

# HP Integrity Virtual Machines Manager 4.1.1 User Guide

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# 1 Introduction

This document helps you understand and use Integrity Virtual Machines Manager.

The audience for this document includes system administrators and others responsible for maintaining an Integrity VM host and its virtual machines. You should be familiar with the HP Integrity Virtual Machines (Integrity VM) product and HP-UX system administration using either HP SMH or HP SIM.

This chapter provides an overview of HP Integrity Virtual Machines Manager (VM Manager) and the product that it manages, HP Integrity Virtual Machines. This chapter also lists the basic management tasks you can perform using VM Manager.

## HP Integrity Virtual Machines

HP Integrity Virtual Machines (Integrity VM) is a soft partitioning and virtualization technology that enables you to create multiple software-controlled Itanium-based virtual machines within a single HP Integrity server, Integrity blade, or nPartition. The Integrity server or nPartition acts as a VM Host for the virtual machines (virtual machines are also called guests). The VM Host is a *platform manager*. It manages hardware resources such as memory, CPU allocation, and I/O devices, and shares them among multiple virtual machines. The VM Host runs a version of the HP-UX operating system and can be managed using standard HP-UX management tools. HP Integrity VM 4.0 and later runs on HP-UX v3 only. Version 3.5 runs on HP-UX v2 only.

The virtual machines share a single set of physical hardware resources, yet each virtual machine is a complete environment in itself and runs its own instance of an operating system (called a guest OS). As with a real machine, the virtual machine contains:

- At least one processor core, also referred to as a virtual CPU or vCPU
- Memory
- Disks
- Networking cards
- A keyboard
- A console
- Other components of a computer

All these elements are virtual, meaning that they are at least partially emulated in software rather than fully implemented in hardware; however, to the guest OS they appear as if they are real, physical components.

No guest OS can access memory allocated to another guest OS. One virtual machine is not affected by software events on another virtual machine, such as faults or planned software downtimes. Integrity VM optimizes the utilization of hardware resources, quickly allocating resources such as processor cores, memory, or I/O bandwidth to the virtual machines as needed. Any software that runs on supported versions of HP-UX can run in an Integrity VM virtual machine. No recompiling, recertification, or changes are required for applications to run in a guest OS. Applications run in the guest OS as they do on any operating system.

The operating systems supported on guests vary from version to version of HP Integrity Virtual Machines. For information about supported VM guest operating systems, see the version of the *HP Integrity Virtual Machines Installation, Configuration, and Administration* manual that corresponds to the version of HP Integrity Virtual Machines being used.

## HP Integrity Virtual Machines Manager

HP Integrity Virtual Machines Manager (VM Manager, also called `vmmgr`) is the GUI that you can use from your browser to manage Integrity VM resources. VM Manager allows you to create, configure, and evaluate virtual machines, and to monitor and evaluate data and resources at the level of the VM Host. You can view all of a VM Host's virtual machines and their assigned

resources, and you can view all resources assigned to a specific virtual machine or virtual switch. For example, VM Manager provides graphical views of virtual-to-physical network and storage devices so that you can view I/O data, including resource utilization information. VM Manager obtains information about Integrity VM resources through Web-Based Enterprise Management (WBEM) providers installed on the VM Host and on virtual machines (guest OSes).

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**NOTE:** Features available from VM Manager may depend on the version of Integrity VM on the VM Host. New VM Manager features described in this document that depend on features introduced with version 4.1 of Integrity VM are not available when managing a VM Host that runs an earlier version of Integrity VM.

VM Manager version 4.1.1 supports all the HP Integrity Virtual Machines version 4.2 features that are documented in this manual. VM Manager version 4.1.1 is compatible with HP Integrity Virtual Machines version 4.2 but does not support new features provided by HP Integrity Virtual Machines version 4.2.

---

VM Manager is available as a standalone product (the VMMGR bundle) that is installed on a VM Host and accessed through the HP System Management Homepage (HP SMH), or as a component provided with HP Insight Dynamics - VSE for Integrity (the VSEMgmt bundle), the latter which is installed with HP Systems Insight Manager (HP SIM) on a central management server (CMS). As a component of HP Insight Dynamics - VSE for Integrity, VM Manager seamlessly-integrates with other Insight Dynamics components.

You can access VM Manager from a browser, using either of two web-based software components (depending on the bundle installed):

- HP System Management Homepage (HP SMH)

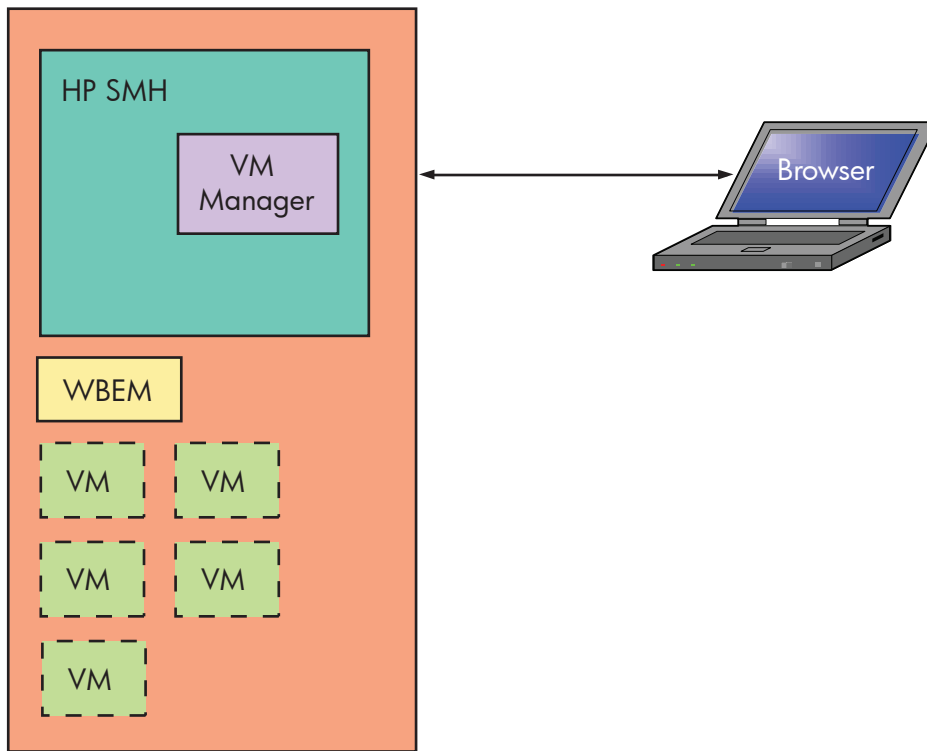
VM Manager is installed separately on any given VM Host to manage that Integrity VM Host and its virtual machines. You access VM Manager from a browser that can connect over the network to that VM Host. Figure 1-1 shows how VM Manager is configured and used with HP SMH. This configuration is supported on HP-UX v3 and v2.



**Figure 1-1 VM Manager with HP SMH**

Using VM Manager with HP SMH

VM Host



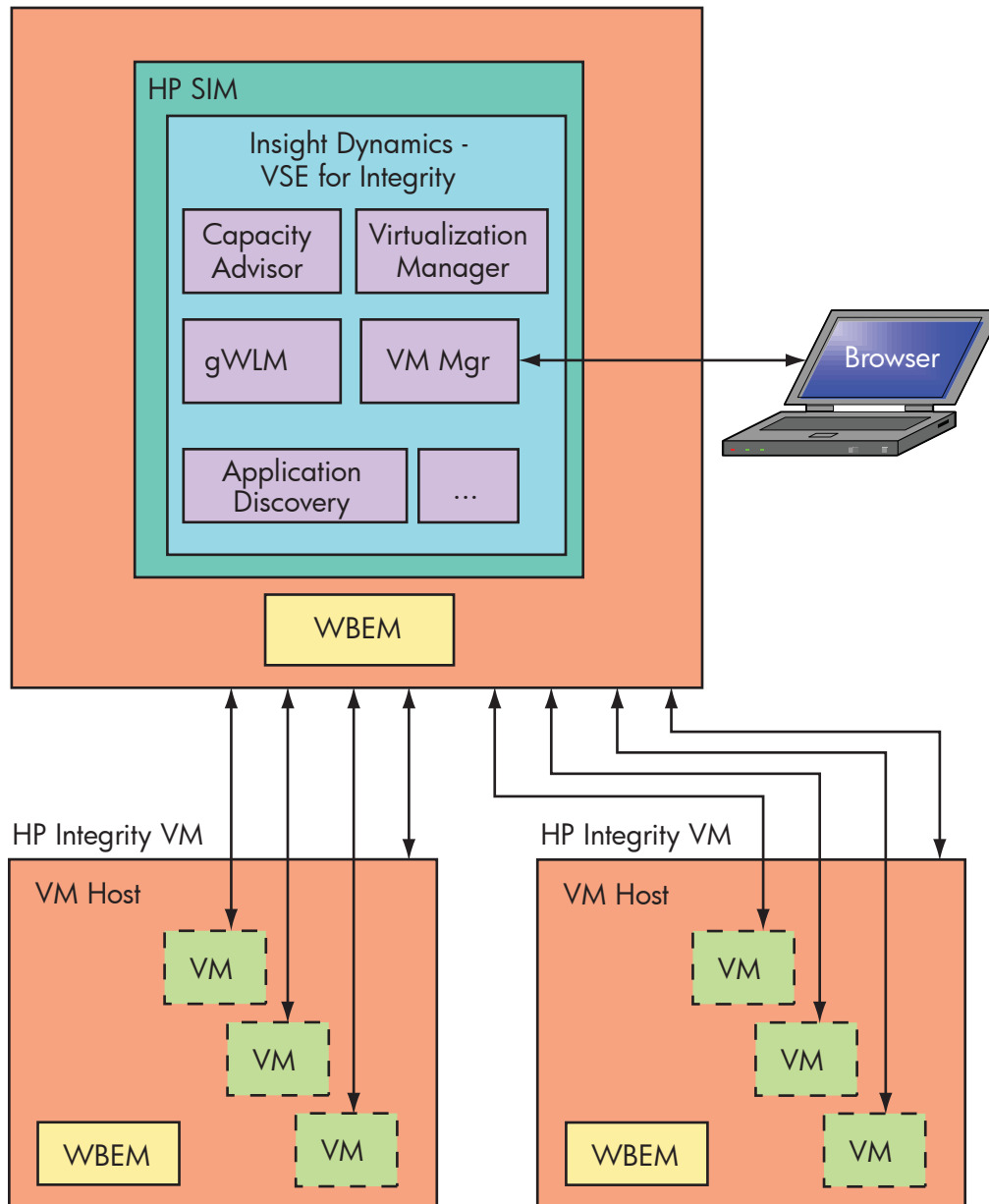
- HP Insight Dynamics - VSE for Integrity

VM Manager is installed as part of Insight Dynamics - VSE for Integrity that runs under HP Systems Insight Manager software (HP SIM) on a server reserved for use as a central management server (CMS). The CMS can run on HP-UX or Windows platforms. HP SIM serves as the central point of administration for complete resource-lifecycle management for multi-OS environments. You access VM Manager from a browser that can connect over the network to the CMS. The CMS allows you to manage multiple Integrity VMs (VM Hosts and each of their virtual machines) that are discovered by HP SIM. [Figure 1-2](#) shows how VM Manager is configured and used with Insight Dynamics and HP SIM.

**Figure 1-2 VM Manager with HP SIM and the Insight Dynamics - VSE for Integrity**

Using VM Manager with HP Insight Dynamics - VSE

CMS



In this environment, you can use VM Manager in seamless integration with other Insight Dynamics - VSE for Integrity components. These interlinking components enhance the functionality and flexibility of your virtual server environment. For example:

- HP Insight Virtualization Manager software provides a framework for visualizing your Virtual Server Environment. All of the systems and workloads that you are authorized to view are displayed in a graphical view. The hierarchical relationships between systems and their current utilization metrics can be seen in a single screen. Using Virtualization Manager, you can manage a pool of multiple-OS, dynamically sizable virtual servers. You use Virtualization Manager to access VM Manager for viewing and modifying VM Host or virtual machine components. For more information, see “Accessing VM Manager from Insight Dynamics - VSE for Integrity” (page 21).
- HP Insight Global Workload Manager software for Integrity (gWLM) is a multiple-system, multiple-OS workload manager that serves as an intelligent policy engine in Insight Dynamics - VSE for Integrity. It simplifies the deployment of

automated workload management policies across multiple servers, and provides centralized monitoring and reporting and improved server utilization to assist in meeting your service level objectives. Using VM Manager with Insight Dynamics - VSE for Integrity, you can create, view, and modify gWLM policies for virtual machines. For more information, see “Using the **Policy** menu” (page 84).

- HP Insight Capacity Advisor software is capacity analysis and planning software that allows you to optimize the workloads across Insight Dynamics - VSE for Integrity for the highest utilization of server resources. From VM Manager, you can cause Capacity Advisor to collect and display historical data for a VM Host or selected virtual machines. Certain VM Manager views include utilization meters (bar graphs) that display current utilization data for a resource; you can click the meter to view a screen that provides more detailed historical data. (These meters are visible when using VM Manager with HP SMH, but you cannot click them to obtain a Capacity Advisor report.) For more information about using VM Manager to collect and view utilization data, see Chapter 7 (page 111). For more information about accessing Capacity Advisor through VM Manager, see “Using the **Tools** menu” (page 76) and “Using the **View** menu” (page 82).

Other Insight Dynamics - VSE for Integrity components include:

- Application Discovery
- HP Instant Capacity Manager
- Partition Manager
- WBEM providers (which include the *VM Provider* and the *Utilization Provider*, as described in “System and software requirements” (page 13) and other agents.

For more information about Insight Dynamics concepts and terminology, including a complete list of the components of Insight Dynamics - VSE for Integrity, see the *HP Insight Dynamics 6.2 Getting Started Guide*.

Information about HP SMH is available from the following HP SMH website:

<http://www.hp.com/go/smh>

Information about HP SIM is available from the following HP SIM website:

<http://www.hp.com/go/hpsim>

## VM Manager tasks

Use VM Manager to create and manage Integrity VM virtual machines. To take full advantage of VM Manager, you can perform the following tasks:

- Create, configure, and control virtual machines and their resources, such as virtual switches (vswitches), virtual network devices, and virtual storage devices (Chapter 6 (page 87))
- Monitor VM Host and virtual machine operation (Chapter 4 (page 31))
- Modify virtual machine configurations (“Modifying virtual machines” (page 92))
- Migrate virtual machines from host to host (“Migrating virtual machines” (page 100))
- Collect and view utilization data for VM Host, virtual machines, and their resources (Chapter 7 (page 111))
- Respond to status reports, error messages, and problems concerning virtual machines (Appendix A (page 123))



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## 2 Installing VM Manager

This chapter discusses how to install VM Manager on your system or on the systems you will manage, including setup and software requirements, licensing requirements, and how to set WBEM security credentials.

### System and software requirements

System requirements for the VM Host and virtual machines are described in the *HP Integrity Virtual Machines Installation, Configuration, and Administration* manual. In addition, see the *HP Integrity Virtual Machines Release Notes*, which are available on the product media. The most up-to-date release notes are available at the following location (click on the **HP Insight Dynamics - VSE for Integrity** tab):

<http://www.hp.com/go/insightdynamics/docs>



**NOTE:** Operating system support for VM Host and guests varies from release to release of HP Integrity Virtual Machines. For information about operating systems supported by a particular release and about installing supported operating systems on virtual machines, see the *HP Integrity Virtual Machines Installation, Configuration, and Administration* manual.

With use of VM Manager in the Insight Dynamics environment, any managed node must have WBEM and the appropriate WBEM credentials to support the visualization and configuration features of Virtualization Manager and the collection of utilization data by HP Insight Capacity Advisor software. Without WBEM, only HP Insight Global Workload Manager software for Integrity (gWLM) is functional. Managed nodes are systems that the user has instructed HP SIM to manage. For Insight Dynamics, all virtual machines and their VM Host are managed nodes. Systems become managed nodes through the HP SIM “discovery” mechanism. Nodes can be discovered by HP SIM in various ways, including automated discovery or manual addition of the node. For example, you can configure and initiate node discovery, and perform numerous other setup tasks, by using the Insight managed system setup wizard. For more information, see the *Insight managed system setup wizard getting started guide*, available at the following location:

<http://www.hp.com/go/insightdynamics/docs>

To use VM Manager and all its features, install the required WBEM provider components on the VM Host and on the virtual machine guests.

In the Insight Dynamics environment, to install such components on guests, use the Insight managed system setup wizard. The wizard allows you to choose whether to install the VM Provider. The wizard also checks the selected virtual machines for the appropriate versions of Utilization Provider software and installs the software as needed on supported platforms. (On a VM Host, you must install the appropriate providers manually, using the VM Host command line.) For more information, see the *Insight managed system setup wizard getting started guide* and the HP Integrity Virtual Machines documentation available from the HP Technical Documentation website (for the HP Integrity Virtual Machines documentation, click on the **HP Insight Dynamics - VSE for Integrity** tab):

<http://www.hp.com/go/insightdynamics/docs>

In the HP SMH environment, install on the virtual machine guests the required provider components located in `/opt/hpvm/guest-images` on the VM Host. Subdirectories contain the guest management software for each type of guest operating system, including both HP-UX versions 11i v2 and v3, Windows, and Linux. Each subdirectory includes software provided by HP Integrity VM that should be installed on the guest, including the latest VM Provider software.

For more information about installing software components on the VM Host and guests, see the *HP Integrity Virtual Machines Installation, Configuration, and Administration* manual and the *HP Integrity Virtual Machines Release Notes*.

The WBEM provider components are the VM Provider and the Utilization Provider:

- The VM Provider provides VM Host and guest configuration data. This information is delivered using WBEM. To use Integrity Virtual Machines Manager to view configuration data, install the VM Provider (VMPProvider bundle) that is provided with Integrity VM. Install the VM Provider on the VM Host and on each virtual machine when you install the HP Integrity Virtual Machines product. If you upgrade Integrity VM, be sure to keep the VM Provider up to date, too. If the VM Provider version does not match the Integrity VM version, the Integrity Virtual Machines Manager might not work as expected.

As for guests, the VM provider is required to view guest configuration data. The VM Provider and Integrity VM versions need not match. A guest's VM Provider can be an earlier version than that of the Integrity VM running on the VM Host. However, HP recommends upgrading the guests to the latest version of VM Provider available, even if the latest available provider version is greater than the version of the Integrity VM currently installed on the VM Host. When the VM Host Integrity VM is upgraded, you are not required to upgrade the VM Provider on each of the guests, but HP recommends upgrading the VM Providers on the guests to at least match the version of the Integrity VM on the VM Host.

To install the VM Provider on the VM Host and guests, install the appropriate provider software from the operating system media or the Integrity VM guest management software kit.

- The Utilization Provider gathers utilization statistics for CPU, memory, disk, and LAN. This information is delivered using WBEM and gathers data using a daemon (/usr/sbin/utild). You must install the Utilization Provider on the VM Host and on each virtual machine.

## Installing VM Manager on HP SIM

On HP SIM, system requirements for installing VM Manager are the same as requirements for installing Insight Dynamics - VSE for Integrity. You must have a license for at least one other component of Insight Dynamics - VSE for Integrity, such as Virtualization Manager. You cannot access the functionality in VM Manager unless you have a license for, and have installed Integrity VM on, at least one system to be managed through your licensed Insight Dynamics - VSE for Integrity components.

For information about system requirements and installation instructions, see the *HP Insight Dynamics 6.2 Integrity CMS Installation and Configuration Guide* and the *Insight managed system setup wizard getting started guide*. This and other similar documentation is available from the HP Technical Documentation website:

<http://www.hp.com/go/insightdynamics/docs>



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**NOTE:** Do not install the VMMGR bundle (the bundle containing the VM Manager HP SMH plug-in) from the software depot onto the HP SIM CMS. For centralized Integrity VM management capabilities, install the VSEMgmt bundle (containing the VM Manager for HP SIM) from the software bundle.

---

## Installing VM Manager on HP SMH

On HP SMH, VM Manager must be installed separately on a VM Host.

VM Manager 4.1.1 requires JDK 6.0 for installation. Ensure that you have installed JDK 6.0 before installing VM Manager 4.1.1.

Download the VM Manager software depot from the following location:

<http://h20293.www2.hp.com/portal/swdepot/displayProductInfo.do?productNumber=VMMGR>

This depot is also available with the HP-UX 11i v2 September 2006 and later releases.

After downloading the depot, install the software. As a privileged user, execute the following command, where *path-to-depot-file* is the full path specification to the depot file:

```
# swinstall -x mount_all_filesystems=false -s path-to-depot-file VMMGR
```

To determine the version of VM Manager currently installed, enter the following command:

```
#!/usr/sbin/swlist VMMGR
```



---

**NOTE:** Beginning with the HP-UX 11i v3 March 2009 Operating Environment Update Release (OEUR), you can optionally install VM Manager on HP SMH as part of the VSE-OE or DC-OE.

---

## Licensing requirements

The licensing requirements for VM Manager on HP SIM and on HP SMH include the following:

- On HP SIM, VM Manager is included with Insight Dynamics - VSE for Integrity and is installed when Insight Dynamics is installed. To make VM Manager operational, you must have a valid license installed for at least one other component of Insight Dynamics - VSE for Integrity (for example, Virtualization Manager) and one license installed for Integrity VM on at least one host.

You cannot access the functionality in VM Manager unless you have a license for Integrity VM and have Integrity VM installed on at least one system to be managed through your licensed Insight Dynamics - VSE for Integrity components.

- On HP SMH, VM Manager is installed separately on a VM Host. You must have a license for Integrity VM and have Integrity VM installed on that VM Host. A separate license for VM Manager is not required.

For information about licensing, see the readme file in either the `/opt/vse/src` directory (HP SIM) or the `/opt/vmmgr/src` directory (HP SMH).

You must purchase licenses for any software you run in a virtual machine, including the HP-UX operating system and any HP or third-party layered software. You can purchase the licenses for HP software under the HP Virtualization Licensing program. For more information, contact your HP representative.

## Setting security credentials

To display the full range of data about each virtual machine in VM Manager, you must have WBEM-recognized credentials for each virtual machine. A user name and password are required to collect resource utilization and other data, such as the status of the installed operating system. This data is available only from a WBEM provider on the VM Host or virtual machine. The WBEM providers are the tools used to gather data about the virtual machine and the VM Host. The user interface uses this information to show various kinds of system status.

You can set credentials by specifying a default user name and password combination for any or all virtual machines. You can also override the default user name or password on a case-by-case basis.



---

**NOTE:**

- For a given virtual machine, if no user name or password is specified, the default is used.
  - If a password is specified but a user name is not, the default user name is used with the password override. This allows a system administrator to use the same user name but different passwords for each virtual machine.
- 

When running VM Manager with Insight Dynamics - VSE for Integrity, HP SIM is responsible for managing the credentials needed for using WBEM providers on the VM Host and on virtual machines. When running VM Manager under HP SMH, HP SMH manages credentials and access

for the VM Host on which HP SMH is running; credentials for each virtual machine are managed by VM Manager.

The method for setting WBEM credentials depends on whether you are using HP SIM or HP SMH.

## Setting WBEM credentials in HP SIM

Any virtual machines that are not managed nodes do not have any credentials available, and VM Manager cannot contact them. These machines are displayed, but some of the information that can be gathered from the managed nodes is not displayed for non-managed nodes.

You can set credentials in HP SIM for a global configuration across multiple systems by selecting **Options**→**Protocol Settings**→**Global Protocol Settings...**; for a single managed node, set credentials by selecting **Options**→**Protocol Settings**→**System Protocol Settings....** VM Manager requires that the proper WBEM credentials (a valid user name and password) be set in those option pages. Without WBEM, the Virtualization Manager and HP Insight Capacity Advisor software functionality will not be available; only HP Insight Global Workload Manager software for Integrity (gWLM) is functional.

With HP SIM, you can set the credentials when you first launch HP SIM after installation by using the HP SIM First Time Wizard. For information about setting credentials, see the *HP Insight Dynamics 6.2 Integrity CMS Installation and Configuration Guide*.

## Setting WBEM credentials in HP SMH

You must set WBEM credentials for virtual machines in HP SMH. This allows VM Manager to collect utilization data and operating system information on the virtual machine. Stored credentials are specific to the user logged in to HP SMH. Two users who are logged in with different user names do not share credentials.

When you log into SMH without having already set the WBEM credentials and saving them in the file system, the **Set WBEM Credentials for Virtual Machines** page is displayed. When you create a new virtual machine, you must add credentials for that virtual machine by selecting **Modify**→**WBEM Credentials...** from the VM Manager menu bar, which displays the same page. Figure 2-1 shows an example of the **Set WBEM Credentials for Virtual Machines** page.



Figure 2-1 HP SMH: Set WBEM Credentials page

hp System Management Homepage User: root Home | Sign Out  Session ne expires

Home Settings Tasks Tools Logs Support Help

Integrity Virtual Machines M ... Host Name tornado Manager System Model ia64 hp server rx4640 http://15.1

### Integrity Virtual Machines Manager

Set the WBEM username and password for each VM

A user name and password is required to access utilization data and operating system information via WBEM for each VM. This information cannot be accessed for VMs without user name and password information.

Require trusted certificates

**Default user name and password for WBEM access to VMs (optional):**

User:

Password:

**Per-VM user name and password for WBEM access to VMs (optional; overrides default):**

| VM         | User                 | Password             |
|------------|----------------------|----------------------|
| suffolk    | <input type="text"/> | <input type="text"/> |
| vm001      | <input type="text"/> | <input type="text"/> |
| vm004-hpvm | <input type="text"/> | <input type="text"/> |

Save user name and password settings in the file system

OK Cancel

On this page, you can set one user name and password combination for all virtual machines, or you can set them individually for one or more virtual machines. If you set the credentials for some but not all of the individual systems, VM Manager does not collect utilization data and operating system information for the excluded systems.

You can also save the user name and password entries in obscured format in the file system. This allows you to use the same setting each time you enter VM Manager through HP SMH. To save these entries, select the **Save user name and password settings in the file system** check box, and then click **OK**. This information is obfuscated before being stored.

If you do not want to provide this security information for the current session, click **Cancel**. VM Manager continues without collecting this data. If you do not want to provide this additional data for subsequent uses of VM Manager, and you do not want to be prompted for it on each entry into VM Manager, make sure all entries on the page are blank, select the check box to save the credentials to file, and click **OK**. Empty credentials are stored, and this prevents the WBEM credentials page from being displayed on subsequent entries into VM Manager.

If you require the additional security provided by certificate validation, you can turn on SSL certificate validation by checking the **Require trusted certificates** check box. If this box is checked, you must store the valid certificates for the virtual machines in a keystore on the VM Host to indicate that connections to those virtual machines are trusted; otherwise, some information is not displayed by VM Manager. For example, if a certificate is missing, utilization meters are labeled `No Data`. For more information about trusted certificates and how to store them in a keystore on the VM Host, see “Trusted certificates” (page 19).

You can use the basic features of the HP SMH version of VM Manager without exposing user credentials or configuration data on the local network. In this case, you see a subset of the potential information that the VM Manager can display. To have all data displayed, the following steps are required.



---

**NOTE:** Displaying all the information about the virtual machines' configuration exposes the credentials of a connecting user.

---

1. Create a nonlogin, nonprivileged account on each virtual machine to which VM Manager might connect and whose credentials can be intercepted on the network. Although these credentials are restricted to nonlogin capabilities, they can also be used to gain access to other data or actions available using WBEM and other nonlogin services, including those from additional providers that are registered on the system.
2. *Optional, for additional security:* If local policy is to avoid exposure of any account credentials on your network, or if you do not want to expose the virtual machine configuration data, then configure an SSH or IPsec tunnel from the VM Host system to each virtual machine for port 5989 (HP WBEM Services).

The following types of information require credentials for each virtual machine for which information is to be gathered:

- **Operating System:** If the required credentials are not set for a virtual machine, VM Manager cannot contact the machine. VM Manager displays the expected operating system (if the operating system was set during configuration of the virtual machine, or if the guest operating system on the virtual machine has been booted). If the credentials are set and the virtual machine is running with the proper provider, VM Manager displays the operating system and version number.
- **Utilization:** If the required credentials are not set for a virtual machine, the utilization meters for virtual machine-specific items are dimmed. (Meters specific to a virtual machine are located on such VM Manager pages as the **VM Host Virtual Machines** tab, the **VM Properties Network** and **VM Properties Storage** tabs, and the **VM Properties General** tab. For more information about these tabs, see [Chapter 4 \(page 31\)](#).) Meters for the VM Host and host resources are still available if the VM Host's WBEM Utilization Provider is running.

The data is a 5-minute average that is calculated and updated on 5-minute boundaries.

When a utilization meter is dimmed, a label next to the meter indicates the probable cause. These labels and status indicators are described in “[Utilization meter status/error information](#)” (page 125).

**Virtual LAN interface I/O utilization on the **VM Properties Network** tab:** For a virtual machine with invalid credentials, either the `No Perm.` or `No Data` label appears next to the meter. The page still displays whatever information is available from the VM Host, such as the status and the bus, device, and function numbers for a virtual LAN interface. For a virtual machine with valid credentials, VM Manager displays I/O utilization data for each virtual LAN interface and for VM aggregated LAN interfaces.

**Virtual storage device I/O utilization on the **VM Properties Storage** tab:** For a virtual machine with invalid credentials, either the `No Perm.` or `No Data` label appears next to the meter. The page still displays whatever information is available from the VM Host, such as the virtual device type and the bus, device, and target numbers for the virtual storage

device. For a virtual machine with valid credentials, VM Manager displays I/O utilization data for each virtual storage device and for VM aggregated storage interfaces.

- Virtual LAN (VLAN) interface name and status on the **Network** tab: This status is displayed for a virtual machine with valid credentials, but invalid credentials will return an unknown LAN status and utilization. It might display whatever information is available, for example, the **bus**, **dev**, or the **fcn** number for the VLAN interface.

To change the WBEM credentials settings for virtual machines, return to the **Set WBEM Credentials for Virtual Machines** page by selecting **Modify**→**WBEM Credentials...** You do not need to select a virtual machine before setting credentials.



---

**IMPORTANT:** After you enter the data, save it by clicking **OK**. Otherwise, the data is cleared when the session ends.

---

## Trusted certificates

If you require the additional security provided by certificate validation you can turn on SSL certificate validation by selecting the **Require trusted certificates** check box on the VM Manager **Set WBEM Credentials for Virtual Machines** page. With this setting turned on, the client Certificate Trust Store must include the server certificates from the virtual machines; otherwise, VM Manager cannot obtain certain information from the virtual machines. If your environment does not require the additional security provided by certificate validation, you can leave certificate validation turned off.

To enable SSL certificate validation in VM Manager, you must export the server certificates from the WBEM services providers on the virtual machines, and import those certificates into the keystore on the VM Host where VM Manager is running. This keystore is shared between Partition Manager and VM Manager. Certificates in this keystore are trusted by both Partition Manager and VM Manager.

To get the certificate file from the WBEM services provider, follow these steps:

1. Locate the WBEM services provider certificate file (`cert.pem`) on the virtual machine to which you want to connect. To find the correct file, open the WBEM services Provider configuration file, which can be found in the following locations:
  - For Windows:  
`%PEGASUS_HOME%\cimserver_current.conf`
  - For HP-UX:  
`$PEGASUS_HOME/cimserver_current.conf`  
(The default value for PEGASUS\_HOME on HP-UX is `/var/opt/wbem.`)

The location of the server certificate file is configured by the `sslCertificateFilePath` setting. If this value is not set in the configuration file, the default values are as follows:

- For Windows:  
`%PEGASUS_HOME%\server.pem`
  - For HP-UX:  
`/etc/opt/hp/sslshare/cert.pem`
2. Copy the certificate file (`cert.pem` or `server.pem`) to the VM Host where VM Manager is running.



---

**NOTE:** Copy the certificate file to a temporary directory (not to the `sslshare` directory) on the VM Host. Do not overwrite the existing `cert.pem` or `server.pem` file in the `sslshare` directory on the VM Host.

---

3. To import the certificate file, enter the following command on the VM Host:

```
$ JAVA_HOME/bin/keytool -import -alias server_hostname \  
-file cert.pem \ -keystore /etc/opt/hp/sslshare/parmgr.keystore
```

### Discovering data when setting new WBEM credentials

When you set new WBEM credentials from the VM Manager **Modify** menu and click **OK**, the page to which you return is updated using the new credentials. However, especially when VM Manager must retrieve data from a large number of virtual machines, some of the data might not yet be updated when the page displays in full (instead, the old data is still displayed). With the exception of data displayed by utilization meters, the new data (such as the virtual machine guest OS version) is not seen until the page refreshes again. The utilization meters update immediately after VM Manager retrieves the utilization data; refreshing the page is not required for updating that data.

# 3 Accessing and Navigating VM Manager

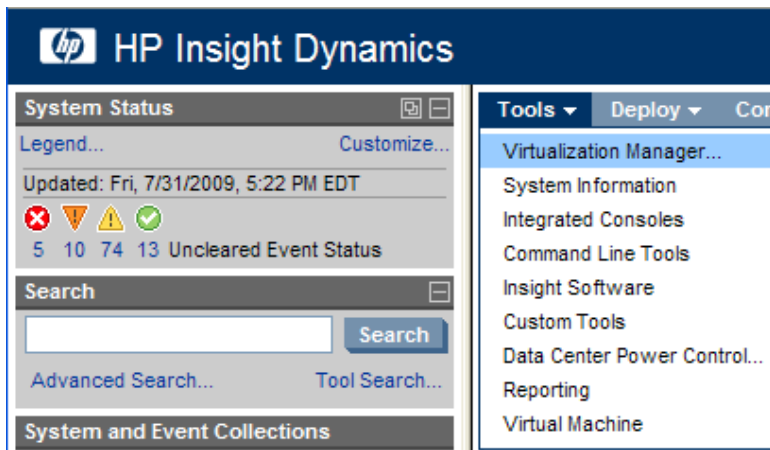
You access VM Manager through a web browser. This chapter explains how to access VM Manager from the HP SIM/Insight Dynamics - VSE for Integrity Virtualization Manager **Visualization** tab and from HP SMH. This chapter also explains how to access VM Manager help. Information about possible access failures and the messages that might be seen is included in [Appendix A](#) (page 123).

## Accessing VM Manager from Insight Dynamics - VSE for Integrity

To use all the VM Manager facilities (view all screens and perform all menu actions), you must have VSE All Tools authorization . To access VM Manager from Insight Dynamics, follow these steps:

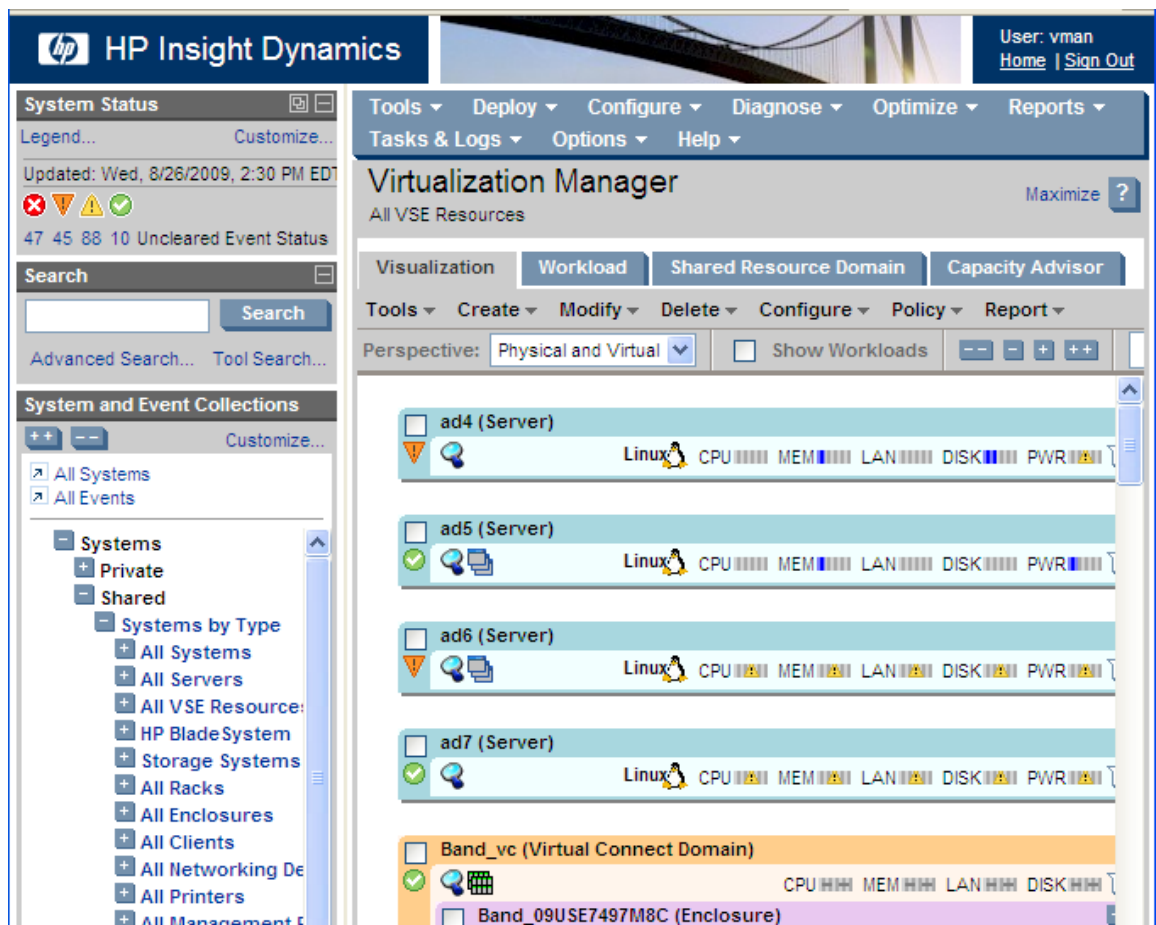
1. From the HP SIM/Insight Dynamics **Home** page, select **Tools**→**Virtualization Manager...**, as shown in Figure 3-1.

**Figure 3-1 Insight Dynamics: accessing Virtualization Manager**



This displays the Virtualization Manager **Visualization** tab, as shown in Figure 3-2.

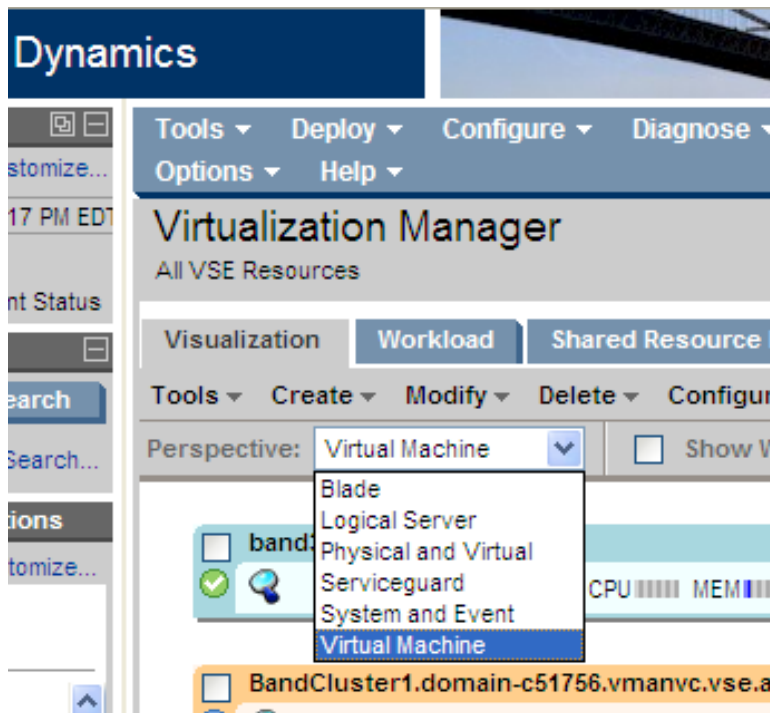
Figure 3-2 Virtualization Manager Visualization tab




2. The first time you start Virtualization Manager, the **Visualization** tab appears with the default **Physical and Virtual** perspective, which shows all physical and virtual nodes in graphical compartments. When you start Virtualization Manager any time after, the software checks whether you had previously set a default view by modifying user preferences (modify user preferences by selecting **Configure**→**User Preferences...** from the Virtualization Manager menu bar). If you set a collection such as VM Hosts, Virtualization Manager displays the collection for all VM Hosts and virtual machines.

The **Perspective** menu allows you to choose a view comprised solely of VM Hosts and virtual machines (both HP Integrity VM and VMware ESX, if both products are present among the resources). Select **Virtual Machine** from the drop-down menu, as shown in Figure 3-3.

**Figure 3-3 Selecting Virtual Machine perspective**

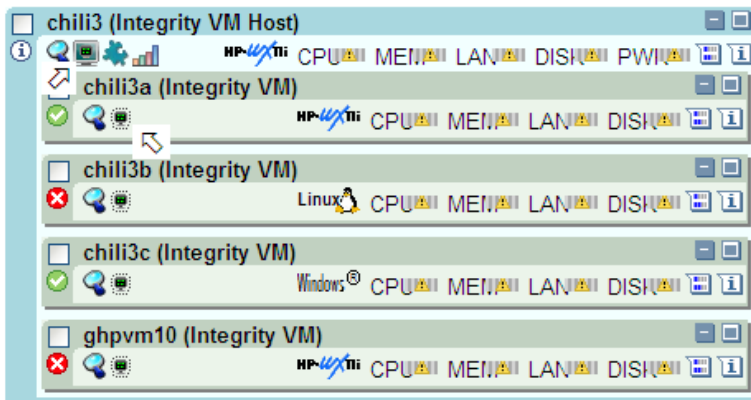


3. On the Virtualization Manager **Visualization** tab, select the VM Host or virtual machine that you want to manage. For example, in the Integrity VM representation shown in Figure 3-4 (a closeup from the screen shown in Figure 3-3 (page 23)), you can select VM Host system `chili3` by clicking the monitor icon  beneath the VM Host name. (If you hover your cursor over the icon, a pop-up pane displays explanatory text.) Selecting a VM Host monitor icon displays the VM Manager **VM Host General** tab.

Alternatively, you can select one of the virtual machines running on VM Host `chili3` by clicking the similar but smaller icon beneath a virtual machine name (such as the monitor icon for `chili3a` in Figure 3-4). Selecting a virtual machine monitor icon, displays the **VM Properties General** tab.

The basic VM Manager views are described in Chapter 4 (page 31).

**Figure 3-4 Select VM Host**



## Accessing VM Manager from HP SMH

To use all the VM Manager facilities (view all screens and perform all menu actions), you must log in to HP SMH with Administrator privileges. To access VM Manager from HP SMH, follow these steps:

1. On the SMH **Home** page, click **Tools**.




---

**NOTE:** SMH GUI sessions stop after the session timeout period elapses without any user activity (by default, the session timeout period is 15 minutes). With HP SMH Version 2.2.7 December 2007 and later, you can prevent a session from timing out by selecting the **Session never expires** check box in the upper right corner of the page. Even if the box is checked, the SMH server might shut itself down to conserve system resources if there is a period of inactivity from all users (by default, this timeout period is 30 minutes). All of the VM Manager Version 4.1.1 views and dialogs periodically issue short keepalive messages to the server to prevent SMH from shutting itself down during your session. For more information about SMH session management, see the *smhstartconfig(1)* and *hpsmh(1)* manpages.

---

2. On the SMH **Tools** page, select **Integrity Virtual Machine Manager** from the **Integrity Virtual Machines Management** menu box. In the SMH **Tools** page shown in Figure 3-5, the **Integrity Virtual Machines Management** menu box appears in the lower right corner of the page. (Its location varies, depending on the management tools that are available.) This example shows the SMH list view. The SMH icon view displays icons instead of menu boxes.



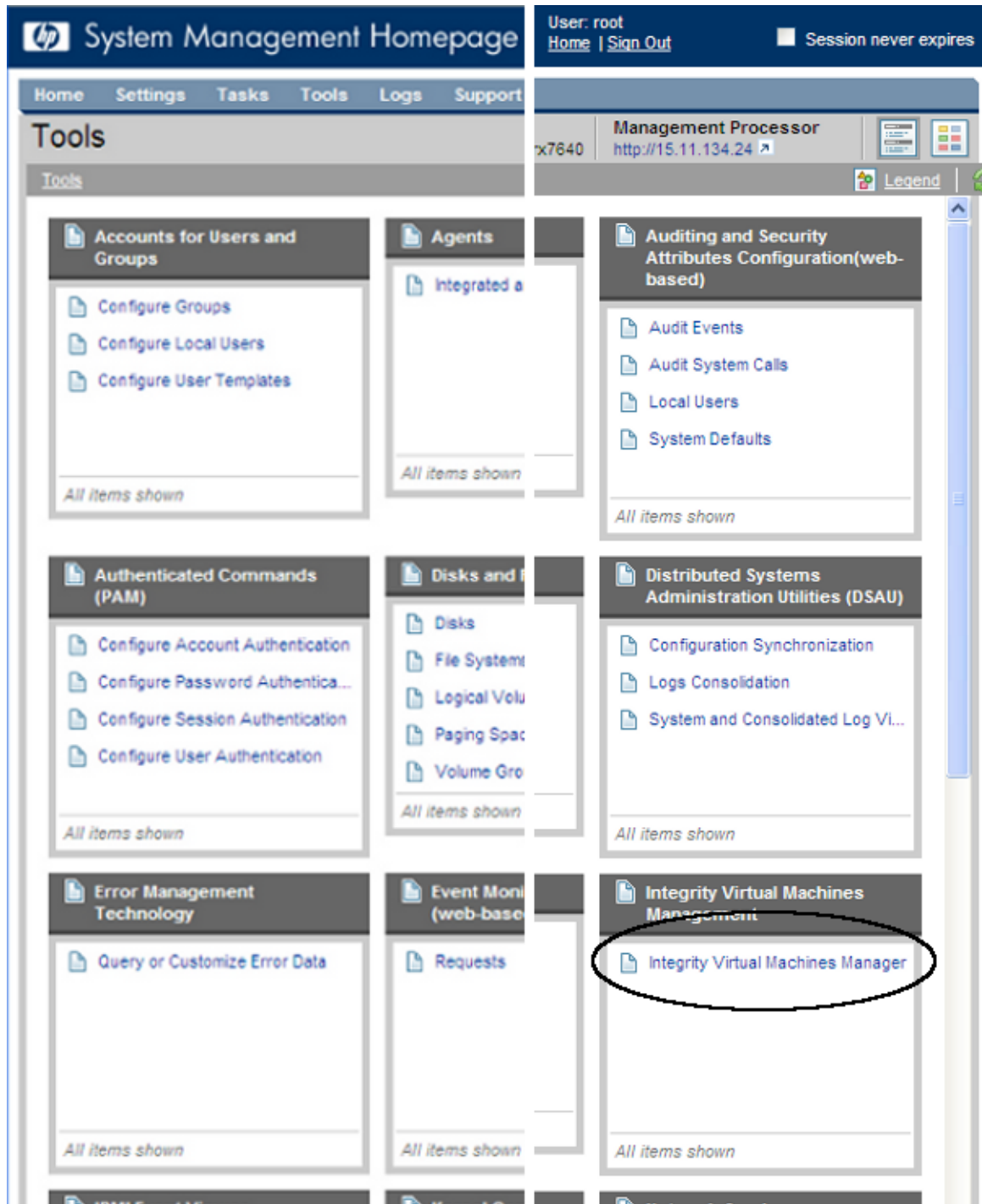
Look for the Integrity Virtual Machines icon (  ). To switch from one type of view to another, click one of the the associated icons in the SMH header (to the right of the Management Processor information).





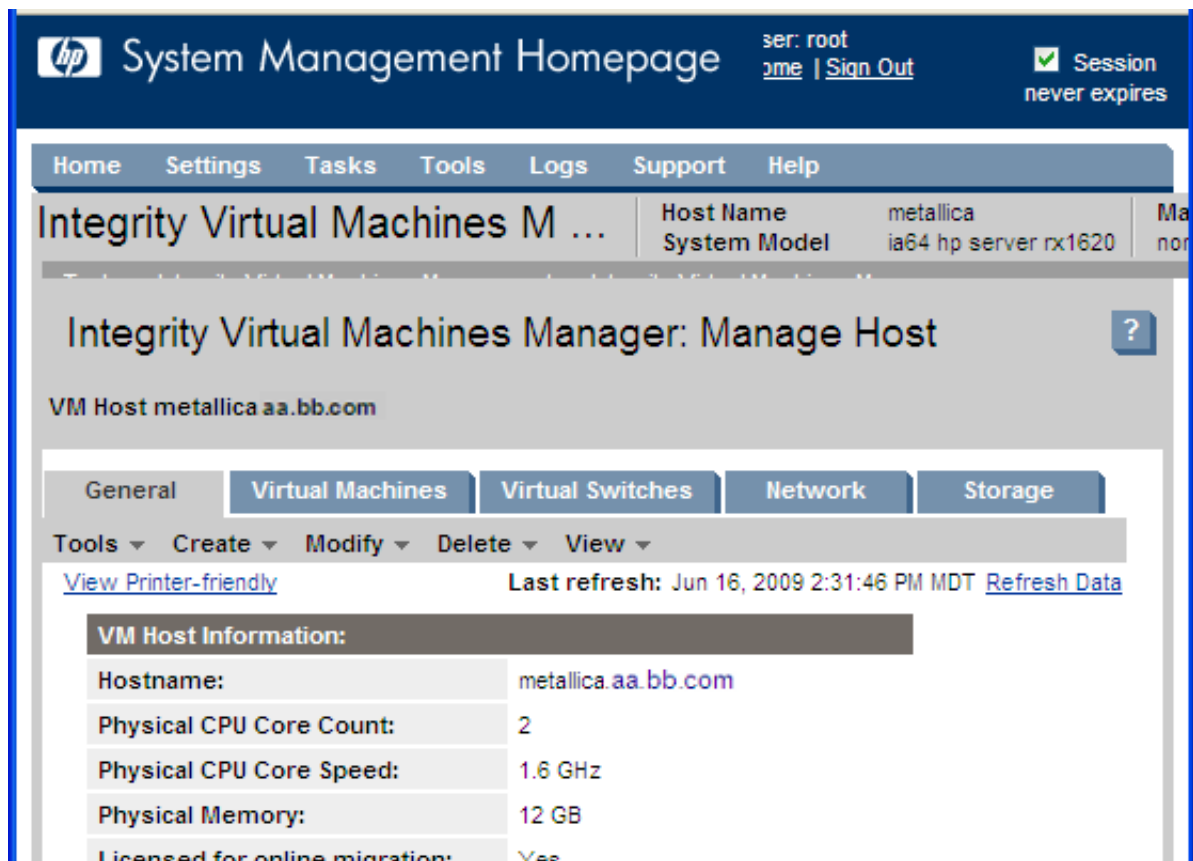
**NOTE:** When you access VM Manager for the first time from HP SMH, you might encounter an End User License Agreement (EULA). You must accept this agreement to continue using the VM Manager product.

**Figure 3-5 HP SMH: accessing VM Manager**




If you have already saved WBEM credentials for each virtual machine, selecting **Integrity Virtual Machines Manager** displays the **VM Host General** tab as shown in Figure 3-6.

Figure 3-6 HP SMH: VM Host General tab



If you have not set and saved WBEM credentials for each virtual machine, the **Set WBEM Credentials** page is displayed first (instead of the **VM Host General** tab). An example of the **Set WBEM Credentials** page is shown in Figure 2-1. Enter the appropriate information and click **OK**, or click **Cancel** to skip this step and advance to the VM Manager **VM Host General** tab. For more information about setting WBEM credentials, see “Setting security credentials” (page 15).

## Accessing VM Manager help

To access help information for any VM Manager page, click the question mark icon  located in the upper right corner of the VM Manager page.

## Navigating VM Manager

VM Manager provides numerous navigation aids, as shown in Figure 3-7, which is an example of a VM Manager view from within the Insight Dynamics environment.



**NOTE:** The VM Manager navigation aids available in a particular view vary according to the view. The view in Figure 3-7 shows most of the navigation aids that VM Manager provides. Missing from this view are navigation buttons such as **Previous** and **Next**, visible in some of the Create Virtual Machines wizard pages (discussed in “Creating virtual machines” (page 87)). Certain VM Manager pages (such as the **Start Virtual Machine** page) include **OK** and **Cancel** buttons, which complete or cancel an action, returning you to the VM Manager view from which you initiated the action.

**Figure 3-7 VM Manager navigation features**

Integrity Virtual Machines Manager: Manage Host  
VM Host metallica.aa.bb.com

Restore Size ?

1 — Go back to [Virtualization Manager](#)

2 — **General** Virtual Machines Virtual Switches Network Storage

3 — Tools Create Modify Delete View

4 — [View Printer-friendly](#) Last refresh: May 5, 2009 2:37:14 PM MDT [Refresh Data](#)

| VM Name (Hostname)   | HW | OS | Operating System             | VM vCPU Utilization | Memory Utilization | Disk I/O | Ne |
|--|----|----|------------------------------|---------------------|--------------------|----------|----|
| <input type="checkbox"/> metallica01 (metallica01.aa.bb.com) | ✓  | ✓  | HP-ux11i<br>HP-UX<br>B.11.31 | 100 %               | 95 % of 1GB        | 18 KB/s  |    |
| <input type="checkbox"/> metallica02 (metallica02.aa.bb.com) | ✓  | ✓  | HP-ux11i<br>HP-UX<br>B.11.23 | 11 %                | 94 % of 1GB        | 20 KB/s  |    |
| <input type="checkbox"/> metallica03 (metallica03.aa.bb.com) |    |    | HP-ux11i<br>HP-UX            | No Data             | No Data            | No Data  |    |
| <input type="checkbox"/> metallica04 (metallica04.aa.bb.com) |    |    | HP-ux11i<br>HP-UX            | No Data             | No Data            | No Data  |    |
| <input type="checkbox"/> motley03 (motley03.aa.bb.com)       |    |    | HP-ux11i<br>HP-UX            | No Data             | No Data            | No Data  |    |
| <input type="checkbox"/> motley04 (motley04.aa.bb.com)       | ✓  | ✓  | HP-ux11i<br>HP-UX<br>B.11.23 | 4 %                 | 95 % of 1GB        | 19 KB/s  |    |

- 1 Click the **Go back** link to return to the previous view.



**NOTE:** Avoid using your browser's **Back** and **Forward** buttons in VM Manager. When you use these buttons, VM Manager cannot identify that you have changed to a different view. This can cause problems, including incorrect display of objects selected in the current view. Instead, use the links and navigation buttons provided by VM Manager.




If you navigate from one VM Manager view to another (for example, from VM Host view to VM Properties view), click the **Go back** link in the new view (and on any subsequent tabs you navigate to in that same view) to return to the previous VM Manager view. For example, if you navigate from the VM Host view to the VM Properties view or to the Vswitch Properties view, clicking the **Go back** link returns you to the VM Host view. If you navigate from the VM Properties view to the VM Host view or to the Vswitch Properties view, clicking the **Go back** link returns you to the VM Properties view.

Using VM Manager from Insight Dynamics, if the VM Manager view was accessed directly from Virtualization Manager, clicking the **Go back** link returns you to Virtualization

Manager (as indicated in Figure 3-7); clicking the **Go back** link on any tab that you navigate to in the same view also returns you to the Virtualization Manager. For more information about returning to Virtualization Manager from VM Manager (or, if you are using HP SMH, about returning to the HP SMH Homepage), see “Returning to Virtualization Manager or the HP SMH Homepage” (page 28).

- 2 Click a tab to change to another view. All VM Manager tabs are described in Chapter 4 (page 31).
- 3 Click a menu in the menu bar beneath the tab title. This displays additional information about the actions you can perform. The VM Manager menu bar is described in Chapter 5 (page 75).
- 4 Click the top of a column of a table (on or near the title of the column) to change which column is driving the sort order of the table. Click the arrow in the selected column to toggle between ascending and descending order. Not all columns can drive the sort order. Hover your cursor over a column heading to determine whether the column is selectable for sorting; the cursor (pointer) changes according to the current pointer scheme configured for your operating system (for example, when you hover over a selectable column, your cursor might change from an arrow to a hand).

In tables that are sortable, one column has a darker grey background in the column heading and an ascending or descending arrow in the same area. The dark grey color indicates that the column is driving the sort order for all rows of data in the table. The arrow indicates whether the column has been sorted in ascending or descending order. Criteria for the order may be numeric or alphabetical. In Figure 3-7, the column that drives the sorting order is the VM Name column, and the column is sorted in ascending order.

- 5 Click a check box next to an object that you want to act on, then select the action from one of the VM Manager menus. To perform an action on all the objects listed, select the box at the top of the check box column (in the header row at the top of the table).
- 6 Using VM Manager with Insight Dynamics - VSE for Integrity, you can click a utilization meter to view a snapshot of Capacity Advisor historical data; this feature is not provided when using VM Manager from HP SMH. For information about using VM Manager to collect and view utilization data, see Chapter 7 (page 111).
- 7 Click a link to an object (the object's name forms the link) to move to a view of that object. For example, click the virtual machine name link shown in Figure 3-7 to access the Virtual Machine Properties page for that virtual machine.
- 8 These icons indicate the status of the virtual machine hardware (HW) and its guest operating system (OS). The icons in the HW column indicate whether the virtual machine is started (up) or stopped (down). For example, the  icon indicates a VM is up; the  icon indicates it is down. The same icons in the OS column indicate whether the operating system is running. In this particular view (the **VM Host Virtual Machines** tab), if a virtual machine is migrating, an icon indicates the direction of migration. In the last row of the table, the  icon indicates the virtual machine is migrating to another VM Host. For more information about migration status icons, see “**VM Host Virtual Machines** tab” (page 36). The meanings of these and other status icons are summarized in “Status indicators” (page 124). For more information on how to migrate virtual machines, see “Migrating virtual machines” (page 100).

## Returning to Virtualization Manager or the HP SMH Homepage

With Insight Dynamics, to access Virtualization Manager from a VM Manager view in which the **Go back** link currently directs you to another VM Manager view, you can do one of the following:

- From the Insight Dynamics menu bar (top menu bar), select **Tools**→**Virtualization Manager**.... Alternatively, select the **All VSE Resources** link in the left-hand navigation pane (**System and Event Collections**→**Systems**→**Shared**→**Systems by Type**→**All VSE Resources**). To access the top menu bar or left-hand navigation pane, your VM Manager

view must not be maximized (using the **Maximize** link in the top right corner). If your view is maximized, return to the view that includes the top menu bar by clicking **Restore Size** in the top right corner of the maximized VM Manager view.

- Continue using the **Go back** link until you return to the VM Manager view that you accessed originally from the Virtualization Manager, at which point you can click the **Go back to Virtualization Manager** link.

Using VM Manager from HP SMH, you can return to the HP SMH Homepage by clicking **Home** from the HP SMH menu bar.



**NOTE:** Avoid using your browser's **Back** and **Forward** buttons in VM Manager. Instead, use the links and navigation buttons provided by VM Manager, as described in this section and “Navigating VM Manager” (page 26).

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## 4 Using VM Manager views and tabs

VM Manager provides three basic views, each with several tabs, as described in the following sections.

You can print any of the VM Host or virtual machine tabs by clicking **View Printer-friendly** beneath the VM Manager menu bar, on the left side of the page. This redisplay the tab in a format suitable for printing. To print the tab, click **Print**. To switch back, click **View Normal**.

You can update the data on certain pages by clicking **Refresh Data** beneath the VM Manager menu bar, on the right side of the page. In general, VM Manager tabbed views are refreshed automatically every five minutes. An indicator on these visualization pages notifies you when the data was last refreshed. VM Manager screens that display configuration data are updated instantaneously when you use VM Manager to change the related configuration parameters. However, when changes to the virtual machine I/O configuration are made using tools other than VM Manager (such as adding or removing I/O devices by using the VM Host command line), the updated configuration data is not shown until the screen is refreshed. Some dialog screens, such as the Create Virtual Machine wizard **Add Storage Device** and the **Modify→Add Storage Device to Virtual Machine...** screens, include a **Refresh Data** link that you can use to manually refresh data.



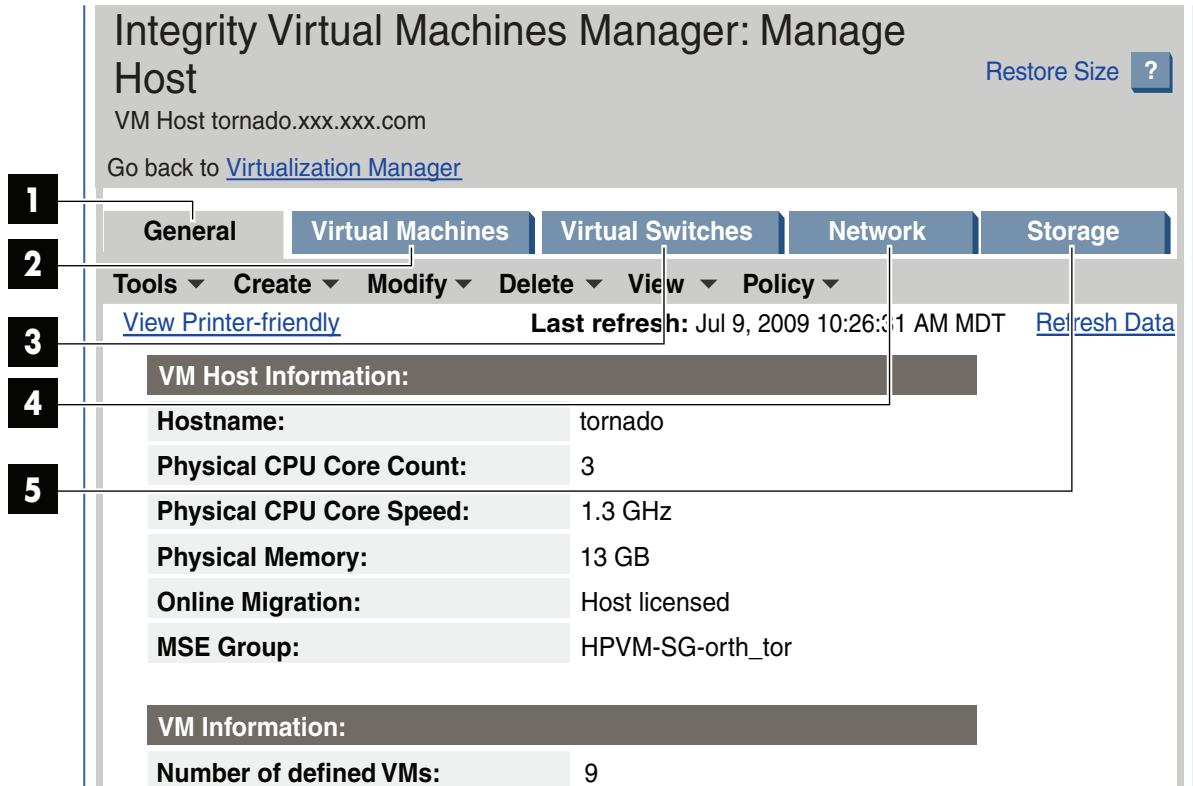
**NOTE:** The figures in this chapter and in the remainder of the manual display views seen from Insight Dynamics. Views in HP SMH might differ slightly. Differences are noted. In addition, the examples display maximized window views to give more focus to the VM Manager window (eliminating the Insight Dynamics system status pane available on the left of the page and the HP SIM/Insight Dynamics header and menu bar on the top of the page). Select the maximized view by clicking **Maximize** in the top right corner of the page. You can see the **Maximize** link in Figure 3-3 (page 23). To return to the original view, click **Restore Size** in the top right corner of the maximized page. The maximize feature is not provided by HP SMH but is not needed; HP SMH provides a full-window VM Manager view.

---

# VM Host view

You can access the VM Manager Host view directly from Virtualization Manager or from other VM Manager views that include a link to the VM Host, such as the VM Properties **General** tab. Figure 4-1 shows a typical VM Host view in VM Manager. Tabs available from the VM Host view are described in the text that follows. Subsequent sections describe each tab in more detail.

**Figure 4-1 VM Host view**



- 1 The “**VM Host General** tab” (page 33) displays information about the VM Host system.
- 2 The “**VM Host Virtual Machines** tab” (page 36) displays information about the virtual machines in the VM Host system.
- 3 The “**VM Host Virtual Switches** tab” (page 40) shows information about the virtual switches on the VM Host.
- 4 The “**VM Host Network** tab” (page 42) shows all mappings from virtual network interface cards in the virtual machines to the physical network interface cards in the VM Host system.
- 5 The “**VM Host Storage** tab” (page 49) shows all mappings from the virtual storage devices in the virtual machines to the physical storage devices in the VM Host system.



## VM Host General tab

The **VM Host General** tab displays information about the state and configuration of the VM Host system.

Quick reference

Figure 4-2 VM Host General tab

Integrity Virtual Machines Manager: Manage Host

VM Host tornado.xxx.xxx.com

Restore Size ?

1 — Go back to [Virtualization Manager](#)

General Virtual Machines Virtual Switches Network Storage

Tools ▾ Create ▾ Modify ▾ Delete ▾ View ▾ Policy ▾

2 — [View Printer-friendly](#) Last refresh: Jul 9, 2009 10:26:31 AM MDT [Refresh Data](#)

3 — VM Host Information:

|                          |                  |
|--------------------------|------------------|
| Hostname:                | tornado          |
| Physical CPU Core Count: | 3                |
| Physical CPU Core Speed: | 1.3 GHz          |
| Physical Memory:         | 13 GB            |
| Online migration:        | Host licensed    |
| MSE Group:               | HPVM-SG-orth_tor |

4 —

5 — VM Information:

|                        |                                |
|------------------------|--------------------------------|
| Number of defined VMs: | 9                              |
| Number of active VMs:  | 1 (1 local; 0 hosted remotely) |
| External Managers:     | (none)                         |

6 — VM Host Resource Utilization:

|                                   |  |
|-----------------------------------|--|
| VM Host CPU Utilization:          | <div style="width: 4%;"></div> 4 %           |
| Physical Memory currently in use: | <div style="width: 48%;"></div> 48 % of 13GB |
| Physical Network I/O:             | <div style="width: 172%;"></div> 172 Kb/s    |
| Physical Disk I/O:                | <div style="width: 234%;"></div> 234 KB/s    |

- 1 Goes back to the previous view, in this case Virtualization Manager. If you accessed the VM Host view from another VM Manager view (such as the VM Properties view), the link returns you to that previous view. In HP SMH, when you first access this page from HP SMH, the link is not provided. The link appears whenever you move from one VM Manager view to another (such as from VM Properties view to VM Host view, in which case the **Go back to Integrity Virtual Machines Manager: Manage VM** link appears on the VM Host view).
- 2 Displays this window in a format suitable for printing.
- 3 Updates the data displayed on this page. In general, VM Manager tabbed view screens are refreshed automatically at regular intervals, and VM Manager screens that display configuration data are updated instantaneously when you use VM Manager to change the related configuration parameters. However, when changes to the virtual machine I/O

configuration are made using tools other than VM Manager (such as adding or removing I/O devices by using the VM Host command line), the updated configuration data is not shown until the screen is refreshed.

- 4 Describes resources in the VM Host system.
- 5 Describes the status of virtual machines in the VM Host system and identifies external managers. If virtual machines are managed by gWLM, the field provides a hyperlink that enables you to access gWLM.
- 6 Summarizes resource utilization for the VM Host system.

For more information about using VM Manager to collect and view utilization data, see Chapter 7 (page 111).

## Screen details

### VM Host Information

- **Hostname:** The hostname of the VM Host system (as well as the nPartition name and link to Partition Manager for this nPartition, if the VM Host system is contained within an nPartition).
- Resource inventory.
  - **Physical CPU Core Count:** The number of processors.
  - **Physical CPU Core Speed:** The speed of processors.
  - **Physical Memory:** The amount of memory.
  - **Online Migration:** Indicates whether the VM Host is enabled and licensed to support online migration of virtual machines. The second column in the following table shows what the status field displays, based on the state of the VM Host listed in the first column:

**Table 4-1 Online migration status**

| VM Host state for online migration | Online migration status |
|------------------------------------|-------------------------|
| Disabled                           | Host disabled           |
| Enabled and licensed               | Host licensed           |
| Enabled and unlicensed             | Host not licensed       |

The licensing is included with a bundle that must be installed on the VM Host. For more information about enabling and licensing the VM Host, see the *HP Integrity Virtual Machines Installation, Configuration, and Administration* manual.

- **MSE group:** The name of the Integrity VM multiserver environment group, which is a set of Integrity VM servers. This grouping is required when a set of Integrity VM servers is also configured as a Serviceguard cluster. Virtual machines configured as Serviceguard packages automatically fail over to another node in the Integrity VM MSE.

### VM Information

- **Number of defined VMs:** The number of defined virtual machines.
- **Number of active VMs:** The number of virtual machines currently booted, and the number of virtual machine packages running on the local VM Host (local) as well as the number that are hosted remotely using HP Serviceguard.
- **External Managers:** Indicates if the virtual machine is being managed by gWLM or HP Serviceguard. With Insight Dynamics - VSE for Integrity, if virtual machines are managed by gWLM, the field provides a hyperlink to gWLM. Under HP SMH, if virtual machines are being managed by gWLM, the field identifies the Central Management Server (CMS) on which gWLM is running and provides a hyperlink to the HP SIM/Insight Dynamics login screen (you cannot modify gWLM policies from HP SMH). In either case (using VM Manager

with Insight Dynamics or HP SMH), if the virtual machines are not being managed by gWLM or HP Serviceguard, this field displays (none).

## VM Host Resource Utilization

Resource utilization meters display data retrieved by the WBEM Utilization Provider. The data is a 5-minute average that is calculated and updated on 5-minute boundaries. If the utilization cannot be displayed, the utilization meter is dimmed and a label indicates the probable cause. For a description of meter labels, see “Utilization meter status/error information” (page 125).

Using VM Manager with Insight Dynamics - VSE for Integrity, you can click a meter to view a snapshot of Capacity Advisor historical data; this feature is not provided when using VM Manager from HP SMH.

- **VM Host CPU Utilization:** An aggregate showing how busy the VM Host is with respect to the processes and virtual machines that are executing on it.
- **Physical Memory currently in use:** A started virtual machine requires the total amount of memory defined for that virtual machine.
- **Physical network I/O** An aggregate of all network I/O that is occurring on the host as a result of both host and guest access to network devices. Because this is an aggregate, one or more network devices might be very busy, while others might be idle. For information about specific devices, see the **VM Host Network** tab.

**Physical disk I/O** An aggregate of the storage I/O that is occurring on the host as a result of both host and guest access to storage devices. Because this is an aggregate, one or more storage devices might be very busy, while others might be idle. For more information about each device, see the **VM Host Storage** tab.

## VM Host Virtual Machines tab

The **VM Host Virtual Machines** tab displays information about the state of virtual machines in the VM Host system.

Quick reference

**Figure 4-3 VM Host Virtual Machines tab**

Integrity Virtual Machines Manager: Manage Host Restore Size ?

VM Host metallica.fc.hp.com

1 [Go back to Virtualization Manager](#)

2 **General** Virtual Machines Virtual Switches Network Storage

3 Tools Create Modify Delete View Last refresh: May 5, 2009 2:37:14 PM MDT [Refresh Data](#)

4 [View Printer-friendly](#)

| <input type="checkbox"/> | VM Name (Hostname)                     | HW | OS | Operating System | VM vCPU Utilization | Memory Utilization | Disk I/O | Net |
|--------------------------|--|----|----|------------------|---------------------|--------------------|----------|-----|
| <input type="checkbox"/> | metallica01<br>(metallica01.xx.xx.com) | ✓  | ✓  | HP-UX<br>B.11.31 | 100 %               | 95 % of 1GB        | 18 KB/s  |     |
| <input type="checkbox"/> | metallica02<br>(metallica02.xx.xx.com) | ✓  | ✓  | HP-UX<br>B.11.23 | 11 %                | 94 % of 1GB        | 20 KB/s  |     |
| <input type="checkbox"/> | metallica03<br>(metallica03.xx.xx.com) | ⚠  | ⚠  | HP-UX            | No Data             | No Data            | No Data  |     |
| <input type="checkbox"/> | metallica04<br>(metallica04.xx.xx.com) | ⚠  | ⚠  | HP-UX            | No Data             | No Data            | No Data  |     |
| <input type="checkbox"/> | motley03<br>(motley03.xx.xx.com)       | ⚠  | ⚠  | HP-UX            | No Data             | No Data            | No Data  |     |
| <input type="checkbox"/> | motley04<br>(motley04.xx.xx.com)       | ✓  | ✓  | HP-UX<br>B.11.23 | 4 %                 | 95 % of 1GB        | 19 KB/s  |     |

- 1 Goes back to the previous view, in this case Virtualization Manager. If you accessed the VM Host view from another VM Manager view (such as the VM Properties view), the link returns you to that previous view. In HP SMH, when you first access this page from HP SMH, the link is not provided. The link appears whenever you move from one VM Manager view to another (such as from VM Properties view to VM Host view, in which case the **Go back to Integrity Virtual Machines Manager: Manage VM** link appears on the VM Host view).
- 2 Displays this window in a format suitable for printing.
- 3 Updates the data displayed on this page. In general, VM Manager tabbed view screens are refreshed automatically at regular intervals, and VM Manager screens that display configuration data are updated instantaneously when you use VM Manager to change the related configuration parameters.
- 4 Allows you to perform an action on the virtual machine. Select the box for a specific virtual machine, then select an action from one of the menus available on the VM Manager menu bar. To perform an action on all the virtual machines, select the box in the header row.
- 5 Displays information about the virtual machine by taking you to the **VM Properties General** tab.
- 6 Utilization meters (bar graphs) display utilization data. This one provides memory utilization data. Other meters display data about virtual machine vCPU utilization, disk I/O, network I/O, and VM Host CPU utilization. (In Figure 4-3, the virtual machine information table is

only partially visible; some utilization meters are not visible. To see all the utilization meters in the full-width view, see Figure 4-4.)

If the data cannot be displayed, the meter is dimmed and a label indicates the probable cause. For a description of meter labels, see “Utilization meter status/error information” (page 125)

Using VM Manager with Insight Dynamics - VSE for Integrity, you can click a meter to view a snapshot of Capacity Advisor historical data.

- 7 Indicates the hardware status of the virtual machine.
- 8 Indicates whether the OS is running. If the virtual machine is migrating, indicates the status or direction of migration. (You can manage the virtual machine at the target host once the migration process finishes.) For more information about migration and how to start the migration of a virtual machine, see “Migrating virtual machines” (page 100).

Figure 4-4 shows an example of the full-width view of the virtual machine information table displayed by the **VM Host Virtual Machines** tab. (To see the entire table, you might have to scroll horizontally or maximize your window.)

**Figure 4-4 Full-width view of virtual machine information table**

| VM Name (Hostname)                       | HW | OS | Operating System      | VM vCPU Utilization | Memory Utilization | Disk I/O | Network I/O | vCPU Count | vCPU Entitlement | VM Host CPU Utilization |
|--|----|----|-----------------------|---------------------|--------------------|----------|-------------|------------|------------------|-------------------------|
| slim4vm1<br>(XXXXXXXXXXe.adapps.hp.com)  | ✓  | ✓  | HP-UX<br>B.11.31      | 100 %               | 95 % of 1GB        | 11 KB/s  | 8 kb/s      | 1          | 10%              | 12 %                    |
| slim4vm10<br>(XXXXXXXXXXe.adapps.hp.com) | ✓  | ⚠  | HP-UX<br>B.11.23      | 2 %                 | 92 % of 1GB        | 21 KB/s  | 8 kb/s      | 1          | 10%              | 0 %                     |
| slim4vm11<br>(XXXXXXXXXXe.adapps.hp.com) | ✓  | ✓  | Linux 2.6.9-<br>SS.EL | 0 %                 | 60 % of 0.9GB      | 16 KB/s  | 8 kb/s      | 1          | 10%              | 0 %                     |
| slim4vm12<br>(XXXXXXXXXXe.adapps.hp.com) | ✓  | ✓  | Windows®<br>5.2.3790  | 11 %                | 80 % of 1GB        | 13 KB/s  | 8 kb/s      | 1          | 10%              | 1 %                     |
| slim4vm?                                 | ✓  | ✓  |                       |                     |                    |          |             | 1          | 10%              |                         |



### Screen details


- **VM Name (Hostname):** Displays the virtual machine name and, in parentheses, a fully qualified network name for the virtual machine (if available). If the virtual machine is configured as a Serviceguard package, the package icon (📦) appears next to the virtual machine name. (If the virtual machine Serviceguard package is being managed by another VM Host, the **HW** field indicates so.) If errors occur during an attempt to migrate the virtual machine, the Migration Alerts icon (🚨) appears next to the virtual machine name; more information about the errors is available from the **VM Properties General** tab.
- **HW:** Displays an icon that indicates the state (for example, up/down) of the virtual machine. You can hover your cursor over the icon for a more detailed description.

If the virtual machine has successfully migrated to another VM Host, the state of the virtual machine becomes Not Runnable, indicated with the following status icon: 🚫. This means that the virtual machine cannot be modified or started. If you never intend to migrate the virtual machine back to this VM Host, you can remove the virtual machine configuration by using the VM Manager **Delete**→**Virtual Machine...** menu item.


If the virtual machine is an HP Serviceguard package managed by another VM Host, this field also displays the following icon: 🖥️. Flyover text shows the state of the hardware (On) and the name of the VM Host currently managing the virtual machine.

For more information on the meanings of status icons, see “Status indicators” (page 124).

- **OS:** Displays an icon that indicates whether the operating system is active on the virtual machine. You can hover your cursor over the icon for a more detailed description. The  icon indicates the operating system is running. The  icon indicates the operating system is not running. If the virtual machine is currently migrating, an icon indicates the direction of migration:

: Migrating to another VM Host. Flyover text indicates the virtual machine is migrating and provides the name of the target VM Host.

: Migrating to this VM Host from another VM Host. Flyover text indicates the virtual machine is migrating from another VM Host.

If the virtual machine is waiting in queue to migrate (when several virtual machines are selected to migrate, only one migrates at a time; the rest wait in queue), an hourglass icon () indicates so. To view changes in migration status, click **Refresh Data**.



**NOTE:** Although only one virtual machine migrates at a time, you might see indication of two machines migrating simultaneously to another host. The first migration has actually completed but VM Manager has not yet received notification from the VM Provider.

For more information on the meanings of status icons, see “Status indicators” (page 124)

- **Operating System:** Displays the operating system type and version information for the virtual machine.
- **VM vCPU Utilization:** Displays how much of the virtual CPU assigned to the virtual machine is currently being used.



**NOTE:** This and other utilization meters in this table display utilization data, if available. The utilization information is a 5-minute average that is calculated and updated on 5-minute boundaries. If the utilization cannot be displayed, the utilization meter is dimmed and a label indicates the probable cause. For a description of meter labels, see “Utilization meter status/error information” (page 125).

Using VM Manager with Insight Dynamics - VSE for Integrity, you can click a utilization meter to view a snapshot of Capacity Advisor historical data; this feature is not provided when using VM Manager from HP SMH. For an example utilization history screen and information about collecting and viewing utilization data, see [Chapter 7](#) (page 111).

- **Memory Utilization:** Displays how much of the memory assigned to the virtual machine is currently being used.
- **Disk I/O:** Displays storage I/O throughput measured for this virtual machine.
- **Network I/O:** Displays network I/O throughput measured for this virtual machine
- **vCPU Count:** Displays how many virtual CPUs the virtual machine has.
- **gWLM Policy:** Displays the gWLM policy for the virtual machine. This field is displayed only if the virtual machines are being managed by gWLM, in which case entitlements are controlled by gWLM. When virtual machines are not being managed by gWLM, the column displays the vCPU entitlement instead of the gWLM policy. In this case, you can use VM Manager to modify the entitlements (for more information about modifying vCPU entitlements, see “Modifying virtual machines” (page 92)). If a policy is defined for a virtual machine, the name of the policy is shown; if a policy is not defined, then “(none)” is displayed. When you use VM Manager with the Insight Dynamics - VSE for Integrity, if the virtual machine is managed by gWLM, the gWLM policy name is a hyperlink to gWLM. When you use VM Manager through HP SMH, if virtual machines are being managed by gWLM, the gWLM policy name is text only (you cannot modify gWLM policies from HP SMH).

- **vCPU Entitlement:** Displays the percentage of CPU power guaranteed to the virtual machine. This field is not displayed if the virtual machines are being managed by gWLM.
- **VM Host CPU Utilization:** Displays how many of the VM Host's physical CPU resources are being consumed by this virtual machine. This meter is not displayed if the virtual machine is a Serviceguard package running on another VM Host.



## VM Host Virtual Switches tab

The **VM Host Virtual Switches** tab shows information about the virtual switches on the VM Host system.

Quick reference

**Figure 4-5 VM Host Virtual Switches tab**

Integrity Virtual Machines Manager: Manage Host Restore Size ?

VM Host crystal.xxx.xxx.com

1 — Go back to [Virtual Manager](#)

2 — [View Printer-friendly](#)

3 — [Refresh Data](#)

| <input type="checkbox"/> | Virtual Switch Name      | Status | Type   | Supports AVIO | Used by                 |
|--------------------------|--------------------------|--------|--------|---------------|-------------------------|
| <input type="checkbox"/> | <a href="#">crvst 01</a> | Up     | Shared | No            | 3 VMs <a href="#">i</a> |
| <input type="checkbox"/> | <a href="#">localnet</a> | Up     | Shared | No            | 1 VMs <a href="#">i</a> |

4 —

5 — [crvst 01](#)

6 — Supports AVIO

- 1 Goes back to the previous view, in this case the Virtualization Manager. If you accessed the VM Host view from another VM Manager view (such as the VM Properties view), the link returns you to that previous view. In HP SMH, when you first access this page from HP SMH, the link is not provided. The link appears whenever you move from one VM Manager view to another (such as from VM Properties view to VM Host view, in which case the **Go back to Integrity Virtual Machines Manager: Manage VM** link appears on the VM Host view).
- 2 Displays this window in a format suitable for printing.
- 3 Updates the data displayed on this page. In general, VM Manager tabbed view screens are refreshed automatically at regular intervals, and VM Manager screens that display configuration data are updated instantaneously when you use VM Manager to change the related configuration parameters. However, when changes to the virtual machine I/O configuration are made using tools other than VM Manager (such as adding or removing I/O devices by using the VM Host command line), the updated configuration data is not shown until the screen is refreshed.
- 4 Allows you to perform an action on the virtual switches. Select the box for a specific virtual switch, then an action from one of the menus available on the VM Manager menu bar. To perform an action on all the virtual switches, select the box in the header row.
- 5 Displays information about the virtual switch by taking you to the **Vswitch Properties General** tab.
- 6 Indicates whether the physical backing device supports Accelerated Virtual Input/Output (AVIO).

### Screen details

- **Vswitch Name:** lists the names of the virtual switches.
- **Status :** shows whether the virtual switch is up (operational) or down (inoperational).
- **Type:** shows whether the corresponding virtual switch is a shared or dedicated vswitch.
- **Supports AVIO:** shows whether the corresponding backing device supports Accelerated Virtual Input/Output (AVIO). AVIO is supported on HP Integrity VM Version 3.5 or later and requires installation of AVIO drivers on the VM Host. For proper operation of virtual



storage or network devices configured to use AVIO, special AVIO software must be installed on the associated VM guest. Currently, for AVIO support, HP Integrity VM requires that a backing device exist. For more information about AVIO requirements, see the HP Integrity VM documentation.

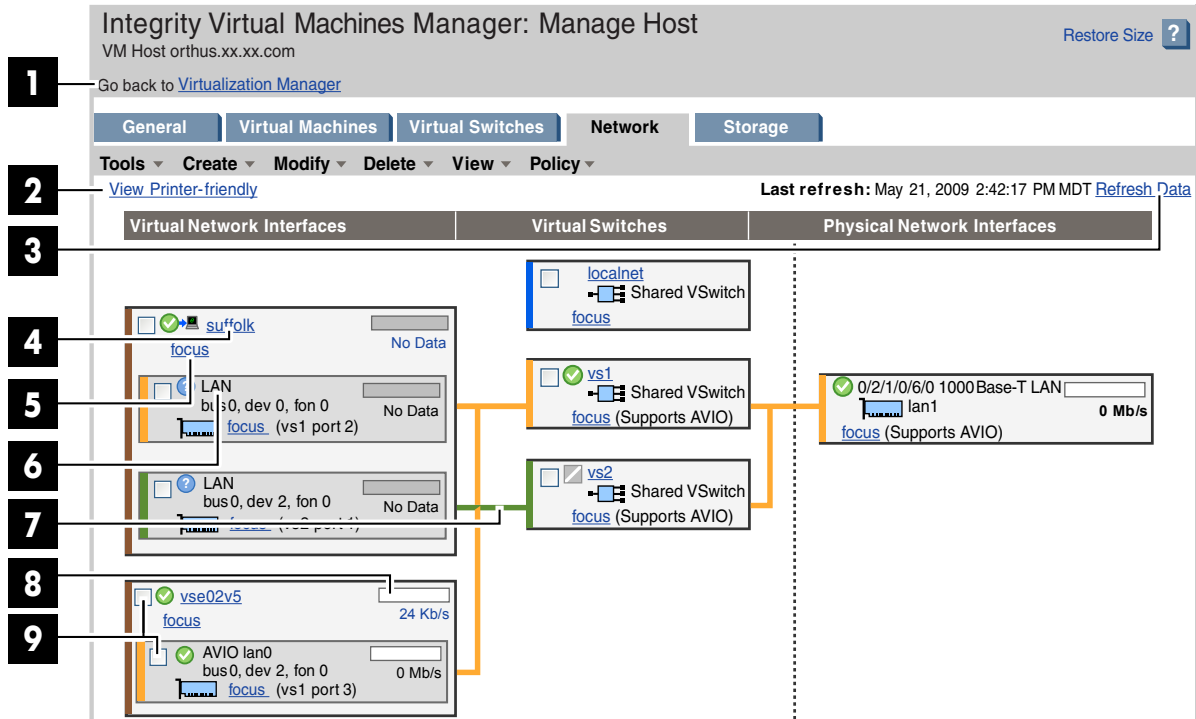
- **Used by:** shows the virtual machines that are using the virtual switch. Position your cursor over the information icon to view a list of the virtual machines that are connected to the virtual switch.

## VM Host Network tab

The **VM Host Network** tab shows the mapping from virtual network interface cards in the virtual machines to the physical network interface cards in the VM Host system.

### Quick reference

**Figure 4-6 VM Host Network tab**



- 1 Goes back to the previous view, in this case Virtualization Manager. If you accessed the VM Host view from another VM Manager view (such as the VM Properties view), the link returns you to that previous view. In HP SMH, when you first access this page from HP SMH, the link is not provided. The link appears whenever you move from one VM Manager view to another (such as from VM Properties view to VM Host view, in which case the **Go back to Integrity Virtual Machines Manager: Manage VM** link appears on the VM Host view).
- 2 Displays this window in a format suitable for printing.
- 3 Updates the data displayed on this page. In general, VM Manager tabbed view screens are refreshed automatically at regular intervals, and VM Manager screens that display configuration data are updated instantaneously when you use VM Manager to change the related configuration parameters. However, when changes to the virtual machine I/O configuration are made using tools other than VM Manager (such as adding or removing I/O devices by using the VM Host command line), the updated configuration data is not shown until the screen is refreshed.
- 4 Displays detailed information about the virtual machine by taking you to the **VM Properties General** tab.
- 5 Clicking the **Focus** link limits the display to only those network devices associated with the selected object (in this instance, the devices associated with virtual machine **suffolk**) and the objects directly connected to it. All other devices are not displayed. To return to the original view, click the **Show All** link visible beneath the VM Manager menu bar on the focused page.
- 6 Displays the type of network interface such as emulated LAN (displayed here as “LAN”) or Accelerated Virtual Input/Output LAN (displayed as “AVIO LAN,” as for the next network device shown in the figure).
- 7 Indicates by color coding that matching components are related.

- 8 The utilization meter (bar graph) displays network I/O throughput data, if available. The data is a 5-minute average that is calculated and updated on 5-minute boundaries. If the data cannot be displayed, the meter is dimmed (as in the meter in the next box below) and a label indicates the probable cause. For a description of meter labels, see “Utilization meter status/error information” (page 125).

Using VM Manager with Insight Dynamics - VSE for Integrity, you can click a meter to view a snapshot of Capacity Advisor historical data for network I/O; this feature is not provided when using VM Manager from HP SMH.




For more information about using VM Manager to collect and view utilization data, see Chapter 7 (page 111).


- 9 Allows you to perform an action on the virtual machine or I/O device. Select the box, then select an action from one of the menus available on the VM Manager menu bar.

## Network devices

VM Manager displays icons to represent certain network devices. You can hover your cursor over the icon to see text describing the representation. Table 4-2 describes these icons.

**Table 4-2 Network device icons**

| Icon  | Description                      |
|---|----------------------------------|
|  | Physical or virtual network card |
|  | Virtual switch                   |
|  | Virtual LAN (VLAN)               |

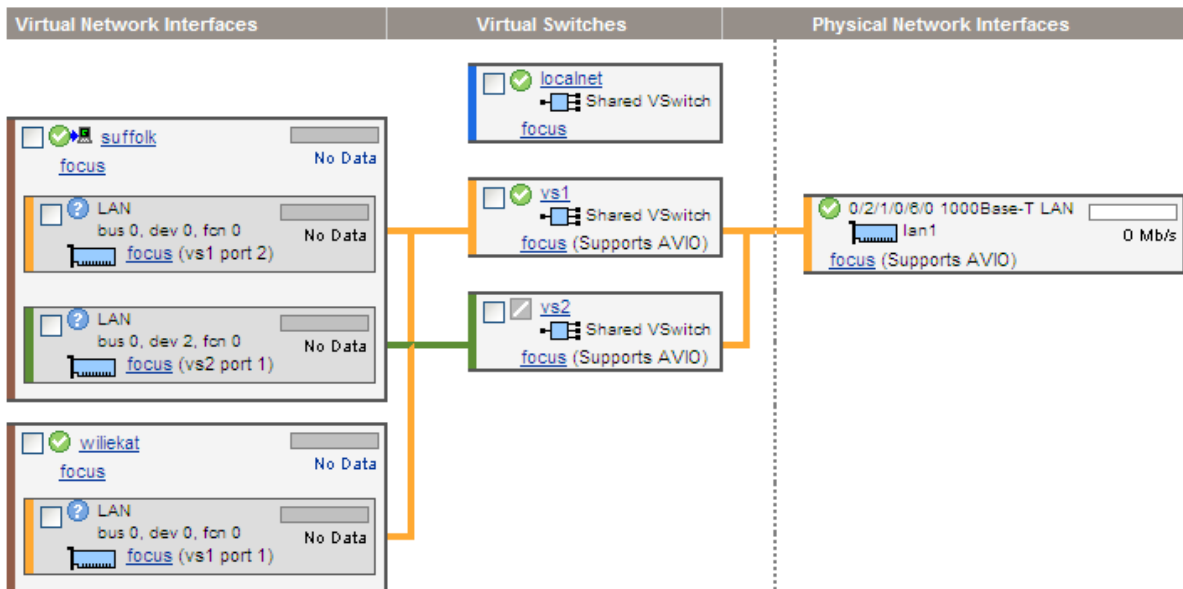
A question mark within the device icon, such as , indicates that the type of device cannot be determined. The device type cannot be determined, for example, when the device has been removed from the VM Host but not from the virtual machine.

## Screen details

### Network tab column layout

Figure 4-7 depicts the column layout for the **VM Host Network** tab.

**Figure 4-7 Network tab column layout**

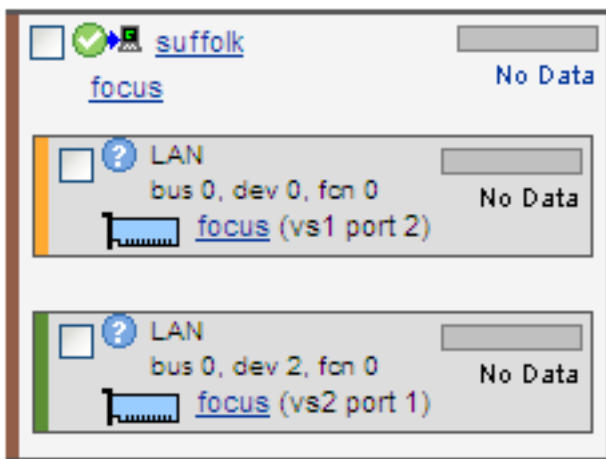


The **VM Host Network** tab consists of three columns with the following titles. The contents of each column are described in the subsections that follow.

Virtual Network Interfaces column contents

This column displays the virtual network interfaces in the virtual machines. The virtual network interfaces are grouped by virtual machine. Each major box grouping in the column represents a virtual machine.

**Figure 4-8 Virtual Network Interfaces column**



Referring to Figure 4-8, note the following:

- The icons next to the name of the virtual machine and next to the network interface devices show the status of the system or interface. A question mark (?) means no information is available.
- Clicking the name of the virtual machine (for example, `suffolk`) displays general information about the virtual machine.
- Clicking the box near the virtual machine name allows you to perform operations on the virtual machine by using one of the menus available from the VM Manager menu bar. Clicking the box next to the device label allows you to perform operations on the device (for example, removing the device).

- The bar graphs indicate network throughput, if available.
- If the virtual machine is running and can be contacted by using WBEM, the network interfaces are shown (for example, vs1); otherwise, a portion of the hardware path (bus, device, and function) is shown.
- If the virtual network interface is defined to use Accelerated Virtual Input/Output (AVIO), the label AVIO appears with the network interface designation, such as AVIO LAN or AVIO lan0 (the latter for a specific guest network interface designation). If the virtual network interface is not defined to use AVIO, the network interface designation does not include the AVIO label.
- The **Focus** link limits the display to a specific virtual machine or interface and the objects connected to it. All other devices are not displayed. If you use this link to focus on only a specific virtual machine or interface, you can return to see all the virtual machines or network interfaces by using the **Show All** link visible on the focus page.

#### Virtual Switches column contents

This column displays details about each virtual switch. Each major box grouping represents a virtual switch.

**Figure 4-9 Virtual Switches column**

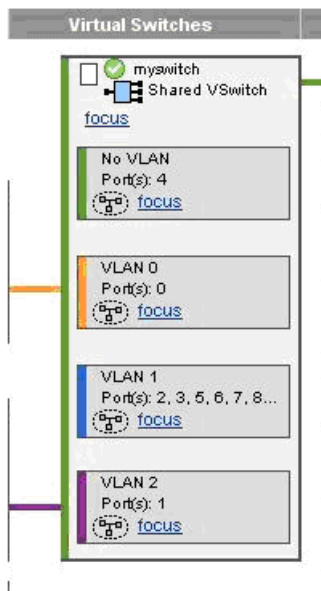


Referring to Figure 4-9, note the following:

- The icon next to the name of the virtual switch shows whether the virtual switch is operational.
- Clicking the box near the virtual switch name allows you to perform operations on the virtual switch by using one of the menus available from the VM Manager menu bar.
- Clicking the virtual switch name displays general information about the virtual switch.
- The icon and label below the virtual switch name indicates whether the corresponding virtual switch is shared or dedicated.
- If the physical network interface that backs the virtual switch can support AVIO, the label Supports AVIO appears next to the **Focus** link. The **Focus** link shows only that specific virtual switch and anything connected to it. If use this link to focus on a specific virtual switch, you can return to displaying all the virtual switches by using the **Show All** link visible on the focus page.

A virtual LAN (VLAN) is depicted as shown in Figure 4-10:

**Figure 4-10 Virtual LAN**



If a virtual switch has VLANs configured on it, each VLAN appears as a separate box within the virtual switch box. The virtual NICs from the virtual machines are connected to the appropriate VLAN box by a color-coded line. The switch port used by the virtual NIC is listed in its box. The VLAN boxes list the switch ports that are using that VLAN ID.

For ports on the switch that are not associated with a VLAN, the virtual switch contains a box labeled No VLAN. Virtual NICs can be connected to the No VLAN box.

#### Physical Network Interfaces column contents

This column displays the physical network interface devices in each virtual machine on the VM Host. These can be either an APA or a single device.

Each box in the Physical Network Interfaces column represents one of the following:

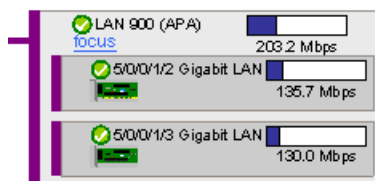
- A physical network interface card in the host

**Figure 4-11 Physical network interface card**



- An APA. When multiple physical network interface devices are aggregated using the Auto Port Aggregation (APA) software package, they are displayed as network devices inside an APA box.

**Figure 4-12 APA**



The icon next to the hardware path of the physical interface device shows whether the device is operational.

The label next to the hardware path shows the description for the physical interface device. The bar graph indicates network throughput, if available.

If the physical interface can support AVIO, the label Supports AVIO appears next to the **Focus** link. The **Focus** link limits the display to the selected physical interface and anything connected to it. If you use this link to focus on a specific physical interface, you can return to displaying all the physical interfaces by using the **Show All** link visible on the focus page.

### Colors



The connections are color coded to help you identify interconnected elements.



**NOTE:** The actual colors shown do not imply any specific meaning. The colors are provided to help you understand the connections from virtual to physical devices.

### Focus links

[focus](#)

Clicking one of these links simplifies the display by showing only the item that was selected and the elements that are directly attached to it.

- Focusing on a virtual machine shows the network interfaces on the virtual machine, the virtual switches that they are connected to, and the physical network interface devices connected to the virtual switches.
- Focusing on a LAN in a virtual machine shows only the devices and virtual machines connected to the LAN.
- Focusing on a virtual network shows all of the virtual switches and all of the network interface devices connected to it.
- Focusing on a virtual switch shows only the devices and virtual machines connected to the vswitch.
- Focusing on a physical network interface device shows the virtual switches connected to the physical interface device and all the virtual network interfaces connected to them.
- Focusing on an APA shows the shared virtual switches connected to it, and all the virtual network interfaces connected to them.
- In a focused view, the presence of additional devices or connections are shown either as an ellipsis, or as a solid line becoming a dotted line.
- To view all the virtual network interfaces again, click the **Show All** link.

### Dotted lines

The vertical dotted line indicates the boundary between the virtual and physical devices.

## Bar graphs

The bar graphs are utilization meters that indicate the current IO throughput of a device or interface device. When using VM Manager with Insight Dynamics - VSE for Integrity, some bar graphs are selectable and bring up a view of the historical data related to the graph.

## Status icons

These indicate whether an item is operational. Position the cursor over the icon to view a textual description. For more information about status icons, see “Status indicators” (page 124).

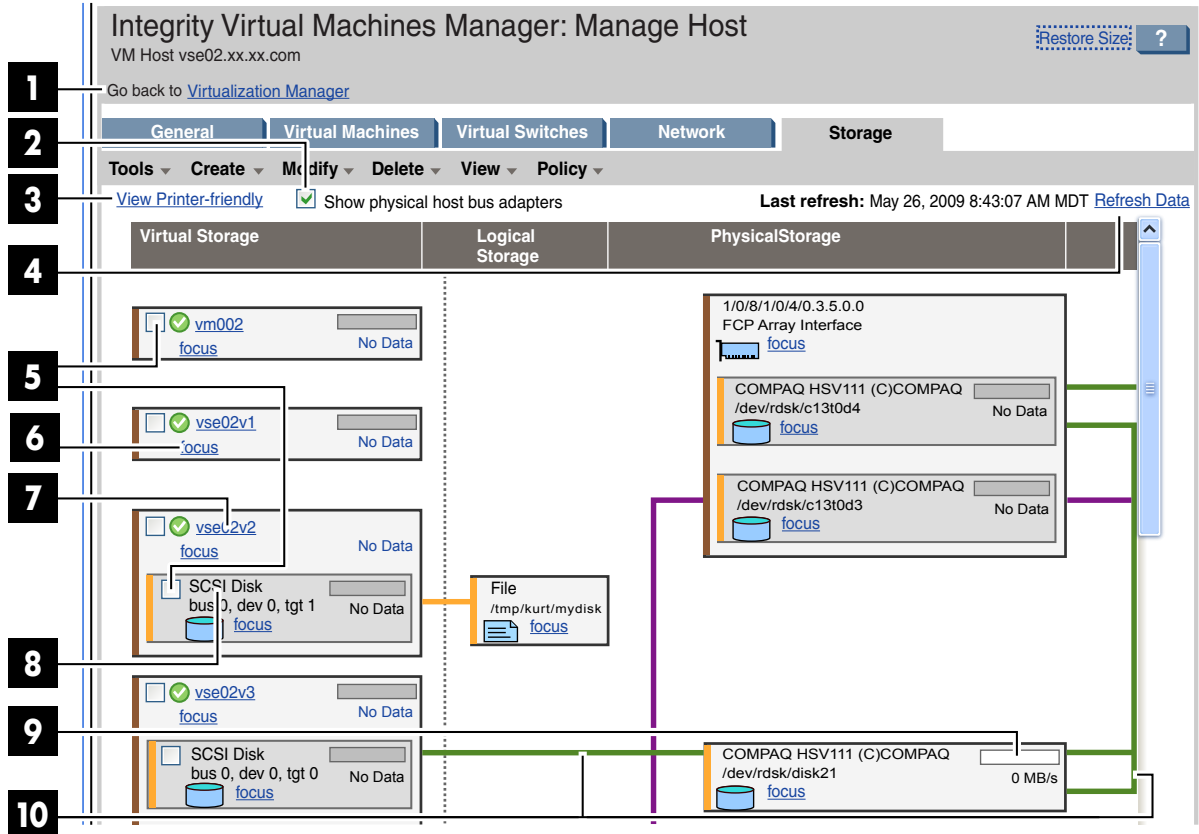


## VM Host Storage tab

The **VM Host Storage** tab shows the mappings from the virtual storage devices in the virtual machines to the physical storage devices in the VM Host system.

Quick reference

Figure 4-13 VM Host Storage tab



- 1 Goes back to the previous view, in this case Virtualization Manager. If you accessed the VM Host view from another VM Manager view (such as the VM Properties view), the link returns you to that previous view. In HP SMH, when you first access this page from HP SMH, the link is not provided. The link appears whenever you move from one VM Manager view to another (such as from VM Properties view to VM Host view, in which case the **Go back to Integrity Virtual Machines Manager: Manage VM** link appears on the VM Host view).
- 2 With the **Show physical host bus adapters** check box selected (as in this example), the view includes the complete storage bus structure, host bus adapters, and multipath storage configurations. This view may take longer to render and can be more challenging for discerning the associations between virtual machines and devices, especially when many multipath storage devices exist on the VM Host. By default (the check box being unselected), the view is simpler, showing only the specific storage devices that are being used as backing devices. For a multipath device, the simple view shows only the device special file (DSF) path, as specified when the virtual storage device was created. In contrast, the complex view displays all DSF versions of the same device, including (on an HP-UX 11i v3 VM Host) the persistent DSF.

When you navigate to another VM Manager view and return to this view again, the **Show physical host bus adapters** check box retains its state. In other words, if the box is checked when you navigate away from the **VM Host Storage** tab, it remains checked when you navigate back (you continue to see the complex view on return). If the box is

unchecked, it remains unchecked when you return (you continue to see the simple view). The check box state on the **VM Host Storage** tab does not affect the state of the same check box on the **VM Properties Storage** tab. For example, selecting the check box on the **VM Host Storage** tab does not automatically affect the check box and view of the **VM Properties Storage** tab.

- 3 Displays this window in a format suitable for printing.
- 4 Updates the data displayed on this page. In general, VM Manager tabbed view screens are refreshed automatically at regular intervals, and VM Manager screens that display configuration data are updated instantaneously when you use VM Manager to change the related configuration parameters. However, when changes to the virtual machine I/O configuration are made using tools other than VM Manager (such as adding or removing I/O devices by using the VM Host command line), the updated configuration data is not shown until the screen is refreshed.
- 5 Allows you to perform an action on the virtual machine or I/O device. Select the box, then select an action from one of the menus available on the VM Manager menu bar.
- 6 Clicking the **Focus** link limits the display to only those storage devices associated with the selected object (in this instance, the devices associated with virtual machine vse02v1) and the objects directly connected to it. All other devices are not displayed. To return to the original view, click the **Show All** link visible beneath the VM Manager menu bar on the focused page.

The **Show physical host bus adapters** check box is disabled (dimmed) in the focussed view; you cannot change the **Show physical host bus adapters** state until you return to the original (unfocussed) view. The simplicity or complexity of the focussed view with respect to host bus adapters and so forth is determined by the check box selection at the time that you selected the **focus** link.

- 7 Displays detailed information about the virtual machine by taking you to the **VM Properties General** tab.
- 8 Displays the type of storage device interface and device, such as emulated SCSI Disk (labeled SCSI Disk, as in this instance) or Accelerated Virtual Input/Output disk (labeled AVIO Disk).
- 9 The meter (bar graph) displays storage I/O throughput data, if available. The data is a 5-minute average that is calculated and updated on 5-minute boundaries. If the data cannot be displayed, the meter is dimmed (as in the meter underneath this one) and a label indicates the probable cause. For a description of meter labels, see “Utilization meter status/error information” (page 125).

Using VM Manager with Insight Dynamics - VSE for Integrity, you can click a meter to view a snapshot of Capacity Advisor historical data for storage I/O; this feature is not provided when using VM Manager from HP SMH.









For more information about using VM Manager to collect and view utilization data, see Chapter 7 (page 111).


- 10 The green horizontal line indicates by color coding that matching components are related. This particular line links the virtual storage component to its corresponding physical storage component. The green vertical line to the right of the screen also indicates by color coding that matching components are related. This line links two representations of the storage device, one with the agile address and the other with the legacy address. The line indicates that they are two different representations of the same physical device. Multiple representations are displayed only if the **Show physical host bus adapters** check box is selected.

## Storage devices

Various types of devices are supported on virtual machines. VM Manager represents each type of device with an icon. You can hover your cursor over the icon to see text describing the representation. Table 4-3 describes these icons.

**Table 4-3 Network device icons**

| Icon  | Description        |
|---|--------------------|
|  | Disk               |
|  | DVD                |
|  | Tape               |
|  | Burner             |
|  | Changer            |
|  | File               |
|  | Directory (folder) |
|  | Storage adapter    |

A question mark within the device icon, such as , indicates that the type of device cannot be determined. The device type cannot be determined, for example, when the device has been removed from the VM Host but not from the virtual machine.

Virtual device type:

- The virtual device type and subset of the hardware path are shown with each virtual device. This also indicates how the device is being used in the virtual machine.

Backing device:

The storage that backs a virtual device does not necessarily need to be the same type as the virtual device itself; for example, a file can be the backing storage for virtual disks or virtual DVDs. A file can be selected as a backing device for one of two purposes:

- The file is intended to represent the capacity of a virtual storage device. This storage space is treated like a disk drive and can be used the way a disk drive is used (for example, by a storage manager, or a raw device).
- The file is intended to represent a DVD or CD. In these cases, the file is an .ISO image of the actual media.

A directory can be a backing device for a virtual DVD. A directory backing device is equivalent to a physical DVD drive that is empty (the DVD was ejected or has not been inserted). The list of files in the backing directory are ISO files, each representing a physical DVD that can be inserted and used as the backing device.

If you eject a file-backed virtual DVD, the storage device is then backed by the directory in which the ISO file was located. If you insert (select) an ISO file for a directory-backed DVD, the DVD becomes a file-backed virtual DVD. For information about loading and ejecting a virtual DVD by command from the virtual machine virtual console, see the *HP Integrity Virtual Machines Installation, Configuration, and Administration* manual.



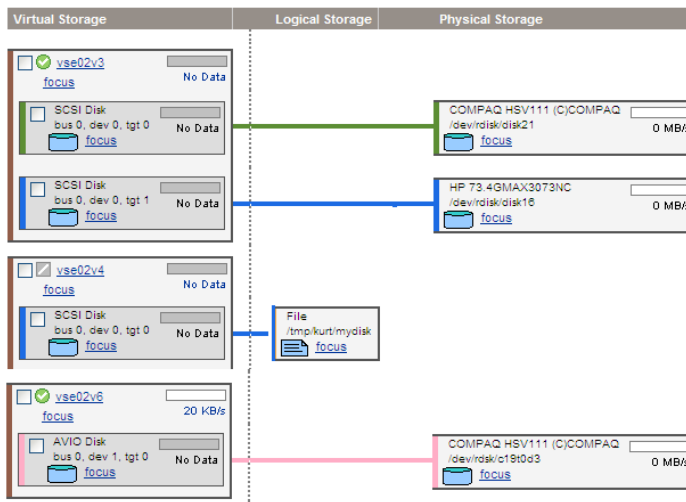
**NOTE:** If you use VM Manager to manage a VM Host running Integrity VM Version 3.5 or earlier, VM Manager does not fully support virtual device special files located in /hpa (introduced in HP StorageWorks Secure Path software Version 3.0F SP2) as backing devices for virtual storage. If a virtual storage device using an /hpa device special file already exists on a virtual machine managed by VM Manager, VM Manager displays it on the **VM Host Storage** and **VM Properties Storage** tabs as an unknown device (using the question mark icon, ?). VM Manager displays the correct device special file name (for example, /hpa/rdisk/hpap1) but the box representing this device is not connected to the boxes that represent the physical storage devices associated with that virtual device special file. In general, VM Manager correctly displays only those device special files located in /dev.

## Screen details

### Storage tab column layout

Figure 4-14 depicts the column layout for the **VM Host Storage** tab.

**Figure 4-14 Storage tab column layout**

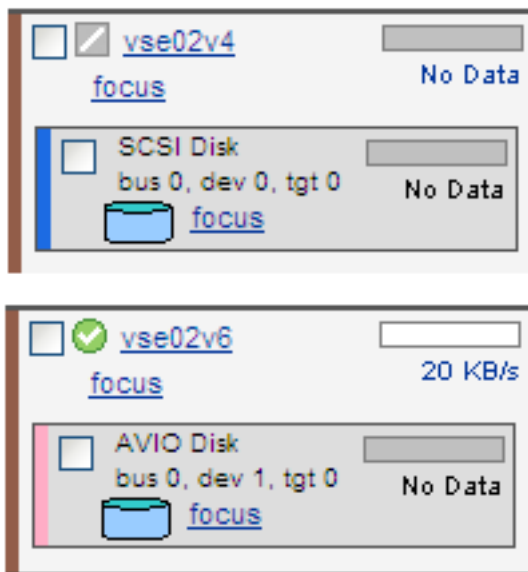


The **VM Host Storage** tab consists of three columns with the following titles. The contents of each column are described in the subsections that follow.

### Virtual Storage column contents

As shown in Figure 4-15, this column displays the virtual storage devices in the virtual machines. The virtual storage devices are grouped by virtual machine. Each major box grouping in the column represents a virtual machine.

**Figure 4-15 Virtual Storage column**



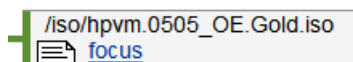
Referring to Figure 4-15, note the following:

- The icon next to the name of the virtual machine shows operational status of the virtual machine. A question mark (?) means no information is available.
- Clicking the name of the virtual machine (for example, vse02v4) displays general information about the virtual machine.
- Clicking the box next to the virtual machine allows you to perform operations on the virtual machine by using one of the menus available from the VM Manager menu bar. Clicking the box near the device name allows you to perform operations on that device (such as removing the device).
- The meters (bar graphs) indicate I/O throughput, if available.
- If the virtual storage device is defined to use Accelerated Virtual Input/Output (AVIO), the label AVIO identifies the device interface type; for example, AVIO Disk. If the virtual storage device is defined to use emulated SCSI, the label SCSI identifies the device interface type; for example, SCSI Disk.
- The **Focus** link limits the display to a specific virtual machine or device and anything connected to it. All other objects are not displayed. If you use this link to focus on only a specific virtual machine or device, you can return to see all the virtual machines or devices by using the **Show All** link visible on the focus page.

Logical Storage column contents

This column displays information about logical storage devices, including the files and logical volumes that reside on physical storage devices. Each box represents a logical storage device, as in Figure 4-16.

**Figure 4-16 Logical storage device**



Referring to Figure 4-16, note the following:

- The **Focus** link limits the display to only that specific storage device and the objects connected to it. All other devices are not displayed. If you use this link to focus on a specific storage device, you can return to displaying all the storage devices by using the **Show All** link visible on the focus page.

#### Physical Storage column contents

This column displays the physical storage media, such as disk, DVD, DVD writers, tape devices and tape changers, as well as their corresponding physical storage devices through which the media is accessed. Each box in the column represents a physical storage device or interface card in the host. Two examples follow: Figure 4-17 shows what might be seen on an HP Integrity VM Version 3.5 VM Host, while Figure 4-18 shows what might be seen on an HP Integrity VM Version 4.0 or later VM Host. The former lists the device special file (legacy addressing) for the storage device, as defined in HP-UX 11i v2 and all earlier versions of HP-UX. The latter lists in addition the device's new persistent device special file (agile addressing), available with HP-UX 11i v3. The orange line in this second example links the two representations of the storage device.

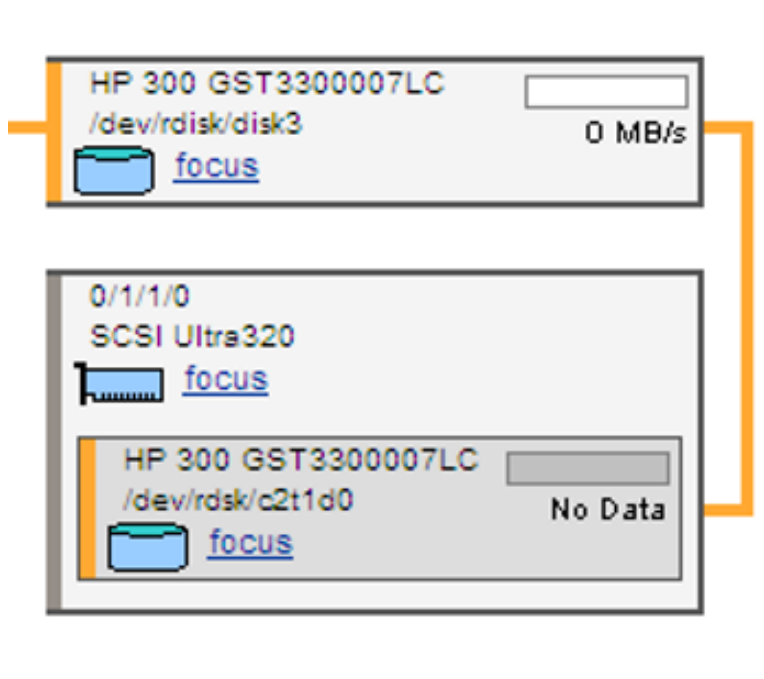
**Figure 4-17 Physical storage detail from HP Integrity VM Version 3.5 VM Host**



The following items describe physical storage details in Figure 4-17:

- The first line at the top includes the hardware path for the adapter (also referred to as the host bus adapter or HBA).
- The line below the hardware path (here, beginning with SCSI) describes the adapter.
- The first line in the gray box describes the storage device.
- The next line in the gray box (`/dev/rdisk/c5t8d0`) displays the device file path (device special file) for the storage device, using the legacy addressing scheme.
- The bar graph is an I/O utilization meter that registers throughput. In this example, the meter is grayed out, indicating that the data is not available.
- Clicking a **Focus** link limits the display to the selected device and those objects connected to it. All other devices are not shown. If you use this link to focus on a specific adapter or device, you can return to the original view displaying all the storage interface cards and devices by using the **Show All** link visible on the focus page.

Figure 4-18 Physical storage detail from HP Integrity VM Version 4.0 or later VM Host



The following items describe physical storage details in Figure 4-18:

- The box on the top is the storage device representation with the persistent device special file (agile addressing). The first line describes the storage device (HP 300 GST3300007LC). The next line below that (`/dev/rdisk/disk3`) displays the persistent device special file (DSF) path for the storage device. The path is persistent with respect to changes in the access path or host bus adapter, and can use multiple paths through a single device file name. This enables VM Manager to display a single DSF for each device instead of displaying a separate DSF for each path to a device with multiple paths (as done when devices are displayed using the legacy addressing scheme).
- The second, larger box shows the adapter information, where the first line displays the hardware address (`0/1/1/0`), and the next line describes the adapter (SCSI Ultra320). The gray box within this larger box is the storage device representation of the HP 300 GST3300007LC, but with the legacy DSF path (`/dev/rdisk/c2t1d0`). The orange line on the right of the two boxes links the two representations of the storage device (one with the agile address and the other with the legacy address), indicating that they are two different representations of the same physical device.
- The utilization meter (bar graph) is an I/O utilization meter that registers throughput. In this example, the meter is grayed out, indicating that the data is not available.
- Clicking a **Focus** link displays information about the specific physical storage adapter or device and anything connected to it. If you use this link to focus on a specific adapter or device, you can return to the original view displaying all the storage interface cards and devices by using the **Show All** link visible on the focus page.



## Colors



The connections are color coded to help identify interconnected elements.



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**NOTE:** The actual colors shown do not imply any specific meaning. The colors are provided to help you understand the connections from virtual to physical devices.

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## Focus links

[focus](#)

Clicking a **Focus** link simplifies the display by showing only the item that was clicked and the elements that are directly attached to it:

- Focusing on a virtual machine shows the virtual storage interfaces in the virtual machine and all the logical storage devices, physical interface cards, and devices that back them.
- Focusing on a virtual storage interface is like focusing on a virtual machine, except that only the selected virtual storage interface and its connections are shown; all others are hidden.
- Focusing on a logical storage device shows all of the virtual storage devices and all of the physical storage interface cards and devices connected to it.
- Focusing on a physical storage interface card shows only the physical devices attached to the card, the logical storage devices connected to the physical device, and the virtual storage devices connected to those logical storage devices.
- Focusing on a physical storage device shows only the logical and virtual devices using that physical storage. This might reduce the number of devices shown, depending on how many virtual devices and virtual machines are connected to the physical storage device.
- In a focused view, the presence of additional devices or connections is shown by either an ellipsis, or a solid line becoming a dotted line.
- To view all the storage devices again, use the **Show All** link.

## Dotted lines

The black vertical dotted line indicates the boundary between the virtual and physical devices.

A colored vertical dotted line indicates devices are present but not associated with the indicated virtual machine. For example, a three-dotted vertical line inside a box indicates that other storage devices are attached to the host bus adapter but are not used by the virtual machine (in other words, other virtual machines are using those devices).

## Bar graphs

The bar graphs are utilization meters that indicate the current I/O throughput of a device or interface card. When running the Integrity VM Manager with Insight Dynamics - VSE for



Integrity, some bar graphs are selectable and display a view of the historical data related to the graph.

#### Status icons

These indicate whether an item is operational. You can hover the cursor over the icon to view a textual description. For more information about status icons, see “Status indicators” (page 124).

## Virtual Machines (VM) Properties view

You can access the VM Properties view directly from the Virtualization Manager or from any other VM Manager views that include a link to a virtual machine, such as the **VM Host General** tab, the **VM Host Virtual Machines** tab, or any **Network** or **Storage** tab. You can also access the VM Properties view by selecting **View**→**Virtual Machine Properties...** (a virtual machine must be selected in the current view). Figure 4-19 shows a portion of a typical VM Properties view. Tabs available from the view are described in the text that follows. Subsequent sections describe each tab in more detail.

**Figure 4-19 VM Properties View**

The screenshot shows the 'Integrity Virtual Machines Manager: Manage VM' interface. The title bar includes 'Restore Size' with a help icon. Below the title, it says 'Properties for VM metallica01 on VM Host metallica.aa.bb.com'. A navigation bar contains tabs for 'General', 'Network', and 'Storage'. A menu bar includes 'Tools', 'Create', 'Modify', 'Delete', and 'View'. A 'View Printer-friendly' link is visible. The main content area is titled 'VM Configuration Information:' and contains the following data:

| VM Configuration Information: |                                     |
|-------------------------------|-------------------------------------|
| VM Name:                      | metallica01                         |
| VM Network Identity:          | metallica01.aa.bb.com (15.1.5xxx)   |
| VM Host(s):                   | <a href="#">metallica.aa.bb.com</a> |
| VM Description:               | (none)                              |
| Virtual Hardware Status:      | ✓ On                                |
| Operating System:             | HP-UX B.11.31                       |
| OS Status:                    | ✓ Up                                |

- 1 The “**VM Properties General** tab” (page 59) displays information about the general state of the virtual machine.
- 2 The “**VM Properties Network** tab” (page 65) displays information about the network devices for the virtual machine.
- 3 The “**VM Properties Storage** tab” (page 67) displays information about the storage devices for the virtual machine.

# VM Properties General tab

The **VM Properties General** tab shows the state and configuration details of a specific virtual machine.

Quick reference

**Figure 4-20 VM Properties General tab**

Integrity Virtual Machines Manager: Manage VM Restore Size ?

Properties for VM suffolk on VM Host tornado.xxx.xxx.com

**1** [Go back to Integrity Virtual Machines Manager: Manage Host](#)

**2** [View Printer-friendly](#) Last refresh: Jul9, 2009 1:31:48 PM MDT [Refresh Data](#)

**3** **VM Configuration Information:**

|                           |  |
|---------------------------|--|
| VM Name:                  | suffolk  |
| VM Network Identity:      | suffolk.xxx.xxx.com (15.1.51.76)                 |
| VM Host(s):               | <a href="#">tornado</a> , <a href="#">orthus</a> |
| VM Description:           | (none)   |
| Virtual Hardware Status:  | <input checked="" type="checkbox"/> Off          |
| Operating System:         | HP-UX  |
| OS Status:                | <input checked="" type="checkbox"/> Down         |
| Boot Attribute:           | start manually                                   |
| Graceful Stop Timeout:    | default  |
| Online Migration Enabled: | Yes  |

**4**

**5** **VM vCPU Information:**

|                          |      |
|--------------------------|------|
| vCPU Count:              | 2    |
| Minimum number of vCPUs: | 1    |
| Maximum number of vCPUs: | 8    |
| vCPU Entitlement:        | 10%  |
| vCPU Entitlement Cap:    | 100% |

**6** **VM Memory Information:**

|         |       |
|---------|-------|
| Memory: | 14 GB |
|---------|-------|

**7** **External Manager Information:**

|                       |         |
|-----------------------|---------|
| gWLM Policy:          | (none)  |
| Serviceguard Package: | suffolk |

**8** **VM Utilization Information:**

|                          |                                |         |
|--------------------------|--------------------------------|---------|
| VM CPU Utilization:      | <div style="width: 0%;"></div> | No Data |
| VM Host CPU Utilization: | <div style="width: 0%;"></div> | No Data |
| Memory Utilization:      | <div style="width: 0%;"></div> | No Data |
| Network I/O:             | <div style="width: 0%;"></div> | No Data |
| Storage I/O:             | <div style="width: 0%;"></div> | No Data |

**9** **VM Authorization Information:**

|                                   |                   |
|-----------------------------------|-------------------|
| Authorized Administrators:        | root (default)    |
| Authorized Administrative Groups: | hpvmsys (default) |
| Authorized Operators:             | (none)            |
| Authorized Operator Groups:       | (none)            |

**1** Goes back to the previous view, in this case the VM Manager VM Host view. When you access the VM Properties view from another VM Manager view (such as the VM Host view),

the link returns you to that previous view. If you had accessed the VM view directly from Virtualization Manager, the link returns you to Virtualization Manager. In HP SMH, when you first access this page from HP SMH, the link is not provided. The link is visible whenever you move from one VM Manager view to another (such as from VM Host view to VM Properties view, in which case the **Go back to Integrity Virtual Machines Manager: Manage Host** link is visible on the VM Properties view).

- 2 Displays this window in a format suitable for printing.
- 3 Updates the data displayed on this page. In general, VM Manager tabbed view screens are refreshed automatically at regular intervals, and VM Manager screens that display configuration data are updated instantaneously when you use VM Manager to change the related configuration parameters.
- 4 Lists virtual machine identification, status, and general configuration details. To update status information, click **Refresh Data**. If supported by the version of Integrity VM running on the VM Host, the Graceful Stop Timeout is displayed, as in this screen example. The timeout value is set by using the `hpvmmodify` command at the VM Host command line.

This section of the screen includes configuration and status information about online migration. If the virtual machine has migrated to another VM Host, the **Virtual Hardware Status** field displays the icon indicating the virtual machine is Not Runnable (🛑), and VM Manager displays additional fields that indicate the agent or activity that caused the Not Runnable status and the reason for the status change. If the virtual machine is currently migrating or waiting to migrate, an icon in the **OS Status** field indicates the status or direction of the migration. (You can manage the virtual machine at the target host once the migration process finishes.) If the virtual machine is migrating to another VM Host, VM Manager displays an **Online Migration Phases** section following this section that reports the status of each phase of the migration. For more information about virtual machine migration and how to start migration of a virtual machine, see “Migrating virtual machines” (page 100).

If an error occurs during the attempt to migrate a virtual machine, VM Manager displays an **Alerts** section that reports the error details.

- 5 Lists information about virtual CPU. If supported by the version of Integrity VM running on the VM Host, the minimum and maximum number of virtual CPUs and a cap for the entitlement is displayed, as in this screen example.
- 6 Lists information about virtual machine memory. If the guest operating system supports dynamic memory, the information about dynamic memory parameters is displayed.
- 7 Lists information about external management tools or software: gWLM or HP Serviceguard.
- 8 Lists utilization information for the virtual machine. Using VM Manager with Insight Dynamics - VSE for Integrity, you can click a meter to view a snapshot of Capacity Advisor historical data for virtual CPUs, memory, disk I/O, or network I/O; this feature is not provided when using VM Manager from HP SMH.
- 9 Lists authorization information.

## Screen details

### VM Configuration Information

- **VM Name:** The virtual machine name. If the virtual machine is configured as a Serviceguard package, the package icon (📦) appears next to the virtual machine name. (If the VM is being managed by another VM Host, the **HW** field indicates so.)
- **VM Network Identity:** The host name of the operating system (OS) running on the virtual machine. The host name is discovered by communicating with the virtual machine, or if the virtual machine is not active, the host name stored in the virtual machine configuration is used. The virtual machine must have booted an OS at least once for a host name to be stored in the virtual machine configuration. If the host name is not known, a question mark (?) is displayed.

- **VM Host(s):** The host name of the VM Host on which this virtual machine is configured. This is a hyperlink to the VM Host view. If the VM Host is an nPartition, the label “(contained in nPartition)” is displayed and “nPartition” is a hyperlink to Partition Manager for that nPartition.

If the virtual machine is managed by HP Serviceguard and is hosted on multiple VM Hosts, all of the VM Hosts are listed here.

- **VM Description:** The description of the virtual machine, if the description is available.
- **Virtual Hardware Status:** This indicates the status of the virtual hardware of a virtual machine. For a description of the status, position the cursor over the icon.

If the virtual machine has migrated to another VM Host, the hardware status of the virtual machine is indicated as Not Runnable (☒ Not Runnable). The VM Configuration Information section includes two additional lines of information explaining the cause of the Not Runnable status, as described below.

If the virtual machine is an HP Serviceguard package that is managed by another VM Host, this field also displays a status icon (🔌) that indicates so. Flyover text shows the status of the hardware (On) and the name of the VM Host currently managing the virtual machine (Serviceguard guest package).

- **Operating System:** Indicates the last OS type to be booted on this virtual machine. If the virtual machine has never been booted, this field contains the value that was supplied when the virtual machine was created.
- **OS Status:** Indicates the OS status for a virtual machine, such as Up, Down, Initializing (indicating that the virtual machine has just been started and is being initialized — the OS is not yet active), or In EFI (indicating that the virtual machine is in the firmware interface and an OS has not yet been booted). If the virtual machine is migrating an icon indicates the direction of migration (👉 indicates migration to another host; 👈 indicates migration from another host). If the virtual machine is waiting to migrate (when multiple virtual machines are selected to migrate, only one is migrated at a time), an hourglass icon (🕒) indicates so; to view changes in migration status, click **Refresh Data**. For a description of the status, position the cursor over the icon.
- **Boot Attribute:** Indicates the hardware startup attribute for a virtual machine, which determines its startup behavior (that is, whether the virtual machine is started automatically when the virtual machine boots or whether it must be manually started). To use VM Manager to modify this attribute, click **Modify** → **Virtual Machine Hardware Auto Start**.
- **Graceful Stop Timeout:** If supported by the version of Integrity VM running on the VM Host, this specifies the amount of time HP Integrity VM waits for I/O activity to complete before stopping a virtual machine. The timeout value is set at the VM Host command line by using the `hpvmmodify` command.
- **Online Migration Enabled:** Indicates whether the virtual machine is enabled for online migration or whether the VM Host is not licensed to support online migration. The VM Host administrator can enable a virtual machine by using the `hpvmmodify` command at the VM Host. The following table shows in the third column what the status field displays, based on the state of the VM Host and virtual machine listed in the first and second column, respectively:

**Table 4-4 Online migration status**

| VM Host state | Virtual machine state | Online migration status |
|---------------|-----------------------|-------------------------|
| Disabled      | Enabled or disabled   | Host disabled           |
| Unlicensed    | Enabled or disabled   | Host not licensed       |

**Table 4-4 Online migration status** (continued)

| VM Host state        | Virtual machine state | Online migration status |
|----------------------|-----------------------|-------------------------|
| Enabled and licensed | Enabled               | VM enabled              |
| Enabled and licensed | Disabled              | VM disabled             |

- **Not Runnable Set By:** Displayed when the virtual machine has migrated to another VM Host, indicates the activity or agent that caused the virtual machine hardware status to be Not Runnable. For example, Migrate indicates the Not Runnable state was initiated by migration (`hpvmigrate`); Admin indicates the VM was marked Not Runnable by the `hpvmmodify` command.
- **Not Runnable Reason:** Displayed when the virtual machine has migrated to another VM Host, indicates the reason the virtual machine hardware status is Not Runnable. For example, the guest has migrated to another VM Host.

### Online Migration Phases

The **VM Properties General** tab displays the Online Migration Phases section when online migration is in progress. An example is shown in Figure 4-21.



**NOTE:** If you access the **VM Properties General** tab immediately after initiating a migration, the Online Migration Phases section might not be displayed. To view this data, click **Refresh Data**.

**Figure 4-21 Online migration phases**

| Online Migration Phases: |      |
|--------------------------|------|
| Init Phase:              | 100% |
| Copy Phase:              | 34%  |
| I/O Quiesce Phase:       | 0%   |
| Frozen Phase:            | 0%   |

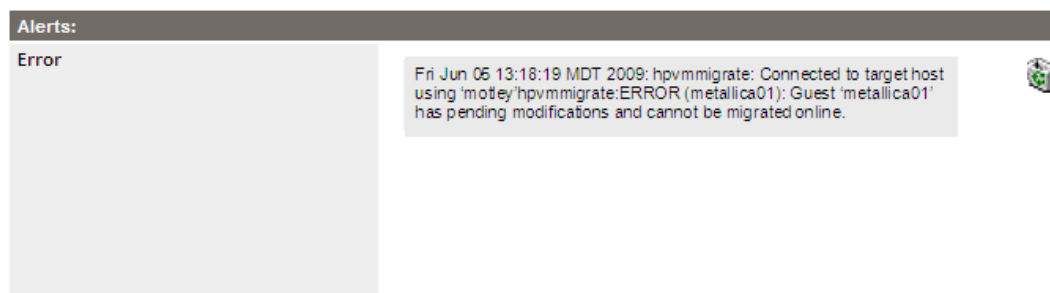
Each of the following fields display the phase's percentage of completion:

- **Init Phase:** The initialization phase when the source and target VM Hosts establish connections, perform various checks, starts the target guest, and so forth.
- **Copy Phase:** Tracks writes to guest memory and copies all of guest memory from the source to the target VM Host.
- **I/O Quiesce Phase:** Completes outstanding I/O and queues new I/O requests for the target guest.
- **Frozen Phase:** Stops the virtual CPUs and copies modified memory and guest state to the target guest.



### Alerts

The **VM Properties General** tab displays the Alerts section only when an error occurs during an attempt to migrate one or more virtual machines to another VM Host. An example is shown in Figure 4-22.

**Figure 4-22 Migration alerts**



- **Error:** Displays errors pertaining to migration of virtual machines.

You can clear the alerts information by clicking the trash button () on the right. This also clears the Migration Alerts icon () next to the virtual machine name on the **VM Host Virtual Machines** tab.

For more information about migration and how to start the migration of a virtual machine, see “Migrating virtual machines” (page 100).

#### VM vCPU Information

- **vCPU Count:** The number of virtual CPUs in the virtual machine. To use VM Manager to modify the vCPU count, click **Modify**→ **Virtual Machine vCPU Count**.
- **Minimum number of vCPUs:** If supported by the version of Integrity VM running on the VM Host, specifies the minimum number of virtual CPUs to be allotted for the virtual machine. To use VM Manager to modify the minimum count, click **Modify**→ **Virtual Machine vCPU Count**.
- **Maximum number of vCPUs:** If supported by the version of Integrity VM running on the VM Host, specifies the maximum number of virtual CPUs to be allotted for the virtual machine. To use VM Manager to modify the maximum count, click **Modify**→ **Virtual Machine vCPU Count**.
- **vCPU Entitlement:** Indicates the entitlement associated with each virtual CPU in the virtual machine. To use VM Manager to modify the vCPU entitlement, click **Modify**→ **Virtual Machine vCPU Entitlement**.
- **vCPU Entitlement Cap:** If supported by the version of Integrity VM running on the VM Host, specifies the maximum amount of processing power (expressed either as a percentage of physical processor power or as a specific processor speed) to be allotted for the virtual machine. To use VM Manager to modify the cap, click **Modify**→ **Virtual Machine vCPU Entitlement**.

#### VM Memory Information

To use VM Manager to modify the following parameters, click **Modify**→ **Virtual Machine vCPU Entitlement**.

- **Current Dynamic Memory Size:** Indicates the current actual memory size for the virtual machine.
- **Current Dynamic Memory Target:** The target value to which Integrity VM is trying to set the memory size for the virtual machine (the Dynamic Memory Size field on the **Modify**→



**Virtual Machine Memory** page). These two values can be different if for some reason Integrity VM cannot change the memory size to the specified value.

- **Memory:** The amount of memory configured for the virtual machine, which is the amount of memory required to start VM (and is modifiable as such on the **Modify**→ **Virtual Machine Memory** page).

If dynamic memory was enabled, the configuration table displays the following fields instead:

- **Memory Required to Start VM:** The amount of memory needed for the virtual machine to boot.
- **Initial Target for Memory Size After Boot:** The value to which Integrity VM tries to change the virtual machine memory immediately after it boots.
- **Minimum Memory Size:** The lowest value to which the virtual machine can attempt to dynamically decrease its memory while the OS is running.
- **Maximum Memory Size:** The highest value to which the virtual machine can attempt to dynamically increase its memory while the OS is running.
- **VM is Allowed to Control Memory Size:** Indicates whether the Allow dynamic control of memory size from the virtual machine is in effect. This control allows applications running VM (for example, gWLM) to dynamically change the memory on the virtual machine.

#### External Manager Information

- **gWLM Policy:** If the VM Host is being managed by gWLM and a policy has been assigned to the virtual machine, the **External Manager gWLM** field displays the name of the gWLM policy. If the VM Host is not managed by gWLM or if a policy has not been assigned to the virtual machine, the gWLM field displays (none) . With Insight Dynamics - VSE for Integrity, if the virtual machine is managed by gWLM, the gWLM policy name is a hyperlink to gWLM. Under HP SMH, if virtual machines are being managed by gWLM, the gWLM policy name is text only (you cannot modify gWLM policies from HP SMH). In either case (using VM Manager with Insight Dynamics or HP SMH), if the virtual machine is not being managed by gWLM, this field displays (none) .
- **Serviceguard Package:** If the virtual machine is being managed by HP Serviceguard, the virtual machine package name is listed here. If the virtual machine is not being managed by HP Serviceguard, this field displays (none) .

#### VM Utilization Information

- **VM Utilization Information:** Displays resource utilization statistics for a virtual machine. The utilization information is a 5-minute average that is calculated and updated on 5-minute boundaries. If the utilization cannot be displayed, the utilization meter (bar graph) is dimmed and a label indicates the probable cause. For a description of meter labels, see “[Utilization meter status/error information](#)” (page 125). When VM Manager runs with Insight Dynamics - VSE for Integrity, the utilization meters link to HP Insight Capacity Advisor software, which records and displays utilization data. Click a meter to view the virtual machine utilization history for virtual CPUs, memory, disk I/O, or network I/O; this feature is not provided when using VM Manager from HP SMH. For an example utilization history screen and more information about collecting and viewing utilization data, see [Chapter 7](#) (page 111).

#### VM Authorization Information

- **Authorized Administrators, Authorized Administrative Groups, Authorized Operators, Authorized Operator Groups:** These fields indicate which users and groups have administrator or operator authority.

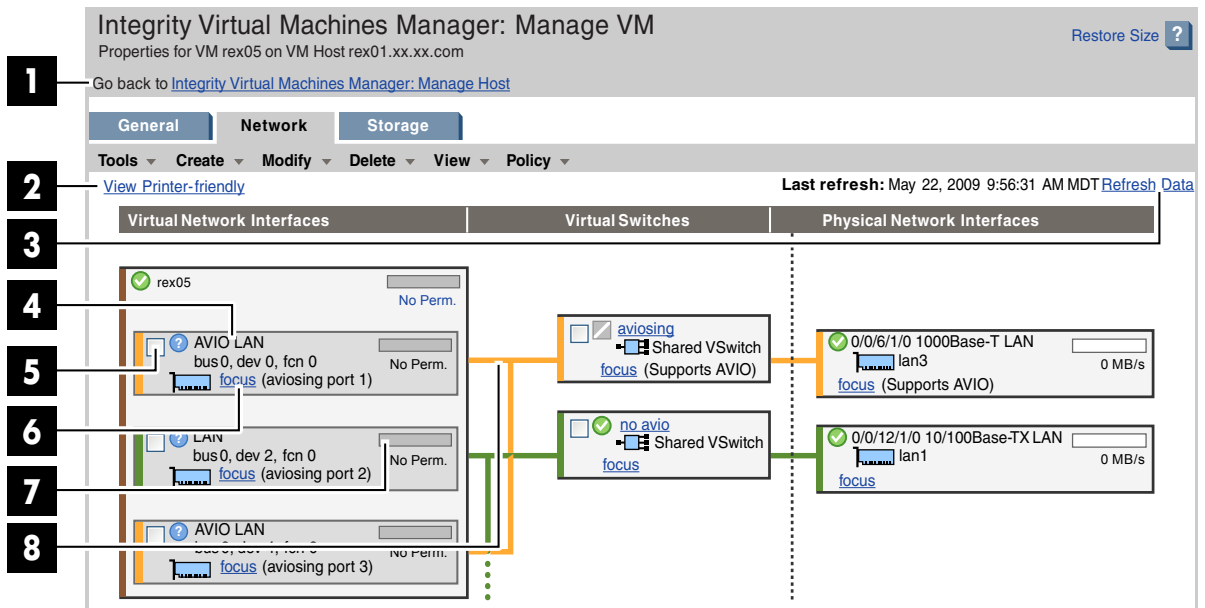


## VM Properties Network tab

The **VM Properties Network** tab shows the network devices for a specific virtual machine.

Quick reference

**Figure 4-23 VM Properties Network tab**



- 1 Goes back to the previous view, in this case the VM Manager VM Host view. When you access the VM Properties view from another VM Manager view (such as the VM Host view), the link returns you to that previous view. If you had accessed the VM Properties view directly from Virtualization Manager, the link returns you to Virtualization Manager. In HP SMH, when you first access this page from HP SMH, the link is not provided. The link appears whenever you move from one VM Manager view to another (such as from VM Host view to VM Properties view, in which case the **Go back to Integrity Virtual Machines Manager: Manage Host** link appears on the VM Properties view).
- 2 Displays this window in a format suitable for printing.
- 3 Updates the data displayed on this page. In general, VM Manager tabbed view screens are refreshed automatically at regular intervals, and VM Manager screens that display configuration data are updated instantaneously when you use VM Manager to change the related configuration parameters. However, when changes to the virtual machine I/O configuration are made using tools other than VM Manager (such as adding or removing I/O devices by using the VM Host command line), the updated configuration data is not shown until the screen is refreshed.
- 4 Displays the type of network interface such as emulated LAN (displayed as “LAN”) or Accelerated Virtual Input/Output LAN (displayed as “AVIO LAN,” as in this instance).
- 5 Allows you to perform an action on the I/O device. Select the box, then select an action from the appropriate menu available on the VM Manager menu bar.
- 6 Clicking the **Focus** link limits the display to only those network devices associated with the selected object (in this instance, the device associated with port 1) and the objects directly connected to it. All other devices are not displayed. To return to the original view, click the **Show All** link visible beneath the VM Manager menu bar on the focused page.
- 7 The meter (bar graph) displays network I/O throughput data, if available. The data is a 5-minute average that is calculated and updated on 5-minute boundaries. If the data cannot be displayed, the meter is dimmed as in this example, and a label indicates the probable cause. For a description of meter labels, see “Utilization meter status/error information” (page 125).

Using VM Manager with Insight Dynamics - VSE for Integrity, you can click a meter to view a snapshot of Capacity Advisor historical data for network I/O; this feature is not provided when using VM Manager from HP SMH.

For more information about using VM Manager to collect and view utilization data, see Chapter 7 (page 111).

**8** Indicates by color coding that matching components are related.

## Screen details

For more information about using and interpreting the items displayed in the **Network** tab, see “Screen details” (page 43).

## VM Properties Storage tab

The **VM Properties Storage** tab shows state and configuration information for a specific virtual machine.

Quick reference

Figure 4-24 VM Properties Storage tab

Integrity Virtual Machines Manager: Manage VM  
Restore Size ?

Properties for VM vse02v6 on VM Host vse02.xx.xx.com

1 Go back to [Integrity Virtual Machines Manager: Manage Host](#)

2 **General** **Network** **Storage**

3 Tools Create Modify Delete View Policy

4  Show physical host bus adapters Last refresh: May 26, 2009 9:39:45 AM MDT Refresh Data

5 **Virtual Storage** **Logical Storage** **Physical Storage**

6 vse02v6 12 KB/s

7 AVIO Disk bus 0, dev 1, tgt 0 No Data focus

8

9

10

1/0/12/1/0/4/0.3.5.0.0  
FCP Array Interface  
focus

COMPAQ HSV111 (C)COMPAQ /dev/rdisk/c19t0d3 No Data focus

COMPAQ HSV111 (C)COMPAQ /dev/rdisk/disk24 0 MB/s focus

1/0/12/1/0/4/0.3.4.0.0  
FCP Array Interface  
focus

COMPAQ HSV111 (C)COMPAQ /dev/rdisk/c17t0d3 0 MB/s focus

- 1 Goes back to the previous view, in this case the VM Host view. If you accessed the VM Properties view from Virtualization Manager, the link returns you to Virtualization Manager. In HP SMH, when you first access this page from HP SMH, the link is not provided. The link appears whenever you move from one VM Manager view to another (such as from VM Host view to VM Properties view, in which case the **Go back to Integrity Virtual Machines Manager: Manage Host** link appears on the VM Properties view).
- 2 With the **Show physical host bus adapters** check box selected (as in this example), the view includes the complete storage bus structure, host bus adapters, and multipath storage configurations. This view may take longer to render and can be more challenging for discerning the associations between virtual machines and devices, especially when many multipath storage devices exist on the VM Host. By default (the check box being unselected), the view is simpler, showing only the specific storage devices that are being used as backing devices. For a multipath device, the simple view shows only the device special file (DSF) path, as specified when the virtual storage device was created. In contrast, the complex view displays all DSF versions of the same device, including (on an HP-UX 11i v3 VM Host) the persistent DSF.

When you navigate to another VM Manager view and return to this view again, the **host bus adapters** check box retains its state. In other words, if the box is checked when you navigate away from the **VM Properties Storage** tab, it remains checked when you navigate back (you continue to see the complex view on return). If the box is unchecked, it remains

unchecked when you return (you continue to see the simple view). The check box state on the **VM Properties Storage** tab does not affect the state of the same check box on the **VM Host Storage** tab. For example, selecting the check box on the **VM Properties Storage** tab does not automatically affect the check box and view of the **VM Host Storage** tab.

- 3 Displays this window in a format suitable for printing.
- 4 Updates the data displayed on this page. In general, VM Manager tabbed view screens are refreshed automatically at regular intervals, and VM Manager screens that display configuration data are updated instantaneously when you use VM Manager to change the related configuration parameters. However, when changes to the virtual machine I/O configuration are made using tools other than VM Manager (such as adding or removing I/O devices by using the VM Host command line), the updated configuration data is not shown until the screen is refreshed.
- 5 The meter (bar graph) displays storage I/O throughput data, if available. The data is a 5-minute average that is calculated and updated on 5-minute boundaries. If the data cannot be displayed, the meter is dimmed (as in the meter below this one) and a label indicates the probable cause. For a description of meter labels, see “Utilization meter status/error information” (page 125).

Using VM Manager with Insight Dynamics - VSE for Integrity, you can click a meter to view a snapshot of Capacity Advisor historical data for storage I/O; this feature is not provided when using VM Manager from HP SMH.

For more information about using VM Manager to collect and view utilization data, see Chapter 7 (page 111).

- 6 Displays the type of storage device interface and device, such as emulated SCSI DVD (labeled SCSI DVD) or Accelerated Virtual Input/Output disk (labeled AVIO Disk).
- 7 Allows you to perform an action on the I/O device. Select the box, then select an action from the appropriate menu available on the VM Manager menu bar.
- 8 Clicking the **Focus** link limits the display to only those storage devices associated with the selected object (in this instance, the devices associated with the indicated AVIO disk) and the objects directly connected to it. All other devices are not displayed. To return to the original view, click the **Show All** link visible beneath the VM Manager menu bar on the focused page.

The **Show physical host bus adapters** check box is disabled (dimmed) in the focussed view; you cannot change the **Show physical host bus adapters** state until you return to the original (unfocussed) view. The simplicity or complexity of the focussed view with respect to host bus adapters and so forth is determined by the check box selection at the time that you selected the **focus** link.

- 9 Indicates by color coding that matching components are related.
- 10 This color-coded line links the multiple representations of the storage device, one with its agile address (`/dev/rdisk/disk24`) and two with legacy addresses (`/dev/rdisk/c18t0d3` and `/dev/rdisk/c17t0d3`). The line indicates that they are different representations of the same physical device. Multiple representations are displayed only if the **Show physical host bus adapters** check box is selected.

## Screen details

For more information about using and interpreting the items displayed in the **Storage** tab, see “Screen details” (page 52).

## Virtual Switch (Vswitch) Properties view

You can access the Vswitch Properties view from any VM Manager views that include a link to a virtual switch, such as the **VM Host Virtual Switches** tab, the **VM Host Network** tab, or the **VM Properties Network** tab. You can also access the Vswitch Properties view by selecting **View**→**Virtual Switch Properties...** (a virtual switch must be selected in the current view).

Figure 4-25 shows a typical Vswitch Properties view. Tabs available from the view are described in the text that follows. Subsequent sections describe each tab in more detail.

**Figure 4-25 Vswitch Properties view**

Integrity Virtual Machines Manager: Manage VSwitch Restore Size ?

Properties for Virtual Switch swlan0 on VM Host metallica.aabb.com

Go back to [Integrity Virtual Machines Manager: Manage Host](#)

1 **General** **Network**

2 Tools ▾ Create ▾ Modify ▾ Delete ▾ View ▾ Policy ▾

[View Printer-friendly](#) Last refresh: Feb 5, 2008 11:11:39 AM MST [Refresh Data](#)

**Virtual Switch Configuration Information:**

|                                       |   |
|---------------------------------------|---|
| Vswitch Name:                         | swlan0  |
| Status:                               | ✓ Up  |
| Type:                                 | Shared  |
| Backing LAG:                          | lan0  |
| Supports AVIO:                        | Yes   |
| Actively used by:                     | <a href="#">bitsv00</a> , <a href="#">bitsv01</a> |
| Configured, but not actively used by: | <a href="#">vm001</a>                             |

**Vswitch Port Assignments:**

| Port | ↑ | VLAN ID | Assigned to |
|------|---|---------|-------------|
| 1    |   | (none)  | bitsv00     |
| 2    |   | (none)  | bitsv01     |
| 3    |   | (none)  | vm001       |

- 1 The “**Vswitch Properties General** tab” (page 70) displays information about the general state of the virtual switch.
- 2 The “**Vswitch Properties Network** tab” (page 72) displays network details about the virtual switch.

## Vswitch Properties General tab

The **Vswitch Properties General** tab shows the status, configuration properties, and port assignments of a virtual switch.

Quick reference

**Figure 4-26 Vswitch Properties General tab**

| Port | VLAN ID | Assigned to |
|------|---------|-------------|
| 1    | (none)  | bitsy00     |
| 2    | (none)  | bitsy01     |
| 3    | (none)  | vm001       |

- 1** Goes back to the previous view, in this case the VM Manager VM Host view. When you access the Vswitch Properties view from another VM Manager view (such as the VM Host view), the link returns you to that previous VM Manager view.
- 2** Displays this window in a format suitable for printing.
- 3** Displays virtual switch configuration information.
- 4** Updates the data displayed on this page. In general, VM Manager tabbed view screens are refreshed automatically at regular intervals, and VM Manager screens that display configuration data are updated instantaneously when you use VM Manager to change the related configuration parameters. However, when changes to the virtual machine I/O configuration are made using tools other than VM Manager (such as adding or removing I/O devices by using the VM Host command line), the updated configuration data is not shown until the screen is refreshed.

**Table 4-5 Data displayed by the Vswitch Properties General tab**

| <b>Data</b>                          | <b>Description</b>  |             |                    |      |                          |         |   |             |   |
|--------------------------------------|---|-------------|--------------------|------|--------------------------|---------|---|-------------|---|
| Vswitch Name                         | Name of the virtual switch  |             |                    |      |                          |         |   |             |   |
| Status                               | The status of the virtual switch: <ul style="list-style-type: none"> <li>• Up (operational)</li> <li>• Down (inoperational)</li> <li>• Link down (the physical network interface used by the vswitch is not running)</li> </ul>   |             |                    |      |                          |         |   |             |   |
| Type                                 | The type of virtual switch: <ul style="list-style-type: none"> <li>• shared vswitch: can be used by more than one virtual machine that includes a virtual network device (virtual NIC) backed by the switch</li> <li>• dedicated vswitch: can be used by only one started virtual machine at a time</li> </ul>  |             |                    |      |                          |         |   |             |   |
| Backing LAN                          | The LAN interface on the host through which the network traffic flows   |             |                    |      |                          |         |   |             |   |
| Supports AVIO                        | Indicates whether the backing LAN interface supports Accelerated Virtual Input/Output. AVIO is supported on HP Integrity VM Version 3.5 or later. For each virtual machine containing an AVIO device, the VM Host OS and the guest OS must support AVIO. For more information about AVIO requirements, see “Creating virtual switches” (page 105) in this manual. In addition, see the <i>HP Integrity Virtual Machines Installation, Configuration, and Administration</i> manual.   |             |                    |      |                          |         |   |             |   |
| Actively used by                     | The set of active virtual machines that are configured to use this vswitch, are currently started, and therefore, are using the vswitch   |             |                    |      |                          |         |   |             |   |
| Configured, but not actively used by | The set of inactive virtual machines with at least one virtual network interface card in the virtual machine configured to use the vswitch as a backing device  |             |                    |      |                          |         |   |             |   |
| Vswitch Port Assignments             | If the VM Host is running HP Integrity Virtual Machines Version 2.0 or greater, a table of the VLAN (virtual LAN) port assignments, if any. (A VLAN defines the logical connectivity defined by a LAN.) This table lists the following information: <table border="1" data-bbox="475 1115 1497 1383"> <thead> <tr> <th><b>Data</b></th> <th><b>Description</b></th> </tr> </thead> <tbody> <tr> <td>Port</td> <td>Port IDs for the vswitch</td> </tr> <tr> <td>VLAN ID</td> <td>If a VLAN ID has been specified for this port, it is displayed here; otherwise, this column displays (none)</td> </tr> <tr> <td>Assigned to</td> <td>List of virtual machines that are assigned to this vswitch port</td> </tr> </tbody> </table> | <b>Data</b> | <b>Description</b> | Port | Port IDs for the vswitch | VLAN ID | If a VLAN ID has been specified for this port, it is displayed here; otherwise, this column displays (none) | Assigned to | List of virtual machines that are assigned to this vswitch port |
| <b>Data</b>                          | <b>Description</b>  |             |                    |      |                          |         |   |             |   |
| Port                                 | Port IDs for the vswitch  |             |                    |      |                          |         |   |             |   |
| VLAN ID                              | If a VLAN ID has been specified for this port, it is displayed here; otherwise, this column displays (none)   |             |                    |      |                          |         |   |             |   |
| Assigned to                          | List of virtual machines that are assigned to this vswitch port   |             |                    |      |                          |         |   |             |   |

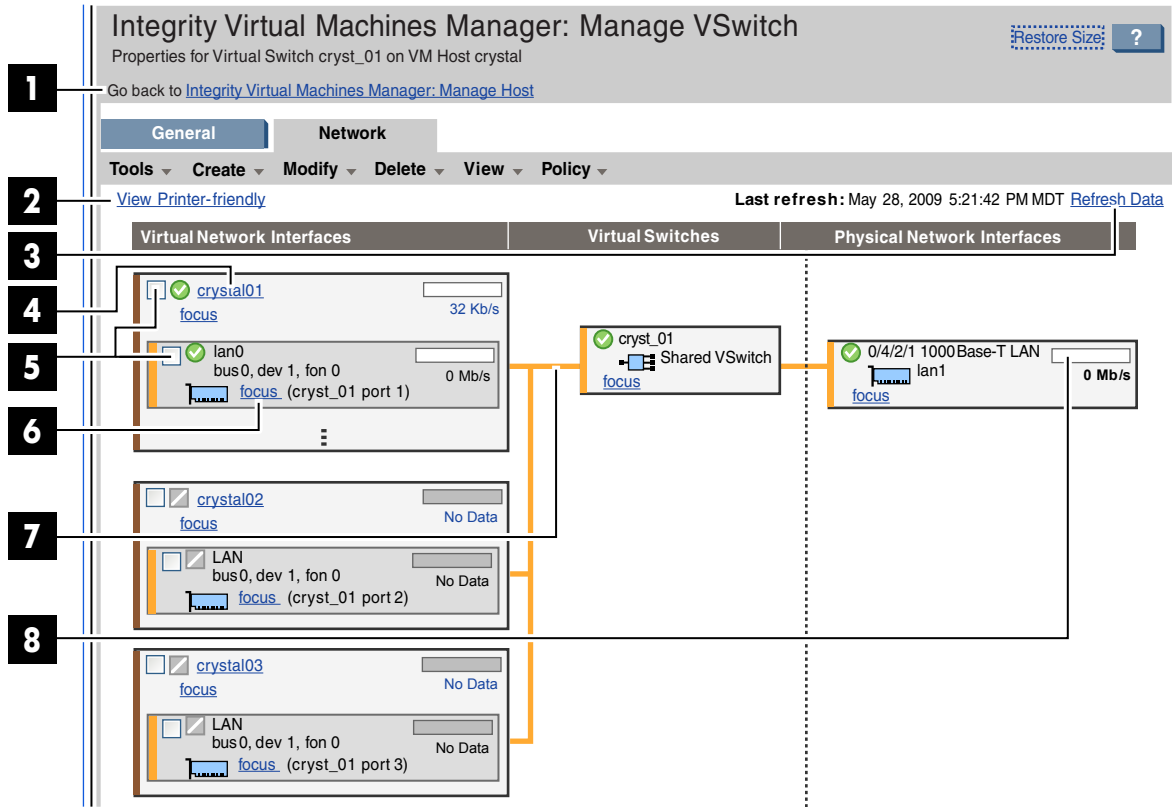


# Vswitch Properties Network tab

The **Vswitch Properties Network** tab shows information about the network devices for a specific virtual switch.

Quick reference

Figure 4-27 Vswitch Properties Network tab



- 1 Goes back to the previous view, in this case the VM Properties view. When you access the Vswitch Properties view from another VM Manager view (such as the VM Properties view), the link returns you to that previous VM Manager view.
- 2 Displays this window in a format suitable for printing.
- 3 Updates the data displayed on this page. In general, VM Manager tabbed view screens are refreshed automatically at regular intervals, and VM Manager screens that display configuration data are updated instantaneously when you use VM Manager to change the related configuration parameters. However, when changes to the virtual machine I/O configuration are made using tools other than VM Manager (such as adding or removing I/O devices by using the VM Host command line), the updated configuration data is not shown until the screen is refreshed.
- 4 Displays information about the virtual machine.
- 5 Allows you to perform an action on the virtual machine or I/O device. Select the box, then select an action from one of the menus available on the VM Manager menu bar.
- 6 Clicking the **Focus** link limits the display to only those network devices associated with the selected object (in this instance, the devices associated with the indicated LAN) and the objects directly connected to it. All other devices are not displayed. To return to the original view, click the **Show All** link visible beneath the VM Manager menu bar on the focused page.
- 7 Color coding indicates that matching components are related.
- 8 The meter (bar graph) displays network I/O throughput data, if available. The throughput data is a 5-minute average that is calculated and updated on 5-minute boundaries. If the



data cannot be displayed, the meter is dimmed and a label indicates the probable cause. For a description of meter labels, see “Utilization meter status/error information” (page 125).

Using VM Manager with Insight Dynamics - VSE for Integrity, you can click a meter to view a snapshot of Capacity Advisor historical data for network I/O; this feature is not provided when using VM Manager from HP SMH.

For more information about using VM Manager to collect and view utilization data, see Chapter 7 (page 111).

## Screen details

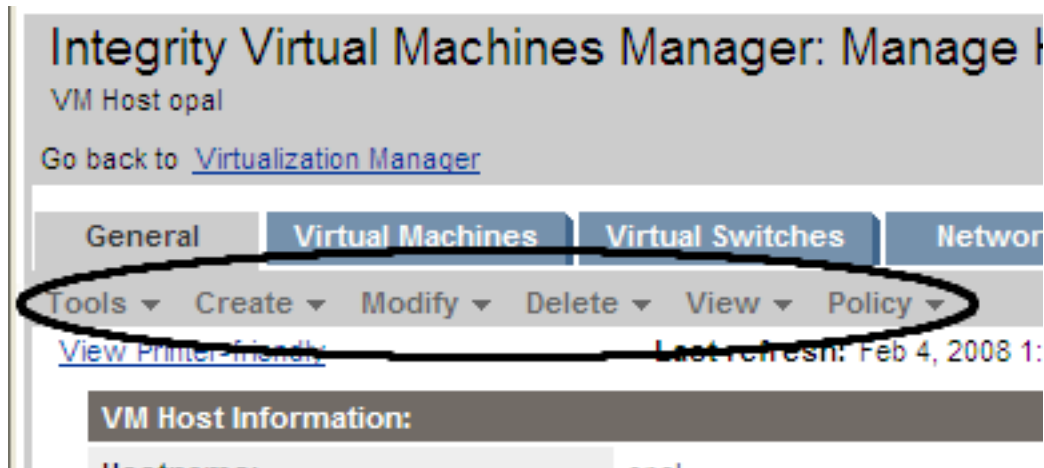
For detailed information about the what is displayed in the **Vswitch Properties Network** tab, see the description of the **VM Host Network** tab, “Screen details” (page 43).



## 5 Using VM Manager menus

VM Manager views provide a menu bar beneath the tabs row, as shown in Figure 5-1. The menus enable you to perform a variety of actions. Not all actions (menu options) are available from every screen view. Actions are enabled or disabled based on the state of the system, the view you are in, and the objects in that view that are currently selected. Actions that are disabled are dimmed and unselectable. To display text that explains how to enable a disabled action, place the cursor over the visible but dimmed, menu item.

**Figure 5-1 VM Manager menus**



The menus are described in each of the following sections:

- "Using the **Tools** menu" (page 76)
- "Using the **Create** menu" (page 78)
- "Using the **Modify** menu" (page 79)
- "Using the **Delete** menu" (page 81)
- "Using the **View** menu" (page 82)
- "Using the **Policy** menu" (page 84)

## Using the **Tools** menu

The VM Manager **Tools** menu allows you to perform actions on a selected virtual machine or virtual switch, and to collect and view HP Insight Capacity Advisor software data. The options that might be available when you select the **Tools** menu are shown in Figure 5-2. In this example, the **Start Virtual Switch...** and **Stop Virtual Switch...** options are disabled. These options are enabled when you are in the Vswitch Properties view or a view with one or more virtual switches selected, such as the **VM Host Virtual Switches** tab. The virtual machine operations (start, stop, restart, migrate) are enabled when you are in a VM Properties view or in a view that allows selection of virtual machines, such as the **VM Host Virtual Machines** tab. From tabs that list and allow selection of multiple virtual machines or multiple virtual switches, you can perform an action on multiple selected machines or switches.



**NOTE:** The **Tools**→**Collect Capacity Advisor Data...** and **Tools**→**Capacity Advisor Data Historical report...** items are displayed only when you use VM Manager with Insight Dynamics - VSE for Integrity; they are not displayed when using VM Manager through HP SMH.

**Figure 5-2 VM Manager Tools menu**

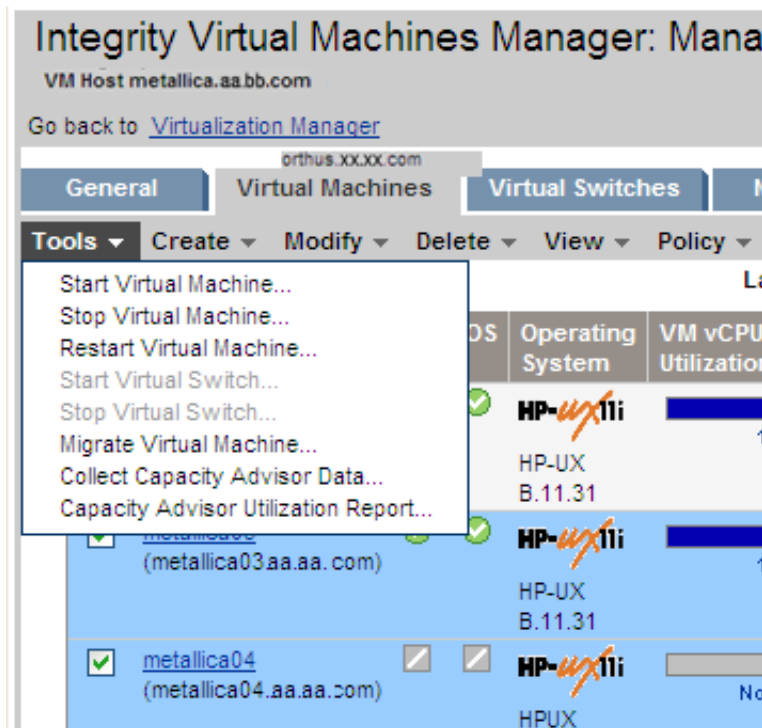


Table 5-1 describes the **Tools** menu options and where to obtain more information in this manual. More detailed information is provided by the VM Manager help.

**Table 5-1 VM Manager Tools menu options**

| Menu Selection                                 | Action Summary  | More Information                      |
|--|---|---------------------------------------|
| <b>Tools</b> → <b>Start Virtual Machine...</b> | Starts the virtual hardware for a virtual machine, taking it from an Off state (powered off) to an On state (powered on). | “Starting virtual machines” (page 94) |
| <b>Tools</b> → <b>Stop Virtual Machine...</b>  | Stops a virtual machine, taking it from an On state (powered on) to an Off state (powered off).                           | “Stopping virtual machines” (page 96) |

**Table 5-1 VM Manager Tools menu options (continued)**

| <b>Menu Selection</b>                                   | <b>Action Summary</b>   | <b>More Information</b>   |
|---|---|---|
| <b>Tools→Restart Virtual Machine...</b>                 | Restarts an already started virtual machine, taking it first to an Off state (powered off) and then to an On state (powered on). Starts a stopped virtual machine.  | “Restarting virtual machines” (page 98)   |
| <b>Tools→Start Virtual Switch...</b>                    | Starts a virtual switch, taking it from a Down state (powered off) to an Up state (powered on).   | “Starting, stopping, and deleting virtual switches” (page 108)  |
| <b>Tools→Stop Virtual Switch...</b>                     | Stops a virtual switch, taking it from an Up state (powered on) to a Down state (powered off).  | “Starting, stopping, and deleting virtual switches” (page 108)  |
| <b>Tools→Migrate Virtual Machine...</b>                 | Starts the Migrate Virtual Machine wizard, which guides you through a two-step procedure for migrating a virtual machine to another VM Host.  | “Migrating virtual machines” (page 100)   |
| <b>Tools→Collect Capacity Advisor Data...</b>           | Causes Capacity Advisor to collect utilization data from specified targets. This menu item is displayed only when you use VM Manager with Insight Dynamics; it is not displayed when using VM Manager through HP SMH.   | “Collecting and viewing utilization data” (page 111)<br><i>HP Insight Capacity Advisor 6.2 User Guide</i> |
| <b>Tools→Capacity Advisor Data Historical Report...</b> | Creates a historical report from the target workloads, systems, complexes or scenarios of your choosing. This menu item is displayed only when you use VM Manager with Insight Dynamics; it is not displayed when using VM Manager through HP SMH.<br><br>Before creating a report, you must have collected data of interest (you can use the <b>Tools→Collect Capacity Advisor Data...</b> menu item to collect data). | “Collecting and viewing utilization data” (page 111)<br><i>HP Insight Capacity Advisor 6.2 User Guide</i> |

## Using the **Create** menu

The **Create** menu allows you to create a virtual machine or virtual switch. Figure 5-3 shows the choices when you select the **Create** menu.

**Figure 5-3 VM Manager Create menu**

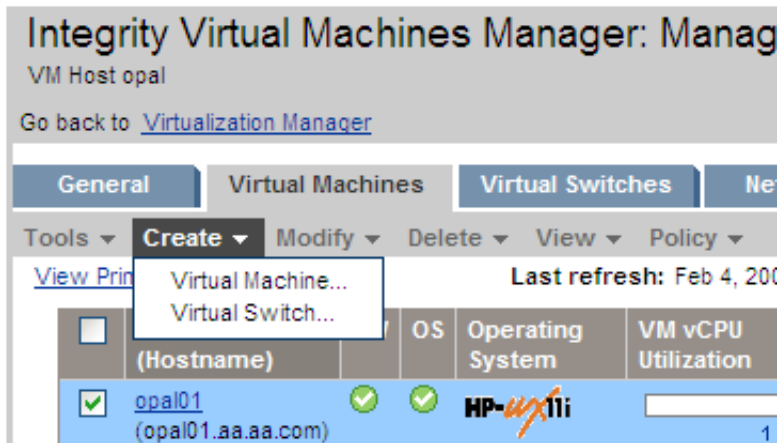


Table 5-2 describes the **Create** menu options and where to obtain more information in this manual. More detailed information is provided by the VM Manager help.

**Table 5-2 VM Manager Create menu options**

| Menu Selection                            | Action Summary  | More Information                       |
|---|---|--|
| <b>Create</b> → <b>Virtual Machine...</b> | Starts the Create Virtual Machine wizard, which guides you through the procedure of creating a virtual machine. Each step presents a dialog that asks you to specify required information.  | "Creating virtual machines" (page 87)  |
| <b>Create</b> → <b>Virtual Switch...</b>  | Creates a new virtual network switch (vswitch) on the host. The vswitch is used by the virtual machines to connect to the network: one or more virtual machines connect to the vswitch, and the vswitch is connected to a host's physical network device. | "Creating virtual switches" (page 105) |

## Using the **Modify** menu

The VM Manager **Modify** menu allows you to perform actions on a selected virtual machine. The options displayed when you select the **Modify** menu using VM Manager from Insight Dynamics are shown in Figure 5-4. The options are available only when you are in a VM Properties view or in a view in which you have selected a virtual machine, such as on the **VM Host Virtual Machines** tab. You can only modify one virtual machine at a time.

If the virtual machine being modified is an HP Serviceguard package, you must make the same modifications to the virtual machine on the other VM Hosts in the cluster.



**NOTE:** When you use VM Manager from HP SMH, this menu includes an additional option that allows you to modify WBEM credentials. This option can be available from any VM Manager view.

**Figure 5-4 VM Manager Modify menu**

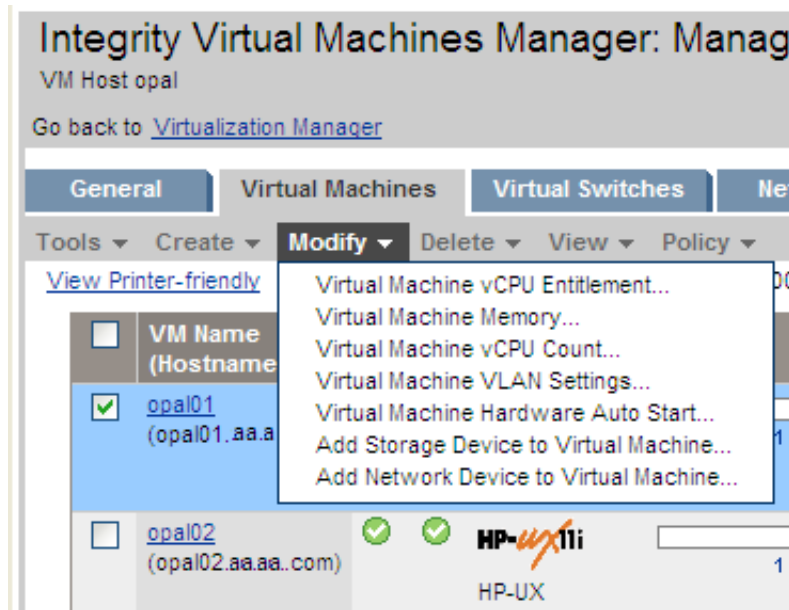


Table 5-3 describes the **Modify** menu options. More information about the various modification options is provided in “Modifying virtual machines” (page 92). More detailed information is provided by the VM Manager help and the *HP Integrity Virtual Machines Installation, Configuration, and Administration* manual.

**Table 5-3 VM Manager Modify menu options**

| Menu Selection                                     | Action Summary   |
|--|--|
| <b>Modify</b> →Virtual Machine vCPU Entitlement... | Modifies the processor entitlement of a selected virtual machine.  |
| <b>Modify</b> →Virtual Machine Memory...           | Modifies the amount of virtual memory (entitlement) to allocate to the virtual machine. Allows you to set dynamic memory parameters if dynamic memory is supported on the virtual machine's OS. The changes take effect when the virtual machine is restarted. |
| <b>Modify</b> →Virtual Machine CPU Count...        | Modifies the number of virtual CPUs allotted to a virtual machine that has been configured for symmetric multiprocessing. The changed value takes effect when the virtual machine is restarted.  |
| <b>Modify</b> →Virtual Machine VLAN Settings...    | Modifies the VLAN assignments of virtual switch ports connected to the virtual machine.  |

**Table 5-3 VM Manager Modify menu options** *(continued)*

| <b>Menu Selection</b>                                  | <b>Action Summary</b>  |
|--|--|
| <b>Modify→Virtual Machine Hardware Auto Start...</b>   | Modifies the startup attribute (autoboot) of a selected virtual machine. You can allow the virtual machine to be started automatically when the VM Host is started, or you can set the attribute so that you can start the virtual machine manually. |
| <b>Modify→Add Storage Device to Virtual Machine...</b> | Adds a virtual storage device to a virtual machine, where the virtual storage device is backed by physical storage and connected to a virtual storage adapter on the VM Host.  |
| <b>Modify→Add Network Device to Virtual Machine...</b> | Adds a network device to a virtual machine, where the network device is associated with a virtual switch. Allows you to create a new virtual switch.   |
| <b>Modify→WBEM Credentials...</b>                      | Sets and changes WBEM credentials for virtual machines. For information, see "Setting WBEM credentials in HP SMH" (page 16). This menu option is available only when using VM Manager with HP SMH.   |



## Using the **Delete** menu

The **Delete** menu allows you to delete one or more virtual machines, virtual switches, or virtual machine I/O devices. Figure 5-5 shows the choices that might be available when you select the **Delete** menu. The choices are enabled according to the view and tab. In Figure 5-5, the **Virtual Machine...** option is enabled and the **Virtual Switch...** and **I/O Device...** options are disabled. The **Virtual Machine...** option is enabled at the VM Properties view or any VM Host or Vswitch Properties tab where you have selected one or more virtual machines (such as the **VM Host Virtual Machines** tab, as shown in Figure 5-5). The **Virtual Switch...** option is enabled at the Vswitch Properties view or any VM Host or VM Properties tab where one or more virtual switches are selected. The **I/O Device...** option is enabled at any **Network** or **Storage** tab where one or more I/O devices are selected.

From tabs that list and allow selection of multiple virtual machines, virtual switches, or I/O devices, you can simultaneously delete all selected objects.

**Figure 5-5 VM Manager Delete menu**

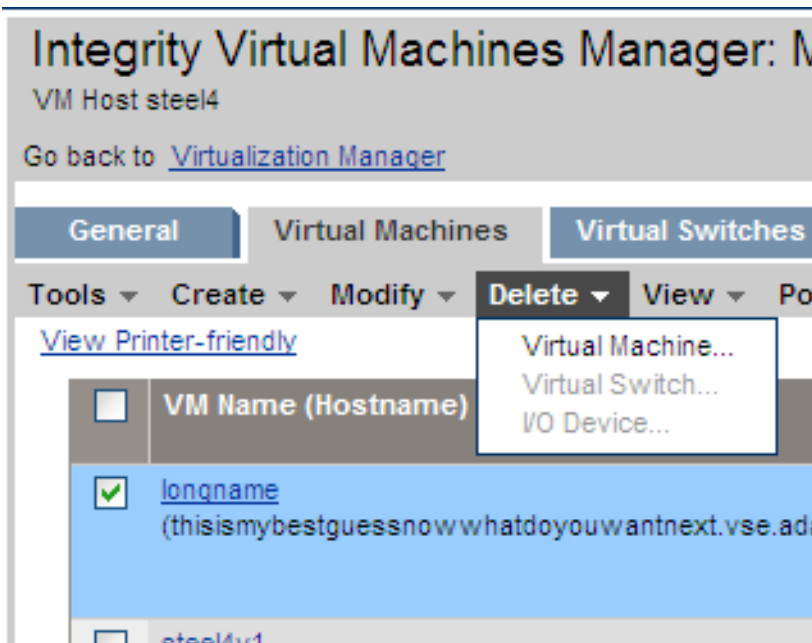


Table 5-4 describes the **Delete** menu options and where to obtain more information in this manual. More detailed information is provided by the VM Manager help.

**Table 5-4 VM Manager Delete menu options**

| Menu Selection                            | Action Summary   | More Information   |
|---|--|--|
| <b>Delete</b> → <b>Virtual Machine...</b> | Deletes all configuration files for the virtual machine and frees resources assigned to the virtual machine. | “Deleting virtual machines” (page 99)                          |
| <b>Delete</b> → <b>Virtual Switch...</b>  | Removes all configuration information for a virtual switch.  | “Starting, stopping, and deleting virtual switches” (page 108) |
| <b>Delete</b> → <b>I/O Device...</b>      | Removes all configuration information for an I/O device.   | “Deleting network or storage Devices” (page 108)               |

## Using the **View** menu

The **View** menu allows you to display a variety of information. Figure 5-6 shows the choices that might be available when you select the **View** menu.



**NOTE:** The **Capacity Advisor Data** item is displayed only when you use VM Manager with Insight Dynamics - VSE for Integrity; it is not displayed when using VM Manager through HP SMH. The accessibility of the other menu items depends on the current view and selections. For example, to access the virtual machine log from the **VM Host Virtual Machines** tab, a virtual machine must be selected, as shown in Figure 5-6.

**Figure 5-6 VM Manager View menu**

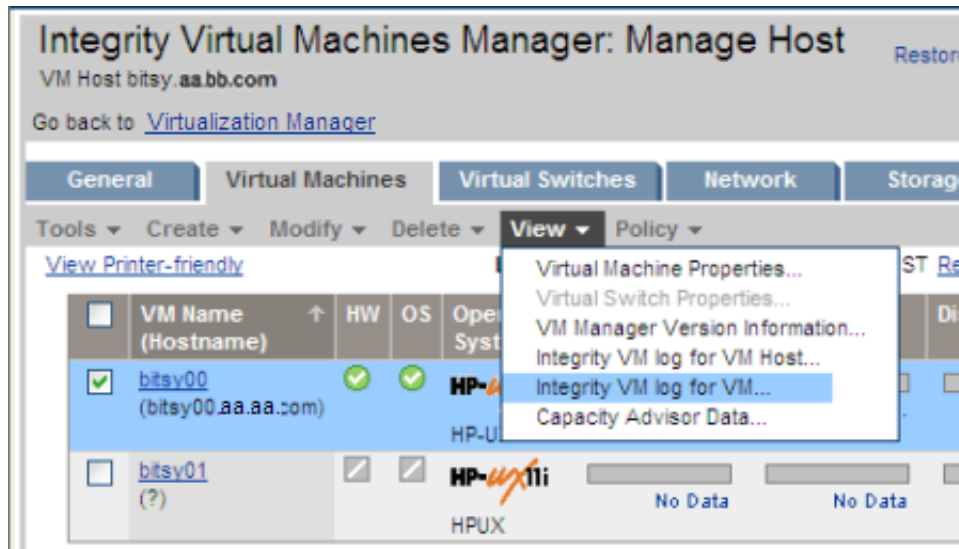


Table 5-5 describes the **View** menu options. More detailed information is provided by the VM Manager help.

**Table 5-5 VM Manager View menu options**

| Menu Selection                         | Action Summary  |
|--|---|
| View→Virtual Machine Properties...     | Displays the <b>VM Properties General</b> tab. For more information about this view, see “ <b>Virtual Machines (VM) Properties</b> view” (page 58).   |
| View→Virtual Switch Properties...      | Displays the <b>Vswitch Properties General</b> tab. For more information about this view, see “ <b>Virtual Switch (Vswitch) Properties</b> view” (page 69).   |
| View→VM Manager Version Information... | Displays the version numbers of VM Manager, Integrity VM, and the providers on the VM Host and each virtual machine. For more information, see “Viewing VM Manager, Integrity VM, and WBEM Provider versions” (page 119).   |
| View→Integrity VM log for VM Host...   | Displays the events logged by Integrity VM pertaining to the VM Host and all its guests. To use this feature with VM Manager running under HP SMH, you must be logged into HP SMH with either Operator or Administrator privileges. For more information, see “Viewing Integrity VM Host and VM logs” (page 119). |

**Table 5-5 VM Manager View menu options (continued)**

| Menu Selection                  | Action Summary   |
|---------------------------------|--|
| View→Integrity VM log for VM... | Displays the events logged by Integrity VM pertaining to a virtual machine. To use this feature with VM Manager running under HP SMH, you must be logged into HP SMH with either Operator or Administrator privileges. For more information, see “Viewing Integrity VM Host and VM logs” (page 119).   |
| View→Capacity Advisor Data...   | Only available when using VM Manager with Insight Dynamics, displays data collected from systems licensed for the Capacity Advisor. You can view data collected for the VM Host or for one or more virtual machines. For more information, see the <i>HP Insight Capacity Advisor 6.2 User Guide</i> . |

## Using the **Policy** menu

The **Policy** menu allows you to perform a variety of tasks pertaining to the gWLM policy. Using VM Manager with Insight Dynamics - VSE for Integrity, VM Manager can be integrated with gWLM. When gWLM is managing specific virtual machines, the virtual machines have assigned policies and are placed in a shared resource domain (SRD). If any virtual machines are managed on a VM Host, then only that set of virtual machines can be started on that VM Host; no other virtual machines can be started on that VM Host without first using gWLM to add them to the SRD.



**NOTE:** The **Policy** menu is not available when using VM Manager with HP SMH.

Figure 5-7 shows the options that might be available in the VM Manager **Policy** menu. If no policy is established, the **Change Associated gWLM Policy...** and **Remove Associated gWLM Policy...** options are disabled.

**Figure 5-7 VM Manager Policy menu**

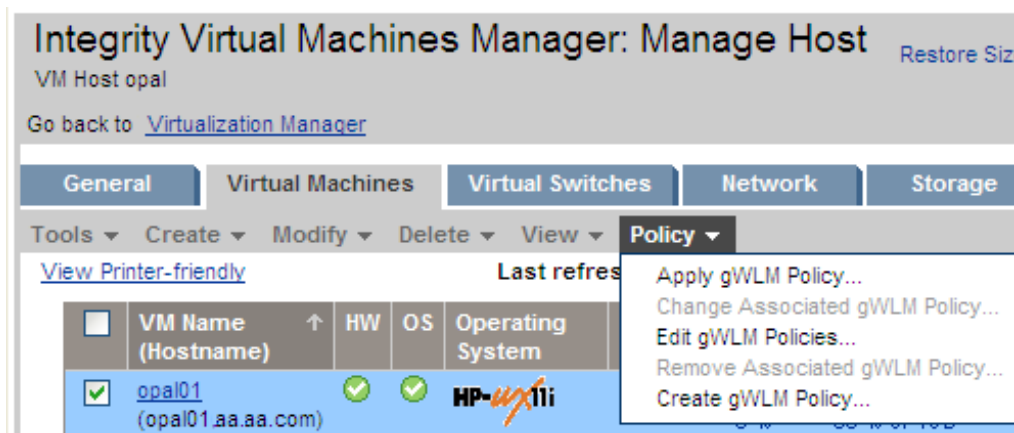


Table 5-6 describes the **Policy** menu options. For more information about gWLM policies, see the *HP Insight Global Workload Manager 6.2 User Guide*. More detailed information is provided by the VM Manager help.

**Table 5-6 VM Manager Policy menu options**

| Menu Selection  | Action Summary   |
|---|--|
| <b>Policy</b> → <b>Apply gWLM Policy...</b>             | Associates a gWLM policy with a virtual machine and adds it to an SRD. This menu option is available when you are in VM Properties view or in another view in which one or more virtual machines are selected. Use this option to start using gWLM for scheduling virtual machine resources. |
| <b>Policy</b> → <b>Change Associated gWLM Policy...</b> | Changes the policy of a virtual machine that is already managed by gWLM. This menu option is available when you are in VM Properties view or in another view in which one or more virtual machines are selected.   |
| <b>Policy</b> → <b>Edit gWLM Policies...</b>            | Displays a page that lists all the gWLM policies that are currently defined and allows you to create, edit, or delete them.  |

**Table 5-6 VM Manager Policy menu options** *(continued)*

| Menu Selection                                 | Action Summary  |
|--|---|
| <b>Policy→Remove Associated gWLM Policy...</b> | Removes the policy association from the virtual machine, effectively removing the virtual machine from the SRD. The selected virtual machine must be powered off before it can be removed from the SRD. This menu option is available when you are in VM Properties view or in another view in which one or more virtual machines are selected. |
| <b>Policy→Create gWLM Policy...</b>            | Creates a new gWLM policy. You do not need to select a virtual machine to create a gWLM policy. The new policy can subsequently be applied to a new virtual machine.  |



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# 6 Working with virtual machines

This chapter describes tasks you can perform to create and manage virtual machines and their resources.

## Planning virtual machines

To achieve your goals using virtual machines, plan the configuration of each virtual machine by assessing its requirements for resources on the HP Integrity system on which it will run. For information about how to assess your system's resources as well as the virtual machines you will run on the system, and how to map your virtual machine requirements to the system's resources, see the *HP Integrity Virtual Machines Installation, Configuration, and Administration* manual, located on the HP Technical Documentation website (click on the **HP Insight Dynamics - VSE for Integrity** tab):

<http://www.hp.com/go/insightdynamics/docs>

For information about AVIO performance tuning, see the latest Integrity VM white papers available from this website.

## Creating virtual machines

To create a virtual machine, VM Manager uses the Create Virtual Machine wizard to guide you through the process. Each step presents a dialog that allows you to specify the required information. At any time you can get help, return to previous steps, or exit the wizard. By creating a new virtual machine, you assign attributes and resources to it. This creates an association among the virtual devices known to the virtual machine and the physical devices managed by the VM Host.

Where possible, reasonable default values are provided for each dialog. However, the default values are not necessarily optimal. You must determine what values are optimal based on the unique requirements of your machine (such as the applications you plan to run and the performance you expect).

To access the Create Virtual Machine wizard, select **Create→Virtual Machine...** from the VM Manager menu bar. The Create Virtual Machine wizard leads you through several screens in the following order. For more information about any screen, see the corresponding VM Manager help topic.

1. Specify VM Identity

Specify the virtual machine name, an optional description, the intended guest operating system, and the virtual machine hardware startup value (autoboot).

2. Specify Processor Entitlements

The processor entitlement sets the guaranteed amount of processing power for each virtual CPU in a virtual machine. The processor entitlement is the default entitlement (10%), a percentage of physical processor power, or a specific, fixed processor speed. If supported by the version of Integrity VM running on the VM Host, you can specify an entitlement cap and the minimum and maximum number of vCPUs to be allotted to the virtual machine. An entitlement cap is the maximum amount of computing power allotted to a virtual machine for each vCPU.

3. Specify Memory

Specify the amount of memory for the virtual machine. If the VM Host has Integrity VM 3.0 or later installed and the OS type you chose in step 1 supports dynamic memory (for example, specifying HP-UX as the intended guest OS, with Integrity VM 3.0 or later installed on the VM Host), the memory screen allows you to set dynamic memory parameters.



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**NOTE:** An up-to-date version of the WBEM Utilization Provider (UP) must be installed on the virtual machine to enable HP Insight Capacity Advisor software and the memory utilization meters in VM Manager and Integrity VM to reflect the dynamic change in memory. For information about verifying and installing software on virtual machines, see “System and software requirements” (page 13) and the HP Integrity Virtual Machines documentation.

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#### 4. Specify Network Devices

To add a virtual network device, click **Add Network Device...** on the first network device screen. This brings up the **Add Network Device** screen. First, select the type of virtual network interface card. The default is an emulated LAN device. You can select Accelerated Virtual Input/Output (AVIO) device type if AVIO is supported by the version of Integrity VM (Version 3.5 or later) on the VM Host and by the intended guest OS. For Windows and Linux guests, support for AVIO virtual network devices requires that compatible Windows and Linux drivers be installed on the guest and additional patches be installed on the Integrity VM Version 3.5 or later. The OpenVMS guest OS supports only the AVIO interface.

For HP-UX, HP recommends that you install the latest AVIO components for both the VM Host and the guest; however, updating both guest and host components at the same time is not mandatory. Updating both components ensures that you always receive the latest bug fixes for a complete solution. Always check the following software depot website for the latest version of AVIO software (search for “HPVM AVIO”):

<http://software.hp.com>

The guest AVIO drivers are included in the `VMGuest.SW` bundle available from the software depot website. Search for the bundle and make sure you install the latest version.

For more information, see the HP Integrity Virtual Machines documentation.

After you select the virtual network interface type, select the virtual switch from the list provided or create a virtual switch. To provide network access for the virtual machine, a virtual switch is necessary.



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**NOTE:** VM Manager does not automatically update its display of I/O while the Create Virtual Machine wizard is being used. If the network or storage I/O configuration on the VM Host changes while the Create Virtual Machine wizard is in use, update the configuration changes displayed by the wizard by clicking the **Refresh Data** link.

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- Each virtual storage device is backed by physical storage in the VM Host system. A physical storage device can be a disk device, a logical volume, a DVD or CD, a DVD writer (burner), a tape device, a tape changer, an existing file (a file or directory being used as the backing storage device for a virtual storage device of an already-existing virtual machine on the VM Host), or a new file that VM Manager allows you to create as a backing storage device for a virtual disk (Virtual FileDisk). When you add a DVD writer, tape device, or changer, they are added as attached devices. You can add attached devices only if they are using an emulated SCSI adapter. You cannot use VM Manager to add an attached AVIO device; to add such a device to a virtual machine, use the `hpvmdevmgmt` command at the Integrity Virtual Machines host. To add a virtual storage device, click **Add Storage Device...** on the first storage device screen. This brings up the **Add Storage Device** screen. First, select the type of virtual storage adapter. The default is an emulated SCSI adapter. You can select Accelerated Virtual Input/Output (AVIO) adapter type if AVIO is supported by the version of Integrity VM (Version 3.5 or later) on the VM Host and by the intended guest OS (HP-UX 11i v3 only).

If the VM Host is running HP-UX 11i v3, the **Add Storage Device** screen gives you the choice of listing storage devices by their agile address (the default) or by their legacy address. HP recommends using agile device addressing when configuring storage devices. This



provides benefits especially for multipath devices. With legacy addressing, the screen lists one entry for each path to a storage device that has multiple paths. With agile addressing, the screen lists only one entry for each multipath storage device. To change the addressing scheme for viewing, select the appropriate addressing scheme. If the VM Host runs an earlier version of HP-UX, you are not given a choice: the table lists devices by the legacy addressing scheme only. For more information about agile addressing, see the **VM Host Storage** tab help topic.

For more information on AVIO devices and on agile addressing, see the HP Integrity Virtual Machines documentation.

After you select the virtual storage adapter type, select the physical backing device from the list of devices provided in the device selection table (such as disk, DVD, tape, LVM volume, files).



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**NOTE:** The list can include file and directory backing devices that have not been associated with a particular virtual machine, or that were associated with virtual machines that have been removed or from which the associated virtual devices have been removed. You can make these devices available to VM Manager by adding them to the Integrity VM device database. One advantage is that this allows you to populate the Integrity VM device database with entries for OS installation DVD images that might be used when creating and provisioning several virtual machines. When you use VM Manager to add a virtual DVD to a virtual machine, the image file shows up in the list of storage backing devices to choose from, saving you from having to type the name of the image file or to browse for it.

At the VM Host command line, add a file as a guest device (`gdev`) to the device management database by specifying the `hpvmdevmgmt` command with the `USAGE` attribute value as either `USAGE=DISK` or `USAGE=DVD`. As a result, the VM Manager screen includes the file in the list of backing devices you can choose from. The file is listed as a backing device for either a virtual disk or a virtual DVD, depending on the value of the `USAGE` attribute. For example, if you add file `/images/myos.iso` to the device management database, specifying attribute `USAGE=DVD`, then `/images/myos.iso` will appear in the VM Manager list of backing devices as a possible backing device for a virtual DVD. If you add a file to the database without specifying the `USAGE` attribute, the file is not included in the list of possible backing devices.

If you add a directory to the database, it is included in the list as a possible backing device for a virtual DVD. Do not specify the `USAGE` attribute for a directory; the attribute is not needed for a directory.

To ensure that a device database entry is preserved in the VM Host device management database for future selection, even when the associated virtual device is removed from the virtual machine, or even when all virtual machines using the entry as a backing device are deleted from the VM Host, you can enter the `hpvmdevmgmt` command with the `PRESERVE` attribute specified as `PRESERVE=YES`.

When you use the `hpvmdevmgmt` command to create a file as a backing device for a disk, specify the size (`-S`) and `-A` attributes to ensure that the file is included in the list of possible backing devices. Specifying these two attributes automatically sets `USAGE=DISK` and `PRESERVE=YES`.

When you use VM Manager to create a file as a backing device for a disk, the `PRESERVE` attribute is set as `PRESERVE=YES`.

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**NOTE:** If you use VM Manager to manage a VM Host running Integrity VM Version 3.5 or earlier, VM Manager does not fully support virtual device special files located in `/hpa` (introduced in HP StorageWorks Secure Path software Version 3.0F SP2) as backing devices for virtual storage. When you use VM Manager to add a storage device on a virtual machine, VM Manager does not display device files in `/hpa` as possible backing devices to choose from.

To add a virtual storage device that uses a virtual device special file in `/hpa` to a new virtual machine on a VM Host running Integrity VM Version 3.5 or earlier, use the Integrity VM `hpvmcreate` command. For more information about these commands, see the *HP Integrity Virtual Machines Installation, Configuration, and Administration* manual.

---

## 6. Summary

Review the identity and resources specified for the new virtual machine and preview the command that will be used to create it. This summary step allows you to review all information before the new virtual machine is created.

At this step, you can still cancel (exit the Create Virtual Machine wizard) or return to modify previous steps in the wizard. When you click **Finish**, the wizard executes the `hpvmcreate` commands displayed in the **Command Preview** area:

- If the **Create VM even if resources are insufficient, missing or unavailable** check box is not selected, the wizard executes the first of two commands (`hpvmcreate -s`) to check for resource availability and other issues without actually creating the virtual machine. This command reports any errors or warnings at the top of the page. If warnings or errors are detected, the virtual machine will not be created. Upon analyzing any reported warnings, you can choose to create the virtual machine anyway by selecting the check box and clicking **Finish** again.

If no serious problems are detected by the first command, the wizard then executes the second command (`hpvmcreate -F`), which creates the virtual machine.

- If the **Create VM even if resources are insufficient, missing or unavailable** check box is selected, the wizard does not check for resource warnings. It simply runs the `hpvmcreate -F` to create the virtual machine even if potential resource issues exist (but not if a fatal error is detected). For example, if this check box is selected, you can create a virtual machine that uses a physical disk that some other running virtual machine is already using. As another example, you can create a virtual machine for which you incorrectly specified a storage device file. You can correct these kinds of problems after the virtual machine is created and before it is started. For information about problem solving, see “Troubleshooting virtual machine problems” (page 126).

## 7. Specify VLAN IDs

If the VM Host supports vswitch VLANs (virtual LANs), and virtual NICs (vNICs) are specified for the new virtual machine, then you can assign VLAN IDs to the newly created virtual machine. You can assign a VLAN ID to the vswitch port connected to each virtual NIC in the virtual machine. By default, VLANs are not specified (VLAN ID is “none”). When you click **OK** on this page, any modifications to the VLAN IDs are updated, after which the Create Virtual Machine wizard **Next Steps** page is displayed.

## 8. Next Steps

After creating the new virtual machine, VM Manager presents you with the next steps you can take to manage and use the new virtual machine. The steps presented depend on the environment in which you created the virtual machine. For example, when virtual machine scheduling on a VM Host is managed by HP Insight Global Workload Manager software for Integrity (gWLM), the **Next Steps** page advises you to associate the virtual machine with a gWLM policy and add the virtual machine to a Shared Resource Domain (SRD). You cannot start the virtual machine until you complete that action.

If the new virtual machine includes AVIO devices (AVIO support is provided on HP Integrity VM Version 3.5 or later), you are advised to make sure the appropriate OS that supports AVIO is installed on the VM Host and the virtual machine. If the intended OS on the virtual machine does not support AVIO, you are warned of this. In addition, HP strongly recommends that AVIO components (such as drivers and libraries) on the virtual machine and VM Host be updated to the latest release of the OS. If the virtual machine OS is Windows or Linux, install additional AVIO-compatible drivers on the VM Host and virtual machine; the Windows and Linux AVIO drivers include instructions for installing the drivers on virtual machines. For more information about AVIO requirements, see the *HP Integrity Virtual Machines Installation, Configuration, and Administration* manual.

Other steps you can take include starting the virtual hardware for the virtual machine, accessing the virtual machine console, adding additional software (provider components) needed to support management of the virtual machine, getting information about the virtual machine, and tuning the performance of the virtual machine.



---

**NOTE:** Any devices added using the Create Virtual Machine wizard are not functional on the virtual machine until the new virtual machine is started. Certain devices are not seen in a VM Manager **Storage** tab until the virtual machine is started.

---

You can configure the virtual machine's Extensible Firmware Interface (EFI) to boot the guest OS automatically when the virtual machine is started (powered on). Configure EFI when the virtual machine has been started and before booting the OS. You can interact with EFI through the virtual Management Processor (vMP) for the virtual machine. The vMP provides access to the console for the virtual machine. To interact with vMP, use the `hvvmconsole` command. For more information, see the *HP Integrity Virtual Machines Installation, Configuration, and Administration* manual.

If you are using VM Manager from HP SMH, click **OK** to finish. VM Manager displays the page from which you initiated the Create Virtual Machine wizard.

If you are using VM Manager from Insight Dynamics, click **Apply gWLM Policy**. To skip this step and add the new virtual machine to the SRD later, click **Apply Later** (you must click either button). When you click **Apply Later**, VM Manager displays the page from which you initiated the Create Virtual Machine wizard. When you are ready to add the virtual machine to the SRD, select the virtual machine from the appropriate screen (for example, from the **VM Host Virtual Machines** tab) and then select **Policy** → **Apply gWLM Policy ...** from the VM Manager menu bar. For more information, see the VM Manager **Policy Menu** help topic.



---

**NOTE:** After creating a virtual machine using VM Manager, if you return immediately to Virtualization Manager, the machine might not yet appear in Virtualization Manager. This means HP SIM/Insight Dynamics has not yet completed identifying the new virtual machine. However, it appears when the identification process completes (usually within a minute or two).

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## Modifying virtual machines

To modify a virtual machine, select one of the following items from the VM Manager **Modify** menu. For more information about any item, see the corresponding VM Manager help topic.



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**NOTE:** You cannot modify a virtual machine that is currently migrating online. You must wait until migration completes. You cannot modify a virtual machine that has migrated to another VM Host (the target): the virtual machine (on the source VM Host) is in the Not Runnable state.

---

- **Virtual Machine vCPU Entitlement** to modify the processor entitlement of a selected virtual machine. If supported by the version of Integrity VM running on the VM Host, you can modify the entitlement cap. An entitlement cap is the maximum amount of computing power allotted to a virtual machine for each vCPU.



---

**NOTE:** If the virtual machine is being managed by gWLM, you cannot modify the vCPU entitlement. When you access the **Virtual Machine vCPU Entitlement** page, the following error message is displayed, where *virtual-machine-name* is the name of the virtual machine:

The processor entitlement for VM *virtual-machine-name* cannot be modified because it is being managed by gWLM. To adjust the processor entitlement for this VM, use gWLM to change the policy associated with this VM.

To create or modify the gWLM policy for this virtual machine, use the **Policy** menu (available when using VM Manager with Insight Dynamics - VSE for Integrity).

---

- **Virtual Machine Memory** to modify the amount of memory for a selected virtual machine. If the VM Host has Integrity VM 3.0 or later installed and the OS type for the VM supports dynamic memory, the dynamic memory parameters are shown, and you can modify them. Changes to memory take effect when the virtual machine is restarted.
- 



**NOTE:** An up-to-date version of the WBEM Utilization Provider (UP) must be installed on the virtual machine to enable HP Insight Capacity Advisor software and the memory utilization meters in VM Manager and Integrity VM to reflect the dynamic change in memory. For information about verifying and installing software on virtual machines, see “System and software requirements” (page 13) and the HP Integrity Virtual Machines documentation.

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- **Virtual Machine vCPU Count** to modify the number of virtual CPUs for a selected virtual machine. If supported by the version of Integrity VM running on the VM Host, you can modify the minimum and maximum number of vCPUs to be allotted to the virtual machine. Changes take effect when the virtual machine is restarted.
- **Virtual Machine VLAN Settings** to modify the VLAN associated with the virtual machine.
- **Virtual Machine Hardware Auto Start** to specify whether the virtual machine should start automatically when Integrity VM is started or whether the virtual machine will be started manually.
- **WBEM Credentials** to set and change WBEM credentials for virtual machines.
- **Add Storage Devices to Virtual Machine** to add storage devices for virtual machines.



---

**NOTE:** The list of possible backing devices for the storage device you want to add can include file and directory backing devices that have not been associated with a particular virtual machine, or that were associated with virtual machines that have been removed or from which the associated virtual devices have been removed.

You can create a file as a backing storage device for a virtual disk. You can add DVD burners, tape devices, and changers if they are emulated SCSI adapters; they are added as attached devices. You cannot use VM Manager to add an attached AVIO device; to add such a device to a virtual machine, use the `hpvmdevmgmt` command at the Integrity Virtual Machines host. For more information, see the **Modify→Add Storage Device to Virtual Machine...** help topic.

**NOTE:** If you use VM Manager to manage a VM Host running Integrity VM Version 3.5 or earlier, VM Manager does not fully support virtual device special files located in `/hpa` (introduced in HP StorageWorks Secure Path software Version 3.0F SP2) as backing devices for virtual storage. When you use VM Manager to add a storage device on a virtual machine, VM Manager does not display device files in `/hpa` as possible backing devices to choose from. If a virtual storage device using an `/hpa` device special file already exists on a virtual machine managed by VM Manager, VM Manager displays it on the **VM Host Storage** and **VM Properties Storage** tabs as an unknown device (using the question mark icon, ). VM Manager displays the correct device special file name (for example, `/hpa/rdisk/hpa1`) but the box representing this device is not connected to the boxes that represent the physical storage devices associated with that virtual device special file. In general, VM Manager correctly displays only those device special files located in `/dev`.

To add a virtual storage device that uses a virtual device special file in `/hpa` to an existing virtual machine on a VM Host running Integrity VM Version 3.5 or earlier, use the Integrity VM `hpvmmodify` command. For more information about these commands, see the *HP Integrity Virtual Machines Installation, Configuration, and Administration* manual.

- 
- **Add Network Device to Virtual Machine** to add network devices and vswitches for virtual machines.



---

**NOTE:** Any network or storage devices that you add are not functional on the virtual machine until the virtual machine is started or restarted. When you add an I/O device to a started virtual machine, it might not appear on the **Network** or **Storage** tab until the virtual machine is stopped or restarted. If you add an I/O device to a stopped virtual machine, the tab displays the device immediately.

**NOTE:** If the virtual machine being modified is an HP Serviceguard package, you must make the same modifications to the virtual machine on the other VM Hosts in the cluster.

---

## Starting virtual machines

Starting a virtual machine starts the virtual hardware for the virtual machine. The virtual machine enters an On state (powered on).

The Start and Restart functions are similar except the Start function does not stop and restart a virtual machine that is already started (it leaves the started machine as is), while the Restart function does. Use Restart instead of Start when you have several virtual machines that you want newly started, some which are already started and some currently stopped. The Restart function takes care of all the virtual machines (in contrast, the Start function does not restart the already started machines). If you do not want the already started machines stopped and restarted (you just want the stopped machines started), use the Start function instead. For information about restarting virtual machines, see “Restarting virtual machines” (page 98).

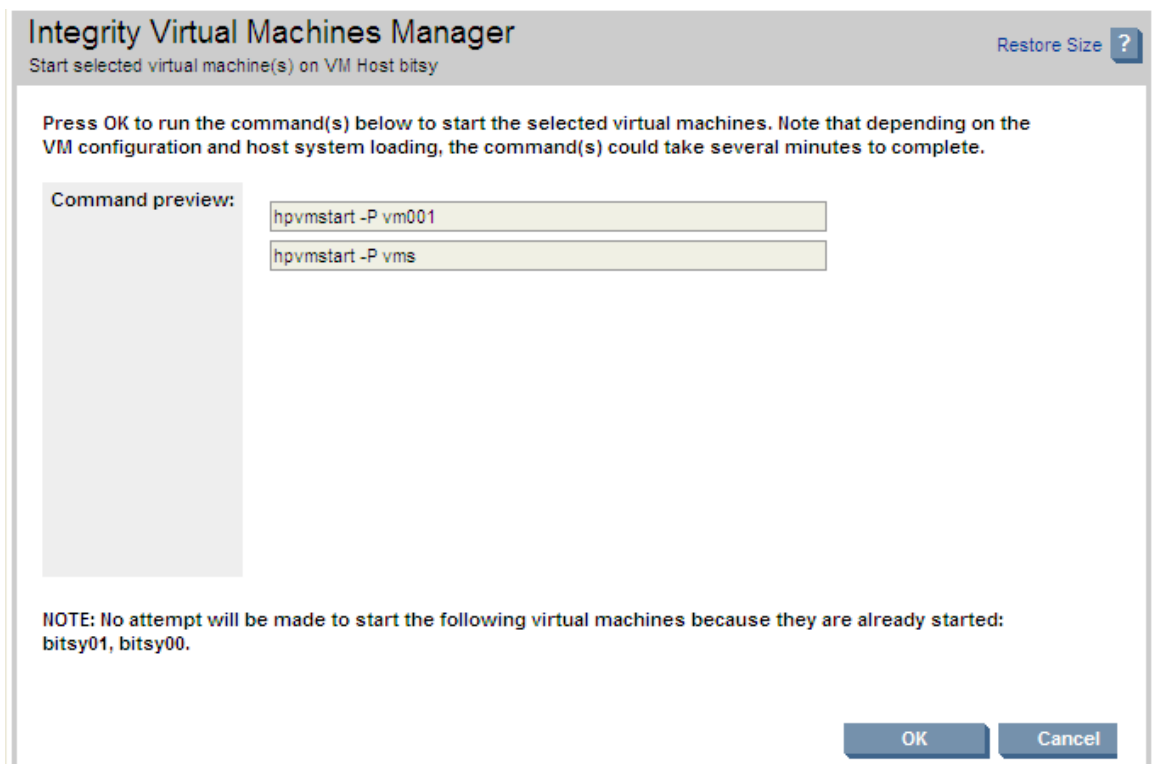


**NOTE:** You cannot start a virtual machine that is currently migrating online. You must wait until migration completes. If the selected virtual machine has migrated to another VM Host (the target), the virtual machine (on the source VM Host) is in the Not Runnable state: you cannot start a virtual machine in this state.

To start one or more selected virtual machines, perform the following steps.

1. From the **VM Host General** tab, select the **VM Host Virtual Machines** tab (or any tab that allows you to select one or more virtual machines).
2. Select one or more virtual machines to start by clicking the appropriate check boxes.  
Alternatively, you can access the VM Properties view, in which case no selection is necessary; the virtual machine being viewed is implicitly selected.
3. Select **Tools**→**Start Virtual Machine...** from the VM Manager menu bar. A page similar to that shown in Figure 6-1 is displayed.

**Figure 6-1 Start Virtual Machine page**



4. In the example shown in Figure 6-1, two virtual machines will be started. A note near the bottom of the screen indicates that two of the selected virtual machines are already started. The **Command Preview** area shows the commands that Integrity VM will perform to start the virtual machine.

Click **OK** to start the virtual machine.

When a virtual machine is started, it is in the On state (powered on). You can then perform the functions you want.



---

**NOTE:** Depending on the settings in the virtual machine's Extensible Firmware Interface (EFI), starting a virtual machine might not boot the operating system. For more information, see “Creating virtual machines” (page 87).

---

Once a virtual machine is started, the resources assigned to the virtual machine are allocated for its use. The VM Host ensures that the resources required by the virtual machine are available in the current VM Host system environment. If the virtual machine cannot be started, VM Manager displays messages indicating which resources cannot currently be provided.

For information about possible reasons that a virtual machine might not start, see “Troubleshooting virtual machine problems” (page 126).

## Stopping virtual machines

To stop one or more virtual machines, perform the following steps. This action allows you to stop the virtual hardware for a virtual machine. When stopped, a virtual machine enters an Off state (powered off) and the virtual machine is halted. Once a virtual machine is stopped, the resources assigned to it no longer are allocated and are now available for use by other virtual machines.



---

**NOTE:** If the OS is running on a virtual machine that you want stopped, HP recommends that you shut down the OS before stopping the virtual machine. This ensures that all applications are shut down cleanly.

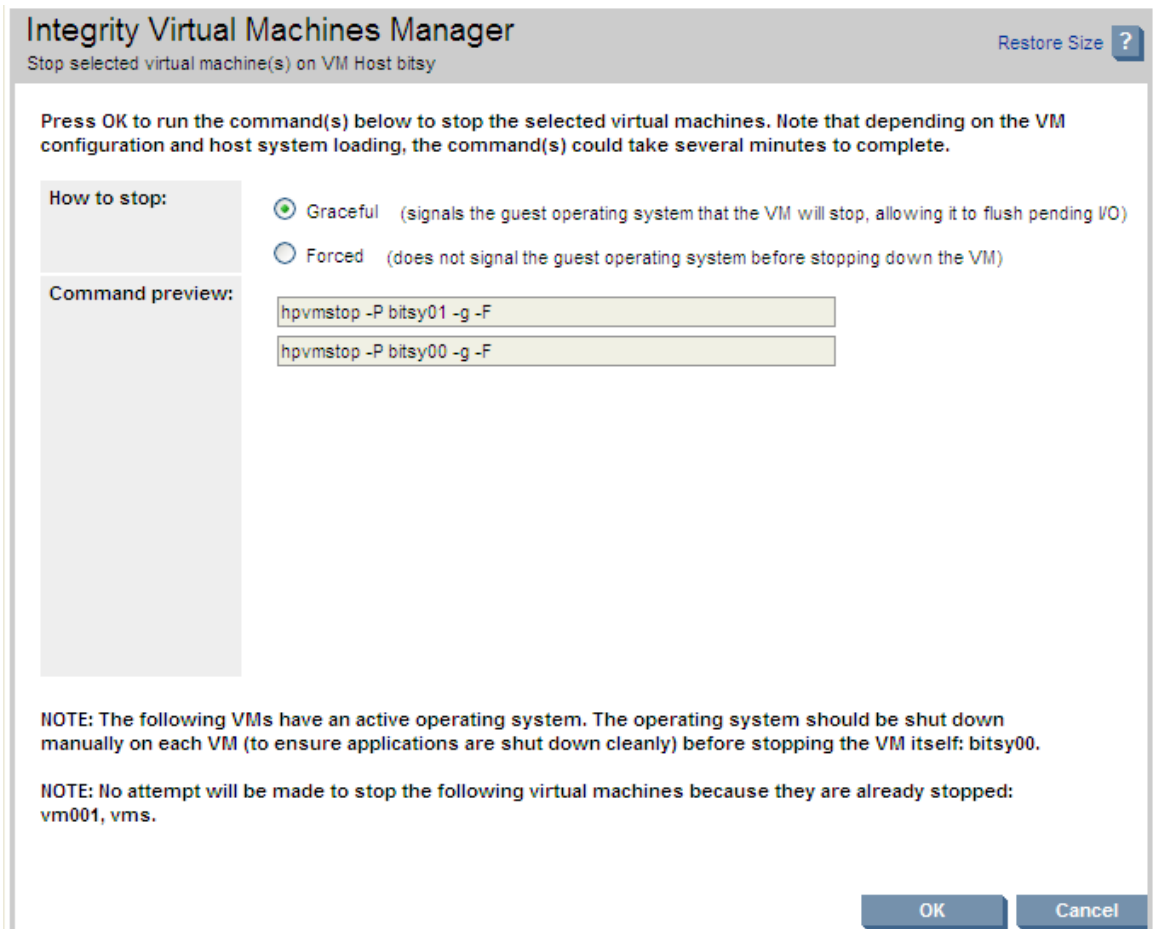
You cannot stop a virtual machine that is currently migrating online. You must wait until migration completes. If the selected virtual machine has migrated to another VM Host (the target), the virtual machine (on the source VM Host) is in the Not Runnable state: attempts to stop the virtual machine will fail.

---

1. From the VM Host view, select the **VM Host Virtual Machines** tab (or any tab that allows you to select one or more virtual machines).
2. Select one or more virtual machines to stop by clicking the appropriate check boxes.  
Alternatively, you can access the VM Properties view, in which case no selection is necessary; the virtual machine being viewed is implicitly selected.
3. Select **Tools**→**Stop Virtual Machine...** from the VM Manager menu bar. This displays a page similar to that shown in Figure 6-2.



**Figure 6-2 Stop Virtual Machine page**



4. In the screen example shown in Figure 6-2, two of the selected virtual machines are going to be stopped (bitsy00 and bitsy01), while two are already stopped (vm001 and vms). The screen reports that the OS is running on one of the virtual machines and advises you to shut down the OS on that machine before stopping it.

The **How to Stop** options allow you to control how a virtual machine is stopped:

- **Graceful.** This is the default. With a graceful stop, the virtual machine notifies the guest OS of an impending shutdown. This advance notice gives the OS an opportunity to perform cleanup operations before its virtual machine is powered off. A graceful stop typically takes 30 to 60 seconds, but can take as long as 5 minutes because Integrity VM waits for the OS to complete its cleanup operations.
- **Forced.** A forced stop is the equivalent of a power failure and gives no warning to the guest OS. Because the guest OS receives no advance notice of the power off operation, the OS has no opportunity to perform a crash dump or perform any system cleanup tasks.

If you want to set a forced stop for the machines, click the Forced option; otherwise, skip to the next step.

5. The **Command Preview** area shows the commands that Integrity VM will perform to stop the virtual machines.

Click **OK** to perform the action.

## Restarting virtual machines

When you choose to restart one or more virtual machines, VM Manager stops a virtual machine that is already started, and then restarts it; if a machine is stopped, VM Manager starts it. Once a virtual machine starts, the resources assigned to the virtual machine are allocated for its use.

The Restart and Start functions are similar except the Restart function first stops a virtual machine that is already started, while the Start function does not (it leaves the started virtual machine as is). Use Restart instead of Start when you have several virtual machines that you want newly started, some which are already started and some currently stopped. The Restart function takes care of all the virtual machines (in contrast, the Start function does not restart the already started machines). However, if you do not want the already started machines stopped (you just want the stopped machines started), use the Start function instead. For information about the start function, see “Starting virtual machines” (page 94).



---

**NOTE:** If the OS is running on a virtual machine that you want stopped, HP recommends that you shut down the OS before stopping the virtual machine. This ensures that all applications are shut down cleanly.

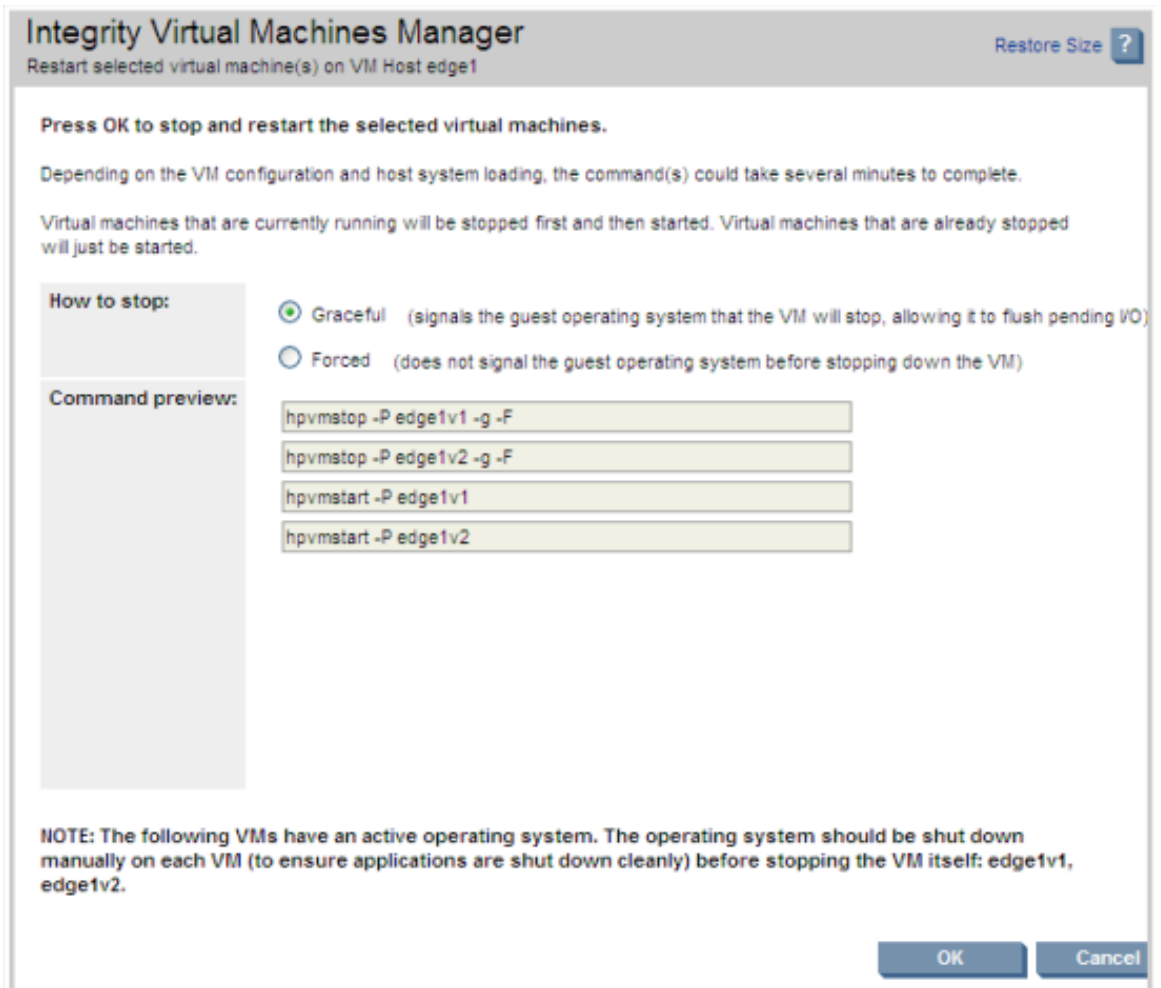
You cannot start a virtual machine that is currently migrating online. You must wait until migration completes. If the selected virtual machine has migrated to another VM Host (the target), the virtual machine (on the source VM Host) is in the Not Runnable state: you cannot start a virtual machine in this state.

---

To restart one or more virtual machines, perform the following steps:

1. From the **VM Host General** tab, select the **VM Host Virtual Machines** tab (or any tab that allows you to select one or more virtual machines).
2. Select the virtual machines to restart by clicking the appropriate check boxes.  
Alternatively, you can access the VM Properties view, in which case no selection is necessary; the virtual machine being viewed is implicitly selected.
3. Select **Tools**→**Restart Virtual Machine...** from the VM Manager menu bar. This displays a page similar to that shown in Figure 6-3.

**Figure 6-3 Restart Virtual Machine page**



4. In the screen example shown in Figure 6-3, two virtual machines will be stopped (gracefully) and restarted. A message indicates that these machines have an active operating system that should be shut down prior to stopping the virtual machine. The **How to Stop** options allow you to control whether the virtual machines are stopped gracefully (the default) or forcefully. For a description of each stop option, see “Stopping virtual machines” (page 96).

If you want to set a forced stop for the machines, click the Forced option; otherwise, skip to the next step. If all machines are already stopped, skip to the next step (the **How to Stop** options are irrelevant).

As noted, if the OS is running on a virtual machine that is already started, shut down the OS before initiating the restart in the next step.

5. The **Command Preview** area shows the commands that Integrity VM will perform to restart the virtual machines.

Click **OK** to perform the action.

For information about possible reasons that a virtual machine might not start, see “Troubleshooting virtual machine problems” (page 126).

## Deleting virtual machines

To delete a virtual machine, select **Delete**→**Virtual Machine...** from the VM Manager menu bar. The **Virtual Machine...** menu option is enabled in the VM Properties view or when one or more virtual machines are selected in any of the tabs that list virtual machines, such as in the **VM Host**

**Virtual Machines** tab. From tabs that list and allow selection of multiple virtual machines, you can simultaneously delete multiple virtual machines that are selected.



**NOTE:** Before deleting a virtual machine, you must first stop the virtual machine (put it in the *Off* state). For instructions, see the section “Stopping virtual machines” (page 96).

Deleting a virtual machine removes the configuration definition for a virtual machine and frees any resources assigned to the virtual machine, making the resources available to be assigned to other virtual machines. Deleting a virtual machine does not delete files and data residing on the virtual storage or backing storage that was assigned to the virtual machine.

By default, vswitch VLAN port assignments are removed when the virtual machine is deleted. If any of the ports are connected to other virtual machines that are not being removed, those port assignments are not removed. Clearing the **Remove VLAN Assignment** check box causes vswitch VLAN port assignments to remain after the virtual machine is deleted.



**NOTE:** You cannot delete a virtual machine that is currently migrating online. You must wait until migration completes.

**NOTE:** Using VM Manager with Insight Dynamics - VSE for Integrity, if you create a virtual machine and then delete it before the new virtual machine has been identified by HP SIM, the virtual machine might appear in Virtualization Manager as though it had not been deleted. The appearance of the virtual machine in Virtualization Manager depends on when the deletion occurred during the HP SIM identification process. In addition, if you decide to delete the virtual machine soon after creating it, wait a few minutes before doing so. If the deleted virtual machine does appear in Virtualization Manager, delete it from the HP SIM All System view. (From the HP SIM **Systems and Event Collections** list in the navigation area on the left, select **All Systems**.) For more information, see the *HP Insight Virtualization Manager 6.2 Software with Logical Server Management User Guide*.

This is not an issue when using VM Manager from HP SMH.

## Migrating virtual machines

### Overview

This topic presents an overview of virtual machine migration and of the Migrate Virtual Machine wizard that allows you to set up and initiate migration of virtual machines from your VM Manager's VM Host (the migration source) to another VM Host (the migration target).

The wizard allows you to perform either online or offline migration:

- Online migration migrates a virtual machine that is running, moving the guest OS and applications without disrupting service. All guest I/O connections to network and storage devices remain active throughout the migration, and the guest OS and its applications continue operating without requiring a reboot or application restart.
- Offline migration migrates the configuration of a virtual machine that is not running.

Some of the most common reasons for migrating virtual machines online include the need to:

- Vacate the source VM Host system for maintenance purposes without disrupting services
- Perform a rolling upgrade of a VM Host, moving its running guests to another VM Host, upgrading the VM Host, then moving the guests back
- Populate a new VM Host with one or more virtual machines already configured and tested on the source
- Move virtual machines to take advantage of a particular resource or feature on the target VM Host, without losing application availability

- Balance VM Host workloads
- Optimize physical resource utilization

Online migration of virtual machines enables a higher level of workload-to-resource alignment, flexibility, and agility.

Reasons for migrating a virtual machine offline include the need to:

- Move a stopped virtual machine's configuration information
- Save VM Host resources while migrating virtual machines (for example, memory and CPUs are not consumed during offline migration)
- Copy local storage, logical volumes, or file-backed storage to the target VM Host (such storage cannot be migrated online)
- Migrate a virtual machine between VM Hosts that might have different processor types, making online migration impossible

The Migrate Virtual Machine wizard is started by selecting **Tools**→**Migrate Virtual Machine...** from the VM Manager menu bar. The menu item is enabled from the VM Properties view, from which you can migrate the one viewed virtual machine, or from a tab on which one or more virtual machines are selected, such as the **VM Host Virtual Machines** tab, from which you can migrate multiple virtual machines at the same time. For more information about starting the wizard, see “Starting the Migrate Virtual Machine wizard” (page 103).

The Migrate Virtual Machine wizard guides you through a two-step procedure. The screen for the first step prompts you to specify the target VM Host. The screen for the second step allows you to preview the HP Integrity Virtual Machine commands that will be invoked to initiate the migration and allows you to initiate the migration.

Using the Migrate Virtual Machine wizard, you can migrate virtual machines from the VM Host you are currently using with VM Manager to another VM Host; you cannot use the wizard to migrate virtual machines from another VM Host to the current VM Manager VM Host.

While a virtual machine is being migrated to another VM Host, you cannot stop, start, restart, modify, or delete that virtual machine. You can continue using VM Manager for other purposes.



**NOTE:** If the virtual machine is configured as a Serviceguard package, the wizard allows you to migrate the virtual machine online or offline. However, you cannot migrate a virtual machine that is configured as a Serviceguard cluster node.

When migrating a virtual machine that is configured as a Serviceguard package, Serviceguard protection is suspended temporarily during the migration.

Capacity Advisor cannot collect utilization information for a virtual machine that is being migrated.

For more information about Serviceguard and Capacity Advisor requirements and recommendations pertaining to virtual machine migration, see “Planning requirements and recommendations” (page 101).

---

## Planning requirements and recommendations

Successful migration of a virtual machine requires that the source and target hosts be configured appropriately. If they are configured properly before migration of a virtual machine, the migration task completes more quickly. Configuration requirements for online migration are more elaborate than for offline migration.

Some of the basic migration requirements include the following; for complete details, see the *HP Integrity Virtual Machines Installation, Configuration, and Administration* manual:

- For online migration, the source and target hosts must be running HP Integrity VM Version 4.1 or later.
- The source and target hosts must conform to the operating system requirements, and both must be able to provide the allocated resources to the virtual machine being migrated.
- The target host must be accessible from the source host.
- Resources used by the virtual machine must be configured symmetrically on both the source and target host.
- You can migrate guests that use both the virtual I/O (VIO) and the accelerated virtual I/O (AVIO) drivers for storage and network. Only whole disk SAN storage and ejected file-backed DVDs can be migrated while the virtual machine is online. File and logical volume backing storage are not supported for online migration of virtual machines.
- Online migration requires that both the source and target VM Host be licensed and enabled for such migration. The licensing is included with a bundle that must be installed on each VM Host; for more information, see the *HP Integrity Virtual Machines Installation, Configuration, and Administration* manual.
- Online virtual machine migration requires that the virtual machine be enabled for online migration (the VM Host administrator can enable a virtual machine by using the `hpvmmodify -x online_migration=enabled` command).

## Serviceguard requirements and recommendations


For online migration of a virtual machine configured as a Serviceguard package, package switching for the migrating virtual machine guest package is disabled before migration begins and then re-enabled immediately after the migration finishes. Therefore, the virtual machine software is not protected by Serviceguard during the migration process. If a failure occurs during migration, you must manually re-enable package failover after the migration completes and restart the virtual machine by running it on one of the Serviceguard cluster nodes.

If temporary loss of failover protection is not tolerable, disable online migration for the virtual machine. For example, to disable the virtual machine named `sgnode`, run the `hpvmmodify` command on the VM Host as follows:

```
hpvmmodify -P sgnode -x online_migration=disabled
```

Do not attempt online migration of a virtual machine configured as a Serviceguard cluster node. If a Serviceguard node is migrated while online, it might lose connection to other cluster members and be automatically removed from the cluster. Disable online migration for all virtual machines configured as Serviceguard cluster nodes.



**NOTE:** VM Manager detects whether a virtual machine is configured as a Serviceguard package; the **VM Host Virtual Machines** and **VM Properties General tab** tabs display the package icon () next to the virtual machine name.

---

For more information about managing virtual machines with Serviceguard support, see the *HP Integrity Virtual Machines Installation, Configuration, and Administration* manual.


## Capacity Advisor requirements and recommendations

If Capacity Advisor is used on the virtual machine, collect utilization information before you migrate the virtual machine. The Capacity Advisor cannot continue to collect utilization information for the virtual machine during the migration.



## Migration status and error notification

The migration status of a virtual machine — including the direction of migration, percentage completion per phase (for online migration only), and error messages — is displayed on the **VM Properties General** tab. The **VM Host Virtual Machines** tab also indicates migration status (use this tab to monitor the migration of multiple virtual machines). For more information, see “**VM Properties General** tab” (page 59) and “**VM Host Virtual Machines** tab” (page 36).

If errors occur during an attempt to migrate a virtual machine online, the **VM Host Virtual Machines** tab (for the source VM Host) displays the Migration Error icon () next to the name of the affected virtual machine. Information about the migration-related errors is on the **VM Properties General** tab. For more information about status icons, see “Status indicators” (page 124).

Various conditions can cause an online migration to abort: insufficient resources on the target host, busy source or target hosts, a slow private network connection, an excessively busy guest (virtual machine operating system and applications), and so on. When a migration aborts, the guest continues to run, unaffected, on the source VM Host. Therefore, these are not serious errors. You can attempt the online migration again when the blocking conditions improve.

After a virtual machine successfully migrates to another VM Host, it is placed in the Not Runnable state on the source VM Host. A virtual machine in this state cannot be modified or started. If you never intend to migrate the virtual machine back to the source VM Host, you can remove the virtual machine configuration by using the VM Manager **Delete**→**Virtual Machine...** menu item.

The state of the virtual machine is displayed by the HW column on the **VM Host Virtual Machines** tab. The Not Runnable state is indicated by the following status icon: . The **VM Properties General** tab also displays the state of the virtual machine (in the Virtual Hardware Status field).

## Adjusting online migration phase timeout values

To protect the guest's workload, the online migration software limits the amount of time spent in each phase of the migration. If necessary, the VM Host administrator can carefully adjust migration time outs for each phase by using the `hpvmmodify -x` command, as documented in the *HP Integrity Virtual Machines Installation, Configuration, and Administration* manual.

## Starting the Migrate Virtual Machine wizard

To migrate one or more virtual machines, follow these steps:

1. If you want to migrate a single virtual machine, access any VM Properties view, and skip to the next step.

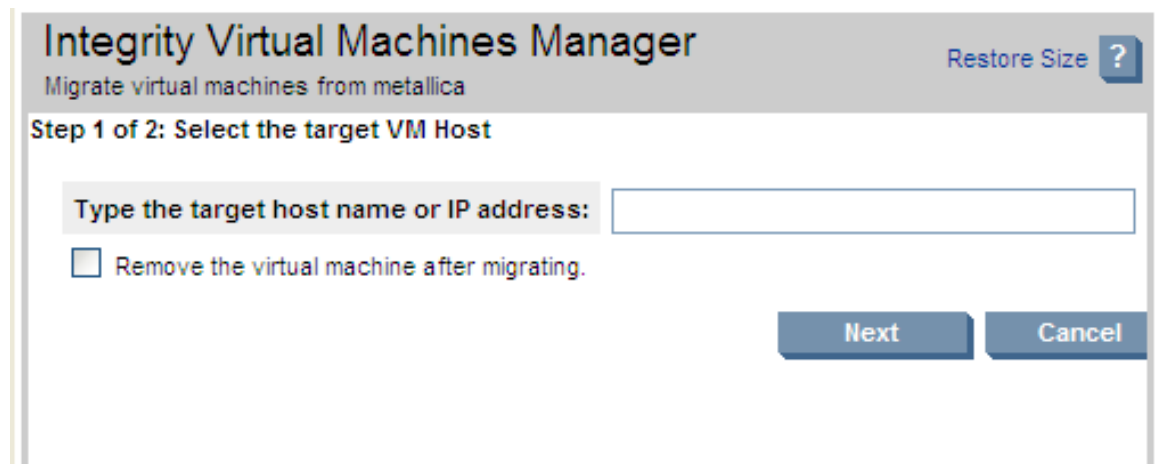
If you want to migrate several virtual machines, access the **VM Host Virtual Machines** tab or any tab that allows you to select multiple virtual machines. Then select the virtual machines to migrate by clicking the appropriate check boxes.

2. To start the Migrate Virtual Machine wizard, select **Tools**→**Migrate Virtual Machine...** from the VM Manager menu bar. This displays the first of two Migrate Virtual Machine wizard screens, the Step 1 screen as shown in Figure 6-4.



**NOTE:** The **Tools**→**Migrate Virtual Machine...** option is enabled from any VM Properties view or from any tab on which one or more virtual machines are selected.

**Figure 6-4 Migrate Virtual Machine: Step 1 of 2**



3. Specify the target VM Host name, alias, or IP address. The target must be a valid VM Host and must be accessible by the source VM Host. If you intend to migrate a virtual machine online, this VM Host must be licensed and enabled for online migration.
4. If you want the virtual machine configuration removed from your source VM Host after the migration completes, select the check box provided for that purpose. Make this selection if you never intend to migrate the virtual machine back to this host. If you might migrate the virtual machine back to this host sometime, or if you might want to create a virtual machine on this host that is based on the configuration of the virtual machine that you migrated to another host, do not check the box.
5. To continue to the Step 2 screen of the Migrate Virtual Machine wizard, click **Next**. To cancel and return to the VM Manager screen from which you initiated the wizard, click **Cancel**. Figure 6-5 shows an example of the Step 2 screen.

This screen lists the commands that VM Manager will issue to start the migration. The first command will migrate a running virtual machine, so it is listed as an online migration. The second command will migrate a virtual machine that is not running and so is listed as an offline migration. If any virtual machines cannot be migrated, the screen lists the virtual machine names and the reasons why they cannot be migrated. Reasons that a virtual machine cannot be migrated include:

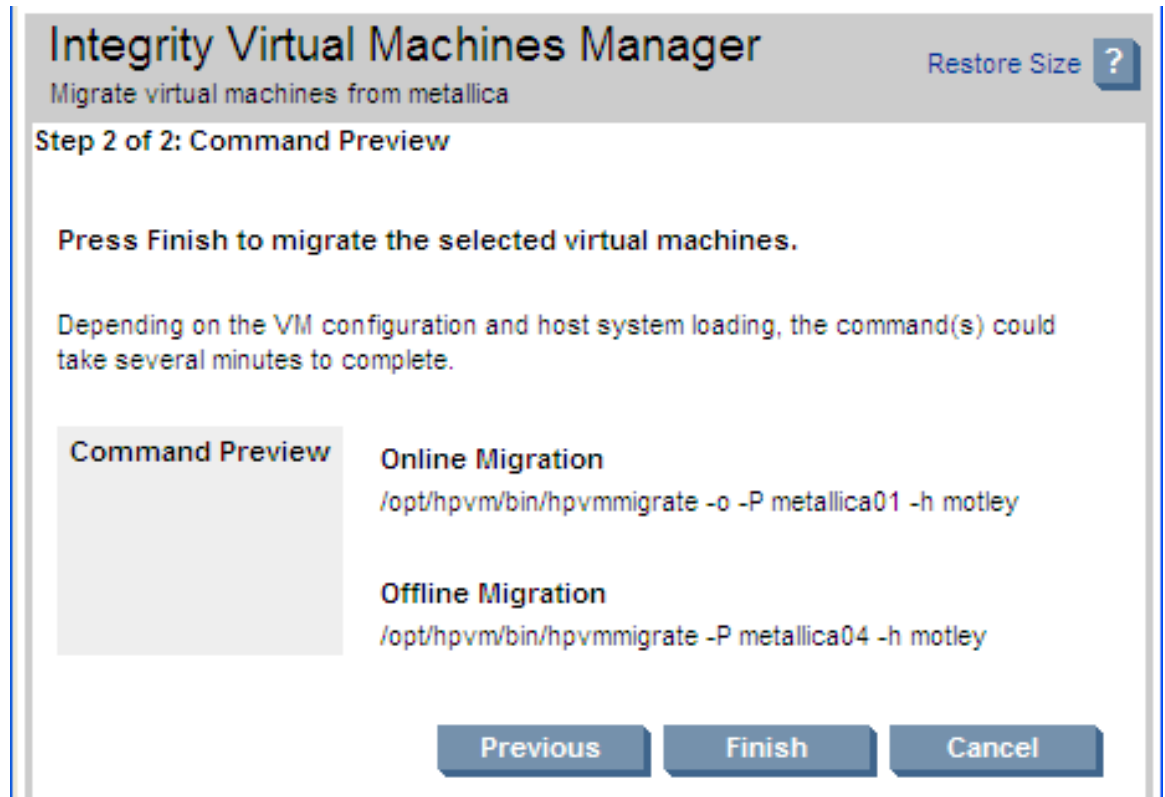
- It is already migrating
- Online migration only — It is not enabled for online migration
- It is in a Not Runnable state
- Online migration only — The source or target VM Host is not licensed and enabled for online migration
- Serviceguard packages only — The package is already running on the target VM Host





**NOTE:** If the source or target VM Host is not enabled and licensed for online migration, or the virtual machine is not enabled for online migration, you can migrate the virtual machine offline. Stop the virtual machine and then retry migrating it.

**Figure 6-5 Migrate Virtual Machine: Step 2 of 2**



6. Inspect the commands. If they suit your needs and you want to go ahead with the migration, click **Finish**. If you want to tailor the commands to be used for migrating the selected virtual machines, you can enter the desired commands manually on the VM Host. If you want to start over — perhaps to specify a different target host or to change your selection regarding whether to remove the virtual machine configuration after it is migrated to the other host — click **Previous** to return to the Step 1 screen of the wizard.

If you do not want to perform the migration, click **Cancel**. When you click **Cancel** or **Finish**, VM Manager returns you to the screen from which you initiated the Migrate Virtual Machine wizard.

While a virtual machine is being migrated to another VM Host, you cannot stop, start, restart, modify, or delete that virtual machine. You can continue using VM Manager for other purposes. While the current migration is in progress, if you start the Migrate Virtual Machine wizard again to migrate another virtual machine, VM Manager queues the newly-selected migration until after the current migration completes.

To determine the status of the migration, use the **VM Host Virtual Machines** tab (especially if multiple virtual machines are being migrated) or the **VM Properties General** tab.

## Creating virtual switches

To provide network access for virtual machines, you must create virtual network switches (vswitches) for them. This section describes how to create a new vswitch on the VM Host. The vswitch is used by a virtual machine to connect to the network: one or more virtual machines connect to the vswitch and the vswitch is connected to a VM Host's physical network device.

To create a vswitch, select **Create**→**Virtual Switch** from the VM Manager menu. This displays a page similar to that shown in Figure 6-6.

**Figure 6-6 Create Virtual Switch page**

**Integrity Virtual Machines Manager** Restore Size ?

Create Virtual Network Switch on VM Host bitsy

[Refresh Data](#)

Virtual Switch name: \*

Virtual Switch type:  ▼

Connect virtual switch to a physical network device (LAN Interface or APA):

|                                  | LAN Interface | Used By  | Hardware Path                                | Supports AVIO |
|----------------------------------|---------------|----------|--|---------------|
| <input checked="" type="radio"/> | (none)        | (unused) | Select this to create a local virtual switch | No            |
| <input type="radio"/>            | lan0          | swlan0   | 0/1/2/0                                      | Yes           |
| <input type="radio"/>            | lan1          | (unused) | 0/1/2/1                                      | Yes           |

Start Virtual Switch after creating

\* required field

Command Preview:

The table on the screen shown in Figure 6-6 displays the following information:

- LAN interface: Shows the physical LAN interface to which a vswitch can be attached. The “(none)” entry indicates that the vswitch is local, meaning that it not connected to a LAN interface. Communication over such a vswitch does not go out on the physical network and is useful only for communicating between virtual machines.
- Used by: Shows all of the vswitches already configured to use the corresponding LAN interface. A LAN interface can be used by only one vswitch at a time. You can configure multiple vswitches that use the same LAN card, but only one of these switches can be active at one time. In the row for creating a local vswitch [“(none)” entry], the Used by column lists all existing local vswitches. All local vswitches can be active simultaneously. A new local vswitch can be started regardless of the number of existing active local vswitches.

- Hardware path: Shows the hardware path associated with the LAN interface.
- Supports AVIO: Shows whether the physical backing device supports Accelerated Virtual Input/Output (AVIO). For each virtual machine containing an AVIO device, the VM Host OS and the guest OS must support AVIO. In addition, HP strongly recommends that AVIO components (such as drivers and libraries) on the virtual machine and VM Host be updated to the latest release of the OS. If the virtual machine OS is Windows or Linux, install additional AVIO-compatible drivers on the VM Host and virtual machine.

For HP-UX, HP recommends that you install the latest AVIO components for both the VM Host and the guest; however, updating both guest and host components at the same time is not mandatory. Updating both components ensures that you always receive the latest bug fixes for a complete solution. Always check the following software depot website for the latest version of AVIO software (search for "HPVM AVIO"):

<http://software.hp.com>

Guest AVIO drivers are included in the VMGuestSW bundle available from the software depot website. Make sure you install the latest version of that bundle.

With HP Integrity VM, AVIO requires a vswitch that has a physical network device as the backing device (local vswitches such as localnet are not supported). In addition, the physical NIC that backs the virtual switch must have an AVIO-compatible driver.

For more information about AVIO requirements, see the HP Integrity Virtual Machines documentation.

Create the virtual switch by performing the following steps:

1. (Required) Enter a virtual switch name.
  - The name must be 8 characters or fewer.
  - The allowable characters are A-Z, a-z, 0-9, dash (-), underscore (\_), and period (.).
  - The name cannot begin with a dash and cannot remain blank.
2. Specify the virtual switch type (whether it is to be dedicated or shareable). The default is shareable.



**NOTE:** The terms "shareable" and "dedicated" refer to how the switch is assigned to the virtual machines.

- A dedicated vswitch can be used by only one started virtual machine at a time and is dedicated to providing network throughput to that virtual machine. More than one virtual machine can have the same dedicated switch as a resource, but only one is allowed to start.
- A shareable vswitch can be used at any given time by all the associated virtual machines that contain the virtual network device (NIC) backed by a shareable vswitch.



**NOTE:** All virtual machines with virtual NICs backed by a shareable vswitch are not required to be running. If you have a stopped virtual machine that uses the shareable vswitch, you can always start the virtual machine (unless other problems prevent it from starting).

3. (Required) From the table, select the VM Host's physical network device that will be the physical backing of the vswitch.

Choices include the following:

- Any physical network cards (adapters) configured on the VM Host
- Any APA (Automatic Port Aggregation) configured on the VM Host

The display shows the APA name in one column and the individual devices or cards in the next column; however, the letters "APA" do not appear in either column. In

HP-UX, any LAN port with port number 900 or greater is an APA (for example, lan900 or lan901).

- None

This creates a local vswitch. When no physical network device on the VM Host is chosen, the vswitch is a local vswitch. A local vswitch has no connection with any physical network device on the VM Host. Virtual machine virtual network interface cards (vNICs) can communicate only with other virtual machines on the same VM Host that are connected to the same local vswitch.

4. Specify whether or not to start the vswitch after it is created. The default is to start the vswitch.

Clicking **OK** does the following:

- Creates the new vswitch, using the `hpvmnet` command.
- If you chose to make the vswitch dedicated, configures the vswitch as a dedicated vswitch, using the `hpvmdevmgt` command.
- If you chose to have the switch started, starts the vswitch, using the `hpvmnet` command.

A preview of these commands is shown in the Command Preview area. After you click **OK**, any errors that occur with the execution of these commands is displayed on a separate error page that lists each command and whether the command succeeded, failed, or was not attempted. Clicking **OK** on the error page returns you to the Create Vswitch page.

## Starting, stopping, and deleting virtual switches

To start or stop a virtual switch, select **Tools**→**Start Virtual Switch...** or **Tools**→**Stop Virtual Switch...** from the VM Manager menu bar. To delete a virtual switch, select **Delete**→**Virtual Switch...**. Access these menu options from a view that allows you to select one or more virtual switches, such as the **VM Host Virtual Switches** tab. In this way, you can act on several multiple switches simultaneously, if selected. (You can also access the menu options from the Vswitch Properties view, in which case the action is performed on a single virtual switch: the one being viewed.)

To start a vswitch, select **Tools**→**Start Virtual Switch...** Once a vswitch is started, the virtual machines that are connected to it can use it for network connectivity. Before you start a vswitch, it must be stopped.

To stop a vswitch, select **Tools**→**Stop Virtual Switch...** The selected vswitch must currently be started. Once a vswitch is stopped, the virtual machines connected to it can no longer use it for network connectivity.

To remove all configuration information for a vswitch, select **Delete**→**Virtual Switch...** Before you remove a vswitch, you must first stop it.



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**NOTE:** For information about creating and managing vswitches, see the *HP Integrity Virtual Machines Installation, Configuration, and Administration* manual.

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## Deleting network or storage Devices

To delete a network or storage device from a virtual machine, select one or more I/O devices from a **Network** or **Storage** tab, and then select **Delete**→**I/O Device...** from the VM Manager menu bar. You can select I/O devices from any of the following tabs: **VM Host Storage**, **VM Properties Storage**, **VM Host Network**, **VM Properties Network**, **Vswitch Properties Network**.

Selecting **Delete**→**I/O Device...** displays a page that allows you to remove the selected I/O devices.

When you delete a device from a virtual machine, it is disassociated from that virtual machine, allowing the device to be used by another virtual machine on the VM Host. Deleted devices

remain active on a virtual machine that is running; the devices are removed once you restart the virtual machine.

Storage devices that you can delete include virtual disks and DVDs as well as attached tapes, burners, and changers. Deleting a storage device does not affect data on that device (files or data are not removed from the device).



---

**NOTE:** You cannot remove a device that is currently being used by the guest OS or if I/O is outstanding.

If a virtual machine is running the Windows operating system, VM Manager indicates that it will not remove the virtual machine's devices. The operating system must be shut down first.

If a virtual machine is running HP-UX, devices selected for removal might not be removed until you restart the virtual machine. To confirm that the device has been removed from the virtual machine, view the appropriate **Network** or **Storage** tab.

**NOTE:** If the virtual machine is powered on, preliminary actions might be required to remove an AVIO storage device. If the virtual machine is powered off, no preliminary actions are required to remove the AVIO storage device (or any other selected storage device). To remove an AVIO storage device from a virtual machine that is powered on, note the following:

- If the virtual machine is powered on and running at EFI, to remove the device, first stop the virtual machine. To stop the virtual machine, use the VM Manager **Tools**→**Stop Virtual Machine...** menu option. Once the virtual machine has stopped, delete the device using the **Delete**→**I/O Device...** menu option.
- If the virtual machine is powered on and running HP-UX 11i v3, you must remove all instances of the device from the guest OS. To do so, follow these steps:

1. Obtain the device's hardware target path (*tgtpath* class) or lun path (*lunpath* class), using the `ioscan` command at the guest in either of the following ways:

```
ioscan -kfNC tgtpath
```

or

```
ioscan -kfNC lunpath
```

2. Remove the device by using the `rmsf` command at the guest, specifying the obtained hardware path:

```
rmsf -H tgtpath
```

or

```
rmsf -H lunpath
```

Once the device has been completely removed from the guest OS, then you can delete the storage device by using the VM Manager **Delete**→**I/O Device...** menu option.

**NOTE:** HP Integrity VM maintains a device database that includes entries for all devices and their associations. If deleting a device causes removal of the last association of that device with any other virtual machine on the VM Host, HP Integrity VM removes that device from its device database unless it is marked for preservation. To preserve an entry, use the Integrity VM `hpvmdevmgmt` command, specifying `PRESERVE=YES`; or, when creating a file as a backing device, specify the `-S` and `-A` attributes with that command.

When you use VM Manager to create a file as a backing device for a disk, the `PRESERVE` attribute is set as `PRESERVE=YES`.

---



# 7 Collecting and viewing utilization data

Certain VM Manager views include utilization meters (bar graphs) that display current utilization data for a resource. For example, the **VM Host Virtual Machines** tab includes several utilization meters for each virtual machine listed, as shown in Figure 7-1. Using VM Manager with Insight Dynamics - VSE for Integrity, you can click a meter to view a more detailed historical data report provided by HP Insight Capacity Advisor software. These meters are visible when using VM Manager with HP SMH, but you cannot click them to obtain a Capacity Advisor report.

**Figure 7-1 Utilization meters displayed by the VM Host Virtual Machines tab**

| VM Name (Hostname)                       | HW | OS | Operating System                | VM vCPU Utilization | Memory Utilization | Disk I/O | Network I/O | vCPU Count | vCPU Entitlement | VM Host CPU Utilization |
|--|----|----|---------------------------------|---------------------|--------------------|----------|-------------|------------|------------------|-------------------------|
| slim4vm1<br>(XXXXXXXXXXe.adapps.hp.com)  | ✓  | ✓  | HP-UX<br>HP-UX<br>B.11.31       | 100 %               | 95 % of 1GB        | 11 KB/s  | 8 kb/s      | 1          | 10%              | 12 %                    |
| slim4vm10<br>(XXXXXXXXXXe.adapps.hp.com) | ✓  | ✓  | HP-UX<br>HP-UX<br>B.11.23       | 2 %                 | 92 % of 1GB        | 21 KB/s  | 8 kb/s      | 1          | 10%              | 0 %                     |
| slim4vm11<br>(XXXXXXXXXXe.adapps.hp.com) | ✓  | ✓  | Linux 2.6.9-<br>55.EL           | 0 %                 | 60 % of 0.9GB      | 16 KB/s  | 8 kb/s      | 1          | 10%              | 0 %                     |
| slim4vm12<br>(XXXXXXXXXXe.adapps.hp.com) | ✓  | ✓  | Windows®<br>Windows<br>5.2.3790 | 11 %                | 80 % of 1GB        | 13 KB/s  | 8 kb/s      | 1          | 10%              | 1 %                     |
| slim4vm2                                 | ✓  | ✓  |                                 |                     |                    |          |             | 1          | 10%              |                         |

Using VM Manager with Insight Dynamics, you can cause Capacity Advisor to collect and display historical utilization data for a VM Host or selected virtual machines.

## Enabling collection of utilization data

Utilization meters display utilization data retrieved by the WBEM Utilization Provider. WBEM providers are included with Insight Dynamics - VSE for Integrity and must be installed on the VM Host and each virtual machine. For more information, see “System and software requirements” (page 13).

Using VM Manager through HP SMH, viewing utilization meter data specific to virtual machines requires certain WBEM credentials to be set. If such credentials are not set, the meters are dimmed. For more information, see “Setting WBEM credentials in HP SMH” (page 16). Meters for the VM Host and host resources are still available if the VM Host's WBEM Utilization Provider is running.

Using VM Manager with Insight Dynamics, you can enable collection of utilization data from systems licensed for HP Insight Capacity Advisor software. Select the **Tools**→**Collect Capacity Advisor Data** menu item from the VM Manager menu bar. This menu item is not available when using VM Manager through HP SMH.

Data is collected by WBEM Utilization Provider software on the licensed systems and stored on the Central Management Server. Data collection is done on individual systems. Results from `stdout` and `stderr` are saved to the HP SIM/Insight Dynamics Tasks Results log. Capacity Advisor uses the collected data to calculate the utilization of CPU and memory on targeted systems. You can collect data for:

- All systems licensed to use Capacity Advisor
- Specific selected systems licensed to use Capacity Advisor

To view the collected data, use the **View**→**Capacity Advisor Data...** menu item, as described in “Viewing utilization data” (page 112).

For information on Capacity Advisor, including prerequisites for using Capacity Advisor features, see the *HP Insight Capacity Advisor 6.2 User Guide*.

## Viewing utilization data

VM Manager provides the following options for viewing utilization data. These assume the prerequisites discussed in “Enabling collection of utilization data” (page 111) have been met.

- Utilization meters provided by VM Manager tabs. Table 7-1 lists the meters provided by VM Manager tabs. Utilization meters display current utilization data for the associated resource. The utilization information is a 5-minute average that is calculated and updated on 5-minute boundaries. If the utilization cannot be displayed, the utilization meter is dimmed. A label next to the meter indicates the probable cause. For information about these labels, see “Utilization meter status/error information” (page 125).

CPU and memory utilization are expressed as a percentage. Network and storage meters display I/O data in terms of throughput (for example, megabytes per second). Storage meters are labeled as “Disk I/O” but provide utilization data for any supported devices (DVDs and tape devices as well as disks). If a network or storage I/O meter is in a device box on a **Network** or **Storage** tab, the data is specific to the device, whether it is a virtual device in a virtual machine or a physical device on the VM Host; if the meter is in a virtual machine box, the data is an aggregate, registering the total throughput for all virtual devices on the virtual machine.



**Table 7-1 Utilization meters available on VM Manager tabs**

| VM Manager Tab                    | Utilization Metrics                                   |              |  |  |
|-----------------------------------|---|--------------|--|--|
|                                   | CPU (%)   | Memory (%)   | Network I/O (throughput)   | Storage I/O (throughput)   |
| <b>VM Host General</b>            | VM Host only  | VM Host only | VM Host only   | VM Host only   |
| <b>VM Host Virtual Machines</b>   | VM Host CPU utilization per VM<br>VM vCPU utilization | Per VM only  | Per VM only  | Per VM only  |
| <b>VM Host Network</b>            |   |              | VM Host (Physical Network Interfaces column)<br>VM (Virtual Network Interfaces column) |  |
| <b>VM Host Storage</b>            |   |              |  | VM Host (Physical Storage column)<br>VM (Virtual Storage column) |
| <b>VM Properties General</b>      | VM CPU utilization<br>VM Host CPU utilization per VM  | VM only      | VM only  | VM only  |
| <b>VM Properties Network</b>      |   |              | VM Host (Physical Network Interfaces column)<br>VM (Virtual Network Interfaces column) |  |
| <b>VM Properties Storage</b>      |   |              |  | VM Host (Physical Storage column)<br>VM (Virtual Storage column) |
| <b>Vswitch Properties Network</b> |   |              | VM Host (Physical Network Interfaces column)<br>VM (Virtual Network Interfaces column) |  |



---

**NOTE:** Data reported by certain VM Manager CPU utilization meters might vary from the data collected by Capacity Advisor as displayed in the Profile Viewer and historical utilization reports. The data from VM Manager meters is reliable for most purposes. For capacity planning, refer to the data collected by the Capacity Advisor Profile Viewer and historical utilization reports. For more information about how Capacity Advisor data might vary from VM Manager data, see “Data Handling for Virtual Machines” in Chapter 3 of the *HP Insight Capacity Advisor 6.2 User Guide*.

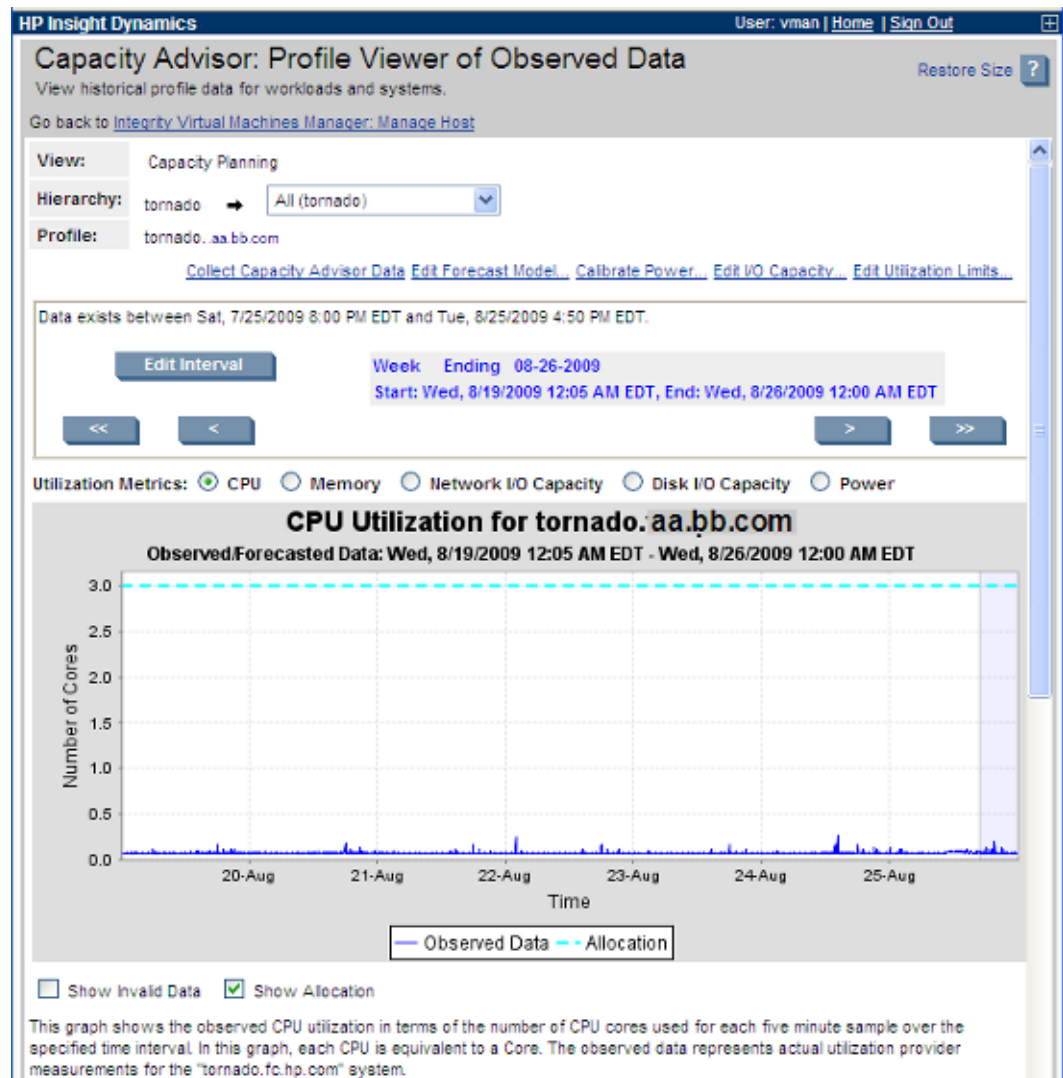
Another source of discrepancy is the difference in the way Capacity Advisor and VM Manager present CPU data. Capacity Advisor Profile Viewer and historical utilization reports present CPU data in absolute terms (specifying the number of physical cores used) while VM Manager presents CPU data in terms of percentages (specifying the percentage of available CPU resources being used). For example, the VM Manager “VM Host CPU Utilization” meter displayed on the **VM Host Virtual Machines** and **VM Properties General** tabs displays the percentage of the total VM Host physical CPU capacity used by the virtual machine in question. Capacity Advisor tabulates similar data but presents it in different terms. For example, on a VM Host that has 16 physical cores, if a VM has 4 vCPUs each currently using 50% of a physical core, CapAd would report that the VM is consuming 2 VM Host cores. The VM Manager “VM Host CPU utilization” meter would report that the VM is consuming 12.5% of the VM Host's CPU capacity.

---

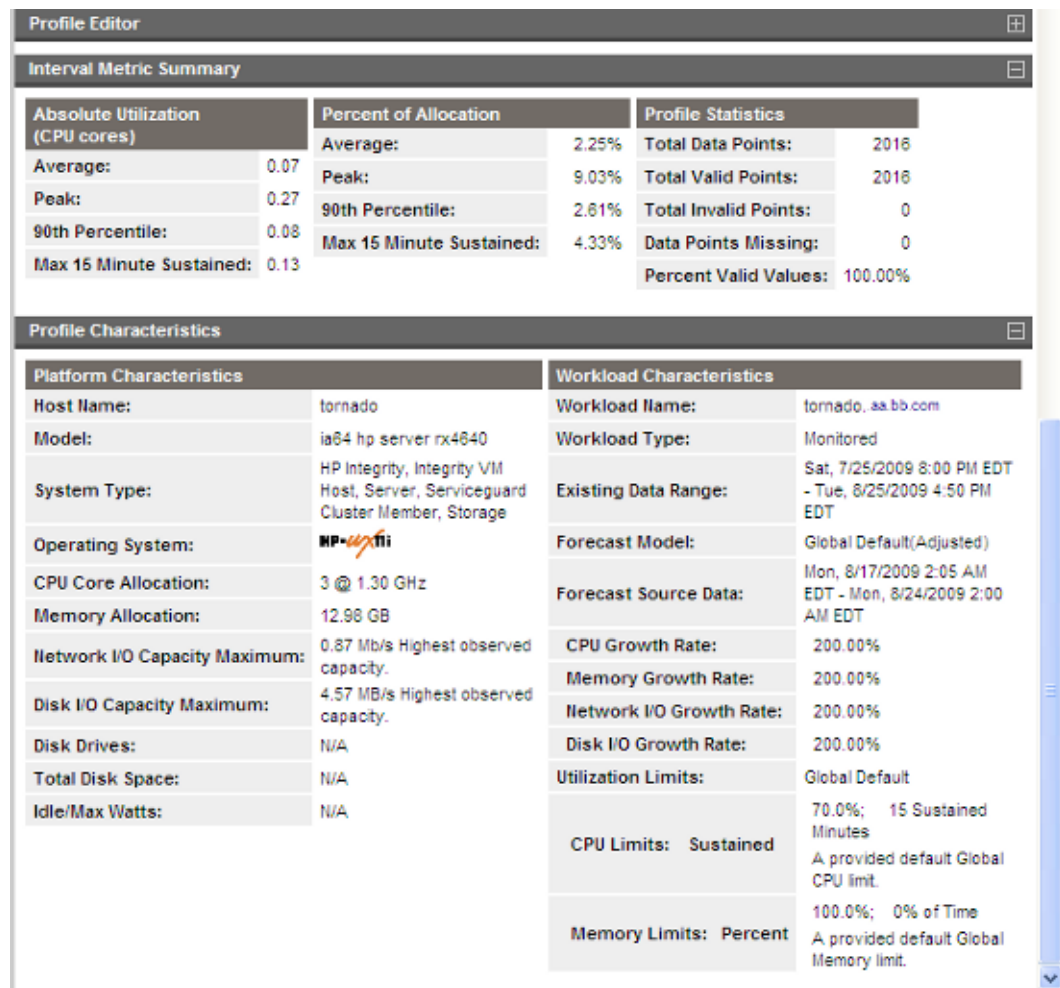
- Using VM Manager with Insight Dynamics:
  - You can click a utilization meter to view a more detailed historical data report provided by HP Insight Capacity Advisor software.
  - You can use the VM Manager **View**→**Capacity Advisor Data...** menu item to view a snapshot of recent utilization data collected by HP Insight Capacity Advisor software. First, you must enable collection of data by using the **Tools**→**Collect Capacity Advisor Data** menu item, as described in “Enabling collection of utilization data” (page 111). (If you use the VM Manager **View**→**Capacity Advisor Data...** menu item without having enabled data collection, no data is displayed; however, the screen includes a link to the Collect Capacity Advisor Data facility so that you can begin collecting data to view.)

Figure 7-2 (page 115) shows the upper half of the screen showing data collected for a VM Host, while Figure 7-3 (page 116) shows the lower half of the screen.

Figure 7-2 View Capacity Advisor data screen: upper half



**Figure 7-3 View Capacity Advisor data screen: lower half**



The data collection view is provided by the Capacity Advisor Profile Viewer. The Profile Viewer displays historical utilization data along with additional information you provide. The Profile Viewer also enables you to examine different time intervals and different categories of data. In the Capacity Advisor graphs, you can view utilization data for both CPUs and memory. You can also view network and disk bandwidth utilization (throughput) for whole OS profiles. For more information about the Capacity Advisor Profile Viewer, see the *HP Insight Capacity Advisor 6.2 User Guide* or the *Capacity Advisor Profile Viewer Screen* help topic.

When you click the **View→Capacity Advisor Data...** menu item without any virtual machines selected on the current tab, the screen shows utilization data pertaining to the VM Host.

The data provided by the **View→Capacity Advisor Data...** menu item is similar to what is provided by clicking on a utilization meter. However, clicking on a meter presets certain parameters, such as what type of utilization metric to display and for which system (VM Host or a particular virtual machine, for example). Nevertheless, you can change parameters once the screen comes up.

- You can use the **Tools→Capacity Advisor Historic Report** menu item to create a comprehensive report that collects and analyzes data over specified time periods from specified sources, as described in “Creating a historical utilization data report” (page 117). The report can be browsed and saved.

## Creating a historical utilization data report

To use HP Insight Capacity Advisor software to create a historical utilization report that includes data for the target workloads, systems, complexes, or scenarios you specify, select the **Tools→Capacity Advisor Historic Report** menu item from the VM Manager menu bar. This menu item is available only when you use VM Manager with Insight Dynamics; it is not available when using VM Manager through HP SMH. Before creating a report, you must have collected data on the systems of interest (see “Enabling collection of utilization data” (page 111)).

HP Insight Capacity Advisor software reports provide information about utilization and allocation data that have been collected and analyzed. This facility gives you the flexibility of analyzing and showing data collected over specified time periods. A wizard allows you to set a variety of parameters to determine the time periods and systems for data collection and analysis. The report can be browsed (the screen is presented in a new browser window) and saved. In contrast, the **View→Capacity Advisor Data...** menu item gives a snapshot of utilization that's more limited to the current, most recent time period.

Capacity Advisor collects data for the following resources or targets: systems, workloads, complexes, and scenarios. For these targets, Capacity Advisor provides utilization information in the following reports:

- System Utilization Report
- Workload Utilization Report
- Complex Utilization Report
- Scenario Utilization Report



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# 8 Viewing logs and version information

## Viewing Integrity VM Host and VM logs

You can view the events logged by Integrity VM pertaining to the VM Host and all guests by selecting **View**→**Integrity VM log for VM Host...** from the VM Manager menu bar. This gives a display similar to that created by the `hpvmstatus -e` command (used at the Integrity VM CLI), except VM Manager limits the display to the most recent 1000 log lines. The VM Host event log records all changes to configurations of the VM Host and to virtual machines on the VM Host, including information about commands issued and error messages.

You can view the events logged by Integrity VM pertaining to a selected virtual machine by selecting **View**→**Integrity VM log for VM...** from the VM Manager menu bar (if you are in a VM Host or Vswitch Properties view, a virtual machine must be selected). This gives the same display that the `hpvmstatus -e -P vm-name` command would give when used at the Integrity VM CLI (where `vm-name` is the name of the virtual machine). The event log records all changes to configurations of the virtual machine and information about commands issued and error messages.



**NOTE:** With VM Manager running under HP SMH, to view the Integrity VM logs using either of these **View** menu items, you must be logged into HP SMH with either Operator or Administrator privileges. For more information, see the HP SMH documentation, available from the following website (click the **Support and Documents** link):

<http://www.hp.com/go/smh>

Some reasons that you might want to view either log include the following:

- To confirm a change that you made to a running virtual machine. This is especially useful when the VM Manager does not immediately display the changed data, such as modification of memory or the number of virtual CPUs for a running virtual machine. In such circumstances, VM Manager does not display the new data until the virtual machine is shut down or restarted.
- To review an error message that resulted from an Integrity VM command run by VM Manager, or to view the actual command line that was run. VM Manager displays, or allows you to view this information, at the time of the action. This view allows you to review the information at a later time without having to access a log manually from the VM Host.
- To view commands, logged information, and error messages obtained directly from the Integrity VM CLI and that might not have been recorded by VM Manager.
- To view other information logged on the VM Host, such as the status of the virtual machine subsystem startup sequence (this information includes whether the virtual machine starts automatically when the Integrity VM Host starts or remains in the Off state until manually started).

## Viewing VM Manager, Integrity VM, and WBEM Provider versions

You can view the version numbers of VM Manager, Integrity VM, and WBEM providers by selecting **View**→**VM Manager Version Information** from the VM Manager menu bar. The resulting screen reports the current versions of Integrity VM, of VM Manager, and of the providers on both the VM Host and each virtual machine.

Figure 8-1 shows an example of a screen. If “No Permission” is displayed where a virtual machine’s WBEM provider version should be, the WBEM credentials (user name and password) have not been set for that virtual machine. For more information on setting WBEM credentials, see “Setting security credentials” (page 15).

**Figure 8-1 VM Manager Version Information screen**

## Integrity Virtual Machines Manager

Restore Size ?

VM Manager Version Information

OK

|  |  |
|--|--|
| <b>VM Host</b>                                   | motley.aa.bb.com   |
| <b>HP Integrity Virtual Machines</b>             | HPVM B.04.10 PATCH_HPVM4.1_PK2_beta<br>clearcase opt Thu May 14 2009 12h37m54s PDT |
| <b>Virtual Machines WBEM Provider on VM Host</b> | HPVM B.04.10 clearcase opt Tue Jan 20 2009<br>13h31m03s PST                        |
| <b>Integrity Virtual Machines Manager</b>        | 04.01.01.00 06/01/2009 07:03 PM  |

| Virtual Machines              | VM WBEM Provider Version                                      |
|-------------------------------|---|
| ecl-guest (?)                 | Unknown; VM is not started                                    |
| motley01 (motley01.aa.bb.com) | HPVM B.04.10 BL06 clearcase opt Thu Jan 08 2009 23h39m47s PST |
| motley02 (motley02.aa.bb.com) | HPVM B.04.10 BL06 clearcase opt Thu Jan 08 2009 23h39m47s PST |
| motley03 (motley03.aa.bb.com) | Unknown; VM is not started                                    |
| motley04 (motley04.aa.bb.com) | HPVM B.04.10 BL06 clearcase opt Thu Jan 08 2009 23h39m47s PST |

OK



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# 9 Support and other resources

## Contacting HP

HP encourages your comments concerning this document. We are truly committed to providing documentation that meets your needs.

Your comments and suggestions regarding product features will help us develop future versions of the Virtual Server Environment Management Software. Use the following email address to send feedback directly to the Insight Dynamics development team: [vse@hpuxweb.fc.hp.com](mailto:vse@hpuxweb.fc.hp.com).



**NOTE:** HP cannot provide product support through this email address. To obtain product support, contact your HP Support Representative, your HP Services Representative, or your authorized HP reseller. For more information about support services, see the support website at:

<http://www.hp.com/go/support>

For other ways to contact HP, see the Contact HP website at:

[http://welcome.hp.com/country/us/en/contact\\_us.html](http://welcome.hp.com/country/us/en/contact_us.html)

## New and changed information in this edition

This document reflects the features provided by VM Manager Version A.4.1.1 (4.1.1). New and changed information in this document includes the following:

- **Support for OpenVMS as a guest OS**  
VM Manager supports guest systems having OpenVMS as operating system.

## Related information

You can download the latest version of this document from the following website (click on the **HP Insight Dynamics - VSE for Integrity** tab):

<http://www.hp.com/go/insightdynamics/docs>

The following related documents can be downloaded from the same site:

- *HP Insight Dynamics 6.2 Getting Started Guide*
- *HP Integrity Virtual Machines Manager 4.1.1 Software: User Guide*
- *HP Integrity Virtual Machines Manager 4.1.1 Software: Release Notes*
- *HP Integrity Virtual Machines Installation, Configuration, and Administration*
- *HP Integrity Virtual Machines Release Notes*

The latest versions of manuals and white papers for the HP Insight Dynamics and related products can be downloaded from the site mentioned previously.

For more information about the Insight Dynamics and related products and solutions, visit the following HP websites:

- Insight Dynamics - VSE for Integrity: <http://www.hp.com/go/insightdynamics/integrity>
- Insight Dynamics for ProLiant: <http://www.hp.com/go/insightdynamics>

## Typographic conventions

This document uses the following typographic conventions.

*Book Title*

Title of a book or other document.

[Linked Title](#)

Title that is a hyperlink to a book or other document.

<http://www.hp.com>

A website address that is a hyperlink to the site.

|                   |  |
|-------------------|--|
| Command           | Command name or qualified command phrase.  |
| <b>user input</b> | Commands and other text that you type.   |
| computer output   | Text displayed by the computer.  |
| <b>Enter</b>      | The name of a keyboard key. Note that <b>Return</b> and <b>Enter</b> both refer to the same key. A sequence such as <b>Ctrl+A</b> indicates that you must hold down the key labeled <b>Ctrl</b> while pressing the <b>A</b> key. |
| variable          | The name of an environment variable, for example PATH or errno.  |
| value             | A value that you may replace in a command or function, or information in a display that represents several possible values.  |
| <i>find</i> (1)   | HP-UX manpage. In this example, “find” is the manpage name and “1” is the manpage section.   |

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# A Error messages, status indicators, and troubleshooting

This appendix discusses error messages and troubleshooting related to VM Manager problems, and describes the status indicators that appear on some VM Manager screens and the error and status labels that might appear with utilization meters (bar graphs) displayed on certain VM Manager screens.

## Error messages

Error messages visible in VM Manager are returned primarily from the Integrity VM commands themselves. This section describes how to review such error messages as logged by Integrity VM and includes information about error messages that might be seen when attempting to access VM Manager. Other errors or problems are discussed in “Troubleshooting virtual machine problems” (page 126).

## Reviewing error messages

To review an error message that resulted from an Integrity VM command run by VM Manager in the past (and so is not currently viewable), you can select **View**→**Integrity VM log for VM Host...** or **View**→**Integrity VM log for VM...** The former menu item displays events logged by Integrity VM that pertain to the VM Host and all its guests. The latter menu item displays events logged by Integrity VM that pertain to a specific virtual machine. For more information, see “Viewing Integrity VM Host and VM logs” (page 119).

For more information about error messages related to Integrity VM, see the *HP Integrity Virtual Machines Installation, Configuration, and Administration* manual.

## Errors accessing VM Manager

Under certain circumstances, errors can occur when attempting to enter Integrity VM Manager from HP Insight Virtualization Manager software (Insight Dynamics - VSE for Integrity) or from the HP System Management Homepage. In those cases, a page titled “Access failure” is displayed with the name of the VM Host system and the reason for the failure to enter Integrity VM Manager. The following list describes the access failure messages that you might receive:

- Incorrect permissions. An error occurred communicating with WBEM: CIM\_ERR\_ACCESS\_DENIED CIM\_ERR\_ACCESS\_DENIED: PGS05203.

The following is an example of the error message displayed for a user, hpsmh:

```
The user 'hpsmh' is not authorized to run 'EnumerateInstances' in the namespace 'root/cimv2/hpvm'.
```

CIM\_ERR\_ACCESS\_DENIED (part of the error message mentioned earlier) indicates that a CIM user is not authorized to access the namespace.

This error occurs when a user with specific credentials uses a WBEM connection to access the VM WBEM services listening at ports 5988 and 5989 without sufficient permissions. For a WBEM user to access the WBEM services, the user must be provided with sufficient permissions.

This issue does not occur if the CIM configuration parameter *enableNamespaceAuthorization* is set to FALSE. If the value is set to FALSE, irrespective of whether the users are SIM or SMH users, they can access WBEM services.

To resolve the issue, first examine the value of the configuration parameter, *enableNamespaceAuthorization*.

To examine the configuration parameter settings, run the following command:

```
cimconfig -lp
```

This command lists all the configuration parameters. Verify whether the *enableNamespaceAuthorization* parameter is set to TRUE. If it is set to TRUE, follow these steps:

1. To access WBEM Providers from HP SIM, run the following command:

```
# cimauth -a -u <SIMUSER> -n root/cimv2/hpvm -R -W
# cimconfig -s enableNamespaceAuthorization=true -p
```

where, *SIMUSER* is the username created for SIM access.

2. To access WBEM Providers from HP SMH, run the following command:

```
# cimauth -a -u <SMHUSER> -n root/cimv2/hpvm -R -W
# cimconfig -s enableNamespaceAuthorization=true -p
```

where, *SMHUSER* is the username created for SMH access.

- The user is not authorized to monitor the VM host in HP SIM/Insight Dynamics. Authority to monitor the VM host is required when using Integrity Virtual Machines Manager for accessing the VM host or for accessing any hosted VM within the Insight Dynamics environment.

To use VM Manager, an HP SIM/Insight Dynamics user must have at least Monitor Tools authorization for the virtual machine host system. If a user has authority to manage an individual virtual machine but is not authorized within HP SIM/Insight Dynamics to monitor the VM Host system that contains it, the error message appears when the user selects the VM Manager icon in the virtual machine's system box displayed by the Virtualization Manager **Visualization** tab. To return to Virtualization Manager, select **All VSE Resources** in the left-hand navigation pane of HP SIM/Insight Dynamics (**System and Event Collections**→**Systems**→**Shared**→**Systems by Type**→**All VSE Resources**).

- The VM host is not known to HP SIM/Insight Dynamics. The VM host must be known to use Integrity Virtual Machines Manager for the VM host or for any VM hosted by it.

It is possible that a virtual machine might be discovered by HP SIM while the containing VM Host has not yet been discovered. To use VM Manager, both the virtual machine and the containing VM Host must be discovered by HP SIM. This error message appears when you select a virtual machine link in the virtual machine system box displayed in Virtualization Manager before HP SIM has discovered the virtual machine's VM Host. To return to Virtualization Manager, select the **All VSE Resources** link in the left-hand navigation bar of HP SIM (**System and Event Collections**→**Systems**→**Shared**→**Systems by Type**→**All VSE Resources**).

- The user is not authorized to use Integrity Virtual Machines Manager on this VM host.

With HP SMH, VM Manager is configured by default to permit read-only access to HP SMH users with User-level privileges, and read-write access to HP SMH users with Operator-level and Administrator-level privileges. However, it is possible to reconfigure these permissions to deny all VM Manager access to User-level and Operator-level users. In this case, these users can log into HP SMH, but they are denied access to VM Manager. To return to the SMH Homepage, select **Home** in the top navigation link.

With Insight Dynamics - VSE for Integrity, users need VSE All Tools authorization to view all VM Manager screens and perform all VM Manager menu actions.











If other messages are displayed on an Access failure page, contact your HP Technical Support Representative for further assistance.

## Status indicators

In several actions and views, the status of a component is represented by an icon next to the component name or label. For example, the icon next to the name of a virtual machine shows whether the virtual machine is up or down. A question mark (?) means no information is available.

Table A-1 explains the meaning of each status icon.

**Table A-1 Status icons**

| Icon  | Indication   | Possible meanings in more detail   |
|---|--|--|
|    | On/Up/Normal   | The virtual machine is started or starting; devices are powered on and active; the operating system is up or in the last part of the boot sequence; no fault was detected.   |
|    | Off/Down/Disabled  | The virtual machine has stopped or is stopping; the devices are powered off, or powered on but inactive; the operating system is down, shutting down, or in the first part of the boot sequence. For a virtual machine that has migrated to another VM Host (the target), this icon indicates the virtual machine is no longer runnable on the source VM Host, meaning that you cannot start or modify it. After the migration has finished, you can delete the virtual machine from the source VM Host. |
|    | Serviceguard package   | The virtual machine is configured as a Serviceguard package; flyover text indicates the virtual machine is a Serviceguard package.   |
|    | Managed by another VM Host   | The virtual machine is a Serviceguard package that is running on another VM Host; flyover text indicates hardware status (On) and the name of the VM Host.   |
|    | Unknown  | The VM Manager cannot read information about virtual machines or devices, or cannot obtain this information from the remote WBEM services provider. This does not necessarily indicate an error condition. For example, some information (such as memory configuration) cannot be obtained if the virtual machine is powered off or has not completed a restart.   |
|    | Critical   | A critical problem with the virtual machine or device configuration has been detected.   |
|  | Major  | The virtual machine is experiencing major performance problems.  |
|  | Migrating to another VM Host   | The virtual machine is currently migrating from this VM Host (source) to another VM Host (target).   |
|  | Migrating from another VM Host   | The virtual machine is currently migrating from another VM Host (source) to this VM Host (target).   |
|  | Waiting for migration  | The virtual machine is in queue, waiting to migrate. When multiple virtual machines are selected to migrate, only one is migrated at a time.   |
|  | Migration error An error was detected during the latest attempt to migrate one or more virtual machines to another host. | An error was detected during the latest attempt to migrate one or more virtual machines to another host.   |

## Utilization meter status/error information

When a utilization meter visible on one of the VM Manager tabs is dimmed (rather than displaying a utilization value), a label indicates the probable cause. The following list describes the labels or status indicators:

- **No Comm.** indicates that VM Manager is unable to communicate with the WBEM provider running on a virtual machine. Hover the cursor over the meter to display an exception error message identifying the problem.

A common reason for the **No Comm.** label to be displayed is a problem with trusted certificates. For example, if trusted certificates are required (the **Require trusted certificates** check box was selected on the **Set WBEM Credentials for Virtual Machines** page) but the

keystore on the host does not trust the certificate from the virtual machine, then the certificate is not in the keystore, has expired, did not match the virtual machine name, or is otherwise invalid. For information about trusted certificates, see “Trusted certificates” (page 19).

If the WBEM provider is unresponsive, you might need to restart it.

- `No Data` indicates one of the following:
  - Data is being collected, but it can take up to 10 minutes to display utilization data.
  - The virtual machine is not started, not booted, or cannot be contacted by the system on which VM Manager is running.
  - The VM Host has no WBEM credentials for collecting the data from the virtual machine. Normally, this is only seen for invalid or missing WBEM credentials for a Windows VM guest. See the discussion of the `No Perm` label. For more information about WBEM credentials, see “Setting security credentials” (page 15).

For more information about problems displaying data (data is out of date, incomplete, or missing), see “Troubleshooting virtual machine problems” (page 126).

- `No Perm.` indicates that the VM Host lacks or has invalid WBEM credentials for collecting the data from the virtual machine.
- `Timed Out` indicates that VM Manager attempted to retrieve utilization data but received no response from the WBEM provider on the virtual machine because of one of the following situations:
  - The WBEM provider for the data is not running, is not installed, or is disabled on the virtual machine.
  - Network problems are preventing a timely response.

For more information about collecting and viewing utilization data, see Chapter 7 (page 111).

## Troubleshooting virtual machine problems

This section discusses problems that might occur when using VM Manager to create, start, or modify a virtual machine or to display virtual machine data. Also included are ways for resolving these problems.

- **Utilization data for OpenVMS guests is not displayed**

The utilization data for OpenVMS guests may not be visible after the first installation of the OpenVMS operating system or after rebooting the OpenVMS guests. This is because, by default, the TCP/IP and WBEM Provider services do not start automatically after rebooting the OpenVMS guest machine.

The TCP/IP, the WBEM Services, and the Utilization Provider products are not installed by default on an OpenVMS guest. Ensure that the TCP/IP, the WBEM services, and the Utilization Provider products are installed, configured, and started on the guest. After rebooting the guest, verify if the TCP/IP and WBEM services have been started. If not, restart TCP/IP and/or WBEM services manually or add the command in the startup script so that they start automatically when the OpenVMS guest reboots. For more information, see the OpenVMS documentation on setting up TCP/IP and WBEM Provider services.

- **Failure creating a virtual machine**

When using the Create Virtual Machines wizard, a number of warning or error conditions can prevent the virtual machine from being created. However, if the **Create VM even if resources are insufficient, missing or unavailable** check box is selected on the Create Virtual Machines wizard **Summary** page, you can still have VM Manager create the virtual machine. You will have to correct the conditions prior to starting the virtual machine.



- **Failure starting a virtual machine**

The most likely cause for a virtual machine failing to start is missing, insufficient, or unavailable resources. Make sure the required resources are made available. For example:

- Not enough memory on the VM Host is available for the virtual machine  
Make sure that enough memory is available on the VM Host to provide the memory you allocated for the new virtual machine (in addition to providing for the existing virtual machines).
- You specified a device that is already in use by another virtual machine  
You might have specified a network or storage device that is already in use by another virtual machine. You need to return to the appropriate Create Wizard page to select a device that is not in use. To determine what devices are already in use, examine the **VM Host Network** or **VM Host Storage** tab.
- A file specified as a backing device does not exist  
You might have incorrectly specified the name or path of a file to be used as a backing storage device, or you specified a file that does not exist.
- The virtual machine is currently migrating online or has migrated to another VM Host (and is in a Not Runnable state).

- **Failure to modify the virtual machine vCPU entitlement**

If you attempt to modify (by selecting **Modify**→**Virtual Machine vCPU Entitlement**) the vCPU entitlement of a virtual machine that is being managed by gWLM, the following error message is displayed, where *virtual-machine-name* is the name of the virtual machine:

The processor entitlement for VM *virtual-machine-name* cannot be modified because it is being managed by gWLM. To adjust the processor entitlement for this VM, use gWLM to change the policy associated with this VM.

To create or modify the gWLM policy for this virtual machine, use the **Policy** menu (available when using VM Manager with the Insight Dynamics - VSE for Integrity).

- **Information is out of date, incomplete, or missing**

In general, VM Manager tabbed view screens are refreshed automatically every five minutes. An indicator on these visualization pages notifies you when the data was last refreshed. VM Manager screens that display configuration data are updated instantaneously when you use VM Manager to change the related configuration parameters.



**NOTE:** When changes to virtual machine I/O configuration are made using tools other than VM Manager (such as adding or removing I/O devices by using the VM Host command line), the updated configuration data is not shown until the screen is refreshed. You can manually refresh a tabbed view screen and certain dialog screens (such as those for adding storage or network devices) by clicking on the **Refresh Data** link.

If information about certain virtual machines is missing from a VM Manager screen (for example, specifics about a port interface), the screen might need refreshing, the virtual machines might not yet be started or, if they are started, the VM Provider or certain WBEM components might not be running on those virtual machines or on the VM Host. WBEM components are required on any virtual machine for which you want data. If the VM Provider is not running on the VM Host, no data will be available on any VM Manager tabs; all tabs will display a “No data available” message. To verify that the VM Provider is running, enter the following command on the virtual machine or VM Host

```
cimprovider -ls
```

The response “HPVMProviderModule OK” indicates the VM Provider is running. Any other response indicates it is not running. For system and software requirements regarding the VM Provider, see “System and software requirements” (page 13). For installation instructions and information about providers that must be installed and running on virtual machines, see the *HP Integrity Virtual Machines Installation, Configuration, and Administration* manual.

- **Device special file displayed as unknown device (🔍)**

If you use VM Manager to manage a VM Host running Integrity VM Version 3.5 or earlier, VM Manager does not fully support virtual device special files located in /hpa (introduced in HP StorageWorks Secure Path software Version 3.0F SP2) as backing devices for virtual storage. If a virtual storage device using an /hpa device special file already exists on a virtual machine managed by VM Manager, VM Manager displays it on the **VM Host Storage** and **VM Properties Storage** tabs as an unknown device (using the question mark icon, 🔍). VM Manager displays the correct device special file name (for example, /hpa/rdisk/hpa1) but the box representing this device is not connected to the boxes that represent the physical storage devices associated with that virtual device special file. In general, VM Manager correctly displays only those device special files located in /dev.

- **Deleted virtual machine still appears in Virtualization Manager**

Using VM Manager with Insight Dynamics - VSE for Integrity, if you create a virtual machine and then delete it before the new virtual machine has been identified by HP SIM, the virtual machine might appear in Virtualization Manager as though it had not been deleted. The appearance of the virtual machine in Virtualization Manager depends on when the deletion occurred during the HP SIM identification process. This is not an issue when using VM Manager from HP SMH. In addition, if you decide to delete the virtual machine soon after creating it, wait a few minutes before doing so. If the deleted virtual machine does appear in Virtualization Manager, delete it from the HP SIM All System view. (From the HP SIM **Systems and Event Collections** list in the navigation area on the left, select **All Systems**.) For more information, see the *HP Insight Virtualization Manager 6.2 Software with Logical Server Management User Guide*.

- **Created virtual machine does not appear immediately in Virtualization Manager**

After creating a virtual machine using VM Manager, if you return immediately to Virtualization Manager, the machine might not yet appear in Virtualization Manager. This means HP SIM has not yet completed identifying the new virtual machine. However, it appears when the identification process completes (usually within a minute or two).



---

# Glossary

The following terms are commonly used to discuss VM Manager and its integrated components:

|   |   |
|---|---|
| <b>Accelerated Virtual Input/Output</b> | <i>See</i> AVIO.  |
| <b>agent</b>                            | A program that regularly gathers information or performs some other service without the user's immediate presence. Insight Dynamics relies on agents on managed systems to provide in-depth hardware and software information.  |
| <b>agile addressing</b>                 | Supported on <i>Integrity VM</i> running HP-UX 11i v3, a storage device addressing model that addresses a logical unit (referred to as LUN, this is the logical device that refers to the physical storage device) by using the same device special file (DSF) regardless of the location of the LUN. The addressing model uses a worldwide device identifier (WWID) to uniquely identify LUNs. The WWID is a device attribute that is independent of the device's location in a SAN or in an adapter/controller access path. With a multipath device, the WWID allows one persistent DSF and one LUN hardware path to represent the device, regardless of the number of legacy hardware paths. Therefore, an agile device address remains the same (is persistent) when changes are made to the access path. Likewise, if additional paths are offered to a given LUN (by adding a new SCSI controller or new SCSI target paths), the DSF is unaffected: no new DSFs need be provided. This model enables VM Manager to display one DSF for each multipath device instead of displaying a separate DSF for each path to the device (as done when using the <i>legacy addressing</i> scheme).<br><i>See also</i> legacy addressing. |
| <b>APA</b>                              | Automatic Port Aggregation. A combination of LAN ports that can be accessed through a single interface name. An APA creates link aggregates (often called trunks) that provide a logical grouping of two or more physical ports into a single "fat pipe." This port arrangement provides more data bandwidth and higher reliability than would otherwise be available.  |
| <b>AVIO</b>                             | Accelerated Virtual Input/Output. An I/O protocol that improves virtual I/O performance for network and storage devices used within the <i>Integrity VM</i> environment. The protocol also enables support for a greater number of virtual I/O devices per guest. For each virtual machine containing an AVIO device, the VM Host OS and the guest OS must support AVIO.  |
| <b>backing device</b>                   | Backing store. The physical device (such as a network adapter, a disk, or a file) on the <i>VM Host</i> that is allocated to <i>guests</i> .  |
| <b>cluster</b>                          | Two or more systems configured together to host workloads. Users are unaware that more than one system is hosting the workload.   |
| <b>core</b>                             | The actual data-processing engine within a processor. A single processor might have multiple cores, and a core might support multiple execution threads. A virtual processor core in a virtual machine is also called a virtual CPU or vCPU.<br><i>See also</i> processor.  |
| <b>dedicated vswitch</b>                | A <i>vswitch</i> that is dedicated to use by a certain <i>virtual machine</i> . This type of vswitch cannot be shared by multiple virtual machines running at the same time.  |
| <b>EFI</b>                              | Extensible Firmware Interface. The system firmware user interface that allows boot-related configuration changes and operations on Itanium-based systems. For example, EFI provides ways to specify boot options and list boot devices.   |
| <b>entitlement</b>                      | The amount of a system resource (for example, processor resources) that is guaranteed to a <i>virtual machine</i> . The actual allocation of resources to the virtual machine can be greater or less than its entitlement, depending on the virtual machine's demand for processor resources and the overall system processor load.   |
| <b>entitlement cap</b>                  | The maximum amount of computing power allotted to a <i>virtual machine</i> for each <i>vCPU</i> .   |
| <b>guest</b>                            | The virtual machine running the <i>guest OS</i> and guest applications.   |
| <b>guest OS</b>                         | Guest operating system.   |

|                             |  |
|-----------------------------|--|
| <b>host</b>                 | <ol style="list-style-type: none"> <li>1. The <i>VM Host</i>, which is the controlling operating system that allows multiple <i>virtual machines</i> (VMs) to be booted on a single server or nPartition.</li> <li>2. A system or partition that is running an instance of an operating system.</li> </ol>   |
| <b>Integrity VM</b>         | HP Integrity Virtual Machines. The HP product that allows you to install and run multiple systems ( <i>virtual machines</i> ) on the same physical <i>host</i> system.   |
| <b>legacy addressing</b>    | The storage device addressing model that uses the device special file (DSF) path as defined in HP-UX 11i v2 and earlier versions. In contrast to the <i>agile addressing</i> model introduced with HP-UX 11i v3, the legacy device special file (DSF) is bound to a specific hardware path to a storage device. For this reason, a device with multiple paths is represented by several legacy DSFs. If the physical storage device is reconnected to a <i>host</i> through a different host bus adapter (HBA) or a different target port, the address represented by the DSF is affected, requiring reconfiguration of applications, volume managers, or file systems. Likewise, if additional paths are offered to a given LUN (through the addition of a new SCSI controller or new SCSI target paths), an equal number of additional DSFs are required to address them.<br><i>See also</i> agile addressing. |
| <b>localnet</b>             | A <i>vswitch</i> created by default when <i>Integrity VM</i> is installed on a <i>VM Host</i> . The local network created by this vswitch can be used for communications among <i>guests</i> but not for communication between the VM Host and any guest or between any external system and a VM guest.  |
| <b>managed node</b>         | A system running under HP SIM/Insight Dynamics. Systems become managed nodes through the HP SIM discovery mechanism.   |
| <b>managed system</b>       | <i>See</i> managed node.   |
| <b>MSE group</b>            | Multiserver Environment group. A set of <i>Integrity VM</i> servers can be grouped into an Integrity VM MSE group, as required when a set of Integrity VM servers is also configured as a <i>Serviceguard</i> cluster.   |
| <b>NIC</b>                  | Network interface card. Also called LAN card, LAN adapter, or PPA.   |
| <b>nPartition</b>           | A partition in a cell-based server that consists of one or more cells, and one or more I/O chassis. Each nPartition operates independently of other nPartitions and either runs a single instance of an operating system or is further divided into virtual partitions.<br><br>nPartitions can be used as compartments managed by HP Insight Global Workload Manager software for Integrity (gWLM) as long as several requirements are met. Refer to the gWLM online help for a description of nPartition requirements.  |
| <b>processor</b>            | Also referred to as the central processor unit (CPU), a processor is the hardware component in a computer that processes instructions and plugs into a processor socket. A processor can contain more than one <i>core</i> .<br><i>See also</i> core.  |
| <b>Serviceguard</b>         | HP Serviceguard. A product that allows you to create high-availability <i>clusters</i> of HP 9000 or HP Integrity servers. By installing Serviceguard on an HP Integrity VM Host system, Serviceguard can manage <i>Integrity VM virtual machines</i> as Serviceguard packages. A Serviceguard package groups application services (individual HP-UX processes) together and maintains them on multiple nodes in the cluster, making them available for failover. When the VM Host system fails, the guests automatically fail over to another node in the Integrity VM multiserver environment ( <i>MSE group</i> ). By installing Serviceguard on HP Integrity guests, each guest becomes a Serviceguard cluster node. When a virtual machine fails, the guest applications can fail over to another guest configured as a Serviceguard node or to another server or partition.                                |
| <b>shared vswitch</b>       | A <i>vswitch</i> that can be used by more than one active <i>virtual machine</i> .   |
| <b>Utilization Provider</b> | The <i>WBEM</i> services provider for real-time utilization data from <i>managed systems</i> .   |
| <b>vCPU</b>                 | Virtual CPU. A single-core virtual processor in a <i>virtual machine</i> .<br><i>See also</i> core, processor.   |
| <b>virtual CPU</b>          | <i>See</i> vCPU.   |
| <b>virtual machine</b>      | A software entity provided by HP <i>Integrity Virtual Machines</i> . This technology allows a single server or <i>nPartition</i> to act as a <i>VM Host</i> for multiple individual virtual machines, each running its own instance of an operating system (referred to as a <i>guest OS</i> ). Virtual machines are managed   |

systems under Insight Dynamics. Other providers of virtual machines include VMware ESX, VMware ESXi, or Microsoft Hyper-V.

|                                |   |
|--------------------------------|---|
| <b>virtual machine console</b> | The user-mode application that provides console emulation for <i>virtual machines</i> . Each instance of the virtual machine console is one console session for its associated virtual machine.   |
| <b>virtual network</b>         | A LAN that is shared by the <i>virtual machines</i> running on the same <i>VM Host</i> or in the same <i>Serviceguard cluster</i> .   |
| <b>virtual switch</b>          | See vswitch.  |
| <b>VLAN</b>                    | Virtual LAN. Defines logical connectivity instead of the physical connectivity defined by a LAN. A VLAN provides a way to partition a LAN logically such that the broadcast domain for a VLAN is limited to the nodes and switches that are members of the VLAN.  |
| <b>VM</b>                      | See virtual machine.  |
| <b>VM Host</b>                 | A server running software such as <i>HP Integrity Virtual Machines</i> , VMware ESX, VMware ESXi, or Microsoft Hyper-V, that provides multiple <i>virtual machines</i> , each running its own instance of an operating system.  |
| <b>VM Provider</b>             | The <i>WBEM</i> services provider for <i>Integrity VM</i> host and guest configuration data. The VM Provider allows Integrity VM Manager to have visibility to <i>VM Host</i> and <i>guest</i> resources. For VM Manager VM Host views, the provider gives information about the VM Host and its guests. For VM Manager <i>virtual machine</i> views, the provider gives information about a particular virtual machine and the identity of its host. |
| <b>vswitch</b>                 | Virtual switch. Refers to both a dynamically loadable kernel module (DLKM) and a user-mode component implementing a <i>virtual network</i> switch. The virtualized network interface cards ( <i>NICs</i> ) for guest machines are attached to the virtual switches. By associating the vswitch with a physical working LAN on the <i>VM Host</i> , you provide the <i>guest</i> with the capability of communicating outside the <i>localnet</i> .    |
| <b>WBEM</b>                    | Web-Based Enterprise Management. A set of web-based information services standards developed by the Distributed Management Task Force, Inc. A WBEM provider offers access to a resource. WBEM clients send requests to providers to get information about, and access to, the registered resources.   |



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