Best practices for VMware ESX Server 2.0 on HP ProLiant servers

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Abstract

This document contains Best Practice information for VMware software running on HP ProLiant servers. Specifically, it provides instructions and best-practice methods for installing VMware ESX Server 2.0 on HP ProLiant BL, DL, and ML Series servers. Two installation methods are discussed. The first method employs the HP Integrated Lights-Out (iLO) CD-ROM installation while the other centers around the HP ProLiant Essentials Rapid Deployment Pack (RDP).

Future revisions to this document will include best practices for HP Insight Manager (IM) Agents, Virtual Machines (VM), Storage, and other topics.

This guide is intended for Solutions Architects or Engineers tasked with defining guidelines and processes around the development, deployment, and operation of virtualization solutions for the purpose of consolidation. The reader should be familiar with networking in a heterogeneous environment, and have a working knowledge of HP ProLiant Essentials Rapid Deployment Pack as well as virtualization concepts.

This guide does not provide step-by-step instructions to install VMware software. A guide is available from VMware to provide this information. The ESX Server 2.0 Install Guide from VMware is located on the root of the ESX Server 2.0 CD.

System requirements

The following section defines the hardware, software and firmware requirements for deploying VMware ESX Server 2.0 on the BL, ML, and DL line of HP ProLiant servers.

Hardware requirements

For a list of the HP ProLiant servers qualified for VMware's ESX Server 2.0 see: VMware Hardware Alliance Partners, http://www.vmware.com/hp

Additional information on which HP ProLiant servers might be best for your organization can be found in the section titled Installation methods.

Software requirements

The following component list (Table 1) was used for testing purposes during the preparation of this document; it should be considered a minimum requirement.

Table 1. Software requirements

NFS Server	HP Rapid Deployment Pack Server	target (deployment) server
	HP SmartStart 6.4 or later	HP SmartStart 6.4 or later
	Microsoft Windows Server 2000 sp3	
Linux RH 8.0	HP Rapid Deployment Pack 1.40	

Firmware requirements

If the HP Integrated Lights-Out (iLO) method of installation is used, the firmware revision must be capable of supporting Virtual CD in the HP iLO interface. The HP iLO ROM revision must be 1.4 or greater to support Virtual CD: this ROM version can be used on all applicable HP ProLiant servers.

HP recommends upgrading to the latest System ROM revisions supported by the hardware platform.

ROMs that are currently shipping on all HP ProLiant servers should operate correctly with the RDP installation method. A matrix of supported products is located at: ftp://ftp.compaq.com/pub/products/servers/management/rdp/support-matrix.pdf.

ROM based setup utility changes

The following section describes suggested changes in the ROM Based Setup Utility (RBSU) to support VMware ESX Server 2.0

Hyper-threading

Hyper-Threading is an embedded processor technology that allows an operating system (OS) to view a single CPU as two logical units. The processor is capable of managing multiple tasks between different requesting applications.

Although the potential advantages of Hyper-Threading are good, VMware does **NOT** recommend its use with VMware ESX Server.

To disable Hyper-Threading, enter the RBSU during system POST by pressing **F9**, and then select **Advanced Options** from the Main Menu. Select Processor Hyper-threading; then select **Disable**. Exit and save your changes by pressing **ESC** followed by **F10**.

Installation methods

The typical method of deploying VMware is via the local CD-ROM drive. This method, and the actual step-by-step installation instructions will not be discussed as it is covered thoroughly in the install guide found at www.vmware.com, specifically, Installing the Software on the Server, http://www.vmware.com/support/esx2/doc/esx20install_server_install.html and on the root of the VMware ESX Server 2.0 CD. However, two alternative methods may be employed to install VMware on HP ProLiant servers. The first method involves the HP Integrated Lights-Out (iLO) virtual CD-ROM, the second centers around RDP. The iLO virtual CD-ROM method is the simpler of the two methods to complete, but may not be suited for a large enterprise-based deployment of VMware.

HP iLO virtual CD-ROM

The HP iLO virtual CD-ROM process requires the HP iLO ROM version 1.4 (or later) in order to function. Once this ROM upgrade is in place, the installation process is the same as would be done from a local console.

HP iLO on blade servers

Although the HP iLO Virtual CD-ROM installation method works on the HP ProLiant ML and DL series servers, it is particularly useful on the HP ProLiant BL series blade servers, because no physical CD-ROM drive ships with these products.

The HP iLO virtual CD-ROM method of installation requires very little additional expense on the part of the customer. All blade servers (capable of accepting the HP iLO ROM version 1.4 ROM upgrade) ship with the advanced HP iLO functionality required to carry out a virtual CD installation. When considering the deployment of a small number of VMware servers, the HP iLO virtual CD method is preferable. However, if a large number of VMware servers are to be deployed using this method, configuration issues may arise. In addition, each server would require its own host computer (with a local CD-ROM) to be accessed as a virtual CD. Because the virtual CD cannot be shared between multiple deployment target servers simultaneously, this process becomes cumbersome in a large corporate environment, especially where great distances separate potential target servers. In this instance, using the RDP method is preferable.

The HP ProLiant Essentials Rapid Deployment Pack

The RDP method of deployment requires Linux NFS (Network Files System) services, DHCP, and an RDP server.

The deployment of VMware via this method is more complex than using the HP iLO virtual CD. This process uses HP Foundation Pack for HP ProLiant servers plus the HP ProLiant Essentials Rapid Deployment Pack, which contains the Rapid Deployment Pack software. This pack is typically shipped with blade servers, but must be purchased for the HP ProLiant ML and DL lines of servers.

This method of deploying VMware involves a longer lead-time as NFS, HP Rapid Deployment Pack, and DHCP services must all be in place for this process to function.

The target server must boot via PXE and find a DHCP server. Once an IP address is assigned, a script can be implemented on the RDP server. Finally, the NFS server acts as a remote mount point from which the VMware installation files can be loaded.

For more information on HP ProLiant Essentials Rapid Deployment Pack, consult the following link: HP.com - ProLiant Essentials Rapid Deployment Pack - Bridge page, http://www.hp.com/servers/rdp.

Sequence of events

The following list is a sequence of events for the VMware installation process (via CD, HP iLO, and HP ProLiant Essentials Rapid Deployment Pack). The following section presumes that the intended target server is functional and that any installation prerequisites have been met.

Install sequence from CD-ROM

1. Insert the VMware ESX Server 2.0 CD
2. Follow the standard ESX CD install procedure via the Remote Console

Install sequence for iLO virtual CD-ROM

1. Verify correct HP iLO ROM version 1.4 or greater
2. Connect to the HP iLO utility port
3. Enable the Virtual CD ROM
4. Insert the VMware ESX Server 2.0 CD
5. Launch a Remote Console session
6. Restart the server
7. Follow the standard VMware ESX CD install procedure via the Remote Console

Install sequence for HP ProLiant Essentials Rapid Deployment Pack

Note: All servers in the configuration should be on the same subnet, and not separated by any packet filtering devices, such as firewalls.

…on the RDP Server

1. Install and configure RDP- installing all Linux options. (This can be done using the HP Rapid Deployment Pack for Microsoft Windows or Linux versions.)

Note: The procedure has not been tested using the Linux version of HP ProLiant Essentials RDP.

…on the Linux/NFS Server

1. Install and configure NFS using the procedures in this guide.
2. Copy the contents of the VMware ESX Server 2.0 CD to a source directory on the Linux/NFS server
3. Copy the ks.cfg file into the source location

…on the Target (Deployment) Server

1. Install HP SmartStart on the target server
2. Configure the server to PXE boot
    a. Select **F12** on POST for systems with RBSU
    b. On systems without RBSE, use the System Config utility (version 5.0 or higher)
3. Reboot
4. Select **BootWorks** on POST

…on the RDP Server

1. Click and drag the desired script onto the target server

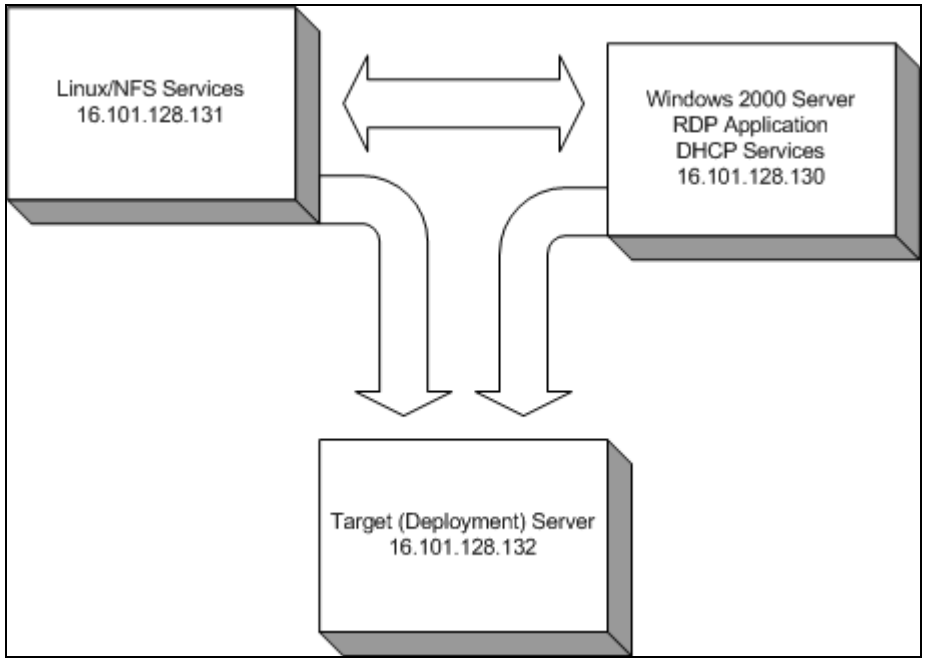
…on the Target (Deployment) Server

1. The BootWorks process should reboot the target server several times
2. The VMware installation process should complete without intervention

HP ProLiant Essentials Rapid Deployment Pack install diagram

Following is a diagram of the configuration used to create these procedures, Figure 1. Your configuration will vary based on your network environment.

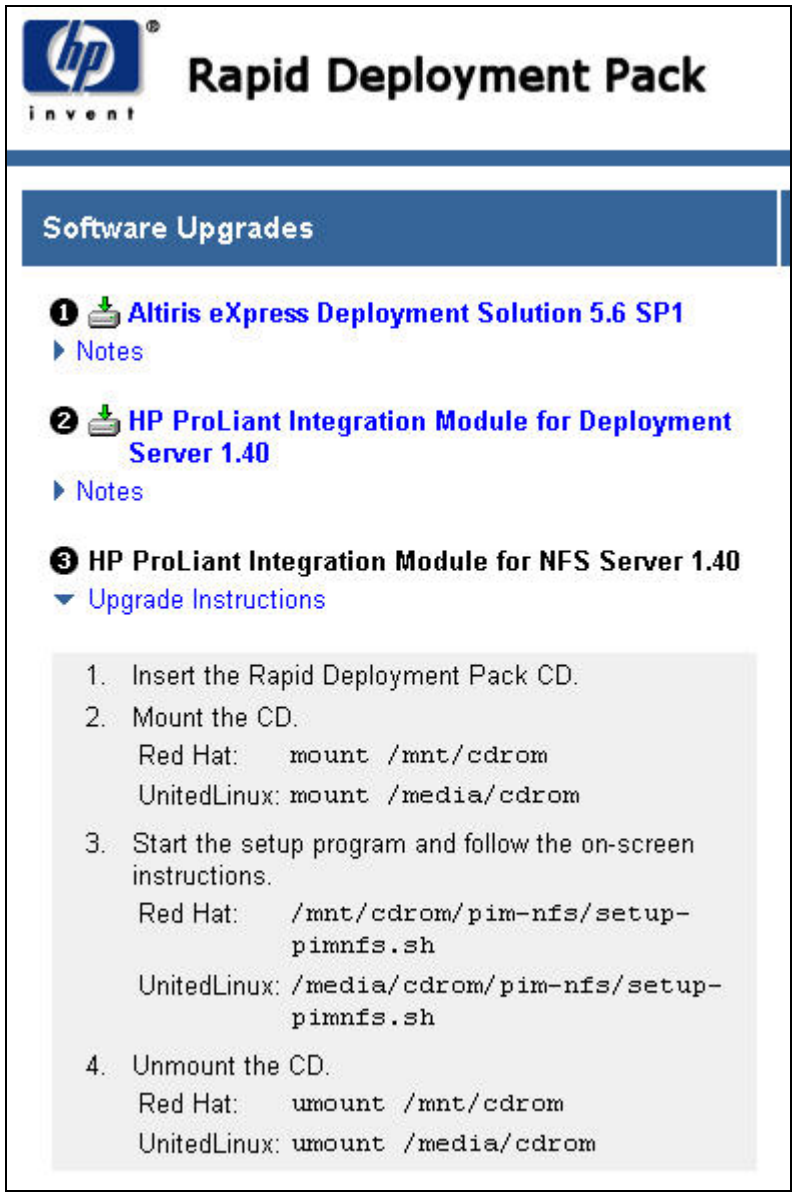
Figure 1. HP ProLiant Essentials Rapid Deployment Pack network environment



Rapid Deployment Pack configuration

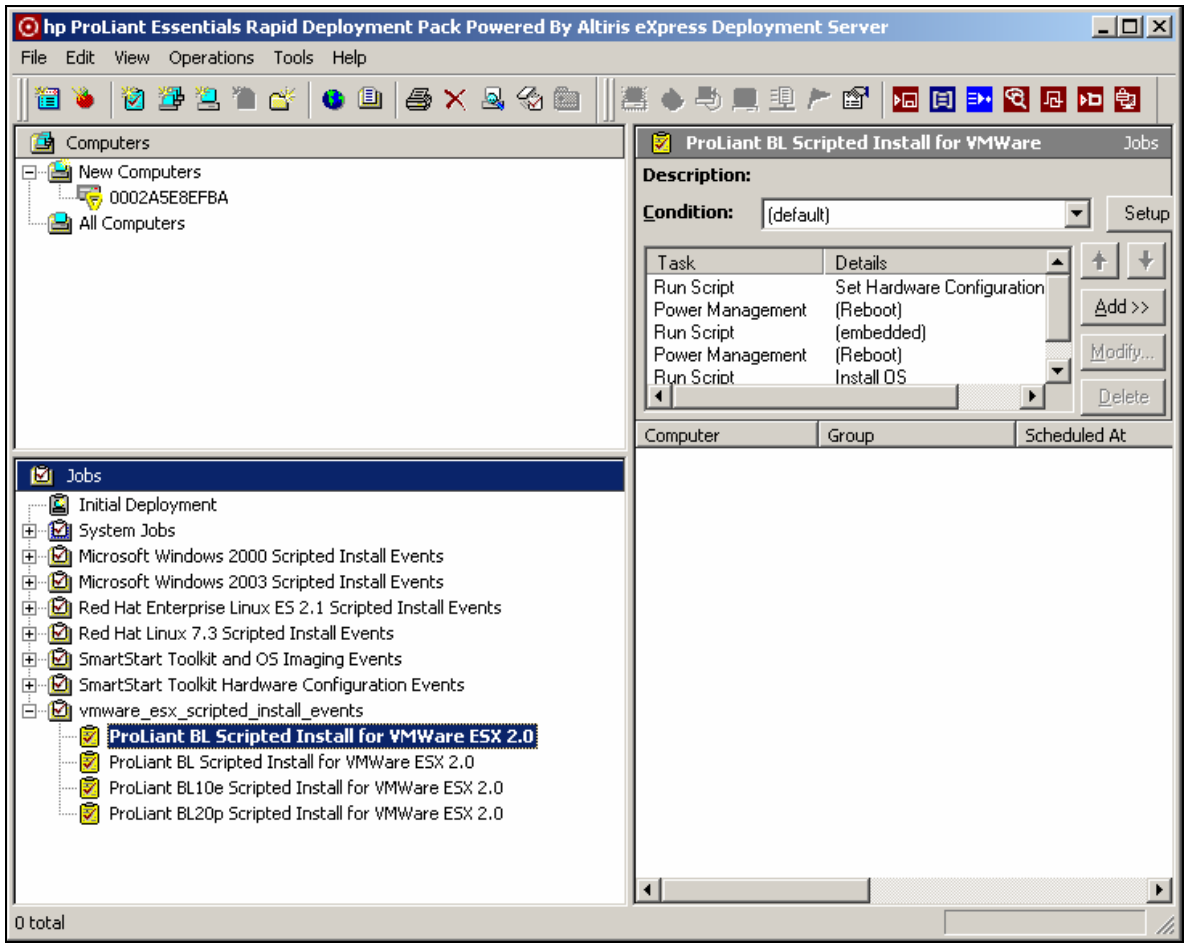
The following is a brief description of the RDP installation process required for interoperation with NFS services. Figure 2 depicts the three installation steps in HP ProLiant Essentials Rapid Deployment Pack; all three steps must be completed.

Figure 2. HP ProLiant Essentials Rapid Deployment Pack –three essential steps



Following is an example of the user interface in HP ProLiant Essentials Rapid Deployment Pack.

Figure 3. HP ProLiant Essentials Rapid Deployment Pack user interface



To complete the RDP install of VMware, copy an existing script in HP ProLiant Essentials Rapid Deployment Pack, edit and rename it to indicate the target hardware type and event. Example: Installing VMware ESX Server 2.0 on BL40p.

The hardware detection section of these scripts is machine specific. Because of this, it is best to copy and edit an existing script for your specific server. Rename the batch file that the script calls as its last operation. For our example, the Linux Red Hat 7.3 script was copied and modified. The original bat filename was rh73.bat. This file was copied and renamed to vm20.bat. This was done to clarify the path to the install files on the NFS server.

Several files required to complete the install process, (not found in the shipped version of HP ProLiant Essentials Rapid Deployment Pack) are the Kickstart file, vmlinuz and initrd.img

Note: You may see error messages at the end of the install, these messages can be safely ignored.

Support files

Most of the support files for the RDP installation can be modified from existing files in HP ProLiant Essentials Rapid Deployment Pack. The Kickstart file (ks.cfg) can be extracted from the VMware CD. The ks.cfg must be the same version as the vmlinuz and initrd.img files used to boot the target server during the deployment process. In order to guarantee this, complete the following:

The Linux boot files

This procedure should be performed on the RDP server.

In the folder Program Files\Altiris\express\Deployment Server\Deploy\cds\compaq\ss6.40\(OS),
copy the directory structure from the (OS) down. This should contain
\(OS)\dosutils\autoboot
In the example case, the rh73 script was used as a template in RDP, the following directory; \rh73\dosutils\autoboot was copied and renamed to **vm20**\dosutils\autoboot
These steps may have already been completed to create the VMware deployment script in RDP.

The Kickstart file

The following procedure explains the extraction of the ks.cfg file from the VMware ESX CD. This procedure should be performed on the NFS server.

Extracting the Kickstart file from the ESX Server 2.0 CD

1. Mount the ESX CD and navigate to the images directory
2. Make a temporary directory /tmp/bootnetimg
3. Mount the bootnet.img to your temporary directory (mount -o loop bootnet.img /tmp/bootnetimg)
4. Navigate to your temporary directory and copy the ks.cfg file into the source directory
5. Copy vmlinuz and initrd.img to the \vm20\dosutils\autoboot (on the RDP server) created in the previous procedure - overwrite the exiting files
6. Modify the ks.cfg file to suit your needs (NFS server, partition information, etc)

The Kickstart file, ks.cfg, should be copied into the source directory (our example): /usr/cpqrdp/ss6.40/vm20 on the NFS server.

WARNING: The Kickstart file is modified to complete the VMware ESX Server 2.0 install without prompting the user. It is configured to auto-partition the target deployment server, and configure networking for DHCP. However, the partitioning commands are overridden in ESX 2.01 with default values. Therefore, all partitions must be entered manually during the deployment process.

Note: Detailed information on Kickstart file configuration can be found at: http://www.redhat.com/

The HP ProLiant Essentials Rapid Deployment Pack install script

The *ProLiant BL scripted install for VMWare ESX Server 2.0 script* file has been modified from an existing script in HP ProLiant Essentials Rapid Deployment Pack, the modifications are minimal and simply contain the variable names used for the purpose of this example. Below is the script used in our example:

```
rem Install OS

rem bootwork unload

set nfsserver=16.101.128.131

set ss=ss.640

set os=vm20

set ksfile=ks.cfg

call f:\deploy\tools\scripts\vm20.bat
```

The VM20.bat file

The vm20.bat file was created from the rh73.bat file currently shipping in RDP. The file contents are identical.

Network File System configuration

The Network File System (NFS) is configured on a Linux Red Hat 8.0 server. The Linux version is preferred over the Microsoft Windows version of NFS because of stability. This process has not been tested under the Microsoft Windows NFS software.

NFS is used during the RDP installation to provide a source location for all the required VMware ESX installation files. The files are nearly an exact copy of the VMware ESX Server 2.0 CD, with one minor exception. Once the files from the VMware CD have been copied to the source location, a symbolic link must be created from the VMware directory to a RedHat directory in that same location. This satisfies a requirement for Anaconda to access the RedHat directory during the installation process. In this example, both the VMware and RedHat directories are located in /usr/cpqrdp/ss6.40/vm20

Installation procedures

Following are several step-by-step procedures needed to install VMware on an HP ProLiant server via HP ProLiant Essentials Rapid Deployment Pack. Not every procedure required to complete this function is explained here. Procedures such as the installation of Linux RedHat 8.0, Microsoft Windows 2000, and the configuration of DHCP services are not discussed in the document.

Configuring NFS services

The following is the suggested procedure to configure the NFS services on a Linux server. This procedure uses directory names that are assigned to variables to complete the process correctly. These names can be changed. However, if they are changed, the names must remain consistent throughout the procedure to ensure proper operation.

1. Install and configure Linux Red Hat 8.0
2. Insert the VMware CD - it should automount
3. Login as root
4. If the CD does not automount, type **mount /mnt/cdrom**
5. Type **mkdir /usr/cpqrdp mkdir /usr/cpqrdp/ss.640/vm20**
6. Type **mkdir /usr/cpqrdp/ss.640/vmware**
7. Type **cp -r /mnt/cdrom/* /usr/cpqrdp/ss.640/vm20**
8. Wait for the CD to copy all files to /vm20
9. Type **cd /usr/cpqrdp/ss.640/vm20**
10. Type **ln – s VMware RedHat**
11. Type **vi /etc/exports**
12. Insert the source location and IP address of the RDP server

    (For the purpose of the example configuration): /usr/cpqrdp/ss.640/vm20 16.101.128.130 (ro)
13. Save and Exit exports
14. Type **umount /mnt/cdrom**
15. Type **/etc/init.d/iptables stop**
16. Type **/etc/init.d/portmap start**
17. Type **/etc/init.d/nfs start**

VMware installation on target server

Following is a step-by-step procedure to install VMware onto the target deployment server.

Prerequisites

- All servers should be configured with an IP address via DHCP services
- The Linux/NFS services should be running
- All support files should be in place
- The RDP application should be installed and operational
- The target deployment server should have the correct System Config and ROM revisions

The following should be performed on the RDP server.

1. Delete any existing scripts that may be on the target deployment server in the RDP interface

The following should be performed on the target deployment server

2. Enable PXE boot via F12 on POST or the RBSU (on older systems, enter the System Config – Hardware Configuration – View or Edit Details)

3. Exit the System Config and reboot the deployment server

4. The BootWorks menu should display on the POST

The following should be performed on the RDP server

5. Open RDP

6. When the target server number displays in the upper left panel of the RDP interface, click and drag your deployment script onto the target server (Figure 3)

7. The target server will reboot several times and complete the unattended install

8. Reboot the server when this portion of the install has completed, finalize the installation via the VMware MUI as directed by the *ESX Server 2.0 Installation Guide*.

iLO virtual CD installation

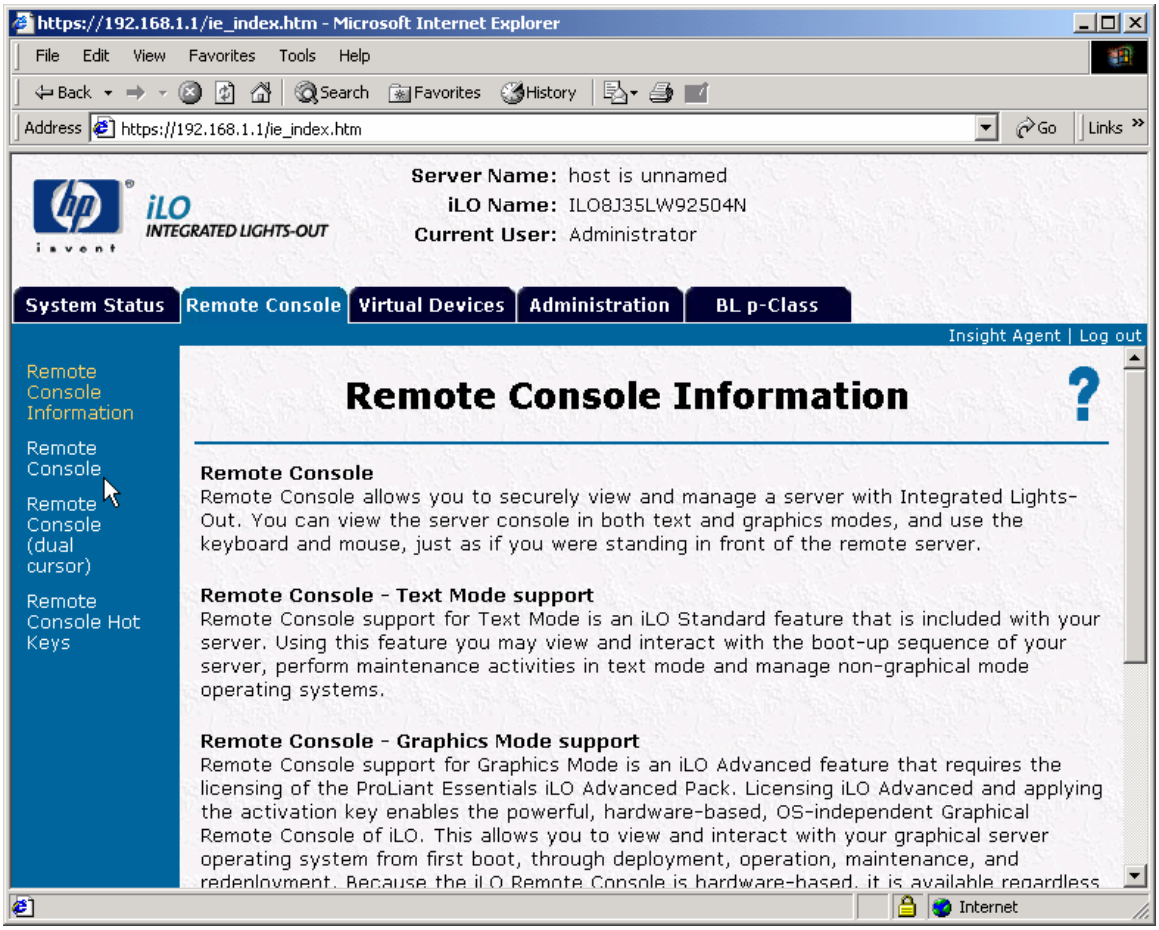
Prerequisites

The correct version of HP Integrated Lights-Out (iLO) ROM should be installed.

A host PC with a local CD-ROM should be available.

1. Connect a remote host via an RJ45 cable to the HP Integrated Lights-Out (iLO) port
2. Configure the remote host to use IP 192.168.1.2
3. Once in the iLO console, enable the virtual CD-ROM under Virtual Media
4. Insert the VMware ESX Server 2.0 CD into the host PC
5. Launch a Remote Console session see Figure 4.

Figure 4. Launch remote console



6. Restart the blade server via the virtual power buttons or the main power button
7. The blade boot cycle should find the CD and start the install process
8. Follow the standard VMware ESX Server 2.0 CD install procedure via the remote console

For more information

For installation instructions see the following guides:

For more information on HP ProLiant Essentials Rapid Deployment Pack, consult the following link: HP.com - ProLiant Essentials Rapid Deployment Pack - Bridge page, http://www.hp.com/servers/rdp.

For a list of hardware platforms qualified with VMware ESX Server 2.0 see VMware Hardware Alliance Partners, http://www.vmware.com/hp

HP ActiveAnswers for VMware for Server Consolidation and Virtualization, http://h71019.www7.hp.com/5360-6-100-225-1-00.htm

VMware *ESX Server 2.0 Installation Guide*, http://www.vmware.com/pdf/esx2_install.pdf

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