

Booting Windows From Enterprise Modular Arrays

Multiple Path Mode Procedures

Firmware 3.81A1 with boot BIOS 1.52A1

Compaq Enterprise Storage
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Refer to the Introduction (INTRODUCTION.PDF) for information about supported configurations, restrictions, and an overview of the procedures detailed here.

Detailed Installation Procedure

This document is valid for BIOS menus based on the 176479-B21 (DS-KGPSA-CB) firmware 3.81A1 with boot BIOS 1.52A1.

Note: The user is expected to have a working knowledge of the HSG80-based Fibre Channel RAID Array technology and the interconnections required to attach to an FC-HBA in a Windows-based server. This information is in the documentation that comes with the RAID Array and StorageWorks Solution Kit. The user is also expected to have a working knowledge of Windows NT 4.0 or Windows 2000.

References in this document to HSG80 are intended to cover all of the RA8000 Family RAID Array products.

Prework

The items listed below are not covered in this document. However, they are part of the initial setup and they must be completed.

RA8000/ESA12000, MA8000/EMA12000, or MA6000

- Setting and/or verifying the HSG80 controller port topology for your configuration.
- Setting and/or verifying the controller SCSI Version. In SCSI-3 mode, LUN 0 is assigned to the Command Console. Therefore, the unit you assign as your boot disk must be LUN 1 or higher. **SCSI-3 mode is recommended.**
- Verifying that all existing storage units have the proper access set.
- Delete any unused connections.

Switch-based Configurations And Zoning

- If zoning is enabled, be sure to check the switch for any zoning conflicts.

Compaq RAID Array Controller Setup

In the course of your set up procedure, you will be required to set up your HSG-80 controller for either Arbitrated Loop (hub-based) or Fabric (switch-based) topology. You will need to use the CLI (Command Line Interface) to do this.

There are two ways to use CLI:

- via a terminal or a terminal emulator like Hyperterm running on a PC.
- via the CLI Window of the Command Console client program.

Hub And Switch Setup

No special considerations are required for booting.

Special Considerations For Boot Disk Partitions

Before attempting to create a boot disk, you must ensure that you are starting with a clean, unpartitioned virtual disk. We recommend using HSUTIL, DILX, or FDISK to delete any partitions that may already exist. If you have just created a new virtual disk, this condition would not exist and you would simply need to create the partition in a step during the installation procedure, itself.

If you are planning to set up booting from a RAID Array that has other virtual disks attached to other servers, be aware of the following. When setting up booting for the new server, the installation program will present you with a list of partition onto which to load the operating system. You will see a disk for every controller port the HBA can access. Although it may look like you have more than one virtual disk available for booting, it really is only one. When creating a partition for the operating system load, you need to create the same partition size on all the disks that carry the same disk description as determined by Windows (for example, Disk 00 Id 01 XXXXX). If you don't make the partitions exactly the same, and especially in SCSI-3 mode, the installer will format the partition, reboot, and restart the selection process.

Booting Multiple Path Configurations

Note: If you are creating a single server, multiple path configuration (which requires Secure Path) use the procedures in this section and ignore instructions for the second FC-HBA and path.

Boot disks created on the Compaq RAID Arrays are limited to 8GB due to features of the 176479-B21 (DS-KGPSA-CB) FC-HBA firmware.

The steps for booting clusters and/or servers with Secure Path are similar to single servers. The additional steps are summarized below. Following that, there is a step-by-step procedural example for booting a two node cluster running Windows and Secure Path.

Considerations For Booting Clusters

Microsoft requires that the FC-HBA used for booting must not be the same FC-HBA used for cluster shared storage. For this reason, you will need to double the number of FC-HBA's in each server when setting up for cluster booting. In general, the key steps for setting up booting include:

- installing all 176479-B21 (DS-KGPSA-CB) FC-HBA's but not connecting them
- configuring for booting each FC-HBA that attaches to boot disks (for cluster, your RAID Array will need two, separate boot disks)
- one-at-a-time, connect and set up the FC-HBA for booting
- set up disk connectivity from each, intended, unique boot disk to its server (use CLI)
- one-at-a-time, install the Windows operating system onto the desired (unique and dedicated) disk in the RAID Array
- make sure the drive letters are the same for both servers' boot disks
- boot the servers
- install cluster software

Considerations For Secure Path

Secure Path provides high availability computing by use of a redundant data path to the RAID Array. In a cluster situation, because of the Microsoft requirement that the boot FC-HBA is different from the shared data FC-HBA, each server will need four FC-HBA's (two boot, two data) bringing the total to eight FC-HBA's overall. This provides data path redundancy for boot and data. Other than this additional requirement, the procedure for setting up booting is no different from either single server or cluster. Secure Path is an application that loads after the operating system has booted and should be treated the same as any other application installation.

Procedure

Note: ProLiant are available in two configurations. Newer models use RBSU (ROM Based Setup Utility) for controlling booting. If you have a newer ProLiant, you should follow the two RBSU procedures below. If you have an older model without RBSU, skip to the non-RBSU setup.

Server ROM BIOS Upgrade for RBSU (ROM Based Setup Utility) ProLiant Servers

1. Boot the server from the ProLiant Smart Start CD-ROM version 5.3 or higher or download the latest ROM BIOS from <http://www.compaq.com>.
2. Install the latest ROM from Smart Start or the one that was downloaded.

Setting The Boot Order for RBSU (ROM Based Setup Utility) ProLiant Servers

1. While the system is booting, Press the <F9> key for the ROM Based Setup Utility.
2. Choose *Boot Controller Order*.
3. Select the primary PCI Fibre Channel Adapter and move it to *Controller Order 1*. Move the secondary adapter to *Controller Order 3*.
4. Exit the utility.

Server Setup non-RBSU ProLiant Servers

1. Boot from the ProLiant Smart Start CD-ROM and run the program to clear the configuration.
2. Run the System Configuration Utility.
3. Set the boot position of the Smart Array Controller to 15.
4. Reboot the server.

FC-HBA Setup

1. Install the 176479-B21 (DS-KGPSA-CB) FC-HBA's on each server, but do not connect them at this time.
2. Record each adapter's IEEE number and make note of which PCI slot it occupies.
3. Boot the Server using an MS-DOS bootable diskette.
4. Run the LP6DUTIL program.
 - o Choose **Maintenance**.
 - o Update the firmware for each adapter to 3.81A1 with boot BIOS 1.52A1.
 - o Enable Boot BIOS for each adapter.
 - o Choose **Quit** to return to MS-DOS.
5. Reboot the server.
6. While the server is booting, watch for this message: *Press <Alt E> To Go To EMULEX BIOS Utility*. Press the **<Alt E>** key.
7. A screen will appear prompting you with **Enter a Selection**.
 - o Choose the first adapter.

Note: You will see a line at the top of the screen titled Port Name. The last 4 digits of the name should match the last 4 digits of the IEEE number that you recorded in the second step of this procedure. Be aware of which adapter you choose for booting.

- o Choose **Configure This Adapter's Parameters**.
 - o Choose **Topology Selection**.
 - o Choose the desired topology.
8. Return to the main menu (press the **<Page Up>** key three times).
 9. Repeat the previous two steps for the second adapter.
 10. Ensure that your RAID Array is configured and connected.
 11. Ensure that the two FC-HBA's you just configured are each connected to a separate switch or hub.
 12. Ensure that both ports from both controllers are connected to the switch or hub following the connectivity rules for multiple bus configurations.

For example: Connect the first port of the top controller and the second port of the bottom controller to one switch, and the second port of the top controller and the first port of the bottom controller to the other switch. When finished you should have three connections in each switch. The two ports from the controllers and one FC-HBA. ???

13. Exit the BIOS.
14. Reboot the system.
15. While the server is booting, watch for this message: *Press <Alt E> To Go To EMULEX BIOS Utility*. Press the **<Alt E>** key.
16. A screen will appear prompting you with **Enter a Selection**.
 - o Choose the first adapter.
 - o Choose **Configure This Adapter's Parameters**.
 - o Enable the BIOS.
 - o Return to the menu. (Press the **<Page up>** key twice)
 - o Choose **Configure Boot Devices**.
 - o Choose 1 as the Primary Boot.

Note: If your RA8000/ESA12000 is configured to operate in SCSI-3 mode, the command Console is displayed as LUN 0. In this case two connections will be shown, one for each controller port. If you are configured to operate in SCSI-2 mode, only the LUNs you create are displayed. In this case no connections will be shown.

17. Return to the main menu. (Press the **<Page Up>** key three times)
18. Repeat the previous two steps for the second adapter and return to the main menu.
19. Use a terminal or computer running a terminal emulator to access CLI for the next steps:
 - o Using CLI, configure a device with no access allowed.

```
HSG> initialize disk10000
HSG> add unit d1 disk10000 disable_access_path=all
HSG> Show d1
```

Note to which LUN the controller is online.

- o Verify that the FC-HBA is online.

```
HSG> show connections
```

Four connections should be present: two for each adapter, one to "this controller" and one to "other controller"

- o Rename the connection, if desired.
- o Assign the FC-HBA access to the LUN.

```
HSG> set d1 enable_access_path=...
```

...enter the names of connections that are associated with same controller to which the LUN is online. There should be two connections entered at this time.

20. On the server, choose the first adapter.
 - o Choose the first adapter.
 - o Choose Configure Boot Devices.
 - o Choose 1 as the Secondary Boot.

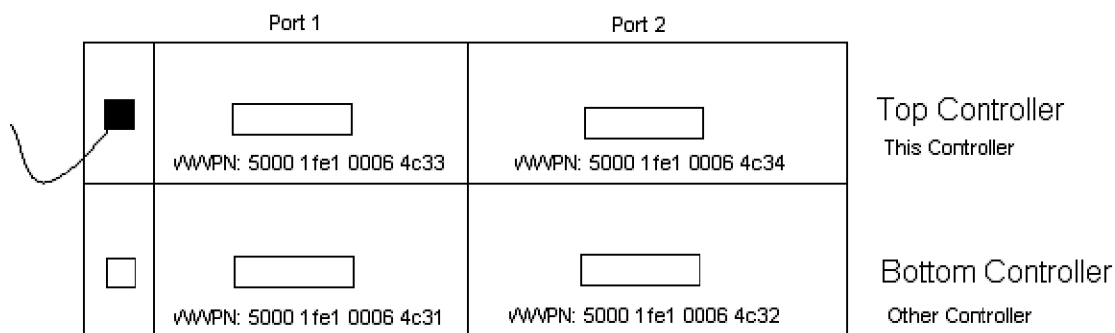
Note: If your RA8000/ESA12000 is configured to operate in SCSI-3 mode, the Command Console is displayed as LUN 0. If you are configured to operate in SCSI-2 mode, you will now see the connection you just created.

- o You will be asked to Select the Desired Boot Device. Choose the line number that has the WWPN of the controller port the LUN is online to. (See the diagram below.)
- o You will be asked to enter a boot device via **Select the Desired Boot Device**. Choose the entry that is next to **LUN:xx**. This establishes the starting LUN number the FC-HBA will use to look for a bootable disk. Your actual boot LUN should be this one or higher.
- o The next screen will show you a list of all boot devices that connection has. Choose the line number that contains the LUN number from which you wish to boot.
- o A box will prompt you to Boot the Device with two options. Choose **Boot this device via WWPN**.
- o You will be returned to the *List of Saved Boot Devices* screen. Page up three times to return to the main menu.

21. Repeat the step above for the second adapter.

Note: The connection WWPN names will be different for each adapter because they are connected to different controller ports. It is only important that you have the same LUN number for each adapter.

22. Return to the main menu.
23. Press the <X> key to Exit.



The controller ports are each given a WWPN. The WWPN should be identical for all ports except for the last number. This is how to distinguish from

which controller port you are booting. The Top Controller is considered "this controller" because of the serial line connection. If the LUN is online to "this controller", then you must choose the line with WWPN from this controller for booting.

Operating System Setup Steps

1. Insert the operating system CD-ROM.
2. Reboot the system. (Answer Y and press the <Enter> key to the question, **REBOOT THE SYSTEM (Y/N).**)
3. Press the <F6> key as soon as the setup text displays at the bottom of the screen. This will allow you to install a third party driver during the installation process.

Note: This is not the same as the better known step to *choose to specify additional drivers* that appears later in the installation procedure. The installation will fail if you do not chose **F6** from the beginning. Windows NT does not prompt for this. Windows 2000 does, however.

4. When setup prompts you to specify an additional device choose **S=Specify Additional Device**.
5. Insert the diskette with the 176479-B21 (DS-KGPSA-CB) FC-HBA driver and press the <Enter> key.
6. A list of devices will be displayed. One will be your 176479-B21 (DS-KGPSA-CB) adapter.
7. Choose this adapter and press the <Enter> key to continue if your adapter is in this list.
8. You will then be returned to the *Specify Additional Device Screen*.

If you don't see the 176479-B21 (DS-KGPSA-CB) adapter in the list, recheck the Compaq HSG80 RA8000 Setup, Hub Setup, Switch Setup, FC-HBA Setup, or Server Setup section(s).

9. Press the <Enter> key to continue with the standard Windows NT or Windows 2000 setup.

Using Secure Path to finish the adapter setup

1. When Windows is finished installing, and your basic configurations are made, you need to install the Fibre Channel Software Setup from Compaq's StorageWorks Platform Kit.
2. Reboot the machine.
3. Install Secure Path and setup the agent and client. See the Secure Path documentation about installing and configuring Secure Path.
4. Reboot the machine
5. Open Secure Path, create a profile, save it, and login.
6. After logging into Secure Path, use the CLI to add the second connections from the FC-HBA to the Boot LUN.

```
HSG> set dl enable_access_path=...
```

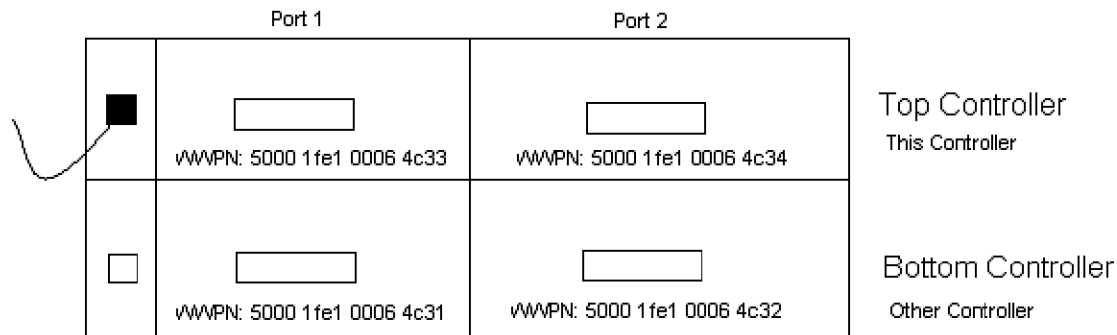
...enter the names of connections that are associated with the same controller to which the LUN is online. There should be two connections entered at this time.

7. Right-click **My Computer**, then left-click **Manage**, then left-click **Disk Management**. Select **Actions** in the menu and then select **Rescan Disks** in the drop-down menu.
8. Return to Secure Path and press the <F5> key to refresh. The new connections will now be shown on the LUN.
9. Right-click the LUN and move to the other controller.
10. Reboot the system.
11. While the server is booting, watch for this message: *Press <Alt E> To Go To EMULEX BIOS Utility*. Press the <Alt E> key.
12. A screen will appear prompting you to Enter a Selection.
 - o Choose the first adapter.
 - o Choose Configure Boot Devices.
 - o Choose 2 as the Secondary Boot.

Note: If your RA8000/ESA12000 is configured to operate in SCSI-3 mode, the Command Console is displayed as LUN 0. If you are configured to operate in SCSI-2 mode, you will now see the connection you just created.

- o You will be asked to Select the Desired Boot Device. Choose the line number that has the WWPN of the controller port the LUN is online to. (See the diagram below.)
- o You will be asked to enter a boot device via **Select the Desired Boot Device**. Choose the entry that is next to **LUN:xx**. This establishes the starting LUN number the FC-HBA will use to look for a bootable disk. Your actual boot LUN should be this one or higher.

- o The next screen will show you a list of all boot devices that connection has. Choose the line number that contains the LUN number from which you wish to boot.
 - o A box will prompt you to Boot the Device with two options. Choose **Boot this device via WWPN**.
 - o You will be returned to the *List of Saved Boot Devices* screen. Page up three times to return to the main menu.
13. Repeat the preceding step for the second adapter.
 14. Reboot the system and open Secure Path. You will now see four connections under the LUN.



The controller ports are each given a WWPN. The WWPN should be identical for all ports except for the last number. This is how to distinguish from which controller port you are booting. The Top Controller is considered "this controller" because of the serial line connection. If the LUN is online to "this controller", then you must choose the line with WWPN from this controller for booting.

Remaining adapters

1. The two remaining FC-HBA's can now be connected to the switches or hubs. No BIOS changes need to be made.
 - o One FC-HBA must be connected to the top switch or hub and the other FC-HBA to the bottom switch or hub.
 - o Using CLI, rename the new connections and create LUNs to use with these connections.

Note: You will need to repeat the *Booting Secure Path Configurations* setup steps for the other server before you begin with the Cluster Installation.

Cluster Setup Steps

1. Using CLI, create a new LUN to be used with the clustering service.
 - o For example, you can type the following.

```
HSG> initialize disk30100
HSG> add unit D5 disk30100 disable_access_path = all
HSG> show connections
HSG> Set D5 enable_access_path = (all non-booting connection names)
```

 - o There should be eight connections, four from each server.
2. Reboot the server.
3. Install clustering service. (Refer to Microsoft documentation on cluster installation.)