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IBM eServer™ BladeCenter Remote SAN Boot for JS20

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Acknowledgements

Table of Contents

1.0 Overview

Remote boot or "root boot" is the name used when referring to a server configuration where the Server's operating system is installed on a logical drive (LUN) that is not resident locally to the Server chassis. This document will describe in details the process that you must go through to setup a remote boot for IBM eServer BladeCenter Servers using a logical drive from Fibre Channel Storage Array.

This process is intended for a configuration of a Blade Center directly connected to the Storage Array using Fibre Channel (FC) cables (Figure 1) If the Blade Server is connected to the Storage Array via FC switches (Figure 2), please reference the IBM eServer BladeCenter Interoperability guide first for instructions to correctly integrate the BladeCenter into an existing FC switched fabric. Upon following these preliminary tasks, you will be able to use the information in this document to set up remote boot.

Figure 1.- BladeCenter in Direct-attach SAN environment

Figure 2.- BladeCenter in Fabric-attach SAN environment

2.0 Change Notification

Change Revision	Description	Date
1.0	Initial release	07/10/2004
2.0	SAN Volume Controller Support Include SDD in intird for Linux installations AIX SDD notice for rootvg Minor corrections	01/31/2005
2.5	Section "Verifying path to FC device removed". "Installation Flow (Quick Guide)" section added (section 5.0). Notes about redundancy added to section 5.0 and 15.0. Important Notice for SLES9 added to section 13.0 Serial Over LAN configuration using Cisco ESM added to section 10.0	05/13/2005

3.0   Using this document

This document will demonstrate to the Storage Administrator audience how to prepare, configure, and boot the IBM eServer BladeCenter using IBM Fibre Channel based storage solutions. The initial view of this document describes how to configure the Blade Center Fibre Channel expansion adapter, provides a brief overview of the BladeCenter I/O module subsystem, and detailed steps for configuring Remote boot. Additionally, this document describes 'how to' and best practices for configuring the Fibre Channel capable modules using DS4000 disk systems series (formerly FAStT) and ESS Storage platforms. I would like to point out that this document was not intended for use in configuring Clustered Hosts for Remote boot.

4.0   Preparation Checklist

As a preparation procedure, ensure that you either have access or have researched the following areas before proceeding to configuration.

Fibre Channel expansion adapter
- ✓ Verify that the FC Expansion card option is p/n: 73P6112, which supports JS20 remote boot. Options 13N2203 and 48P7061 are supported in the JS20. However, they are not boot capable.
- ✓ Review the Blade Center Fibre Channel Adapter Installation & User's guide.
- ✓ Refer to the Storage vendor's Settings for assigning the Boot LUN. In most cases, this will be LUN 0 (zero).
- ✓ Ensure that the Fibre Channel Adapter has the latest supported F-Code, known as FC BIOS in the Intel space. This is located at: www.ibm.com/support.

Fibre Channel Switch Module
- ✓ Review the appropriate Switch Module installation & User's guide.
- ✓ For the Optical Pass-thru module, ensure that the OPM (break-out) cable is using the correct mapping to identify the Blade that you intend to configure for remote booting, this is further explained in section 7.2.
- ✓ Review the Blade Center's Fibre Channel switch Interoperability Guide.
- ✓ Backup the switch fabric configuration to a file.
- ✓ Record the IP Addresses of the BladeCenter Fibre Channel Switch module.

Remote Management workstation for configuring remotely
- ✓ Configure a Remote Management workstation which can be used to access the Fibre Channel switch module via an IP address. This is a system with the IBM FAStT Storage Manager installed also and can be used to manage the storage.
- ✓ If using the Embedded IBM BladeCenter 2-port Fibre Channel Switch Module or IBM BladeCenter 6-port Fibre Channel Switch Module, install the IBM SAN Browser (previously called Utility) switch management application on the Remote Management workstation to have a graphical interface for managing the Fibre Channel Switch module. This workstation should be running the latest Java Utility.

DS4000 disk systems series (formerly FAStT) Storage
- ✓ Reference the most current DS4000 series readme files, Installation and User's guides to ensure that you are comfortable with the configuration to follow. Otherwise, contact your local Blade Center support representative.

- ✓ Install the Storage Manager software on the Remote Management workstation for storage management.

- ✓ Obtain the IP Addresses of the DS4000 series Storage subsystem.

- ✓ Obtain the necessary Storage Partitioning Premium Feature if required.

- ✓ Ensure that the DS4000 series Storage subsystem and drives are cabled in accordance with the DS4000 series cabling guide.

- ✓ Contact your Storage support representative for supported configurations.

ESS and SVC Storage

- ✓ Reference the most current ESS/SVC Readme, Installation and User's guides to ensure that you are comfortable with the configuration to follow. Otherwise, contact your local Blade Center or Storage support representative.

- ✓ Contact your Storage support representative for supported configurations.

Minimum JS20 Firmware and HBA Fcode versions

- ✓ Ensure that the JS20 firmware is at FW04430130 or higher and the HBA Fcode version is v1.05 or higher (the code can be updated using the Standalone Diagnostics CD-ROM, latest version can be obtained at: http://techsupport.services.ibm.com/server/mdownload/diags - this is bootable CD).

5.0 Installation Flow (Quick Guide)

This section can be used as a quick guide for experienced users. See section 6.0 -> for detailed installation instructions.

Configure single FC path
- ✓ Disable FC port to HBA on FC switch in bay 4 or remove switch in bay 4.

Gather WWN of FC adapter
- ✓ Access the Open Firmware prompt at <D5BB>
- ✓ Type: dev /packages/gui
- ✓ Type: setup-fcp-disk
- ✓ Select the adapter and force a scan.
- ✓ Exit the "setup-fcp-disk" menu.
- ✓ Type: dev /pci@8000000f8000000/pci@1f/fibre-channel@1
- ✓ Type: my-wwn
- ✓ Type: .
- ✓ Record the WWN of HBA

Zone the FC switch
- ✓ Zone the FC switch; include the WWN of HBA and Storage Controller in the zone.
- ✓ Add the zone to the zone config.
- ✓ Activate the config on the switch.

Create and Map LUN to Host
- ✓ Create one boot LUN.
- ✓ Using the storage management software for your storage device, map the LUN to the WWN of the HBA of the FC daughter card in the blade server.

OS Install
- ✓ Insert the CD-ROM of the OS that you want to install and assign the CD-ROM and boot sequence to the blade server that you want install.
- ✓ Power ON the blade server and continue to install the OS on the blade server.

Configure Boot sequence
- ✓ Boot to Open Firmware prompt and enter the "setup-fcp-disk" menu and configure the boot LUN.
- ✓ Change boot sequence within the MM interface to "Hard drive 2".

Configure for redundancy
NOTE: JS20 cannot boot over the second HBA port. Once the OS is up and running, however, it will failover as needed to the second port to access non-boot hard drives if supported path failover software is properly installed
NOTE: SDD for AIX do not support redundancy for rootvg (boot disk).
- ✓ Enable the second path by inserting the FC switch in bay 4 or enable the port for the HBA.
- ✓ Install the multi-path software, ex RDAC if using DS4000 or SDD if using SVC or ESS.

6.0   About the BladeCenter I/O Subsystem

The IBM eServer BladeCenter is capable of containing up to fourteen processor blades for the Enterprise chassis and eight for the Telco chassis, two management modules, and four total I/O modules. Based on the current blade design, only Ethernet[1] (ENET) or Optical Pass-thru (OPM) I/O modules can be inserted into Bays 1 & 2. Any type of defined switch module, for example the Ethernet Switch Modules, Fibre Channel and Optical-Pass-Thru, can be inserted into Bays 3 & 4. However, for the purpose of this document, the I/O module will either be a Fibre Channel switch or Optical Pass-Thru module used in Slots 3 or 4. The corresponding blade server I/O expansion card must match with the I/O module protocol type. For example, the Fibre Channel daughter-card supports the Fibre protocol and only the OPM or Fibre Channel switch module is supported. On a BladeCenter chassis, the four switch bays are numbered from a rear view perspective as shown in below in Figure 3. Also, the JS20 blade server requires two Ethernet switches to be installed, in Bays 1 & 2. Bay 1 requires a Serial Over LAN (SOL) capable Ethernet switch module and Bay 2 requires a Ethernet switch module for data traffic. For additional information about SOL requirements, see the "*Enabling and configuring SOL (Serial Over LAN) on an 8842 Blade Server Whitepaper*" for more in-depth SOL instructions, this can be found at: http://www-3.ibm.com/pc/support/site.wss/document.do?lndocid=MIGR-55018

Figure 3.   Enterprise and Telco Blade Chassis Rear view (I/O subsystem)

7.0   Preparing the BladeCenter Server FC Expansion card for Remote Boot

This section is intended to provide a description and steps for preparing the JS20 Blade Servers with and I/O expansion card in preparation to Remote Boot from Fibre Channel Storage. The JS20 Server Blade has the capabilities of using the FC Expansion card that is designed with dual-channels. When the Blades using FC expansion cards are inserted into the BladeCenter's chassis they interface with two mid-plane's which provides connectivity to I/O modules 3 and 4 in the rear of the chassis.

The diagram in Figure 4 depicts placement of the FC expansion card on the Server blade. For a more detailed overview of the FC expansion card, you should refer to the Installation and User's guides.

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[1]Ethernet will be abbreviated as ENET in the rest of this document.

Figure 4. -JS20 Blade FC Expansion card layout

7.1 Installing the FC Expansion Card

NOTE: The IBM BladeCenter JS20 Fibre Channel Expansion Card - option part number (p/n) 73P6112 is currently the only adapter which has been tested for remote boot with JS20.

1. Ensure that the JS20 blade server is powered-off.

2. Remove the JS20 blade server from the chassis (if installed in the chassis).

3. Remove the cover of the JS20 blade server.

4. Remove the FC Expansion Card from the static-protective package.

5. Slide the narrow end of the FC Expansion Card into the raised hook on the tray.

6. Align the FC Expansion Card connectors with the network-interface option connector and the PCI-X expansion slot.

7. Gently press the card into the connectors.

8. Lower the cover so that the slots at the rear slide down onto the pins at the rear of the blade server.

Important: The blade server cannot be inserted into the BladeCenter unit until the cover is installed and closed. Do not attempt to override this protection.

The following example (Figure 5) shows how to install an FC expansion card on the blade server.

Figure 5. –JS20 Blade FC Expansion card layout

9. Install the JS20 blade server into the BladeCenter chassis.

7.2   Record Host Adapter Port Name

Gather the WWN of the host adapter in the blade from the name server of the fibre switch module, as shown in the following example. This information is needed later to map the LUNs to the JS20 blade server using Storage Partitioning (LUN masking). The WWPN can be gathered from the Open Firmware command line, as shown in the following example.

Open Firmware command line	
1. Power on the JS20 blade server. During the boot, at the D5BB prompt, press <**8**> to enter the Open Firmware command line.	
2. Type: **dev /packages/gui**	
3. Type: **setup-fcp-disk**	
4. Select the adapter and force a scan. Ensure that the version of the F-code is listed.	
5. Exit the "setup-fcp-disk" menu.	
6. Type: **dev /pci@8000000f8000000/pci@1f/fibre-channel@1**	<== move to fibre-channel node
7. Type: **my-wwn**	<== type my-wwn
8. Type: **.**	<== type . to print it
9. Following output will appear: `1 >. 2100000d60d31448  ok`	
10. Record the WWN of HBA	

Alternatively, the WWN of the HBA can be gathered from the switches, note that the FC driver needs to be loaded before the HBA will login to the FC switch.

Brocade Switch Module Commands	Qlogic Switch Module Commands
1. Start a telnet session and login to the switch 2. BSSM: >nsShow 3. BSSM: > logout	1. Start a telnet session and login to the switch 2. FCSM: USERID> admin start 3. FCSM (admin): USERID> ns show 4. FCSM (admin): USERID> admin end 5. FCSM (admin): USERID> logout

7.3 Configuring FC Expansion card parameters

The default settings should be used for the FC expansion adapter.

8.0 Configuring IBM eServer BladeCenter FC Modules

This section describes I/O modules that support the FC expansion card. Therefore, I/O modules must reside in slots 3 or 4. The I/O modules are provided in two flavors; Fibre Channel Switches and Optical Pass-thru modules that can be used as interconnects to attach the Blade Center into an external SAN environment.

The Fibre Channel switch module is designed to reduce the amount of cabling that is used to interface to the external SAN environment. The Fibre Channel switch module also has resident functionality of a traditional Fibre Channel switch.

The Optical Pass-thru module is designed to allow I/O expansion card break-out capabilities to an external SAN environment. Because the optical break-out provides a one-to-one (FC expansion-to-external device) port correlation, it may become more feasible to utilize an intermediate switch device. This intermediate switch device allows cable extensibility and aggregates the flow of traffic to a Target device with minimal port-count.

NOTE: The instructions in this section assumes that the FC modules has been installed and configured with an IP-address. **You should consult the documentation that comes with the FC module for additional guidance.**

8.1 Configuring Fibre Channel Switch module for a Remote Boot environment

This section describes two important concepts; Zoning and Interoperability. These should be considered when deploying BladeCenter in a Remote boot SAN environment while using Fibre Channel Switch Modules. Also, this section does not assume that you are using a particular type of Fibre Channel switch module, only that the switch module inside the BladeCenter is a functional IBM eServer BladeCenter Fibre Channel switch module. The following embedded BladeCenter FC modules have been tested for remote boot with the JS20 blade server:

Type
IBM eServer BladeCenter 2-port and 6-port Fibre Channel Switch Module
Brocade Entry/Enterprise SAN Switch Module for IBM BladeCenter
IBM eServer BladeCenter Optical Passthru Module (OPM)

A. Zoning

Zoning is used to prevent propagation of state-change traffic to other Blades in the Fabric. It is recommended that each Blade that has I/O expansion cards resident be included in a separate zone. This is to prevent extraneous State-change traffic to other Blades that may be in operation. Although in most cases, this traffic is non-disruptive, it can have a slight performance impact on adjacent Blades in the fabric.

Figure 17. - Zoning Concept

Follow the zoning example provided in **Figure 18** to guide you through zoning setup for your configuration. When zoning, ensure that the zone only contains the WWN of the HBA (FC daughtercard) and the backend storage controller. NOTE: One FC path only during OS installation.

IBM eServer Brocade SAN Switch Module (using CLI)	IBM eServer Fibre Channel 2-port FC Switch Module (using CLI)
1. brocadessm:USERID> **zonecreate "Blade1","WWPn"** 2. brocadessm:USERID> **cfgcreate "RemoteBoot", "Blade1"** 3. brocadessm:USERID> **cfgenable "RemoteBoot"** 4. brocadessm:USERID> **cfgsave**	1. Start a zone editing session: cli $> **admin start** cli (admin) #> **zoning edit** 2. Create a zoneset: cli (admin-zoning) #> **zoneset create RemoteBoot** 3. Create a zone: cli (admin-zoning) #> **zone create Blade1** 4. cli (admin-zoning) #> **zone add Blade1 *WWPn*** 5. Make the zone a member of the zoneset: cli (admin-zoning) #> **zoneset add RemoteBoot Blade1** 6. Save the zoning session: cli (admin-zoning) #> **zoning save** 7. Activate the zoneset: cli (admin) **#> zoneset activate RemoteBoot** 8. Exit from admin mode: cli (admin) #> **admin end**

Figure 18. - Zone Configuration steps using the Brocade SAN switch Module and 2-port FC switch Module

NOTE: These zoning steps must be repeated for each Fibre Channel Switch Module.

B. **Interoperability**

For SAN environments that operate on the premise of Open Fabrics, interoperability may be inherent. Open Fabrics are SANs where vendor neutral device integration is permissible. Interoperability is described as interconnecting two or more Switch Fabric devices of different vendor types.

When attaching the BladeCenter into any SAN environment, it is important to understand the SAN vendor of the devices that you are attaching to. Once this is determined, you should proceed to gathering appropriate documentation that will guide you in designing this interoperable SAN. For the purpose of Remote booting, you should consult the Storage vendor to ensure that Interoperable Fabrics are supported. For best practices, before proceeding to integrate the BladeCenter into an existing Fabric, you should backup your switch configuration. Additionally, for BladeCenter Interoperability guidelines see the IBM eServer BladeCenter Fibre Channel Interoperability Guide, available at http://www.pc.ibm.com/support.

8.2   Configuring Optical Pass-thru module for a Remote Boot environment

NOTE: Red Hat LINUX Version 3 Update 2 does not support OPM. See Retain tips H182518 for more information.

The Optical Pass-thru module (OPM) provides 4-pair of fiber optic cable break-outs per single Optical transceiver. The OPM has 4 Optical transceivers numbered 1 thru 4 on the face of the OPM that allows communication to the device. Each cable correlates to a particular Blade slot. For example, break-out Cable extension 1 thru 4 of Optical transceiver port 1 correlates with the Blades in slot 1 thru 4. The break-out cable extension 1 thru 4 of Optical transceiver port 2 correlates with Blades in slot 5 thru 8 and so on. Depending on whether the OPM is in slot 3 or 4 will determine whether you have connectivity to the upper or lower port of the I/O Expansion card.
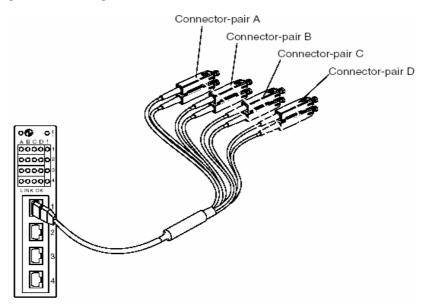

Figure 19. - Optical Pass-Thru Module and Break-out (SC-type) cable

Because the OPM serves as a physical extension of the FC expansion card ports, there is not a concern for Interoperability or zoning on the OPM per se. The SAN Administrator should be mindful of cable management and port-count when designing a SAN using OPM.
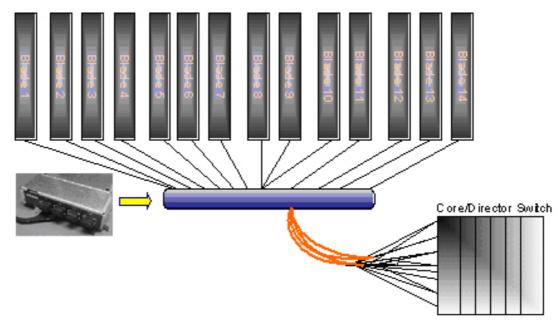
Figure 20. - SAN diagram using OPM

As shown in figure 20, the OPM is directly attached to the external switch. The external switch can be zoned as described in the zoning section of "Configuring Fibre Channel Switch module for Remote boot environment" section of this document. It is also recommended to consult the switch vendor's documentation to find out more about Zoning.

8.3   Configuring a Single Path to the Storage Server

During the installation of you Operating System there should only be one path active to each JS20 blade server. The second or alternate paths can be activated after the installation of the Operating System. Follow the steps in the following example to disable the second path on your embedded BladeCenter switch. If you are using a OPM, simply remove the FC cable going to the OPM in slot 4 during the installation of the OS. **Note:** In this example, the Storage Subsystem is connected to port 0 on the embedded BladeCenter switch module.

Brocade Switch Module Commands	Qlogic Switch Module Commands
1. Start a telnet session to the switch	1. Start a telnet session to the switch
2. Login using 'USERID'	2. FCSM: USERID> admin start
3. BSSM: > portDisable **0**	3. FCSM (admin): USERID> config edit
4. BSSM: > logout	4. FSCM (admin-config): USERID> set config port **0**
	5. set port **0** to offline
	6. FSCM (admin-config): USERID> config save
	7. FCSM (admin): USERID> config activate
	8. FCSM (admin): USERID> admin end
	9. FCSM (admin): USERID> logout

9.0   Configuring Fibre Channel Storage arrays

Up to this point, the Storage Administrator has configured the Blade Server, FC Expansion card, and FC module. During the installation of the Operating System it is highly recommended that there is

only one single path enabled to the blade, as multiple paths can cause problems during the installation. Once the Operating System has been installed, you can enable the second/alternate path and continue to configure the blade for multi pathing. This section describes attaching the IBM eServer BladeCenter into a SAN and configuring the Blade to Remote boot devices from the DS4000 series or ESS storage array.

NOTE: The instructions in this section assumes that the Storage subsystem has been installed and configured with an IP-address. **You should consult the documentation that comes with the Storage Subsystem for additional guidance.**

9.1 Configuring DS4000 series Storage for Remote boot

NOTE: The following steps will be performed from a Remote workstation that has the FAStT Total Storage Manager client installed. **You should consult the DS4000 series documentation for additional guidance.**

1. Install the IBM FAStT Storage Manager Client on the designated Remote workstation.

2. Launch the IBM FAStT Storage Manager Client, for in-depth instructions consult the DS4000 series documentation.

3. Using the Storage Management application, connect to the Storage subsystem that you intend to manage and configure for Remote booting.

4. Once you have selected the Storage subsystem that you want to configure for remote boot, proceed to Creating logical drives and arrays. To do this, right click on <**unconfigured capacity**> and select <**Create Logical drive**>, as shown in the figure 7 below. Follow the wizard to create a logical drive to suit your requirement. For further information see the DS4000 series documentation.
   NOTE on Adding Volumes: You will want to add 2-3 GB LUN, for Operating Systems Purposes. Additional volumes can be added after the installation of the OS. Perform the Configuration Update. **Only one volume** should be assigned to the Host until the installation of the Operating System has been completed.

Figure 7. - Storage Manager client management screen.

5. Proceed to configure Storage partitioning by performing the steps below.

NOTE: You should review your DS4000 series publications, these will provide more in-depth examples on Storage Partitioning.

6. Under the *Mappings View* tab, you should create a host group, host, and assign host ports.
    a. Select <**Mappings**> → <**Define Host Group**>.
    b. Click on the Host group; select <**Mappings**> → <**Define**>→ <**Host**>.
    c. Click on the Host that was created in the previous step; select *Mappings → Define→ Host-ports*. Each Host should initially have a single host-port assigned. Otherwise, the host will have dual-path access assigned. The host port is the Adapter WWPN that you recorded while configuring the FC Expansion card. The host type for each of these host-port types will be Windows® Non-clustered by default and should be changed to correspond to the Operating system type that you will be installing.

Figure 8. -Configuring Host groups and defining Host ports

7. Right click on the host created in Step 6 and assign the intended boot Logical Drive, *as LUN 0,* to the Host that was also created previously.

8. Remove the Access Logical Drive from the **Host group** created in Step 6.
    NOTE: This LUN is added automatically to the host group when the first LUN is mapped to it. Review the figure below to compare with your configuration.

Figure 9. - DS4000 series Host-port mapping

9.2   Configuring IBM Enterprise Storage Server (ESS) for Remote boot

NOTE: The following steps will be performed from a Remote workstation that has been configured to use the ESS Specialist. **You should consult the ESS documentation for additional guidance.**

1. Configure the ESS using the ESS Specialist.
    -Storage Allocation
    -Open Systems
    -Modify Host Systems.

2. Enter the information in the text fields of the Modify Host System, as shown in the following example.

3. Add the Host Attributes to the Host Systems List and Perform Configuration Update.

4. After the Configuration Update you will be brought to the Open Systems Storage Window, Add Volumes to the Host. Select the <**Add volumes**>.

Figure 11. - ESS Host-port mapping

5. Click on your Host (Host Nickname), and select clusters (Green) from Cluster 1 and/or Cluster 2, then select *Next*.
   NOTE on Adding Volumes: You will want to add 2-3 GB LUN, for Operating Systems Purposes. Additional volumes can be added after the installation of the OS. Perform the Configuration Update. **Only one volume** should be assigned to the Host until the installation of the Operating System has been completed.

Figure 12. - ESS Host-port mapping

6. You will then see the 2-3GB LUN that was created and that it is assigned to the WWPN of the FC Expansion card.

9.3 Configuring IBM TotalStorage SAN Volume Controller (SVC) for Remote boot

NOTE: The following steps will be performed from a Remote workstation that has access to the SVC master console. **You should consult the SVC documentation for additional guidance.**

1. Install and configure the master console using the SVC documentation.

2. Launch the IBM TotalStorage SAN Volume Controller Console (SVC Console), for in-depth instructions consult the SVC documentation.

3. Using the SVC Console, connect to the SVC cluster that you intend to manage and configure for Remote booting.

4. Once you have selected the SVC cluster that you want to configure for remote boot, proceed to creating Mdisk groups and Vdisks. To do this, click on <**Work with Managed Disks**> and select <**Create Mdisk Group**>, as shown in the figure 7 below. Follow the wizard to create a Mdisk group to suit your requirement. For further information see the SVC documentation.

Figure 7. – Create Mdisk group

5. Create a Virtual disk (vdisk). To do this, click on <**Work with Virtual Disk**s) and select <**Create Virtual Disk**>, as shown in the figure 8 below.
    NOTE on Adding Volumes: You will want to add 2-3 GB LUN, for Operating Systems Purposes. Additional volumes can be added after the installation of the OS. Perform the Configuration Update. **Only one volume** should be assigned to the Host until the installation of the Operating System has been completed.

Figure 8. – Create Virtual Disk

6. Create a host with WWPN from the HBA in the Blade. To do this, click on <**Work with virtual disks**> and then select <**Hosts**>. Select <**Create Host**>, as shown in figure 9 below. Follow the wizard to create the host and assign the WWPN from the Blade.

Figure 9. – Create Host

7. Proceed to map the Virtual disk to the Blade by performing the following steps. Click on <**Work with Virtual Disk**> and then select <**Hosts**>, select the Virtual disk that you want to map to the blade and select <**Map Virtual Disk**>, as shown in figure 10 below.
NOTE: You should review your SVC publications, these will provide more in-depth examples on Storage Partitioning.

Figure 10. – Map Virtual Disk

10.0   Configuring Boot Sequence for Installing from CD

Complete the following steps to set up the startup sequence from the management-module Web interface:

1. Log in to the management module.

2. In the left navigation pane, click <**Blade Tasks>**, then select <**Configuration>**.

3. Scroll down to the <**Boot Sequence**> page.

4. Select <**CD-ROM**> as the 1st boot device and select <**Save**>, as shown in the following example.

11.0 Configuring Serial Over LAN (SOL)

The BladeCenter Management module in the BladeCenter unit contains a video connector for attaching a monitor. However, the JS20 blade server does not contain a video controller. You need to configure and establish a SOL connection to the JS20 blade server for console output. This can be done remotely through a HS20 or HS40 blade server attached to a monitor or using a separate client system using Telnet. For additional information about SOL requirements, see the "*Enabling and configuring SOL (Serial Over LAN) on an 8842 Blade Server Whitepaper*" for more in-depth SOL instructions, this can be found at: http://www-3.ibm.com/pc/support/site.wss/document.do?lndocid=MIGR-55018

NOTE: The values in the examples in this document are examples. Your settings may be different. Also, SOL uses the Ethernet switch in slot 1, so it is highly recommended to not configure the first Ethernet (eth0) device on each JS20 blade server. In order to properly configure a JS20 blade server, you therefore require two Ethernet switches, one which is capable of SOL in slot 1, see the IBM website for tested combinations.

1. Connect and login to the BladeCenter Management Module using your web browser.

2. Make sure that the IBM eServer BladeCenter Management Module and the Ethernet switches are at the most recent firmware levels. You can check this from the management module, as shown in the following example.

NOTE: To update the firmware, see the documentation that comes with the blade server and the readme file that comes with the firmware update package.

3. **Instructions for Non-Cisco ESM:** To enable SOL, on the management module, in the left navigation pane, select <Blade Tasks>, then <Serial Over LAN>, as shown in the following example.

4.

The default management-module SOL settings provide the best overall SOL performance. You can modify these settings to meet requirements that are specific to your BladeCenter unit or network configuration. The default SOL values are:

- ➢ Serial Over Lan: Enabled
  Use this field to enable or disable SOL globally for the BladeCenter unit. Enabling or disabling SOL globally does not affect the SOL session status for each blade server.
- ➢ SOL VLAN ID: 4095
  This value is fixed and cannot be modified.
- ➢ BSMP IP Address Range: x.x.x.x
  This is a mandatory field where x.x.x.x is the base IP address for blade servers in the BladeCenter unit. The IP address that SOL uses to communicate with the blade system management processor (BSMP) of each blade server is based on the IP address that is set in this field. For example, if the value that you enter is 10.1.1.1, the blade server in blade bay 1 will have IP address 10.1.1.1, the blade server in blade bay 2 will have IP address 10.1.1.2, and so on.
- ➢ Accumulate timeout: 5
- ➢ Send threshold: 250
- ➢ Retry count: 3
- ➢ Retry interval: 250

- ➢ Select <**Save>** when complete.

5. **Instructions for Cisco ESM (CIGESM):**
   a. Follow the instructions below to configure the CIGESM in bay 1 and the Management Module to support Serial Over LAN (SoL).

Configure CIGESM in Bay 1 to support Serial Over LAN (SoL)
1. Telnet to the top CIGESM and log in
2. Run the following commands to configure SoL on the CIGESM in switch Bay 1. **NOTE:** VLAN can be other then 4094 but must match MM SoL VLAN
3. Enter config and create and name the VLAN to be used for SoL: **config t** **vlan 4094** **name SoL**
4. Block SoL VLAN from being carried on uplinks: **int range g0/17 -20** **switchport trunk allowed vlan remove 4094**
5. Allow SoL VLAN to be carried on ports to Blade servers and over to MM: **int range g0/1 -16** **switchport trunk allowed vlan add 4094**
6. Exit config and save to NVRAM: **end** **write**
7. Exit telnet session **exit**
Configure the Management Module to support the VLAN for SoL (in this example we used 4094)
1. Log in to the MM interface and , select Serial Over LAN on the left hand side.
2. Make sure Serial over LAN shows Enabled
3. Set SOL VLAN ID to 4094
4. Click on the Save button
5. One left hand side of screen, scroll down and restart the MM.

6. Enable SOL for each blade server. (For each blade server, scroll down to the Serial Over LAN Configuration section, and in the Serial over LAN field, select Enabled.), as shown in the following example.

7. Make sure that the status of the SOL session is <**Ready**> and that SOL is <**Enabled**>, as shown in the following example.

8. SOL has now been configured.

12.0 Installing the AIX Operating System

Now that you have configured the FC Expansion card, FC switches and Storage - you are now ready to begin the installation of the Operating System. The following AIX levels have been validated and are subjects of this section:

Operating System
AIX 5.2H

To install AIX on JS20, use one of the following two methods:

Network Install using Network Installation Manger (NIM) – See the AIX documentation
Installation using CD-ROM

The instructions in this document will describe how-to install AIX on a JS20 blade server using a CD-ROM.

Important Notice
The customer interface card in the media tray may need to be replaced. See Retain Tip H181771 for more information.

12.1 Installing AIX 5.2H or later

1. Insert the AIX 5.2 CD1 in to the CD-ROM drive.

2. Turn on the JS20 blade server.

3. Press the media tray button on the JS20 blade server to assign the media tray to the JS20 blade server.
   NOTE: Make sure that local switching of the media tray is not disabled for the JS20 blade server in the management-module Web interface. For more information, see the *IBM eServer BladeCenter Management Module User's Guide*.

4. Telnet to the management module (MM) and start a SOL session, as shown in the example below. In this example the JS20 blade server is located in slot 4 in the BladeCenter chassis.

```
1.  >telnet 192.168.70.125
2.  username: USERID
3.  password: ********
4.  system> console -T blade[4]
```

5. At the "System Console" screen, select <**1**> and press enter, as shown in following example.

```
******* Please define the System Console. *******
Type a 1 and press Enter to use this terminal as the
  system console.
Pour definir ce terminal comme console systeme, appuyez
  sur 1 puis sur Entree.
Taste 1 und anschliessend die Eingabetaste druecken, um
  diese Datenstation als Systemkonsole zu verwenden.
Premere il tasto 1 ed Invio per usare questo terminal
  come console.
```

```
Escriba 1 y pulse Intro para utilizar esta terminal como
  consola del sistema.
Escriviu 1 1 i premeu Intro per utilitzar aquest
  terminal com a consola del sistema.
Digite um 1 e pressione Enter para utilizar este terminal
  como console do sistema.
>>> Choice [1]: 1
```

6. At the "Language" screen, select your language and press enter. In the example below we are installing in English, by selecting <**1**> and enter.

```
HARDWARE SYSTEM MICROCODE
 Licensed Internal Code - Property of IBM
 (C) Copyright IBM Corp. 1990, 1994.
 All rights reserved.

 US Government Users Restricted Rights -|
>>>  1 Type 1 and press Enter to have English during install.
     2 Entreu 2 i premeu Intro per veure la instalÀlaci¾ en catalÓ.
     3 Entrez 3 pour effectuer l'installation en franþais.
     4 F³r Installation in deutscher Sprache 4 eingeben
        und die Eingabetaste dr³cken.
     5 Immettere 5 e premere Invio per l'installazione in Italiano.
     6 Digite 6 e pressione Enter para usar PortuguÛs na instalapÒo.
     7 Escriba 7 y pulse Intro para la instalaci¾n en espa±ol.
     88  Help ?

>>> Choice [1]: 1
```

7. At the "Installation and maintenance" screen, select <**2**> and press enter, as shown in the following example.

```
Welcome to Base Operating System
                     Installation and Maintenance
Type the number of your choice and press Enter.  Choice is indicated by
>>>.
>>> 1 Start Install Now with Default Settings
    2 Change/Show Installation Settings and Install
    3 Start Maintenance Mode for System Recovery
    88  Help ?
    99  Previous Menu
>>> Choice [1]: 2
```

8. At the "Installation and settings" screen, select <**3**> and press enter for more options, as shown in the following example.

```
Installation and Settings

Either type 0 and press Enter to install with current settings, or type
the
number of the setting you want to change and press Enter.
    1  System Settings:
         Method of Installation.............New and Complete Overwrite
         Disk Where You Want to Install.....hdisk1
    2  Primary Language Environment Settings (AFTER Install):
         Cultural Convention................English (United States)
         Language ..........................English (United States)
         Keyboard ..........................English (United States)
         Keyboard Type......................Default
    3  More Options  (Desktop, Security, Kernel, Software, ...)
>>> 0  Install with the current settings listed above.
                       +----------------------------------------------
------
    88  Help ?         |     WARNING: Base Operating System Installation
```

```
will
    99  Previous Menu  |    destroy or impair recovery of ALL data on
the
                       |    destination disk hdisk0.
>>> Choice [0]: 3
```

9. At the "Install options" screen, Enable the 64-bit kernel by selecting <**3**> and press enter, as shown in the following example.

```
Install Options

 1.  Enable Trusted Computing Base...................................
No
 2.  Enable CAPP and EAL4+ Technology...............................
No
     (English only, 64-bit kernel enablement, JFS2 file systems)
 3.  Enable 64-bit Kernel...........................................
No
 4.  Create JFS2 File Systems.......................................
No

 5.  Graphics Software..............................................
Yes
 6.  Documentation Services Software................................
No
 7.  Enable System Backups to install any system....................
Yes
     (Installs all devices and kernels)

>>> 8.  Install More Software

     0  Install with the current settings listed above.

     88  Help ?
     99  Previous Menu

>>> Choice [8]: 3
```

10. At the "install options" screen, select "Create JFS2 file systems" by selecting <**4**> and press enter, as shown in the following example.

```
Install Options

 1.  Enable Trusted Computing Base...................................
No
 2.  Enable CAPP and EAL4+ Technology................................
No
     (English only, 64-bit kernel enablement, JFS2 file systems)
 3.  Enable 64-bit Kernel............................................
Yes
 4.  Create JFS2 File Systems........................................
No

 5.  Graphics Software...............................................
Yes
 6.  Documentation Services Software.................................
No
 7.  Enable System Backups to install any system.....................
Yes

     (Installs all devices and kernels)
>>> 8.  Install More Software
     0  Install with the current settings listed above.
```

```
    88  Help ?
    99  Previous Menu

>>> Choice [8]: 4
```

11. At the install options screen, select <**0**> and press to continue with selected settings, as shown in the following example.

```
Install Options

 1.   Enable Trusted Computing Base...................................
No
 2.   Enable CAPP and EAL4+ Technology................................
No
      (English only, 64-bit kernel enablement, JFS2 file systems)
 3.   Enable 64-bit Kernel...........................................
Yes
 4.   Create JFS2 File Systems.......................................
Yes

 5.   Graphics Software..............................................
Yes
 6.   Documentation Services Software................................
No
 7.   Enable System Backups to install any system....................
Yes
      (Installs all devices and kernels)

>>> 8.  Install More Software

     0   Install with the current settings listed above.

    88  Help ?
    99  Previous Menu

>>> Choice [8]: 0
```

12. At the "Overwrite installation summary" screen, select <**1**> to continue with new install, as shown in the following example.

```
Overwrite Installation Summary

Disks:  hdisk0
Cultural Convention:  en_US
Language:  en_US
Keyboard:  en_US
64 Bit Kernel Enabled:  Yes
JFS2 File Systems Created:  Yes
Graphics Software:  Yes
Documentation Services Software:  No
Enable System Backups to install any system:  Yes
Optional Software being installed:

>>> 1   Continue with Install
                        +----------------------------------------------
------
    88  Help ?         |    WARNING: Base Operating System Installation
will
    99  Previous Menu  |    destroy or impair recovery of ALL data on
the
                       |    destination disk hdisk0.
>>> Choice [1]: 1
```

13. Installation will now start to copy files to the hard drive (be patient). When prompted for CD2, insert the AIX CD2 and press enter to continue, as shown in the following example.

```
Filesets processed:  2 of 56
System Installation Time: 1 hr 9 mins     Tasks Complete: 20%

installp:  APPLYING software for:
        Java14.sdk 1.4.1.6

installp:  Please insert volume 2 into device /dev/cd0 and press Enter
            to continue or enter "q" to quit.
```

14. When prompted for Terminal Type, select <**vt100**> and press enter to continue, as show in the following example.

```
Set Terminal Type
The terminal is not properly initialized.  Please enter a terminal type
and press Enter.  Some terminal types are not supported in
non-English languages.

    ibm3101          tvi912          vt330
    ibm3151          tvi920          vt340
    ibm3161          tvi925          wyse30
    ibm3162          tvi950          wyse50
    ibm3163          vs100           wyse60
    ibm3164          vt100           wyse100
    ibmpc            vt320           wyse350
    lft              sun


                     +----------------------Messages-----------------
-------
                     | If the next screen is unreadable, press Break
(Ctrl-c)
    88  Help ?       | to return to this screen.
                     |
>>> Choice []: vt100
```

15. Select <**Accept**> and press enter, as show in the following example.

```
Software License Agreements

Move cursor to desired item and press Enter.

  Show Installed License Agreements
  Accept License Agreements


F1=Help             F2=Refresh   .    F3=Cancel           Esc+8=Image
Esc+9=Shell         Esc+0=Exit        Enter=Do
```

16. Select **yes** by toggling using tab and press enter to continue, as shown in the following example.

```
Accept License Agreements

Type or select values in entry fields.
Press Enter AFTER making all desired changes.
                                          [Entry Fields]
  ACCEPT Installed License Agreements          yes
```

17. Configure your system as desired and exit <**ESC+0**> when complete, as shown in the following example.
    NOTE: It is highly recommended that you at least set your root password.

```
Installation Assistant

Move cursor to desired item and press Enter.
  Set Date and Time
  Set root Password
  Configure Network Communications
  Install Software Applications
  Using SMIT (information only)
  Tasks Completed - Exit to Login


F1=Help            F2=Refresh        F3=Cancel         Esc+8=Image
Esc+9=Shell        Esc+0=Exit        Enter=Do
```

18. You have now successfully installed AIX 5.2 onto your JS20 blade server. Continue to section 14.0 which will guide you through the setup of the boot sequence.

13.0 Installing the Linux Operating System

Once you have configured the FC Expansion card, FC switches and Storage - you are now ready to install Linux. The following Linux versions are subjects of this section.

Operating System	Platform
SUSE	Enterprise Linux v8.0 SP3A
Red Hat	Enterprise Linux v3.0 U3

The Linux distribution typically has the FC Expansion card source files. Therefore, you should proceed with installation and the KudZu application should detect the appropriate device driver for the boot device.

Red Hat and SUSE has the ability for graphic installs using VNC. Prior to start the graphical installation (as we are using in this section) of either SUSE or Red Hat, download VNC from the internet (http://www.realvnc.com/) and install onto your management station. VNC is available for general use under the conditions of the GNU General Public Licence. See the VNC website for installation and usage instructions.

13.1 Installing SLES8 SP3A or later

1. Insert the SLES8 SP3A CD1 in to the CD-ROM drive.

2. Turn on the JS20 blade server.

3. Press the media tray button on the JS20 blade server to assign the media tray to the JS20 blade server.
   NOTE: Make sure that local switching of the media tray is not disabled for the JS20 blade server in the management-module Web interface. For more information, see the *IBM eServer BladeCenter Management Module User's Guide*.

4. Telnet to the management module (MM) and start a SOL session, as shown in the following example.

```
 >telnet 192.168.70.125
username: USERID
password: ********
system> console -T blade[4]
```

5. At the install boot prompt, type:
<**install vnc=1 vnc_password=password netdevice=eth1>** and press <enter> to continue,
as shown in the following example.
Note: It is highly recommended to not configure eth0 as Serial Over LAN is using this device.
Also, for text mode install, simply press <enter> instead of supplying the vnc parameters.

```
D099
D5BB 1
E1AA
E1AD/
Elapsed time since release of system processors: 0 mins 47 secs
E105
Config file read, 92 bytes
  Welcome to SuSE Linux (SLES8 SP3)!
  Use  "install"    to boot the ppc64 kernel
  You can pass the option "noinitrd"  to skip the installer.
  Example: install noinitrd root=/dev/sda4
Welcome to yaboot version 1.3.6.SuSE
Enter "help" to get some basic usage information
boot: install vnc=1 vnc_password=password netdevice=eth1
```

6. When prompted, insert the original SLES8 CD1 and select <**OK**>, as shown in the following
example.

7. Select whether you want to use DHCP or not, as shown in the following example.

8. If using static IP, enter your IP address and press enter, as shown in the following example.

9. If using static IP, enter your <**subnetmask**> and press enter, as shown in the following example.

10. If using static IP, enter your <**gateway**> and press enter, as shown in the following example.

```
>>> Linuxrc v1.4 (Kernel 2.4.21-138-pseries64) (c) 1996-2002 SuSE Linux AG



         If you need a gateway to reach the server, please enter the
          IP address of the gateway. If you do not need a gateway,
                       just enter your own IP address.

                               192.168.70.222
```
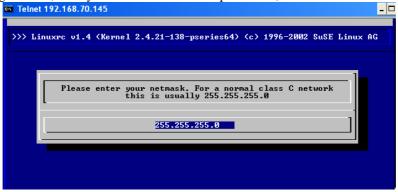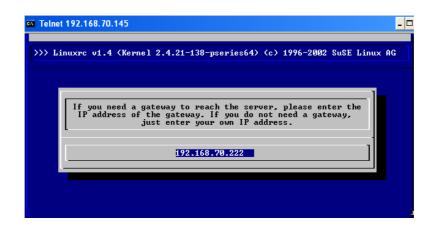
11. If using static IP, enter the address of your <**name server**> and press enter, as shown in the following example.


```
>>> Linuxrc v1.4 (Kernel 2.4.21-138-pseries64) (c) 1996-2002 SuSE Linux AG



             Please enter the IP address of your name server. If you
                       don't use a name server, press ESC.


                               192.168.70.222
```

12. Select VT100 by selecting <**1**> and press enter, as shown in the following example.

```
What type of terminal do you have ?

  1) VT100
  2) VT102
  3) VT220  (recommended with p690 hvc console)
  4) X Terminal Emulator (xterm)
  5) X Terminal Emulator (xterm-vt220)
  6) X Terminal Emulator (xterm-sco)
  7) X Terminal Emulator (xterm-sun)
  8) Linux VGA or Framebuffer Console
  9) Other


Type the number of your choice and press Return: 1
```

13. Start VNC viewer, once the VNC server has started, as shown in the following example.

```
Please wait while YaST2 will be started

Unpacked extension disk...OK

starting VNC server...
```

```
a log can be found in /tmp/vncserver.log ...

***           You can connect to 192.168.70.222, display :1 now
with vncviewer
***           Or use a Java capable browser on
http://192.168.70.222:5801/
(When YaST2 is finished, close your VNC viewer and return to this
window.)
Xlib:  extension "XInputExtension" missing on display ":1.0".
```

14. Type the <**IP address:1**> (display 1) of the VNC server running on the blade and select <**OK**>, as shown in the following example.

15. Type the <**VNC password**>, that you specified during the install boot prompt and select <**OK**>, as shown in the following example.

16. Select your language and select <**Accept**> to continue, as shown in the following example.

17. Select <**New Installation**> and select <**OK**> to continue, as shown in the following example.

18. Make sure that the partition has been configured on /dev/sdbx (where x is the partition number). Customize the Software selection to suit your requirements.
    Note: hd*x* is the IDE drive and sd*x* is the SCSI device, where *x* is the device number.

19. Select <**Accept**> to continue, as shown in the following example.

20. Select <**Yes, install**> to start the installation, as shown in the following example.

21. Insert the SLES8 SP3A CD1 if prompted and select <**OK**> to continue, as shown in the following example.

22. Server will now reboot. Once rebooted, re-connects using VNC viewer (as previously described) and connect to the VNC server running on the JS20 blade.

23. Set the Linux password and select <**Next**> to continue, as shown in the following example.

24. Type in the user details and press <**Next**> to continue, as shown in the following example.

25. Configure your network interface and select <**Next**> to continue, as shown in the following example.

26. SLES8 has now successfully been installed on the JS20 blade server. Continue to section 14.0 which will guide you through the setup of the boot sequence.

13.2 Installing SLES9

The installation of SLES8 and SLES9 is similar.

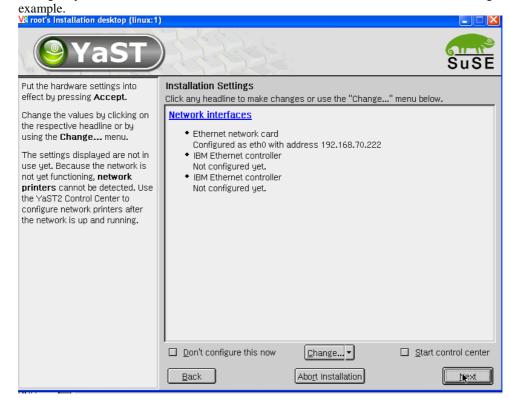| Important Notice for SLES9 |
| --- |
| Using SCSI or hotplug devices may lead to boot failure or mount problems. On reboot, SCSI or hotplug devices may be assigned to different device file names than before. If the root filesystem moved to a different device name, the kernel will not find it and fail booting. **Workarounds:** For a root filesystem use mount by volume label, see below. For all other filesystems configure mount by UUID using YaST2:
 • In YaST2 go to the Partitioner
 • For every SCSI device partition /dev/sd? with a mount point, go to Edit... -> Fstab Options and select Mount in /etc/fstab by UUID.

Using mount by volume label for root filesystem:
 • Assign a volume label to the root filesystem and activate mount by volume label
   Go to the YaST2 Partitioner. Select the root filesystem (Mount on /) and go to Edit, then Fstab Options. Check Mount in /etc/fstab by Volume label. Enter a label in the field Volume Label, e.g. rootvollabel. Be sure to use a volume label that is not used by any other volume in the system. Commit changes (press Ok, Ok, Next).
 • Set up the root= kernel parameter in the bootloader configuration
   Go to the YaST2 Boot Loader Setup. Press Edit Configuration Files. In the line that starts with append =, add root=LABEL=rootvollabel to the kernel command line. rootvollabel is the Label you assigned to the root filesystem above. Commit changes (press Ok, Finish). |

13.3 Installing RHEL3 U3 or later

1. Insert the RHEL3 U3 CD1 in to the CD-ROM drive.

2. Turn on the JS20 blade server.

3. Press the media tray button on the JS20 blade server to assign the media tray to the JS20 blade server.
   NOTE: Make sure that local switching of the media tray is not disabled for the JS20 blade server in the management-module Web interface. For more information, see the *IBM eServer BladeCenter Management Module User's Guide*.

4. Make sure that CDROM is in the CD tray and is assigned to the blade that you are installing. Also, make sure that the bootsequence to boot on CDROM have been configured. Telnet to the management module (MM) and start a SOL session, as shown in the following example.

```
>telnet 192.168.70.125
username: USERID
```

```
password: ********
system> console -T blade[4]
```

5. At the install boot prompt, type:
<**linux vnc vncpassword=password>** and press enter to continue, as shown in the following example. Also, for text mode install, simply press <enter> instead of supplying the vnc parameters.

```
pamcwatt@localhost:/
File  Edit  View  Terminal  Go  Help
E14A
D008
E1F0
E1F1



D099
D5BB 1


E1AA
E1AD
Elapsed time since release of system processors: 0 mins 52 secs

Config file read, 207 bytes

Welcome to Red Hat Linux!
Hit <TAB> for boot options.


Welcome to yaboot version 1.3.10
Enter "help" to get some basic usage information
boot: linux vnc vncpassword=password
```

6. At the networking device screen, select the second network device (eth1) to configure for VNC, as shown in the following example..It is highly recommended to not configure ETH0 as Serial Over LAN is using this device.

```
pamcwatt@localhost:/                                          _ □ ✕

File   Edit   View   Terminal   Go   Help
Welcome to Red Hat Enterprise Linux


       +--------------------+ Networking Device +--------------------+
       |                                                            |
       | You have multiple network devices on this system. Which    |
       | would you like to install through?                         |
       |                                                            |
       | eth0 - Broadcom Corporation|NetXtreme BCM5704S Gigabit Ethernet |
       | eth1 - Broadcom Corporation|NetXtreme BCM5704S Gigabit Ethernet |
       |                                                            |
       |          +----+                        +------+           |
       |          | OK |                        | Back |           |
       |          +----+                        +------+           |
       |                                                            |
       |                                                            |
       |                                                            |
       +------------------------------------------------------------+



 <Tab>/<Alt-Tab> between elements  | <Space> selects | <F12> next screen
```

7. Specify whether you are using DHCP or static. As shown in the following example.
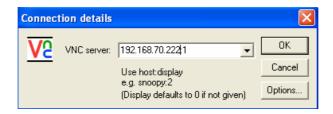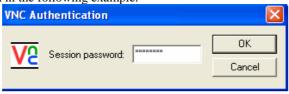
```
pamcwatt@localhost:/                                          _ □ ✕

File   Edit   View   Terminal   Go   Help
Welcome to Red Hat Enterprise Linux


       +--------------------+ Configure TCP/IP +--------------------+
       |                                                            |
       | Please enter the IP configuration for this machine. Each   |
       | item should be entered as an IP address in dotted-decimal  |
       | notation (for example, 1.2.3.4).                           |
       |                                                            |
       |         [*] Use dynamic IP configuration (BOOTP/DHCP)      |
       |                                                            |
       |           IP address:            _____         |
       |           Netmask:               _____         |
       |           Default gateway (IP):  _____         |
       |           Primary nameserver:    _____         |
       |                                                            |
       |          +----+                        +------+           |
       |          | OK |                        | Back |           |
       |          +----+                        +------+           |
       |                                                            |
       |                                                            |
       +------------------------------------------------------------+



 <Tab>/<Alt-Tab> between elements  | <Space> selects | <F12> next screen
```

8. Start VNC viewer, once the VNC server has started on the JS20 blade that you are installing. Type the < **IP address:1**> (for display 1) of the VNC server running on the blade and select <**OK**>, as shown in the following example.

9. Type in the <**VNC password**>, that you specified during the install boot prompt and select
   <**OK**>, as shown in the following example.
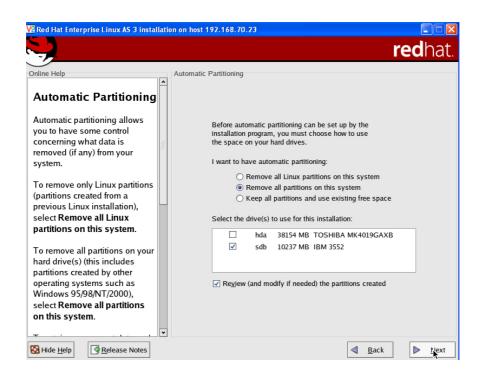

10. Select <Next> to continue, as shown in the following example.

11. At the "Automatic Partitioning" screen, select <**sdb**> and select <**Next**> to continue, as shown in
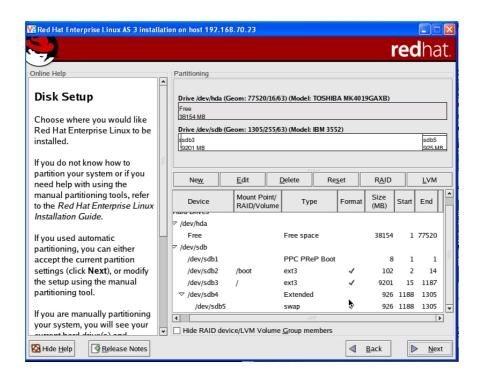   the following example.
    Note: hd$x$ is the IDE drive and sd$x$ is the SCSI device, where x is the device number.

12. At the "Warning" screen, select <**Yes**> to continue, as shown in the following example.
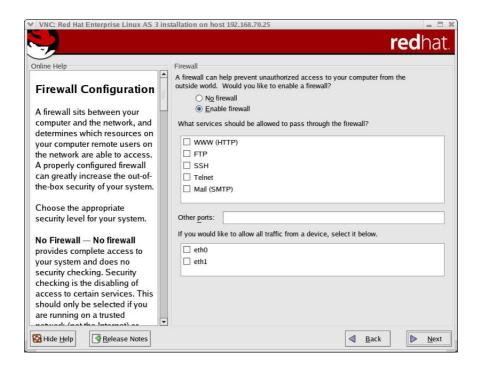

13. Verify the partitioning at the "Disk setup" screen and select <**Next**> to continue, as shown in the following example.
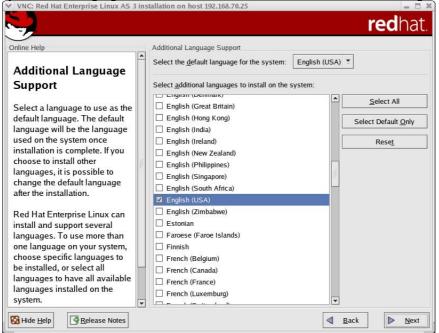
14. Configure your network settings and select <**Next**> to continue, as shown in the following example.
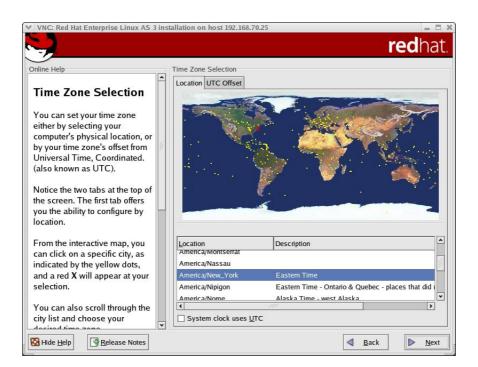

15. Select whether you want to use firewall or not and select <**Next**> to continue, as shown in the following example.

16. Select your desired language and select <**Next**> to continue, as shown in the following example.
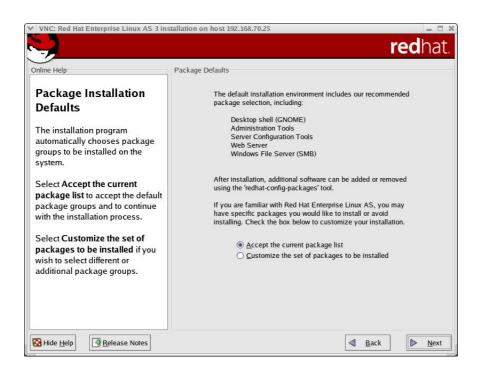

17. Select your desired Time Zone and select <**Next**> to continue, as shown in the following example.
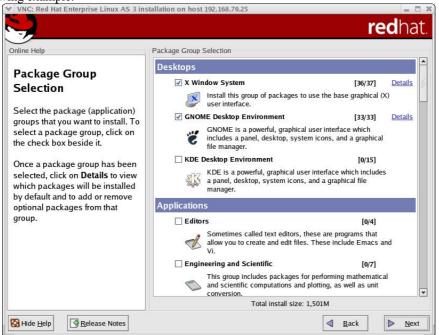
18. Type in root password and select <**Next**> to continue, as shown in the following example.
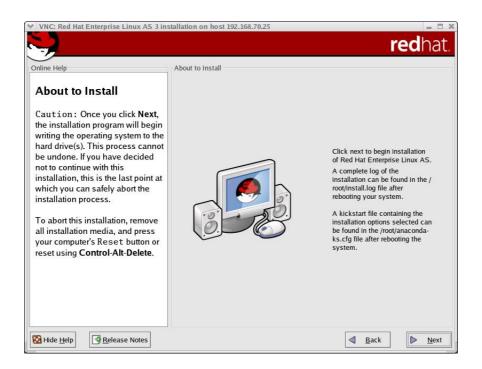

19. Select whether you want to customize the package selection or accept default and click <**Next**> to continue, as shown in the following example.
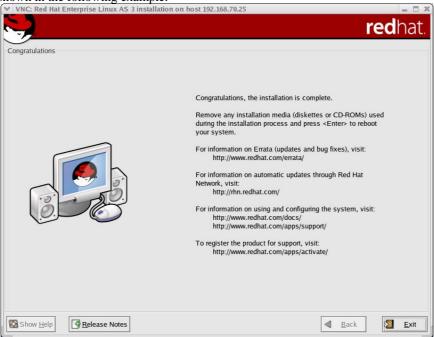
20. Select the packages that you want to install and click <**Next**> to continue, as shown in the following example.

21. Select <**Next**> to finalize the installation and start copy files to your SAN boot device, as shown in the following example.
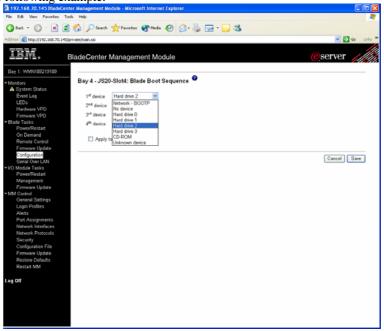
22. Change CDROM when prompted. Once copying is complete, select <**Exit**> to exit the installation, as shown in the following example.

23. RHEL3 has now successfully been installed on the JS20 blade server. Continue to section 14.0 which will guide you through the setup of the boot sequence.

14.0 Configuring Boot Sequence and Open Firmware for Remote Boot

1. From the MM interface, change the boot sequence to <**Hard Drive 2**> as the first boot device, as shown in the following example.

2. Select <**Save**> to save your settings and exit from the MM interface.

3. Power on the JS20 blade server and start a SOL session, as described previously in Section 13.x during the Operating System install.

4. during the boot, at the D5BB prompt, press <**8**> to enter the Open Firmware prompt.

5. Type <**dev/packages/gui**> and press enter. Then type <**setup-fcp-disk**> and press enter to start the mini SMS, as shown in the following example.

```
D5BB 4

E1A1
E1A8 ok
0 > dev /packages/gui  ok
0 > setup-fcp-disk
```

6. At the "Main Menu", select <**2**> and press enter, as shown in the following example.

```
pSeries Firmware
Version FW04251120
SMS 1.3 (c) Copyright IBM Corp. 2000,2004 All rights reserved.
--------------------------------------------------------------


Main Menu
 1.   Select Language
 2.   Select Media Adapter
```

```
--------------------------------------------------------------
Navigation Keys:
                                           X = eXit System Management
Services
--------------------------------------------------------------
Type the number of the menu item and press Enter or select Navigation
Key:2
```

7. At the "Select Media Adapter" screen, select <**1**> and press enter, as shown in the following example.

```
Select Media Adapter

 1.         U8842.P1Z.23A0626-P1-C5-T1
/pci@8000000f8000000/pci@1f/fibre-chanel@1
--------------------------------------------------------------

Navigation keys:
M = return to Main Menu
ESC key = return to previous screen         X = eXit System
Management Services
--------------------------------------------------------------
Type the number of the menu item and press Enter or select
Navigation Key: 1
```

8. At the "Select Device" screen, select your boot drive and press enter to continue, as shown in the following example.

```
scan /pci@8000000f8000000/pci@1f/fibre-channel@1/disk@QLogic QLA2312
Fibre Channel Host Adapter fcode version 1.03.13 06/22/04
Firmware version 32.27.06

check /pci@8000000f8000000/pci@1f/fibre-
channel@1/disk@21000004cf2fcded,00-
pSeries Firmware
Version FW04271120
SMS 1.3 (c) Copyright IBM Corp. 2000,2004 All rights reserved.
--------------------------------------------------------------
Select Device
Device  Current  Device
Number  Position  Name
 1.        -       SCSI 36401 MB FC Harddisk ( loc=U8842.P1Z.23A0626-
P1-C5-T1-L21
000004cf2fcded-L00 )
--------------------------------------------------------------
Navigation keys:
M = return to Main Menu
ESC key = return to previous screen         X = eXit System
Management Services
--------------------------------------------------------------
Type the number of the menu item and press Enter or select
Navigation Key: 1
```

9. At the "Select Task" screen, select <**2**> for "Normal Mode Boot" and press enter to continue, as shown in the following example.

```
pSeries Firmware
Version FW04271120
```

```
SMS 1.3 (c) Copyright IBM Corp. 2000,2004 All rights reserved.
-------------------------------------------------------------
Select Task
SCSI 36401 MB FC Harddisk ( loc=U8842.P1Z.23A0626-P1-C5-T1-
L21000004cf2fcded-L0 )
 1.   Information
 2.   Normal Mode Boot
-------------------------------------------------------------
Navigation keys:
M = return to Main Menu
ESC key = return to previous screen        X = eXit System
Management Services
-------------------------------------------------------------
Type the number of the menu item and press Enter or select
Navigation Key:2 ok
0 >
```

10. Reboot the blade from the MM interface. The blade should now boot to the OS prompt.

15.0 Configuring for Redundancy

Up to this point of configuring Remote boot, these steps have assumed that you were using a single port of the FC expansion card to perform the OS installation (configured through Port Disable on the switch). The purpose of this was to prevent LUN contention during the OS installation. The next steps will discuss configuring the 2nd port of the FC Expansion card to become useable in the event of a failure on the 1st port. This section will also describe how to configure the second I/O expansion module and install multi-path software etc. This process is used for connecting the secondary path using Storage Partitioning for DS4000 series or provisioning for ESS platforms.

Important Notice
NOTE: JS20 cannot boot over the second HBA port. Once the OS is up and running, however, it will failover as needed to the second port to access non-boot hard drives if supported path failover software is properly installed. **NOTE:** SDD for AIX do not support redundancy for rootvg (boot disk).

15.1 Enable second switch path

Enable the second switch path to the Storage controller, using the steps outlined below. If using OPM, reconnect the FC cable to the OPM in slot 4.
Note: In this example, the Storage Subsystem is connected to port 0 on the embedded BladeCenter switch module.

Brocade Switch Module Commands	Qlogic Switch Module Commands
1. Start a telnet session to the switch 2. Login using 'USERID' 3. BSSM: >portEnable **0** 4. BSSM: > logout	1. Start a telnet session to the switch 2. FCSM: USERID> admin start 3. FCSM (admin): USERID> config edit 4. FSCM (admin-config): USERID> set config port **0** 5. set port **0** to online 6. FSCM (admin-config): USERID> config save 7. FCSM (admin): USERID> config activate 8. FCSM (admin): USERID> admin end 9. FCSM (admin): USERID> logout

NOTE: Enable **Port 0** on the BladeCenter Switch Modules that was previously disabled to allow only a single path during the installation of the OS. This provides you with dual-paths to the storage controller.

15.2 DS4000 series

1. Add the second WWPN of the FC expansion card to the Storage Partitioning to allow for dual path to the Storage Subsystem.

    a. Launch the FAStT client and open the Storage Subsystem that you are configuring for remote boot.

    b. Click on the Host that was created in the previous step; select <**Mappings**> → <**Define**>→ <**Host-port**>s. Each Host should initially have a single host-port assigned. Otherwise, the host will have dual-path access assigned. The host port is the Adapter WWPN that you recorded while configuring the FC Expansion card. The host type for each of these host-port types will be Windows® Non-clustered by default and should be changed to correspond to the Operating system type that you will be installing.

2. Auto-volume transfer/auto-disk transfer (AVT/ADT) is a function that provides automatic failover in case of controller failure on a storage subsystem. This function has to be enabled on the DS4000 series controller in a remote boot environment. Enable AVT for the DS4000 series Storage Controller using the following script sample. For information on how-to load DS4000 series script, see your DS4000 series documentation.

> **Enabling AVT on DS4000 series**
> // The following commands **Enable** AVT
> // You must reboot the controllers for the NVSRAM settings to take effect
> set controller[a] NVSRAMByte[0x33]=0x40,0x40;
> set controller[b] NVSRAMByte[0x33]=0x40,0x40;

Linux configuration

3. (**LINUX only**) Install the IBM FAStT Management Suite Java (MSJ) for failover capability as directed below.
   NOTE: The FAStT MSJ application should be compatible with the Firmware that is being used on the Storage controller. You can confirm this by referring to the FAStT MSJ and Firmware Readme files.

    a. Obtain the latest FAStT MSJ from the IBM support website (http://www-1.ibm.com/servers/storage/support/fastt/index.html)

    b. Telnet and log on as root to the JS20 blade Server.

    c. Copy the FAStT MSJ to the JS20 blade server.

    d. Change to the directory that contains the FAStT MSJ installer.

    e. At the prompt , type <**sh FAStTMSJ_install.bin -i silent**>. FAStT installs in the /opt directory. The launch script is located in the /usr directory.

4. (**LINUX only**) Run the IBM FAStT Management Suite Java (MSJ).
   Note: The default FAStT MSJ password is "config". Make sure you change this password after installation to ensure that security is not compromised. To enter a new Password you must have Administrative Privileges. You cannot perform management functions and NVRAM\Flash modification unless you set a Password for FAStT MSJ.

    a. Ensure that you are in a graphical user environment.

b. Start qlremote, open a command terminal from the root directory and type <**qlremote**>.

c. Change to the usr directory in which the IBM FAStT MSJ script is installed, by typing <**cd /usr**>

d. Start the application, by typing <**./FAStT_MSJ**>

e. When FAStT MSJ is no longer required, enter ctrl-c and close the terminal window where qlremote is running. To ensure that qlremote has been successfully terminated do the following: From a command terminal type: killall -TERM qlremote. You should get a "no process killed" message.
Note: Ensure that no I/O's are occurring when qlremote is running.

f. Please refer to the online help file or the User's Guide for more information. To view the online help, go to Help and "Set Browser Location" to match the location where your preferred browser is located. You may now browse the Help file by selecting "Browse Contents".

5. (**LINUX only**) Configure the IBM FAStT Management Suite Java (MSJ) for failover capability.

Use the Auto Configure option to configure all device paths for the selected host to the default values for failover. The default path for each device is the first available path as visible, with the other paths hidden. This option prompts for the automatic configuration of LUNs associated with these devices. Perform the following steps to configure the device paths, and optionally the LUN paths, on this host to default values.
Note: If required, consult the FAStT MSJ User's Guide for guidance on how-to manually configure the failover.

a. From the Fibre Channel Port Configuration window, click <**Tools**> -> <**Auto Configure**>.

b. The system prompts whether you also want to use default LUN configurations. Click <**Yes**> to change the current LUN configurations to the default values.

c. Verify that paths have been setup and that it can see both paths, by right-clicking the cell for the device in the Adapter *n* column. Verify the path information in the "Path Information window".

d. Exit and close the MSJ application.

e. When FAStT MSJ is no longer required, enter ctrl-c and close the terminal window where qlremote is running. To ensure that qlremote has been successfully terminated do the following: From a command terminal type: killall -TERM qlremote. You should get a "no process killed" message.
Note: Ensure that no I/O's are occurring when qlremote is running.

AIX configuration

6. (**AIX only**) Install the RDAC file sets for failover capability.

a. Verify that all pre-req's for the RDAC file sets has been installed by consulting the latest AIX RDAC User's Guide.

b. Download the most recent AIX RDAC file sets from the following IBM Web site: techsupport.services.ibm.com/server/aix.fdc.

c. Telnet and log on as root to the JS20 blade Server.

d. Probe for new devices by typing <**cfgmgr –v**>.

e. Copy the AIX RDAC file sets to the JS20 blade server.

f. From the command prompt, type <**smitty install_update**> and press enter to go directly to the installation panels. The "Install and Update Software" menu is displayed.

g. Select <**Install Software**> and press enter.

h. Press <**F4**> to display the "INPUT Device/Directory for Software" panel.

i. Type in the directory path to where RDAC filesets was copied to and press enter.

j. Press Enter again. "The Install Software" panel is displayed.

k. Select Software to Install and press <**F4**>. The "Software to Install" panel is displayed.

l. Select the installation package that is appropriate for your environment.

m. Press Enter. The "Install and Update from LATEST Available Software" panel is displayed with the name of the software that you selected to install.

n. Check the default option settings to ensure that they are what you need.

o. Press enter to install.

p. Press enter to continue.
   Note: The installation process can take several minutes to complete.

q. When the installation is complete, press <**F10**> to exit from SMIT.

r. Run and examine the output of the <**lsdev -Cc disk**> command to ensure that the RDAC software recognizes the FAStT logical drives that has been assigned to the JS20 blade server.

15.3 ESS / SVC

1. Add the second WWPN of the FC expansion card to the Storage Partitioning to allow for dual path to the Storage Subsystem.

   a. Using ESS Specialist, modify the Host System to include the 2nd HBA and Boot LUN.

   b. Enter the information in the text fields for the 2nd port of the FC Host adapter and Boot LUN.

   c. Save the configuration and proceed to enabling the path through the Switch Module.

Linux configuration

> **Important Notice**
> Note that initrd needs to be configured after installation for boot luns to take advantage of multipathing. See Appendix C for more information.

2. (**LINUX only**) Install the SDD multi-path device driver using the Linux RPM or AIX installation package.
   NOTE: You should reference the SDD User's Guide to properly plan your installation. This can be found at: : http://www-1.ibm.com/servers/storage/support/software/sdd.html

   a. Obtain the latest version of SDD for Linux from the IBM SDD support website (http://www-1.ibm.com/servers/storage/support/software/sdd.html)

   b. Telnet and log on to the JS20 blade server as the root user.

   c. Copy the SDD package to the JS20 blade server.

   d. Type <**rpm -Uvh IBMsdd-***xxxxx***.rpm>** to install SDD, where xxxx represents the current version release modification level number.

   e. Verify that the JS20 blade server can see both paths using and examining the <**datapath query device**> command from the command line.
      NOTE: See the SDD User Guide for more information.

   f. If you desire to boot from the SDD virtual disk, you should follow the steps provided in Appendix C.

AIX configuration

> **Important Notice**
> Note that any volume/LUN in rootvg will not be managed by SDD. Given the design, you cannot have multipathing and fault tolerance for any volume in rootvg. SDD does not manage volumes in rootvg.

Prior to installing SDD on AIX, you should install the latest version of AIX host attachment script.

> **AIX Hosts attachment script**
> **For ESS devices:**
> Install ibm2105.rte. Consult the SDD website for latest version (http://www-1.ibm.com/servers/storage/support/software/sdd/index.html).
> Attention: Starting from ibm2105.rte version 32.6.100.21, ESS FC devices will be configured as "IBM FC 2105", as seen from the "lsdev -Cc disk" output. This is changed from "IBM FC 2105XXX", where 'XXX' is the ESS device model, such as F20 or 800. There are two side effects of this change:
> o To avoid ODM corruption, you will need to remove all ESS FC hdisks on your host system with the "rmdev" command if you are upgrading from ibm2105.rte version 32.6.100.19 or ealier to ibm2105.rte version 32.6.100.21 or later.
> o HACMP processing will fail to bring up volume groups in concurrent mode. In order to work around this issue, the /etc/cluster/conraid.dat HACMP file must be updated to include the following line:
> 2105***
> If the /etc/cluster/conraid.dat HACMP file does not exist, it should

> be created and contain this line.
> **For SVC devices:**
> Install devices.fcp.disk.ibm2145.rte. Consult the SDD website for latest version (http://www-1.ibm.com/servers/storage/support/software/sdd/index.html).

3.   (**AIX only**) Install SDD to achieve failover and multi-pathing for none-rootvg disks only
     a.   Verify that all pre-req's for the SDD file sets has been installed by consulting the latest SDD User's Guide.

     b.   Download the most recent SDD file sets from the following IBM Web site (http://www-1.ibm.com/servers/storage/support/software/sdd.html)

     c.   Telnet and log on as root to the JS20 blade Server.

     d.   Probe for new devices by typing <**cfgmgr –v**>.

     e.   Copy the AIX SDD file sets to the JS20 blade server.

     f.   From the command prompt, type <**smitty install_update**> and press enter to go directly to the installation panels. The "Install and Update Software" menu is displayed.

     g.   Select <**Install Software**> and press enter.

     h.   Press <**F4**> to display the "INPUT Device/Directory for Software" panel.

     i.   Type in the directory path to where SDD filesets was copied to and press enter.

     j.   Press enter again. "The Install Software" panel is displayed.

     k.   Select Software to Install and press <**F4**>. The "Software to Install" panel is displayed.

     l.   Select the installation package that is appropriate for your environment.

     m.   Press Enter. The "Install and Update from LATEST Available Software" panel is displayed with the name of the software that you selected to install.

     n.   Check the default option settings to ensure that they are what you need.

     o.   Press enter to install.

     p.   Press enter to continue.
          Note: The installation process can take several minutes to complete.

     q.   When the installation is complete, press <**F10**> to exit from SMIT.

r. Verify that the JS20 blade server can see both paths using and examining the <**datapath query device**> command from the command line.
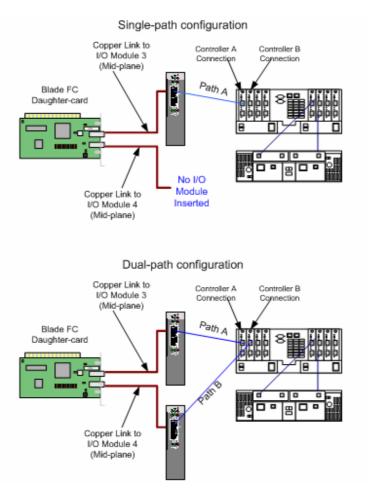**NOTE:** See the SDD User Guide for more information.

16.0 Installing Linux Service Aids and Updating the Open Firmware on JS20

After installation of the Operating System, you must download and install the Service Aids for Hardware Diagnostics. This service aids toolkit provides the tools required to service and update JS20 blade systems running IBM's supported versions of the Linux operating system. In the rare instance when a system error occurs, the toolkit provides first failure data capture, error log analysis, and other necessary information needed for accurate problem determination and correction.

1. Download and install the Service Aids for Linux, these utilities and instructions can be found at:
    http://techsupport.services.ibm.com/server/lopdiags

2. Obtain the latest JS20 Open Firmware level (JSFWxxx.IMG) from the IBM support site (http://www.pc.ibm.com/support).

3. Telnet and login as root to the JS20 blade server.

4. Copy the latest version of the Open Firmware that you obtained from the IBM support site to the JS20 blade server.

5. Type < **update_flash –f** *filename*> command to upgrade the open firmware of the JS20 blade.
    NOTE: The update_flash utility will immediately reboot the server when the temporary image is flashed.

6. After the JS20 blade has successfully rebooted, log in as root and promote the flash to the temporary side. This is done, using the <**update_flash –c** > command. Options available with the "update_flash" command are:

Update_flash usage
Usage: update_flash [-q] { -r | -c | [-v] -f <filename> }
-r   Reject temporary image
-c   Commit temporary image
-v   Validate ONLY with specified image file working
-f <filename>   Update firmware with specified image file

Appendix A: Single/Dual-path Concept Diagrams [2]

Single-path configuration

Dual-path configuration

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[2] **NOTE:** Other configurations can be used in combination with zoning. However, hardware and software level zoning and provisioning should be carefully planned.

Appendix B: BladeCenter SAN Options Equipment List

Note: The following I/O Expansion card option is supported for Remote booting with the JS20 (8842) Blade: 73P6112. Options 13N2203 and 48P7061 are supported in the JS20. However, they are not boot capable.

Option Number	Description	Option Number	Description
13N2203	BladeCenter Fibre Channel Expansion Card. Note this card does not support JS20 remote boot.	26K6477	Qlogic 6-port Enterprise Fibre Channel Switch Module (Qlogic SANBox 5200 Equivalent)
73P6112	BladeCenter Fibre Channel Expansion Card. This card supports JS20 remote boot.	48P7062	BladeCenter 2-port Fibre Channel Switch Module2 (Qlogic SB2- 16 Equivalent)
19K1271	Short-wave SFP Module	26K5601	Brocade Entry SAN Switch Module for IBM BladeCenter
19K1272	Long-wave SFP Module	90P0165	Brocade Enterprise SAN Switch Module for IBM BladeCenter
19K1247	1m LC-LC Fibre Channel Cable	02R9080	BladeCenter Optical Pass-thru Module
19K1248	5m LC-LC Fibre Channel Cable	26K5618	Brocade Entry Switch Full SAN Upgrade for IBM eServer BladeCenter
19K1249	25m LC-LC Fibre Channel Cable	26K5613	Brocade Extended Fabrics for IBM eServer BladeCenter
19K1250	LC-SC Fibre Channel Adapter Cable (Note: 1)	26K5605	Brocade Performance Bundle for IBM eServer BladeCenter
73P6033	BladeCenter Optical Pass-thru Module LC Cable	**Note:** You should contact the Field Sales Rep for other options that may have become available.	

Appendix C: Modify initrd for SDD on Linux (RHEL 3, SLES 8)

First, this assumes you have correctly configured your bootloader to boot from the SAN device single pathed. It is also assumed that the SDD rpm has been installed on the system. This procedure describes how to copy SDD files into the initial ramdisk (initrd) and edit the linuxrc script which is processed when the kernel mounts the initial ramdisk at boot time.

You will need sufficient space in your /boot to contain considerably larger initrd files (eg: 32MB each). If there is not sufficient space in /boot the following steps can be performed in some other temporary directory. At the end simply copy the compressed initrd file (a few megabytes instead of 32MB) back into the /boot directory.

The initrd usually must be enlarged to allow it to hold additional files amounting to roughly 4MB of space. To do this:

- o Make a backup of your of existing _initrd_file_:
     cd /boot
     cp _initrd_file_ _initrd_file.bak
- o Uncompress the image:
     zcat _initrd_file_.bak > _initrd_file_
- o Setup a loopback device for the image:
     losetup /dev/loop0 /path/to/your/_initrd_file_
- o Fix any errors that may exist on the filesystem:
     e2fsck -f /dev/loop0
     losetup -d /dev/loop0
- o The 'df /dev/loop0' command will tell you how large the initrd's filesystem is. If it is not 32MB or larger, or does not have much free space it needs enlarged (eg: to 32MB):
     dd if=/dev/zero of=_initrd_file_ seek=33554432 count=1 bs=1
     If the file is already 32MB or larger do not perform this step as it is unneeded and could corrupt the initial ramdisk filesystem. On SuSE it may be necessary to create an even larger initial ramdisk (eg: 48MB or 48*1024*1024 would give a seek=50331648). If the initrd is sufficiently large skip ahead to mounting the loopback device.
- o Setup a loopback device for the image:
     losetup /dev/loop0 /path/to/your/_initrd_file_
- o Another e2fsck here should show clean. If it doesn't, the 'dd' step was not performed correctly and corrupted the initrd. You will need to delete the loopback device ('losetup -d /dev/loop0) and start the procedure from the beginning.
- o Resize the filesystem (this will automatically expand it to use all available space, which is what we want):
     resize2fs /dev/loop0
     Mount the loopback device:
     mount /dev/loop0 /mnt/tmp

The initrd filesystem is now 32MB in size and additional files can be added to it:
cd /mnt/tmp

If you haven't already added your hba driver to the initrd using the standard mk_initrd or mkinitrd process (depending on your distribution) you can manually copy the module files for the hba driver as well as the scsi core and scsi disk drivers into the initrd filesystem and add the appropriate insmod command to the initrd's linuxrc script, but this should've been done in the first step of configuring for single-path SAN booting and that step is a prerequisite for this procedure. On SuSE you may need to create the etc/, proc/ and sysroot/ directories in the initrd.

You may also wish to add echo commands into the linuxrc after the hba load and mounting /proc in order to force adding luns through /proc/scsi/scsi if the device discovery is not happening correctly automatically.

Create SDD's directories in the initrd:
mkdir -p opt/IBMsdd/bin
chmod -R 640 opt/IBMsdd/

For SDD you will need to copy the following files to the initrd filesystem:
- o   /etc/vpath.conf   -> etc/
- o   /etc/group, passwd, nsswitch.conf   -> etc/
- o   /opt/IBMsdd/sdd-mod.o-CORRECT_VERSION -> lib/sdd-mod.o
- o   /opt/IBMsdd/bin/*   -> opt/IBMsdd/bin/
- o   /lib/libc.so.6   -> lib/
- o   /lib/ld-linux.so.2   -> lib/
- o   /lib/libacl.so.1   -> lib/
- o   /lib/libattr.so.1   -> lib/
- o   /lib/libdl.so.2   -> lib/
- o   /lib/libm.so.6   -> lib/
- o   /lib/libpthread.so.0   -> lib/
- o   /lib/libnss_files.so.2   -> lib/
- o   /lib/librt.so.1   -> lib/
- o   /bin/awk, chmod, chown, cp, date, grep, ls, mknod, mount, ps, rm, sed, sh, tar, umount -> bin
- o   /dev/sd[a-z], sd[a-z][a-z]   -> dev/ (ie: tar cps /dev/sd[a-z] /dev/sd[a-z][a-z]| tar xps)
- o   On RedHat you will additionally need:
    - ▪   /lib/libproc.so.2.0.7   -> lib/
    - ▪   /lib/libpcre.so.0   -> lib/
    - ▪   /lib/libtermcap.so.2   -> lib/
    - ▪   /bin/ash.static   -> bin/ash
- o   On SuSE you will additionally need:
    - ▪   /lib/libreadline.so.4   -> lib/
    - ▪   /lib/libhistory.so.4   -> lib/
    - ▪   /lib/libncurses.so.5   -> lib/
- o   The etc/nsswitch.conf file must have its passwd and group entries changed to point to "files" instead of "compat".

The following changes must be made to the initrd's linuxrc script:
- o   On Redhat the following block of commands should be removed from the end the file:
    echo Creating block devices
    mkdevices /dev
    echo Creating root device
    mkroot dev /dev/root
    echo 0x0100 > /proc/sys/kernel/real-root-dev
    echo Mounting root filesystem
    mount -o defaults --ro -t ext2 /dev/root /sysroot
    pivot_root /sysroot /sysroot/initrd
    umount /initrd/proc
    Also the first line of the linuxrc script should be changed to invoke the "ash" shell instead of the "nash" shell.
- o   The /proc filesystem must be mounted for the SDD configuration, so if /proc is not already explicitly mounted in the linuxrc (or is subsequently unmounted) append a mount command:
    mount -n -tproc /proc /proc
- o   Append the following commands to the end of the linuxrc script to configure SDD:
    insmod /lib/sdd-mod.o
    /opt/IBMsdd/bin/cfgvpath
    Configuration information needs copied to the system's root filesystem so it must briefly be

mounted. Eg, for an ext3 root filesytem on /dev/vpatha3:
/bin/mount -o rw -t ext3   /dev/vpatha3 /sysroot
or for a reiserfs root filesytem on /dev/vpatha3:
/bin/mount -o rw -t reiserfs /dev/vpatha3 /sysroot
To copy the dynamically created device special files onto the system's root filesystem:
tar cps /dev/IBMsdd /dev/vpath* | (cd /sysroot && tar xps) /bin/umount /sysroot
The kernel needs told where its root filesystem will be. This is traditionally passed to the
bootloader as a string (eg: /dev/vpatha3) and translated to a hexadecimal representation of the
device's major and minor number. If the major and minor number are 254,3 then these are
represented in hex as 0xFE03. The linuxrc simply passes the hexadecimal value into /proc:
echo 0xFE03 > /proc/sys/kernel/real-root-dev /bin/umount /proc

Edit the system fstab, changing all the system mount points from LABEL and/or /dev/sd mount
sources to their equivalent /dev/vpath. See comments below regarding the dangers of booting by label
in a multipath configuration. Copy the system fstab to the initrd's etc/ directory.

Unmount the image and remove the loopback binding:
umount /mnt/tmp
losetup -d /dev/loop0

Compress the image:
gzip -9 _initrd_file_
mv _initrd_file_.gz _initrd_file_

Append the following to your boot parameters (eg: in lilo.conf or grub.conf or menu.lst):
ramdisk_size=34000
If you created a larger initrd, make this large enough to cover the size.

For completeness your bootloader's append for the kernel's root parameter could be changed to the
appropriate vpath device (eg: root=/dev/vpatha5), but the above steps override this value by passing the
corresponding hex major,minor into /proc within the initrd's linuxrc script.

Important Notice
NOTE: Booting by LABEL risks that the first device found in the fabric with the correct label will be the wrong device or that it will be an sd single-path device instead of a vpath multipathed device. At this point the machine may be rebooted and should come up with it's root filesystem on a vpath device instead of an sdd device.

Summary

This paper provides an overview for configuring the IBM BladeCenter JS20 to remote boot in the Linux and AIX operating environments. These steps are typically performed by seasoned Storage Administrators with requisite knowledge of the DS4000 series and ESS Storage products. However, this document has sought to provide guidance for the novice SAN Administrator to follow and successfully accomplish this task. One should keep in mind that this provides a general guideline for configuring remote boot and any effort to create a remote boot environment should be well planned.

Additional Information

For more information about blade server technology and benefits in general and BladeCenter specifically, read Why Blade Servers? and Slashing the costs of your IT Infrastructure, at
http://www.ibm.com/pc/us/eserver/xseries/bladecenter/more_about.html.
Visit http://www.ibm.com/servers/eserver/blades (or call 1-888-SHOPIBM) for information about IBM eServer BladeCenter products and services, including part numbers and prices for servers, racks, storage units and other options.