identifiers, and more), which preserves the running software and data on the machine. Virtual machines created from templates are given new network profiles as they join a configuration. This profile changes through the LM Tools utility installed on the template operating system.

- **Lab Manager SOAP API** – A SOAP API Web service that enables you to access Lab Manager programmatically. This allows easy integration with build management systems and with automated testing tools from Mercury, IBM, Segue, and other companies.

"Lab Manager servers" collectively refers to the Lab Manager Server, Managed Server systems, and storage servers.

Lab Manager Benefits and Features

Lab Manager enables users to lower development, test, and integration costs, as well as tap into a shared pool of server and networking resources, eliminate manual setup, decrease software development times, and improve software quality.

Review these specific benefits:

- **Productivity** – Saves time for when provisioning machines.
- **Process improvement** – Assists with communication between testing and development teams.
- **Server consolidation** – Includes pool and share servers, storage, and other testing and development resources.
- **Computer access** – Provides access to more computers than available physical machines.
- **Self-help** – Allows engineers to individually create, set up, and tear down configurations without relying on IT.

- **Outsourcing and distributed development** – Allows geographically dispersed teams to work on the same machines and configurations over the Internet.

Review these specific features:

- **Templates** – Create new, fully configured virtual machines in seconds.
- **Configurations** – Run, manage, and monitor multiple configurations simultaneously.
- **Configuration library** – Store configurations to persistent storage for team use.
- **State capture** – Capture the live state of all the machines in a configuration. You can capture and share bugs in their running state.
- **Network fencing** – Run copies of configurations with identical network profiles simultaneously using this network isolation technology.
- **Resource management** – Manage a pool of computing and storage resources.
- **Delta tree management** – Save virtual machine file changes to efficient and high-performance storage.
- **Application integration** – Integrate test applications with the Lab Manager Web service SOAP API.
- **Monitoring** – View and control server farm utilization in real time.
- **Browser access** – Remotely access Lab Manager from any location.
- **Automation** – Automate test matrices end-to-end.

Using Lab Manager with VirtualCenter Management Server

You can use VMware VirtualCenter Management Server (VirtualCenter Server) to monitor ESX Server systems managed by Lab Manager. Be aware that all VirtualCenter Server actions that register or deregister Lab Manager virtual machines (including those triggered by VMware HA and VMware VMotion™) break Lab Manager. VMware recommends managing ESX Server systems with Lab Manager or VirtualCenter Server, but not both.

Getting Started with Lab Manager

2

To get started with Lab Manager, you can become familiar with the main elements, operations, and navigation of the Lab Manager Web console.

This chapter covers these topics:

Setting Internet Explorer Options

Review the requirements for client user machines in the *VMware Lab Manager Installation Guide*. When accessing the Lab Manager Web console with IE, make sure to set browser settings to enable client operation.

To set IE options

1. If you are using Windows 2003, open the **Control Panel** from the desktop and click **Add or Remove Programs**.

   If you are using a Windows platform other than Windows 2003, proceed to Step 4.

2. Click **Add/Remove Windows Components**.
3. Deselect the **Enhanced Internet Explorer Security Configuration** check box and click **Next**.
4. From the **Tools** menu in IE, choose **Internet Options**.
5. In the **Security** tab, click **Custom Level**.
6. Enable these browser options:
   - **Download signed ActiveX controls**
   - **Run ActiveX controls and plug-ins**
   - **Allow META REFRESH**
   - **Active scripting**
   - **Allow paste operations via script**
7. In the **Advanced** tab, enable the **Play animations in web pages** option.

Accessing the Lab Manager Console

After installing Lab Manager, you can access the Lab Manager Web console and Overview page. See the *VMware Lab Manager Installation Guide* for complete requirements, including browser settings, on client user machines.

To access the Lab Manager console

1 Obtain a Lab Manager account.

If you do not have an account or need account information, see a Lab Manager Administrator.

2 On a Windows machine connected to the Internet or your local intranet, launch IE 5.5 or higher.

Experimental support for Firefox is available.

3 To connect to a Lab Manager Server, go to https://<Lab Manager server domain name or IP address>/.

NOTE The first time you access the console, an SSL warning might appear. To avoid this warning in the future, use fully qualified domain names or ask your Administrator for more information.

To add the certificate to your trusted certificate list, click **View Certificate** in the IE SSL alert, and click **Install Certificate**.

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4 Enter your user name and password to log in to the console.

Passwords for the console require at least six characters.

5 In the Overview page that appears after logging in, use the check box at the bottom of the page to specify whether you want the console to open to the Workspace page at startup.

For highlights on this page and the user interface, see "Reviewing the Lab Manager User Interface" on page 20.

Reviewing the Lab Manager User Interface

The Lab Manager Web console has a navigation pane on the left and a main display area on the right. Figure 2-1 shows a sample page in the console.

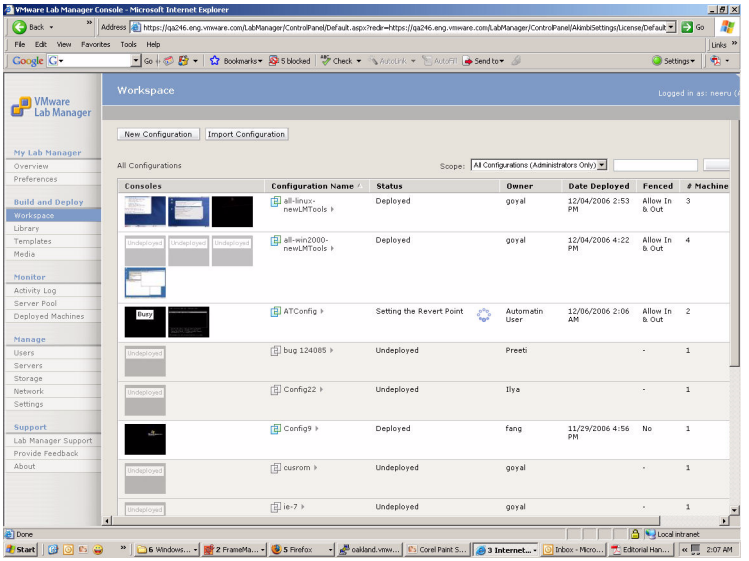


Figure 2-1. Sample Page in Lab Manager

- The navigation pane provides access to major concepts and operations:
  - **My Lab Manager**
  - **Build and Deploy**
  - **Monitor**
  - **Manage** (Administrator operations only)
  - **Support** (Administrator operations only)
- The main display area shows configuration, virtual machine, machine template, server, and system administration information in table format. This area also displays data in tabbed folders that you can navigate.

Default Landing Page

The default landing page is the Overview page.

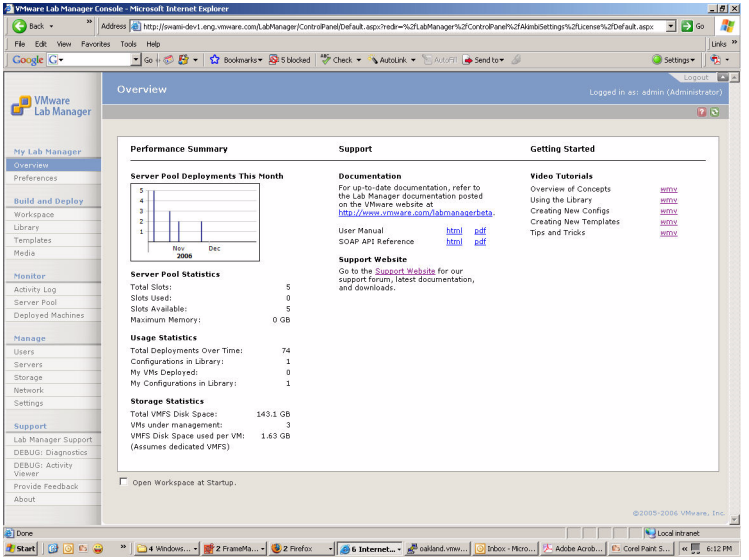


Figure 2-2. Overview Page

The **Performance Summary** column includes these statistics:

- **Total Slots** – Number of reserved spaces across all virtual machines on the Managed Server systems.
- **Slots Used** – Number of deployed machines.
- **Slots Available** – Difference between **Total Slots** and **Slots Used**.
- **Maximum Memory** – Physical memory of the Managed Server systems.
- **Total Deployments Over Time** – Sum of all deployed virtual machines since the installation of Lab Manager.
- **Configurations in Library** – Number of virtual machine configurations stored in the configuration library.
- **My VMs Deployed** – Number of your deployed virtual machines.
- **My Configurations in Library** – Number of your virtual machine configurations in the configuration library.
- **Total VMFS Disk Space** – Sum of the disk space in the VMware Virtual Machine File System (VMFS) storage.
- **VMs under management** – Number of virtual machines (except routers) under Lab Manager control.

- **VMFS Disk Space used per VM**– Average disk space for each virtual machine.

  This entry assumes you are using dedicated VMFS disk space for Lab Manager virtual machines.

The **Support** column provides access to documentation and customer support. Up-to-date product documentation is available on the VMware Web site.

The **Getting Started** column provides access to video tutorials to become familiar with the product.

If you want the Web console to open to the Workspace page at startup, select the check box for this option.

Specific Areas and Operations

The Lab Manager Web console includes these specific areas and operations:

- **Overview** – Provides information on performance, support, documentation, and tutorials. You can specify whether to make the Workspace page the default landing page of the console.
- **Preferences** – Enables you to set preferences for such items as the default start page, number of items on a page, behavior for undeploy operations, network fencing, and the server boot sequence.
- **Workspace** – Serves as the control center for the Lab Manager system. This space is similar to the concept of a desktop where you can work on configurations, share them with individuals, and perform other operations. If you are an Administrator, all configurations (private and shared) are visible.

  From this location, navigate to the details for a particular configuration on the **Configuration <Configuration Name>** page, or access all of the virtual machine consoles for a configuration with the **Show Consoles** feature. From the **Configuration <Configuration Name>** page, you can navigate to a specific virtual machine console with the **View Console** feature.
- **Library** – Displays your saved configurations and configurations shared by other users. Administrators can view all shared and private configurations.
- **Templates** – Enables you to create, view, or track your machine templates and those shared by other users. Administrators can view all templates.

  A template serves as the base of a configuration and offers a matrix that you can build on. You can create a new template and clone, copy, or consolidate an existing one. Other operations involve sharing templates and making them private, importing and exporting templates on the network, deploying and undeploying templates, and modifying the settings or installed software.

- **Media** – Enables you to add, delete, and track media (CD and floppy) image files. You can upload data (for example, drivers) to a template from the media library and synchronize the library with the files in media storage servers.
- **Activity Log** – Displays the status of operations. Most Lab Manager operations occur immediately (synchronously), while others take time and complete asynchronously. During asynchronous operations, you can perform other tasks at the console and return to the Activity Log page to check the status.
- **Server Pool** – (Administrators) Shows deployed machines, available slots, types of machines, and activities for Managed Server systems.
- **Deployed Machines** – (Administrators) Presents details on the virtual machine status, configuration, IP address, Managed Server names, machine owner, and CPU utilization. You can navigate to individual consoles.
- **Configuration Details** – Shows details about the configuration's virtual machines, IP addresses, deployment, fencing, virtualization technology, boot options, and CPU utilization. You have the option to add or remove virtual machines from the configuration on this screen or drill-down to see the console display of one machine.
- **Machine Console** – Provides access to the console window of a virtual machine. Drill down from the Templates page to access a machine console. You can perform all virtual machine operations.
- **All Consoles** – Provides access to a large console display of every virtual machine in a configuration.

For components dealing with Administrator management, see "Administering and Monitoring Lab Manager" on page 105.

Interface Features

The Lab Manager interface includes features such as mouseover menus, breadcrumb titles, and filters.

Mouseover Menus

The console has mouseover menus that are similar to right-click menus and appear when you move the pointer over an object name. A name or title has a mouseover menu if an arrow appears to its right.

Breadcrumb Titles

If you drill down to view specific templates or configurations, the title of the page displays the object path. The objects link to the appropriate pages.

Text Search Filter

Use the **Filter** button at the top of various pages to view a subset of the information on the current page. Lab Manager matches the text entered in the field to the left of the button against the attribute data of the search objects. Entries are not case-sensitive.

NOTE The filter text search does not recognize wildcards. If you enter a traditional wildcard, such as an asterisk (*), this function performs a literal search for an asterisk symbol.

Column Sorting

Most pages in Lab Manager present data in tables. You can sort the data in each column in ascending or descending order. Click the table heading name to perform the sort operation. The arrow to the right of the column name indicates whether the data appears in descending or ascending order.

VMware Tools and Mouse Control

Difficulty might arise when moving your mouse in to and out of the virtual machine console window. You might "lose" the pointer. VMware Tools corrects this problem.

If you do not install VMware Tools, press Ctrl + Alt to regain mouse control.

Reviewing the General Workflow in Lab Manager

The basic workflow might involve these tasks:

- Creating or importing templates, which serve as the raw virtual machines.
- Creating configurations composed of one or more virtual machines based on machine templates.
- Performing a range of operations in the Workspace, such as capturing configurations to the configuration library.

  For example, a QA engineer finds a bug in a configuration and captures it to preserve the current state.
- Providing access to library configurations using the LiveLink feature.

  For example, a QA engineer puts a LiveLink URL in a bug report or sends a LiveLink URL to a developer. The developer clicks the link to access and review the "live" configuration in the Workspace.

These tasks are covered throughout this guide.

Working with Virtual Machines

3

A virtual machine is a simulated computer environment running a guest operating system and associated application software. Virtual technology allows a "host" server to run multiple virtual machines concurrently and isolate each virtual machine in a self-contained environment.

Lab Manager enables you to create virtual machines from machine templates and to create configurations composed of multiple virtual machines. For details on templates and configurations, see Chapter 4 and Chapter 5.

This chapter covers these topics:

Accessing Virtual Machines

From the Lab Manager Web console, you can drill down to individual virtual machine consoles and perform a range of operations.

For details on accessing a virtual machine console for the first time, see "Accessing a Virtual Machine Console for the First Time" on page 27.

For details on logging in to a virtual machine console of the sample template or configuration packaged with Lab Manager, see the *VMware Lab Manager Installation Guide*.

To access the console of a virtual machine template from the Templates page

1 In the left pane, click **Templates**.

2 If the template is undeployed, move the pointer over the template name and choose **Deploy** from the menu.

3 In the **Console** column, click the thumbnail icon of the deployed template.

You can work in the console of the machine template.

To access a specific virtual machine in a configuration

1 In the left pane, click **Workspace**.

2 If the configuration is undeployed, move the pointer over the configuration name and choose **Deploy** from the menu.

For details on this operation, see "Deploy Options" on page 83 and "Deploy with Defaults Option" on page 84.

3 Use one of these methods to access a virtual machine:

- In the **Console** column, click the thumbnail icon of the deployed virtual machine.
- Move the pointer over the configuration name, and choose **Details** from the menu. From this page, either click the thumbnail icon of the deployed virtual machine or move the pointer over the configuration name and choose **View Console** from the menu.

You can work in the console of the virtual machine.

To access all virtual machines in a configuration

1 In the left pane, click **Workspace**.

2 If the configuration is undeployed, move the pointer over the configuration name and choose **Deploy** from the menu.

For details on this operation, see "Deploy Options" on page 83 and "Deploy with Defaults Option" on page 84.

3 Move the pointer over the configuration name and choose **Show Consoles** from the menu.

You can work in the consoles for all virtual machines.

Accessing a Virtual Machine Console for the First Time

If you are accessing a virtual machine console for the first time, review these sections:

- "Installing the ActiveX Control" on page 27
- "Installing the VMware Remote MKS Plugin for Firefox" on page 28

Installing the ActiveX Control

Be aware that the first time you deploy a template or configuration to access a virtual machine console, you must follow the instructions to install the ActiveX control.

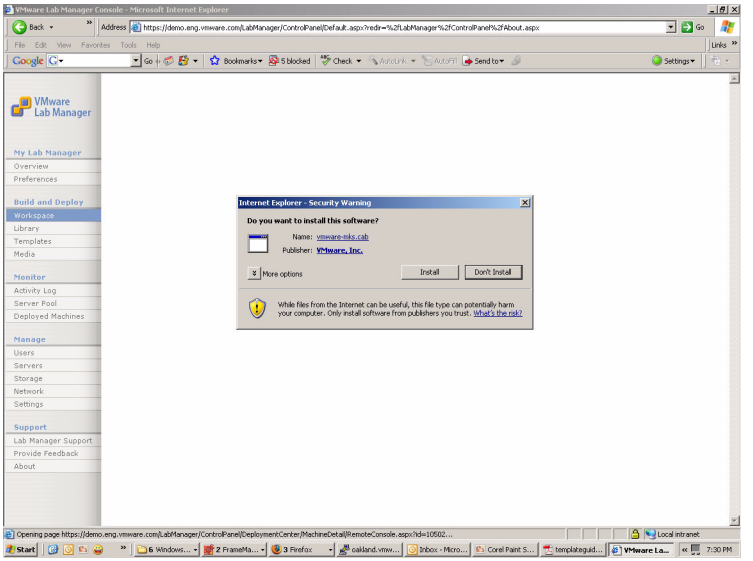


Figure 3-1. Warning for ActiveX installation in Virtual Machine Console

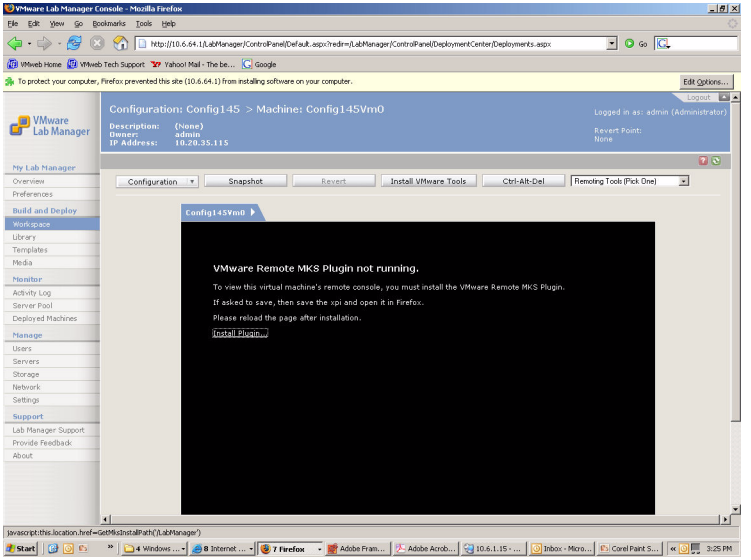
Installing the VMware Remote MKS Plugin for Firefox

The first time you access an individual virtual machine console page using Firefox, a message notes that you must install the VMware Remote MKS Plugin to use the console.

To install the VMware Remote MKS Plugin

1 Click **Install Plugin**.

2 When the message appears across the top of the page about Firefox preventing the installation to protect your computer, click the **Edit Options** button in the top right corner.



3 Click **Allow** and click **Close**.

4 In the virtual console, click **Install Plugin**.

5 Click **Install Now**.

6 Close the extensions dialog box and click the refresh button in the Lab Manager page.

For some versions of Firefox, you might have to restart the browser.

The virtual machine console is ready for use.

Reviewing the Virtual Machine Console Page

Review the elements of the virtual machine console page:

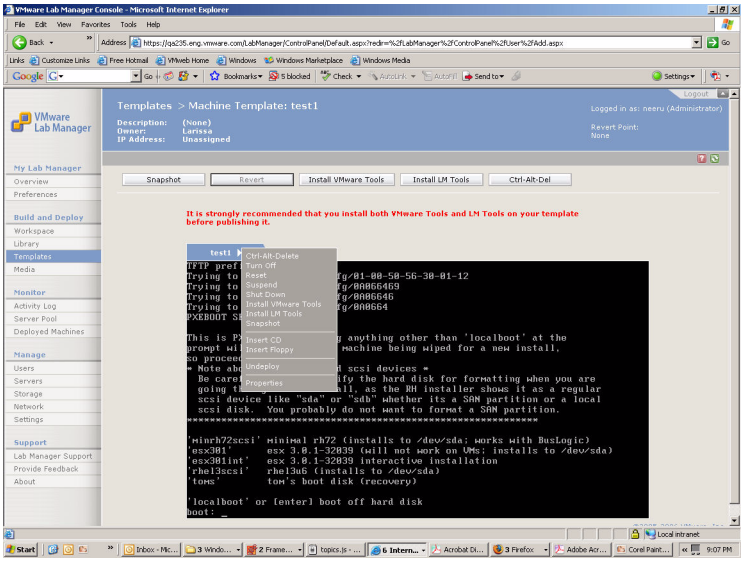


Figure 3-2. Virtual Machine Console Page

- **Fencing** – If the virtual machine uses Lab Manager network fencing, the internal and external IP addresses appear at the upper-left corner of the page.

  For details on network fencing, see Appendix A, "Network Fencing," on page 161.

- **Configuration** – Displays thumbnail icons of other virtual machines in the same configuration.

  Click a thumbnail icon to see the console display, or click **All Consoles** to see all virtual machine consoles in a configuration.

  Click **Configuration** to view the details of the configuration. For more information on configuration details, see "Viewing Details on Virtual Machines in a Configuration" on page 96.

- **Snapshot** – Captures a configuration and its virtual machines at a certain point in time.

- **Revert** – Returns the virtual machine to the last snapshot.

  The thumbnail icon of the last snapshot is available in the upper-right corner under **Revert Point**.

After the virtual machine reverts to the last snapshot, the display matches the **Revert Point** thumbnail icon.

- **Install VMware Tools** – Installs VMware Tools on this template.

  For information on VMware Tools, see "Installing VMware Tools" on page 57.

- **Install LM Tools** – Installs LM Tools on this template.

  For information on LM Tools, see "Installing LM Tools" on page 58 and "Review the LM Tools Tab" on page 147.

- **CTRL-ALT-DEL** – Opens a Ctrl + Alt + Del window in the virtual machine. The functionality is identical to using Ctrl + Alt + Del on a physical machine.
- **Revert Point** – Displays a thumbnail icon of the last snapshot point.
- **Remoting Tools** – Displays tools to set up a Remote Desktop Connection for the virtual machine.

Changing the Console Display Size

You can change the size of a virtual machine console as you would for a physical machine.

To change a virtual machine console size (Windows)

1. From the virtual machine console, open the Control Panel.
2. Double-click **Display**.
3. From the **Settings** tab, move the screen resolution slider bar to your preferred display size.
4. Click **OK**.

Reviewing Virtual Machine Operations

The options in the mouseover menu for a virtual machine are contingent upon its state. Operations on individual virtual machines affect the menu options for configurations.

For example, you have a configuration with four deployed virtual machines. If you undeploy one of the virtual machines, the configuration status in the Workspace page remains **Deployed** but both the **Deploy** and **Undeploy** options appear in the mouseover menu.

Summary of Virtual Machine Operations

Table 3-1 summarizes the operation options for virtual machines.

For information on related operations involving templates and configurations, see Chapter 4 and Chapter 5.

Table 3-1. Virtual Machine Operations

Operation	Description
Add to Templates	Creates a machine template from this virtual machine.
Consolidate VM Chain	Consolidates a virtual machine image and all its changes, which can be scattered across several storage servers. This operation is similar to defragmenting a hard disk to improve access efficiency.
Ctrl-Alt-Delete	Executes a Ctrl + Alt + Del operation on the virtual machine.
Delete	Removes an undeployed virtual machine.
Deploy	Runs a virtual machine on the Managed Server pool. You must deploy a virtual machine before installing software on it.
Eject CD	Ejects the CD in the virtual CD drive of the virtual machine.
Eject Floppy	Ejects the floppy in the virtual floppy drive of the virtual machine.
Insert CD	Prompts you to select an ISO image from the media library or enter a UNC path to the image on your network. For details on media and ISO images, see "Specific Areas and Operations" on page 22.
Insert Floppy	Prompts you to select a floppy image or enter a UNC path to the floppy image file. For details on media and floppy images, see "Specific Areas and Operations" on page 22.

Table 3-1. Virtual Machine Operations (Continued)

Operation	Description
Install LM Tools	Install LM Tools. This installation allows Lab Manager to automatically customize the network settings for a virtual machine. See "Installing LM Tools" on page 58.
Install VMware Tools	Installs VMware Tools on Windows machines. This installation has numerous benefits and makes it easier for you to move the mouse in to and out of the console window. See "Installing VMware Tools" on page 57.
Properties	Allows you to view and edit virtual machine properties.
Reset	Restarts the virtual machine and clears the machine state. This operation does not shut down the guest operating system. If a boot image is not available in peripheral storage, the virtual machine boots off the virtual hard disk.
Resume	Resumes the operation of a suspended virtual machine.
Shut Down	Shuts down the operating system of the virtual machine.
Snapshot	Captures a configuration (and all its virtual machines) at a specific point in time. Only one snapshot can exist at a time. Taking a new snapshot replaces the previous one.
Suspend	Freezes a virtual machine operation and its CPU.
Turn Off	Turns off the virtual machine. This option is the virtual equivalent of powering off a physical machine.
Turn On	Turns on the virtual machine. This option is the virtual equivalent of powering on a physical machine.
Undeploy	Stops running a virtual machine on the Managed Server pool.

Summary of Virtual Machine States

Table 3-2 summarizes the non-transitory states of virtual machines.

Table 3-2. Virtual Machine States (Non-Transitory)

State	Description
On	Virtual machine is deployed and running on the Managed Server. You can see the thumbnail icon of the virtual machine console.
Off	Virtual machine is deployed (registered on the Managed Server) but not running.
Suspended	Virtual machine processor is frozen. You can restart the processor at the same point where it became suspended.
Undeployed	Virtual machine is off and not registered on the Managed Server. If you deploy the virtual machine, Lab Manager registers and reboots it on the Managed Server.

Table 3-3 summarizes the transitory states of virtual machines.

Table 3-3. Virtual Machine States (Transitory)

State	Description
Busy	Virtual machine is in the midst of an operation.
Pending	Virtual machine is stuck and poses interactive questions in the virtual machine console.

Changing IP or MAC Addresses

You can change an IP or Media Access Control (MAC) address for a virtual machine after adding the virtual machine to a configuration.

To change the IP or MAC address for a virtual machine

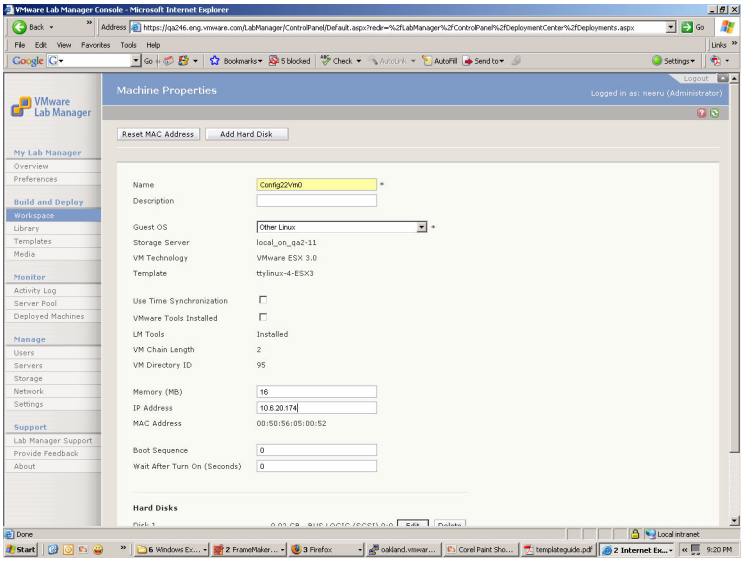
1 In the left pane, click **Workspace**.

2 Move the pointer over the configuration name and choose **Details** from the menu.

3 If the virtual machine is deployed, move the pointer over the configuration name and choose **Undeploy** from the menu.

4 Move the pointer over the configuration name and choose **Properties** from the menu.

5 Enter the properties information:



a Enter a new IP address.

b To create a random MAC address, click **Reset MAC Address**.

You cannot choose your own MAC address.

c Click **Update**.

6 Move the pointer over the virtual machine configuration name and choose **Deploy** from the menu.

NOTE When you deploy the virtual machine, an error message might appear about a duplicate IP address because only Lab Manager is aware of the new IP address.

If this error message appears, click **No**.

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7 From the virtual machine console window (see page 26), manually change the IP address of the virtual machine.

For Windows machines, complete these steps:

a From the virtual machine console, open the Control Panel.

b Navigate to the Local Area Connection (LAN) window through the Network Connections window.

c Click **Properties**.

d From the **General** tab, select the I**nternet Protocol (TCP/IP)** check box and click **Properties**.

e Click **Use the following IP address**, and enter the new IP address.

f Close all screens.

For Linux machines, complete these steps:

a Log in as `root`.

b Use the `ifconfig -a` command to retrieve the IP address of the machine and the name of the Ethernet Card Identifier.

c Use the `ifconfig` command to change the IP address:

```
ifconfig <ethernet card identifier> inet <new IP address> netmask
              <netmask>
```

Refer to this example:

```
ifconfig eth0 inet 10.10.10.10 netmask 255.255.0.0
```

Setting Up Remote Desktop Connections

From the page with a single virtual machine console (rather than the page with all consoles), you can remotely connect to a virtual machine configuration. The **Remote Desktop** option allows you to connect to the virtual machine from any location with these requirements:

- The virtual machine must be running the Windows operating system.
- You must have network access.
- You must have access permission as a Lab Manager Administrator or an authorized remote-access user.

To set up a remote desktop connection to a virtual machine

1 From the virtual machine console window (see page 26), open the Control Panel.

2 Navigate to the **Remote** tab of the System Properties dialog box.

3 Click the **Allow users to connect remotely to this computer** check box.

4 To specify individual users, click **Select Remote Users** and enter the information.

5 From the virtual machine console window, select **Remote Desktop** from the **Remoting Tools** list and complete the instructions.

Taking Snapshots and Reverting the Snapshots

After deploying a virtual machine, you can take a snapshot and revert the virtual machine to that snapshot at a later time.

The snapshot is a captured virtual machine state at a specific point in time. Lab Manager stores snapshots persistently with the virtual machine image. If you undeploy a virtual machine and deploy it, the snapshot remains.

NOTE Only one snapshot for a virtual machine is active at a time.

To take a virtual machine snapshot

From the virtual machine console window (see page 26), click **Snapshot**.

Lab Manager turns off the virtual machine for a short time and then displays the console. A thumbnail icon of the snapshot display appears in the top-right corner of the page.

To return to the virtual machine revert points

1 From the virtual machine console window (see page 26), click **Revert**.

2 Confirm to revert to the last snapshot of the machine and lose the current state of the machine.

Lab Manager turns off the virtual machine for a short time and then displays the console. The thumbnail icon of the snapshot appears in the top-right corner of the page.

Inserting CDs

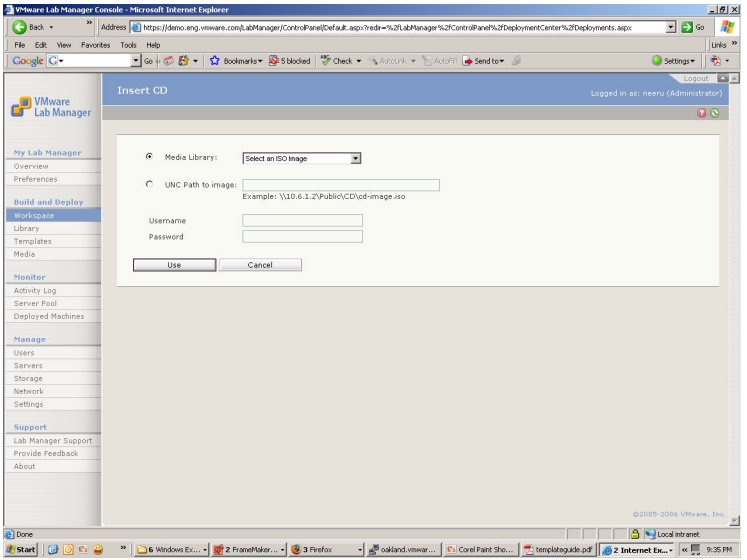
You can upload data (for example, drivers) to a template from the media library. During the **Insert CD** operation (available from the individual console of a template or configuration), you can access the ISOs in the media library.

For more information on media, see "Specific Areas and Operations" on page 22.

To insert a CD into a virtual machine

1 From the virtual machine console window (see page 26), move the pointer over the virtual machine name and choose **Insert CD** from the menu.

2 Specify the information for the ISO image:



a Select an ISO file from the media library.

VMware recommends putting your ISO image files in the default `\\VMwareLM\ISO` directory created during installation. Images in this directory are automatically populated to the **Media Library** list. For information on using this directory and additional media storage (NFS), see "Specific Areas and Operations" on page 22.

b If your ISO image file does not appear in the **Media Library** list, specify the details on the UNC path:

- Enter the UNC name of your machine image (for example, `\\10.6.1.2\Public\CD\cd-image.iso`).

  Use English characters for the UNC path.

- If required, enter a user name and password.

c Click **Use**.

After a brief pause, the virtual machine console appears. The **Eject CD** option replaces the **Insert CD** option on the mouseover menu.

Ejecting CDs

After inserting a CD to a virtual machine, you can eject the CD.

To eject the CD from a virtual machine

From the virtual machine console window (see page 26), move the pointer over the virtual machine name and choose **Eject CD** from the menu.

Inserting Floppy Disks

You can upload data (for example, drivers) to a template from the media library. During the **Insert Floppy** operation available from the individual console of a template or configuration, you can access the floppy files in the media library.

For more information on media and floppy file names, see "Specific Areas and Operations" on page 22.

To insert a floppy disk into a virtual machine

1. From the virtual machine console window (see page 26), move the pointer over the virtual machine name and choose **Insert Floppy** from the menu.
2. Specify the information for the floppy file:
   a. Select a floppy file from the media library.

      VMware recommends putting your floppy files in the default `\\VMwareLM\ISO` directory created during installation. Images in this directory are automatically populated to the **Media Library** list. For information on using this directory and additional media storage (NFS), see "Specific Areas and Operations" on page 22.

   b. If your ISO image file does not appear in the **Media Library** list, specify the details on the UNC path:

      - Enter the UNC name of your image (for example, `\\10.6.1.2\Public\Floppy\floppy.vfd`).

        Use English characters for the UNC path.

      - If required, enter a user name and password.

   c. Click **Use**.

After a brief pause, the virtual machine console appears. The **Eject Floppy** option replaces the **Insert Floppy** option on the mouseover menu.

Ejecting Floppy Disks

After inserting a floppy disk to a virtual machine, you can eject the floppy disk.

To eject the floppy disk from a virtual machine

From the virtual machine console window (see page 26), move the pointer over the virtual machine name and choose **Eject Floppy** from the menu.

Adding Virtual Hard Disks to Virtual Machines (Templates)

After accessing the properties settings for virtual machines and templates, you can add one or more virtual hard disks (`.vhd`) for a machine template or a virtual machine. Different methods are available to access properties information.

To access the properties for machine templates

1 In the left pane, click **Templates**.

2 If the virtual machine is deployed, move the pointer over the template name and choose **Undeploy** from the menu.

3 Move the pointer over the template name and choose **Properties** from the menu.

To access the properties for virtual machines

1 In the left pane, click **Workspace**.

2 If the virtual machine is deployed, move the pointer over the configuration name and choose **Undeploy** from the menu.

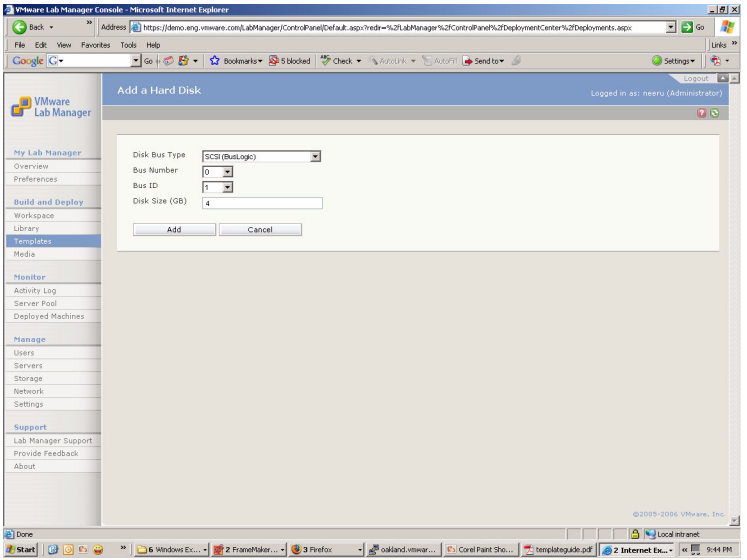
3 Move the pointer over the configuration name and choose **Details** from the menu.

4 Move the pointer over the virtual machine name and choose **Properties** from the menu.

To add virtual hard disks

1 After accessing the page with properties information for either machine templates or virtual machines, click **Add Hard Disk**.

2 Enter the disk information:



a Specify whether the bus type is BusLogic SCSI or LSI Logic SCSI.

b Review these details on the bus number, bus ID, and disk size:

Table 3-4. Bus Number and ID Entries

Bus Type	Bus Number	Bus ID
SCSI	0-3	0-15

- If bus numbers are not available, **None** appears in the **Bus Number** list.
- Bus ID #7 is reserved for a SCSI adapter.
- If a bus is completely used, the **Bus ID** list appears as an empty list.
- Disk Size (GB) is limited by the space available for storage servers.

c Click **Add**.

The new hard disk appears in the information on properties.

Adding SCSI Virtual Hard Disks

Review these points about adding SCSI virtual hard disks:

- If you add a SCSI hard disk to a virtual machine, you might generate an operating system error message about missing drivers for this device.

  If this error occurs, download and install the appropriate driver, and contact VMware for further support.

- If you add the first instance of a SCSI hard disk to a Windows machine template, reboot the template and log in once before publishing it. This process allows Windows to properly recognize the new virtual hardware.

- If you add the first instance of a SCSI hard disk to a Windows virtual machine in a Workspace configuration, verify that the virtual machine network settings are unaltered:

  - Log in to the virtual machine console window.
  - From the command line, run the `ipconfig` command.
  - If the IP address is not the same as the one listed in the properties information for the virtual machine, reset the IP address. For details, see "Changing IP or MAC Addresses" on page 33.
  - If you get an error message when changing the IP address, click **No**.

Editing Virtual Machine Properties

You can access and edit the properties of virtual machines.

To edit virtual machine properties

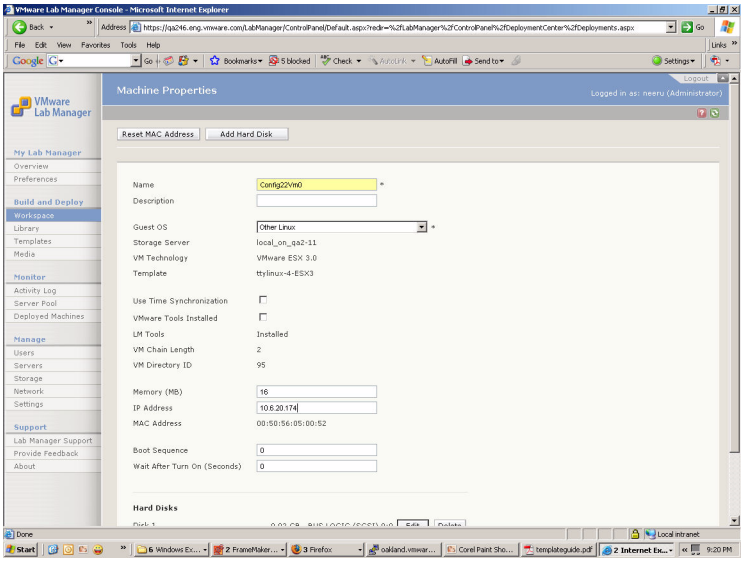
1 In the left pane, click **Workspace**.

2 If the virtual machine is deployed, move the pointer over the configuration name and choose **Undeploy** from the menu.

3 Move the pointer over the configuration name and choose **Details** from the menu.

4 Move the pointer over the virtual machine name and choose **Properties** from the menu.

5 Edit the properties.



For details on the properties, see "Reviewing the Properties List" on page 42.

6 Click **Update**.

Reviewing the Properties List

Review the properties list for virtual machines:

- **Name** – Can only contain alphanumeric characters (a–z, A–Z, 0–9), hyphens, underscores, or periods. Maximum length is 15 characters.

- **Description** – (Optional) Maximum number of characters is 128.
- **Guest OS** – (Optional) Maximum number of characters is 128. The guest OS is the operating system of the virtual machine and runs on the Managed Server OS ("Host OS").
- **Storage Server** – Storage server or storage device where the virtual machine image resides.
- **VM Technology** – Virtualization technology (VMware ESX Server) that this machine is configured for.
- **Template** – Machine template that the virtual machine is created from.
- **Use Time Synchronization** – Virtual machine time is in sync with the host operating system time.
- **VMware Tools Installed** – Indicates if VMware Tools is installed. Lab Manager refers to this check box to verify whether VMware Tools is installed on the template.

  If the option indicates that VMware Tools is installed, the **Install VMware Tools** button no longer appears on the virtual machine console. You can still access the option to install VMware tools through the mouseover menu on the virtual machine console.
- **LM Tools Installed** – Indicates if LM Tools is installed.
- **VM Chain Length** – The number of delta disks generated by certain operations. For each change, Lab Manager freezes a delta disk and creates a new one.

  The chain length indicates how scattered the virtual machine image is across storage servers.
- **VM Directory ID** – Location of the virtual machine on the file system.
- **Memory (MB)** – Amount of RAM allocated for running the virtual machine.
- **IP Address** – Virtual machine IP address.
  - You must undeploy a virtual machine before editing the virtual machine IP addresses.
  - Editing the IP address does not change the IP address on the machine. The editing process only affects the IP address that Lab Manager configured internally for the machine.

  For more information, see "Changing IP or MAC Addresses" on page 33.

- **MAC Address** – Machine Media Access Control (MAC) Address of the virtual machine. If the virtual machine is undeployed, you can click the **Reset MAC Address** button to re-create the MAC address.

  For more information, see "Changing IP or MAC Addresses" on page 33.

- **Boot Sequence** – Integer number (0-n) indicating the boot order for virtual machines. Lab Manager can boot virtual machines in a configuration in a specific sequence or all at once.

  You do not need to use sequential numbers. Lab Manager can determine the relative order for virtual machines.

- **Wait After Turn On (Seconds)** – Integer number indicating the delay time (or "pause") between the boot up process of this machine and the next machine.

- **Hard Disks** – Storage, bus type, bus number, and bus ID for each virtual hard disk. See "Adding Virtual Hard Disks to Virtual Machines (Templates)" on page 39.

  - To add a new virtual hard disk, click the **Add Hard Disk** button at the top of the page.
  - To edit a virtual hard disk, click the **Edit** button.
  - To delete a virtual hard disk, click the **Delete** button.

  Adding or editing a virtual hard disk requires unpublishing the virtual machine.

Working with Machine Templates

4

Machine templates are virtual machine images used as building blocks for configurations. You can build a collection of templates containing a variety of operating systems, application servers, databases, directory servers, and other infrastructures used in development and testing.

This chapter covers these topics:

About Templates

A template is a virtual machine image loaded with an operating system, applications and data. You can think of a template as a raw virtual machine.

Once you "publish" a template (make it available to the public), you can lay the foundation for multimachine configurations without the time-consuming process of reinstalling software or performing setup tasks again. The use of templates ensures that virtual machines are consistently configured with operating systems, versions, system packs, and more across an entire organization.

VMware recommends installing LM Tools on templates. LM Tools is a feature which allows Lab Manager to automatically configure network settings (IP address, MAC address, Security Identifier, and more) for virtual machines. These tools save you the trouble of manually configuring the settings. See "Installing LM Tools" on page 58 for more information.

Accessing the Templates Page

Use the **Templates** link in the left pane to access the Templates page.

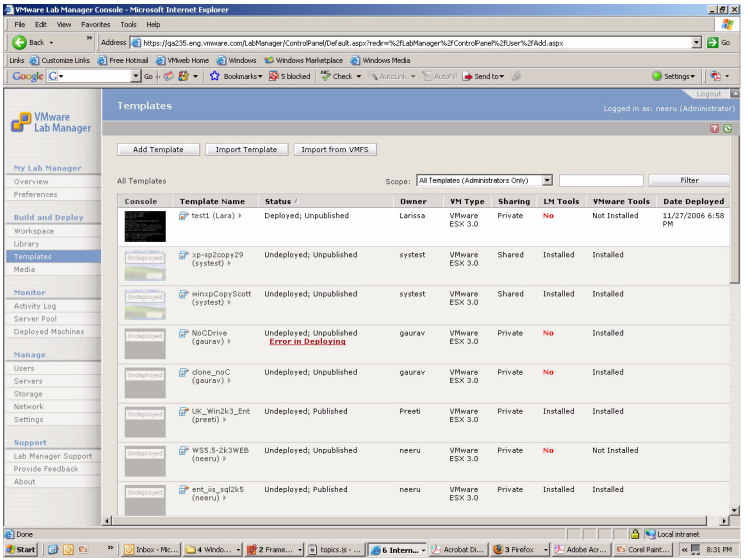


Figure 4-1. Templates Page

The page includes these highlights:

- **Templates** – View the templates, status, owner, and other details on this page. White rows reflect deployed templates on the Managed Server pool.

- **Filter** – View a subset of the templates. In the field to the left of the **Filter** button, enter text that appears in the attributes of the configuration you want to view. The filter text search does not recognize wildcards. If you enter a traditional wildcard, such as an asterisk (*), this function performs a literal search for an asterisk symbol.
- **Scope** – Use the **Scope** list to determine which templates are displayed.
  - **My Templates** – View only your templates, both shared and private.
  - **Templates Shared by Others** – View all shared templates except for your own template.
  - **All Templates Accessible by Me** – View your templates, both shared and private, and templates shared by others.
  - **All Templates (Administrators Only)** – View all shared and private templates. This option is available for Administrators only.
- **VM Type** – Indicates the virtualization technology (VMware ESX Server).
- **Sharing** – Indicates whether the template is shared among users.
- **LM Tools** – Indicates whether the template has LM Tools. VMware recommends installing LM Tools.
- **VMware Tools** – Indicates whether the template has VMware Tools. VMware recommends installing VMware Tools.
- **Add Template** – Create a new template.
- **Import Template** – Import a template from the network.

Reviewing Template Operations

Review the machine template operations, states, and specific procedures. Most operations are available from the mouseover menu or buttons on the Templates page.

Summary of Template Operations

Table 4-1 summarizes the operation options for templates.

NOTE In addition to these options, "Adding Virtual Hard Disks to Virtual Machines (Templates)" on page 39 is a procedure that applies to both virtual machines and machine templates.

Table 4-1. Machine Template Options

Option	Description
Clone	Creates a delta disk instead of copying an entire virtual hard disk. This operation addresses virtual machine proliferation by using "referential provisioning." This process involves storing new changes but referring back to a chain of delta disks. For each change, Lab Manager freezes a delta disk and creates a new one.
Copy	Creates a complete (deep) copy of the template. This operation copies (rather than consolidates) all of the delta disks and the master disk. Typically, you do not copy a template unless you need to dismantle the storage and move the virtual machine to a different server. This operation takes a longer time than the clone operation.
Consolidate	Collapses the delta disks that might affect performance into one master disk. Use this option when performance is slow and the virtual machine chain length is ten or more. (To view the chain length, choose **Properties** in the mouseover menu.)
Delete	Removes a template from the machine template library.
Deploy	Registers and runs the virtual machine on the Managed Server pool. After you deploy a template, you can view and use the virtual machine console.
Export	Exports the machine template to a network directory.
Force Undeploy	Forces the undeploy process after a failed undeploy operation. If you are aware of a problem (for example, the Managed Server is down), you might forcefully need to clean the templates area. If an attempt to undeploy a template fails and you need to access this option, click the **Error in Undeploying** link in the **Status** column and click **Force Undeploy**.
Import	Imports a machine template from a network directory.
Make Private	Makes a template visible and accessible only for your use.
Make Shared	Makes a template available for others to use.
Properties	Enables you to view and edit machine template properties.
Publish	Makes the template available for use in building configurations.
Undeploy	Un-registers and stops running the virtual machine on the Managed Server pool.
Unpublish	Makes the template unavailable for use in building configurations.
View Console	Enables you to view and use the virtual machine console for the template.

Summary of Template States and Attributes

Machine template states are transitory or nontransitory:

- Transitory states, such as **Cloning** and **Deploying**, exist for most operations. These states appear in the **Status** column on the Templates page when active.

  When a machine template is in a transitory state, a spinning icon appears in the **Status** column.

- Nontransitory states (for example, **Deployed** and **Undeployed**) and attributes (for example, **Published** and **Unpublished**) appear in the **Status** column. Various attributes appear for both shared and private templates.

  Table 4-2 summarizes the nontransitory states.

Table 4-2. Machine Template States and Attributes (Nontransitory)

State	Description
Deployed	Template is registered and running on the Managed Server pool.
Unpublished	Template is not available for use in building configurations.
Private	Template is not available for others to access and use.
Shared	Template is available for others to access and use.
Published	Template is available for use in building configurations.
Undeployed	Template is not registered nor running on the Managed Server pool.

Creating Templates

Use one of these methods to create a machine template:

- Import a machine template from a directory on your network. Use this option to incorporate a virtual machine external to Lab Manager. See "Importing Templates" on page 50.
- Install an operating system and other applications on a new template. See "Creating Templates from Scratch" on page 53.
- Use an active virtual machine in Lab Manager as the basis of a new template. See "Creating Templates from Active Virtual Machines in Lab Manager" on page 63.
- Clone or copy a template. See "Cloning Templates" on page 63 or "Copying Templates" on page 65.

Importing Templates

Importing a template implies bringing a virtual machine external to the Lab Manager system into the system. You can import an existing virtual machine from SMB storage or VMFS storage to serve as a template. Refer to the instructions in this section for VMFS storage if you have an existing template on an ESX Server machine and you want to move the template under Lab Manager control.

You can import a machine that Lab Manager was not aware of, or you can import a machine that was previously exported by Lab Manager.

The setup for the virtual machine is primarily stored in these files:

- Virtual machine disk (`.vmdk`) file. You can have multiple `.vmdk` files.
- Virtual machine configuration (`.vmx` for VMware) file. This file is approximately 15K.

Lab Manager supports these types of virtual machines for import operations:

- VMware Workstation
- VMware Server
- VMware ESX Server

Lab Manager does not support templates with multiple NICs or IDE disk drives. If you are not sure whether your virtual machines can run in an ESX Server environment, you can refer to the VMware Converter product documentation for details on converting virtual machine formats.

Importing a Template from SMB Storage

You can import virtual machines up to 2GB per `.vmdk` file. Virtual machines larger than this size may require VMware Virtual Disk Manager packaged with Workstation. For details, see "Importing a Virtual Machine as a Template Fails" on page 155.

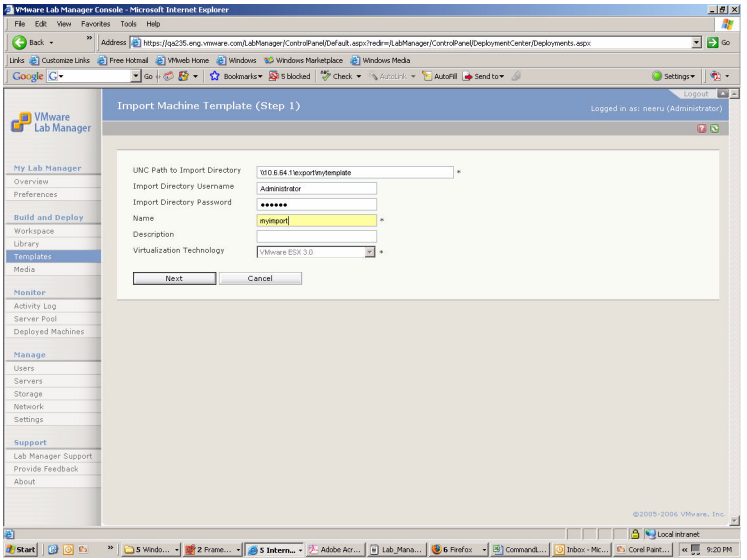
NOTE Do not import templates manually with ESX Server commands.

To import a template from SMB storage

1 In the left pane, click **Templates**.

2 Click the **Import Template** button.

3 Enter the information for the template:



a Enter the UNC path to the appropriate directory (for example, `\\10.10.10.10\importdir`).

Use English characters for the UNC path.

b If the UNC folder needs authentication, specify the user name and password to access the files.

c Enter the name.

d (Optional) Enter a description.

e Click **Next**.

4 If Lab Manager cannot detect if VMware Tools and LM Tools is installed on the template, you might need to specify that information.

5 Select the storage server to import the template to.

6 Click **Import**.

The Templates page displays the imported template. The import process takes several minutes.

7 Move the pointer over the template name and choose **Publish** from the menu. Publishing makes the template available for use in building configurations.

8 (Optional) Move the pointer over the template name and choose **Make Shared** from the menu.

Sharing allows other users to deploy your template and use it in building configurations.

Importing a Template from VMFS Storage

If you have an existing virtual machine on an ESX Server system, you can use the **Import from VMFS** option to place that virtual machine under Lab Manager control. Because you are simply moving the virtual machine and not copying it, the original virtual machine is lost in this process. If you need the original virtual machine for any reason, make a copy of it.

The original virtual machine remains registered under the VI Client but is not longer available. You can use the VI Client to unregister the virtual machine. See the VMware Infrastructure 3 documentation for information on unregistering a virtual machine.

NOTE The **Import from VMFS** option does not work for a virtual machine with an absolute path to its `.vmdk` file or a virtual machine that has snapshots. Delete any snapshots prior to importing a template from VMFS storage.

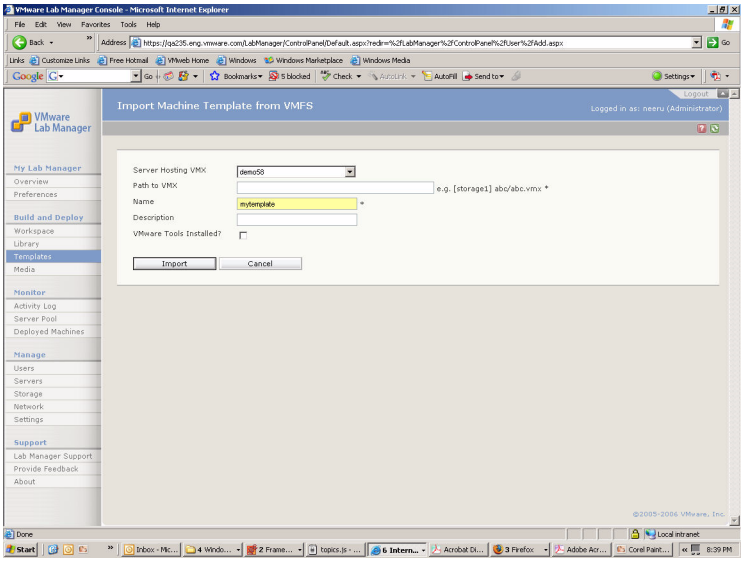
To check if you have an absolute path to the `.vmdk` file, use a text editor to open the `.vmx` file, look for the line that points to the virtual disk (`.vmdk`), and verify that the value does not start with a forward slash (`/`).

To import a template from VMFS storage (ESX Server machine)

1 In the left pane, click **Templates**.

2 Click the **Import from VMFS** button.

3 Enter the information for the template:



a Select the server hosting the `.vmx` file.

b Enter the path to `.vmx` file (for example, `[storage1] abc/abc.vmx`).

c Enter a name.

d (Optional) Enter a description.

e Specify whether VMware Tools is installed on the template.

f Click **Import**.

Creating Templates from Scratch

Creating a machine template from scratch involves these tasks:

- Create a blank template without an operating system or additional software. See page 54.
- Deploy the template. See page 55.
- Install a guest operating system on the virtual machine. See page 56.
- Install VMware Tools to allow the mouse to move into and out of the virtual machine console window. See page 57.

Be aware of the problem of moving a mouse into and out of a virtual machine console window before VMware Tools is installed. You must press Ctrl + Alt to correct this problem until you install VMware Tools.

- Install any additional software you need to run on the virtual machine. See page 58.
- Install LM Tools to automatically configure network settings for virtual machines. See page 58.
- Publish the template to make it available for building configurations. See page 62.
- (Optional) Share the template to make it available for others to use. See page 62.
- Shut down the virtual machine and bring it back up. See page 63.

NOTE To install an image on to a virtual machine, you must load it from a virtual CD. The CD is the Universal Naming Convention (UNC) name for a machine image on the network. Typically, the machine image is an ISO file (image of a CD-ROM).

Creating a Blank Template

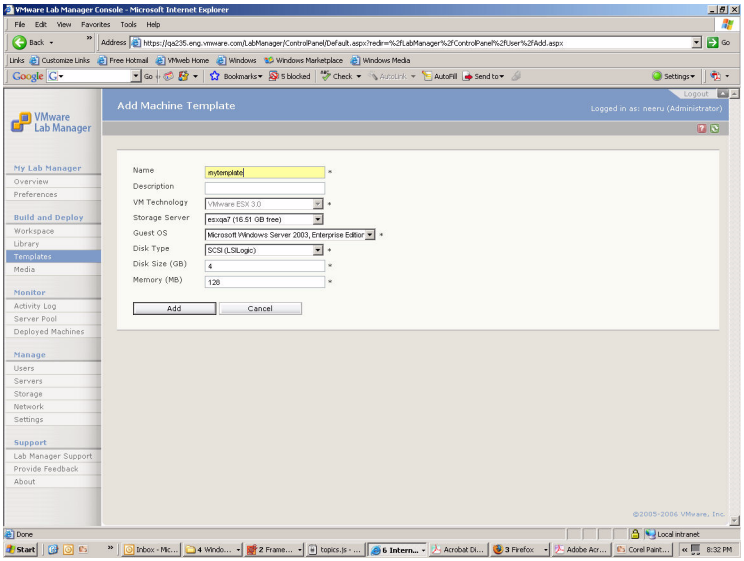
Create a blank template to start the process of creating a template from scratch.

To create a blank template

1 From the left pane, click **Templates**.

2 Click **Add Template**.

3 Specify the template information:



a Enter a name.

b (Optional) Enter a description.

c (Optional) Select the storage server.

d Select the guest operating system.

e Select the disk type.

f Enter the disk size (GB).

g Enter the memory (MB).

h Click **Add**.

The Templates page lists the new template with an **Undeployed** status.

Deploying a Template

Before installing an operating system and other software on to the machine template, deploy it on a Managed Server.

To deploy a template

1 From the left pane, click **Templates**.

2 If the template is published, move the pointer over the template name and choose **Unpublish** from the menu.

3 Move the pointer over the template name and choose **Deploy** from the menu.

4 If the NTLM Authentication dialog box appears, select the **Don't Ask Me Again** check box and click **Yes**.

Installing the Guest Operating System

Installing an operating system on the template requires entering the path name of an ISO image file.

For information on ISO files, see "Defining an ISO File" on page 56 and "Creating an ISO File" on page 56. Otherwise, proceed to the steps to install an operating system.

Defining an ISO File

An ISO image file is an exact representation of a CD or DVD, including its content and logical format.

The ISO files that represent CD/DVD data contain an image of an ISO-9660 file system. ISO 9660 is a standard published by the International Organization for Standardization defining a file system for CD-ROM media.

Many operating systems are distributed for download as self-contained, bootable ISO file images. Most operating systems allow you to mount these images as physical disks, making them useful as a universal archive format.

Creating an ISO File

Most CD-authoring utilities generate new ISO image files from existing files and record them on a disk. You create an ISO file by copying an entire disk, from Sector 0 to the end, to a file. Common Windows utilities for creating ISO files from a CD or DVD include ISORecorder (**http://isorecorder.alexfeinman.com**), WinImage (**http://www.winimage.com**), and Roxio (**http://www.roxio.com**).

To install an operating system on a template virtual machine

1 From the left pane, click **Templates**.

2 If your template is undeployed, move the pointer over the template name and choose **Deploy** from the menu.

3 Click the thumbnail console icon in the Console column for the machine you want to install on.

The machine console appears on the Templates > Machine Template: <NAME> page.

4 Move the pointer over the tab with the template name and choose **Insert CD** from the menu.

5 Specify the information for the operating system:

a Select an operating system ISO image.

If your ISO image file does not appear in the media library list, enter the Universal Naming Convention (UNC) name of your machine image (for example, `\\<Server>\LM\ISO\wind2k3.iso`), user name, and password.

Use English characters for the UNC path.

NOTE Download your operating system ISO image files to the `\\VMwareLM\ISO` directory created during the Lab Manager installation or to a `\ISO` directory on additional NFS media servers. Images in `\\VMwareLM\ISO` are automatically populated to the media library list on the Insert CD page. You can use the **Synchronize** feature of the media library to sync up with the files on an NFS media server.

To view all Lab Manager ISO image files, click **Media** in the left pane. See "Specific Areas and Operations" on page 22 for information on the media library.

---

b Click **Use**.

6 From the tab, move the pointer over the template name and choose **Reset** from the menu to launch the installation.

Resetting the machine restarts the virtual machine and clears the machine state. This operation does not shut down the guest operating system.

7 Enter any required information for the installation process.

The installation of the operating system resembles the installation on a physical machine and takes a similar amount of time.

Installing VMware Tools

Installing VMware Tools allows you to move the pointer in to and out of the virtual machine console window. Prior to installing VMware Tools, you can "lose the mouse" and experience difficulty when navigating into and out of the console window.

Until you can install VMware Tools, press Ctrl + Alt to fix the problem.

To install VMware Tools

1 From the left pane, click **Templates**.

2 If the template is not yet deployed, move the pointer over the template name and choose **Deploy** from the menu.

3 Move the pointer over the template name and choose **View Console** from the menu.

4 Click **Install VMware Tools**.

NOTE Installing VMware Tools takes several minutes and requires you to restart the machine.

Installing Additional Software

You can install any other software that you want on the template.

Installing LM Tools

LM Tools is a collection of software utilities for a new or modified machine template. Installing LM Tools allows Lab Manager to automatically customize the network settings for a virtual machine made from a template.

Lab Manager automatically assigns IP addresses from an IP address pool. See the *VMware Lab Manager Installation Guide* for more information on network settings.

Do I Need to Install LM Tools?

LM Tools automatically sets the machine name and network parameters (IP address, MAC address, Security Identifier, and more) for the virtual machine. The virtual machine retains these network parameters whenever it runs.

Without LM Tools, the virtual machine uses the IP address of the template. This situation creates network conflicts when you deploy other virtual machines created from the same template at the same time. To avoid this conflict without using LM Tools, access the virtual machine console through Lab Manager and manually set the network parameters to unique values.

If you have a Windows virtual machine without LM Tools, and you intend to add the virtual machine to a Windows domain, change the Security Identifier (SID) using Microsoft Sysprep or another third-party tool.

VMware recommends installing LM Tools on templates except under these circumstances:

- The software in the template is configured to use specific network settings.

- You have virtual machines that must remain untouched for specific security or integrity requirements.
- You have guest operating systems that Lab Manager does not support.

  To review a list of supported operating systems for LM Tools, see "Guest Operating System Requirements" in the *VMware Lab Manager Installation Guide*.

Prerequisites for LM Tools

Review these prerequisites:

- You must install VMware Tools prior to installing LM Tools.
- You must be an Administrator on the virtual machine to install LM Tools.
- You cannot install LM Tools on a template in a domain.
- You cannot install LM Tools on a template configured as a Microsoft Cluster Service server, a Microsoft Certificate Services server, or a domain controller.

Installing LM Tools on Windows and Linux Machines

Review these installation steps for Windows and Linux machines.

To install LM Tools on Windows machines

NOTE At the end of this installation, LM Tools sets the NIC to DHCP. This avoids network conflicts in a situation where LM Tools customizes Workspace virtual machines based on a template, and an existing virtual machine has the same IP address as the template.

1. In the left pane of the console, click **Templates**.
2. Move the pointer over the name of a deployed template, and choose **View Console** from the menu.
3. Click the **Install LM Tools** button.
4. Review the prerequisites and click **OK**.
5. After the installation, shut down the machine.

You can proceed to undeploy and publish the template for configurations.

NOTE You can only install LM Tools using the configuration mouseover menu on Windows 2000, Windows 2003, and Windows XP machines.

To install LM Tools on Linux machines

1 In the left pane of the console, click **Templates**.

2 Move the pointer over the name of a deployed template, and choose **View Console** from the menu.

3 Click the **Install LM Tools** button.

4 In the virtual machine console, perform the installation with these case-sensitive commands.

For RHEL, type:

```
> mount -t iso9660 /dev/cdrom /mnt/cdrom
> cd /etc/rc.d/init.d
> cp /mnt/cdrom/lm-tools .
> sh lm-tools install
> umount /mnt/cdrom
```

For SUSE Linux, type:

```
> mount -t iso9660 /dev/cdrom /media/cdrom
> cd /etc/rc.d
> cp /media/cdrom/lm-tools .
> sh lm-tools install
> umount /media/cdrom
```

5 Leave the console.

6 In the Templates page, move the pointer over the template name, and choose **Eject CD**.

7 Navigate to the virtual machine console and type:

```
> shutdown -h now
```

8 After installing LM Tools, undeploy the template on the Templates page, open the template Properties page, and select the **Lab Manager Tools Installed** check box.

9 (Optional) Publish the template to make it available for configurations.

10 (Optional) Share your template by moving the pointer over the template name and choosing **Make Shared**.

The process of sharing allows other users to deploy your template and use it for building configurations.

Addressing a Failed Attempt at Installing LM Tools

If the installation of LM Tools fails, Lab Manager may remain unaware of the failure and assume LM Tools is available. Lab Manager automatically removes the **Install LM**

Tools button from the virtual machine console page after it assumes an installation has already taken place.

If you need to try to install LM Tools again after a failed attempt, you can still complete this operation through the mouseover menu on the virtual machine console page.

To install LM Tools after a failed attempt

1 In the left pane of the console, click **Templates**.

2 Move the pointer over the name of a deployed template, and choose **View Console** from the menu.

3 Though the **Install LM Tools** button is no longer available after the first installation attempt, you can instead move the pointer on the tabbed folder and choose **Install LM Tools** from the mouseover menu.

Modifying a Machine Template After Installing LM Tools

Modifications to a template may affect LM Tools. If you make changes, be aware of these restrictions:

- Do not add the template to a domain.
- If you change the password, you need to uninstall and reinstall LM Tools.

Installing LM Tools on a Windows Template with a Null Password

If you install LM tools on a template with a null password, and deploy a virtual machine in the Workspace based on that template, the autologin process does not work for the SID mechanism.

To address this issue, log in to the virtual machine console with the null password and wait for LM Tools to customize the virtual machine.

Uninstalling LM Tools

If you need to uninstall LM Tools at some point, refer to these instructions.

To uninstall LM Tools on a Linux guest operating system

1 Log in as root.

2 Uninstall LM Tools.

For RHEL, type:

```
# chkconfig --del lm-tools
# rm –f /etc/rc.d/init.d/lm-tools
```

For SUSE Linux, type:

```
# chkconfig --del lm-tools
# rm -f /etc/rc.d/lm-tools
```

To uninstall LM Tools on a Windows guest operating system

Use the Add or Remove Programs window in the Control Panel to remove LM Tools.

If you uninstall LM Tools in a virtual machine environment, Lab Manager is isolated from and unaware of that operation. Make sure to deselect the **LM Tools Installed** check box that is automatically selected after installing LM Tools.

To deselect the LM Tools check box

1 In the left pane of the console, click **Templates**.

2 Move the pointer over the name of the template, and choose **Properties** from the menu.

3 Deselect the **LM Tools Installed** check box.

4 Click **OK**.

Publishing a Template

Publishing a template makes it available for use in building configurations.

To publish your template

1 Verify the template is turned off and undeployed.

2 If deployed, move the pointer over the template name and choose **Undeploy** in the menu. Wait until the template status changes to **Undeployed**.

3 From the Templates page, move the pointer over the template name and choose **Publish** in the menu.

If you edit your machine template, you must repeat the steps of installing LM Tools (page 58) and publishing your template.

Sharing a Template

Sharing a template allows other users to deploy your template and use it in configurations.

To share a template

1 From the left pane, click **Templates**.

2 Move the pointer over the template name, and select **Make Shared** from the menu.

Shutting Down a Template

You must shut down the virtual machine and bring it back up.

Creating Templates from Active Virtual Machines in Lab Manager

You can create a template from an active virtual machine in Lab Manager. After a virtual machine in a configuration undergoes changes, such as the addition of software or altered properties, you might want to use it as the basis of a new machine template.

To create a machine template from an active virtual machine

1 From the left pane, click **Workspace**.

2 Move the pointer over the template name, and choose **Details** from the menu.

3 Move the pointer over the virtual machine name, and choose **Add To Templates** from the menu.

4 Specify the details of the template:

   a Enter a name.

   b (Optional) Enter a description.

   c Click **Add**.

5 From the left pane, click **Templates**.

   The Templates page appears with the new template.

Cloning Templates

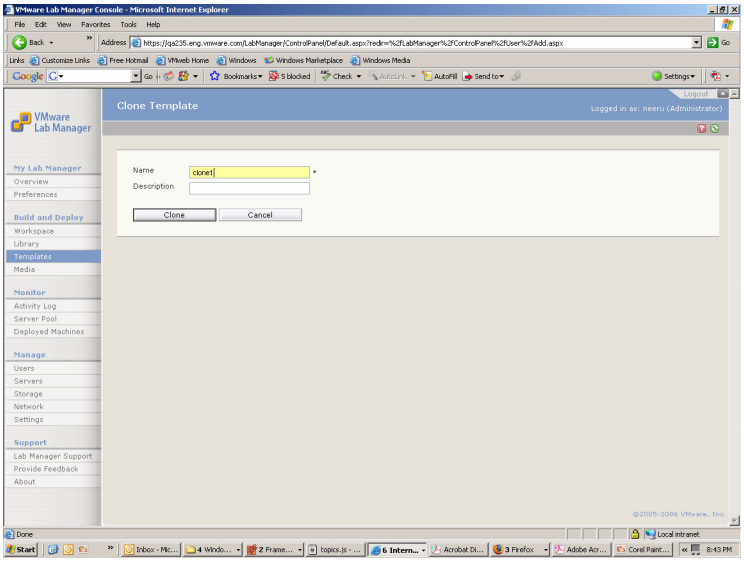
You can make a clone of your own template or a template shared by another user. This option allows you to take advantage of software already installed on an existing template.

To clone a template from another template

1 From the left pane, click **Templates**.

2 Move the pointer over the template name, and choose **Clone** from the menu.

3 Specify the details on the template:



a Enter a name.

b (Optional) Enter a description.

c Click **Clone**.

In the Templates page, the template status is **Cloning**. After a brief time, your new template is available on the page.

4 (Recommended) Install LM Tools.

You must install VMware Tools before installing LM Tools. For more information, see "Installing VMware Tools" on page 57 and "Installing LM Tools" on page 58.

Virtual machines created from templates with LM Tools installed automatically have network parameters (IP address, MAC address, Security Identifiers, and more) set when first deployed.

For more information on cloning operations, see "Reviewing Template Operations" on page 47.

Copying Templates

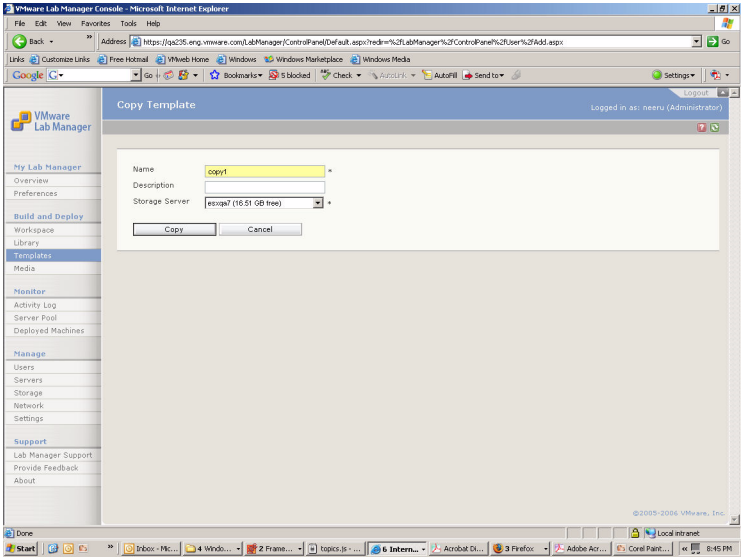
You can make a copy of your own template or a template shared by another user.

To copy a template from another template

1 From the left pane, click **Templates**.

2 Move the pointer over the template name, and choose **Copy** from the menu.

3 Specify the details on the template:



a Enter a name.

b (Optional) Enter a description.

c Select the storage server for the copy of the template.

d Click **Copy**.

In the Templates page, the template status is **Copying**. After a brief time, the new template is available on the page.

4 (Recommended) Install LM Tools.

You must install VMware Tools before installing LM Tools. For more information, see "Installing VMware Tools" on page 57 and "Installing LM Tools" on page 58.

For more information on copy operations, see "Reviewing Template Operations" on page 47.

Undeploying Templates

You can undeploy a template to stop the virtual machine from running on the Managed Server pool. Various operations, such as exporting a template, require you to undeploy the template.

To undeploy the template

1 From the left pane, click **Templates**.

2 If the template is deployed, move the pointer over the template name and choose **Undeploy** from the menu.

Sharing Templates

You have the option to keep templates for your own use or share them with other Lab Manager users.

To share your template with other users

1 From the left pane, click **Templates**.

2 Move the pointer over the template name, and choose **Make Shared** from the menu.

To reserve your template for your own use

1 From the left pane, click **Templates**.

2 Move the pointer over the template name, and choose **Make Private** from the menu.

Exporting Templates

You can export a template and its virtual machine files to a directory on your network.

NOTE Exporting can take up to 30 minutes, depending on the size of the virtual machine.

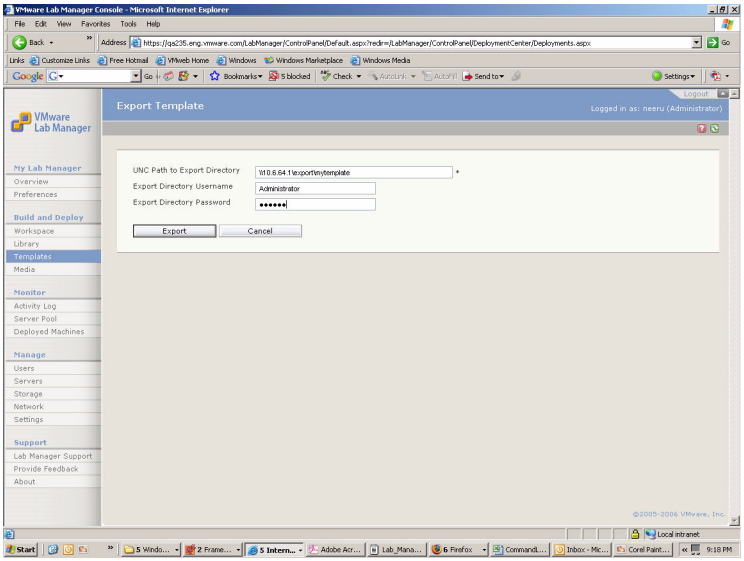
To export a template

1 From the left pane, click **Templates**.

2 If the template is deployed, move the pointer over the template name and choose **Undeploy** from the menu.

3 Move the pointer over the template name and choose **Export** from the menu.

4 Enter the information for the export process:



a In the **UNC Path to Export Directory** text box, enter the Universal Naming Convention (UNC) name of the directory (relative to the Lab Manager Server) where you want to store the configuration files. A sample path is `\\10.10.10.10\\VMwareLM\ExportTemplates`.

Use English characters for the UNC path.

b Click **Export**.

c Confirm to continue the export process.

Consolidating Templates

A virtual machine image can change over time, typically with the addition of new software and changed settings. Each change to a virtual machine image is stored as a delta disk.

Over time, the increasing number of delta disks stored across storage servers can add to the time it takes to deploy, transfer, or execute an image. To improve access and deployment time, consolidate a virtual image and its delta changes. Use this option when the virtual machine chain length is ten or more.

Consolidating a virtual machine image can take up to 30 minutes, depending on the image size and number of deltas being merged.

To consolidate a template

1 From the left pane, click **Templates**.

2 Move the pointer over the template name and choose **Consolidate** from the menu.

On the Templates page, the virtual machine status changes to **Consolidating the hard disk**. The hard disk is the virtual machine disk (`.vmdk`).

Editing Template Properties

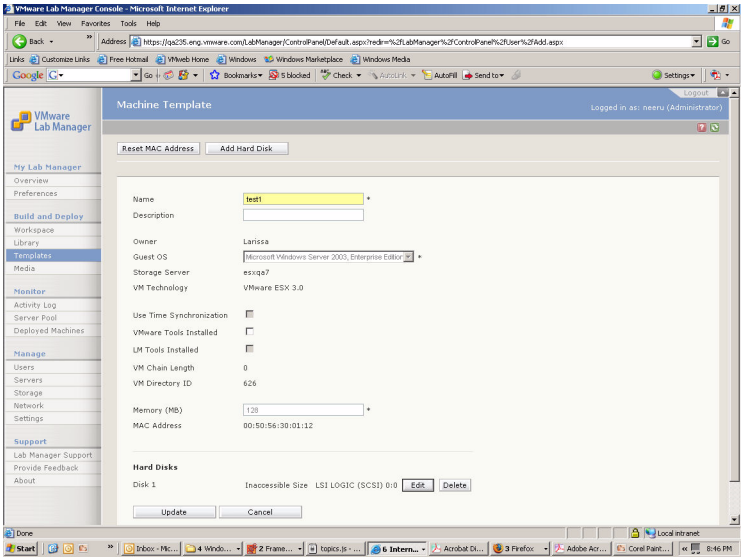
You can edit and select various properties of the template.

To edit template properties

1 From the left pane, click **Templates**.

2 Move the pointer over the template name, and choose **Properties** from the menu. You can also just click the template.

3 Review, select, and edit the appropriate properties:



- **Name** – Can contain only alphanumeric characters (a–z, A–Z, 0–9), hyphens, underscores, or periods. Maximum length is 15 characters.
- **Description** – (Optional) Maximum number of characters is 128.
- **Owner** – Name of the template owner.
- **Guest OS** – (Optional) Maximum number of characters is 128.
- **Storage Server** – Storage server to store the virtual machine on.

  If the template is deployed, click **Templates** in the left pane, move the pointer over the template name, and choose **Undeploy** from the menu.
- **VM Technology** – VMware ESX Server.
- **Use Time Synchronization** – Virtual machine time is in sync with the host operating system time.
- **VMware Tools Installed** – Indicates if VMware Tools is installed. This is how Lab Manager knows if VMware Tools is installed on the template.
- **LM Tools Installed** – Indicates if LM Tools is installed and enabled. Deselecting this check box disables LM Tools and prevents Lab Manager from customizing the network settings for a virtual machine.
  - **SID Mechanism** – (For Windows machines) Indicates the tool Lab Manager uses to change the SID. For information on the SID mechanism, see "Review the LM Tools Tab" on page 147.

    If your template uses a particular SID mechanism (**SIDgen** or **Sysprep** as designated on the **LM Tools** tab of the Web console) and the template owner wants to switch the mechanism just for that template, he or she can specify the desired option.
- **VM Chain Length** – The number of delta disks generated by certain operations. For each change, Lab Manager freezes a delta disk and creates a new one.
- **VM Directory ID** – Location of the virtual machine on the file system.
- **Memory (MB)** – Amount of RAM allocated for running the virtual machine.
- **MAC Address** – Machine Media Access Control (MAC) Address. If the template is undeployed, you can click the **Reset MAC Address** button to re-create the MAC address.
- **Hard Disks** – Storage, bus type, bus number, and bus ID for each virtual hard disk. See "Adding Virtual Hard Disks to Virtual Machines (Templates)" on page 39.

- To add a new virtual hard disk, click the **Add Hard Disk** button at the top of the page.
- To edit or remove a virtual hard disk, click the **Edit** or **Delete** buttons.

NOTE Adding or editing a virtual hard disk requires unpublishing the template. If the template is published, click **Templates** in the left pane, move the pointer over the template name, and choose **Unpublish** from the menu.

4 Click **Update**.

Deleting Templates

You can delete a template from the machine template library.

To delete a template

1 From the left pane, click **Templates**.

2 If the template is deployed, move the pointer over the template name and choose **Undeploy** from the menu

3 Move the pointer over the template name and choose **Delete** from the menu.

4 Confirm the deletion.

Working with Configurations

5

Configurations are the core of the Lab Manager system and are composed of one or more virtual machines created from machine templates. Lab Manager offers the ability to group, deploy ("power on" to interact with a template), save, share, and monitor multimachine configurations.

This chapter covers these topics:

About Configurations

Templates must be published (made available for public use) before you can create configurations. For information on building and using machine templates, see Chapter 4, "Working with Machine Templates," on page 45.

Lab Manager provides the Workspace page to work with configurations and the configuration library to store and check out configurations.

Accessing Configurations

You can access configurations in the Workspace and in the configuration library.

To access the Workspace page

Click **Workspace** in the left pane.

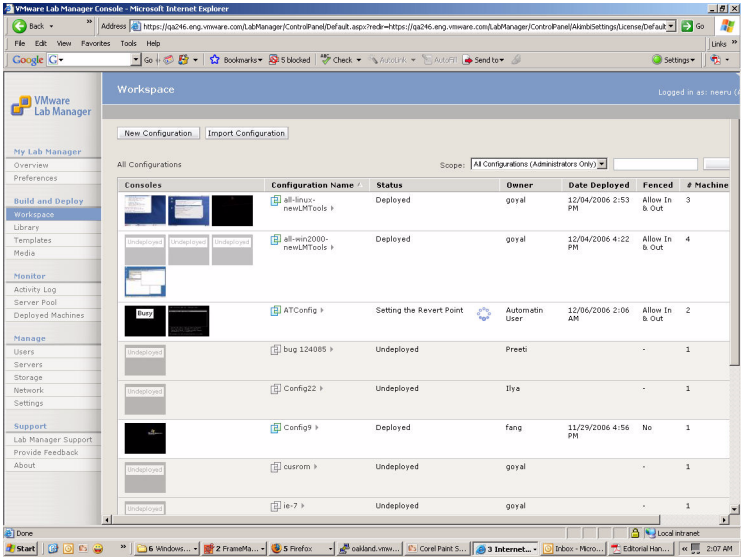


Figure 5-1. Workspace Page

The Workspace page includes these elements:

- **Configurations** – View the configurations, status, owner, and other details on this page. White rows reflect deployed configurations on the Managed Server pool.
- **Filter** – View a subset of the configurations. In the field to the left of the **Filter** button, enter text that appears in the attributes of the configuration you want to view. The filter text search does not recognize wildcards. If you enter a traditional

wildcard, such as an asterisk (*), this function performs a literal search for an asterisk symbol.

- **Scope** – Use the **Scope** list options to determine which configurations are displayed.
  - **My Configurations** – View only your configurations, both shared and private.
  - **Configurations Shared by Others** – View all shared configurations except for your own configuration.
  - **All Configurations Accessible by Me** – View your configurations, both shared and private, and configurations shared by others.
  - **All Configurations (Administrators Only)** – View all shared and private configurations. This option is available for Administrators only.

Review these highlights of the columns and buttons on the Workspace page:

- **Fenced** – Column shows configurations running in fenced mode. The ability to run in fenced mode is contingent upon licensing.
- **# Machines** – Column shows the number of virtual machines in the console.
- **Sharing** – Column shows configurations available for others to use beside the owner.
- **New Configuration** – Button enables you to creates a new configuration.
- **Import Configuration** – Button enables you to import a configuration from the network.

To access the configuration library

Click **Library** in the left pane.

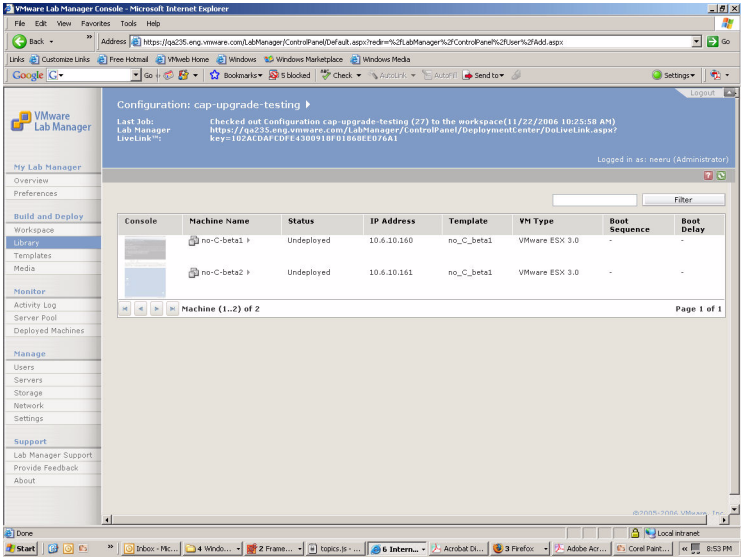


Figure 5-2. Configuration Library Page

The Library page for configurations includes these elements:

- **Configurations** – View the configurations, status, owner, and other details on this page.
- **Filter** – View a subset of the configurations. In the field to the left of the **Filter** button, enter text that appears in the attributes of the configuration you want to view. The filter text search does not recognize wildcards. If you enter a traditional wildcard, such as an asterisk (*), this function performs a literal search for an asterisk symbol.
- **Scope** – Use the **Scope** list options to determine which configurations are displayed.
  - **My Configurations** – View only your configurations, both shared and private.
  - **Configurations Shared by Others** – View all shared configurations except for your own configuration.
  - **All Configurations Accessible by Me** – View your configurations, both shared and private, and configurations shared by others.
  - **All Configurations (Administrators Only)** – View all shared and private configurations. This option is available for Administrators only.

Review some of the columns on the Library page:

- **Date Captured** – Column shows the date the configuration was captured from the Workspace to the configuration library.
- # **Machines** – Column shows the number of virtual machines in the console.
- **Sharing** – Column shows configurations available for others to use beside the owner.

Reviewing Configuration Operations

Most operations for a configuration affect all the virtual machines in the configuration. If you need to initiate an operation for a single virtual machine, drill down to the individual machine console to specify an operation.

If a particular operation appears in a configuration menu, the appearance indicates the state of one or more virtual machines in that configuration. Review these examples:

- If **Undeploy** appears in a configuration menu, at least one virtual machine in the configuration is deployed.
- If **Deploy** appears in a configuration menu, at least one virtual machine in the configuration is undeployed.
- If **Turn On** appears in a configuration menu, at least one virtual machine in the configuration is off.

Operations for a configuration might not affect all its virtual machines. Review these examples:

- If you start the **Turn On** operation, virtual machines that are already turned on are unaffected.
- If you start the **Revert** operation, only the virtual machines that have a snapshot set are reverted.

Summary of Configuration Operations

Table 5-1 summarizes the operations for configurations. To access the options, move the pointer over a configuration name and use the mouseover menu.

The displayed options depend on whether the configuration is currently deployed or undeployed.

Table 5-1. Configuration Options

Operation	Description
Capture to Library	Captures the configuration and saves it to the configuration library.
Checkout	Checks out a copy of configuration from configuration library and moves it to the Workspace.
Clone	Makes a quick copy of this configuration and moves it to the Workspace. Instead of copying an entire virtual hard disk, Lab Manager creates a delta disk. This operation addresses virtual machine proliferation by using "referential provisioning." This process involves storing new changes but referring back to a chain of delta disks. For each change, Lab Manager freezes a delta disk and creates a new one.
Copy	Creates a complete (deep) copy of the configuration. Copies include all of the delta disks. Typically, you do not copy a configuration unless you need to dismantle the storage and move the virtual machine configuration to a different server. This operation takes a longer time than the clone operation.
Delete	Deletes a configuration.
Deploy	Registers and runs the virtual machines of a configuration on the Managed Server pool.
Deploy with defaults	Deploys a configuration with the default user preferences.
Details	Enables you to view details about virtual machines in the configuration.
Export	Exports a configuration to a directory on the network.
Force Undeploy	Forces the undeploy operation to occur after an undeploy operation fails. You might be aware of a problem (for example, the Managed Server is down) but you forcefully need to clean the Workspace area.
Import	Imports the configuration from directory on your network.
LiveLink	Creates a URL for a configuration in the configuration library. Lab Manager can email this URL to another user. When a user clicks the URL, the configuration returns to an active state.
Make Private	Makes this configuration accessible only for you and Administrators.
Make Shared	Makes this configuration available for all users to use and perform operations on.
Properties	Enables you to view and edit configuration properties. Any changes to the properties affect the default settings for new virtual machines added to the configuration, network configuration of the virtual router during fence deployment, and display. The changes do not modify existing virtual machines in the configuration.

Table 5-1. Configuration Options (Continued)

Operation	Description
Reset	Restarts the virtual machines in a configuration and clears the machine states. This operation does not shut down the guest operating systems.
Resume	Resumes the operation of a suspended configuration.
Revert	Returns the configuration to its last snapshot revert point.
Show Consoles	Shows a large, graphical display of all configuration virtual machine console windows.
Shut Down	Shuts down the guest operating systems of the virtual machines in a configuration.
Snapshot	Captures a configuration (and all its virtual machines) at a specific point in time. Only one snapshot can exist at a time. Taking a new snapshot replaces the previous one.
Suspend	Stops the operation affecting the virtual machines in a configuration. This suspends or "freezes" CPUs for the virtual machines.
Turn Off	Turns off the virtual machines in a configuration. This operation is the virtual equivalent of physically powering off machines.
Turn On	Turns on the virtual machines in a configuration. This operation is the virtual equivalent of physically powering on machines.
Undeploy	Stops running the virtual machines of a configuration on the Managed Server pool.

Summary of Configuration States and Attributes

Configuration states are transitory or nontransitory.

- Transitory states, such as **Deploying** and **Suspending**, exist for most operations. These states appear in the **Status** column on the Workspace page when active.

  When a configuration is in a transitory state, a spinning icon appears in the **Status** column.

- Nontransitory states (for example, **Deployed** and **Undeployed**) appear in the **Status** column.

Configuration attributes cover these areas:

- Date and time of deployment (if deployed)
- Number of machines
- Shared or private status

- Fenced mode status (if deployed)

Creating Configurations

A configuration uses templates created by you or provided by Lab Manager. You must publish the templates to make them available for building configurations.

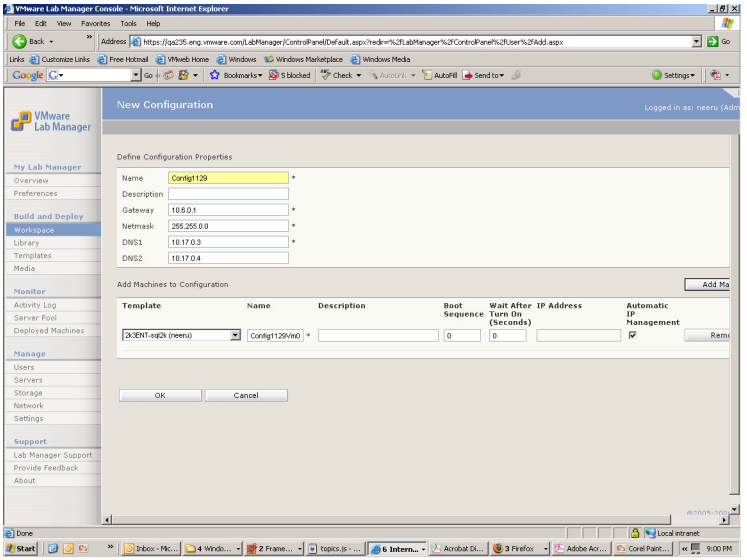
Creating a configuration involves defining configuration properties and adding virtual machines to the template.

To define configuration properties for a new configuration

1 In the left pane, click **Workspace**.

2 Click the **New Configuration** button at the top of the page.

3 In the **Define Configuration Properties** list, complete these tasks:



a Enter a name for the configuration.

b (Optional) Enter a description of the configuration.

c (Optional) Change the networking information for the gateway, netmask, and DNS settings for the virtual machines.

On the same page, proceed to add virtual machines to the configuration.

To add virtual machines to a new configuration

1 Select the template for the virtual machine.

The **Template** list contains the templates you created and the templates shared by others. If a known template does not appear in the list, verify that you published the template (see page 62).

2 Enter the name of the virtual machine.

3 (Optional) Enter a description of the virtual machine.

4 (Optional) Change the defaults values for the boot sequence and boot delay:

- **Boot Sequence** – Enter an integer number (0-n) indicating the boot order for the virtual machines.

  You do not need to use sequential numbers. Lab Manager can determine the relative order.

- **Wait After Turn On (Seconds)** – Enter an integer number indicating the delay time (or "pause") between the boot up process of this machine and the next machine.

5 Specify whether you want automatic IP management.

To manually configure an IP address for this virtual machine, deselect the **Automatic IP Management** check box, and enter an IP address. For more information on IP address allocation, see "Understanding IP Address Management" on page 139 and "Manually Configuring the IP Address for the Virtual Machine" on page 80.

6 To add another machine to this configuration, click **Add Machine** and specify the required information. An additional entry row entry appears in the **Add Machines to Configuration** list.

NOTE During the creation of the initial configuration, you can add only 20 virtual machines. You can add more virtual machines at a later time.

---

7 Click **OK**.

The new configuration appears in the Workspace page.

Manually Configuring the IP Address for the Virtual Machine

On the New Configuration page, entering an IP address changes the information that Lab Manager has about the machine but does not necessarily change the IP address configured on the machine. This situation depends on whether the template has LM Tools.

Review the scenarios in Table 5-2.

Table 5-2. IP Address Entry Scenarios

Automatic IP Management	Template With LM Tools	Template Without LM Tools
Yes	Lab Manager assigns the IP address internally and configures the virtual machine.	Lab Manager assigns the IP address internally, but the user must manually configure the virtual machine: Navigate to the properties information for the virtual machine, note the assigned IP address, and manually configure the virtual machine IP address.
No	Lab Manager takes the address that the user enters, assigns it internally, and configures the virtual machine.	Lab Manager assigns the IP address that the user enters, but the user must manually configure the virtual machine IP address.

For more information on manually configuring a virtual machine IP address, see "Changing IP or MAC Addresses" on page 33.

Adding Virtual Machines to Existing Configurations

After you build a configuration, you can add more virtual machines to it at any time.

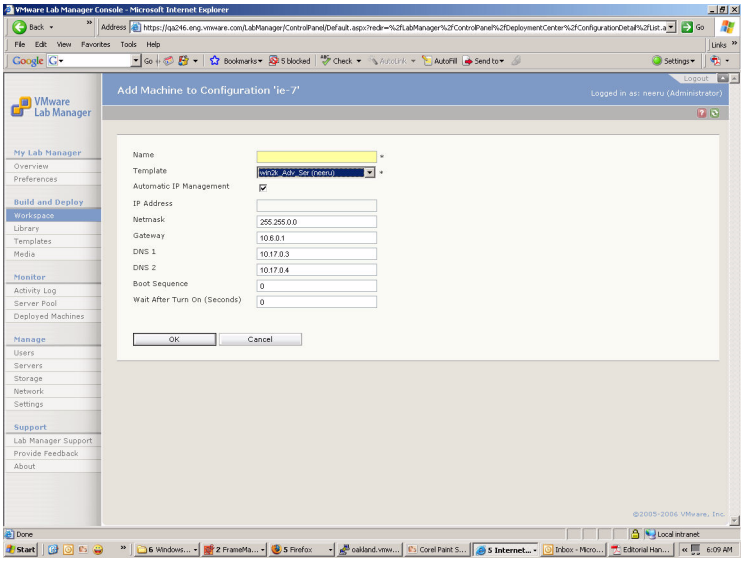
To add virtual machines to configurations

1 In the left pane, click **Workspace**.

2 Move the pointer over the configuration name and choose **Details** from the menu.

3 Click the **Add VM** button.

4 Enter the information for the virtual machine:



a Enter a virtual machine name.

The name must contain alphanumeric characters (a–z, A–Z, 0–9), hyphens, underscores, or periods. Maximum length is 15 characters.

b Select the template from the list of published templates.

c Specify whether you want automatic IP management.

To manually configure an IP address for this virtual machine, deselect the **Automatic IP Management** check box.

For more information, see the step on configuring IP management in "Creating Configurations" on page 78.

d See your IT Administrator to change network settings for the gateway, netmask, DNS 1, and DNS 2.

e Enter an integer number (0–n) indicating the boot order for the virtual machines.

You do not need to use sequential numbers. Lab Manager can determine the relative order.

f Enter an integer number (in seconds) indicating the delay time (or "pause") between the boot up process of this machine and the next machine.

For example, if you have a server and client setup, the client requires the server to function upon startup. You can use this feature to start the server, pause, and start the client.

g Click **OK**.

The new virtual machine appears as part of the configuration in the Workspace page.

Deploying Configurations

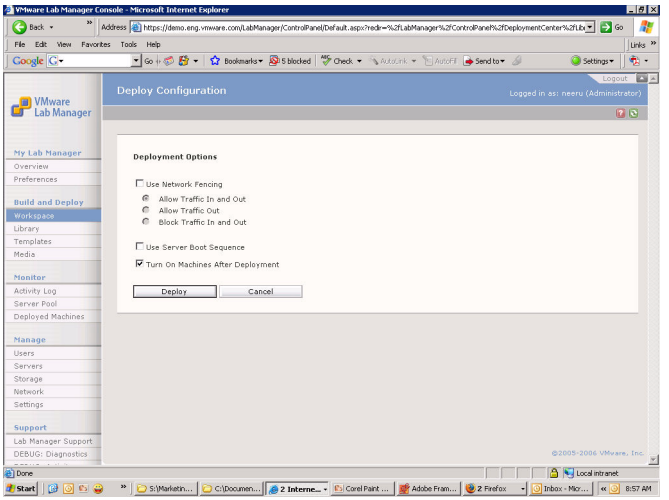
Deploying a configuration registers and runs the virtual machines on the Managed Server pool. This section includes information on deploy options and IP address allocation.

To deploy a configuration

1 In the left pane, click **Workspace**.

2 Move the pointer over the name of the configuration and choose **Deploy with defaults** (page 84) or **Deploy** from the menu.

3 If you choose **Deploy**, specify the required information in the Deploy Configuration page.



- To understand the options, see "Deploy Options" on page 83 and "Deploy with Defaults Option" on page 84.
- Click **Deploy**.

Deploy Options

Review the options for the **Deploy** operation:

- Specify whether to deploy the configuration in fenced mode.

  Fencing is a technology that isolates or "fences" groups of machines on the same network from other machines. For complete information on this feature and consequences of deploying a fenced configuration after deploying it without fencing and saving its state, see Appendix A, "Network Fencing," on page 161.

  - **Allow Traffic In and Out** – Virtual machines can communicate with machines outside the fence and machines outside the fence can communicate with virtual machines in the fenced configuration.
  - **Allow Traffic Out** – Virtual machines in a fenced configuration can initiate communication to machines outside the fence, and can receive messages back on the same connection. Machines outside the fence cannot initiate communication to virtual machines in the fenced configuration.

    This option is useful when virtual machines need to obtain data or execute code outside the fence (as seen with Web services or databases), but do not want to receive messages that may disrupt testing.
  - **Block Traffic In and Out** – Network traffic does not travel across the fence. Virtual machines in a fenced configuration cannot communicate with machines outside of the fence, and machines outside the fence cannot communicate with virtual machines in the fenced configuration.

    This option is useful in these circumstances:

    - You are testing software viruses which need to remain isolated from the network.
    - You are testing a client-server application in isolation.

  Deploying a configuration in fenced mode places all the virtual machines on a single Managed Server. You must have a Managed Server connected to the storage server where the templates that serve as the basis of this configuration reside. The Managed Server must have sufficient resources, such as memory, slots, and fences.

CAUTION If you deploy a cloned or checked-out configuration and you do not use fencing, errors about duplicate IP addresses appear when the original configuration is also deployed in unfenced mode.

Other than fencing one of the configurations, your only other option is to manually change the IP and MAC addresses (and Security Identifiers on Windows machines) on each of the virtual machines in one of the configurations.

Changing virtual machine IP and MAC addresses involves manually changing the IP and MAC addresses on the virtual machine, and editing the properties information to ensure Lab Manager can acknowledge the new addresses. For more information, see "Changing IP or MAC Addresses" on page 33.

- **Use Server Boot Sequence**—You can boot virtual machines in a specific sequence or all at once. Select this check box if you want to use the boot sequence specified during the creation of the configuration.
- **Turn On Machines After Deployment**—Deselect this check box to prevent Lab Manager from turning on virtual machines immediately after deployment. Some users might find it useful to manually bring up virtual machines one at a time.

Deploy with Defaults Option

If you run the **Deploy with Defaults** operation on a configuration, Lab Manager uses the deployment options from your user preferences. Review these points:

- Click **Preferences** in the left pane to view and edit your user preferences.
- On the Workspace page, the configuration entry in the **Status** column changes to **Deploying**. After a brief time, this status changes to **Deployed**.
- To view configuration details, move the pointer over the configuration name and choose **Details** from the menu.
- To view a full-screen display of the virtual machines in the configuration, click the virtual machine console thumbnail in the **Consoles** column.

Undeploying Configurations

Undeploying a configuration stops virtual machines in a configuration from running on the Managed Server pool.

To undeploy a configuration

1 In the left pane, click **Workspace**.

2 Move the pointer over the configuration name and choose **Undeploy** from the menu.

If an undeploy operation fails, you can force the undeploy operation to occur to clean the Workspace area.

To undeploy configurations with force

1 If an attempt to undeploy a configuration fails and you need to access this option, click the **Error in Undeploying** link in the **Status** column.

2 Click **Force Undeploy**.

Capturing Configurations to the Library

Captured configurations in the configuration library are read-only. You cannot alter a captured configuration. You can delete a captured configuration.

To capture a configuration to the configuration library

1 In the left pane, click **Workspace**.

2 Move the pointer over the configuration name and choose **Capture to Library**.

3 Complete the capture process:

a Enter a name for the captured configuration.

NOTE VMware recommends devising a naming convention for your stored configurations that assists in unique and simple identification.

---

b (Optional) Enter a description.

c Click **Capture**.

On the Workspace page, the entry in the **Status** column briefly changes to **Capturing**. After a brief time, the entry changes back to **Deployed**.

4 In the left pane, click **Library** to see the captured configuration.

Checking Out Configurations from the Library

Configurations stored in the library are read-only. When you check out a configuration, Lab Manager creates a copy that requires a different name.

To check out and copy a configuration

1 In the left pane, click **Library**.

The Library page shows all your captured configurations and captured configurations shared by other users.

2 (Optional) Use the **Scope** list to determine which configurations are displayed.

- **My Configurations** – View only your configurations, both shared and private.
- **Configurations Shared By Others** – View shared configurations outside of your own configurations.
- **All Configurations Accessible By Me** – View your configurations (shared and private) and configurations shared by others.
- **All Configurations (Administrator Only)** – View all configurations.

3 Move the pointer over the configuration name and choose **Checkout** from the menu.

4 Complete the checkout process:

a Enter a unique name for the checked-out configuration.

b Click **Checkout**.

After a brief time, an undeployed copy of the library configuration appears in the Workspace page.

Stopping Configurations

More than one option is available in the Workspace to stop a configuration.

- **Undeploy** – Turns off all configuration virtual machines, freeing resources on the Managed Server pool.

CAUTION During the undeploy operation, an orderly shutdown of the virtual machines does not exist. The undeploy operation "turns off" the virtual machines before uninstantiating them, and removes them from the Managed Server pool. For example, if you have an application open on a Windows virtual machine, you must remember to save your work.

If you need to preserve the current state of the configuration, capture the configuration to the configuration library.

- **Turn Off** – Turns off all virtual machines in the configuration. Turning off a virtual machine is the virtual equivalent of powering down a physical machine. The configuration remains registered on the Managed Server pool.

  The **Turn On** option reverses this operation.

- **Suspend** – Suspends CPUs for all the virtual machines. The configuration remains registered on the Managed Server pool.

  The **Resume** option reverses this operation.

Cloning Configurations

You can clone your own configuration or configurations shared by other users. When you clone a configuration, Lab Manager assigns the same network parameters to the cloned virtual machines. If you deploy the original and cloned configurations at the same time, duplicate IP address errors occur unless one of the configurations is deployed in fenced mode.

In a fenced configuration, virtual machines retain the same IP address within the fence. Lab Manager assigns new external IP addresses for communication outside the fence. Each time you deploy a fenced configuration, Lab Manager assigns new external IP addresses from the Lab Manager IP address pool. Lab Manager returns the IP addresses to the pool when the fenced configuration is undeployed.

NOTE Lab Manager does not return the IP address of a cloned or copied virtual machine to the IP pool until the virtual machine and all its copies are deleted.

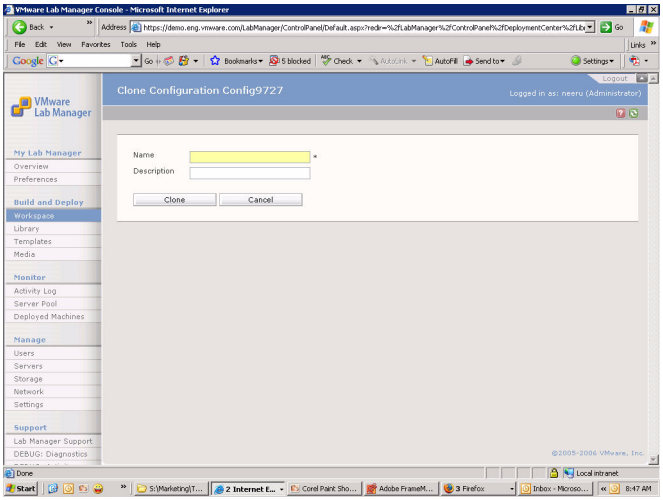
For more information on cloning operations, see "Reviewing Configuration Operations" on page 75.

To clone a configuration

1 In the left pane, click **Workspace**.

2 Move the pointer over the configuration name and choose **Clone** from the menu.

3 Specify the details of the clone:



a Enter a name for the clone.

b (Optional) Enter a description.

c Click **Clone**.

The cloned configuration appears in the Workspace page with an **Undeployed** status. The status of the original configuration being cloned is **Cloning**. After cloning process, the status reverts to its previous state.

Copying Configurations

You can make a copy of your own configuration or a configuration shared by another user.

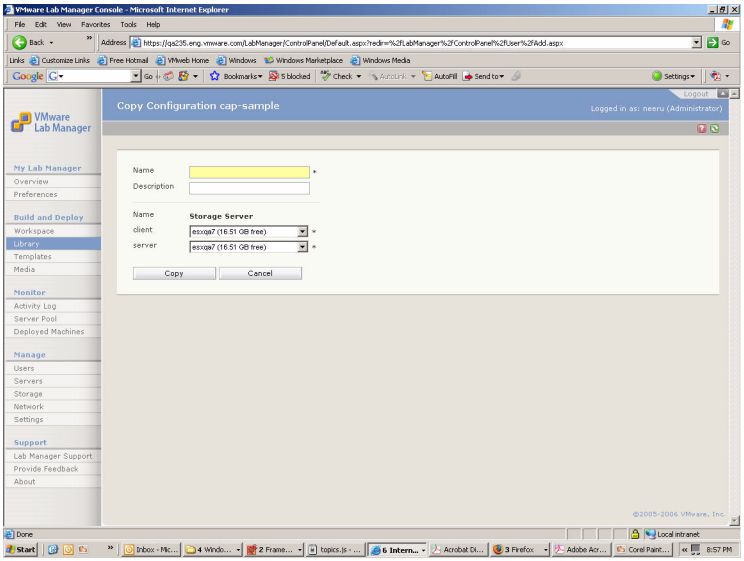
To copy a configuration

1 In the left pane, click **Workspace**.

2 If the configuration is deployed, move the pointer over the configuration name and choose **Undeploy** from the menu.

3 Move the pointer over the template name and choose **Copy** from the menu.

4 Specify the details of the configuration:



a Enter a name.

b (Optional) Enter a description.

c Select the storage server for the copy of the configuration.

d Click **Copy**.

In the Workspace page, the configuration status is **Copying**. After a brief time, the new configuration is available on the page.

For more information on copy operations, see "Reviewing Configuration Operations" on page 75.

Exporting Configurations

You can export an undeployed configuration and all its virtual machine files to a directory on your network.

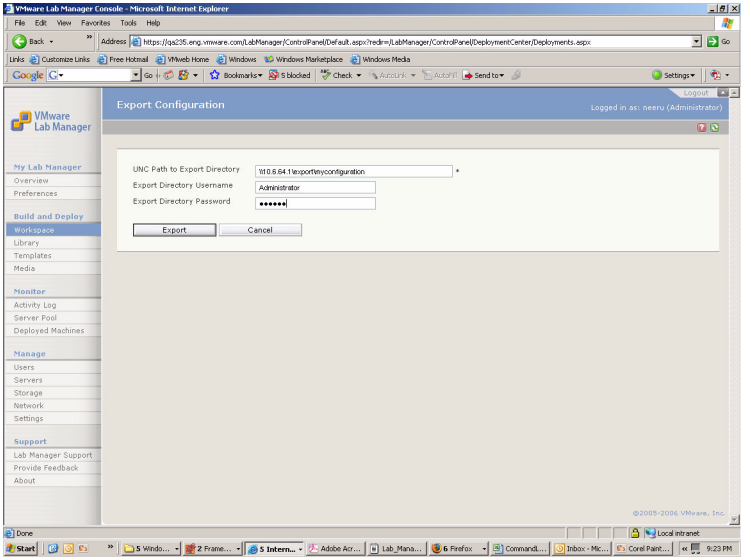
Exporting can take up to 30 minutes for each virtual machine in the configuration, depending on the size of the virtual machine. The Administrator may restrict users from performing this system-wide operation. See the Administrator if the Export function is not visible to you.

To export a configuration

1 In the left pane, click **Workspace**.

2 Move the pointer over the undeployed configuration name and choose **Export** from the menu.

3 Enter the information on the configuration:



a Enter the UNC (Universal Naming Convention) name of the directory (relative to the Lab Manager Server) where you want your configuration files stored. A sample path is `\\10.6.1.246\VMwareLM\ExportConfigs`.

Use English characters for the UNC path.

b If necessary, enter a user name and password for the export directory.

c Click **Export**.

4 Confirm to continue the export process.

The configuration appears on the Workspace page with a status of **Exporting**.

Importing Configurations

You can import a configuration and all its virtual machine files to a directory on the network.

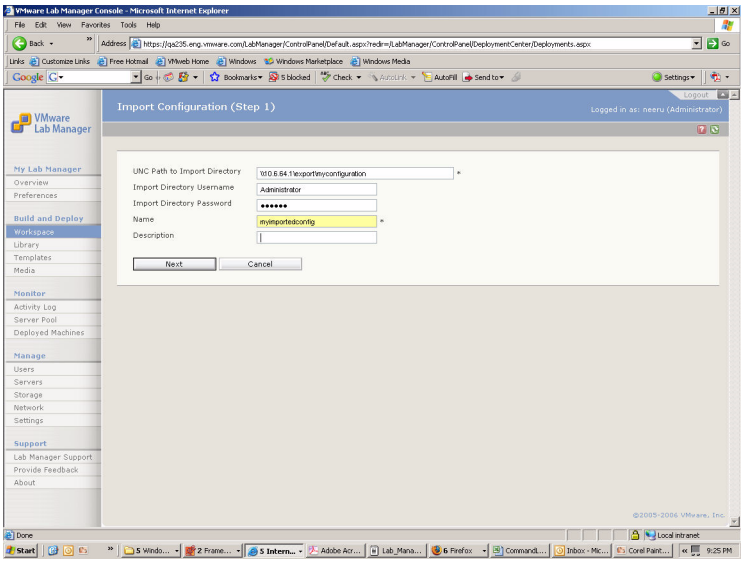
Importing can take up to 30 minutes for each virtual machine in the configuration, depending on the size of the virtual machine.

To import a configuration

1 In the left pane, click **Workspace**.

2 Click the **Import Configuration** button at the top of the page.

3 Enter the information for the configuration:



a Enter the UNC (Universal Naming Convention) name of the directory (relative to the Lab Manager Server) where you want your configuration files stored. A sample path is `\\10.6.1.246\VMwareLM\ExportConfigs`.

Use English characters for the UNC path.

b If necessary, enter a user name and password for the import directory.

c Enter a name for the imported configuration.

d (Optional) Enter a description.

e Click **Next**.

4 Enter the information on the storage server:

   a Select the storage server to import the configuration to.

   b Click **Import**.

   The Workspace page has an **Importing** status for the configuration.

Sharing Configurations

Sharing a configuration to make it available for other users.

To share a configuration

1 In the left pane, click **Workspace**.

2 Move the pointer over the undeployed configuration name and choose **Make Shared** from the menu.

   The Workspace page shows a **Shared** entry for the configuration.

To see all shared configurations except for your own configurations, select **Configurations Shared by Others** in the **Scope** list.

Creating and Restoring Configuration LiveLinks

A LiveLink is the HTTP URL of a configuration in the configuration library. You can email this URL to another Lab Manager user who can click it to return the configuration to its active state.

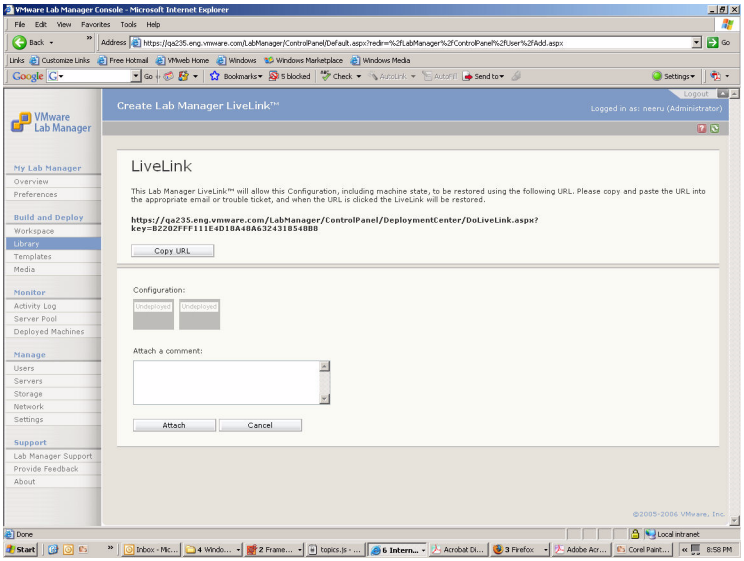
To create a LiveLink

1 In the left pane, click **Library**.

2 If the configuration is not yet shared, move the pointer over the configuration name and choose **Make Shared** from the menu.

3 Move the pointer over the configuration name and choose **LiveLink** from the menu. The URL to the library configuration appears.

4 Set up the LiveLink:



a Click **Copy URL** to copy the URL to your Windows clipboard.

b Email this link to another tester or developer.

c (Optional) Type a note in the **Attach a comment** field. This note appears when a user invokes the URL of the configuration LiveLink.

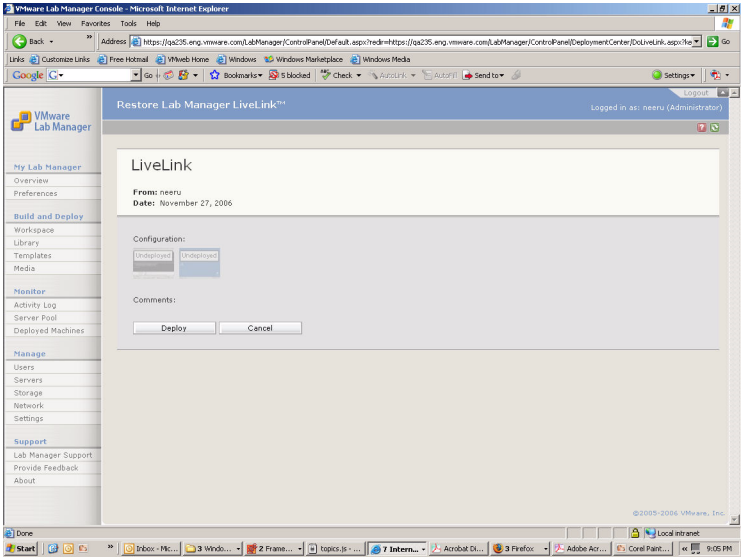
To restore a configuration LiveLink

1 Invoke a LiveLink URL in a browser.

If you are not already logged in, the Lab Manager login page appears.

2 Enter your user name and password.

The Restore Lab Manager LiveLink page appears. Thumbnails of the virtual machines are available.



3 Click **Deploy** to deploy the configuration in the Workspace.

The configuration name is the name of the Library configuration with "LiveLink" prefixed to it. For example, "Oracle Linux Bob" becomes "LiveLink – Oracle Linux Bob (n)," where "n" indicates the number of times the LiveLink has been restored.

Taking Snapshots and Reverting to Snapshots

After deploying a configuration, you have the option to take a snapshot and revert to the snapshot at a later time. Review these points:

- A snapshot is a complete configuration (including all its virtual machines) at a specific point in time.
- Once set, Lab Manager stores the snapshot with the configuration.
- Only one snapshot for a configuration is active at a time. The most recent snapshot replaces the previous one.
- A snapshot might be useful as a baseline or "clean slate" that you can return to when running a number of tests on the same configuration.

To take a snapshot of a configuration

1 In the left pane, click **Workspace**.

2 Move the pointer over the configuration name and choose **Deploy** from the menu.

3 Move the pointer over the configuration name and choose **Snapshot** from the menu.

The configuration status displays **Setting the Revert Point**. After a brief time, the configuration returns to its previous state.

To revert a configuration to its snapshot

1 In the left pane, click **Workspace**.

2 Move the pointer over the deployed configuration name and choose **Revert** from the menu.

The status of the configuration appears as **Reverting**. The thumbnail icons for the virtual machines are updated to reflect the revert point state.

Editing Configuration Properties

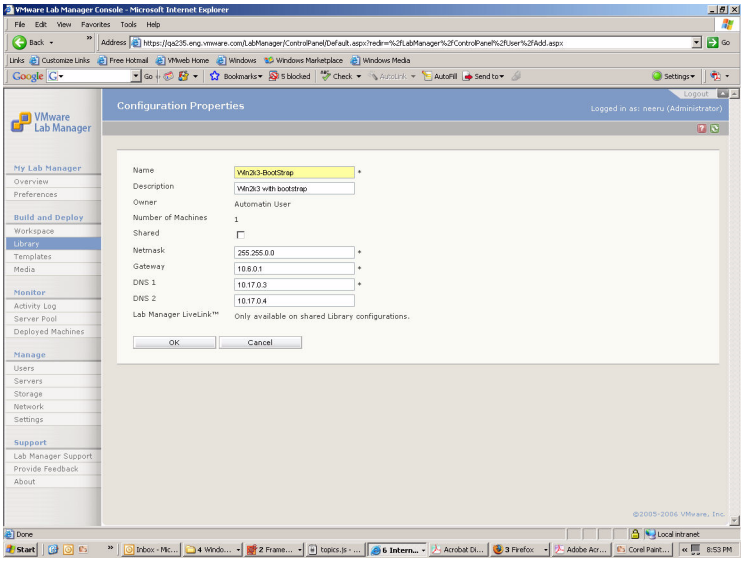
You can edit the properties for configurations in the Workspace or configuration library.

To edit configuration properties

1 In the left pane, click **Workspace** or **Library**.

2 Move the pointer over the configuration name and choose **Properties** from the menu.

3 Edit the appropriate properties:



a Enter a name for the configuration.

b Enter a description of the configuration.

c Specify whether to share this configuration with other users.

d Change the networking information for the gateway, netmask, and DNS settings for the virtual machines.

e Click **OK**.

Viewing Details on Virtual Machines in a Configuration

From the Workspace or configuration library, you can view details on the virtual machines in a configuration.

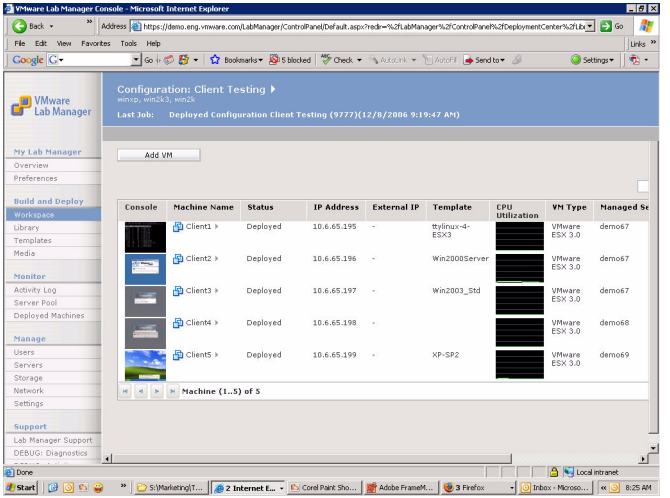
To view details on all virtual machines in a configuration

1 In the left pane, click **Workspace** or **Library**.

2 Move the pointer over the configuration name and choose **Details** from the menu.

3 For each virtual machine in the configuration, view details on the virtual machine status, IP addresses (two for each virtual machine in fenced mode), template, CPU

utilization, fence status, and more. Library configurations do not include all of the details that appear for Workspace configurations.



Review these highlights:

- **IP Address** – Provides the IP address of the virtual machine.
- **External IP** – Provides the external IP address for the virtual machine if it runs in fenced mode.

  This column appears only for fenced configurations in the Workspace. For details about fenced mode, see Appendix A, "Network Fencing," on page 161.
- **Template** – Indicates the template that the virtual machine is based on.
- **CPU Utilization** – Displays the amount of virtual machine CPU used over the last five minutes.

  This column appears only for Workspace configurations. The graph does not indicate the amount of CPU on the host Managed Server that the virtual machine uses.
- **Managed Server** – Indicates which Managed Server is hosting the virtual machine.

  This column appears only for Workspace configurations.
- **Boot Sequence** – Indicates the order to boot the virtual machines.
- **Boot Delay** – Indicates the delay time (in seconds) after booting this machine and before booting the next machine.

Accessing a Virtual Machine Console

From the Workspace, you can navigate to a specific virtual machine console.

To navigate to a large-screen display of a virtual machine console

1 In the left pane, click **Workspace**.

2 If the configuration is undeployed, move the pointer over the configuration name and choose **Deploy** from the menu.

3 Click the virtual machine thumbnail icon in the **Console** column.

Accessing All Virtual Machine Consoles in a Configuration

Lab Manager provides a page with all virtual machine consoles in a configuration.

To view all virtual machine consoles for a configuration on one page

1 In the left pane, click **Workspace**.

2 If the configuration is undeployed, move the pointer over the configuration name and choose **Deploy** from the menu.

3 Move the pointer over the configuration name and choose **Show Consoles** from the menu.

4 Scroll up or down to access a virtual machine console.

Deleting Configurations

You can delete a configuration from the Workspace page or configuration library.

To delete a configuration from the Workspace page

1 In the left pane, click **Workspace**.

2 If the configuration is deployed, move the pointer over the configuration name and choose **Undeploy** from the menu.

3 Move the pointer over the configuration name and choose **Delete** from the menu.

4 Confirm the deletion.

To delete a configuration from the configuration library

1 In the left pane, click **Library**.

2 Move the pointer over the configuration name and choose **Delete** from the menu.

3 Confirm the deletion.

Working with Media

6

The media library enables you to store media (CD and floppy) image files. You can upload data (for example, drivers) to a template from the media library.

During the **Insert CD** or **Insert Floppy** operations available from the individual console of a template or configuration, you can access the ISOs in the media library.

This chapter covers these topics:

Accessing the Media Library

Access the Media page to work with CD and floppy image files.

To access the media library

In the left pane, click **Media**.

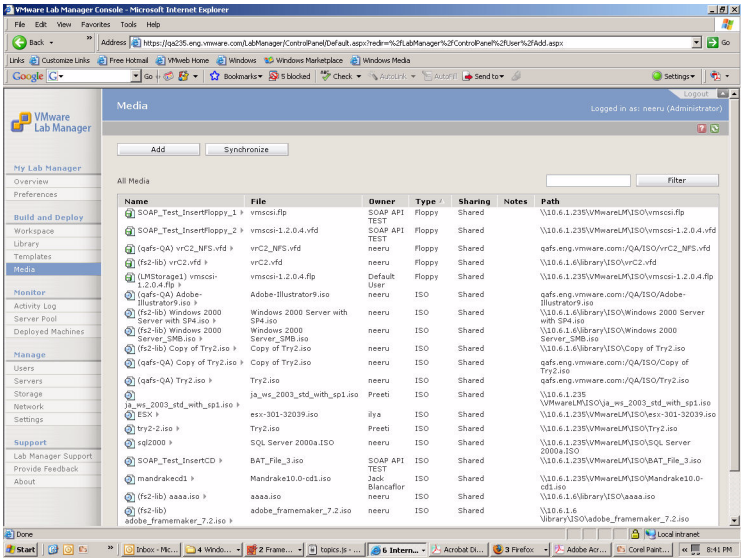


Figure 6-1. Media Page

The page highlights the owner of the file, the type of media, the sharing status, and the path location. You can view image files shared by other users. Administrators can view all media images.

For your convenience, Lab Manager automatically provides the `(LMStorage1) vmscsi-1.2.0.4.flp` file in the media library. This media file is a BusLogic driver disk for the installation of Windows operating systems (such as Windows XP). For information on this driver, see the VMware Guest Operating System Installation Guide:

http://pubs.vmware.com/guestnotes/wwhelp/wwhimpl/js/html/wwhelp.htm

Reviewing Media Operations

Review the operations available from the Media page:

Adding Media to the Library

You can add media from an SMB server to the library. Review these file requirements:

- Lab Manager can handle image files up to 2GB.
- CD files must end with `.iso`.
- Floppy files must end with `.img`, `.vfd`, and `.flp`.

You cannot add media from an NFS server, but you can synchronize the library with the contents of an NFS server. For details, see "Synchronizing Lab Manager with Media Storage" on page 102.

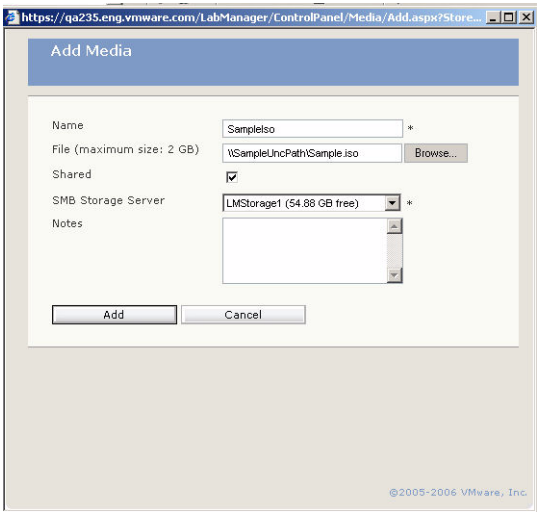
To add media to the library

1 In the left pane, click **Media**.

2 Click **Add**.

3 Confirm to abort any ongoing media upload.

4 Enter the details of the file:



a Enter a name.

You cannot enter a name that already exists in the library.

b Browse for the file.

c Specify whether you want to share the file with others.

d Select the SMB storage server that contains the media file.

e Enter specific notes on the file.

f Click **Add**.

During the upload process, you can navigate to other pages and check on the progress at your convenience.

Synchronizing Lab Manager with Media Storage

You can synchronize the contents of the Lab Manager media library with the contents of media storage servers. Specifically, Lab Manager enables you to synchronize the media library with the files in the `\\VMwareLM\ISO` folder of the default media repository. Lab Manager automatically creates this folder for the default server.

To synchronize Lab Manager with files on NFS media servers, refer to the *VMware Lab Manager Installation Guide* for information on NFS storage setup.

The ability to synchronize the library enables users to perform ISO operations outside of the Lab Manager Web console. Use the synchronize feature after moving or deleting large files or large numbers of files.

For more details on NFS storage, see "Adding Media Storage to Lab Manager" on page 130.

To synchronize Lab Manager Server with NFS media storage

1 In the left pane, click **Storage**.

2 In the left pane, click **Media**.

3 Click **Synchronize** to make Lab Manager recognize the contents of the NFS server.

4 Confirm to synchronize the contents.

Deleting Media from the Library

Deleting a media file only deletes the Lab Manager database entry, not the actual file.

To delete media from the library

1 In the left pane, click **Media**.

2 Move the pointer over a media file name and choose **Delete** from the menu.

3 Confirm to delete the file.

Sharing Media Files

You can make media files available to others for use.

To share media files

1 In the left pane, click **Media**.

2 Move the pointer over the name of a private media file and choose **Make Shared** from the menu.

Privatizing Media Files

You can keep media files for private use.

To privatize media files

1 In the left pane, click **Media**.

2 Move the pointer over the name of a private media file and choose **Make Private** from the menu.

Editing Media Properties

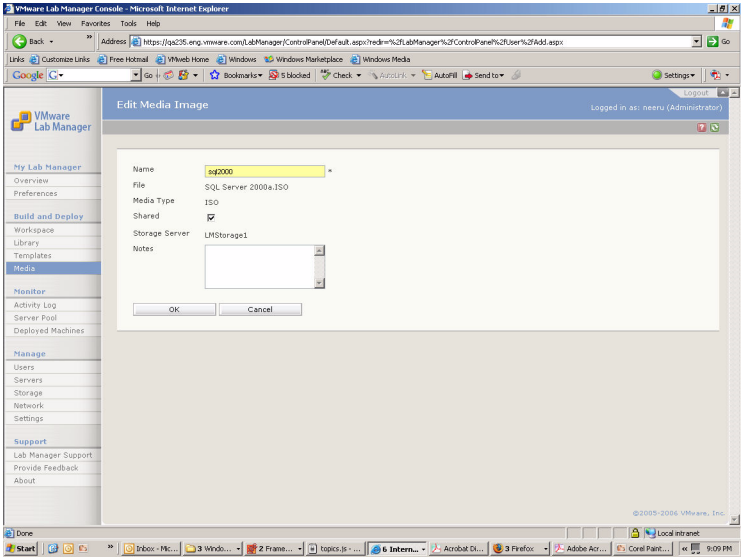
From the Media page, you can edit the properties of a media file.

To edit media properties

1 In the left pane, click **Media**.

2 Move the pointer over a media file name and choose **Properties** from the menu.

3 Edit the properties:



a Enter the name of the file.

b Specify whether to share the template among users.

c Enter extra details on the file.

d Click **OK**.

Administering and Monitoring Lab Manager 7

Use the Lab Manager Web console to manage and monitor your Lab Manager system. Many operations appear only for users with Administrator privileges.

This chapter covers these topics:

Monitoring Lab Manager

You can monitor these areas:

- **Activity Log** – View information about asynchronous actions. This feature is available to all users.
- **Server Pool** – View a graphical display of the Managed Server systems and current usage. From this page, you can perform configuration operations and access virtual machine consoles.
- **Deployed Machines** – View information about all deployed virtual machines.

Monitoring the Activity Log

All users can view the activity log to monitor time-consuming (asynchronous) tasks or jobs which do not require immediate completion.

Examples of asynchronous operations include deploying a configuration, undeploying a configuration, cloning a configuration, and setting a revert point for a configuration.

To monitor activities

In the left pane, click **Activity Log**.

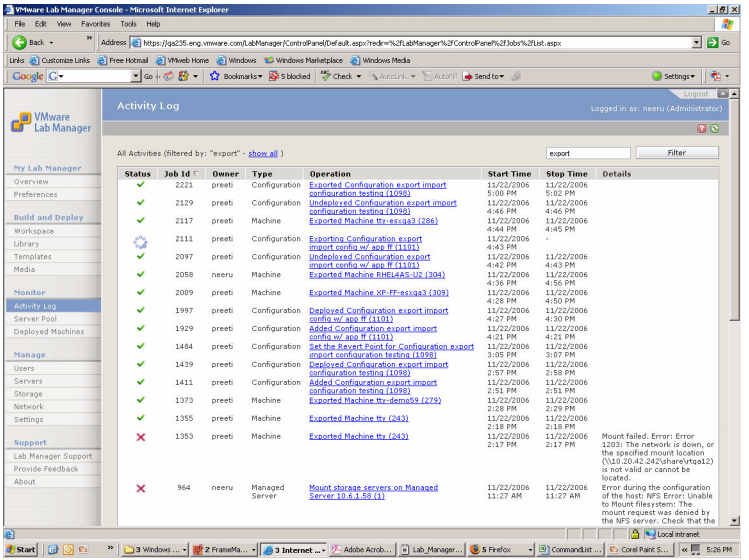


Figure 7-1. Activity Log Page

Review these highlights of the log:

- The **Status** column indicates the success, failure, or in progress status of a job. A failed job includes a short description in the **Details** column.
- The job types include **Configuration**, **Machine**, **Storage Server**, and **Managed Server**.
- Details and debugging information are available through the link in the **Operation** column.

Monitoring the Server Pool

Administrators can view a graphical display of the Managed Server pool and its usage.

To monitor the server pool

In the left pane, click **Server Pool**.

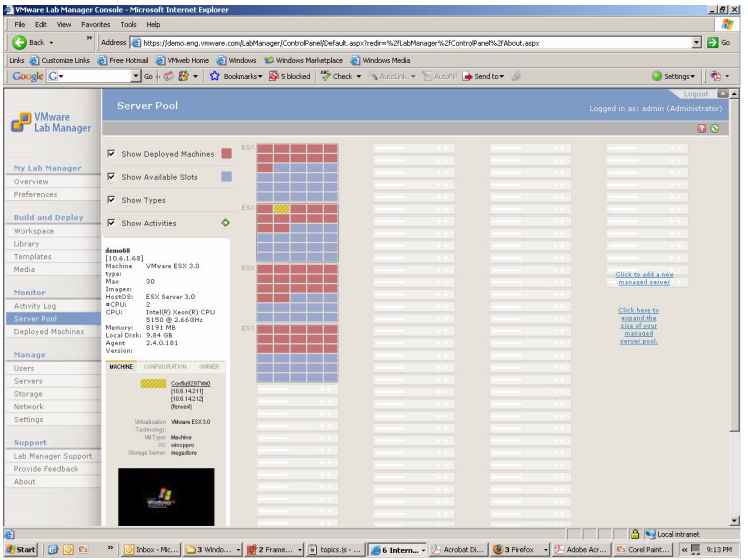


Figure 7-2. Server Pool Page

This page highlights this information:

- The number of Managed Server licenses as indicated by the number of Managed Server systems that appear on the page.
- The number of Managed Server systems in use.
- The type of virtual technology (ESX Server) running on each Managed Server.

- The type of virtual machine (machine in a Workspace configuration or template) running on each Managed Server.
- The number of available slots you have for virtual machines on your Managed Server systems.

The left panel in the page presents these options:

- If you do not select any option, you can still see the outline of each Managed Server that you have a license for.

  You can click a Managed Server to view machine details in the bottom of the left panel. These details include the name, machine type, CPU, local disk, and version of the Managed Server agent software.

- If you select the **Show Deployed Machines** check box, the red boxes on each Managed Server indicates deployed virtual machines. If you select a box, the color turns to yellow with cross-hatching.

  After selecting a deployed virtual machine, additional information appears in the lower left panel below the machine details on the Managed Server:

  - From the **Machine** tab, you can access information on the virtualization technology, virtual machine type, operating system, and storage server.

    To access the virtual machine console, click the thumbnail icon.

  - From the **Owner** tab, you can access information about the owner of the configuration, the deployed and stored virtual machine quota set by the Administrator, and the number of deployed virtual machines.

  - From the **Configuration** tab, you can access more information about the configuration and its owner.

    When you select this tab, the Managed Server systems display the other virtual machines in the configuration as yellow boxes. The original virtual machine that you selected retains the cross-hatching design.

    You can deploy virtual machines in a configuration on different Managed Server systems. This tab provides **Capture** and **Undeploy** buttons to perform these operations on the configuration.

- If you select the **Show Available Slots** check box, the light-blue boxes on each Managed Server indicates available slots for virtual machines.
- If you select the **Show Types** check box, **ESX** appears next to all the Managed Server systems.

- If you select the **Show Activities** check box, an icon appears next to a Managed Server that is in the midst of some activity.

Use the links in the right panel of the page to add a new Managed Server or to expand the size of the Managed Server pool:

- For instructions on adding a Managed Server, see "Adding Managed Server Systems" on page 122.
- Expanding the Managed Server pool involves a license change.

Monitoring Deployed Machines

Administrators can monitor all deployed virtual machines in Lab Manager.

To monitor all deployed machines

In the left pane, click **Deployed Machines**.

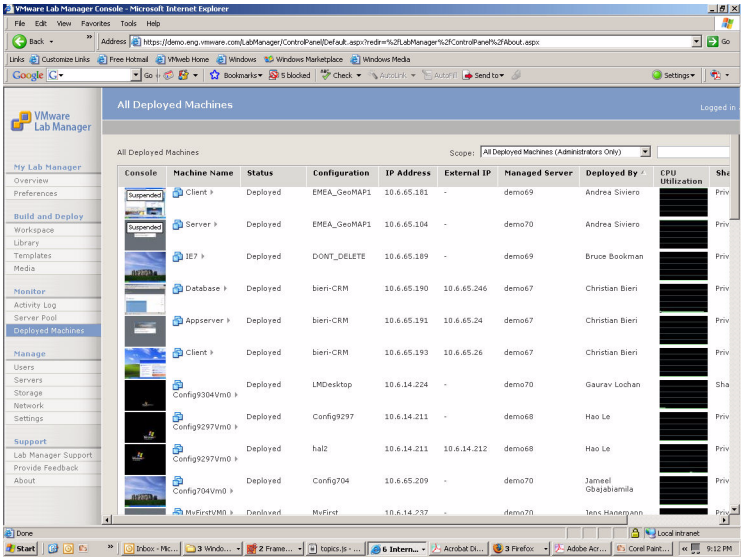


Figure 7-3. All Deployed Machines Page

The All Deployed Machines page includes these highlights:

- **Console** – Provides access to the virtual machine console through the thumbnail icon.
- **Name** – Provides a mouseover menu to view the virtual machine console or undeploy the virtual machine.

- **Configuration** – Specifies whether the virtual machine is part of a configuration or a template.
- **IP Address** – Provides the IP address of the virtual machine.
- **External IP** – Provides the external IP address for the virtual machine if it runs in fenced mode. For details about fenced mode, see Appendix A, "Network Fencing," on page 161.
- **CPU Utilization** – Displays the amount of virtual machine CPU used over the last five minutes.

NOTE This graph does not indicate the amount of CPU on the host Managed Server that the virtual machine uses.

- **Sharing** – Indicates whether the configuration is accessible for others to use.
- **Scope** – Determines which configurations to display.
  - **My Deployed Machines** – View only your machines, both shared and private.
  - **Deployed Machines Shared by Others** – View shared machines but not your own machines.
  - **All Deployed Machines Accessible by Me** – View your machines, both shared and private, and all shared machines.
  - **All Deployed Machines (Administrators Only)** – View every machine, both shared and private.
- **Filter** – Displays a subset of the total number of configurations. Enter text that appears in the attributes of the machines you want to view. If you enter a traditional wildcard, such as an asterisk (*), this function performs a literal search for an asterisk symbol.

NOTE Searches using the **Filter** feature are easier if you have a naming convention for the machines, templates, and configurations in your organization.

Managing Users

Managing users involves these procedures:

- "Setting User Preferences" on page 111. This feature is available to all users.
- "Viewing Users" on page 113
- "Adding New Users" on page 115
- "Deleting Users" on page 117
- "Editing User Properties" on page 117

Setting User Preferences

All users can set a range of user preferences.

To set user preferences

In the left pane, click **Preferences**.

The User Preferences page includes a **Defaults** tab and **Password** tab.

Defaults Tab

The **Defaults** tab sets default display and deployment options.

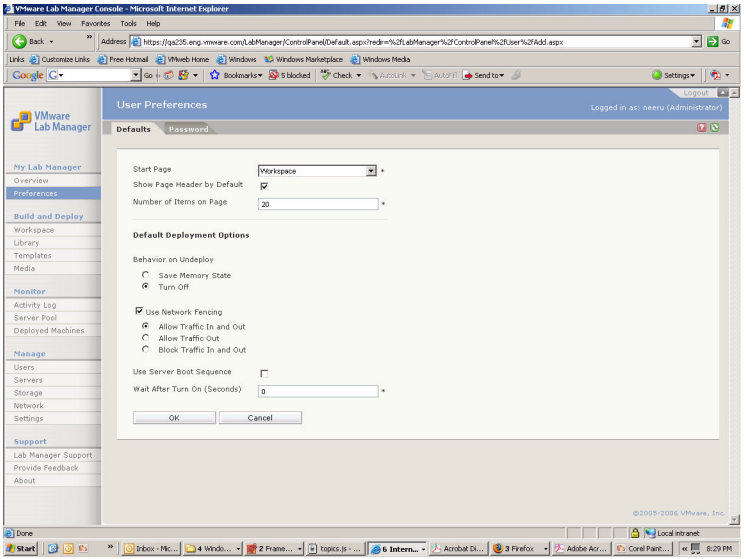


Figure 7-4. Defaults Tab of the User Preferences Page

Review the options:

- **Start Page** – Sets the first page that appears after logging in. The Workspace page is the default setting.
- **Show Page Header by Default** – Deselect the check box to prevent the display of information that usually appears at the top of the each page.

  This information includes IP addresses, virtual machine description, virtual machine owner, breadcrumb title, link for downloading the Lab Manager Web console and a snapshot thumbnail (if set). Removing the header gives you more room to view the console.
- **Number of Items on Page** – Determines the number of rows displayed on pages with data in tabular format.

  The maximum number is 500. The default number is 20.
- **Behavior on Undeploy** – Specifies undeploy behavior for configurations:
  - **Save Memory State** – Captures all data in RAM.

    This option creates a file to store the data from the RAM of the virtual machines. Saving the memory state of virtual machines helps you to debug memory-specific issues and makes virtual machines ready for deployment and use almost instantly.

    A consequence of this feature is the possible impact on performance for certain operations, such as undeploy, clone, snapshot, and suspend. If you specify to save memory state but want to avoid saving state for a particular operation, shut down the guest operation system from within the guest before performing the operation.
  - **Turn Off** – Turns off all the virtual machines in a configuration.

    This operation is the virtual equivalent of physically powering off all machines.
- **Use Network Fencing** – Runs your configurations in fenced mode. For extensive details on fencing, see Appendix A, "Network Fencing," on page 161.
  - **Allow Traffic In and Out** – Virtual machines can communicate with machines outside the fence and virtual machines outside the fence can communicate with virtual machines in the fenced configuration.
  - **Allow Traffic Out** – Virtual machines in a fenced configuration can initiate communication to machines outside the fence and can receive messages back on the same connection. Machines outside the fence cannot initiate communication to virtual machines in the fenced configuration.

This option is useful when virtual machines need to obtain data or execute code outside the fence (as seen with Web services or databases) but do not want to receive messages that disrupt testing.

- **Block Traffic In and Out** – Network traffic does not travel across the fence. Virtual machines in a fenced configuration cannot communicate with machines outside of the fence, and machines outside the fence cannot communicate with virtual machines in the fenced configuration.

  This option is useful in these circumstances:

  - You are testing software viruses that need to remain isolated from the network.
  - You are testing a client-server application in isolation.

- **Use Server Boot Sequence** – Specifies whether to use the assigned boot order to boot virtual machines in a configuration.

  For details on determining the order, see "Reviewing the Properties List" on page 42 and "Creating Configurations" on page 78.

- **Wait After Turn On (Seconds)** – Set the default value for the delay time (or "pause") between booting each virtual machine in a configuration.

  Lab Manager uses this default value when the user creates a new configuration or adds a virtual machine to an existing configuration.

Password Tab

Use the **Password** tab to change your password. You cannot use Lab Manager to change an LDAP account password.

Viewing Users

Administrators can view all users.

To view all users

In the left pane, click **Users**.

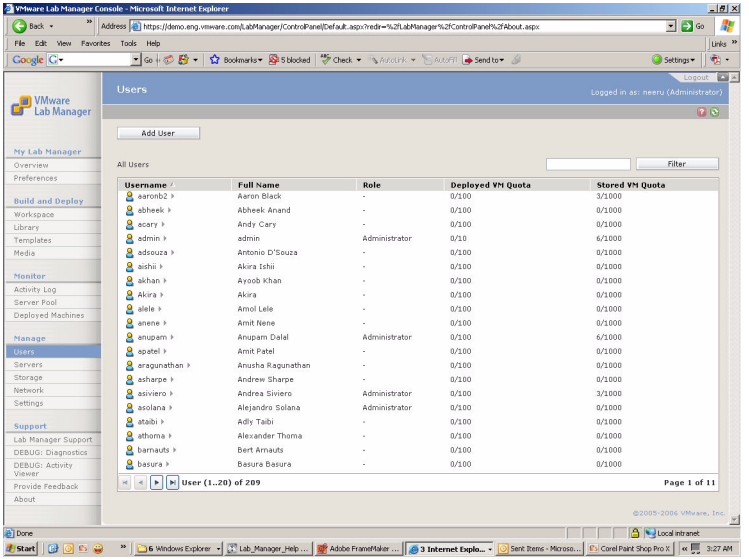


Figure 7-5. Users Page

The Users page includes these highlights:

- **Username** – Displays an icon in this column.
  - A gray icon indicates the user is disabled and cannot log in to the Web console.
  - A blue and yellow icon indicates the user is enabled.

NOTE A user can exist in the system without an enabled status. For example, you can disable a user on extended leave.

- **Filter** – Shows a subset of the total number of users. Lab Manager matches the text entered in the field to the left of the button against the attribute data of the search objects. Entries are not case-sensitive.

  The filter text search does not recognize wildcards. If you enter a traditional wildcard, such as an asterisk (*), this function performs a literal search for an asterisk symbol.

- **Role** – Shows **Administrator** for users with Administrator privileges. Only Administrators can perform these tasks:
  - Add, remove, and modify other users.
  - Change Lab Manager network settings.

- View all deployed machines and configurations.
- Add, delete, and configure Managed Server systems, storage servers, and the Lab Manager Server.

- **Deployed VM Quota** – Displays two numbers (separated by "/"). The first number indicates the number of virtual machines this user deployed. The second number indicates the number of virtual machines that the user is allowed to deploy. (The Administrator sets that limit during the process of adding a user.)
- **Stored VM Quota** – Displays two numbers (separated by "/"). The first number indicates the number of virtual machine images this user stored in the configuration library. The second number indicates the total number of virtual machine images that the user is allowed to store. (The Administrator sets that limit during the process of adding a user.)

Adding New Users

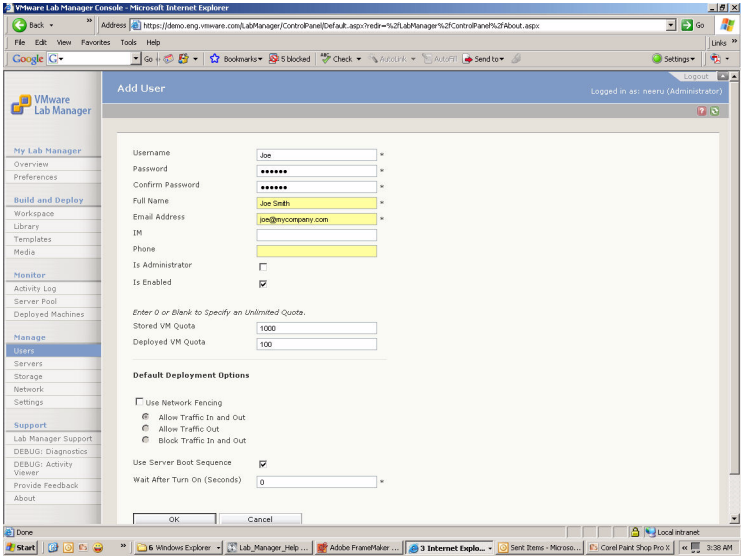
Administrators can add new users.

To add a new user

1 In the left pane, click **Users**.

2 Click **Add User**.

3 Enter the user information:



- Selecting the **Is Administrator** check box assigns Administrator privileges.
- Deselecting the **Is Enabled** check box blocks the user from immediate access to the Web console. (Although user information remains stored in the system, you can enable and disable access.)
- The **Stored VM Quota** is an integer number indicating how many virtual machine images the user is allowed to store in the configuration library.

  You can leave this field blank or enter "0" to avoid setting a quota.
- The **Deployed VM Quota** is an integer number indicating how many virtual machines at a time the user is allowed to deploy on Managed Server systems.

  You can leave this field blank or enter "0" to avoid setting a quota.
- Selecting the **Use Network Fencing** check box allows configurations to run in fenced mode. For details on fencing, see Appendix A, "Network Fencing," on page 161.
  - **Allow Traffic In and Out** – Virtual machines can communicate with machines outside the fence and virtual machines outside the fence can communicate with virtual machines in the fenced configuration.
  - **Allow Traffic Out** – Virtual machines in a fenced configuration can initiate communication to machines outside the fence, and can receive messages back on the same connection. Machines outside the fence cannot initiate communication to virtual machines in the fenced configuration.

    This option is useful when virtual machines need to obtain data or execute code outside the fence (as seen with Web services or databases) but do not want to receive messages that may disrupt testing.
  - **Block Traffic In and Out** – Network traffic does not travel across the fence. Virtual machines in a fenced configuration cannot communicate with machines outside of the fence, and machines outside the fence cannot communicate with virtual machines in the fenced configuration.

    This option is useful when you test software viruses that need to remain isolated from the network, or you test a client-server application in isolation.
- Selecting the **Use Server Boot Sequence** check box boots virtual machines in a configuration according to the assigned boot order.

  For details on determining the order, see "Reviewing the Properties List" on page 42 and "Creating Configurations" on page 78.

- The **Wait After Turn On (Seconds)** value sets the default value for the delay time (or "pause") between booting each virtual machine in a configuration.

4 Click **OK**.

The new user appears on the Users page.

Deleting Users

Administrators can delete a user.

To delete a user

1 In the left pane, click **Users**.

2 If the user is enabled, move the pointer over the user name and choose **Disable** from the menu.

3 Move the pointer over the user name and choose **Delete** from the menu.

4 Confirm the deletion of the user.

The deletion removes all undeployed configurations for the user.

Editing User Properties

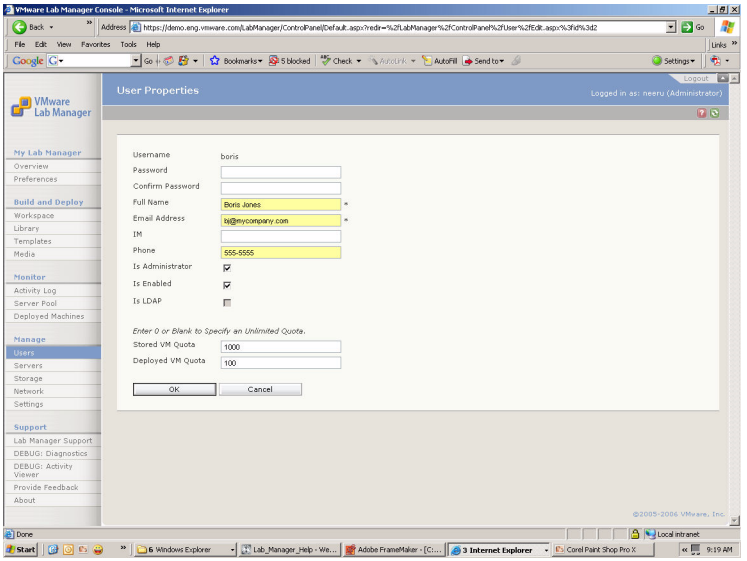
Administrators can edit user properties.

To edit user properties

1 In the left pane, click **Users**.

2 Move the pointer over the user name and choose **Properties** from the menu.

3 Edit the information:



- You can alter the password in the **Password** and **Confirm Password** fields.
- A name and email address is required for the user.
- Selecting the **Is Administrator** check box gives the user Administrator privileges.

  Only Administrators can add users, change network settings, view all deployed machines and configurations, and add, delete and configure Managed Server systems and the Lab Manager Server.
- Deselecting the **Is Enabled** check box allows the user to remain in the system but blocks the user from immediate access to the Web console.
- For details on the **Is LDAP** check box, see "Authenticating User Names and Passwords" on page 119.
- The **Stored VM Quota** is an integer number indicating how many virtual machine images the user is allowed to store in the configuration library.

  You can leave this field blank or enter "0" to avoid setting a quota.

- The **Deployed VM Quota** is an integer number indicating how many virtual machines at a time the user is allowed to deploy on Managed Server systems.

  You can leave this field blank or enter "0" to avoid setting a quota.

4 Click **OK**.

Authenticating User Names and Passwords

Lab Manager can authenticate a password either against its own database or against an LDAP server.

Using the LDAP Binding String

If an Administrator enters an LDAP binding string, a new user who is also an LDAP user can automatically log in to Lab Manager using his or her LDAP user name and password. However, existing users in the Lab Manager database are not authenticated against that LDAP server and can only continue to use the Lab Manager user name and password.

To enter an LDAP binding string

1 In the left pane, click **Settings**.

2 On the **General** tab, enter the LDAP binding string (for example, `LDAP://<server>/<path>`).

  Some LDAP servers require a case-sensitive string.

Marking an LDAP User Without Authentication

Some Administrators do not have access to the LDAP server but want to mark (without authentication) an existing Lab Manager user as an LDAP user.

To mark an existing Lab Manager user as an LDAP user without authentication

1 In the left pane, click **Users**.

2 Click the user name.

3 Select the **Is LDAP** check box.

  The existing user can log in using his or her LDAP user name and password.

Marking an LDAP User With Authentication

If you are an Administrator *and* an LDAP user, you can mark an existing Lab Manager user as an LDAP user and confirm that the user exists on the LDAP server.

To mark an existing Lab Manager user as an LDAP user with authentication

1 In the left pane, click **Settings**.

2 Select **Validate LDAP Users when Added**.

3 In the left pane, click **Users**.

4 Click the user name.

5 Select the **Is LDAP** check box.

A message appears confirming whether the user is actually an LDAP user.

Managing Managed Server Systems

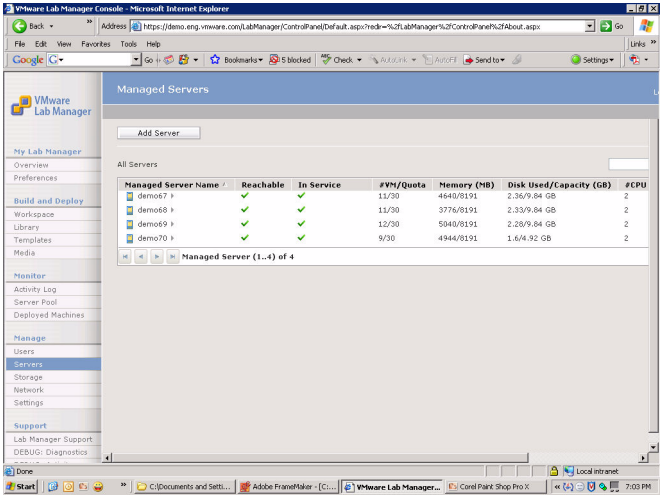
Managing Managed Server systems involves these procedures:

Viewing Managed Server Systems

Administrators can view a list of Managed Server systems.

To view Managed Server systems

In the left pane, click **Servers**.



The Managed Servers page includes these elements:

- **Filter** – Shows a subset of the total number of Managed Server systems. Lab Manager matches the text entered in the field to the left of the button against the attribute data of the search objects. Entries are not case-sensitive.

  The filter text search does not recognize wildcards. If you enter a traditional wildcard, such as an asterisk (*), this function performs a literal search for an asterisk symbol.

- **Reachable** – Indicates that the Lab Manager Server can communicate with ("ping") the Managed Server.
- **In Service** – Indicates whether the Managed Server is available for running deployed machines.

  If the Managed Server is not reachable, it is also not in service. The Managed Server might also not be in service if the Administrator disallows deployments (using the Managed Server mouseover menu) for this Managed Server.
- **#VM/Quota** – Displays two numbers (separated by "/"). The first number indicates the number of virtual machines running on the Managed Server. The second number indicates the maximum number of virtual machines allowed to run on the Managed Server.

  For details on setting the quota, see "Editing Managed Server Properties" on page 125.
- **Memory** – Displays two numbers (separated by "/"). The first number indicates the amount of RAM that the Managed Server uses to run virtual machines. The second number indicates the maximum amount of RAM allowed to run virtual machines.

NOTE If the number of virtual machines running on the Managed Server systems frequently reaches maximum capacity, you can add more Managed Server systems. If you are unable to deploy the maximum number of virtual machines on a Managed Server, you might need to add more RAM.

- **Disk Used/Capacity (GB)** – Displays two numbers (separated by "/"). The first number indicates the amount of disk space you use. The second number indicates the total amount of disk space.

  If you reach maximum capacity, you might want to add a larger hard disk to the Managed Server or add more Managed Server systems.
- **#CPU** – Shows the number of processors running on the Managed Server.
- **Lab Manager Agent Version** – Displays the version of the Managed Server agent software.

Adding Managed Server Systems

Administrators can add a Managed Server.

Review these requirements to add a Managed Server:

- The Managed Server must be a physical machine.

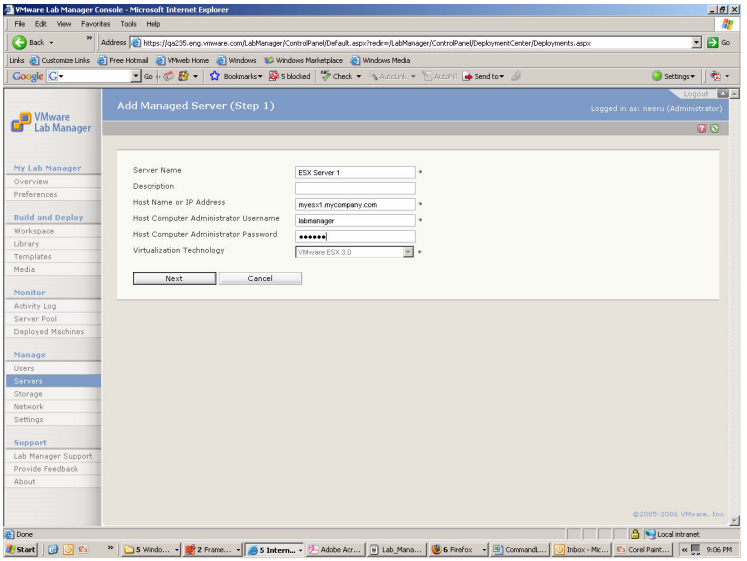
- All Managed Server systems must exist on the same subnet. The Lab Manager Server does not need to exist on the same subnet as the Managed Server systems.
- Before adding a Managed Server to Lab Manager, you must install the Managed Server agent software on the target Managed Server. For installation instructions, see the *VMware Lab Manager Installation Guide*.
- You cannot have two Managed Server systems with the same VMFS partition name. This situation can occur when two Managed Server systems use the same name for local storage. When you add the second Managed Server, its identically named VMFS partition becomes disabled.

To add a Managed Server

1 In the left pane, click **Servers**.

2 Click **Add Server**.

3 Enter the information for the Managed Server:



a Enter the name of the Managed Server.

b (Optional) Enter a description.

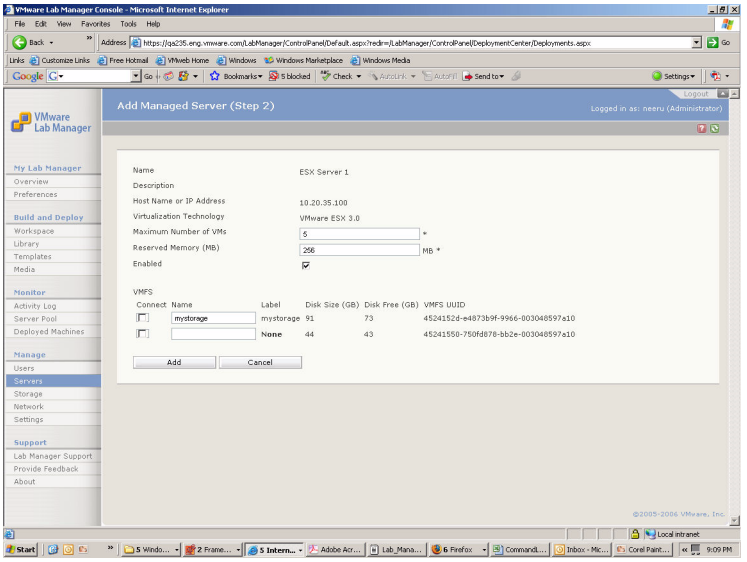
c Enter the host name or IP address.

d Enter a host Administrator user name and password for when you log in to the Managed Server. A Managed Server is a "host" computer, while the virtual machines running on the Managed Server are "guest" computers.

Do not confuse these fields with your Lab Manager Web console login.

e Click **Next**.

4 Enter the information for these items:



a Enter an integer number for the maximum number of virtual machines.

The higher the number, the slower your Managed Server will run when reaching maximum capacity. The Lab Manager Server prevents the Managed Server from running more than this number of virtual machines.

b Enter an amount of reserved memory for the host operating system. This setting indicates the amount of memory set aside for virtual machines not managed by Lab Manager. Lab Manager can use the remainder of memory.

c (Optional) Deselect the **Enabled** check box if you do not want to put the Managed Server into production right away.

d (Optional) Select the VMFS devices you want this Managed Server to use for storage.

If you are not putting this Managed Server into production right away, you do not have to select any devices.

e Click **Add**.

The new Managed Server appears on the **Managed Servers** page.

Removing Managed Server Systems

Administrators can remove Managed Server systems.

To remove a Managed Server

1 In the left pane, click **Servers**.

2 Move the pointer over the Managed Server name, and choose **Disallow Deployments** from the menu.

3 Undeploy all virtual machines running on this Managed Server:

a In the left pane, click **Deployed Machines**.

b For each virtual machine running on this Managed Server, move the pointer over the virtual machine name and choose **Undeploy** from the menu. You can also use column sorting or the **Filter** function to view specific virtual machines.

NOTE Before undeploying the virtual machines, notify users of these virtual machines about your pending action.

---

4 From the Managed Servers page, move the pointer over the Managed Server name and choose **Remove** from the menu.

Editing Managed Server Properties

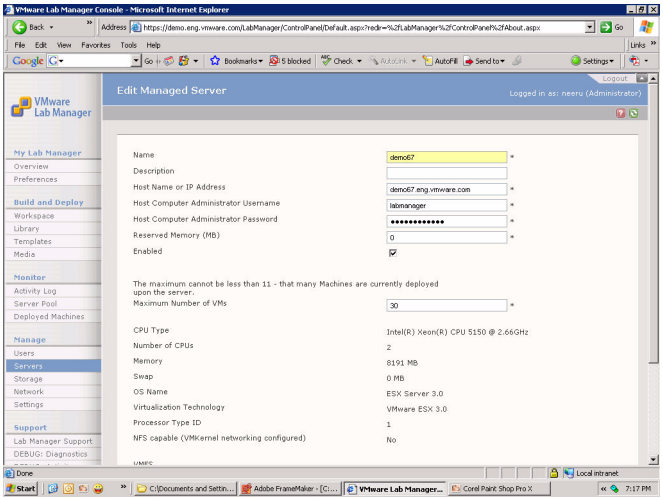
Administrators can edit Managed Server properties.

To edit Managed Server properties

1 In the left pane, click **Servers**.

2 Move the pointer over the Managed Server name and choose **Properties** from the menu.

3 Edit the properties that can be altered:



- **Name** – Contains alphanumeric characters (a–z, A–Z, 0–9), hyphens, underscores, or periods. The maximum length is 15 characters.
- (Optional) **Description** – Maximum number of characters is 128.
- **Host Name or IP Address** – Domain Name System (DNS) name or IP address of Managed Server.
- **Host Computer Administrator Username** – User name of the Administrator account on the Managed Server.
- **Host Computer Administrator Password** – Password of the Administrator account on the Managed Server.
- **Reserved Memory (MB)** – Enter an amount of reserved memory for the host operating system. This setting indicates the amount of memory set aside for virtual machines not managed by Lab Manager. Lab Manager can use the remainder of memory.
- (Optional) **Enabled** – Deselect the check box if you do not want to put the Managed Server into production right away.
- **Maximum Number of VMs** – Maximum number of virtual machines that can be deployed on Managed Server.
- (Optional) **VMFS** – Select the VMFS devices you want this Managed Server to use for storage.

If you do not want to put this Managed Server into production right away, you do not need to select any devices.

- Click **OK**.

Reviewing Additional Managed Server Operations

Review these additional operations available from the mouseover menu on the Managed Servers page:

- **Disallow Deployments** – Prevents Lab Manager from further deploying virtual machines on the Managed Server.

  This operation does not affect the virtual machines currently deployed.

NOTE You must perform this operation before removing a Managed Server from Lab Manager.

- **Undeploy all and cleanup** – Undeploys all virtual machines currently running on the Managed Server.

  This option appears after choosing **Disallow Deployments** from the menu.

- **Allow Deployments** – Allows you to deploy more virtual machines on the Managed Server.

- **Reboot** – Reboots the Managed Server.

  Before performing this operation, undeploy all virtual machines on the Managed Server.

Managing Storage Servers

Managing storage servers involves these procedures:

Viewing Storage Servers

Administrators can view storage servers for virtual machines and media.

To view storage servers

In the left pane, click **Storage**.

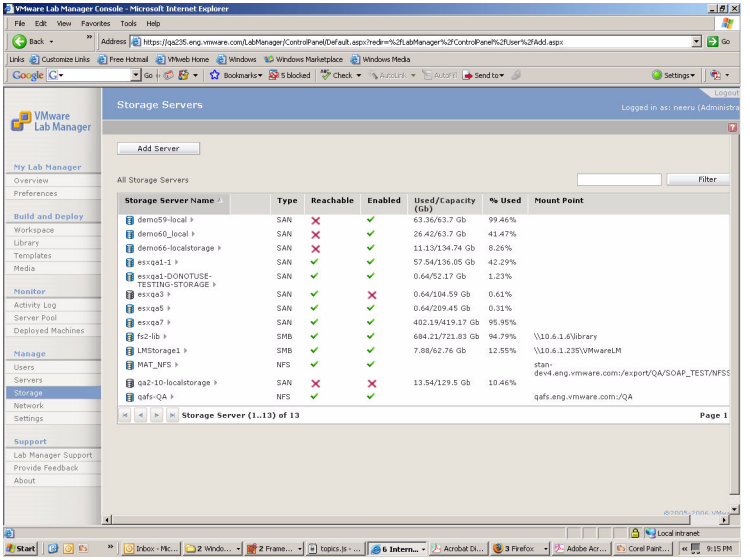


Figure 7-6. Storage Servers Page

The Storage Servers page includes these highlights:

- **Filter** – Shows a subset of the total number of storage servers. Lab Manager matches the text entered in the field to the left of the button against the attribute data of the search objects. Entries are not case-sensitive.

  The filter text search does not recognize wildcards. If you enter a traditional wildcard, such as an asterisk (*), this function performs a literal search for an asterisk symbol.

- **Type** – Indicates whether the storage server is an SMB, SAN, or NAS server.
- **Reachable** – Indicates that the Lab Manager Server can communicate with ("ping") the storage server.
- **Enabled** – Indicates whether the storage server is available for capturing configurations.

  If the storage server is not reachable, it is not enabled.

- **Used/Capacity (GB)** – Displays two numbers (separated by "/"). The first number indicates the amount of disk space you use. The second number indicates the total amount of disk space.
- **% Used** – Displays the percentage of used disk space.
- **Mount Point** – Shows the directory to access the storage server after mounting it.

Moving the Contents of a SAN Server

Administrators can move the contents of a SAN (VMFS) storage server to another server. Undeploy the virtual machines on the storage server before starting this operation. The virtual machines that you are moving are inaccessible for the duration of the move.

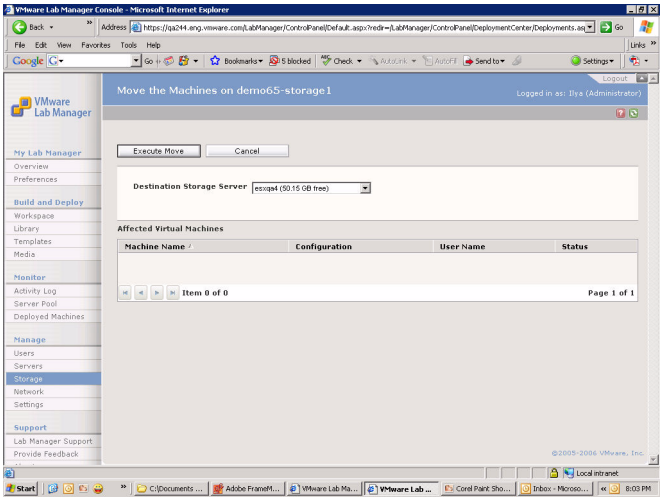
To move the contents of a SAN server

1 Click **Storage** in the left pane.

2 If the SAN is enabled, move the pointer over the SAN and choose **Disable** from the menu.

3 Move the pointer over the SAN and choose **Move** from the menu.

4 Complete the move operation:



a Select the destination server.

b If applicable, review the list of affected virtual machines.

The user can inform the owners of the impacted machines that the machines will be unavailable.

c Click **Execute Move**.

Adding Media Storage to Lab Manager

Adding media storage to Lab Manager involves a two-step process:

- Configuring the target storage server for Lab Manager.
- Attaching the storage server through the Lab Manager Web console.

NOTE You can add only storage servers for media. You cannot add or delete a VMFS partition (ESX) storage device.

Media Storage Requirements

For information on media storage requirements and NFS storage setup, see the *VMware Lab Manager Installation Guide*.

Setting Up SMB Media Storage for Lab Manager

If necessary, set the server computer name and DNS suffix.

To set up SMB media storage for Lab Manager

1 From the desktop, choose **Start > Control Panel > System**.

2 Select the **Computer Name** tab and click **Change**.

3 Enter a computer name.

4 Select the **Workgroup** check box.

5 Click **More**.

6 Enter a DNS suffix (for example, VMware.com).

7 If you made changes, restart the computer.

Creating a Share for Lab Manager to Set Permissions

Create a shared folder before attaching SMB media storage.

To create a share for Lab Manager

1 In Windows Explorer, create a folder (for example, `VMware`).

2 Right-click the folder and select **Sharing and Security**.

3 On the **Sharing** tab, select the **Share this Folder** check box and enter a share name.

4 Click **Permissions**.

5 Set permissions to grant **Everyone** full control.

6 On the **Security** tab, add **Everyone** (if it does not already exist) and allow full control.

Attaching Media Storage to Lab Manager

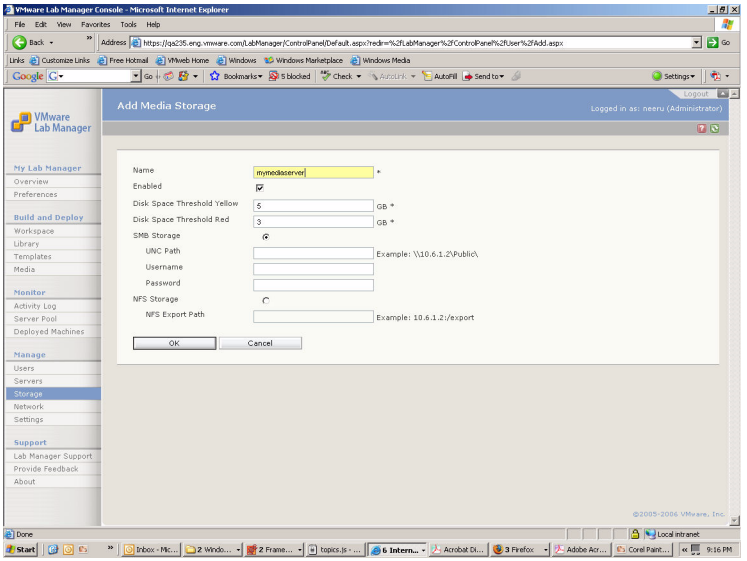
After preparing the media storage, you can attach it to Lab Manager.

To attach media storage

1 In the left pane, click **Storage**.

2 Click **Add Server**.

3 Enter the details on the SMB or NFS server:



a Enter a name for the new server.

The name can only contain alphanumeric characters (a–z, A–Z, 0–9), hyphens, underscores, or periods. The maximum length is 15 characters.

b (Optional) If you do not want the storage server immediately available for use, deselect the **Enabled** check box.

c Enter a value for **Disk Space Threshold Yellow**.

When available disk space falls below this level, Lab Manager sends an email warning message to all Administrators.

d Enter a value for **Disk Space Threshold Red**.

When available disk space falls below this level, Lab Manager sends an email alert (more severe than the **Disk Space Threshold Yellow** message) to all Administrators.

e Specify SMB media storage (if applicable), enter the UNC path of the folder where Lab Manager will store files, and enter the user name and password of an account with Administrator privileges for accessing the storage server.

Use English characters for the UNC path.

NOTE A limit may exist on the number of storage servers you can add depending on your license type.

f Specify NFS media storage (if applicable), and enter the NFS export path.

g Click **OK**.

The new storage server appears on the Storage Servers page. To verify a successful attachment, create a new configuration and deploy it on the new storage server.

Removing Storage Servers

Administrators can remove a SAN (VMFS), NFS, or SMB storage server from Lab Manager. If virtual machines exist on the server, undeploy them before starting this operation.

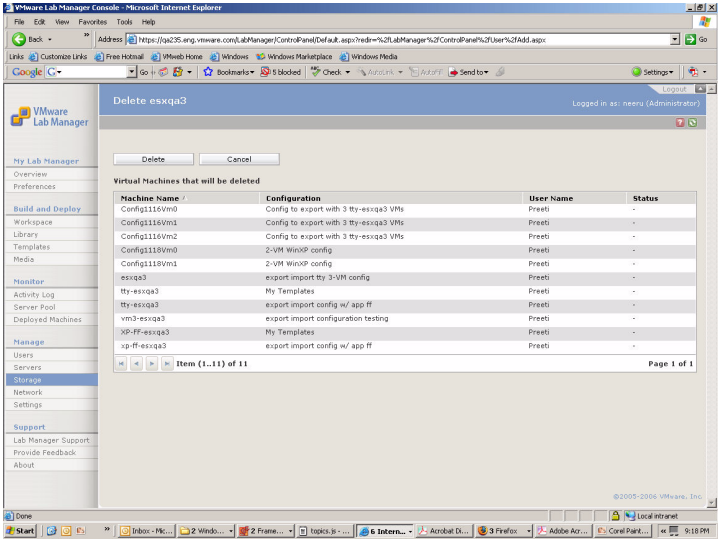
To remove a storage server

1 Click **Storage** in the left pane.

2 If the server is enabled, move the pointer over the server and choose **Disable** from the menu.

3 Move the pointer over the server and choose **Remove** from the menu.

4 If applicable, review the list of affected virtual machines and click **Delete**.



Though Lab Manager removes the storage server from the Lab Manager system, the files on the storage server still exist. The user must delete these files manually to reclaim the space.

Additional Tasks for Removing an NFS Media Server

After you remove an NFS storage server, the media files in its ISO sub folder disappear from the media library listing but the files on the storage server still exist.

If any NFS media on the removed NFS server is in use, eject the NFS CD or floppy files from all the virtual machines to avoid potential errors. Specifically, if a virtual machine uses media on an NFS storage server and you remove that server, the media disappears from the Lab Manager Server but still exists on the Managed Server because it is still in use. If you add the same NFS server again, the Managed Server cannot locate the media because it believes it already has that NFS server. After you eject the media file and wait for the next monitoring cycle (default time is five minutes), the monitoring cycle removes the old NFS storage server. At that point, you can add the same storage server again under a new name to allow the media on that server to work.

Editing Storage Server Properties

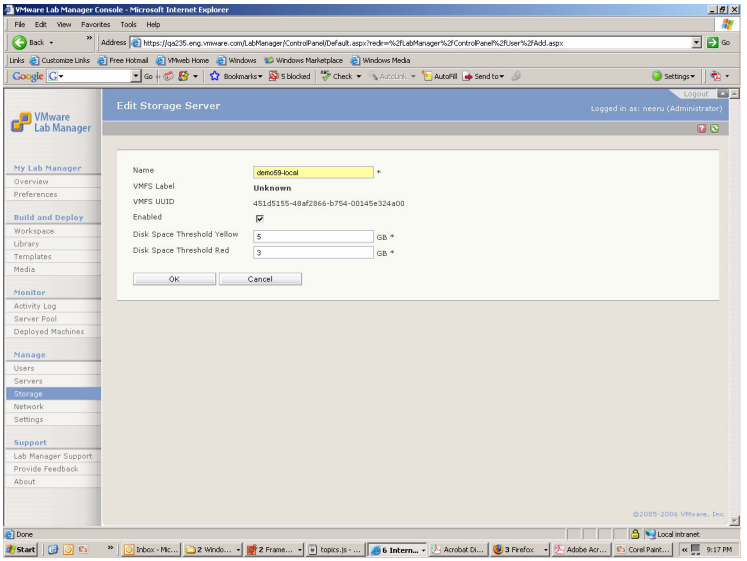
Administrators can edit various properties for all storage servers.

To edit storage server properties

1 Click **Storage** in the left pane.

2 Move the pointer over the storage server and choose **Properties** from the menu.

3 Edit the various properties that apply to your server:



a Enter a name that only contains alphanumeric characters (a–z, A–Z, 0–9), hyphens, underscores, or periods. The maximum length is 15 characters.

b (Optional) If you need to take the storage server out of production, deselect the **Enabled** check box.

c Enter the value for **Disk Space Threshold Yellow**.

When available disk space falls below this level, Lab Manager sends an email warning message to all Administrators.

d Enter the value for **Disk Space Threshold Red**.

When available disk space falls below this level, Lab Manager sends an email alert message to all Administrators.

e If you are using a UNC path, enter the user name and password for the Administrator on the storage server.

f Click **OK**.

Reviewing Additional Storage Server Operations

Table 7-1 describes additional operations on storage servers.

Table 7-1. Storage Server Operations

Operation	Description
Attempt to Remount	Attempts to remount the Lab Manager Data Repository share for the storage server.
Disable	Makes this storage server unavailable for Lab Manager use.
Enable	Makes this storage server available for Lab Manager use.
Refresh	Updates displayed storage server information.

Configuring Network Settings

Configuring network settings involves these sections:

Viewing Network Settings

Administrators can view network settings. Consult your network IT Administrator for questions on settings established prior to the installation.

To view network settings

In the left pane, click **Network**.

The Network page includes the **Settings** tab and **IP Pool** tab.

Reviewing the Settings tab

Use this tab to alter the default network settings and the Lab Manager installation ID.

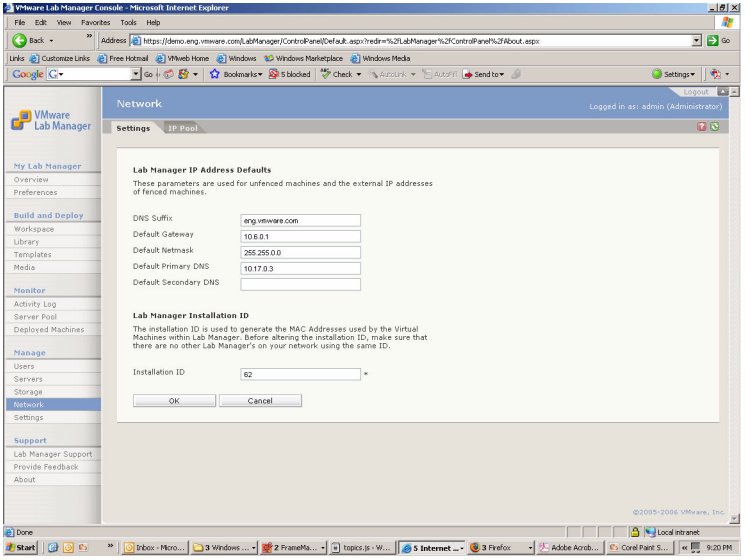


Figure 7-7. Setting Tab of Network Page

Lab Manager uses the network settings for unfenced virtual machines and the external IP addresses of fenced virtual machines. For details on fencing, see Appendix A, "Network Fencing," on page 161.

Lab Manager uses the installation ID to generate the MAC addresses used by the virtual machines. Before altering the installation ID, make sure no other installations of Lab Manager on the network use the same ID.

Reviewing the IP Pool Tab

Use this tab to view IP address information for the Lab Manager IP pool.

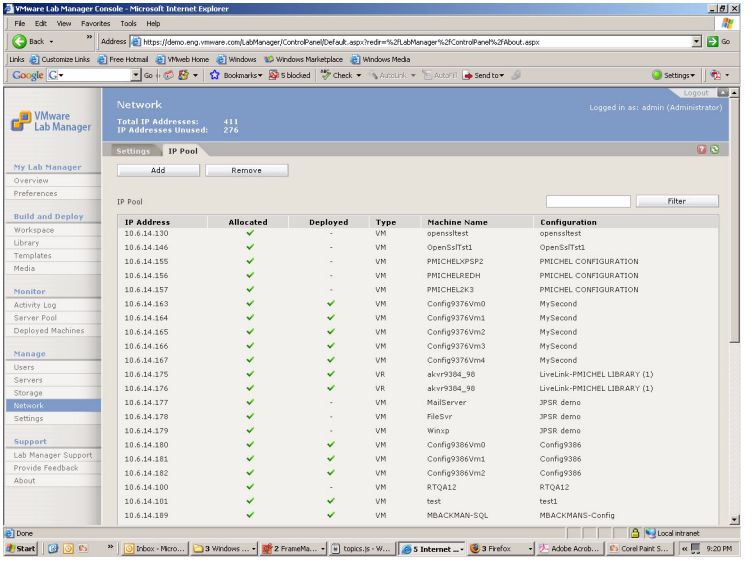


Figure 7-8. IP Pool Tab of Network Page

Review the highlights of the tab:

- **Network** – Network information in the top left corner shows the total number of IP addresses in the Lab Manager IP pool and the number of available IP addresses.
- **Filter** – Shows a subset of the total number of IP addresses in the Lab Manager IP pool. Lab Manager matches the text entered in the field to the left of the button against the attribute data of the search objects. Entries are not case-sensitive.

  The filter text search does not recognize wildcards. If you enter a traditional wildcard, such as an asterisk (*), this function performs a literal search for an asterisk symbol.

- **Allocated** – Green check mark indicates a virtual machine has this IP address.
- **Deployed** – Green check mark indicates the virtual machine is deployed. A hyphen ("-") indicates the virtual machine is not deployed.
- **Type** – Allocated IP address is assigned to a virtual machine (VM) or virtual router (VR).
- **Machine Name** – Virtual machine names can be the same unless the virtual machines are in the same configuration.
- **Configuration** – Configuration that the virtual machine belongs to.

Understanding IP Address Management

When you create a virtual machine from a template in the Workspace, and you select **Automatic IP Management** as noted in the steps for "Creating Configurations" on page 78 and "Adding Virtual Machines to Existing Configurations" on page 80, Lab Manager allocates an IP address from the IP pool to the virtual machine. This IP address stays with the virtual machine through the various operations in Lab Manager. When you delete all instances of the virtual machine with this IP address, Lab Manager releases the IP address to the IP pool.

If you deploy a configuration in fenced mode, Lab Manager allocates an additional IP address from the IP pool and assigns it as the external IP address for each virtual machine in the configuration. You can use the external IP address to access the virtual machine from outside the fenced configuration (for example, from your desktop). When you undeploy this configuration, Lab Manager releases the IP address to the IP pool.

Adding IP Addresses to the Lab Manager IP Pool

Administrators can add IP addresses to the IP pool.

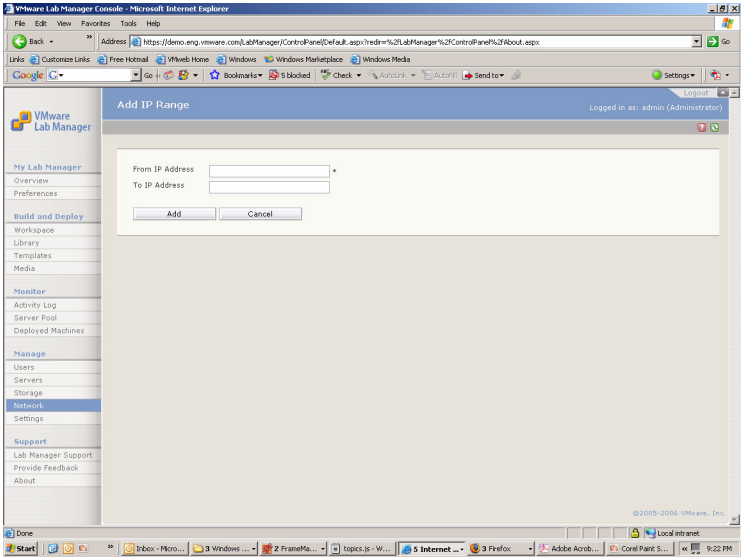
To add IP addresses

1 From the **IP Pool** tab, click **Add**.

2 Specify the range of IP addresses.

NOTE Every virtual machine requires an IP address. A virtual machine requires an additional IP address for fenced mode.

Every virtual router (automatically created for fenced configurations) requires two IP addresses. Virtual machine addresses remain allocated until you delete a virtual machine and all its clones. The addresses for a virtual router return to the IP pool when you undeploy a fenced configuration.



3 Click **Add**.

The Network page displays the new IP addresses.

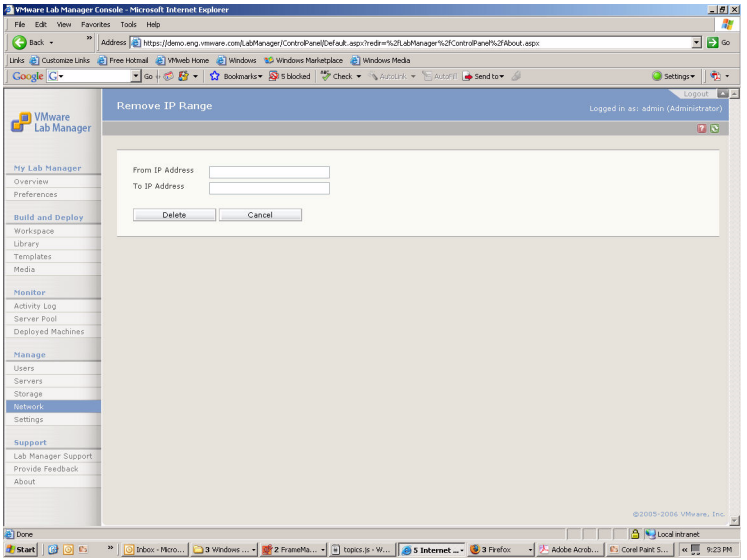
Removing IP Addresses from the Lab Manager IP Pool

Administrators can remove IP addresses from the IP pool.

To remove IP addresses

1 From the **IP Pool** tab, click **Remove**.

2 Specify the range of IP addresses. The "From" address must be less than the "To" address.



You cannot delete IP addresses allocated to a virtual machine.

3 Click **Delete**.

Lab Manager removes the IP addresses from the Network page.

Configuring Lab Manager Settings

Managing Lab Manager settings involves these procedures:

Accessing Lab Manager Settings

Administrators can access various settings for Lab Manager.

To access Lab Manager settings

In the left pane, click **Settings**.

The page includes the **General**, **License**, **LM Tools**, and **SupportLink** tabs.

Reviewing the General Tab

The general tab covers server preferences, email preferences, default user preferences, and default deployment options.

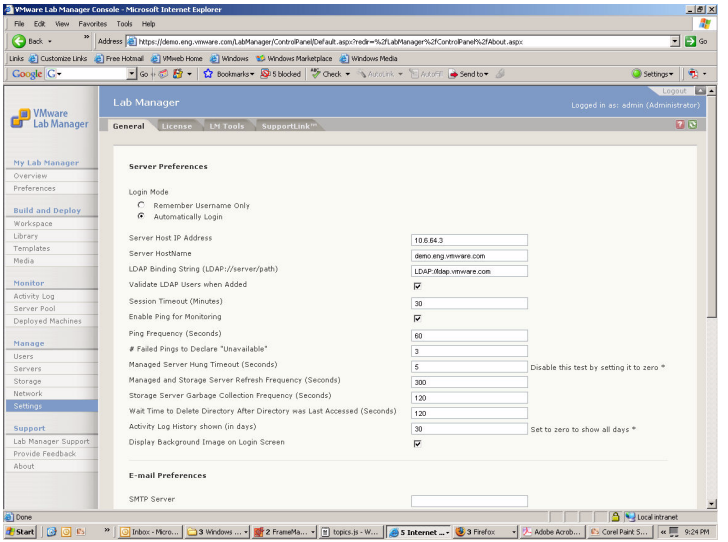


Figure 7-9. General Tab for Lab Manager Settings

Server Preferences

Review the server preferences:

- **Login Mode** – Lab Manager can remember the user name and password and can also automatically log the user in.

NOTE Like most browser applications, Lab Manager uses persistent cookies (physically stored in the computer hard disk) to remember the login information. If you delete the browser cookies, this information is no longer unavailable until the next time you log in.

  - **Remember username only** – Lab Manager remembers the user name but not the password.
  - **Automatically Login** – Lab Manager automatically logs users in when they start the Lab Manager application.
- **Server Host IP Address** – IP address of the Lab Manager Server.
- **Server HostName** – DNS name of the Lab Manager Server.
- **LDAP Binding String (LDAP://server/path)** – See "Authenticating User Names and Passwords" on page 119. Refer to this sample Lightweight Directory Access Protocol (LDAP) string:

  ```
  "LDAP://your_ldap_servername/department='QA',DC=companyabc,DC=com"
  ```

  For more information on LDAP binding strings and formatting methods, go to **http://www.rlmueller.net/LDAP_Binding.htm**.
- **Validate LDAP Users when Added** – See "Authenticating User Names and Passwords" on page 119.
- **Session Timeout (Minutes)** – Amount of time you want the Lab Manager application to remain active without user interaction.
- **Enable Ping for Monitoring** – If your network blocks ICMP, you can disable the ping between the Lab Manager Server and Managed Server systems to prevent the Managed Server systems from reporting an unreachable state.
- **Ping Frequency (Seconds)** – Frequency of "are you alive" messages from the Lab Manager Server to Managed Server systems and storage servers.

  This value only comes into play if you select the **Enable Ping for Monitoring** check box.
- **#Failed Pings to Declare "Unavailable"** – Number of times a Managed Server or storage server fails to respond to a "ping" before being declared unavailable.

- **Managed Server Hung Timeout (Seconds)** – Length of time to wait before determining a Managed Server is hung. For example, if the timeout is 20 seconds and Lab Manger pings a Managed Server every 10 seconds, Lab Manager marks the Managed Server as hung if it fails to respond for 20 seconds.
- **Managed and Storage Server Refresh Frequency (Seconds)** – Frequency of updating page information about a storage server or Managed Server.
- **Storage Server Garbage Collection Frequency (Seconds)** – Frequency of performing garbage collection (the automatic detection and freeing of images that are no longer in use) on storage servers.
- **Wait Time to Delete Directory After Directory was Last Accessed (Seconds)** – Lab Manager no longer uses this value.
- **Active Log History shown (in days)** – Specify the amount of log history to display in the Web console.

  A value of "0" shows all activity.
- **Display Background Image on Login Screen** – Specify whether to display the background image.

  If you have a slow or remote connection to Lab Manager, you can turn off the background image to speed up loading time.

Email Preferences

- **SMTP Server** – DNS host name or IP address of a mail server that Lab Manager uses for sending out email alerts and warnings. Administrators receive email alerts or warnings under these conditions:
  - The status of a Managed Server or storage server changes.
  - The disk threshold (yellow or red) of a Managed Server or storage server is crossed.
- **Requires Username** – Indicates the SMTP server requires a user name.
  - **Username** – Enter the user name of the SMTP server account.
  - **Password** – Enter the password of the SMTP server account.
- **Default E-mail Subject Prefix** – Initial text for the subject field of messages.

Default User Preferences

- **Default Stored VM Quota** – Number of virtual machines you can store on storage servers.

- **Default Deployed VM Quota** – Number of virtual machines you can deploy at one time.
- **Default Media Server** – Media server for CD and floppy images.

Default Deployment Options

These options set the default deployment options for new users.

- **Use Network Fencing** – Run your configurations in fenced mode. For details on fencing, see Appendix A, "Network Fencing," on page 161.
  - **Allow Traffic In and Out** – Virtual machines can communicate with machines outside the fence and machines outside the fence can communicate with virtual machines in the fenced configuration.
  - **Allow Traffic Out** – Virtual machines in a fenced configuration can initiate communication to machines outside the fence and can receive messages back on the same connection. Machines outside the fence cannot initiate communication to virtual machines in the fenced configuration.

    This option is useful when virtual machines need to obtain data or execute code outside the fence (as seen with Web services or databases) but do not want to receive messages that disrupt testing.
  - **Block Traffic In and Out** – Network traffic does not travel across the fence. Virtual machines in a fenced configuration cannot communicate with machines outside of the fence, and machines outside the fence cannot communicate with virtual machines in the fenced configuration.

    This option is useful when you test software viruses that need to remain isolated from the network, or you test a client-server application in isolation
- **Wait After Turn On (Seconds)** – Delay time (or "pause") between booting each virtual machine in a configuration.
- **Use Server Boot Sequence** – Use the assigned sequence order to boot virtual machines in a configuration.

  For details on determining the order, see "Reviewing the Properties List" on page 42 and "Creating Configurations" on page 78.

Reviewing the License Tab

Use this tab to view details on the license, such as expiration, capacity, and features.

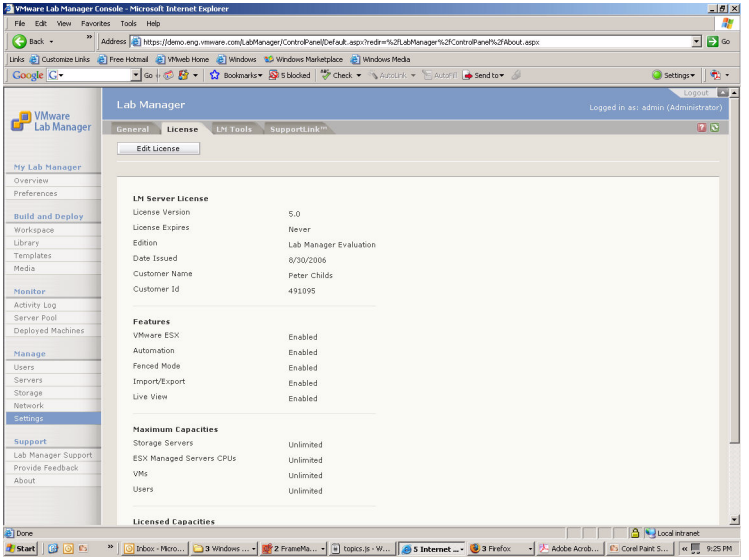


Figure 7-10. License Tab for Lab Manager Settings

Use the **Edit License** button to alter the license text. You might need to change the text when you purchase an updated license or feature.

Review the LM Tools Tab

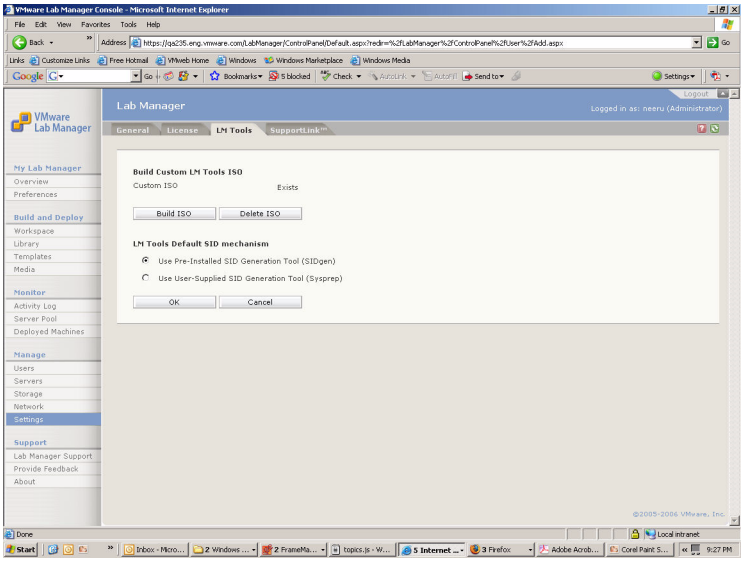
Lab Manager customizes virtual machines (IP address, machine name, security identifier (SID), and more) using LM Tools. SIDgen is a tool packaged with Lab Manager to change the SID for a Windows machine. If you prefer to use Sysprep (supported by Microsoft and included on the installation CDs for Windows 2000, Windows XP, and Windows 2003), you can create a custom ISO for that purpose.

NOTE A template with a null password affects the automatic Windows setup by Sysprep. After building a custom ISO with Sysprep, installing LM Tools in a template, and creating a Workspace configuration, the configuration starts to run but requires you to click **Next** during the process.

To build a custom LM Tools ISO with Sysprep

1. For each OS (Windows 2000, Windows XP, and Windows 2003), insert the Windows OS CD in the CD-ROM. If you have an ISO, mount the ISO using a third-party tool.
2. Locate the `DEPLOY.CAB` file in the `\Support\Tools` directory on the CD.
3. Expand the `DEPLOY.CAB` file using `Winzip.exe` or another tool capable of reading Microsoft CAB files. You can also use Windows Explorer in Windows XP or Windows 2003.
4. Copy the files to the appropriate Lab Manager directory for Sysprep support. For example, if you installed Lab Manager in `C:\Program Files\VMware\VMware Lab Manager Server`, copy the files to one of these directories:
   - `C:\Program Files\VMware\VMware Lab Manager Server\Tools\LMTools\Sysprep\win2k3`
   - `C:\Program Files\VMware\VMware Lab Manager Server\Tools\LMTools\Sysprep\win2000`
   - `C:\Program Files\VMware\VMware Lab Manager Server\Tools\LMTools\Sysprep\winxp`
5. Repeat this procedure to extract Sysprep files for each Windows guest operating system.
6. In the Lab Manager Web console, click **Settings** in the **Manage** section of the left pane.

7 In the **LM Tools** tab, click **Build ISO**.



NOTE If you do not have an existing custom ISO, certain options do not appear.

After creating the ISO, the page notes the path of the ISO. At this point, any person installing LM Tools on templates uses this default ISO.

If you need to remove the ISO for any reason, use the **Delete ISO** button in the **LM Tools** tab.

If an individual template owner needs to change the SID mechanism for a particular template, he or she can edit the properties of that template and switch the mechanism.

8 If you are not ready to use Sysprep because of testing activity or another situation, select the **Use Pre-Installed SID Generation Tool (SIDgen)** option to use the default Lab Manager SID mechanism. If you are ready to use Sysprep, select **Use User-Supplied SID Generation Tool (Sysprep)**.

Reviewing the SupportLink Tab

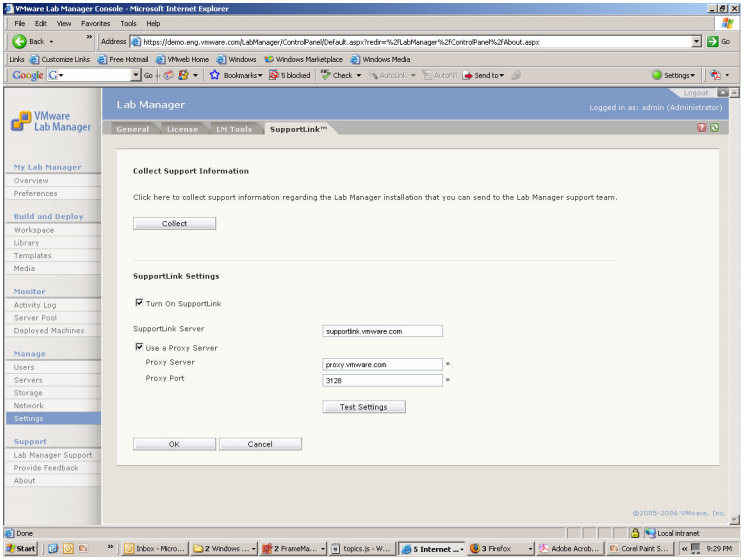
The Lab Manager SupportLink feature sends usage data to VMware for improved product support. VMware does not share this data with other organizations or trace any data back to individual users. During the Lab Manager installation and initialization process, the Administrator initially indicates whether to enable SupportLink.

With the aid of SupportLink information, VMware can provide individualized email support with guaranteed 24-hour response time. Customers who deactivate SupportLink still have access to the Web-based support forum.

To set up SupportLink

1 In the left pane of the console, click **Settings**.

2 In the **SupportLink** tab, specify the details for SupportLink:



a Choose whether to enable SupportLink.

Do not alter the SupportLink server unless instructed to change the name.

b Indicate whether to enable a proxy server and specify the details.

c If VMware support requests a test of SupportLink, click the **Test Settings** button on the **SupportLink** tab to verify the connectivity to the Lab Manager SupportLink Server.

d If VMware support requests you to collect information from your Lab Manager environment, click the **Collect** button.

e Click **OK**.

Troubleshooting Lab Manager

8

This chapter addresses these troubleshooting topics:

If you need additional help, contact VMware support.

Blank Screen Appears When Accessing Lab Manager

Problem When I try to access the Lab Manager Web console, a blank page appears even though **Done** appears in the browser status bar. As required, I am using Internet Explorer 5.5 or higher.

Solution You might not have enabled all the IE options for client access, such as **Allow paste operations via script**. For details on setting up IE for client operation, see "Setting Internet Explorer Options" on page 18.

Lab Manager Does Not Display Virtual Machine Console

Problem When I click a virtual machine thumbnail icon, the virtual machine console does not appear. Lab Manager takes me to a page where I see a tab in the upper left corner that can display a mouseover menu.

Solution You might not have enabled all the IE options for client access, such as the options for downloading and running ActiveX controls. Lab Manager uses an ActiveX control to display a virtual machine console. For details on setting up IE for client operation, see "Setting Internet Explorer Options" on page 18.

Problem I recently added a Managed Server. I cannot see the console windows for virtual machines running on that Managed Server.

Solution If you use a host name instead of an IP address to add the Managed Server, the DNS might not be configured properly and may prevent the resolution of the host name.

To address this issue

1 In the left pane, click **Servers**.

2 Move the pointer over the Managed Server name, and choose **Properties** from the menu.

3 In the **Host Name or IP Address** field, enter an IP address instead of a DNS host name.

Problem I cannot connect to a virtual machine console from Lab Manager. The console appears as a black console.

Solution Try to connect to the virtual machine from the Virtual Infrastructure Client packaged with ESX Server. If the VI Client is unable to connect to the virtual machine, connect directly to the ESX Server machine and run these commands in a shell console:

```
ifdown vswif0
ifup vswif0
```

Duplicate IP Address Errors Appear

Problem After creating a baseline configuration and saving it to the configuration library, I check it out and save a duplicate configuration to the library.

From the configuration library, I navigate to the details page for the duplicate configuration and open the properties page for each virtual machine to modify the IP and MAC addresses. I deploy the original configuration and then deploy the duplicate configuration. The second configuration fails to deploy and generates "duplicate IP address" errors.

Solution You modified the information that Lab Manager has about the virtual machines, but you did not change the actual IP and MAC addresses. This change requires a manual process through each virtual machine console. You would have to modify both the IP and MAC addresses to avoid network errors.

Instead of manually changing IP and MAC addresses, consider easier options to avoid duplicate IP address errors:

- Deploy your configurations in fenced mode. Lab Manager gives each virtual machine in a fenced configuration a unique, external IP address. Be aware that subnet broadcasts do not travel outside the fence. If you want two configurations to talk to each other using broadcasts, refer to the next option.
- In the baseline configuration, create a machine template from each virtual machine and install LM Tools on it. To build the duplicate configuration, create the virtual machines from these templates. You can deploy both configurations in unfenced mode without IP address errors because LM Tools automatically assigns unique IP addresses from the IP pool. The virtual machines in the configuration can respond to subnet broadcasts.

Addition of SCSI Virtual Hard Disk Fails

Problem When I add a new SCSI virtual hard disk to a virtual machine, an operating system message appears because drivers for this device are missing.

Solution Download and install the appropriate drivers from **http://www.vmware.com/download**. Contact VMware for support.

Mouse Navigation on Virtual Machine Console Fails

Problem When I move the pointer into a virtual machine console, the pointer appears as a small dot. I cannot move it out of the window and use it on the host operating system.

Solution VMware Tools is not installed on the guest operating system. If you do not install VMware Tools, you cannot move the pointer outside of the guest operating system unless you press Ctrl + Alt.

Install VMware Tools to move the pointer freely between the virtual machine window and the host operating system. For more information, see "Installing VMware Tools" on page 57.

Remote Access to Virtual Machine Fails

Problem I cannot set up remote access to a virtual machine console.

Solution To set up remote access to a virtual machine, you must configure the operating system of the virtual machine to allow for remote connections. On Windows 2003, the user must either be an Administrator or an authorized user.

To allow for remote desktop connections on Windows

1 Navigate to the **System Properties** information in the Control Panel.

2 From the **Remote** tab, complete these steps:

   a Select the **Allow users to connect remotely to this computer** check box.

   b Click **Select Remote Users** and enter the required user information.

LiveLink URL Error Appears

Problem A tester emails me a LiveLink URL. I click the link, log in to Lab Manager, and see an error message:

```
Could not perform operation because the object is busy.
```

Solution Depending on the complexity, capturing a configuration to the configuration library can take some time. Wait for some time and try again.

Host Server CD Drive Cannot Install Software

Problem I want to use the physical CD drive on the host server to install software on a virtual machine instead of using ISO images.

Solution Lab Manager does not allow direct physical access to the CD-ROM. With a server farm, you do not necessarily know which physical servers virtual machines will be deployed on. Even if you did have this knowledge, someone would have to physically access the server and insert a CD.

You can use the media library or a UNC path to insert CD or floppy images into a virtual machine. For details, see "Working with Media" on page 99.

Importing a Virtual Machine as a Template Fails

Problem I try to import a virtual machine to serve as a template and see this error message:

```
Disk too large to import. Consider using 'VMware vdiskmanager' to split the
large disk.
```

Solution You can import virtual machines up to 2GB per `.vmdk` file. For monolithic templates that exceed the size limit, create split disks using the VMware Virtual Disk Manager utility packaged with Workstation.

For instructions on using this utility, see the "Using Disks" chapter of this Workstation guide: **http://www.vmware.com/products/beta/ws/ws60_manual_beta.pdf**

If you cannot access the beta documentation for Workstation 6, refer to the Workstation 5.5 documentation:
http://www.vmware.com/support/ws55/doc/ws_disk_virtual_disk_manager.html

Import from VMFS Operation Fails

Problem I try to import a virtual machine from VMFS storage to serve as a template. This error message appears:

```
The source VM's vmx configuration file and vmdk disk file(s) must all reside
in the same directory on the VMFS volume.
```

Solution To import a virtual machine with an absolute path to its `.vmdk` file into Lab Manager, review these requirements:

- The `.vmdk` files have to reside in the same directory as the `.vmx` file.
- The path to a `.vmdk` file must be relative to the virtual machine.

  For example, if a `.vmx` file is in `[storage1] abc/abc.vmx`, the `.vmdk` path in the `.vmx` file must be `abc.vmdk`. You cannot use `/vmfs/volumes/storage1/abc/abc.vmdk`.

If you need to import a virtual machine with an absolute path to its `.vmdk` file, power off the virtual machine, open its `.vmx` file, and make the path relative to the `.vmx` file.

Inserting Media from NFS Server Fails

Problem The process of inserting media (CD or floppy images) from an NFS Server fails.

Solution Pinpoint the Managed Server involved in the operation. (The error message typically displays the name of the involved Managed Server.)

Make sure all Managed Server systems meet these requirements:

- You properly configured the vmkernel.
- The vmkernel is attached to a NIC that has connectivity to the NFS storage server.
- The gateway of the vmkernel is set to the correct value for the network.
- The NIC is up.
- Conflicting NFS datastores cannot exist on the Managed Server. Conflicting datastores can arise either through the external creation of such datastores or through internal processes within Lab Manager.
  - Typically, Lab Manager creates datastores with the LabManager-NFS-<ID> naming format which points to all NFS storage servers enabled on the Lab Manager Server. The datastore acts as a mount point for inserted media. If an NFS datastore already mounts an enabled NFS datastores managed by Lab Manager, Lab Manager cannot create the NFS datastore on the Managed Server and cannot access media hosted on the storage server. ESX Server does not allow two datastores to share the same NFS mount.

    To address this situation, remove the NFS datastore that is not managed by Lab Manager.
  - A situation in which Lab Manager manages conflicting NFS datastores can arise when you remove an NFS server from Lab Manager and a virtual machine currently uses that NFS server. (The virtual machine has inserted media hosted on the NFS server.) Although Lab Manager does not report errors on the NFS storage server remove operation, the Managed Server agent cannot remove the NFS datastore because the virtual machine is holding on to media hosted by the NFS datastore. If you add the NFS datastore to Lab Manager again, Lab Manager might fail because it is already mounted under a different name.

    To address this situation, eject the media from the virtual machine and manually remove the NFS datastore from the VI client. You can remove the datastore from Lab Manager and add it again.

Lab Manager Server Fails, Loses Connectivity, or Reboots the System

Table 8-1 describes the behavior and recovery options for a Lab Manager Server failure.

Table 8-1. Lab Manager Server Failure and Recovery Options

Failure Behavior	Recovery Behavior and Actions	Additional Steps
The user interface stops working. Lab Manager aborts running operations. If import and export operations occurred, you may not be able to use the Managed Server and virtual machines. **Note**: Virtual machines not using the Lab Manager Server continue to run on the Managed Server systems.	Lab Manager Server reconnects with the deployed virtual machines and resumes control. If import and export operations took place, you might need to restart the ESX Server machine.	Delete or undeploy any partially-created objects (from aborted operations) and try the operations again.

SMB Media Storage Server Fails

The SMB media storage includes the default media storage on the Lab Manager Server. Table 8-2 describes the behavior and recovery options for an SMB media storage failure.

Table 8-2. SMB Media Storage Server Failure and Recovery Options

Failure Behavior	Recovery Behavior and Actions	Additional Steps
If CD and floppy operations involved SMB media storage, you might not be able to use the Managed Server and virtual machines.	Restart the ESX Server machine if necessary.	Migrate media to NFS storage to avoid virtual machine instability. Loss of connectivity to NFS media storage does not require an ESX Server machine reboot. For details on setting up NFS media storage, see the *VMware Lab Manager Installation Guide*.

Permanent Failure of Managed Server Occurs

Table 8-3 provides details on addressing a permanent Managed Server failure.

Table 8-3. Managed Server Failure (Permanent) and Recovery Options

Failure Behavior	Recovery Behavior and Actions	Additional Steps
Within two minutes, the Lab Manager Web console notes the lost Managed Server is "unreachable." All virtual machine operations on that machine fail (except for **Force Undeploy**). All other operations continue to work. Virtual machines running on other Managed Server systems can function properly. Configurations with virtual routers running on the lost Managed Server cannot communicate outside the network fence. Lab Manager no longer deploys virtual machines on this Managed Server.	Automatic recovery does not exist. Review the manual steps for recovery: ■ Undeploy virtual machines on the lost Managed Server and redeploy the virtual machines on other Managed Server systems. Be aware that the **Undeploy** operation fails but allows you to perform a **Force Undeploy** operation. ■ Remove the Managed Server from management.	No additional steps are necessary.

Temporary Failure of Managed Server Occurs (Reboot or Turn Off)

Table 8-4 describes the temporary failure of the Managed Server after someone reboots or turns off the server.

Table 8-4. Managed Server Failure (Reboot or Turn Off) and Recovery Options

Failure Behavior	Recovery Behavior and Actions	Additional Steps
Within two minutes, the Lab Manager Web console notes the lost Managed Server is "unreachable." You cannot access virtual machines running on the Managed Server using the remote consoles. Thumbnail icons appear as **Unavailable**. All virtual machine operations on that machine fail (except for **Force Undeploy**). Configurations with virtual routers running on the lost Managed Server cannot communicate outside the network fence. Lab Manager no longer deploys virtual machines on this Managed Server.	When the Managed Server comes back up, the virtual machines are either in the **Off** or **Suspended** state. You can access the virtual machines. Configurations with virtual routers running on the Managed Server are no longer able to communicate outside the fence until you redeploy them.	No additional steps are necessary.

Temporary Failure of Managed Server Occurs (Networking)

Table 8-5 describes the temporary failure of the Managed Server because of a networking glitch.

Table 8-5. Managed Server Failure (Networking) and Recovery Options

Failure Behavior	Recovery Behavior and Actions	Additional Steps
Within two minutes, the Lab Manager Console notes the lost Managed Server is "unreachable." You cannot access virtual machines running on the Managed Server using remote consoles. Thumbnail icons appear as **Unavailable**. All virtual machine operations on that machine fail (except for **Force Undeploy**). Lab Manager no longer deploys virtual machines on this Managed Server. If networking fails between this Managed Server and other Managed Server systems, external networking stops working for fenced configurations with virtual routers on this server.	When the network glitch disappears, the Managed Server typically works as it used to.	No additional steps are necessary.

Network Fencing

Lab Manager uses network fencing, a technology that isolates or "fences" virtual machine configurations while allowing full network access. Fencing enables you to work with live instances of the same configuration on the same network.

For example, when you want to have concurrent development or testing on the same configuration, you can duplicate or clone the configuration and avoid any IP or MAC address collision with this technology.

This appendix covers these topics:

Why Should I Fence Configurations?

Typically, you want to enable network fencing under these circumstances:

- You have a configuration with one or more servers, and you anticipate cloning the configuration numerous times.
- You have a configuration involving a difficult and complex setup, and cloning the configuration is an easier route than repeating the setup.

With fencing, engineers can run multiple, independent tests on a configuration deployed multiple times. Fencing is particularly useful when a developer needs to examine a bug without interrupting or stopping ongoing testing on a configuration. Lab Manager also enables you to reproduce the bug at a later time if the developer is unavailable.

More instances of a smaller configuration might require raising the number of fenced configurations. A smaller number of configurations containing more virtual machines in each configuration may require lowering the number of fenced configurations. No penalty exists in choosing a larger number.

From a performance perspective, network fencing impacts the traffic flow between modules. Fencing requires a slightly higher number of resources on the Managed Server, such as memory, CPU, networking, and virtual machine slots. If you enable fencing but never use it, these resources do not come into play.

How Does Fencing Work?

Virtual machines in a configuration have pre-configured (internal) IP addresses. When you deploy virtual machines in fenced mode, Lab Manager assigns a unique external IP address to each of these machines. Through these external addresses, virtual machines both inside and outside the fence can communicate with each other. Lab Manager automates the address translation and routing support through the creation of a virtual router.

Fencing a configuration does not require any changes to its virtual machines. Within a fenced configuration, virtual machines continue to use preassigned IP addresses to communicate with each other. For more information on IP address allocation in fenced configurations, see "Understanding IP Address Management" on page 139.

Fencing Options

You can deploy fenced configurations in three ways:

- **Allow Traffic In and Out** – Virtual machines can communicate with machines outside the fence and machines outside the fence can communicate with virtual machines in the fenced configuration.
- **Allow Traffic Out** – Virtual machines in a fenced configuration can initiate communication to machines outside the fence and can receive messages back on the same connection. Machines outside the fence cannot initiate communication to virtual machines in the fenced configuration.

  This option is useful when virtual machines need to obtain data or execute code outside the fence (as seen with Web services or databases) but do not want to receive messages that may disrupt testing.
- **Block Traffic In and Out** – Network traffic does not travel across the fence. Virtual machines in a fenced configuration cannot communicate with machines outside of the fence, and machines outside the fence cannot communicate with virtual machines in the fenced configuration.

  This option is useful in these circumstances:

  - You are testing software viruses that need to remain isolated from the network.
  - You are testing a client-server application in isolation.

Processor Type Incompatibility

Deploying a configuration in fenced mode hosts all the virtual machines on a single Managed Server. You must have a Managed Server connected to the storage server where the templates that serve as the basis of this configuration reside on. The Managed Server must have sufficient resources, such as memory, slots, and fences.

If you deploy a configuration, perform an operation which saves the state of the configuration (for example, suspend or capture to library), and redeploy the configuration with fencing (which requires hosting all virtual machines on the same physical machine), the virtual machines end up running on the same Managed Server and may fail because of processor type incompatibility. The captured memory expects a particular processor type.

To address this situation, deploy the configuration without fencing, undeploy it without saving the memory state (as defined in the User Preferences page on the Web console), and redeploy the configuration. If you need to address individual virtual machines, you can deploy them one by one and discard the saved state.

Viewing Virtual Switches for Fences

You can use the VI Client in the ESX Server system to see the "LMNetwork<n>" virtual switches or networks that Lab Manager creates for each fence.

To view virtual switches for fences

1 Navigate to the **Configuration** tab of the VI Client.

2 Click the **Networking** link in the **Hardware** list to view virtual switches (for example, "LMNetwork001").

See the VMware Infrastructure 3 documentation for details on using VI Client.

CAUTION Do not connect the virtual switches that Lab Manager creates to an external network. Lab Manager needs these virtual switches for deploying fenced configurations.

Reviewing Additional Fencing Operations

If you need to view current fencing options or change the switch that Lab Manager uses for fencing, follow these instructions (instead of uninstalling and reinstalling the Managed Server agent software).

For more information on switches, see the VMware Infrastructure 3 documentation.

NOTE Undeploy virtual machines before changing the switch for fencing.

To change the switch for fencing

1 Log in as root.

2 From the command line, type:

```
> lm-fencecfg
```

3 Select a different network switch for virtual machines.

To view current fencing options

1 Log in as root.

2 From the command line, type:

```
> cat /etc/labmanager/agentconf.xml
```

The `HostNic` field contains the bridge device and the `VNetCount` field contains the number of fences.

Extending LM Tools

B

Installing LM Tools allows Lab Manager to automatically customize the network settings for a virtual machine made from a template. For general information on LM Tools, see "Installing LM Tools" on page 58.

In some cases, you might want to extend the customization of LM Tools. Review some examples:

- If you have an application that depends on the SID, you might need to prevent LM Tools from changing the SID but still allow LM Tools to make other changes.
- You want to incorporate some kind of verification in the LM Tools script. For example, the script could check for viruses or start and stop processes.

Extending LM Tools involves making changes to each template.

NOTE Extending LM Tools is different from building a custom LM Tools ISO (specifically for Microsoft Sysprep). For information on building a custom ISO, see "Review the LM Tools Tab" on page 147.

This appendix covers these topics:

How does LM Tools work?

The configuration file for a virtual machine, the `.vmx` file, contains a `machine.id` line. If you install VMware Tools on the template, the guest operating system can read this line.

The Lab Manager Server sets the values for this line while deploying virtual machines. See this example of the `machine.id` line:

```
machine.id =
"ip=10.6.11.101&netmask=255.255.0.0&gateway=10.6.0.1&dns1=10.5.1.20&dns
2=10.5.1.21&computerName=arp&UseSysPrep=No&KEYNUM=612942190"
```

To access the machine.id line

1 From the Managed Server, open the `.vmx` file.

2 Search for `machine.id` from inside the guest operating system:

- From the command prompt on a Linux guest OS, type:

  ```
  # vmware-guestd --cmd machine.id.get
  ```

- From a Windows guest OS, navigate to the directory where VMware Tools is installed (usually `C:\Program Files\VMware\VMware Tools`) and type:

  ```
  >VMwareService.exe -cmd machine.id.get
  ```

The installation of LM Tools on a template configures a script to run every time the system starts up. This script reads the `machine.id` information and determines what action to take.

The Lab Manager Server does not set any actions in the `machine.id` line while deploying virtual machine templates. As a result, the LM Tools script does not perform any customization for the template when it starts up.

The Lab Manager Server does set customization actions in the `machine.id` line while deploying Workspace virtual machines. When these virtual machines first start up, the LM Tools script performs the relevant actions.

Extending the LM Tools Script

Review the instructions to extend the customization of the LM Tools script.

Extending the LM Tools Script on a Windows Guest OS

The Windows script, `win_autoconfig.vbs`, is installed in the LM Tools program files folder (usually `C:\Program Files\VMware\LM Tools`). Write your own script based on `win_autoconfig.vbs`, and perform the required customization using the settings passed to the Lab Manager Server.

Extending the LM Tools Script on a Linux Guest OS

The Linux script is `lm-tools`. Write your own script, based on `lm-tools`, and perform the required customization using the settings passed to the Lab Manager Server.

You can also change the `.vmx` file of a virtual machine (for example, change the `computerName` value) and have `lm-tools` apply those changes either when the guest operating system restarts or when you run the `lm-tools` script.

To run the `lm-tools` script on SUSE Linux, type:

```
/etc/rc.d/lm-tools start
```

To run the `lm-tools` script on RHEL, type:

```
/etc/rc.d/init.d/lm-tools start
```

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