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Configuring a Pre-eXecution Environment (PXE) using Red Hat Linux 7.0 on Compaq ProLiant Servers

Abstract: This integration note discusses configuring a Pre-eXecution Environment (PXE) using Red Hat Linux on Compaq ProLiant Servers.

The following topics are covered in detail throughout this integration note:

- Setting up a Red Hat Linux operating system including the prerequisites and minimum requirements
- Preparing the Red Hat Linux server
- Installing the Red Hat Linux software
- Launching the PXE for Red Hat Linux

The Appendix has a listing of Compaq web resources and other helpful websites for the Linux operating system.

In addition to this integration note and for current information about Linux visit http://www.compaq.com/linux/.

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Notice

Configuring a Pre-eXecution Environment (PXE) using Red Hat 7.0 Linux on Compaq ProLiant Servers Integration Notes prepared by OS Integration Engineering

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Setting up a Red Hat Linux Operating System Image

Red Hat Linux and many other Linux distributions now support the Pre-eXecution Environment (PXE). PXE can be used to install the operating system, or create a diskless client. These directions were written using Red Hat 7.0 Linux, however other distributions will work as well, albeit with minor changes in paths and filenames.

This link downloads original, older documentation for Red Hat produced by Intel: ftp://download.intel.com/ial/wfm/pxesdklinux.pdf.

Additional information on the Linux operating system is also available here: http://www.linuxdocs.org.

Prerequisites for Red Hat Linux

A separate DHCP or BOOTP server must be running on the same network when using Linux as a PXE server. The operating system is not an issue; any operating system will suffice. The Linux PXE service cannot communicate to the DHCP service on the same server, hence the need for a separate machine. The Linux PXE server requires at least 4 GB (gigabyte) of available hard disk space.

Due to the way the client interacts with the server, setting up a Red Hat Linux PXE server requires downloading multiple files. The Red Hat source package contains the PXE server and all the code bits necessary for Linux to boot from a boot disk image on a Linux PXE server.

If you need more information on setting up and using Linux, browse the documentation at the Red Hat website http://www.redhat.com/index.html or at http://www.linuxdocs.org.

Prerequisites and Minimum Requirements

A separate DHCP or BOOTP server must be running on the same network segment. See Table 1 for server hardware machine requirements for running Red Hat 7.0 Linux.

Table 1. Server hardware requirements

Red Hat 7.x Linux Server
Pentium or Pentium II 200-MHz or faster processor (Pentium 166 minimum).
64 megabytes (MB) of RAM (96-128 MB preferred).
At least 4-gigabyte (GB) free hard drive space
10 Mb (megabits)/second network adapter (100 Mb megabits/second recommended).
CD-ROM drive.
A separate DHCP or BOOTP server must be running on the same network segment.

See Table 2 for client machine requirements for Red Hat 7.0 Linux.

Table 2. Client machine requirements

Red Hat 7.x Linux
PXE-enabled personal computer with a minimum PXE revision of NetPC.99c and a minimum of 64 MB RAM.
System must be setup to boot from the network before HDD.
Active DHCP server on the network so the client can acquire an IP address.

Figure 1 shows a typical setup for Red Hat 7.0 Linux including the servers and the client target machine.

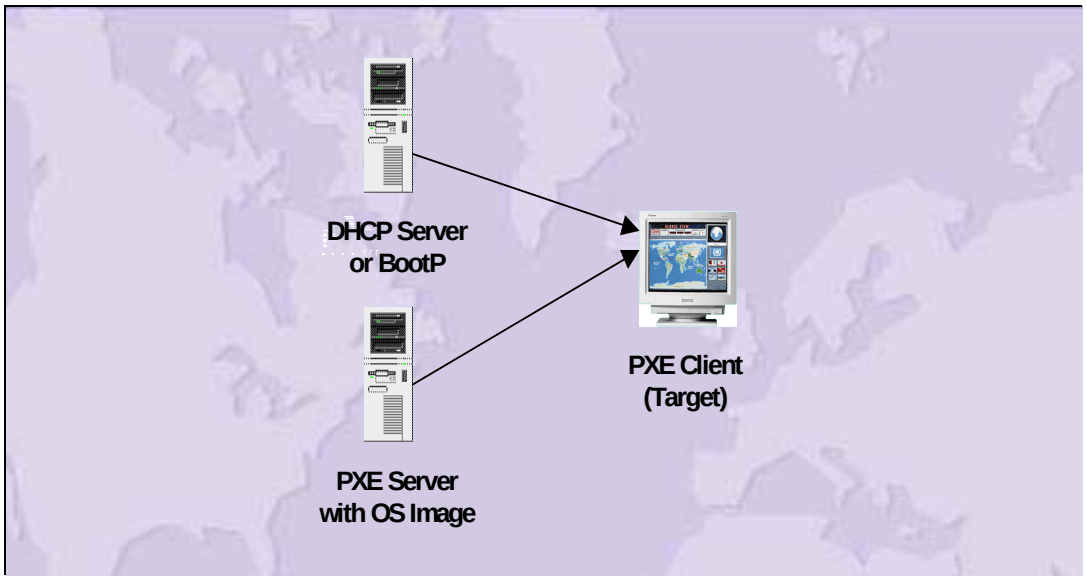

Figure 1. Typical PXE setup for Red Hat 7.0 Linux

Preparing for a Red Hat Linux PXE Server

Before proceeding with the PXE server setup be sure to install Red Hat Linux with the following aspects.

- FTP support
- C and C++ Development
- Static IP Address
- Red Hat Source (RPMS, specifically, the PXE RPM)

The PXE package for Red Hat contains the Preboot eXecution Environment server and code bits needed for Linux to boot from a boot disk image is available on your Red Hat install and source disks or from the following link: http://rpmfind.net/linux/rpm2html/search.php?query=pxe.

Setting Up the Linux PXE Server

After installing a static IP address, allowing for both FTP support and software development support, setup the PXE server by following the steps detailed in the following sections.

Software Installation

The following instructions specify paths and filenames that are correct in most cases. It is possible, with different versions of Red Hat and different installations that the user will have to adjust the directions for these differences.

1. Install the PXE software by doing the following.

   Insert Red Hat 7.0 Disk 2 (Binary CD) into CD-ROM drive:

   ```
   Type  [mount /dev/cdrom /mnt/cdrom]
         [rpm –Uvh /mnt/cdrom/RedHat/RPMS/pxe-0.1-20-i386.rpm]
         [umount /mnt/cdrom]
   ```

   Insert Red Hat 7.0 Disk 4 (Source CD) into CD-ROM drive:

   ```
   Type   [mount /dev/cdrom /mnt/cdrom]
          [rpm –Uvh /mnt/cdrom/SRPMS/pxe-0.1-20-scr.rpm]
          [umount /mnt/cdrom]
   ```

2. Add the following lines to /etc/services:

   ```
   Type  [mtftp 1759/udp]
         [pxe  67/udp]
         [pxe  4011/udp]
   ```

3. Add these lines to /etc/xinetd.d before “includedir /etc/xinetd.d:

   ```
   Type  [service mtftp]
         [     {]
         [socket_type=dgram]
         [wait=yes]
         [user=root]
         [server=/usr/sbin/in.mtftpd]
         [server_args=/tftpboot]
         [     }]
   ```

4. Start the PXE Deamon on reboots in level 2, 3, 4

   ```
   Type  [cd /etc/init.d/]
         [chkconfig –-level 234 pxe on]
   ```

5. Add these lines to the end of your /etc/rc.d/rc.local file:

   ```
   Type  [route add –host 255.255.255.255 eth0]
         [route add –net 224.0.0.0 netmask 224.0.0.0 eth0]
   ```

6. Test the PXE server by restarting the server. Upon restart, boot up a PXE enabled client.

   The client’s PXE boot process should receive an IP address from DHCP.

7. Press **F8** when you see the following:

```
Press <F8> to view menu...
```

A PXE boot menu displays stating
```
Local Boot
Linux Install
```

8. Select Linux Install and press <Enter>. You should see the following text appear on the screen.

```
MD w.x.y.z
BOOT SERVER IP: w.x.y.z
MTFTP..
Intel Linux NBP, PXE-2.0 Beta-x (build nnn)
Downloading linux kernel image
PXE-T01: File not found.
```

If you see this message, you configured the PXE server and TFTP/MTFTP daemons correctly. The next step is to put the proper boot images in place.

9. Insert the Red Hat CD-ROM #1
10. Insert an erasable floppy diskette
11. Perform the following to copy the boot images:

```
Type     [cd /usr/src]
         [tar –xzf redhat/SOURCES/pxe-linux.tar.gz]
         [cd /tftpboot/X86PC/UNDI/linux-install]
         [cp /usr/src/pxe-linux/server/linux.0 ./]

Type     [mount /dev/cdrom /mnt/cdrom]
         [cd /mnt/cdrom/images/]
         [dd if=bootnet.img of=/dev/fd0 bs=72k]
         [umount /mnt/cdrom]
         [mount /dev/fd0 /mnt/floppy]
         [cd /tftpboot/X86PC/UNDI/linux-install]
         [cp /mnt/floppy/vmlinuz ./linux.1]
         [cp /mnt/floppy/initrd.img ./linux.2]
         [umount /mnt/floppy]
```

At this point, the client can boot Linux.

The following instructions are necessary to complete setup of the PXE Installation for Red Hat Linux operating system. It is easier to configure the PXE server for installing the operating system over FTP than NFS.

For NFS Installation

12. Configure a NFS mountpoint.
13. Copy the Red Hat CD-ROM to the path for the mountpoint.

For FTP Installation

For FTP installation, follow the steps outlined below:

14. Copy the Red Hat CD-ROM to /home/ftp for anonymous FTP access.

Upon completion of these steps, the Red Hat CD-ROM files are available over NFS or FTP, for the PXE boot image to use for installation. The next section describes how to install Red Hat 7.0 Linux via PXE to a target.

Launching the PXE Image for installing Red Hat Linux 7.0

If you have completed all the steps above, you are now ready to launch the PXE image for Red Hat 7.0 Linux.

1. Connect the target server and the PXE server on an isolated network. After PXE support has been enabled and setup to boot to the network, power on the target server.
2. Press **F12** at POST for network boot. The target server connects to the PXE server and attempts to obtain an IP address from the DHCP server.

Note: If the "Show Setup" prompt is disabled on a ProLiant DL360, this **F12** will not appear. The system will boot depending upon the order selected in the "Option ROM Setup".

---

3. Press **F12** again to begin the network boot and download the PXE image. After the Linux image takes over, the Linux installation process begins. Several prompts for language and keyboard appear.
4. Select FTP, NFS, or HTTP access to the Red Hat CD-ROM when prompted. Enter the PXE-Server's IP address and corresponding path to the Red Hat CD-ROM.

After completing the steps above, the remainder of the installation works the same as a regular CD-ROM installation.

ProLiant Health Driver for Linux

A ProLiant Health driver is now available for Linux (cpqhealth) users. This driver provides hardware monitoring support for select ProLiant servers using Red Hat 7.0 Linux. The driver is available through the Compaq Server Download Center website http://www.compaq.com/support/files/server/us/index.html.

Additional information on using this driver is available in the Linux Health Driver *How-to* document located at ftp://ftp.compaq.com/pub/products/servers/linux/linuxhealth.pdf.

Appendix - Web Resources

In addition to hardware and software products, Compaq also provides information enabling you to stay current on the latest developments and assisting you in making deployment decisions.

Compaq *ActiveAnswers*™ gives you the benefit of our experience to help manage your system and reduce the time, risks, and complexity associated with deploying solutions.

Compaq ActiveUpdate offers proactive notification and delivery of the latest software updates. Do not waste time searching the web. Subscribe to Compaq ActiveUpdate for automatic delivery of software updates for your Compaq servers, desktops, workstations, and portables.

If you require more timely access to information products, Compaq provides a service called Compaq Info Messenger, which can be accessed through the Compaq website. If you submit a profile to Compaq Info Messenger, telling it what platforms and operating systems you are interested in, the service tracks your areas of interest and will advise you when related information products are released.

Customer Advisories inform you of any known problems and workarounds because of a Service Pack release.

Communiqués and press releases announce the availability of new products and versions.

Service Advisories notify Compaq resellers and retailers of any known service-related issues and provide them with the information they need to effectively support their customers.

Solution Stories describe how Compaq customers have addressed their business needs through the combination of Compaq products and third-party software products.

TechNotes and Tech Briefs update customers on the latest developments in Compaq products.

White papers inform you of ways to optimize your environment and obtain the maximum benefit from software enhancements.

These information products range from those with no specific OS focus to those that address specific OS issues and answers. Information products specific to Linux are collected and distributed as part of the Compaq Resource Paqs produced twice a year.

Table 1 lists Compaq resources on the web.

Table 2 lists other helpful web resources to assist in setting up a Linux Pre-execution (PXE) server.

Table 1. Compaq web resources

Item	Web Location
Compaq and Linux website	http://www.compaq.com/products/software/linux/
Opensource@Compaq.com website	http://opensource.compaq.com/
Compaq *ActiveAnswers*	http://www.compaq.com/activeanswers
Compaq ActiveUpdate	http://www.compaq.com/products/servers/management/activeupdate/index.html
Compaq Info Messenger	http://www.compaq.com/infomessenger
Compaq Insight Manager XE	http://www.compaq.com/products/servers/management/cim-xe.html
Compaq Management CD	http://www.compaq.com/support/files/server/MGMTSOL/index.html
Compaq Option ROMPaq	http://www.compaq.com/support/files/storage/index.html
Compaq SmartStart Subscription Service	http://www.compaq.com/products/servers/smartstart/index.html
Compaq System ROMPaq	http://www.compaq.com/support/files/server/us/locOsCat/35_16.html
Customer Advisories	http://www.compaq.com/support/techpubs/Customer_advisories/index.html
Press releases	http://www.compaq.com/newsroom/pr/2001/index.html
Compaq Server Software Download Center (complete listing of server support software)	http://www.compaq.com/support/files/server/us/index.html
White Papers and other technical documents (complete listing)	http://www.compaq.com/support/techpubs/whitepapers/index.html

Table 2. Helpful web resources

Item	Web Location
Intel Wired for Management Development Tools	http://developer.intel.com/ial/wfm/tools/pxesdk20linux/
Red Hat Linux website	http://www.redhat.com/index.html
justlinux, the complete Linux Guide website	http://www.justlinux.com/
Compaq / InformIT Linux website	http://compaq.informit.com/linux/content/
The PXE package containing the Preboot eXecution Environment server and code bits needed for Linux to boot from a boot disk image for Red Hat Linux 7.0.	http://rpmfind.net/linux/rpm2html/search.php?query=pxe.
Linux HOWTO docs	http://www.linuxdocs.org