

Application Notes

HP StorageWorks Booting 32-bit Linux Systems from a Storage Area Network

Second Edition (January 2004)

Part Number: AA-RV1AB-TE

This document describes how to boot Linux systems from HP StorageWorks Enterprise Virtual Arrays (HSV110), Enterprise/Modular Storage RAID Arrays (HSG80), and Disk Array XP1024/128.

For the latest version of these Application Notes and other Storage Area Network documentation, access the HP storage web site at <http://www.hp.com/country/us/eng/prodserve/storage.html>.



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Booting 32-bit Linux Systems from a Storage Area Network Application Notes
Second Edition (January 2004)
Part Number: AA-RV1AB-TE

Application Notes Contents

These Application Notes describe boot setup procedures on Linux systems for specific software solutions, Fibre Channel Host Bus Adapter (HBA) firmware versions, and boot BIOS versions. The following sections are included:

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- [Required Hardware and Software](#), page 6
- [Boot from SAN Procedures](#), page 7
 - [Step 1: Set Up the Host Systems](#), page 7
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Intended Audience

This document is intended for storage system administrators who are familiar with:

- Then technology and the interconnections required to attach to an HBA in a Linux server for:
 - HSG80-based or HSV110-based Fibre Channel RAID arrays
 - Disk Array XP 1024/128
- Linux operating systems
- HBAs
- Switch zoning
- Rapid Deployment Pack (RDP) V1.40

Prerequisites

To set up booting from a SAN, you should be familiar with:

- HSG80-based, Enterprise Virtual Array-based, or XP 1024/128 Fibre Channel RAID arrays. This information is in the RAID Array and Platform software documentation.

The following procedures are not described in this document. However, they must be performed before performing this installation.

- RA8000/ESA12000 and MA8000/EMA12000/EMA16000
 - Set and/or verify the HSG80 controller port topology for your configuration.
 - Verify that all existing storage units have the proper access.

Note: References to the HSG80 are intended to cover all of the RA8000 RAID Array products.

- Enterprise Virtual Array—Verify that all existing storage units (virtual disks) have the proper access settings.
- Disk Array 1024/128—Verify that all existing storage units (virtual disks) have the proper access settings.
- Linux Operating Systems:
 - Red Hat Enterprise Linux 2.1 QU2 (Red Hat)
 - SUSE Linux Enterprise Server 8 SP2a (SUSE8)

Note: For Red Hat, use the HP StorageWorks Red Hat Enterprise Linux 2.1 QU2 CD 1 CD-ROM for the procedures in these application notes available at <http://www.hp.com/servers/rdp>.

- Switch-based configurations and zoning—If zoning is enabled, check the switch to ensure there are no zoning conflicts.
- The Rapid Deployment Pack (RDP) and NFS servers reside in the same network.

Introduction

Traditionally, HP ProLiant servers boot operating systems from internal SCSI and IDE storage devices. With the support of external booting with StorageWorks HBAs and RAID Arrays, customers can optionally eliminate server-based internal boot devices. Booting from an external device decreases downtime in the event of server failure through faster server replacement.

Why Boot to a SAN?

Booting to the SAN provides:

- Improved disaster Recovery
- Reduced backup window through SAN
- Additional SAN managed features

Additional Information

For detailed information about HBAs, switches, storage arrays, and storage software, access the following HP web sites:

Topic	HP Website
HBAs and switches	http://h18006.www1.hp.com/storage/saninfrastructure.html
Storage array systems	http://h18006.www1.hp.com/storage/array systems.html
Platform software	http://h18006.www1.hp.com/storage/software.html
ProLiant servers	http://h18004.www1.hp.com/products/servers/platforms/storage.html

Supported Configurations

This document describes single server configurations for Enterprise Modular Arrays, Enterprise Virtual Arrays, and Disk Array XP 1024/128.

Required Hardware and Software

Table 1 lists the required hardware and software.

Table 1: Required Hardware and Software

Supported Feature	Requirement
Operating Systems	Red Hat Enterprise Linux 2.1 (Red Hat) – QU2 SUSE Linux Enterprise Server 8 (SUSE8) – Service Pack 2a
RAID Arrays	Enterprise Virtual Arrays (EVA5000 and EVA3000) with VCS 3.010 Enterprise Modular Arrays (RA8000, MA8000, EMA12000, EMA16000, ESA 12000 Fibre Channel) with ACS 8.7-3 XP 1024/128 with 21.07.04.00/00
External Boot Devices	HSV110 with VCS 3.010 HSG80 with ACS 8.7x XP 1024/128 with 21.07.04.00/00
Fibre Channel Switches	Booting from the SAN is supported on B-Series and M-Series switch products. Refer to the <i>HP StorageWorks SAN Design Reference Guide</i> for the latest supported switches at: http://h18006.www1.hp.com/products/storageworks/san/documentation.html
Servers	All HP ProLiant Servers, including BL20p, BL40p, and ML/DL, are supported. For detailed information, refer to http://h18004.www1.hp.com/products/servers/platforms/storage.html Be sure that the servers have the latest ROM BIOS.
Host Bus Adapters (HBAs)	
HBA Models	FCA2214 2GB PCI-X Host Bus Adapter, part number 281541-B21 FCA2214DC 2GB PCI-X Host Bus Adapter, part number 321835-B21 Dual Port Fibre Channel Mezzanine Card (2 Gb) for BL20Gp2 G2
HBA BIOS and Drivers	BIOS: 1.34 Minimum qla23000 driver: 6.50.00 Note that the HBA firmware loads at driver load time.

Switch Based Zoning

You must be familiar with switch-based zoning. For specific information about zoning for your environment, refer to your switch's installation guide.

Boot from SAN Procedures

Perform the following procedures for setting up your Linux systems to boot from a SAN:

- [Step 1: Set Up the Host Systems](#), page 7
 - [Step 1A: Configure the Host Boot Order](#), page 7
 - [Step 1B: Setting Up Switch Zoning](#), page 7
 - [Step 1C: Configure the Host Bus Adapter BIOS](#), page 8
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 - [Step 1: Set Up the Scripted Linux Install Events](#), page 10
 - [Step 2: Edit the Scripted Install Events for each Job you Deploy](#), page 14
 - [Step 3: Configure the Linux NFS Server](#), page 14
 - [Step 4: Deploy the Linux Operating System to the RDP Hosts](#), page 15

Step 1: Set Up the Host Systems

Use the following steps to set up all host systems:

- [Step 1A: Configure the Host Boot Order](#), page 7
- [Step 1B: Setting Up Switch Zoning](#), page 7
- [Step 1C: Configure the Host Bus Adapter BIOS](#), page 8

Step 1A: Configure the Host Boot Order

1. Verify that you have the latest BIOS.
2. Set the boot order:
 - a. While the system is booting, Press **F9** to start the BIOS Setup Utility.
 - b. Choose **Boot Controller Order**.
 - c. Select the primary HBA (that is, the HBA dedicated to your SAN or presented to your LUN) and move it to **Controller Order 1**.
 - d. Disable the Smart Array Controller.
3. Press **F10** to save your configuration and exit the utility.

Step 1B: Setting Up Switch Zoning

Initial Zoning Setup

1. Create a zone that includes the boot HBA port and active storage.
2. Enable the zone.

Finalize Zoning

1. Configure your adapter as described in “[Step 1C: Configure the Host Bus Adapter BIOS](#)” on page 8.
2. After the operating system is installed, modify the initial zone to include the second controller port.

Step 1C: Configure the Host Bus Adapter BIOS

1. While the server is booting, press **Ctrl Q** to enter *Fast/UTIL*.
2. In the Select Host Adapter Menu, choose the adapter you want to boot, then press **Enter**.
3. In the *Fast/UTIL* Options Menu, choose **Configuration Settings**, then press **Enter**.
4. In the Configuration Settings menu, choose **Host Adapter Settings**, then press **Enter**.
5. In the Host Adapter Settings menu, change the **Host Adapter BIOS** to **Enabled** by pressing **Enter**.
6. Press **ESC** to go back to the Configuration Settings menu, Choose **Selectable Boot Settings**, then press **Enter**.
7. In the Selectable Boot Settings menu, enable the **Selectable Boot** option, then move the cursor to the **Primary Boot Port Name, Lun:**, then press **Enter**.
8. In the Select Fibre Channel Device menu, Choose the device to boot from, then press **Enter**.
9. Go back to the HBA BIOS.
10. In the Select LUN menu, choose the supported LUN.
11. Save the changes by pressing **ESC** twice.

Step 2: Set Up the Storage Arrays

Before you begin, make sure that you are starting with a clean, unpartitioned virtual disk.

To set up the storage:

1. Create a Virtual Disk (LUN) that is greater than or equal to 9 Gb.

Note: A unit is not bootable to a Linux host connection other than LUN 1. For example, Unit D11 is visible and bootable to a host connection on Port 1, that has an offset of 10 on LUN1. Refer to the documentation for the HP StorageWorks HSG80 platform software for detailed information. In general, the LUN number equals the unit number minus the offset. Therefore LUN1=21-20.

2. Present the LUN to the Boot from SAN (BFS) host.
3. Set and/or verify the controller SCSI Version. Linux is supported in SCSI-3 mode only. In this mode, LUN 0 is assigned to the Command Console. Therefore, the next available LUN, the one you assign as your boot disk, must be LUN 1. Changing offsets allows for multiple occurrences of LUN 1.

Note: You must assign one bootable LUN to the BFS host.

Step 3: Select the Operating System Installation Method

Select one of the following methods for installing the Linux operating system to your BFS hosts:

- CD-ROM Installation
- Automated installation with the Rapid Deployment Pack (RDP)

Option 1: Use CD-ROM Installation

Installing Red Hat

1. Insert the Red Hat Enterprise Linux 2.1 QU2 CD 1 CD-ROM (supplied by HP) in the BFS host.
2. At the system boot up menu, pass the following parameter to the kernel by entering the following:

```
boot: linux scsi_mod_opts="max_scsi_luns=32"
```
3. The installation begins. Follow the installation instructions.
4. When the **Installation Complete** window displays, press **Enter** to complete the installation and reboot the system, completing the configuration.
5. Download and install the latest HBA drivers available at <http://h18006.www1.hp.com/storage/saninfrastructure.html>.

Installing SUSE8

1. Reboot your BFS host server and make sure you have the SUSE powered by United Linux 1.0 SP2a CD1 in your CD-ROM drive.
2. The installation procedure prompts you for United Linux CD1. Follow the instructions.
3. Once the installation starts, a message about missing a device file system disk displays. Ignore the message and press any key to continue the installation following the instructions.
4. Complete the installation using either the console or the installation GUI method:
 - Console Method:
 - a. Press **ALT+F2** to enter a Linux shell.
 - b. Enter:

```
# insmod qla2300
```
 - c. Press **ALT+F1** to exit the shell.
 - d. Complete the installation by following the instructions.

- GUI Method:
 - a. Select **Abort installation**.
 - b. Select **Kernel Modules**.
 - c. Select **Abort installation**.
 - d. Select **Kernel Modules**.
 - e. Select **Load IDE/RAID/SCSI**.
 - f. Select **Qla2300: Qlogic ISP2300**.
 - g. Exit and wait for the modules to load.
 - h. Select **Start Installation**.
 - i. Select **Start Installation/Update**.
 - j. Select **CD-ROM**.
 - k. Follow the instructions to complete the installation.
- 5. Install the latest drivers available at <http://h18006.www1.hp.com/storage/saninfrastructure.html>.

Option 2: Use the Automated RDP Installation

HP assumes you have an existing RDP server running. For information about supported servers or for RDP documentation, go to <http://www.hp.com/servers/rdp>.

Use the following procedures to set up the BFS hosts using RDP:

- [Step 1: Set Up the Scripted Linux Install Events](#), page 10
- [Step 2: Edit the Scripted Install Events for each Job you Deploy](#), page 14
- [Step 3: Configure the Linux NFS Server](#), page 14
 - [Run the NFS Server Configuration Script](#), page 15
 - [Edit the Kickstart Files on the NFS Server](#), page 15
- [Step 4: Deploy the Linux Operating System to the RDP Hosts](#), page 15
 - [Deploying Red Hat](#), page 16
 - [Deploying SUSE](#), page 18

Step 1: Set Up the Scripted Linux Install Events

This section provides instructions for modifying the Linux-scripted install jobs provided with the Rapid Deployment Pack (RDP) to deploy servers that boot from a SAN.

Note: HP strongly suggests that you make a backup copy of each file or deployment job before making any changes.

Copy a scripted install job provided with the RDP to use for your BFS deployment job as follows:

1. Right-click the title bar of the Jobs pane, and choose **create a new folder** as shown in [Figure 1](#).

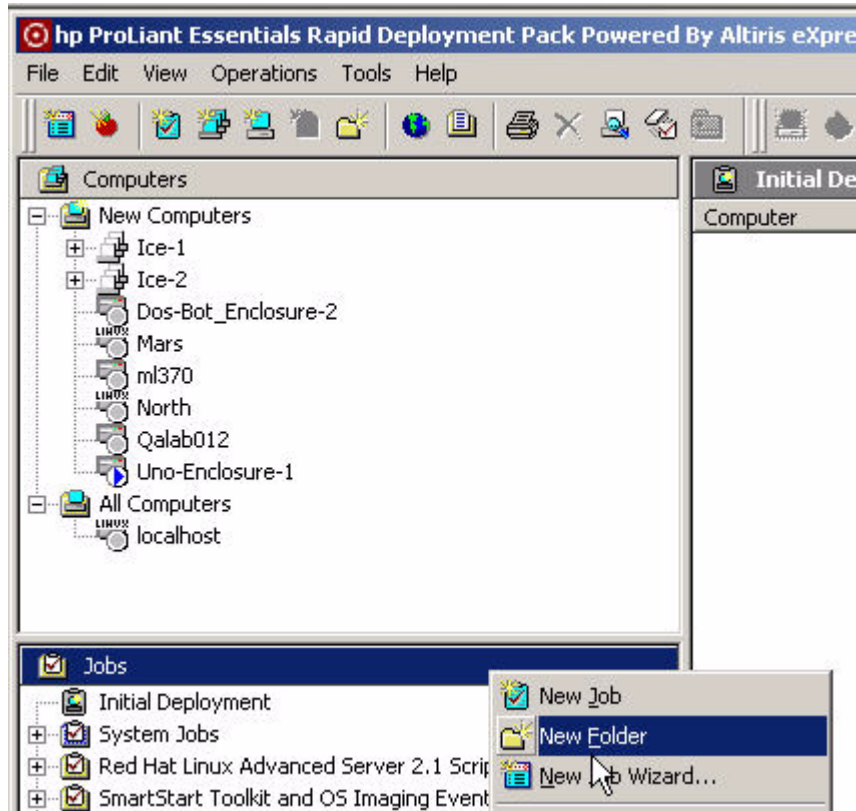


Figure 1: Creating a new RDP folder

2. Enter the desired name for your Boot from SAN jobs folder, for example **BFS**.

3. Select the Linux scripted **Install Events** folders for your target system hardware (BL or ML/DL). Right-click the events folder and choose **Copy** as shown in [Figure 2](#):

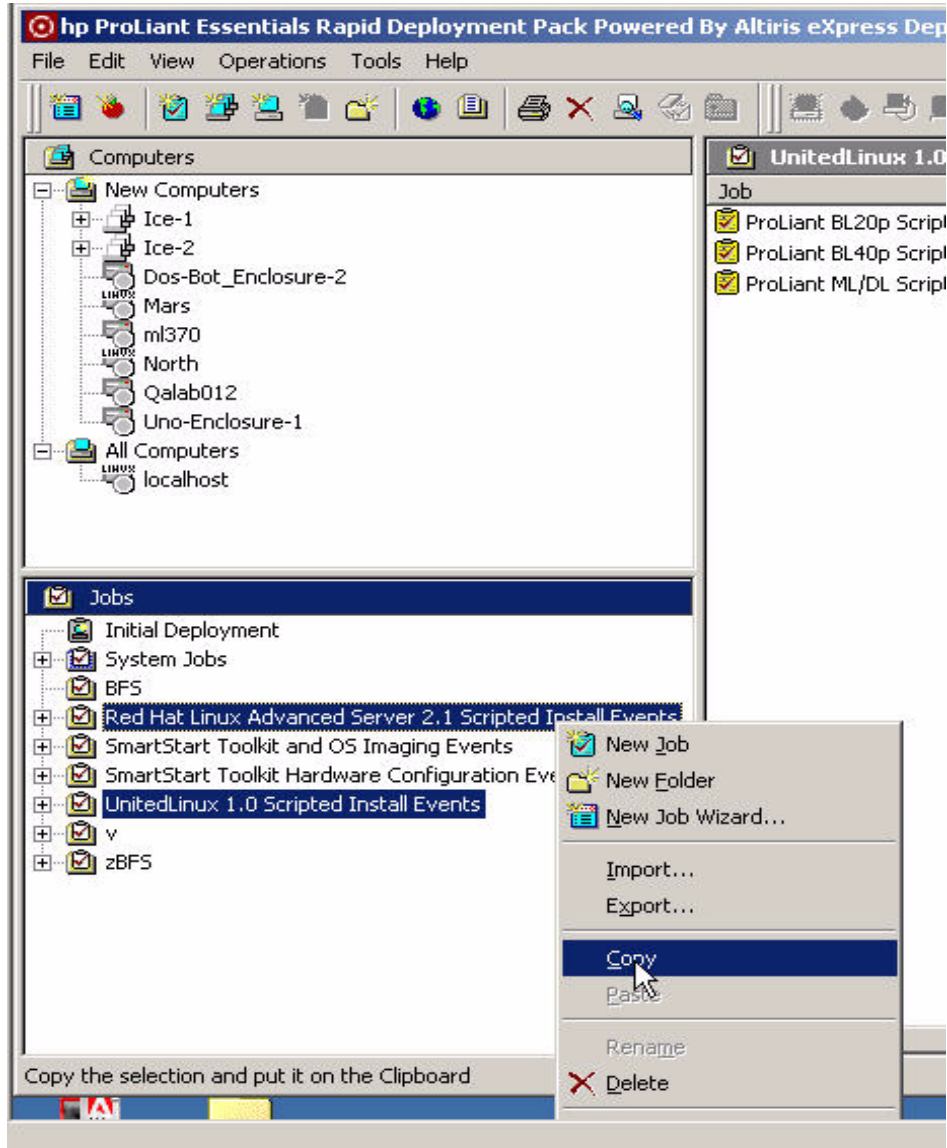


Figure 2: Copying the install job

4. Right-click the **BFS** (or new) folder, and choose **Paste** to copy the job into the **BFS** (or new) folder as shown in [Figure 3](#).

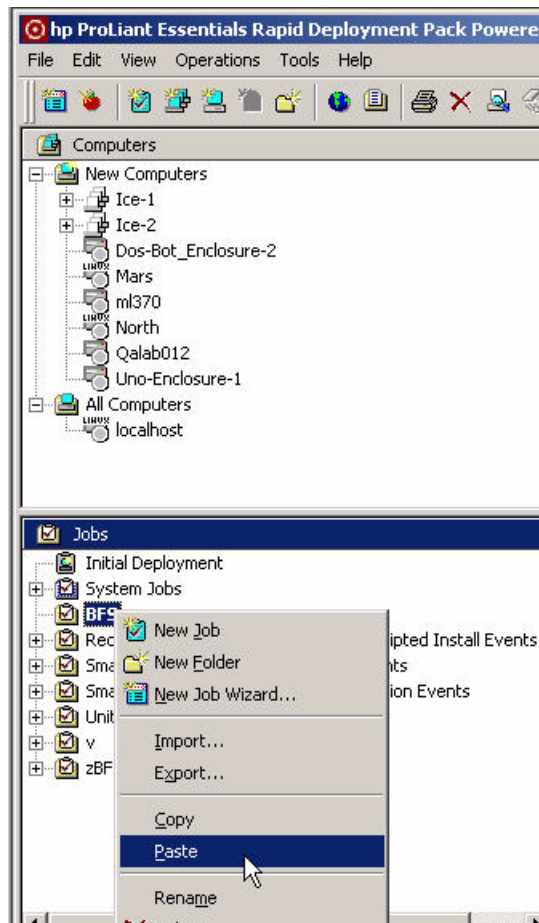


Figure 3: Pasting install jobs

Figure 4 shows the Job Properties dialog box entry for installing the job with the RDP.

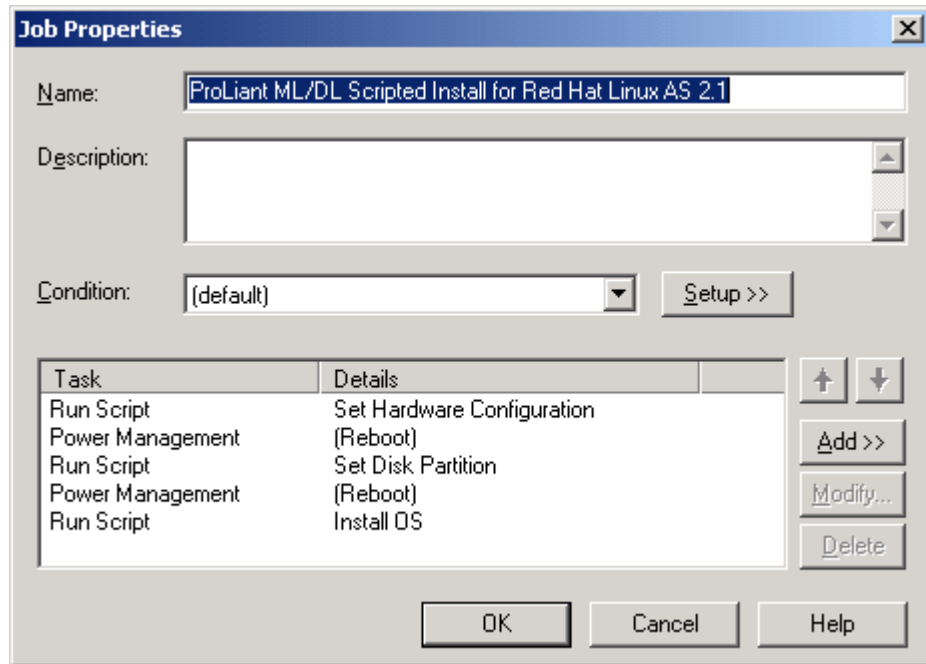


Figure 4: Linux scripted install job as provided with Rapid Deployment Pack

Step 2: Edit the Scripted Install Events for each Job you Deploy

1. In the BFS folder, select the job you want to deploy.
2. Click the newly created job, as shown in Figure 4 on page 14.
3. Delete the first **Run Script** entry.
4. Delete the first **Power Management** entry.
5. Edit the last **Run Script** entry by entering the IP address of the NFS server.
6. Click **Finish**.

Step 3: Configure the Linux NFS Server

You must configure the Linux NFS server for booting from a SAN. These sections describe how to configure the NFS Server running on Red Hat or SUSE8.

Before you begin, HP assumes you have an NFS server running on either a Red Hat or SUSE Linux operation system. For RDP documentation, go to <http://www.hp.com/servers/rdp>.

Run the NFS Server Configuration Script

1. Insert the RDP CD-ROM in the NFS server's CD-ROM drive.
2. Mount the CD by entering:

- For Red Hat:

```
# mount /mnt/cdrom
```

- For SUSE:

```
# mount /media/cdrom
```

3. Run the script by entering:

```
# ./mnt/cdrom/pim-nfs/setup-pimnfs.sh
```

Follow the instructions to install desired distributions. Make sure you have the following:

- Red Hat Installation CD-ROMs:

- HP StorageWorks-supplied Red Hat Enterprise Linux 2.1 QU2 CD 1 – Make sure you use this CD-ROM first

- RHAS 2.1 QU2 CD-ROMs

- SLES 8 by UL 1.0 SP2 CD-ROMs – Make sure you use the UL 1.0 CD1 first.

Edit the Kickstart Files on the NFS Server**Red Hat**

1. Edit each kickstart file that you plan to deploy (such as *bl20p.ks.cfg*, *bl40p.ks.cfg*) located in */usr/cpqrqp/ss.640/rhas21* directory.
2. Comment or delete both references to reboot.
3. Insert the word **text** on a new line below the first instance of install.

SUSE

1. Insert the SUSE powered by United Linux SP2a CD-ROM in your NFS server.
2. Enter the following commands:

```
# mount /media/cdrom
```

```
# cd /usr/cpqrqp/ss.640/ul10/extras
```

```
# ./installsp.sh <sp_number> <path>
```

The *sp_number* is SP2a and *path* is the path to the SP2a CD-ROM.

3. Follow the instructions.

The NFS Server configuration is now complete.

Step 4: Deploy the Linux Operating System to the RDP Hosts

After completing the procedures in “[Option 2: Use the Automated RDP Installation](#)” on page 10, you must deploy Linux to the BFS hosts. These sections describe how to deploy the Red Hat and SUSE8 operating systems.

Before you begin, make sure that you download the latest drivers from the web. The drivers are available at <http://h18006.www1.hp.com/storage/saninfrastructure.html>.

Deploying Red Hat

1. Go to `C:\Program Files\ALTIRIS\Express\Deployment Server\Deploy\cds\compaq\ss.640\rhas2\dosutils\autoboot` and backup or rename the `initrd.img` and the `vmlinuz` files.
2. Insert the first Red Hat CD-ROM (supplied by HP) in the RDP server and locate the `initrd.img` and the `vmlinuz` files.
3. Copy the two files to `C:\Program Files\ALTIRIS\Express\Deployment Server\Deploy\cds\compaq\ss.640\rhas2\dosutils\autoboot`.
4. Go to `C:\Program Files\ALTIRIS\Express\Deployment Server\Deploy\tools\scripts`.
5. Edit the `rhas21.bat` file as follows. The changes you need to make are **bold**:

```
echo loadlin vmlinuz ks=nfs:%%n%%:/usr/cpqrdp/%%s%%o%%k%%
scsi_mod_opts="max_scsi_luns=32" initrd=%%i%%text
console=%%c2%%>>c:\autoexec.bat

echo loadlin vmlinuz ks=nfs:%%n%%:/usr/cpqrdp/%%s%%o%%k%%
scsi_mod_opts="max_scsi_luns=32" initrd=%%i%%>>c:\autoexec.bat
```

Note: There is a DOS line length limitation of 128 characters per line. Make sure you do not exceed this limit when changing the lines in the `rhas21.bat` file.

6. Deploy the RDP Job to install Red Hat on a remote client:
 - a. In the RDP interface, click a scripted job in the Jobs pane. [Figure 5](#) shows the selection of the job **ProLiant BL20p Scripted Install for Red Hat Linux AS2.1**:

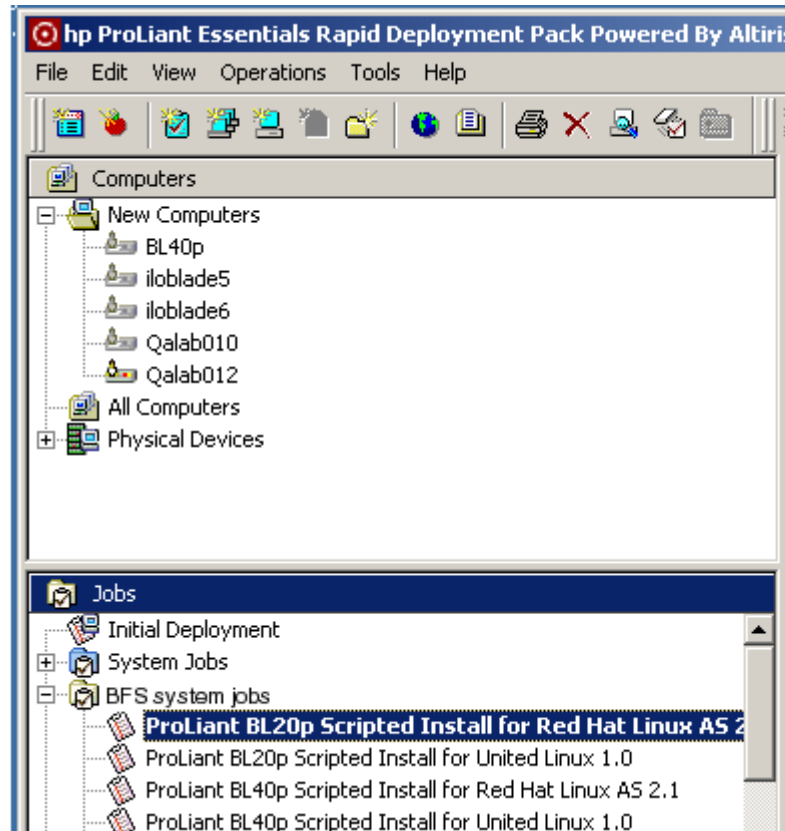


Figure 5: Selecting a job to deploy the RDP server

- b. Drag the job to the target system in the Computers pane. For example, you drag and drop the job **ProLiant BL20p Scripted Install for Red Hat Linux AS2.1** to the server **Qalab010**. The job then runs on that server.
- c. The installation starts. When the **Complete** window displays, press **ALT + F2** to enter a Linux shell.
- d. Enter the following:


```
# cd /mnt/source/images/scripts
# sh -x qinstall.sh
```
- e. Press **ALT + F1** to return to the **Complete** window.
- f. Press **Enter** to complete the installation and reboot the system, completing the configuration.
- g. Log in as **root** with **password** as your password.

Deploying SUSE

1. Insert the SLES 8 SP2A CD-ROM in the RDP server and locate the following two files in the *boot/loader/* directory:
 - *initrd*
 - *linux*
2. Backup or rename these two files.
3. Copy the files to *C:\Program Files\ALTIRIS\Express\Deployment Server\Deploy\cds\compaq\ss.640\ull01\dosutils\autoboot.*
4. Deploy the RDP Job as described in [step 6](#) on page 17.
5. When deployment completes, the system displays a message stating it cannot find a device. Beginning with [step 3](#), follow the instructions in “[Installing SUSE8](#)” on page 9.
6. Complete the installation using either the Console or the GUI method:
 - Console Method:
 - a. At device error message, press **ALT+F2** to enter a Linux shell.
 - b. Enter:

```
# insmod qla2300
```
 - c. Press **ALT+F1** to exit the shell.
 - d. Disregard the Error During Installation messages and select **OK**.
 - e. Select **Start installation/system**.
 - f. Select **Start installation/update**.
 - g. Select **Network**.
 - h. Select **NFS**.
 - i. Select **Automatic config via DHCP**.
 - j. Follow the instructions to complete the installation. The system automatically reboots.

- GUI Method:
 - a. Select **OK** to accept the device message.
 - b. Select **OK** to accept the error message.
 - c. Select **Kernel Modules** (hardware drivers).
 - d. Select **Load IDE/RAID/SCSI**.
 - e. Select **Qla2300: Qlogic ISP2300**.
 - f. Select **OK** at the enter parameters prompt.
 - g. Select **OK** after the driver load, then select Back to exit the Kernel Modules menu.
 - h. Select **Start installation/system**.
 - i. Select **Start installation/update**.
 - j. Select **Network**.
 - k. Select **NFS**.
 - l. Select **Automatic config via DHCP**.
 - m. Follow the instructions to complete the installation. The system automatically reboots.
- 7. At the prompt enter **root** for the user name and **password** for the password.
- 8. Install the latest drivers available at <http://h18006.www1.hp.com/storage/saninfrastructure.html>.

Boot Setup Procedures for Disk Array XP1024/128

If one server is booting from a SAN, one host group is required for that HBA. If more than one server is booting from a SAN and accessing the same physical port, a unique host group is required for each HBA. Every host group must be assigned on a port with a unique LUN 0. If LUN security is turned off for this port (for example, port CL1-A) all the servers defined in the host groups are suddenly given access to all LUNs contained in the default host group.

For detailed information about Disk Array XP1024/128 host groups, LUN Security, and host modes, refer to the *HP StorageWorks Command View XP User Guide* available at

http://h20000.www2.hp.com/bizsupport/TechSupport/DocumentIndex.jsp?contentType=SupportManual&locale=en_US&docIndexId=179911&taskId=101&prodTypeId=12169&prodSeriesId=64820

Step 1: Set Up the Server

ProLiant servers are available in two configurations. Newer models use ROM Based Setup Utility (RBSU), while older models do not. For servers with RBSU, refer to the section [Setup for RBSU Servers](#). For those without this utility, refer to the section [Setup for Servers without RBSU](#). Select one of the following procedures based on your ProLiant server configuration.

Select one of the following procedures based on your ProLiant server configuration.

Setup for RBSU Servers

1. Boot the server from the ProLiant Smart Start CD-ROM version 5.3 or higher. You can alternatively download the latest ROM BIOS from <http://www.hp.com>.
2. Install the latest ROM from the Smart Start CD-ROM or the downloaded version.
3. Set the boot order:
 - a. While the system is booting, Press **F9** to start the ROM Setup Utility.
 - b. Choose **Boot Controller Order**.
 - c. Select the primary HBA and move it to **Controller Order 1**.
 - d. Move the secondary adapter to the next highest in the order if you are going to use it as an alternative boot path.
4. Disable the Smart Array Controller.
5. Exit the utility.

Setup for Servers without RBSU

If your server does not have RBSU, perform the following steps:

1. Download and install the latest system ROM from the HP website: <http://www.hp.com>.
2. Download SOFTPAQ SP21860.
3. Run the SOFTPAQ program to create an upgrade diskette.
4. Boot from the ProLiant Smart Start CD-ROM and run the program to clear the configuration.
5. Reboot from the new upgrade diskette. The ORD . EXE program should start automatically.

6. Set the Primary HBA to **Position 1**. If any additional HBAs are required, set the additional HBAs now.

Note: The SmartArray should be in a higher numbered position than the HBAs.

7. Reboot the server.

Step2: Set Up the Host Bus Adapter

1. Install all adapters.
2. Perform the steps in “[Initial Zoning Setup](#)” on page 7.
3. Configure the adapter:
 - a. While the server is booting, press **Ctrl Q** to enter *Fast/UTIL*.
 - b. Perform the steps in “[Initial Zoning Setup](#)” on page 7 then go to [step c](#).
 - c. In the Select Host Adapter Menu, choose the adapter you want to boot, then press **Enter**.
 - d. In the *Fast/UTIL* Options Menu, choose **Configuration Settings**, then press **Enter**.
 - e. In the Configuration Settings menu, choose **Host Adapter Settings**, then press **Enter**.
 - f. In the Host Adapter Settings menu, change the **Host Adapter BIOS** to **Enabled** by pressing **Enter**.
 - g. Press **ESC** to go back to the Configuration Settings menu, Choose **Selectable Boot Settings**, then press **Enter**.
 - h. In the Selectable Boot Settings menu, enable the **Selectable Boot** option, then move the cursor to the **Primary Boot Port Name, Lun:**, then press **Enter**.
 - i. In the Select Fibre Channel Device menu, Choose the device to boot from, then press **Enter**.
4. After locating the connection, optionally rename the connection and make note of the name.
5. Using a web browser, start Command View XP and perform the following steps:
 - a. Select a port (such as CL1-A).
 - b. Set LUN security for the controller port.
 - c. Create a Host Group with Host Mode 00
 - d. Assign the first boot HBA port WWN to the newly created host group.
 - e. Assign a LUN 0 to that Host group

For detailed information about using Command View XP, refer to the *HP StorageWorks Command View XP User Guide* available at

http://h20000.www2.hp.com/bizsupport/TechSupport/DocumentIndex.jsp?contentType=SupportManual&locale=en_US&docIndexId=179911&taskId=101&prodTypeId=12169&prodSeriesId=64820

6. Go back to the HBA BIOS.
7. In the Select LUN menu, choose the supported LUN.
8. Save the changes by pressing **ESC** twice.

Step3: Set Up the Remaining HBA Ports

1. Connect the remaining HBAs:
 - a. A secondary HBA for booting should be set up in the same manner as the primary HBA.
 - b. Connect any additional (nonbooting) HBAs. You do not need to make any BIOS changes.
2. Finalize the zoning as described in [Finalize Zoning](#), page 8.
3. Using a web browser, access Command View XP and add the HBA WWNs to the appropriate host group.

Note: Assign nonbooting HBAs to a different host group.

Maintenance

Server Replacement in the Event of a Server Failure

You must retain the HBAs to ensure that the replacement server hardware components are identical in every way to the one that you are replacing. Place each HBA into the PCI slots of the new server in the same order as they were placed in the old server.

If you are using an internal disk for your paging file system, you can move this disk to the replacement server. You can also use a new disk, but you must format it and manually reset the paging to that disk.

If you are replacing a BL20p, you can move the Mezzanine HBAs to a replacement server and the WWPNs remain the same. However, you also retain two MAC addresses when you move the Mezzanine card. Therefore, you must remap all the LUNs to the onboard Fibre Channel adapters.

Troubleshooting

SUSE 8 Systems

The following message may occur during installation on the BFS host:

```
Loading.....  
Can't open image file for initrd  
C:\>
```

This usually occurs due to a bad or corrupted LUN in your storage. To fix this problem, rebuild your LUN, then proceed with the installation.

Red Hat Systems

When installing with the RHAS 21 QU2 CD_ROM, the installation may fail due to an invalid file system disk. To avoid this problem, make sure that the HBA in the BFS host server is zoned to one active controller.