**Dense computing and redundant storage consolidation**
July 2006

# IBM BladeCenter™
# Booting JS21 from fibre network attached storage

**Mats Wahlstrom**
**BladeCenter SME**
**IBM Systems & Technology Group RTP, NC**

Worldwide Service and Support Education – System x and BladeCenter
IBM Systems Group. Building 203, Department EYGA, Post Office Box 12195
Research Triangle Park, North Carolina 27709-2195

# Table of Contents

# Acknowledgements

Thanks to the many who have contributed to the finalization of this document. Without your expertise and critiques, this document wouldn't have come together. Many Thanks!

# 1.0 Change Notification

| Change Revision | Description | Date |
|---|---|---|
| 1.0 | Initial release | July, 2006 |

# 2.0 Using this document

This document will demonstrate to the Storage Administrator audience how to prepare, configure, and boot the IBM 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 provides detailed steps for configuring remote boot. Additionally, this document describes 'how to' and best practices for configuring the Fibre Channel capable modules using DS4000, 6000 and 8000 disk systems series.

# 3.0 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 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 BladeCenter Interoperability guide first for instructions to correctly integrate the BladeCenter into an existing FC switched fabric. This guide is available at: http://www-307.ibm.com/pc/support/site.wss/document.do?sitestyle=ibm&lndocid=MIGR-58206. Upon following these preliminary tasks, you will be able to use the information in this document to set up remote boot.

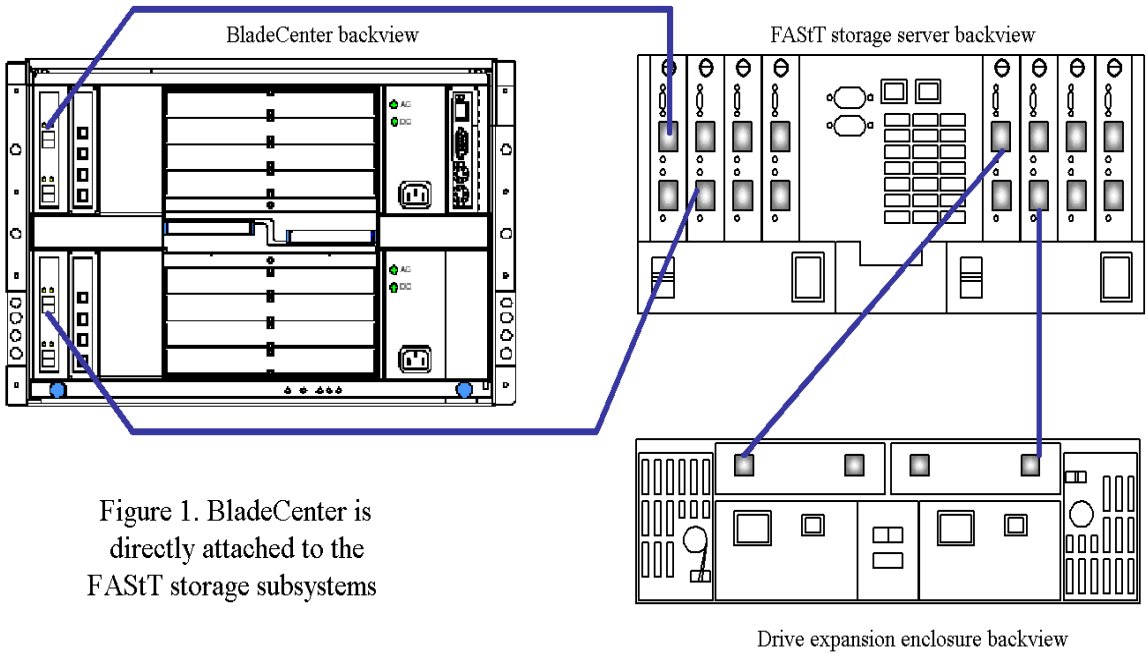



Figure 1. BladeCenter is directly attached to the FAStT storage subsystems

**Figure 1.- BladeCenter in Direct-attach SAN environment**

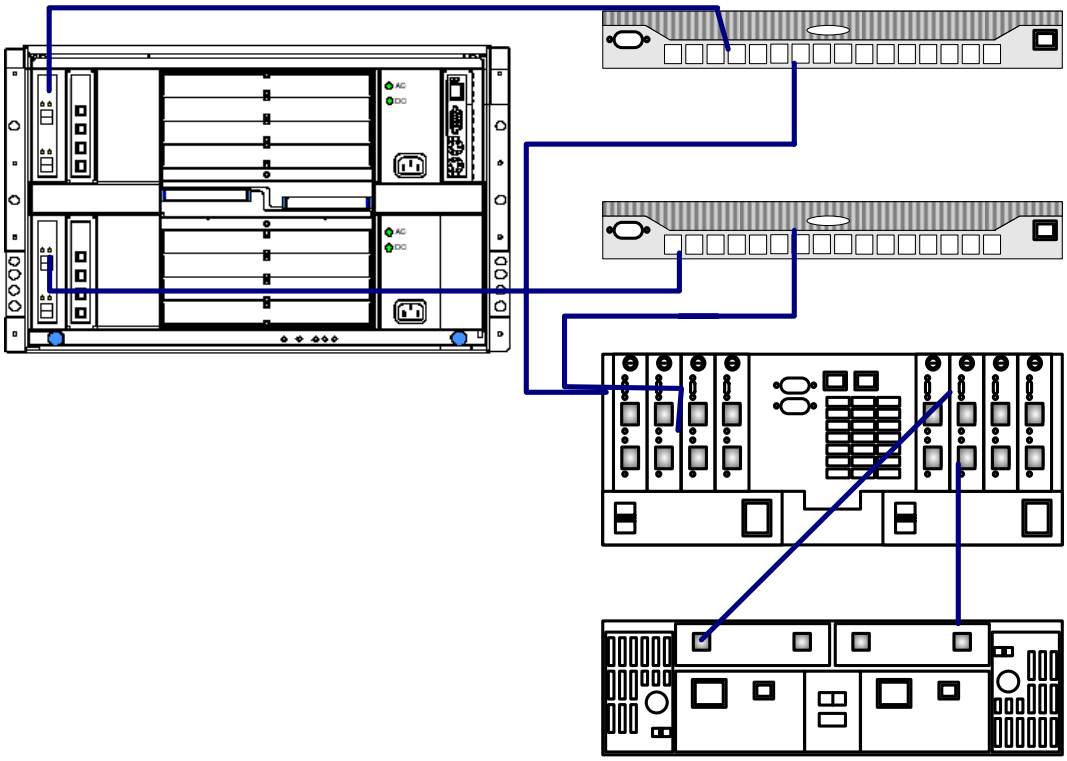
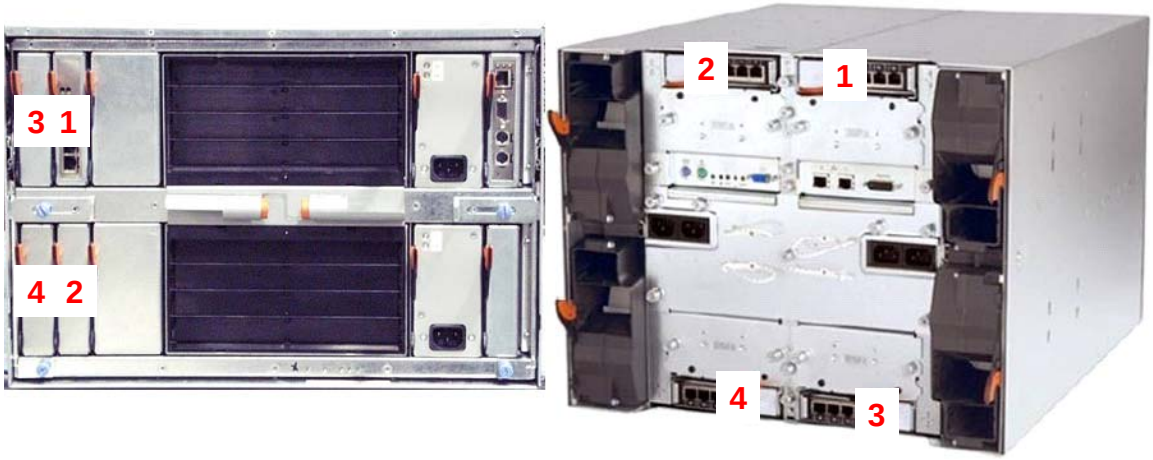


**Figure 2.- BladeCenter in Fabric-attach SAN environment**

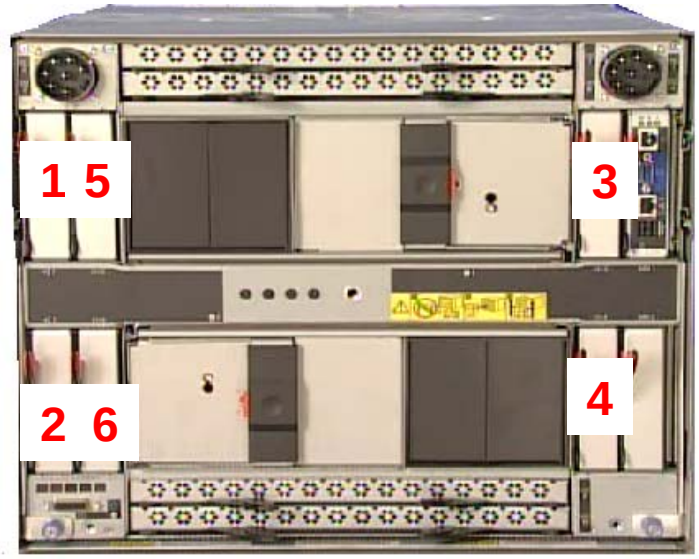
# 4.0 About the BladeCenter I/O Subsystem

Currently there are 3 different types of chassis Telco, Enterprise and H. The H and Enterprise chassis is capable of containing up to fourteen blade servers and eight for the Telco chassis. The chassis also has two management modules and four total I/O modules. Based on the current blade design, only ethernet, Copper Pass-thru (CPM) 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 and Fibre Switch Modules, and Copper or Optical Pass-thru, can be inserted into Bays 3 & 4. A 2-port fibre channel expansion card option will be installed in the blade server where port 1 will always be connected to the module in Bay 3 and port 2 will always be connected to the module in bay 4.




**BladeCenter Enterprise and Telco chassis**

In addition, the BladeCenter H chassis is capable of containing bridge modules in bays 3, 4, 5 and 6 as well as high-speed switch modules in bay 7 to 10. However, for the purpose of this document, the I/O module will be a Fibre Channel switch module installed in bay 3 and 4. The BladeCenter H chassis is shown below.




**BladeCenter H chassis**

# 5.0 Preparation Checklist

As a preparation procedure, ensure that you either have access to, or have researched the following areas before proceeding to configuration. **First, review the Considerations section in the Appendix.**

**IBM BladeCenter Fibre Channel expansion adapter**

- The Qlogic 4Gb SFF Fibre Channel Expansion Card for IBM BladeCenter - option part number (p/n) 26R0890 is currently the only adapter which has been tested for remote boot with JS21.
- Review the BladeCenter Fibre Channel Adapter Installation & User's guide, available at: http://www-03.ibm.com/servers/eserver/support/bladecenter/index.html.
- 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: http://www-03.ibm.com/servers/eserver/support/bladecenter/index.html.

**IBM BladeCenter Fibre Channel Switch Module**

- Review the appropriate Switch Module Installation & User's guide, available at http://www-03.ibm.com/servers/eserver/support/bladecenter/index.html.
- Review the Blade Center's Fibre Channel switch Interoperability Guide, available at http://www-03.ibm.com/servers/eserver/support/bladecenter/index.html.
- Backup the switch fabric configuration to a file. These steps are documented in the user guides for the switch modules.
- Record the IP Addresses of the BladeCenter Fibre Channel Switch modules.

**Management workstation**

- Configure a workstation which can be used to access the Management Module and the Fibre Channel switches via an IP address.

**IBM TotalStorage disk systems series**

- Reference the most current readme files and user guides that come with the storage subsystem. This can be found at http://www-03.ibm.com/servers/storage/support/. Otherwise, contact your local IBM support representative.

- Install the Storage Manager software on the workstation for storage management. This is available at http://www-03.ibm.com/servers/storage/support/.
- Obtain the IP Addresses of the storage subsystem.
- Ensure that the storage subsystem and drives are cabled in accordance with the publications that comes with the storage device.

**Minimum JS21 firmware and HBA Fcode versions**

- Ensure that the JS21 firmware is up-to-date and that the HBA Fcode version is at the latest level. This can be updated using the Standalone Diagnostics CD-ROM, latest version can be obtained at: http://www14.software.ibm.com/webapp/set2/sas/f/diags/download/home.html

# 6.0 Installation Flow (Quick Steps)

This section can be used as a quick guide for experienced users. See section 6.0 and onwards for more detailed instructions.

**Configure single FC path**

- Setup single-path environment, this can be done by disabling the FC port that is connected to the HBA on FC switch in bay 4 or remove the switch in bay 4. This is the fcs1 interface out of the blade server.

**Gather WWN of FC adapter**

- Login to the FC switch module and locate the WWN of the HBA from the name server. Note that the HBA must have loaded the driver in order to login to the switch.

**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 and map as LUN 0 to the HBA.

**Serial Over LAN**

- Configure Serial Over LAN.

**Configure boot sequence for booting on CD-ROM**

- Use either the Management Module or the SMS within the JS21 blade server to configure the boot sequence. The boot sequence is synchronized between the Management Module and the SMS within the JS21 blade server.

**OS Install**

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

**Configure Boot sequence**

- Boot to SMS menu on the JS21 blade server and configure the boot sequence.

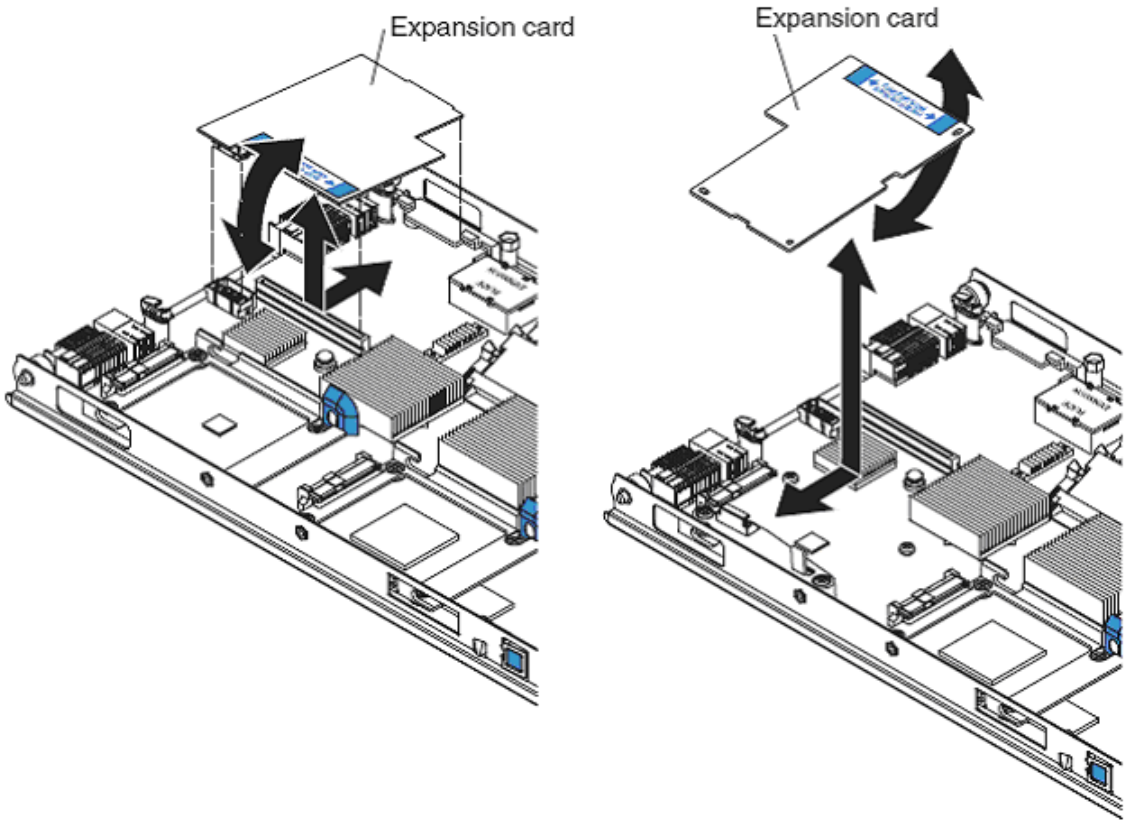
**Configure for redundancy**

- Enable the second path by inserting the FC switch in bay 4 or enable the port for the HBA.
- Install the multi-path software.
- Configure SMS on the JS21 blade server to boot on the second path.

# 7.0 Preparing the FC expansion card

This section is intended to provide a description and steps for preparing the JS21 blade servers with a FC expansion card. This is done in preparation to remote boot from fabric attach storage. The FC expansion card is an option card that is installed inside the blade server. The expansion card interfaces with the two mid-planes and provides connectivity to I/O modules 3 and 4 in the rear of the chassis.

The figure below depicts placement of the FC expansion card inside the blade server. The figure to the left-hand-side illustrates a small-form-factor expansion card and the figure to the right-hand-side illustrates a standard-form-factor expansion card. For a more detailed overview of the FC expansion cards, you should refer to the Installation and User's guides that comes with the adapter.




**Blade server FC expansion card installation**

## Directions - Installing the FC Expansion Card

**NOTE:** The Qlogic 4Gb SFF Fibre Channel Expansion Card for IBM BladeCenter - option part number (p/n) 26R0890 is currently the only adapter which has been tested for remote boot with JS21.

____**1.** Ensure that the JS21 blade server is powered-off.

____**2.** Remove the JS21 blade server from the chassis (if installed in the chassis).

____**3.** Remove the cover of the JS21 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 figure above shows how to install the FC expansion card in the blade server.

____**9.** Install the JS21 blade server into the BladeCenter chassis.

## Directions - Record the WWN of FC Expansion Card

The WWN of the FC expansion card (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. Follow the directions below to initiate the HBA to login to the switch without an OS installed on the blade server.

**NOTE:** The WWN cannot be gathered from within the JS21 blade server itself.

____**1.** Power on the blade server.

____**2.** Open a command prompt and telnet to the management module.

____**3.** Change the session console timeout value in the Management Module to infinity, type <**telnetcfg -T system:mm[1] -t 0>.**
**NOTE:** This configuration command only needs to be entered once and will be saved in MM NVRAM.

____**4.** Open a SOL connection to the blade, type: **console –T blade[*bladeno*].**

____**5.** During the boot of the blade server and when the POST menu and indicators are displayed, press the 1 key after the word *Keyboard* is displayed and before the word *Speaker* is displayed to enter the SMS menu. The SMS menu is displayed as shown below.

```
PowerPC Firmware
 Version MB240_470_012
 SMS 1.6 (c) Copyright IBM Corp. 2000,2005 All rights reserved.
------------------------------------------------------------------
 Main Menu
 1.   Select Language
 2.   Setup Remote IPL (Initial Program Load)
 3.   Change SCSI Settings
 4.   Select Console
 5.   Select Boot Options
 6.   Firmware Boot Side Options
 7.   Progress Indicator History

------------------------------------------------------------------
 Navigation Keys:

                                              X = eXit System
Management Services
 ------------------------------------------------------------------
 Type menu item number and press Enter or select Navigation key:5
```

____**6.** Select Option <5> then option <1>, as shown below.

```
PowerPC Firmware
 Version MB240_470_012
 SMS 1.6 (c) Copyright IBM Corp. 2000,2005 All rights reserved.
------------------------------------------------------------------
 Multiboot
 1.   Select Install/Boot Device
 2.   Configure Boot Device Order
 3.   Multiboot Startup <OFF>
 ------------------------------------------------------------------
------------
 Navigation keys:
 M = return to Main Menu
```

```
 ESC key = return to previous screen         X = eXit System
Management Services
 ------------------------------------------------------------------
 Type menu item number and press Enter or select Navigation key:1
```

____**7.** Select option <7>, as shown below. This will force the JS21 blade server to go and scan for bootable devices, such as login to the fabric and look for bootable LUNs on both ports of the HBA (4Gb FC expansion cards are capable of booting on both ports). In order to find a bootable LUN, an OS has to be installed.

```
PowerPC Firmware
 Version MB240_470_012
 SMS 1.6 (c) Copyright IBM Corp. 2000,2005 All rights reserved.
------------------------------------------------------------------
 Select Device Type
 1.   Diskette
 2.   Tape
 3.   CD/DVD
 4.   IDE
 5.   Hard Drive
 6.   Network
 7.   List all Devices

 ------------------------------------------------------------------
 Navigation keys:
 M = return to Main Menu
 ESC key = return to previous screen         X = eXit System
Management Services
 ------------------------------------------------------------------
 Type menu item number and press Enter or select Navigation key:3
```

____**8.** Once the HBA has logged in to the switch, you can now gather the WWN of the HBA from the name server of the switch. Follow the instructions below to accomplish this. Note that in order to get the WWN of both adapters, you need to perform the steps below on both of the switches (bay 3 and 4).

| Brocade Switch Module Commands | Qlogic / McData Switch Module Commands |
|---|---|
| 1. Start a telnet session and login to the switch, open a command-prompt and type <telnet *ipaddressofswitch*>.<br>2. BSSM: >nsShow<br>3. BSSM: > logout | 1. Start a telnet session and login to the switch, open a command-prompt and type <telnet *ipaddressofswitch*>.<br>2. FCSM: USERID> admin start<br>3. FCSM (admin): USERID> ns show<br>4. FCSM (admin): USERID> admin end<br>5. FCSM (admin): USERID> logout |

Take a note of the WWN of the first port here:

_____

Take a note of the WWN of the second port here:

_____

# 8.0 Configuring IBM BladeCenter FC Modules

This section describes the I/O modules that support the FC expansion card. I/O modules must be installed in slots 3 or 4 to provide an external connection to the blade server. The I/O modules are provided in two flavors; Fibre Channel Switch modules and Optical Pass-thru modules that can be used as interconnects to attach the Blade Center into an external SAN environment. The Optical Pass-thru module is only supported with 2Gb adapters and therefore not supported in a remote boot environment when using a JS21 blade server.

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.

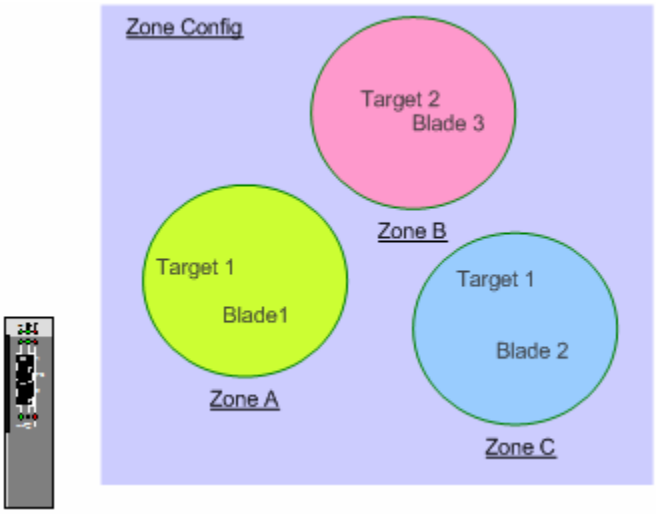
**NOTE:** The instructions in this document assume that the FC modules have been installed and configured with an IP address. You should consult the documentation that comes with the FC module for additional guidance.

## Directions - Configuring Fibre Channel Switch module

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 BladeCenter Fibre Channel switch module.

### A. Zoning

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




**Zoning Concept**

Follow the zoning example provided in the figure below to guide you through zoning setup for your configuration. When zoning, ensure that the zone only contains the WWN of the HBA (FC expansion card) and the backend storage controller.
NOTE: Allow only ONE FC path only during OS installation. The figure below is an example of how the zoning can be done using a Brocade, Qlogic and McData switch module.

| IBM BladeCenter Brocade SAN Switch Module (using CLI) | IBM BladeCenter Qlogic and McData SAN Switch Module (using CLI) |
|---|---|
| 1. brocadessm:USERID> **zonecreate "Blade1","WWWPn"**<br>2. brocadessm:USERID> **cfgcreate "RemoteBoot", "Blade1"**<br>3. brocadessm:USERID> **cfgenable "RemoteBoot"**<br>4. brocadessm:USERID> **cfgsave** | 1. Start a zone editing session:<br>cli $> **admin start**<br>cli (admin) #> **zoning edit**<br>2. Create a zoneset:<br>cli (admin-zoning) #> **zoneset create RemoteBoot**<br>3. Create a zone:<br>cli (admin-zoning) #> **zone create Blade1**<br>4. cli (admin-zoning) #> **zone add Blade1 *WWWPn***<br>5. Make the zone a member of the zoneset:<br>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**

**Zone Configuration steps**

**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 SAN where vendor neutral device integration is permissible. Interoperability is described as interconnecting two or more switch fabric devices of different vendor types together.

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. This is documented in the User Guide of the switch module, available at http://www-03.ibm.com/servers/eserver/support/bladecenter/index.html. Additionally, for BladeCenter interoperability guidelines see the IBM BladeCenter Fibre Channel Interoperability Guide, available at http://www-03.ibm.com/servers/eserver/support/bladecenter/index.html. You should now proceed to the Configure Single Path section for configuring a single path environment.

# Directions - Configuring Single Path

During the installation of the Operating System, there should only be one path active to each JS21 blade server. The second or alternate paths can be activated after the installation of the Operating System has completed. Follow the steps below to disable the second path on your embedded BladeCenter switch.

**NOTE:** In this example, the blade server is installed in blade slot 1. Blade slot 1 is connected to the port 1 on the switch module. Remember to follow the directions in section 15.0 to enable the second port (fcs1).

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

# 9.0 Configuring Fibre Channel Storage arrays

Up to this point, the Storage Administrator has configured the blade server, HBA and the FC switch module. This section describes how-to configure the storage device that is connected to the IBM BladeCenter. This document will only cover IBM storage devices. For OEM storage devices, consult the documentation and the vendor for configuration and support.

**NOTE:** The instructions in this section assume 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.**

## Directions - Configuring DS4000 series

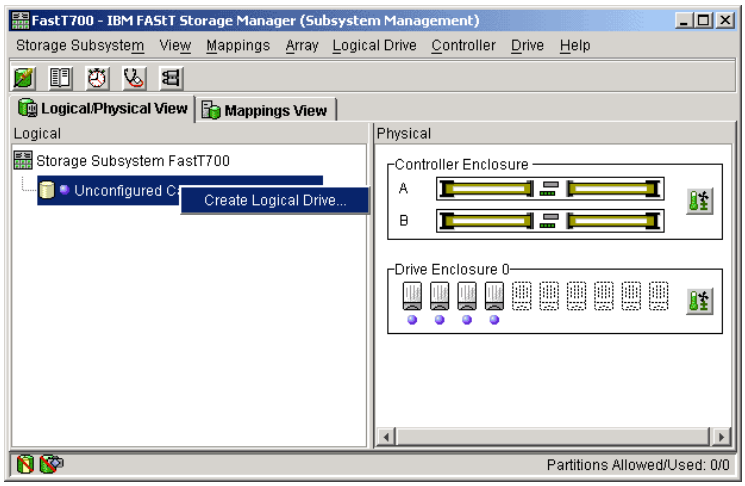
**NOTE:** The following steps will be performed from a workstation that has the Storage Manager client installed. You should consult the DS4000 series documentation for additional guidance.

____**1.** Launch the IBM DS4000 Storage Manager Client, for in-depth instructions consult the DS4000 series documentation.

____**2.** Using the Storage Management application, connect to the Storage subsystem that you intend to manage and configure for remote booting.

____**3.** 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 below.

____**4.** Follow the wizard to create a logical drive to suit your requirement. For further information see the DS4000 series documentation.
**NOTE**: You will want to add one 2-3 GB LUN, for Operating Systems Purposes. Only one volume should be assigned to the blade server until the installation of the Operating System has been completed. Additional volumes can be added after the installation of the OS.



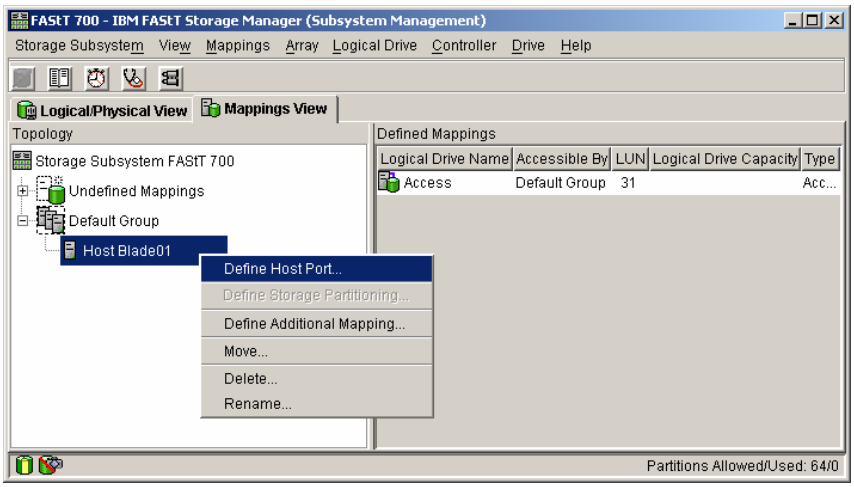

**Storage Manager client management screen**

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.

____**5.** Under the ***Mappings View*** tab, you should create a host, and assign host ports.

____**6.** Select <**Mappings View**> → <**Define Host**>.

____**7.** Click on the Host; select <**Mappings**> → <**Define Host port**> and create the host port. 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 WWWPN 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.




**Configuring Host and defining Host ports**

____**8.** Remove the **Access Logical Drive** from the **Host.**
**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.

____**9.** Right-click on the host that you just created and select **Define Additional Mapping**. Complete the wizard to map the LUN to the blade server as LUN 0.
**NOTE:** It is highly recommended to just create on single boot LUN during the installation of the Operating System. Once the OS have been installed you can create and map additional LUNs.

# Directions - Configuring IBM SAN Volume Controller (SVC)

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

____**10.** Launch the IBM TotalStorage SAN Volume Controller Console (SVC Console), for in-depth instructions consult the SVC documentation.

____**11.** Using the SVC Console, connect to the SVC cluster that you intend to manage and configure for remote booting.

____**12.** 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 below. Follow the wizard to create an Mdisk group to suit your requirement. For further information see the SVC documentation.

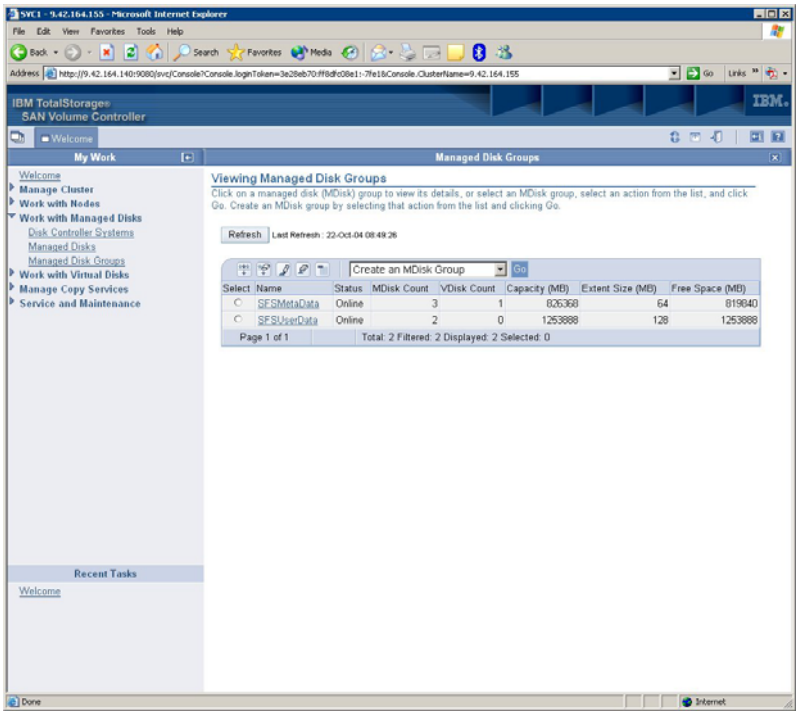
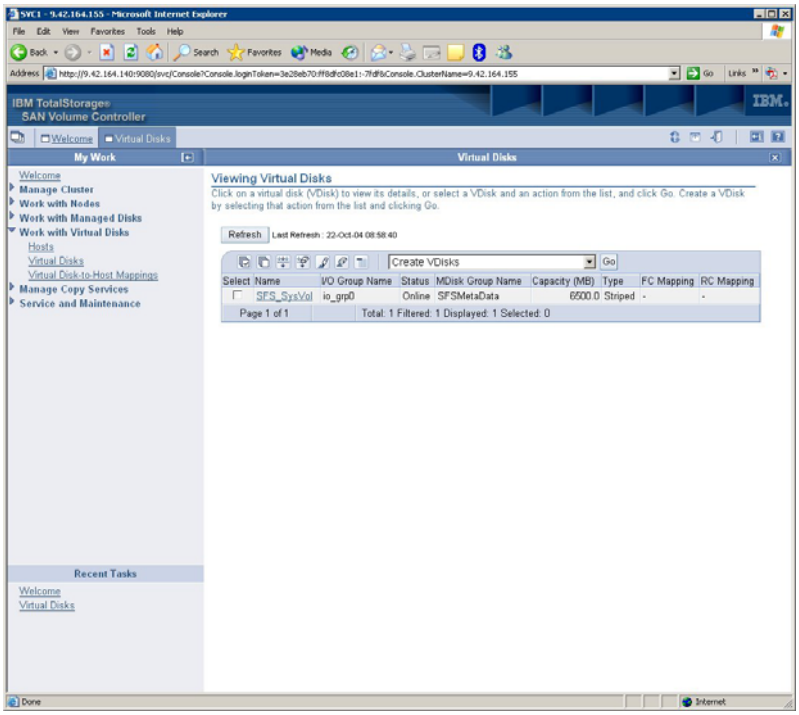


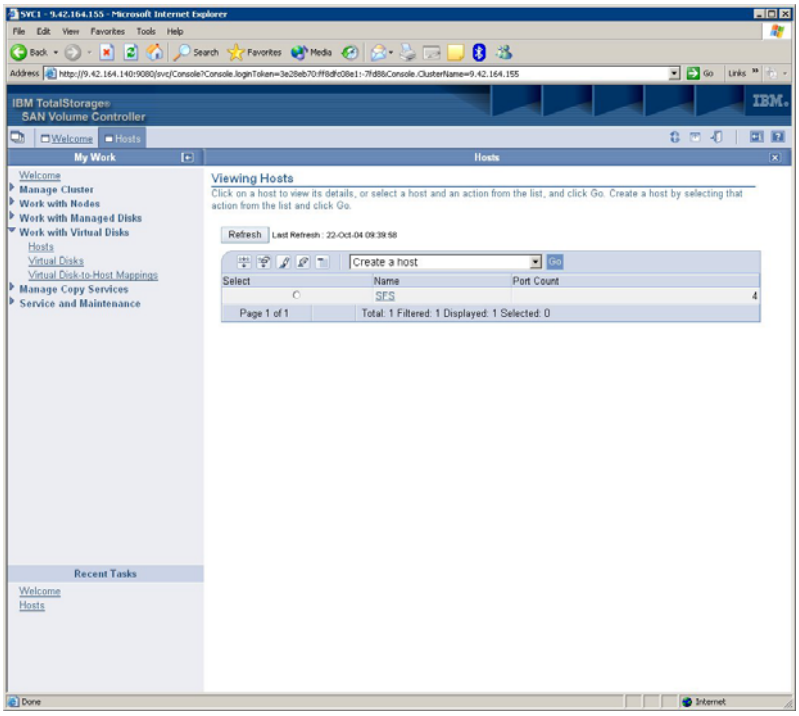

**Figure – Create Mdisk group**

____**13.** 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 below. **NOTE**: You will want to add 2-3 GB LUN, for Operating Systems Purposes. Additional volumes can be added after the installation of the OS. **Only one volume** should be assigned to the blade server until the installation of the Operating System has been completed.




**Create Virtual Disk**

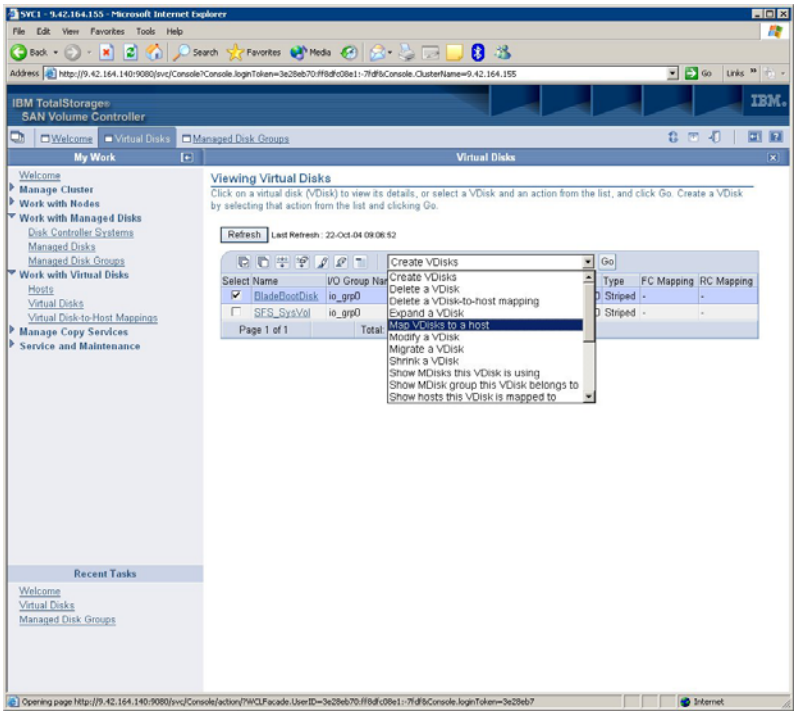
____**14.** Create a host with WWWPN from the HBA in the blade server. To do this, click on <**Work with virtual disks**> and then select <**Hosts**>. Select <**Create Host**>, as shown in figure below. Follow the wizard to create the host and assign the WWWPN from the blade server.




**Create Host**

____**15.** 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 server and select <**Map Virtual Disk**>, as shown in figure below.

**NOTE**: You should review the SVC publications that come with the storage device. These will provide more in-depth examples on storage partitioning.


IBM TotalStorage
SAN Volume Controller
Welcome
Virtual Disks
Managed Disk Groups
My Work
Virtual Disks
Viewing Virtual Disks
Click on a virtual disk (VDisk) to view its details, or select a VDisk and an action from the list, and click Go. Create a VDisk by selecting that action from the list and clicking Go.
Refresh
Last Refresh: 22-Oct-04 09:06:52
Create VDisks
Go
Select Name
I/O Group Name
Type
FC Mapping
RC Mapping
BladeBootDisk
io_grp0
Striped
SFS_SysVol
io_grp0
Striped
Page 1 of 1
Total
Create VDisks
Delete a VDisk
Delete a VDisk-to-host mapping
Expand a VDisk
Map VDisks to a host
Modify a VDisk
Migrate a VDisk
Shrink a VDisk
Show MDisks this VDisk is using
Show MDisk group this VDisk belongs to
Show hosts this VDisk is mapped to
Work with Managed Disks
Disk Controller Systems
Managed Disks
Managed Disk Groups
Work with Virtual Disks
Hosts
Virtual Disks
Virtual Disk-to-Host Mappings
Manage Cluster
Work with Nodes
Manage Copy Services
Service and Maintenance
Recent Tasks
Welcome
Virtual Disks
Managed Disk Groups

# 10.0 Configuring Serial Over LAN (SOL)

The Management Module in the BladeCenter unit contains a video connector for attaching a monitor. However, the JS21 blade server does not contain a video controller. You need to configure and establish a SOL connection to the JS21 blade server for console output. 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 switch bay 1. It is therefore highly recommended to not configure the first Ethernet (eth0) device on each JS21 blade server. In order to properly configure a JS21 blade server, you therefore require two Ethernet switches, one which is capable of SOL in switch bay 1 and a one in switch bay 2. See the IBM website for tested combinations.

**NOTE:** If using the Cisco switch module in bay 1, it is highly recommended to upgrade the switch firmware to IOS 12.1(22)EA6 or later as it supports the use of VLAN 4095 for Serial Over LAN. If using this firmware level, there is no configuration needed on the Cisco switch module for Serial Over LAN.

## Directions – Configure SOL

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

____**2.** Make sure that the Management Module and the ethernet switches are at the most recent firmware levels. You can check this from the management module.

**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.** To enable SOL, on the management module, in the left navigation pane, select <Blade Tasks>, then <Serial Over LAN>.

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 should not be modified.
- BSMP IP Address Range: x.x.x.x
- Accumulate timeout: 5
- Send threshold: 250
- Retry count: 3
- Retry interval: 250

____**4.** Select <**Save>** when complete.

____**5.** 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.).

____**6.** Make sure that the status of the SOL session is <**Ready**> and that SOL is <**Enabled**>. Serial Over LAN has now been configured.

# 11.0 Configuring Boot Sequence for Installing from CD

The boot sequence can be configured using the SMS menu on the JS21 blade server or the Management Module. In this section we are showing both scenarios. The first section will guide you through the steps on how-to configure using the SMS and the second section will be using the Management Module. The boot sequence is synchronized between the Management Module and SMS within the JS21 blade server.

## Directions – Configure SMS to boot JS21 on CD

____**1.** Ensure that the media tray is assigned to the blade server. This can be done by pressing the media select button on front of the blade server.

____**2.** Turn the blade server on.

____**3.** Open a command prompt and telnet to the management module.

____**4.** Open a SOL connection to the blade, type: **console –T blade[*bladeno*].**

____**5.** During the boot of the blade and when the POST menu and indicators are displayed, press the 1 key after the word *Keyboard* is displayed and before the word *Speaker* is displayed. The SMS menu is displayed as shown below.

```
PowerPC Firmware
 Version MB240_470_012
 SMS 1.6 (c) Copyright IBM Corp. 2000,2005 All rights reserved.
------------------------------------------------------------------
 Main Menu
 1.   Select Language
 2.   Setup Remote IPL (Initial Program Load)
 3.   Change SCSI Settings
 4.   Select Console
 5.   Select Boot Options
 6.   Firmware Boot Side Options
 7.   Progress Indicator History

------------------------------------------------------------------
 Navigation Keys:
 X = eXit System Management Services
 ------------------------------------------------------------------
 Type menu item number and press Enter or select Navigation key:5
```

____**6.** Select Option <5> then option <1>, as shown below.

```
PowerPC Firmware
 Version MB240_470_012
 SMS 1.6 (c) Copyright IBM Corp. 2000,2005 All rights reserved.
-------------------------------------------------------------------------
 Multiboot
 1.   Select Install/Boot Device
 2.   Configure Boot Device Order
 3.   Multiboot Startup <OFF>
 -------------------------------------------------------------------------
------------
 Navigation keys:
 M = return to Main Menu
 ESC key = return to previous screen         X = eXit System
Management Services
 -------------------------------------------------------------------------
 Type menu item number and press Enter or select Navigation key:1
```

____**7.** Select option <7>, as shown below.

```
PowerPC Firmware
 Version MB240_470_012
 SMS 1.6 (c) Copyright IBM Corp. 2000,2005 All rights reserved.
-------------------------------------------------------------------------
 Select Device Type
 1.   Diskette
 2.   Tape
 3.   CD/DVD
 4.   IDE
 5.   Hard Drive
 6.   Network
 7.   List all Devices

 -------------------------------------------------------------------------
 Navigation keys:
 M = return to Main Menu
 ESC key = return to previous screen         X = eXit System
Management Services
 -------------------------------------------------------------------------
 Type menu item number and press Enter or select Navigation key:3
```

____**8.** Select option <3> for USB-CDROM, as shown below.

```
PowerPC Firmware
 Version MB240_470_012
 SMS 1.6 (c) Copyright IBM Corp. 2000,2005 All rights reserved.
-------------------------------------------------------------------------
 Select Device
```

```
 Device  Current  Device
 Number  Position  Name
 1.        -      Ethernet
                  ( loc=U788D.001.23A0285-P1-T7 )
 2.        -      Ethernet
                  ( loc=U788D.001.23A0285-P1-T8 )
 3.        1      USB CD-ROM
                  ( loc=U788D.001.23A0285-P1-T1-L1-L2-L3 )
 4.        2      SCSI 36401 MB Harddisk, part=2 (AIX 5.3.0)
                  ( loc=U788D.001.23A0285-P1-T10-L1-L0 )

 ------------------------------------------------------------------
 Navigation keys:
 M = return to Main Menu
 ESC key = return to previous screen         X = eXit System
Management Services
 ------------------------------------------------------------------
 Type menu item number and press Enter or select Navigation key:3
```

____**9.** Select option <2> for Normal Mode Boot, as shown below.

```
Version MB240_470_012
 SMS 1.6 (c) Copyright IBM Corp. 2000,2005 All rights reserved.
------------------------------------------------------------------
 Select Task

USB CD-ROM
    ( loc=U788D.001.23A0285-P1-T1-L1-L2-L3 )

 1.   Information
 2.   Normal Mode Boot
 3.   Service Mode Boot
 ------------------------------------------------------------------
 Navigation keys:
 M = return to Main Menu
 ESC key = return to previous screen         X = eXit System
Management Services
 ------------------------------------------------------------------
 Type menu item number and press Enter or select Navigation key: 2
```

____**10.** Select option <1> for YES, shown below. The blade server will now start the installation of the operating system from the CD-ROM.

```
Version MB240_470_012
 SMS 1.6 (c) Copyright IBM Corp. 2000,2005 All rights reserved.
------------------------------------------------------------------
 Select Task

USB CD-ROM
```

```
    ( loc=U788D.001.23A0285-P1-T1-L1-L2-L3 )

 1.   Information
 2.   Normal Mode Boot
 3.   Service Mode Boot
 ------------------------------------------------------------------------
 Navigation keys:
 M = return to Main Menu
 ESC key = return to previous screen         X = eXit System
Management Services
 ------------------------------------------------------------------------
 Type menu item number and press Enter or select Navigation key: 2
```

____**11.** Continue to section 12.0 if you are installing AIX or section 13.0 if you are installing LINUX.

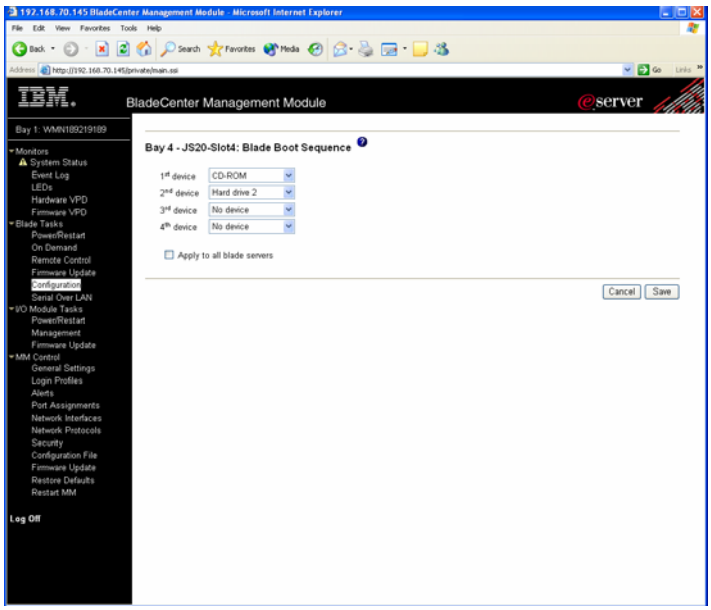
## Directions – Configure MM to boot JS21 on CD

____**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 below.



____**5.** You have now configured the boot sequence on the JS21 blade server to boot on CD-ROM. Continue to section 12.0 if you are installing AIX or section 13.0 if you are installing LINUX.

# 12.0 Installing the AIX Operating System

Now that you have configured the fibre expansion card, switches and the storage device - 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 5.2M w/ Service Pack 2 |
| AIX 5.3E w/ Service Pack 2 |

To install AIX on JS21, use one of the following two methods;

- Network Install using Network Installation Manger (NIM) – See the AIX documentation. This requires the blade server to boot on the network instead of CD-ROM.
- Installation using CD-ROM – Follow the instructions below.

The instructions in this document will describe how-to install AIX on a JS21 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. |

## Directions - Installing AIX 5.2 and 5.3

The installation of AIX 5.2 and 5.3 is identical. This section will guide you through the steps on how-to install AIX 5.2 or 5.3 using CD-ROM.

____**1.** Insert the AIX 5.3 CD1 in to the CD-ROM drive.

____**2.** Ensure that the media tray is still assigned to the JS21 blade server.
**NOTE:** Make sure that local switching of the media tray is not disabled for the JS21 blade server in the management-module Web interface. For more information, see the *IBM BladeCenter Management Module User's Guide*.

____**3.** Turn on the JS21 blade server.

____**4.** Telnet to the management module (MM) and start a SOL session, as shown in the example below. In this example the JS21 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 example below.

```
******* 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
instalaþÒo.
     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 example below.

```
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 example below.

```
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.....hdisk0
    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 example below.

```
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 example below.

```
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 example below.

```
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 example below.

```
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 example below.

```
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 example below.

```
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 example below.

```
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 example below.

```
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 example below.
**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 5.3 onto your JS21 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 v9.0 SP3 |
| Red Hat | Enterprise Linux v4.0 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 have 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.

# Directions - Installing SLES9 SP3

**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).

____**1.** Insert the SLES9 CD1 in to the CD-ROM drive.

____**2.** Ensure that the media tray is still assigned to the JS21 blade server. .
**NOTE:** Make sure that local switching of the media tray is not disabled for the JS21 blade server in the management-module Web interface. For more information, see the *IBM BladeCenter Management Module User's Guide*.

____**3.** Turn on the JS21 blade server.

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

```
 >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 example below.
**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 SLES9 CD1 and select <**OK**>.

____**7.** Select whether you want to use DHCP or not.

____**8.** If using static IP, enter your IP address and press enter.

____**9.** If using static IP, enter your <**subnetmask**> and press enter.

____**10.** If using static IP, enter your <**gateway**> and press enter.

____**11.** If using static IP, enter the address of your <**name server**> and press enter.

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

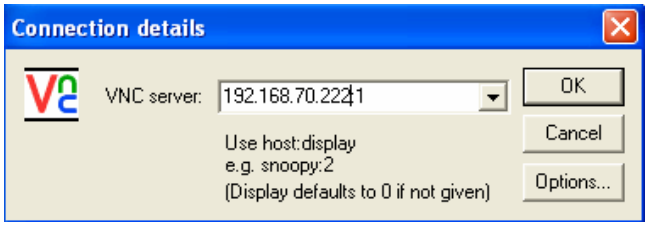
```
What type of terminal do you have ?

  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
```

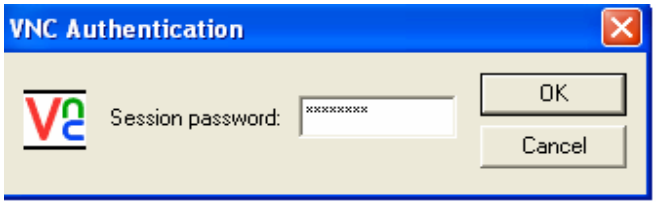
____**13.** Start VNC viewer, once the VNC server has started, as shown in the example below.

```
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".
```

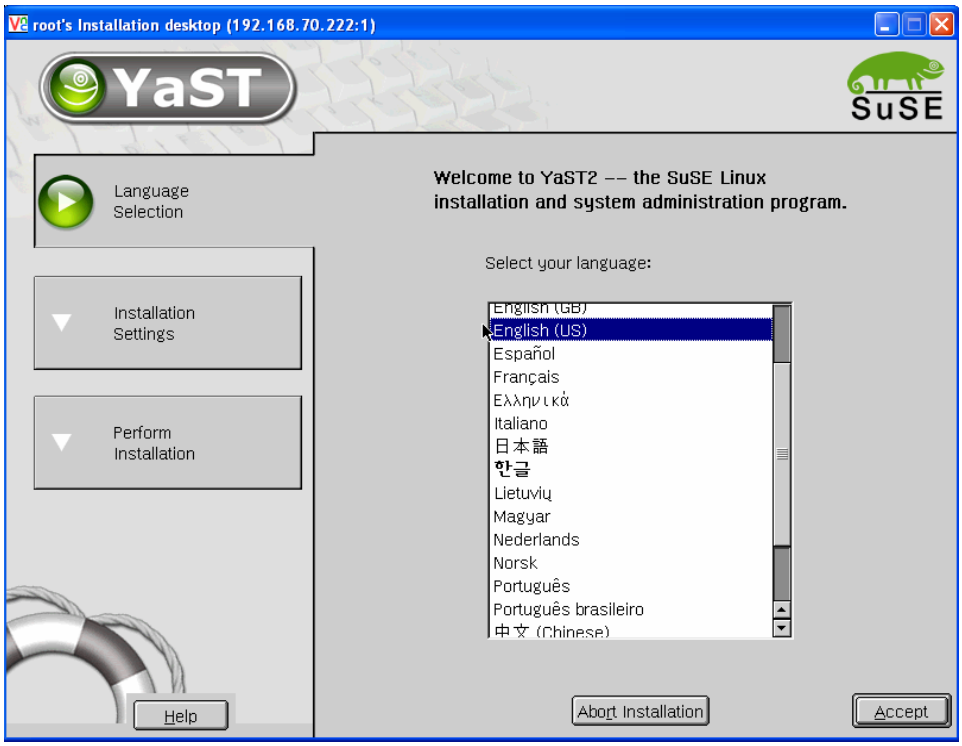
____**14.** Type the <**IP address:1**> (display 1) of the VNC server running on the blade and select <**OK**>, as shown in the example below.



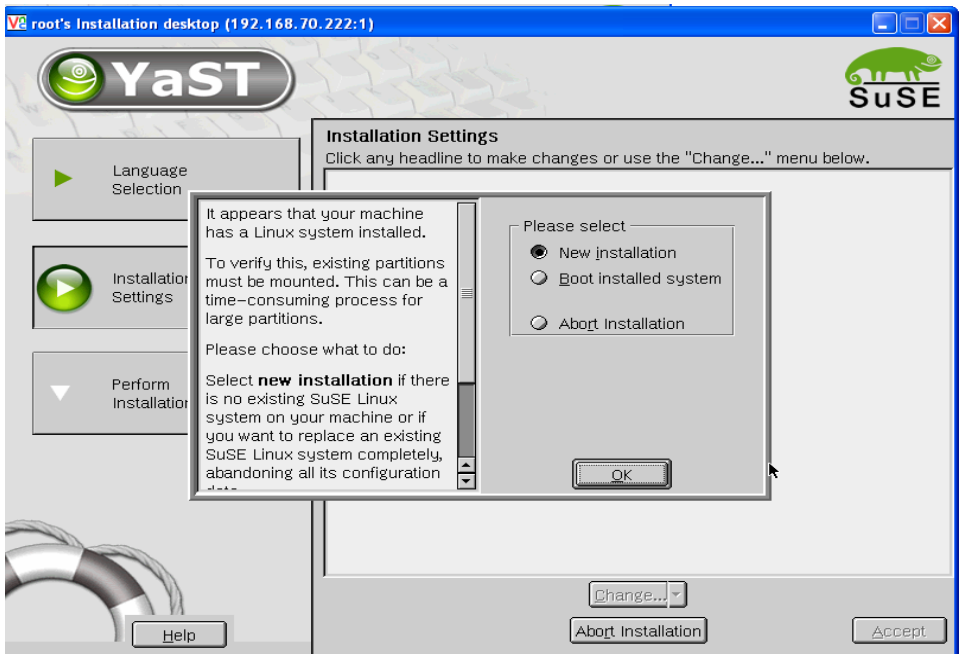

____**15.** Type the <**VNC password**>, that you specified during the install boot prompt and select <**OK**>, as shown in the example below.




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

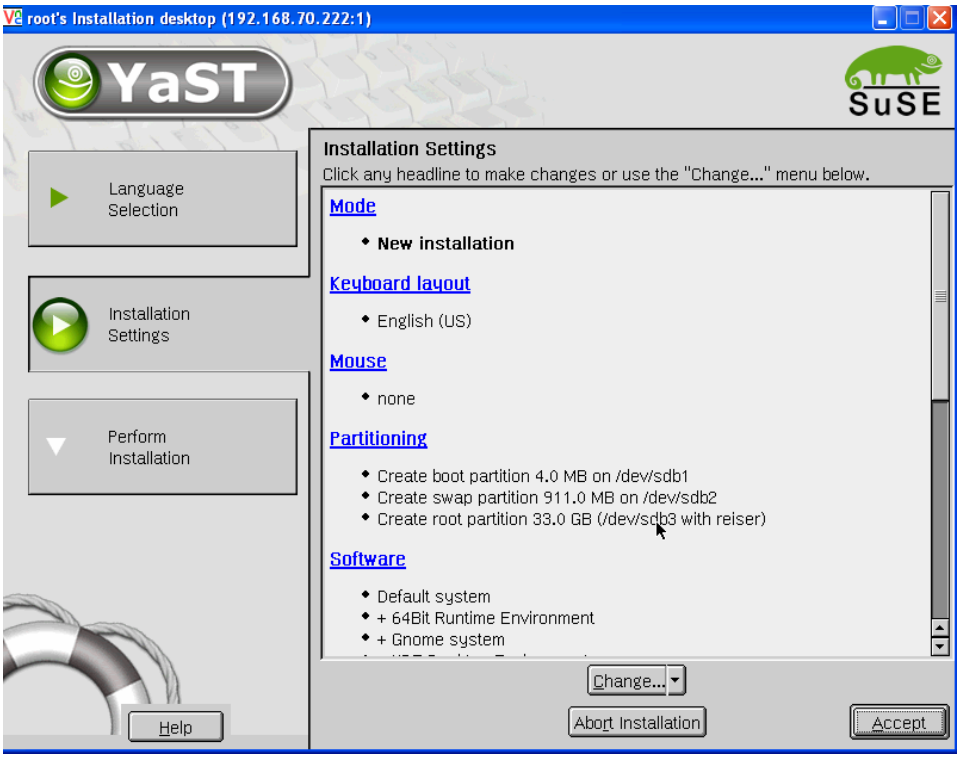



____**17.** Select <**New Installation**> and select <**OK**> to continue, as shown in the example below.

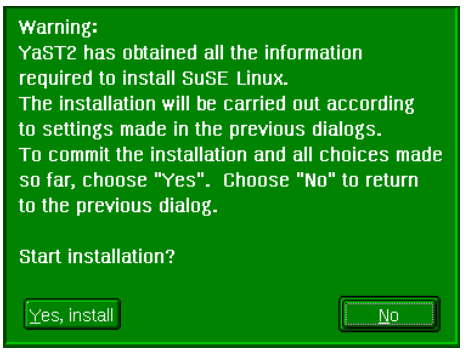


____**18.** Make sure that the partition has been configured on /dev/sdbx (where x is the partition number). Customize the Software selection to suit your requirements.
**NOTE:** hd*x* is the IDE drive and sd*x* is the SCSI device, where *x* is the device number.

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



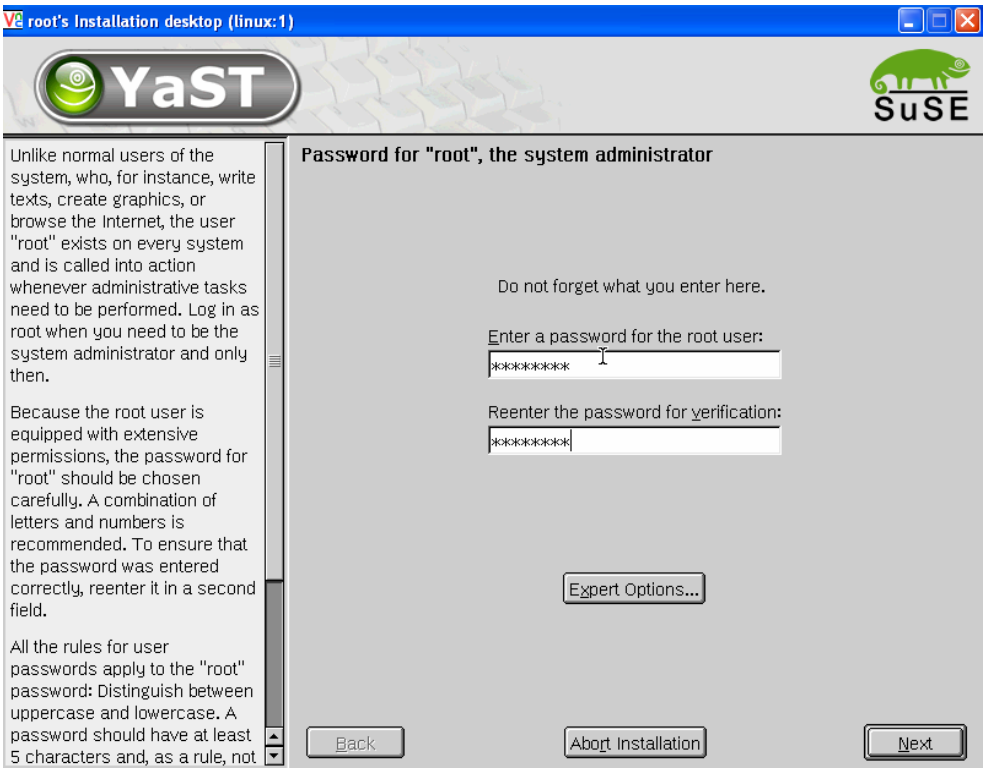

____**20.** Select <**Yes, install**> to start the installation, as shown in the example below.



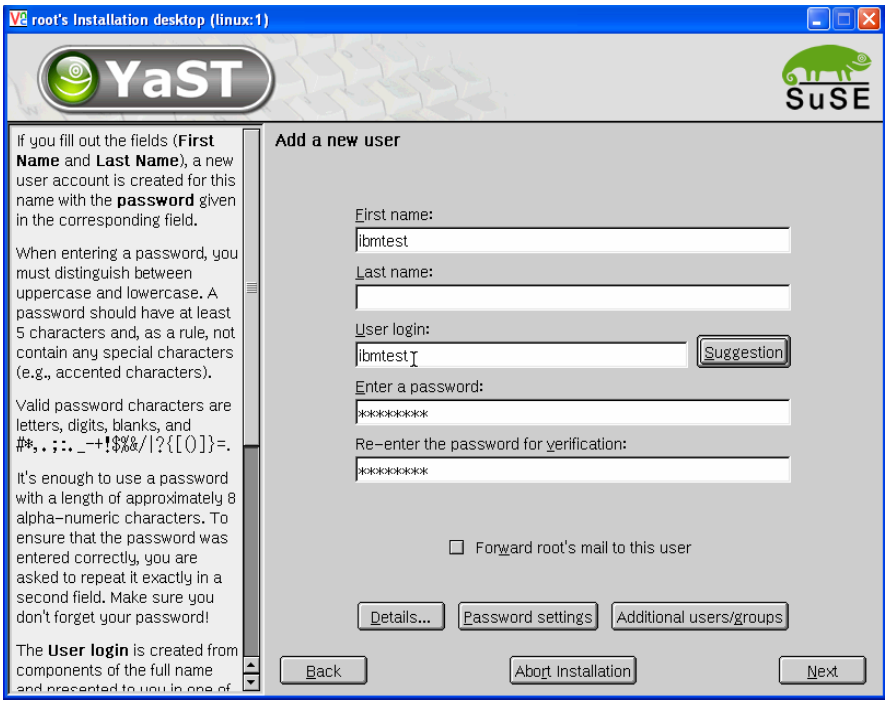
____**21.** Insert additional CD's when prompted.

____**22.** Server will now reboot. Once rebooted, re-connects using VNC viewer (as previously described) and connect to the VNC server running on the JS21 blade.

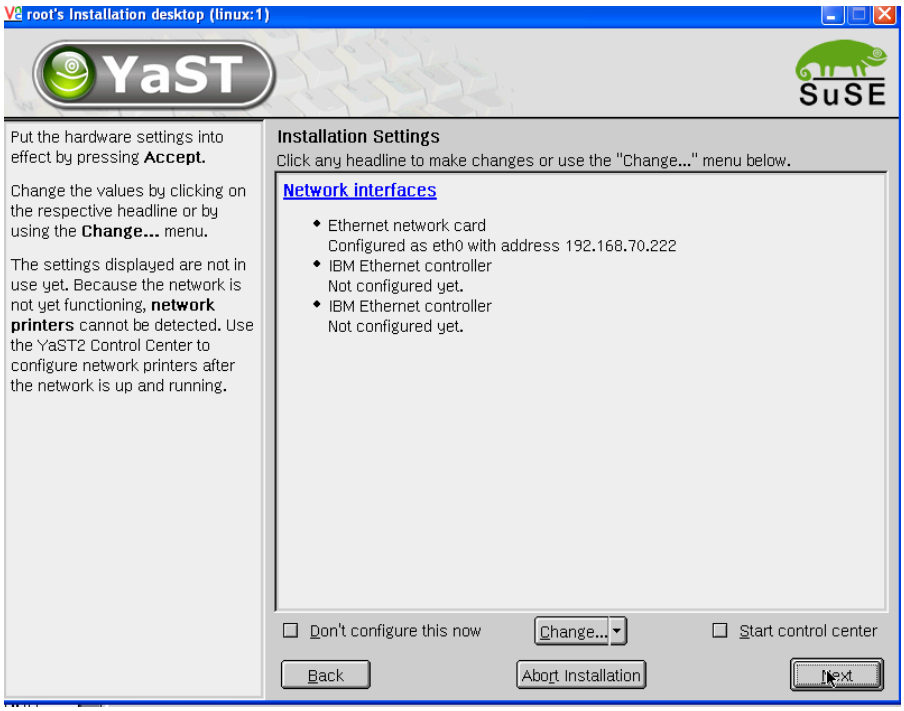
____**23.** Set the Linux password and select <**Next**> to continue, as shown in the example below.




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




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



____**26.** SLES9 has now successfully been installed on the JS21 blade server. Continue to section 14.0 which will guide you through the setup of the boot sequence.

## Directions - Installing RHEL4 U3

The installation of RHEL3 and RHEL 4 is very similar. Refer to the RHEL3 for a more detailed step-by-step.

____**1.** Insert the RHEL4 U3 CD1 in to the CD-ROM drive.

____**2.** Ensure that the media tray is still assigned to the JS21 blade server. . **NOTE:** Make sure that local switching of the media tray is not disabled for the JS21 blade server in the management-module Web interface. For more information, see the *IBM BladeCenter Management Module User's Guide*.

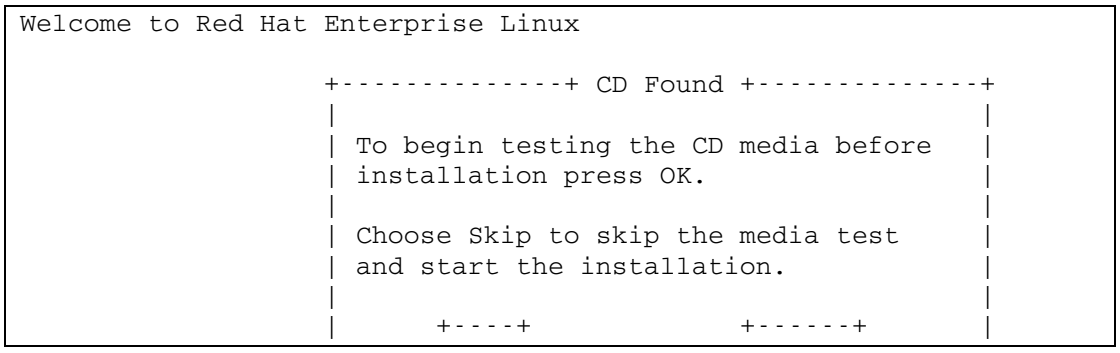
____**3.** Turn on the JS21 blade server.

____**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 boot sequence is set to boot on CDROM have been configured. Telnet to the management module (MM) and start a SOL session, as shown in the example below.

```
 >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 with the install.

____**6.** Select <Skip> to skip the media test, as shown below.



```
                    |      | OK |              | Skip |       |
                    |      +----+              +------+       |
                    |                                         |
                    |                                         |
                    +-----------------------------------------+

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

____**7.** At the language screen, select your language and select <OK> as shown below.

```
   Welcome to Red Hat Enterprise Linux

          +---------+ Choose a Language +---------+
          |                                       |
          | What language would you like to use   |
          | during the installation process?      |
          |                                       |
          |       Catalan                #        |
          |       Chinese(Simplified)    #        |
          |       Chinese(Traditional)   #        |
          |       Croatian               #        |
          |       Czech                  #        |
          |       Danish                 #        |
          |       Dutch                  #        |
          |       English                #        |
          |                                       |
          |                +----+                 |
          |                | OK |                 |
          |                +----+                 |
          |                                       |
          +---------------------------------------+
```

____**8.** At the networking device screen, select the network device that you want to use for VNC, as shown below. Note that the switch in bay 1 is connected to <eth0> and bay 2 is connected to <eth1>.

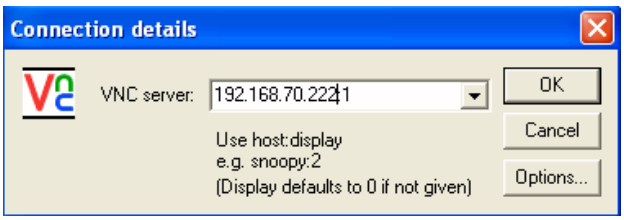
```
  Welcome to Red Hat Enterprise Linux

   +----------------------+ Networking Device +----------------------+
   |                                                                  |
   | You have multiple network devices on this system. Which          |
   | would you like to install through?                               |
   |                                                                  |
   | eth0 - Broadcom Corporation NetXtreme BCM5780S Gigabit Ethernet  |
   | eth1 - Broadcom Corporation NetXtreme BCM5780S Gigabit Ethernet  |
   |                                                                  |
   |            +----+                          +------+             |
```

```
   |            | OK |                          | Back |              |
   |            +----+                          +------+              |
   |                                                                  |
   |                                                                  |
   +------------------------------------------------------------------+

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

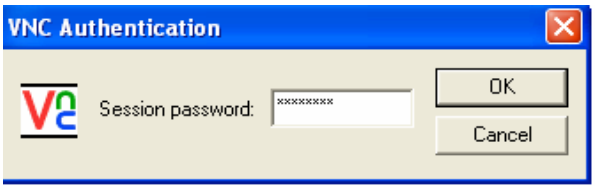
____**9.** Specify whether you are using DHCP or static, as shown in the example below.

```
      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:           192.168.70.8____            |
      |           Netmask:              255.255.255.0___            |
      |           Default gateway (IP): 192.168.70.254__            |
      |           Primary nameserver:   192.168.70.1____            |
      |                                                             |
      |            +----+                        +------+          |
      |            | OK |                        | Back |          |
      |            +----+                        +------+          |
      |                                                             |
      +-------------------------------------------------------------+
```

____**10.** Start the VNC viewer, once the VNC server has started on the JS21 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 example below.



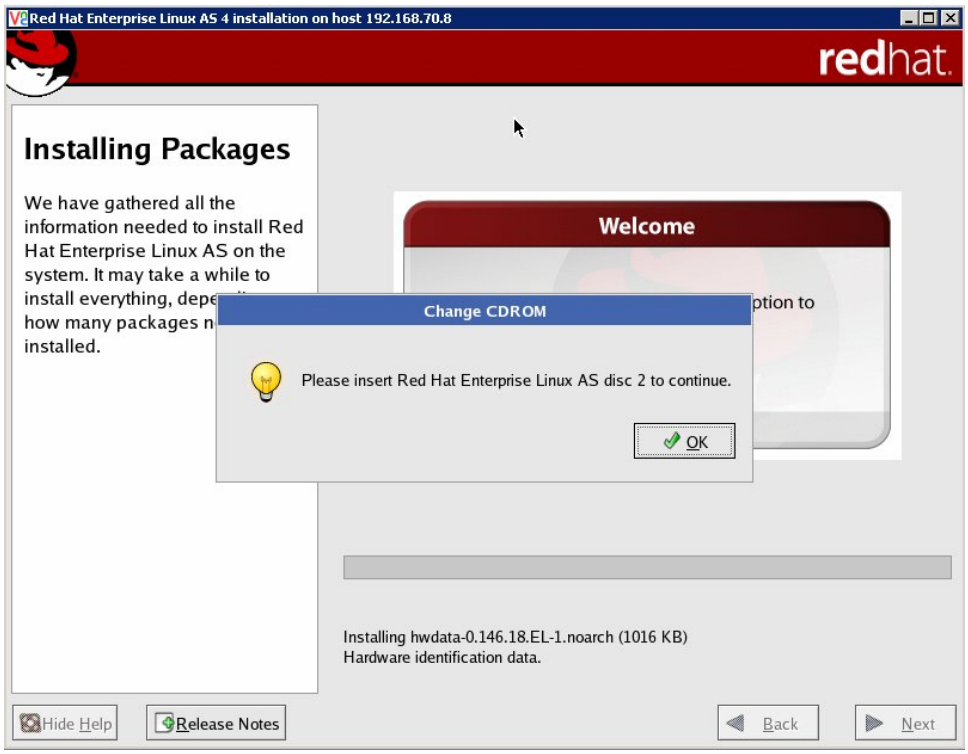

____**11.** Type in the <**VNC password**>, that you specified during the install boot prompt and select <**OK**>, as shown in the example below.




____**12.** Select <Next> to continue, as shown in the example below.

____**13.** Customize the installation to your preference. The screens are identical to the RHEL3 installation. See the RHEL3 section in this white paper if unsure. Once ready to install, select <NEXT> to start the installation.

____**14.** Change CD1 to CD2 when prompted and select <OK> to continue, as shown below.




____**15.** RHEL4 has now successfully been installed on the JS21 blade server. Continue to section 14.0 which will guide you through the setup of the boot sequence.

# 14.0 Configuring Boot Sequence for Remote Boot

In this section, we will guide you through the steps to setup the boot sequence of the blade server and how-to enable boot on the fibre expansion card.

## Directions - Configuring SMS to boot on the first path (fcs0)

____**1.** Turn the blade server on.

____**2.** Open a command prompt and telnet to the management module.

____**3.** Open a SOL connection to the blade, type: **console –T blade[*bladeno*].**

____**4.** During the boot of the blade and when the POST menu and indicators are displayed, press the 1 key after the word *Keyboard* is displayed and before the word *Speaker* is displayed. The SMS menu is displayed as shown below.

```
          1 = SMS Menu                          5 = Default Boot
          8 = Open Firmware Prompt              6 = Stored Boot List

     Memory      Keyboard     Network     SCSI     Speaker

 PowerPC Firmware
 Version MB240_470_012
 SMS 1.6 (c) Copyright IBM Corp. 2000,2005 All rights reserved.
-------------------------------------------------------------------
 Main Menu
 1.   Select Language
 2.   Setup Remote IPL (Initial Program Load)
 3.   Change SCSI Settings
 4.   Select Console
 5.   Select Boot Options
 6.   Firmware Boot Side Options
 7.   Progress Indicator History

 -------------------------------------------------------------------
 Navigation Keys:

                                             X = eXit System
Management Services
 -------------------------------------------------------------------
 Type menu item number and press Enter or select Navigation key:5
```

____**5.** Select option <5> to *Select Boot Options*, then select option <2> to *Configure Boot Device Order*, as shown below.

```
PowerPC Firmware
 Version MB240_470_012
 SMS 1.6 (c) Copyright IBM Corp. 2000,2005 All rights reserved.
-------------------------------------------------------------------------
 Multiboot
 1.   Select Install/Boot Device
 2.   Configure Boot Device Order
 3.   Multiboot Startup <OFF>
 -------------------------------------------------------------------------
------------
 Navigation keys:
 M = return to Main Menu
 ESC key = return to previous screen         X = eXit System
Management Services
 -------------------------------------------------------------------------
 Type menu item number and press Enter or select Navigation key:2
```

____**6.** Select option <1> to *Select 1st Boot Device*, as shown below.

```
PowerPC Firmware
 Version MB240_470_012
 SMS 1.6 (c) Copyright IBM Corp. 2000,2005 All rights reserved.
-------------------------------------------------------------------------
 Configure Boot Device Order
 1.   Select 1st Boot Device
 2.   Select 2nd Boot Device
 3.   Select 3rd Boot Device
 4.   Select 4th Boot Device
 5.   Select 5th Boot Device
 6.   Display Current Setting
 7.   Restore Default Setting
 -------------------------------------------------------------------------
 Navigation keys:
 M = return to Main Menu
 ESC key = return to previous screen         X = eXit System
Management Services
 -------------------------------------------------------------------------
 Type menu item number and press Enter or select Navigation key:1
```

____**7.** Select option <8> to *List All Devices*, as shown below.

```
PowerPC Firmware
 Version MB240_470_012
 SMS 1.6 (c) Copyright IBM Corp. 2000,2005 All rights reserved.
-------------------------------------------------------------------------
```

```
 Select Device Type
 1.   Diskette
 2.   Tape
 3.   CD/DVD
 4.   IDE
 5.   Hard Drive
 6.   Network
 7.   None
 8.   List All Devices

 ------------------------------------------------------------------------
 Navigation keys:
 M = return to Main Menu
 ESC key = return to previous screen         X = eXit System
Management Services
 ------------------------------------------------------------------------
 Type menu item number and press Enter or select Navigation key:8
```

____**8.** Select option <4> for FC Harddisk, as shown below.

```
------------------------------------------------------------------------
 Select Device
 Device  Current  Device
 Number  Position  Name
 1.        -      Ethernet
                  ( loc=U788D.001.23A0292-P1-T7 )
 2.        -      Ethernet
                  ( loc=U788D.001.23A0292-P1-T8 )
 3.        1      USB CD-ROM
                  ( loc=U788D.001.23A0292-P1-T1-L1-L3 )
 4.        -      SCSI 5368 MB FC Harddisk, part=1 ()
                  ( loc=U788D.001.23A0292-P1-C5-T1-W200400a0b8139d63
 5.    None



 ------------------------------------------------------------------------
 Navigation keys:
 M = return to Main Menu
 ESC key = return to previous screen         X = eXit System Management
Services
 ------------------------------------------------------------------------
 Type menu item number and press Enter or select Navigation key:4
```

____**9.** Select option <2> for *Set Boot Sequence*, as shown below.

```
SCSI 5368 MB FC Harddisk, part=1 ()
    ( loc=U788D.001.23A0292-P1-C5-T1-W200400a0b8139d63-
L0000000000000000 )
```

```
 1.   Information
 2.   Set Boot Sequence: Configure as 1st Boot Device

 -------------------------------------------------------------------------
 Navigation keys:
 M = return to Main Menu
 ESC key = return to previous screen         X = eXit System Management
Services
 -------------------------------------------------------------------------
 Type menu item number and press Enter or select Navigation key:2
```

____**10.** The boot sequence for the JS21 blade server has now been configured. Select option <M> to return to the main menu or X to exit the System Management Services, as shown below.

```
-------------------------------------------------------------------------
 Current Boot Sequence
 1.  SCSI 5368 MB FC Harddisk, part=1 ()
    ( loc=U788D.001.23A0292-P1-C5-T1-W200400a0b8139d63-
L0000000000000000 )
 2.    None
 3.    None
 4.    None
 -------------------------------------------------------------------------
 Navigation keys:
 M = return to Main Menu
 ESC key = return to previous screen         X = eXit System Management
Services
 -------------------------------------------------------------------------
 Type menu item number and press Enter or select Navigation key: M
```

____**11.** You may now go to section 15.0 to configure for redundancy.

# 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 or sometimes called LUN masking.

**Important Notice**

**NOTE:** SDD for AIX does not support redundancy for rootvg (boot disk).

## Directions - Enable second switch path

Enable the second switch path to the Storage controller, using the steps outlined below.
**Note:** In this example, the blade server is installed in blade slot 1. Blade slot 1 is connected to the port 1 on the switch module.

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

**NOTE:** Enable **Port 1** 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.

## Directions - DS4000 series

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

____**2.** Launch the DS4000 client and open the Storage Subsystem that you are configuring for remote boot.

____**3.** 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 WWWPN 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.

____**4.** 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 only**

____**5.** (**LINUX only**) Install the QLOGIC SANSURFER for failover capability as directed below.
**NOTE:** The QLOGIC SANSURFER application should be compatible with the Firmware that is being used on the Storage controller. You can confirm this by referring to the QLOGIC SANSURFER and Firmware Readme files.

____**6.** Obtain the latest QLOGIC SANSURFER from the IBM support website (http://www-1.ibm.com/servers/storage/support/fastt/index.html)

____**7.** Telnet and log on as root to the JS21 blade Server.

____**8.** Copy the QLOGIC SANSURFER to the JS21 blade server.

____**9.** Change to the directory that contains the QLOGIC SANSURFER installer.

____**10.** At the prompt , type <**sh FAStTMSJ_install.bin -i silent**>. The utility will install in the /opt directory. The launch script is located in the /usr directory.

____**11.** Run the QLOGIC SANSURFER.
**Note:** The default QLOGIC SANSURFER 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 QLOGIC SANSURFER.

____**12.** Ensure that you are in a graphical user environment.

____**13.** Start qlremote, open a command terminal from the root directory and type <**qlremote**>.

____**14.** Change to the usr directory in which the QLOGIC SANSURFER script is installed, by typing <**cd /usr**>

____**15.** Start the application, by typing <**./FAStT_MSJ**>

____**16.** When QLOGIC SANSURFER 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.

____**17.** 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".

____**18.** (**LINUX only**) Configure the QLOGIC SANSURFER for failover capability.

____**19.** 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 QLOGIC SANSURFER User's Guide for guidance on how-to manually configure failover.

____**20.** From the Fibre Channel Port Configuration window, click <**Tools**> -> <**Auto Configure**>.

____**21.** The system prompts whether you also want to use default LUN configurations. Click <**Yes**> to change the current LUN configurations to the default values.

____**22.** 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".

____**23.** Exit and close the QLOGIC SANSURFER application.

____**24.** When QLOGIC SANSURFER 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**

____**25.** (**AIX only**) Install the RDAC file sets for failover capability.

____**26.** Verify that all pre-req's for the RDAC file sets have been installed by consulting the latest AIX RDAC User's Guide.

____**27.** Download the most recent AIX RDAC file sets from the following IBM Web site: techsupport.services.ibm.com/server/aix.fdc.

____**28.** Telnet and log on as root to the JS21 blade Server.

____**29.** Probe for new devices by typing <**cfgmgr –v**>.

____**30.** Copy the AIX RDAC file sets to the JS21 blade server.

____**31.** 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.

____**32.** Select <**Install Software**> and press enter.

____**33.** Press <**F4**> to display the "INPUT Device/Directory for Software" panel.

____**34.** Type in the directory path to where the RDAC filesets were copied to and press enter.

____**35.** Press Enter again. "The Install Software" panel is displayed.

____**36.** Select Software to Install and press <**F4**>. The "Software to Install" panel is displayed.

____**37.** Select the installation package that is appropriate for your environment.

____**38.** Press Enter. The "Install and Update from LATEST Available Software" panel is displayed with the name of the software that you selected to install.

____**39.** Check the default option settings to ensure that they are what you need.

____**40.** Press enter to install.

____**41.** Press enter to continue.
**Note:** The installation process can take several minutes to complete.

____**42.** When the installation is complete, press <**F10**> to exit from SMIT.

____**43.** Run and examine the output of the <**lsdev -Cc disk**> command to ensure that the RDAC software recognizes the DS4000 logical drives that have been assigned to the JS21 blade server.

# Directions - SVC

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

____**2.** Using the SVC Console, modify the host system to include the 2nd HBA and Boot LUN.

____**3.** Enter the information in the text fields for the 2nd port of the FC Host adapter and Boot LUN.

____**4.** 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 for more information.

____**5.** (**LINUX only**) Install the SDD multi-path device driver using the Linux RPM 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

____**6.** 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)

____**7.** Telnet and log on to the JS21 blade server as the root user.

____**8.** Copy the SDD package to the JS21 blade server.

____**9.** Type <**rpm -Uvh IBMsdd-***xxxxx***.rpm>** to install SDD, where xxxx represents the current version release modification level number.

____**10.** Verify that the JS21 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.

____**11.** If you desire to boot from the SDD virtual disk, you should follow the steps provided in the Appendix.

**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:**
  **I**nstall 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:
  - 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.
  - 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).

____**12.** **AIX only**) Install SDD to achieve failover and multi-pathing for non-rootvg disks only

____**13.** Verify that all the pre-req's for the SDD file sets have been installed by consulting the latest SDD User's Guide.

____**14.** Download the most recent SDD file sets from the following IBM Web site (http://www-1.ibm.com/servers/storage/support/software/sdd.html)

____**15.** Telnet and log on as root to the JS21 blade Server.

____**16.** Probe for new devices by typing <**cfgmgr –v**>.

____**17.** Copy the AIX SDD file sets to the JS21 blade server.

____**18.** 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.

____**19.** Select <**Install Software**> and press enter.

____**20.** Press <**F4**> to display the "INPUT Device/Directory for Software" panel.

____**21.** Type in the directory path to where the SDD filesets were copied to and press enter.

____**22.** Press enter again. "The Install Software" panel is displayed.

____**23.** Select Software to Install and press <**F4**>. The "Software to Install" panel is displayed.

____**24.** Select the installation package that is appropriate for your environment.

____**25.** Press Enter. The "Install and Update from LATEST Available Software" panel is displayed with the name of the software that you selected to install.

____**26.** Check the default option settings to ensure that they are what you need.

____**27.** Press enter to install.

____**28.** Press enter to continue.
**Note:** The installation process can take several minutes to complete.

____**29.** When the installation is complete, press <**F10**> to exit from SMIT.

____**30.** Verify that the JS21 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.

## Directions – Configuring SMS to boot on second path (fcs1)

**NOTE:** IBM has currently tested that only one boot path at a time can be selected at a time. The selection of the second path must be done manually if the first path fails, i.e., there is no automatic failover today. To manually change the boot sequence to boot on the second path, perform the following steps.

____**1.** Login to the Storage Management software and ensure that the LUN has actually failed over to the second path.

____**2.** Turn the blade server on.

____**3.** Open a command prompt and telnet to the management module.

____**4.** Open a SOL connection to the blade, type: **console –T blade[*bladeno*].**

____**5.** During the boot of the blade and when the POST menu and indicators are displayed, press the 1 key after the word *Keyboard* is displayed and before the word *Speaker* is displayed. The SMS menu is displayed as shown below.

```
          1 = SMS Menu                              5 = Default Boot
          8 = Open Firmware Prompt                  6 = Stored Boot List

     Memory      Keyboard     Network     SCSI     Speaker

 PowerPC Firmware
 Version MB240_470_012
 SMS 1.6 (c) Copyright IBM Corp. 2000,2005 All rights reserved.
-------------------------------------------------------------------------
 Main Menu
 1.   Select Language
 2.   Setup Remote IPL (Initial Program Load)
 3.   Change SCSI Settings
 4.   Select Console
 5.   Select Boot Options
 6.   Firmware Boot Side Options
 7.   Progress Indicator History

 -------------------------------------------------------------------------
 Navigation Keys:

                                              X = eXit System
Management Services
 -------------------------------------------------------------------------
 Type menu item number and press Enter or select Navigation key:5
```

____**6.** Select option <5> to *Select Boot Options*, then select option <2> to *Configure Boot Device Order*, as shown below.

```
PowerPC Firmware
 Version MB240_470_012
 SMS 1.6 (c) Copyright IBM Corp. 2000,2005 All rights reserved.
-------------------------------------------------------------------------
 Multiboot
 1.   Select Install/Boot Device
 2.   Configure Boot Device Order
 3.   Multiboot Startup <OFF>
 -------------------------------------------------------------------------
------------
 Navigation keys:
 M = return to Main Menu
 ESC key = return to previous screen         X = eXit System
Management Services
 -------------------------------------------------------------------------
 Type menu item number and press Enter or select Navigation key:2
```

____**7.** Select option <1> to *Select 1st Boot Device*, as shown below.

```
PowerPC Firmware
 Version MB240_470_012
 SMS 1.6 (c) Copyright IBM Corp. 2000,2005 All rights reserved.
------------------------------------------------------------------------
 Configure Boot Device Order
 1.   Select 1st Boot Device
 2.   Select 2nd Boot Device
 3.   Select 3rd Boot Device
 4.   Select 4th Boot Device
 5.   Select 5th Boot Device
 6.   Display Current Setting
 7.   Restore Default Setting
 ------------------------------------------------------------------------
 Navigation keys:
 M = return to Main Menu
 ESC key = return to previous screen         X = eXit System
Management Services
 ------------------------------------------------------------------------
 Type menu item number and press Enter or select Navigation key:1
```

____**8.** Select option <8> to *List All Devices*, as shown below.

```
PowerPC Firmware
 Version MB240_470_012
 SMS 1.6 (c) Copyright IBM Corp. 2000,2005 All rights reserved.
------------------------------------------------------------------------
 Select Device Type
 1.   Diskette
 2.   Tape
 3.   CD/DVD
 4.   IDE
 5.   Hard Drive
 6.   Network
 7.   None
 8.   List All Devices
 ------------------------------------------------------------------------
 Navigation keys:
 M = return to Main Menu
 ESC key = return to previous screen         X = eXit System
Management Services
 ------------------------------------------------------------------------
 Type menu item number and press Enter or select Navigation key:8
```

____**9.** Select option <4> for FC Harddisk, as shown below.

```
------------------------------------------------------------------------
 Select Device
```

```
 Device  Current  Device
 Number  Position  Name
 1.        -      Ethernet
                  ( loc=U788D.001.23A0292-P1-T7 )
 2.        -      Ethernet
                  ( loc=U788D.001.23A0292-P1-T8 )
 3.        1      USB CD-ROM
                  ( loc=U788D.001.23A0292-P1-T1-L1-L3 )
 4.        -      SCSI 5368 MB FC Harddisk, part=1 ()
                  ( loc=U788D.001.23A0292-P1-C5-T1-W200400a0b8139d63
 5.    None
 ------------------------------------------------------------------------
 Navigation keys:
 M = return to Main Menu
 ESC key = return to previous screen         X = eXit System Management
Services
 ------------------------------------------------------------------------
 Type menu item number and press Enter or select Navigation key:4
```

____**10.** Select option <2> for *Set Boot Sequence*, as shown below.

```
SCSI 5368 MB FC Harddisk, part=1 ()
    ( loc=U788D.001.23A0292-P1-C5-T1-W200400a0b8139d63-
L0000000000000000 )

 1.   Information
 2.   Set Boot Sequence: Configure as 1st Boot Device

 ------------------------------------------------------------------------
 Navigation keys:
 M = return to Main Menu
 ESC key = return to previous screen         X = eXit System Management
Services
 ------------------------------------------------------------------------
 Type menu item number and press Enter or select Navigation key:2
```

____**11.** The boot sequence to boot the JS21 blade server on the FC hard disk that has been assigned to the HBA connected to switch bay 3. Select option <M> to return to the main menu or X to exit the System Management Services, shown below.

```
------------------------------------------------------------------------
 Current Boot Sequence
 1.  SCSI 5368 MB FC Harddisk, part=1 ()
    ( loc=U788D.001.23A0292-P1-C5-T1-W200400a0b8139d63-
L0000000000000000 )
 2.    None
 3.    None
 4.    None
```

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

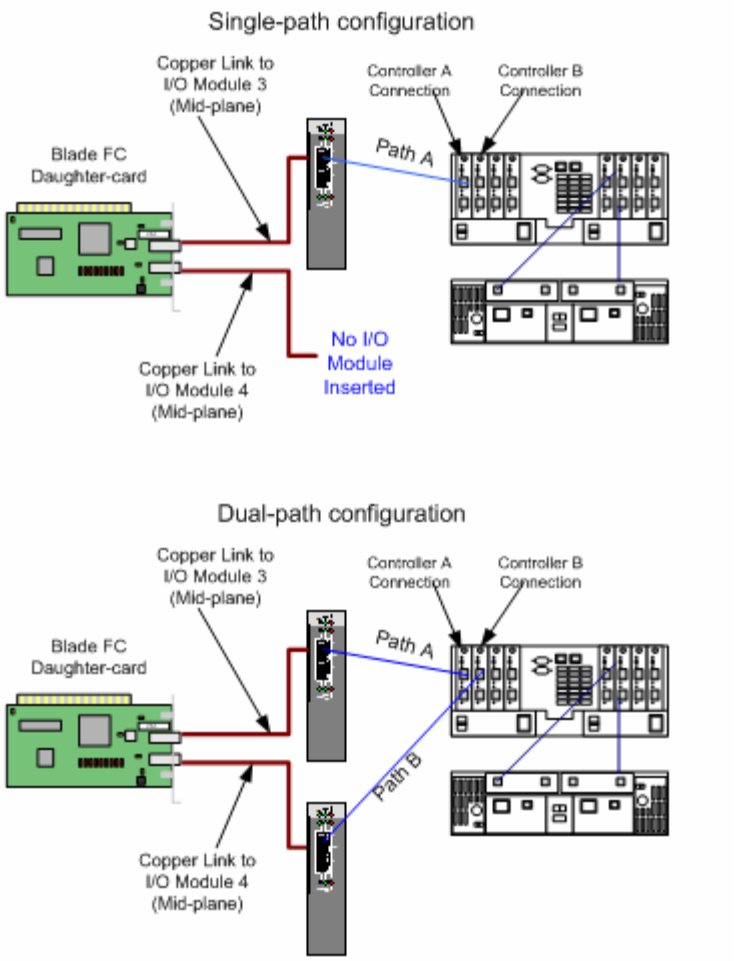
____**12.** You have now successfully configured the JS21 blade server. Check the appendix below for additional information.

# Appendix A – Design and Implementation Considerations

Use these considerations when designing or implementing a remote boot environment using JS21 blade servers;

- Check IBM ServerProven for supported configurations. IBM ServerProven is available at: http://www-03.ibm.com/servers/eserver/serverproven/compat/us/index.html.
- Review supported configurations from the storage vendor. For IBM storage support, see http://www-03.ibm.com/servers/storage/support/. EMC has documented how to SAN boot off a PowerPath device, instructions are available at http://www.emc.com/. Hitachi Data Systems (HDS) has also documented on how to SAN Boot in a HDLM environment, instructions are available at http://www.hds.com. Note that the JS21 does not support HDLM and HDLM does not support a SAN boot device but there is a procedure on how to remove a boot disk from HDLM control, see the IBM MPIO publications available at http://www-03.ibm.com/servers/storage/support/.
- Review the IBM Switch Interoperability Guide for IBM BladeCenter for supported switch configurations. This guide is available at: http://www-307.ibm.com/pc/support/site.wss/document.do?sitestyle=ibm&lndocid=MIGR-58206.
- 2Gb expansion card has not been tested for remote boot on a JS21 blade server.
- The Optical Pass-thru Module is not supported with the 4Gb expansion card in a boot environment.
- During installation of the Operating System, there should only be a single path to the storage device. This is to ensure that the first port on the fibre expansion card (fcs0) gets configured and also prevent that the same LUN shows up twice. Additional paths and fail-over may be configured after the installation of the Operating System.
- The boot LUN should be assigned as LUN 0 when using IBM TotalStorage as the storage device.
- Recommended to have only one LUN assigned to the JS21 blade server during installation of the Operating System. Additional LUNs can be added once the Operating System has been installed.
- SDD on AIX does not support redundancy for volumes in rootvg.
- Reconfiguration of expansion card using SMS on JS21 is required if first fibre path fails (fcs0).

# Appendix B - Single/Dual-path Concept Diagrams[1]




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

# Appendix C - Standalone Diagnostics

The IBM Standalone Diagnostics CD-ROM provides hardware diagnostics and service-related utilities for POWER, PowerPC, eServer i5 system with common pSeries I/O, and RS/6000-based systems. The preferred method for diagnosing and servicing these systems is to use the concurrent diagnostics and service-related utilities that are installed with the operating system on the system or partition. However, the standalone diagnostics CD-ROM would be used in the following situations when it makes sense to test the hardware independent of the operating system:

- When there is no operating system installed on a system or partition
- When the operating system does not have support for the service related function you wish to perform
- When there may be a problem with the boot device
- When the service documentation specifically recommends running standalone diagnostics

Updates are released periodically to support new systems and devices. You can find the latest release of the Standalone Diagnostic CD-ROM at http://www14.software.ibm.com/webapp/set2/sas/f/diags/download/home.html.

Diagnostics can also be run from within AIX, using the <**diag**> command. The menu options and functionality is the same as the stand-alone version. See Appendix B for upgrading the firmware within the Linux operating system.
Follow the instructions below to update the JS21 blade server using the Standalone Diagnostics.

## Directions – Update JS21 using Standalone Diagnostics

____**13.** Boot the JS21 blade server on the Standalone Diagnostics CD-ROM or if running AIX, type <**diag**> to start the Standalone Diagnostics.

____**14.** From the ″Function Selection″ menu, choose <**Task Selection**>.

____**15.** From the ″Tasks Selection List″ choose <**Update and Manage System Flash**>.

____**16.** Choose <**Validate and Update System Firmware**>.

____**17.** At the ″flash update image file″ prompt, insert the CDROM containing the Open Firmware and select </dev/cd0> as source, and then Commit <PF7>.

____**18.** Follow instructions displayed on the screen, for example: Choose <**Yes**> to proceed with the flash operation.

____**19.** After the system reboots successfully and once you are satisfied with the functionality of the new image, commit the update using the Standalone Diagnostics CD-ROM.

____**20.** From the ″Function Selection″ menu, choose <**Task Selection**>.

____**21.** From the ″Tasks Selection List″ choose <**Update and Manage System Flash**>.

____**22.** Choose <**Commit the Temporary Image**>.

____**23.** Choose <**Yes**> to commit the image.

**NOTE**: This selection copies the permanent system firmware image to the temporary image when booted from the temporary image. Booting of temporary or permanent can be configured using the SMS within the JS21 blade server.

____**24.** Press <**ESC**> then <**F10**> to exit diagnostics.

# Appendix D - Linux Service Aids

After installation of the LINUX 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 JS21 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.

## Directions – Updating JS21 using Linux Service Aids

____**1.** Download and install the Service Aids for Linux, these utilities and instructions can be found at: https://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/home.html

____**2.** Obtain the latest JS21 Open Firmware level from the IBM support site (http://www-03.ibm.com/servers/eserver/support/bladecenter/index.html).

____**3.** Telnet and login as root to the JS21 blade server.

____**4.** Copy the latest version of the Open Firmware that you obtained from the IBM support site to the JS21 blade server.

____**5.** Type < **update_flash –f** ***/path/to/filename***> command to upgrade the open firmware of the JS21 blade.
**NOTE:** The update_flash utility will immediately reboot the server when the temporary image is flashed.

____**6.** After the JS21 blade has successfully rebooted, log in as root and promote the flash to the permanent 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 E - Modify initrd for SDD on Linux (RHEL 3, SLES 8)

You should review the SDD User Guide available at http://www-03.ibm.com/servers/storage/support/ for more detailed information.

- First, this assumes you have correctly configured your bootloader to boot from the SAN device single path. 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:

  - Make a backup of your existing _initrd_file_:
    cd /boot
    cp _initrd_file_ _initrd_file.bak
  - Uncompress the image:
    zcat _initrd_file_.bak > _initrd_file_
  - Setup a loopback device for the image:
    losetup /dev/loop0 /path/to/your/_initrd_file_
  - Fix any errors that may exist on the filesystem:
    e2fsck -f /dev/loop0
    losetup -d /dev/loop0

  - 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.
  - Setup a loopback device for the image:
    losetup /dev/loop0 /path/to/your/_initrd_file_
  - 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.
  - 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 automatically happening correctly.
- 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:
  - /etc/vpath.conf -> /etc/

- /etc/group, passwd, nsswitch.conf -> /etc/
- /opt/IBMsdd/sdd-mod.o-CORRECT_VERSION -> /lib/sdd-mod.o
- /opt/IBMsdd/bin/* -> /opt/IBMsdd/bin/
- /lib/libc.so.6 -> /lib/
- /lib/ld-linux.so.2 -> /lib/
- /lib/libacl.so.1 -> /lib/
- /lib/libattr.so.1 -> /lib/
- /lib/libdl.so.2 -> /lib/
- /lib/libm.so.6 -> /lib/
- /lib/libpthread.so.0 -> /lib/
- /lib/libnss_files.so.2 -> /lib/
- /lib/librt.so.1 -> /lib/
- /bin/awk, chmod, chown, cp, date, grep, ls, mknod, mount, ps, rm, sed, sh, tar, umount -> bin
- /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)
- 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
- On SuSE you will additionally need:
  - /lib/libreadline.so.4 -> /lib/
  - /lib/libhistory.so.4 -> /lib/
  - /lib/libncurses.so.5 -> /lib/
- 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:
  - 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.

- 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 –t proc /proc /proc
  ```
- 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 to be 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 2 bytes 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 the kernels root parameter that was appended to the bootloader 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 JS21 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 BladeCenter products and services, including part numbers and prices for servers, racks, storage units and other options.

IBM Systems Group
Department AE3A
Research Triangle Park NC 27709

Produced in the USA
2-04