HP ProLiant Essentials Virtual Machine Management Pack Version 1.1 Product Brief

Introduction

Virtualization is the representation of hardware through software. This representation, in which multiple guest operating systems run concurrently on a single hardware machine, reduces costs and complexity in operating server consolidation projects. In addition, virtualization provides faster response times to changing business demands.

Overview

The HP ProLiant Essentials Virtual Machine Management Pack (VMM) provides management of virtual machine hosts and virtual machine guests for Microsoft® Virtual Server 2005, VMware ESX Server, and VMware GSX server. The Virtual Machine Management Pack does this within the HP Systems Insight Manager (HP SIM) 4.2 environment, which allows tracking, monitoring, and control functions for organizing an effective virtualized environment. HP leverages key industry alliances to provide best-in-class management capability across most contemporary virtualization software platforms and industry-standard servers.

The Virtual Machine Management Pack integrates completely within HP SIM to provide ease of use, installation, and maintenance. All requirements and practices for proper operation of HP SIM must be observed for the Virtual Machine Management Pack. For more information about HP SIM requirements and usage, refer to the HP SIM web site at http://www.hp.com/go/hpsim.

The Virtual Machine Management Pack includes the following components, which are installed and set up during the Virtual Machine Management Pack installation:

- Virtual Machine Management Service—This service resides on the HP SIM server and controls the internal functions of Virtual Machine Management Pack.
- Virtual Machine Management Console—As the user interface for the Virtual Machine Management Pack, the console provides access to the virtual machine monitoring and control functions. The GUI can be accessed locally or remotely using industry-standard Web browsers.
- Virtual Machine Management Agent—This agent is provided with the Virtual Machine Management Pack installation and distributed to managed virtual machine hosts from HP SIM.
- HP ProLiant Essentials Server Migration Pack—Used to perform physical-to-virtual (P2V) migration or virtual-to-virtual (V2V) migration of virtual machines managed in the Virtual Machine Migration Pack console using the Server Migration Pack integrated console. Note that the Server Migration Pack has additional licensing requirements. For more information about the Server Migration Pack, refer to http://www.hp.com/servers/proliantessentials/smp.

Benefits

The Virtual Machine Management Pack provides central management and control of virtual machines from Microsoft and VMware. Among its benefits, the Virtual Machine Management Pack provides:

Single console for physical server and virtual machine resources
The Virtual Machine Management Pack is a plug-in to HP SIM that provides the ability to use a single management console to manage both physical and virtual resources. This integrated approach enables IT administrators to associate virtual machine guests to host servers and correlate the health of host servers to virtual machine guests running on the host—making it easy to identify potential host issues and avoid possible service interruption.

Simplifies virtual machine management and operation

The Virtual Machine Management Pack simplifies day-to-day management tasks and ongoing operation of virtual machines. The Virtual Machine Management Pack simplifies typical management tasks by providing:

- Remote access through remote console
- Virtual machine guest control functions (start, stop, pause, and reset capabilities)
- Virtual machine host backup to preserve valuable virtual machine guest, operating system, and application configuration information
- Templates that reduce virtual machine guest deployment time to a matter of minutes

These features simplify the virtual machine management process and reduce the time you need to perform these tasks.

HP SIM integration

HP SIM provides a unified view of virtual machines and supporting host server resources with an at-a-glance view of host server and associated virtual machine performance.

Heterogeneous virtual machine guest management

Heterogeneous virtual machine host management supports management and control of virtual machine software from VMware with ESX Server and GSX Server versions and Virtual Server from Microsoft.

Workload management

IT administrators can easily move virtual machine guests between host servers to optimize workloads of host server resources.

These benefits provide you with simplified management and operation of multi-VM environments, reduced administration cost and complexity, and faster response times.

Technology summary

Virtualization allows for the migration and consolidation of applications from legacy operating systems to current hardware and software platforms. Depending on the technology, virtualization layers such as Microsoft Virtual Server 2005 and VMware GSX Server are examples of hosted environments. Meanwhile, VMware ESX Server is an example of a bare metal environment.

Hosted virtual machine host servers

A hosted virtual machine host server requires a host operating system such as Microsoft Windows® Server 2003 or Windows 2000 Server. For example, the Microsoft Virtual Server 2003 or VMware GSX Server virtualization layers require a host operating system.

The following figure shows an example of how virtualization component placement on a hosted virtual machine host server.

**Figure 1.** Virtualization components on a hosted virtual machine host server
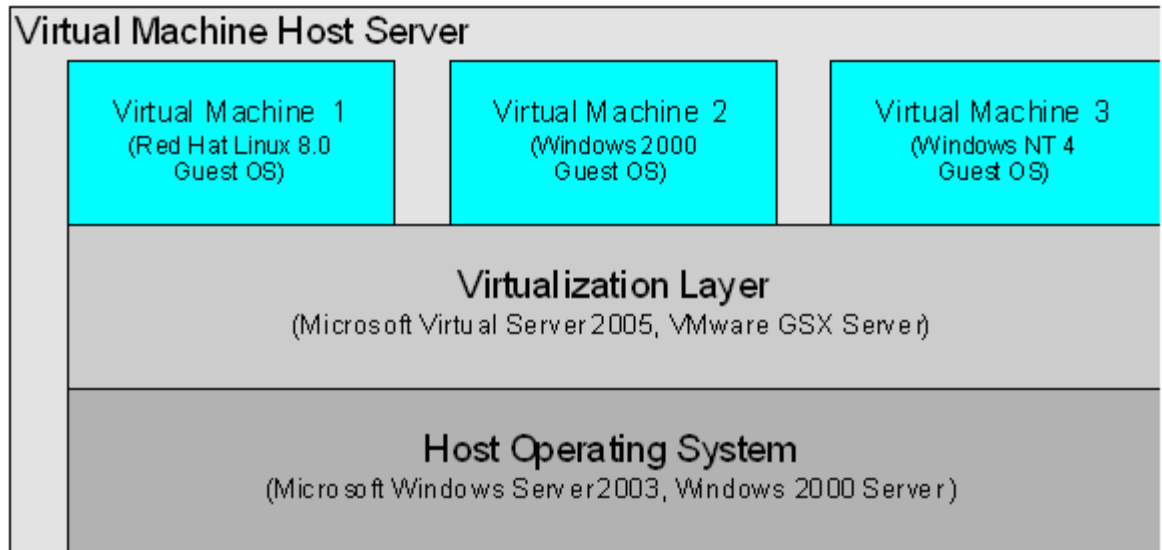
The host operating system serves as the foundation for the hosted virtual machine host server. The operating system is aware of the hardware and can virtualize the hardware out to the virtual machine guests that are associated with the virtual machine host. Each virtual machine guest contains a distinct guest operating system.

Bare metal physical servers

The following figure shows the virtualization components that exist directly on a bare metal physical server. A bare metal physical server does not use a host operating system. For example, the VMware ESX Server virtualization layer requires a bare metal physical server.

The following figure shows an example of virtual machine guest placement on a bare metal physical server.

Figure 2. Virtualization components on a bare metal physical server
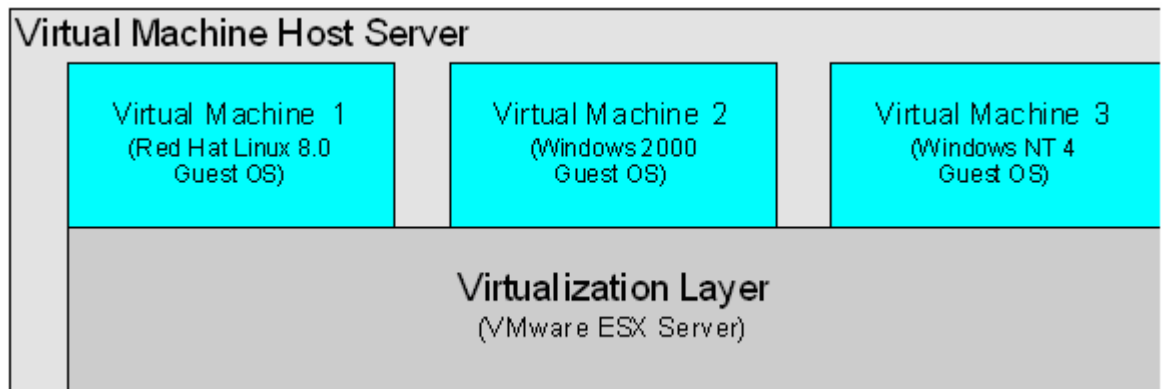
Virtualization allows for the partitioning and isolating of server resources in secure and portable virtual machine guests. These resources can then be remotely managed, automatically provisioned, and standardized on a uniform platform.

Integration with HP SIM

A key differentiator for the Virtual Machine Management Pack is its integration with HP SIM. The Virtual Machine Management Pack installs and runs on the HP SIM Central Management Server (CMS). The Virtual Machine Management Pack displays the status of virtual machine hosts and guests in the HP SIM console.

With the Virtual Machine Management Pack integration, you can associate physical and virtual machines to update and manage your environment. This information helps you anticipate potential issues that affect the health of your server.

The virtual machine host and guest status information is displayed in the VM column, shown circled in the following figure.

Figure 3. HP SIM console

In this figure, systems ml350g3-w2k3, ntvm1, and printervm are operating in normal condition, as evidenced by the normal (✓) icon displayed in the Hardware Status (HW) column in the right frame. Meanwhile, systems dl560g1-wk3ee and ml350g3-2 have potential issues, as evidenced by the major (▽) icon displayed in the HW column.
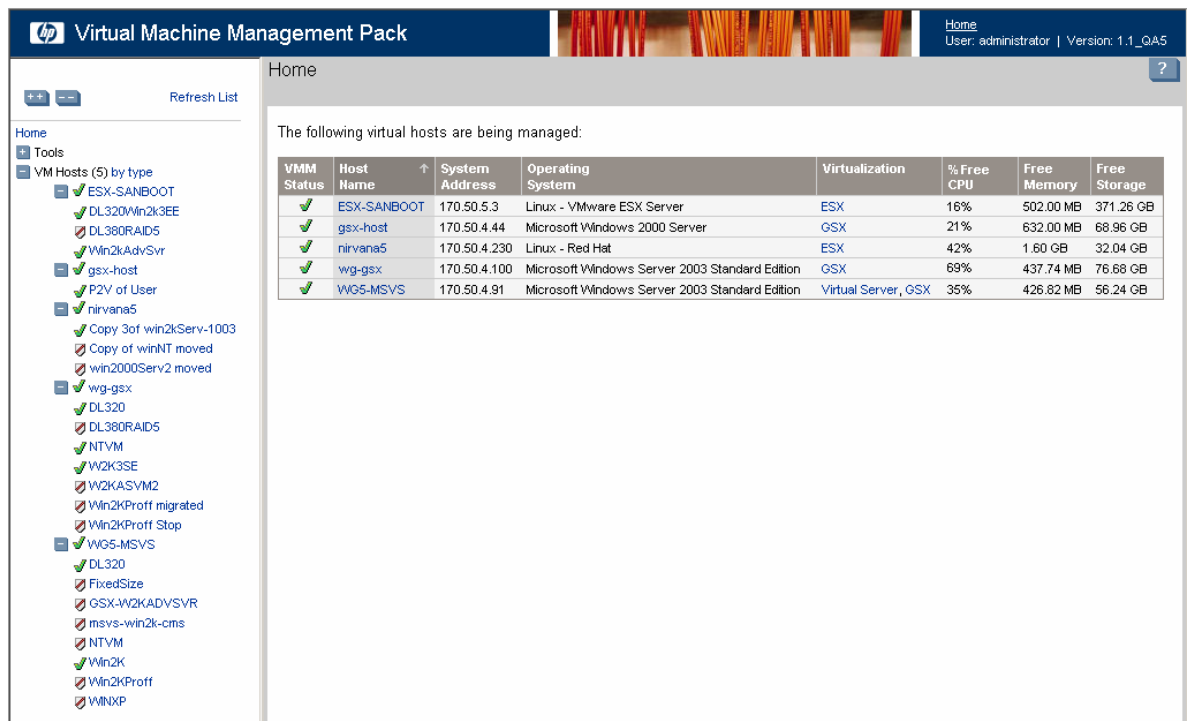
HP SIM integration enables you to identify issues in both your physical servers and the virtual environment. The Virtual Machine Management Pack grants you the control needed to manipulate your servers to ensure optimal efficiency.

Virtual machine host association and virtual machine guest control

Using the Virtual Machine Management Pack, you can start, resume, shut down, stop, pause, reset, restart, move, and copy virtual machine guests.

Select **Tools>Integrated Console>Virtual Machine Management Pack** from the HP SIM toolbar to access the Virtual Machine Management Pack console. The home page of this console presents information about each virtual machine host being managed.

Figure 4. Virtual Machine Management Pack console

Performance metrics listed in the right frame are as follows:

- % Free CPU—% Free CPU is the amount of processor resources available on the virtual machine hosts. These resources can be allocated to additional virtual machine guests.
- Free Memory—Free memory is the amount of virtual machine host physical memory that is not used. Free memory can be allocated to additional virtual machine guests.
- Free Storage—Free storage is the amount of virtual machine host disk capacity that is not in use.

From this console, select the virtual machine host in the left frame to display information for its associated virtual machine guest or guests in the right frame.

The following figure shows a Virtual Machine Management Pack guest console. The left frame displays the tree of virtual machine hosts and guests and provides easy identification. The right frame displays information for the selected node. In this example, the virtual machine guest msvs-w2k-2004, is displayed.

Figure 5. Virtual Machine Management Pack guest console
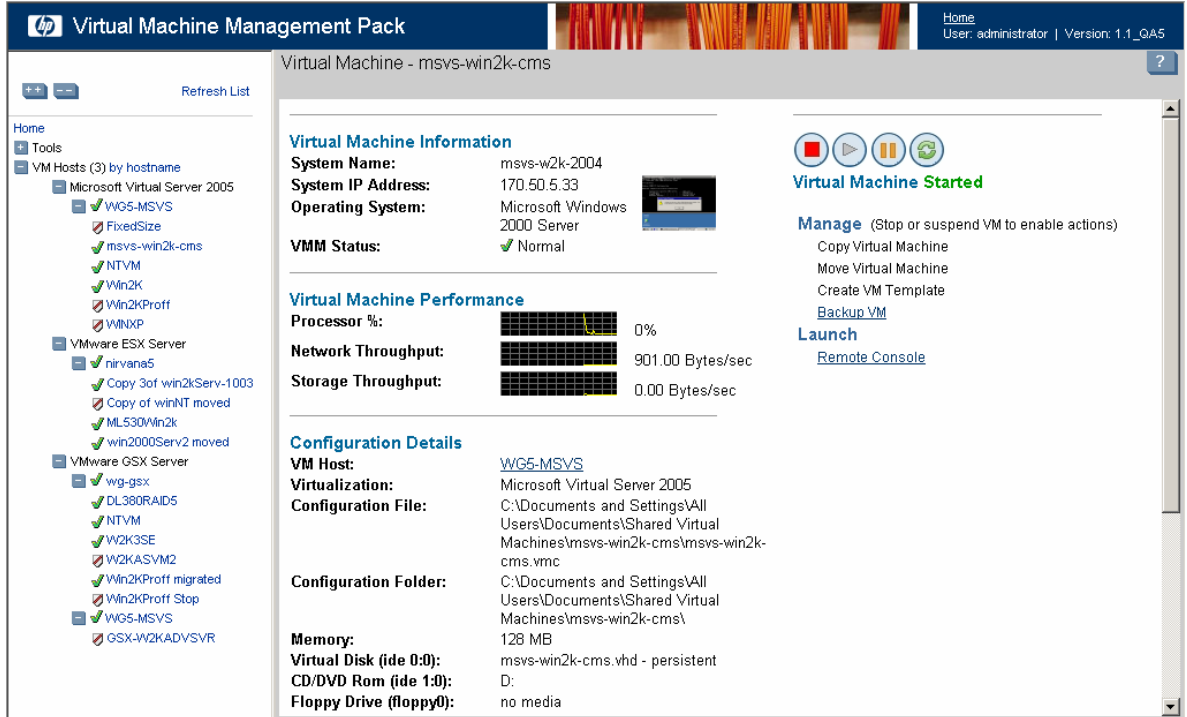
The Virtual Machine Management Pack guest console is designed to provide management and control functions in the virtual environment. The following configuration information is displayed for each virtual guest:

- Virtual machine host
- Virtualization layer
- Configuration file
- Configuration folder
- Memory
- Virtual disk name

- Virtual disk
- CD/DVD drive
- Floppy drive
- Network card
- Total file size
- Virtual disk size

Additional information is displayed for virtual machine hosts and guests using color-coded icons so you can quickly identify status. The following tables depict the status icons of virtual machine hosts and guests.

Table 1. Virtual machine host icons

Icon	Status
	The virtual machine host is licensed and is currently communicating with the Virtual Machine Management Pack.
	The virtual machine host is licensed but is not currently communicating with the Virtual Machine Management Pack.
	The VMM agent is installed on the virtual machine host, but the host is not licensed.
	The VMM agent is installed on the server, but the server is not a virtual machine host.
No icon	The VMM agent is not installed on the server.

Table 2. Virtual machine guest icons

Icon	Status
	The virtual machine guest is associated with a licensed virtual machine host, and the guest is started.
	The virtual machine guest is associated with a licensed virtual machine host, but the host is not communicating with the Virtual Machine Management Pack.
	The virtual machine guest is in a state requiring user attention.
	The virtual machine guest is associated with a licensed virtual machine host, but the guest is not started.
	The virtual machine guest is not associated with a licensed virtual machine host.

NOTE: The status shown in the VMM Status field is the same in both the virtual machine host and guest consoles.

Using the remote console

Some vendors provide native management tools with their virtualization layers. Whenever possible, the Virtual Machine Management Pack provides remote access to native management tools. Additionally, the Virtual Machine Management Pack provides remote desktop to access these guest operating system consoles.

To launch a remote console for the virtualization layer installed on a virtual machine host, select a virtual machine guest in the Virtual Machine Management Pack console, and click the thumbnail image of the virtual machine guest or click **Remote Console** in the Launch menu as shown in the following figure. The remote console displays in a separate browser window.

Figure 6. Virtual Machine Management Pack guest console with remote options identified
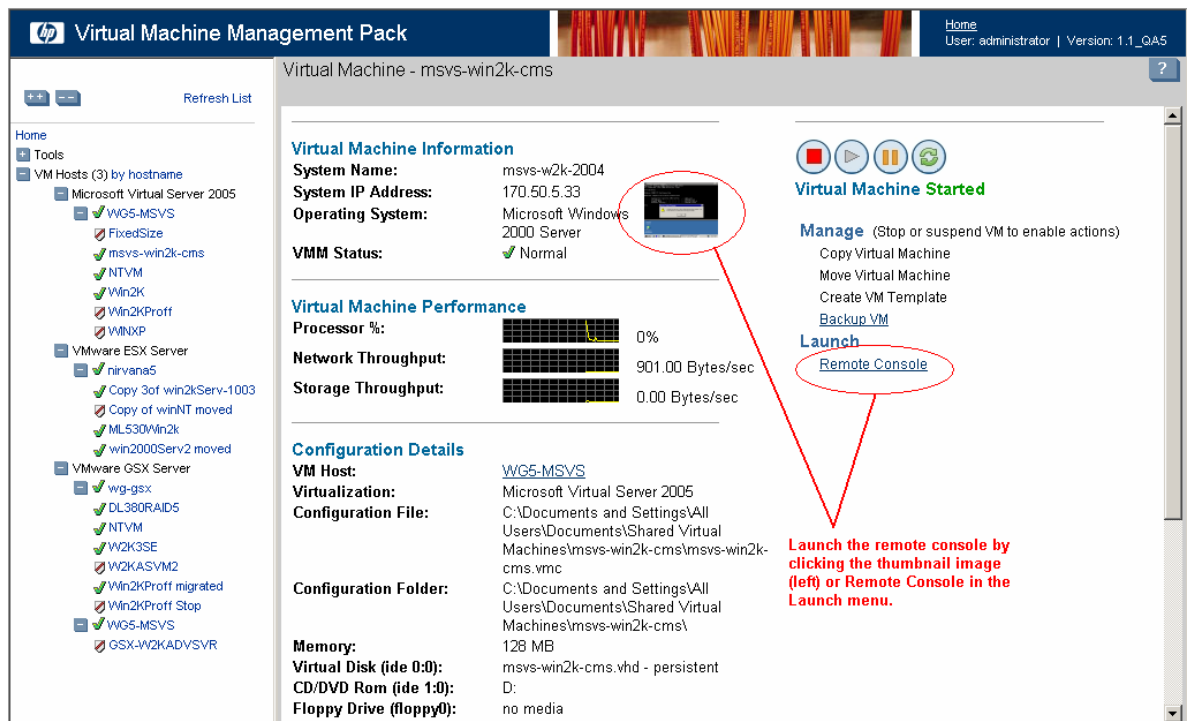
IMPORTANT: Microsoft Virtual Server 2005 remote console is only supported with Microsoft Internet Explorer browsers.

IMPORTANT: VMware Remote Console application must be installed on the client machine to launch and view the virtual machine remote console.

Because the Virtual Machine Management Pack is integrated tightly with HP SIM, you can control the virtual machine guest remotely, and to launch the task manager.

Virtual disk detail display

Another management feature is the ability to monitor virtual disk capacity. The Virtual Machine Management Pack provides virtual disk details at the bottom of the virtual machine guest information display as shown in the following figure.

Figure 7. Virtual disk details display
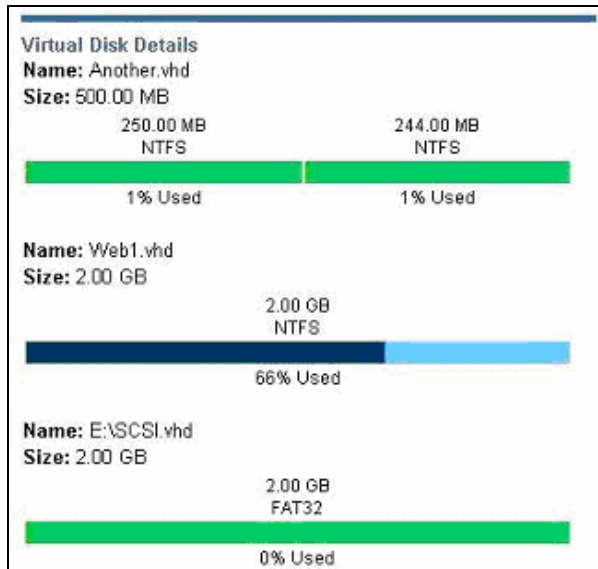
Monitor the virtual disk capacity by reviewing this screen. In this example, the screen calls out the virtual disk details as follows:

- The first virtual disk, Another.vhd, has a 500 MB capacity that has been partitioned. The first partition has a 250 MB capacity, of which 1% is currently used. The second partition has a 244 MB capacity, of which 1% is currently used.
- The second virtual disk, Web1.vhd, has a 200 GB capacity, of which 66% is currently used.
- The third virtual disk, SCSI.vhd, has a 2 GB capacity and has an empty FAT32 partition.

IMPORTANT: The network server does not immediately register changes to the virtual machine guest name, the Internet browser, or security settings. This situation causes inconsistency between HP SIM and the Virtual Machine Management Pack, and possibly affects performance. For the same reason, avoid using multiple management tools to perform actions on virtual machine hosts and guests.

Performance analysis

The Virtual Machine Management Pack reports the total processor utilization on the virtual machine hosts. This utilization includes the processor consumption by all virtual machine guests on the virtual machine host and all other processes running on the virtual machine host.

Virtual machine host performance

To access the Virtual Machine Management Pack console, select **Tools>Integrated Console> Virtual Machine Management Pack** from the HP SIM toolbar. The Virtual Machine Management Pack console displays in a new browser window.

- The left frame of the Virtual Machine Management Pack console displays the tree of virtual machine hosts and guests. The Virtual Machine Management Pack home page displays in the right frame.
- After a node is selected, the right frame displays information for the selected node. The information displays in both text and graphical format. The numbers to the right of the graphs indicate the most recent data collected in the last minute. Graphical data depicts performance for the previous 60 minutes.
- Select a virtual machine host or guest in the left frame to display the virtual machine host or guest information in the right frame. Select a VMM log under the Tools directory to display completed events, running tasks, or scheduled backups.

The following figure shows a Virtual Machine Management Pack virtual machine host console.

Figure 8. Virtual Machine Management Pack host console
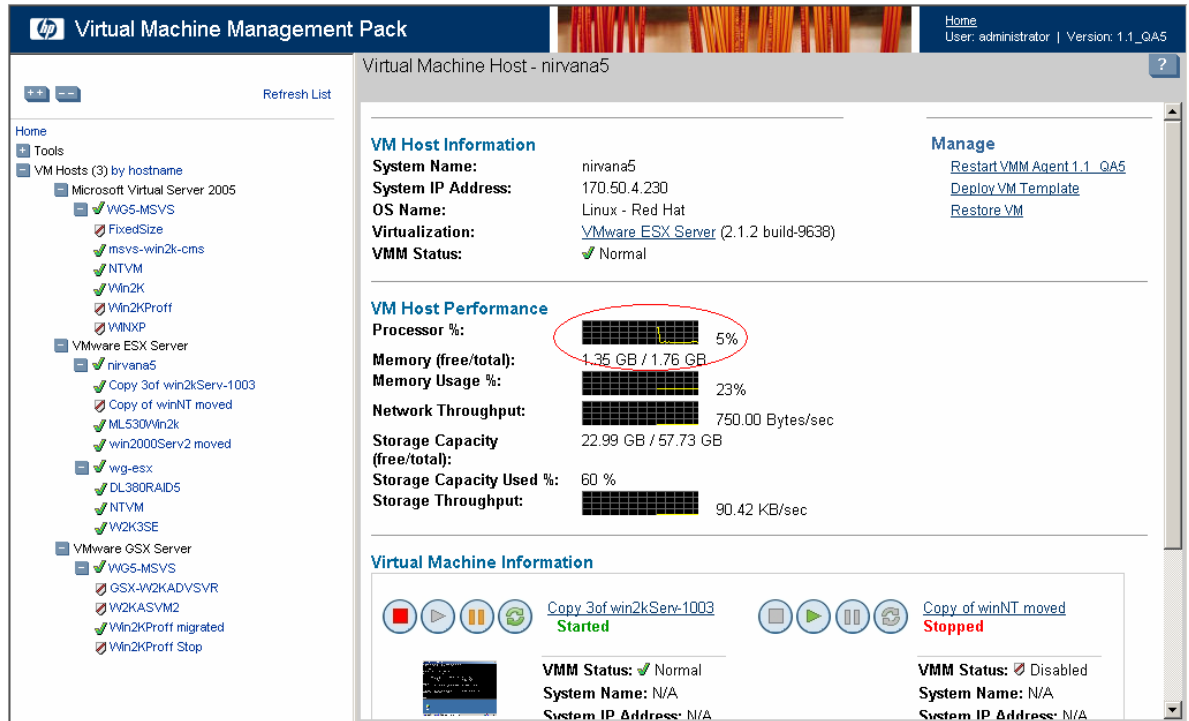
Monitor the virtual machine host capacity by reviewing the information in the right frame. In this figure, the processor utilization (Processor %) is at 5%. As virtual machine guests are added to the virtual machine host, the processor usage will increase and could become a performance issue.

The Virtual Machine Management Pack collects virtual machine guest performance information from the supported virtualization product every minute. The performance numbers give a pretext for why it would become necessary to move or copy a virtual machine guest.

Analyzing virtual machine host performance information

The type of performance information collected by Virtual Machine Management Pack varies according to the virtualization product installed as indicated in the following table. The performance information for the virtual machine host consists of the sum of the metrics for each virtual machine guest along with the virtual machine host.

Table 3. Performance information by virtualization product

Virtualization product	Performance information
VMware ESX Server, VMware GSX Server, and Microsoft Visual Server 2005	Processor %
VMware ESX Server	Memory (free/total)
VMware ESX Server	Memory Usage %
VMware ESX Server and Microsoft Virtual Server 2005	Network Throughput
VMware ESX Server and Microsoft Virtual Server 2005	Storage Throughput

Key performance metrics relevant to virtual machine hosts are derived from different sources, depending on the virtualization product. VMware ESX Server performance metrics are made available through the VMware ESX Server Application Program Interface (API) program. VMware GSX Server and Microsoft Virtual Server metrics are made available through the Performance Monitor (perfmon) program in Windows.

Analyzing virtual machine guest performance information

Virtual Machine Management Pack shows the actual processor consumption of the virtual machine guest on the virtual machine host (that is, how much of the host processor is used by the guest).

With virtual machine guests that run on a single processor (almost all) and are not constrained, the processor utilization reported by the Virtual Machine Management Pack is approximately the same value that would be seen in the Performance Monitor on the guest operating system. For example, if the Performance Monitor showed 50% processor utilization in the guest, the Virtual Machine Management Pack would show approximately 50% processor utilization (usually a bit more).

The processor percentage reported by Performance Monitor is not valid if the virtual machine guest hits resource constraints. Such constraints are either imposed by the virtualization platform or by other virtual machine guests attempting to do work.

As the virtual machine guest processor utilization gets close to the utilization limit, requests to use the processor are rejected by the virtualization platform. The operating system inside the virtual machine guest cannot differentiate this from normal "out of cycles" conditions, and utilization rapidly diverges from the real utilization toward 100%. This phenomenon complicates performance analysis and capacity planning. Similar but unpredictable observations can be made when virtual machines compete for processor resources. See Figure 7 on page 11 for an example.

The following figure shows a virtual machine guest running on a single processor virtual machine host.

Figure 9. Virtual machine guest performance
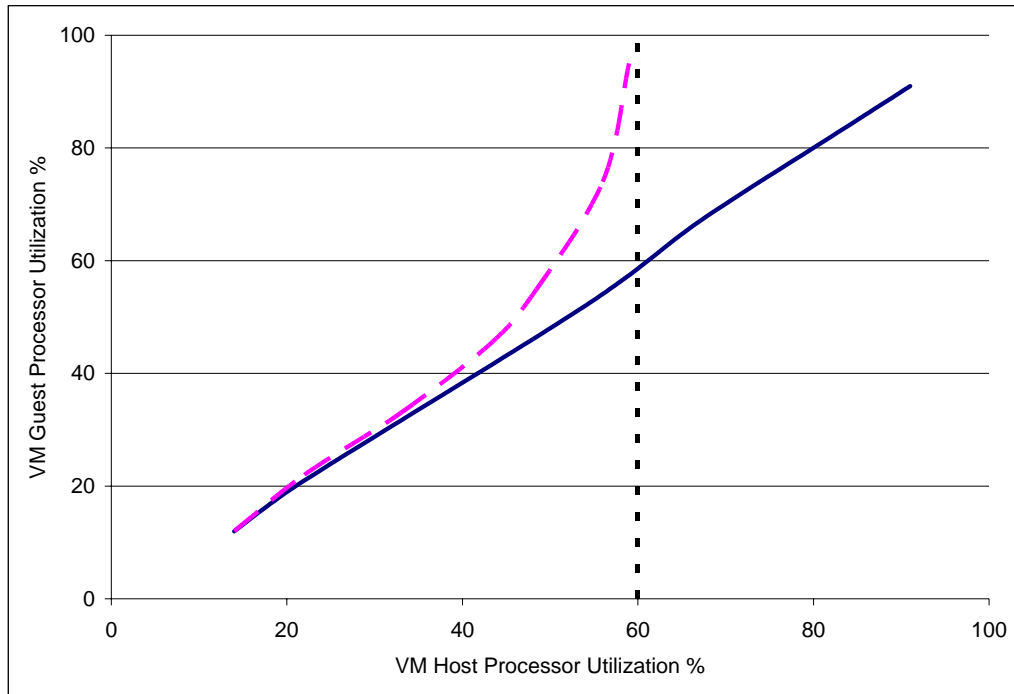
- The horizontal axis is the processor utilization of the virtual machine host where the virtual machine guest resides.
- The vertical axis is the virtual processor utilization as observed from within the virtual machine guest (through Performance Monitor, for instance).
- The solid line shows that when there is no contention for processor resources, the virtual processor utilization of the virtual machine guest tracks closely to the actual processor utilization of the virtual machine host.
- The dashed line illustrates the divergence between the virtual and actual processor utilization when there is contention for the host processor resource. In this case, the virtual processor utilization detected by the guest operating system quickly approached 100% as the actual processor usage on the virtual machine host approached the 60% utilization limit.

The host processor utilization depends on the number of processors. For example, on a system with four processors, a virtual machine guest that used 50% of a processor would use 12.5% of the system processor capacity. (Virtualization overhead and other host processes always cause the actual virtual machine host utilization to be higher.)

NOTE: VMware ESX Server can dynamically reallocate memory and processor resources. These resources are assigned a minimum value, maximum value, and shares per virtual machine guest. The minimum value is the minimum guaranteed resource amount that the virtual machine guest will always have. The maximum value is a fixed upper limit on the amount of resources that a virtual machine guest can consume. A virtual machine guest will never be assigned more resources than the specified maximum, even if resources are available. Shares are a relative weight assigned to a virtual machine guest for resource allocation. Shares determine which virtual machine guests should be assigned a contended resource. For example, a virtual machine guest with twice the shares of another will win

contention for that resource about 66% of the time. Microsoft Virtual Server can also perform dynamic processor allocation. However, VMware GSX Server is incapable of this type of resource arbitration.

By monitoring and analyzing server performance in your virtual environment, you can maintain server efficiency before problems arise by using the Virtual Machine Management Pack copy and move features.

Moving and copying virtual machine guests

Another key differentiator for the Virtual Machine Management Pack is its ability to move and copy virtual machine guests between licensed virtual machine hosts. The entire move and copy capability consists of the user interface to define the parameters of the operation, the integration with HP SIM, and the actual move and copy operations.

NOTE: The Virtual Machine Management Pack supports copying or moving a virtual machine guest that has been configured with VMware Virtual SMP to use more than one processor to another VMware ESX Server only if the target virtual machine host also has Virtual SMP installed and enough physical processors.

NOTE: The Virtual Machine Management Pack will not move or copy virtual machine guests with the following disk types shown in the following table:

Table 4. Disk types not moved or copied by virtualization product

Virtualization product	Disk type
Microsoft Virtual Server 2005	Linked Disk
	Differencing Disk
VMware ESX Server	Physical (RAW) Disk
VMware GSX Server	

Moving a virtual machine guest

Virtual machine guests can be moved from an existing virtual machine host to a new host when the same virtualization technology exists on both the source and target hosts. The Virtual Machine Management Pack simplifies virtual machine guest movement by pre-selecting hosts with the same virtualization layers.

Virtual Machine Management Pack copies the virtual machine guest configuration file from the source virtual machine host to your specified location on the target virtual machine host. The Virtual Machine Management Pack then copies virtual disk files from the source virtual machine host to your specified location on the target virtual machine host. The copied virtual machine guest is then registered to the target virtual machine host.

When the move is complete, the Virtual Machine Management Pack status of the moved virtual machine guest is displayed as Disabled on the new host. Start the moved virtual machine guest as necessary.

NOTE: When a virtual machine guest is moved, the source virtual machine (the old one) is unregistered, so it is no longer accessible to the VMware/VS platform, but the files remain on the host server. You must manually delete those virtual machine guest files. Also, depending on the virtualization product, you might need to manually reconfigure the virtual network connections on the moved virtual machine guest.

Copying a virtual machine guest

Virtual machine guests can be copied from an existing virtual machine host to a new host when the same virtualization technology exists on both the source and target host servers.

When copying a virtual machine guest, first select the target virtual machine host, the target virtual machine name, and the target path for storing the files and then confirm the copy. To begin this process, select the virtual machine guest in the left frame of the VMM console, and click **Copy Virtual Machine** in the Administrate action menu.

In Virtual Machine Management Pack, the steps involved in copying the virtual machine guest to moving a virtual machine guest. The Virtual Machine Management Pack copies the virtual machine guest configuration file from the source virtual machine host to your specified location on the target virtual machine host. The Virtual Machine Management Pack then copies virtual disk files from the source virtual machine host to your specified location on the target virtual machine host. The copied virtual machine guest (new one) is then registered with the target virtual machine host.

When the copy is complete, the Virtual Machine Management Pack status of the new virtual machine guest is displayed as Disabled on the console. Start the copied virtual machine guest as necessary.

NOTE: Depending on the virtualization product, you might need to manually reconfigure the virtual network connections on the new virtual machine guest.

VMM Event log

The Virtual Machine Management Pack displays the completed moving and copying tasks on its Event Log screen. To access the Event Log screen:

- From the Virtual Machine Management Pack left frame, click **Event Log** to view the completed moving and copying tasks for all managed virtual machine hosts and guests.
- From the virtual machine host console, click **Event Log** to view the completed moving and copying tasks for that particular host.

The Virtual Machine Management Pack logs the in-progress moving and copying tasks on its Running Task Log screen. To access the Running Task Log screen:

- From the Virtual Machine Management Pack home page, click **Running Task Log** to view the in-progress moving and copying tasks for all managed virtual machine hosts and guests.

Notes and limitations on moving and copying virtual machine guests

- The Virtual Machine Management Pack copies the virtual machine configuration file and virtual disk files into a single folder for Microsoft Virtual Server 2005 and VMware GSX Server, regardless of their placement on the source virtual machine host.
- The Virtual Machine Management Pack copies all VMware ESX Server virtual disks to a user-selected location. VMware ESX Server definition files are copied into a separate location.
- The Virtual Machine Management Pack does not copy virtual disks mapped to physical devices.
- The Virtual Machine Management Pack does not support movement of virtual machines with differencing files.

- The Virtual Machine Management Pack does not copy virtual network configuration. The virtual machine will retain its virtual network definitions if the named virtual networks are defined on the target virtual machine host.
- The Virtual Machine Management Pack does not copy media images attached to virtual floppy or CD devices.
- The Virtual Machine Management Pack does not delete any files from the source virtual machine host after "Move."

Creating templates and backups

The Virtual Machine Management Pack allows for rapid provisioning in which you can build a reference copy of a virtual machine guest and replicate it as needed. The Virtual Machine Management Pack allows for the creation of templates, or images, of complete virtual machine guest configurations. These configurations include all relevant information needed to create and register a new virtual machine guest on a new virtual machine host with the same virtualization technology. Any existing licensed virtual machine guest can be used to create a template.

IMPORTANT: Virtual machine guests that contain disk types that are not currently supported by the Virtual Machine Management Pack do not support backups.

Creating a template

A key Virtual Machine Management Pack differentiator is that it does not provision only a virtual machine guest configuration in the template. Instead, it provisions both the virtual machine guest configuration as well as virtual disk files containing the guest operating system. You can decide whether to include a preinstalled guest operating system in the template. Should a guest operating system be included, the disks will be stored in a user-defined location

From the virtual machine guest console, select **Create VM Template** to begin the template creation wizard. The wizard will first check whether the virtual machine guest is a valid source for a template. If this is the case, you will be asked for a name under which the template will be stored, and a description of the template, which is optional.

NOTE: Virtual machine hosts that contain disk types not currently supported by the Virtual Machine Management Pack cannot be used as a template source. If the template source contains disks that are not supported by the Virtual Machine Management Pack, the wizard will abort and an error message will appear.

Templates will not allow cross-deployment to other virtualization layers than the one used to create the template. Allowing cross-deployment requires the same functionality used in the HP ProLiant Essentials Server Migration Pack to perform virtual-to-virtual machine (V2V) migrations. For more information about the Server Migration Pack, refer to the Server Migration Pack web site at http://www.hp.com/servers/proliantessentials/smp.

Any existing virtual machine host template can be used to create a new virtual machine guest on one of the virtual machine hosts known to the Virtual Machine Management Pack. During template deployment, you must select a template and modify certain settings before deployment is completed.

The Virtual Machine Management Pack also provides a simple way to create backup copies of virtual machine guests. A backup is a copy of all files associated with a virtual machine guest.

Creating a backup

The Virtual Machine Management Pack enables you to make an immediate backup, or schedule a recurring backup on a daily or weekly basis. Scheduled backups will be stored under the user-defined backup location where each backup is stored in a separate subfolder.

IMPORTANT: During a backup, the virtual machine guest must be either stopped or suspended. If the virtual machine guest is running, it will be automatically suspended and restarted after the backup is completed. Time needed for the backup process depends on the amount of data to transfer. HP recommends that you schedule backups during periods of low usage or specified service maintenance windows.

Usage scenario: Workload optimization

In this scenario, you first display the virtual machine hosts and review the performance data of each host. The following figure shows that the nirvana5 virtual machine host is operating at 90% utilization capacity.

Figure 10. Virtual machine host at 90% capacity
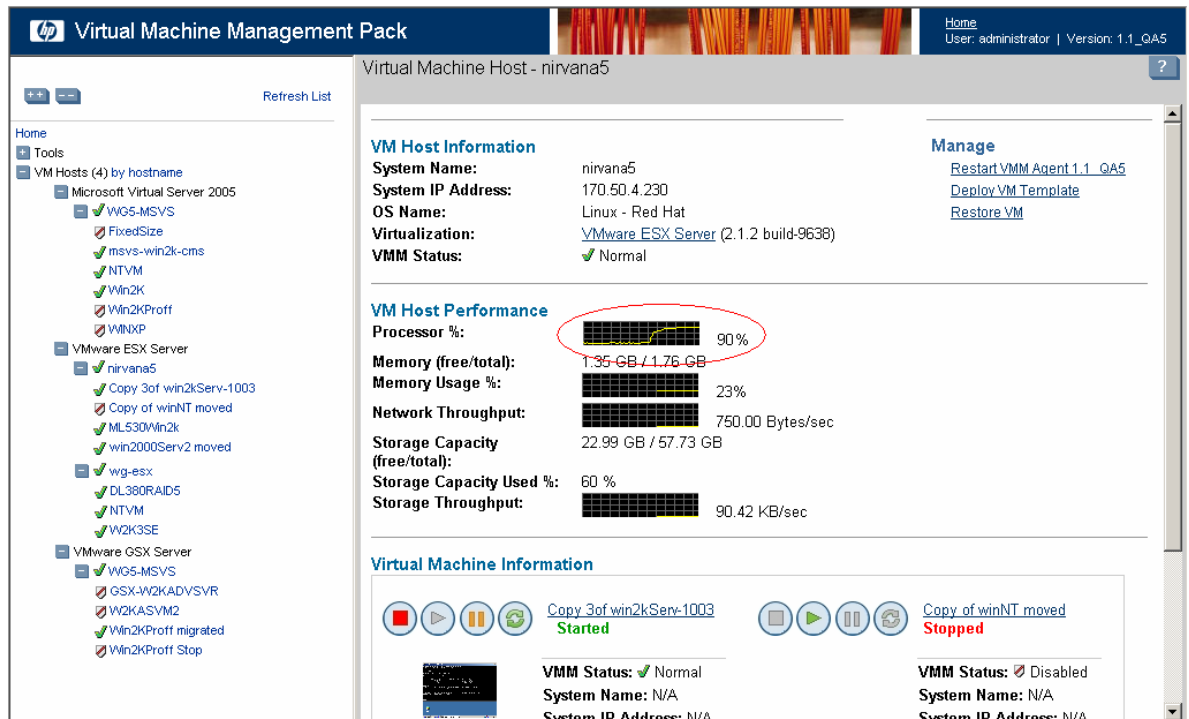
To balance the utilization capacity of the four virtual machine hosts, you must redistribute the virtual machine guests from virtual machine host nirvana5 to the other VMware ESX Server virtual machine host. You accomplish this redistribution by moving virtual machine guests to achieve the desired configuration.

Upon completion of this task, verify the association tree in the left panel of the virtual machine host console. In addition, verify the host performance status. The following figure shows that the virtual machine guest ML530Win2k has been moved from the VMware ESX Server virtual machine host nirvana5 to virtual machine host wg-esx. The figure also shows that virtual machine host nirvana5 now operates at 25% utilization capacity as a result of this move.

Figure 11. Virtual machine host at 25% capacity
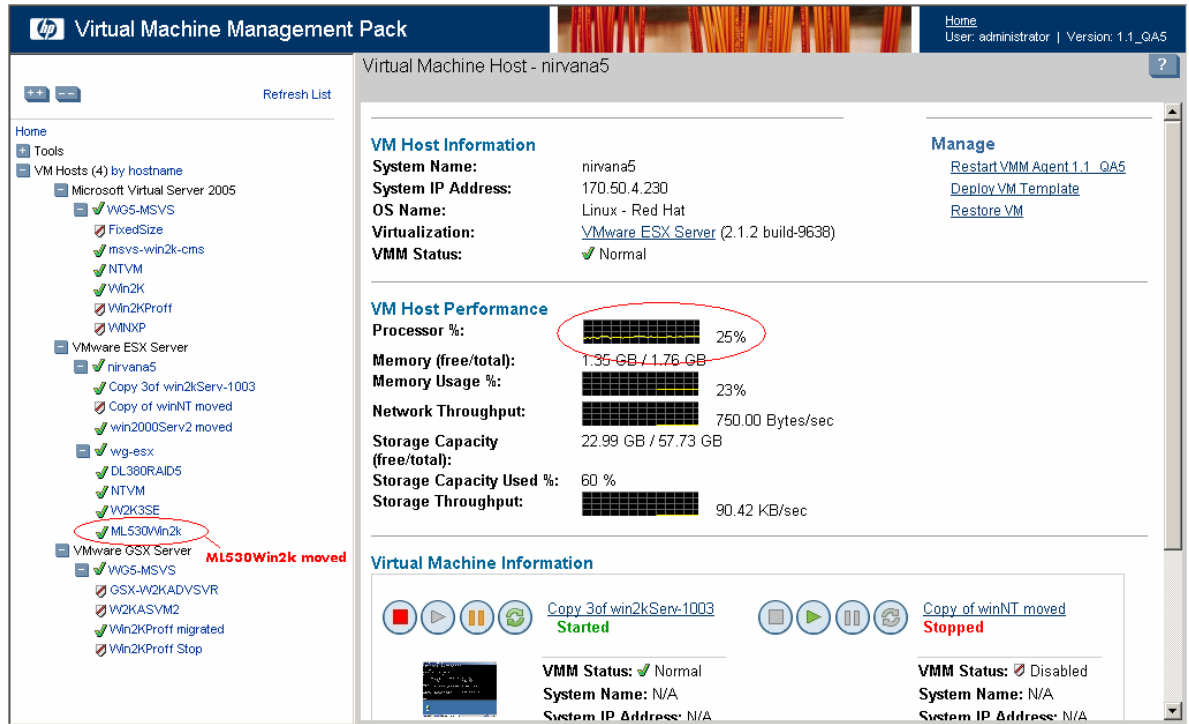
Conclusion

Today's competitive environment demands maximum efficiency at minimum cost. Virtual server technology helps companies save money and resources by optimizing all the server resources available. HP's Virtual Machine Management Pack stands apart as the premier solution for several reasons.

- Integration with HP SIM—the Virtual Machine Management Pack installs and runs on the HP SIM CMS. The Virtual Machine Management Pack displays the status of virtual machine hosts and guests in the HP SIM console.
- Virtual machine movement—the Virtual Machine Management Pack can move and copy virtual machine guests from one virtual machine host to another in response to performance or hardware concerns. You can move any virtual machine from one virtual machine host to another when the virtualization platform, such as Microsoft Virtual Server 2005 or VMware, is the same on both hosts.
- Rapid provisioning—the Virtual Machine Management Pack gives you the ability to perform rapid provisioning of both the virtual machine guest and the guest operating system. The Virtual Machine Management Pack lets you create templates for easy virtual machine guest creation and registration.
- Heterogeneous virtual environment support—the Virtual Machine Management Pack provides support to Microsoft Virtual Server, VMware ESX Server, and VMware GSX Server virtual environments.

These benefits provide you with simplified development, reduced cost and complexity, and faster response times.

Glossary

CMS—HP SIM Central Management Server.

VMware ESX Server—VMware ESX Server product that provides a virtual machine solution.

VMware GSX Server—VMware GSX Server product for Windows- or Linux. This product runs as an application inside a host operating system (Windows or Linux) to provide a virtual machine solution.

guest operating system—A reference to a distinct operating system instance running in a virtual machine.

host operating system—A reference to the operating system running on the physical host/server.

legacy operating system—An older operating system, often incompatible with up-to-date hardware. Virtual machines allow legacy operating system to run on new hardware.

virtual machine—Essentially a computer within a computer, implemented in software. A virtual machine virtualizes a complete hardware system, from processor to network card, in a self-contained, isolated software environment, enabling the simultaneous operation of otherwise incompatible operating systems. Each operating system runs in its own isolated software partition.

virtualization—The representation of hardware through software. Virtual machines are an example of virtualization, as are virtual memory and virtual disks.

Microsoft Virtual Server 2005—Microsoft's host operating system that provides a virtual machine solution.

For more information

For more information about the Virtual Machine Management Pack, refer to:

- http://www.hp.com/servers/proliantessentials/vmm
- *HP ProLiant Essentials Virtual Machine Management Pack Quick Setup Poster*
- *HP ProLiant Essentials Virtual Machine Management Pack Support Matrix*
- *HP ProLiant Essentials Virtual Machine Management Pack User Guide*

For more information about the Server Migration Pack, refer to:

- http://www.hp.com/servers/proliantessentials/smp
- *HP ProLiant Essentials Server Migration Pack Quick Setup Poster*
- *HP ProLiant Essentials Server Migration Pack User Guide*

For more information about HP Systems Insight Manager, refer to:

- http://www.hp.com/go/hpsim
- *HP Systems Insight Manager Help Guide*
- *HP Systems Insight Manager Installation and User Guide*