

Deploy Hitachi Unified Compute Platform Select for Oracle Database using Oracle 11g Release 2 Enterprise Edition

Implementation Guide

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Feedback

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Deploy Hitachi Unified Compute Platform Select for Oracle Database using Oracle 11g Release 2 Enterprise Edition

Implementation Guide

This implementation guide gives you instruction on how to deploy Hitachi Unified Compute Platform Select for Oracle® Database. You have the option of whether to use PCI flash acceleration in your deployment. Using servers and storage from Hitachi, this seamless solution is for Oracle Database 11g Release 2.

A description of the architecture in this paper is in [Deploying Hitachi Unified Compute Platform Select for Oracle Database -11g Release 2 Enterprise Edition Reference Architecture](#).

To benefit from this implementation guide, you need to be a database administrator, storage administrator, or have the responsibility to plan and deploy an Oracle Database 11g Release 2 solution. You need familiarity with the following:

- Hitachi Unified Storage
 - Hitachi Compute Blade 2000
 - Storage area networks
 - Oracle Database 11g Release 2
 - Oracle Automatic Storage Management
 - Fusion-io ioDrive flash storage cards
-

Tested Solution Components

Figure 1 shows the infrastructure without PCIe flash acceleration.

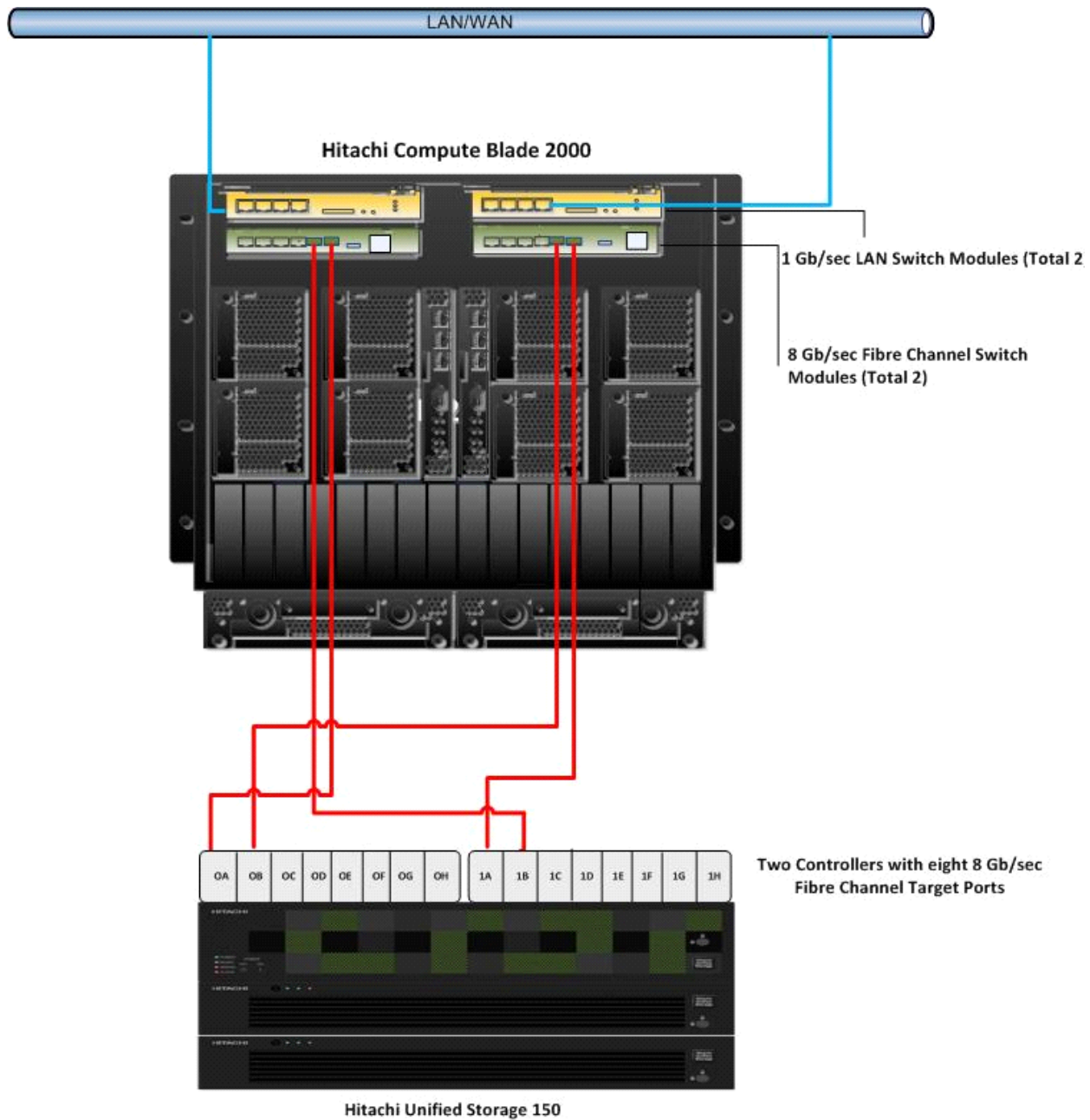


Figure 1

Figure 2 shows the infrastructure using PCIe flash acceleration.

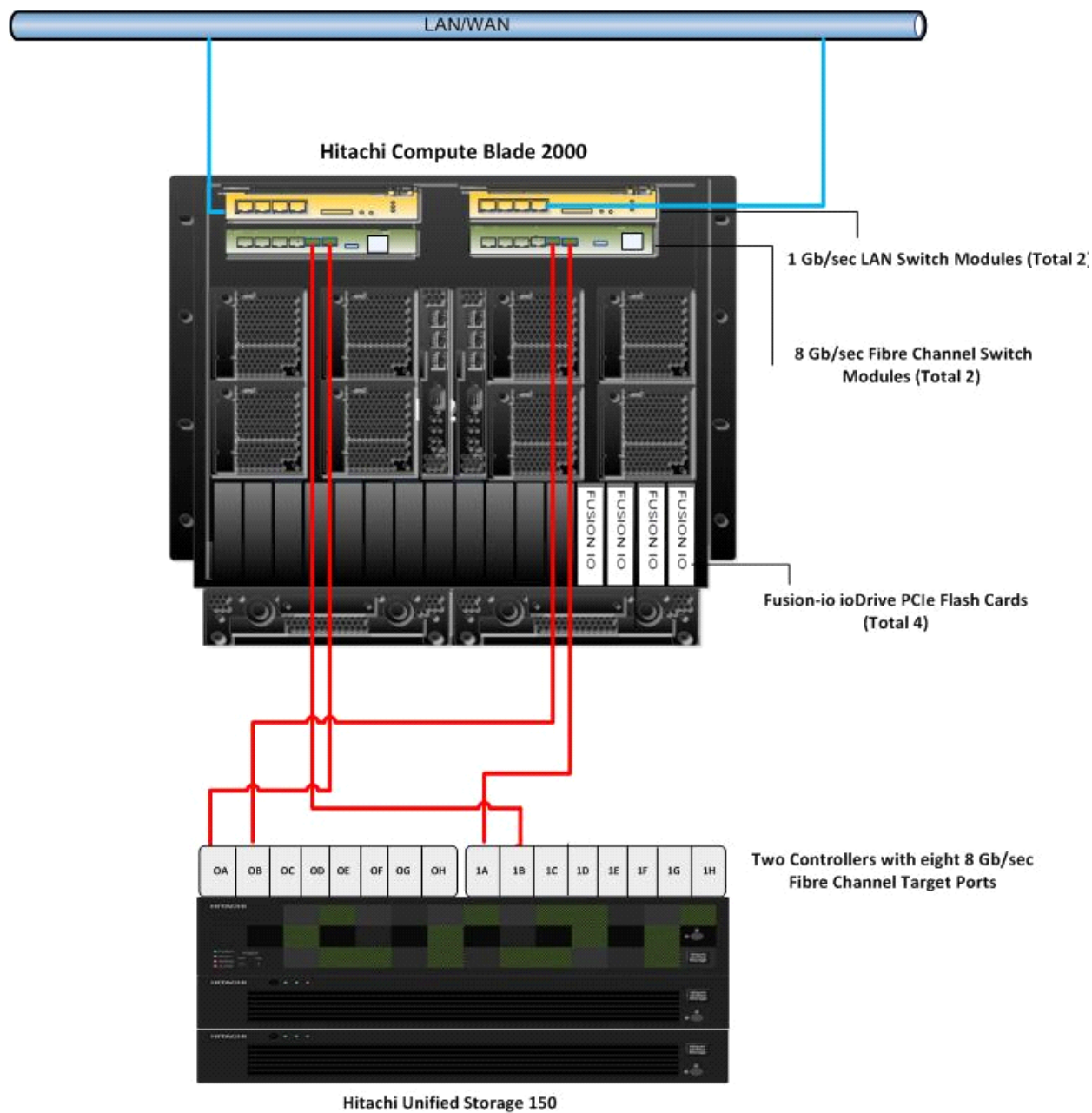


Figure 2

Table 1 lists the hardware components used in this implementation guide.

Table 1. Solution Hardware Components

<i>Component</i>	<i>Description</i>	<i>Version</i>	<i>Quantity</i>
Server Chassis	Hitachi Compute Blade 2000	Firmware Version A0195-C-6443	1
Server Blades	<p>Model GVAX57A1 (X57-A1), each configured as follows:</p> <ul style="list-style-type: none"> ▪ Intel Xeon X7560 at 2.26 GHz, two 8-core physical processors ▪ 96 GB RAM using 4 GB DIMMs ▪ One dual port Fibre Channel card (Mezzanine Slot 0) ▪ Two 1 Gb/sec Ethernet NICs ▪ (Used only with architecture using PCIe flash card) Two Fusion-io ioDrive 320 GB MLC, version 5.0.7, Revision 101971, in PCIe expansion Slot 0 and PCIe expansion Slot 1 <p>See note at bottom of table.</p>	EFI BIOS Version 4.6.3.7	2
Storage System	<p>Hitachi Unified Storage 150, configured as follows:</p> <ul style="list-style-type: none"> ▪ 96 x 600 GB SAS 10k RPM drives in 4 trays, each tray with 24 disks, for about 56 TB raw capacity ▪ 2 x 8 host port Fibre Channel controllers ▪ 32 GB cache (16 GB per controller) ▪ Two front-end ports on each controller connect to the Hitachi Compute Blade 2000. 	0910TB5H	1
SAN Connectivity	<ul style="list-style-type: none"> ▪ 6 port, 8 Gb/sec Fibre Channel switch modules 	V 642b	2

Table 1. Solution Hardware Components (Continued)

<i>Component</i>	<i>Description</i>	<i>Version</i>	<i>Quantity</i>
LAN Connectivity	<ul style="list-style-type: none"> ■ GigE L3 LAN switch modules <ul style="list-style-type: none"> ■ 16 Internal GigE ports ■ 4 External GigE ports 	10.7.F	2
Symmetric Multiprocessing (SMP)	<ul style="list-style-type: none"> ■ SMP connector creates one server from two GVAX57A1 server blades 	N/A	1

Note — This implementation guide uses X57-A1 (GVAX57A1) server blades with 4 GB DIMMs. You may upgrade to X57-A2 server blades using Intel Xeon Processor E7-8870. In addition, you may upgrade the 4 GB DIMMs to 8 GB DIMMs

Table 2 lists the software components used in this implementation guide.

Table 2. Solution Software Components

<i>Component</i>	<i>Description</i>	<i>Version</i>
Operating System	Oracle Enterprise Linux	5 Update 5 Red Hat compatible kernel
TELNET Client	PuTTY	0.60
Database Software	Oracle	11g Release 2, 11.2.0.1.0
Storage Management Software	Hitachi Command Suite	7.1.1
	Hitachi Storage Navigator Modular 2	21.10
	Hitachi Dynamic Link Manager Advanced	6.6.2-01
	Hitachi Dynamic Provisioning	Microcode dependent

Note — This implementation guide uses Oracle Linux version 5, Update 5, and Oracle Database 11g Release 2. Instead of using Oracle Linux version 5, Update 5, you can use Red Hat Linux Version 5 or later. If you are using PCI flash acceleration, you must use Oracle Database 11g or later. If you are not using PCI flash acceleration, you can use Oracle Database 9i or later.

Hitachi Unified Storage 150

[Hitachi Unified Storage](#) is a midrange storage platform for all data. It helps businesses meet their service level agreements for availability, performance, and data protection.

The performance provided by Hitachi Unified Storage is reliable, scalable, and available for block and file data. Unified Storage is simple to manage, optimized for critical business applications, and efficient.

Using Unified Storage requires a smaller capital investment. Deploy this storage, which grows to meet expanding requirements and service level agreements, for critical business applications. Simplify your operations with integrated set-up and management for a quicker time to value.

Unified Storage enables extensive cost savings through file and block consolidation. Build a cloud infrastructure at your own pace to deliver your services.

Hitachi Unified Storage 150 provides a reliable, flexible, scalable, and cost-effective modular storage. Its symmetric active-active controllers provide input-output load balancing that is integrated, automated, and hardware-based.

Both controllers in Unified Storage 150 dynamically and automatically assign the access paths from the controller to a logical unit (LU). All LUs are accessible, regardless of the physical port or the server that requests access.

Hitachi Compute Blade 2000

[Hitachi Compute Blade 2000](#) is an enterprise-class blade server platform. It features the following:

- Balanced system architecture that eliminates bottlenecks in performance and throughput
- Configuration flexibility
- Eco-friendly power-saving capabilities
- Fast server failure recovery using a N+1 cold standby design that allows replacing failed servers within minutes

Virtualization on Hitachi Compute Blade 2000 consolidates application and database servers for backbone systems. Removing performance and I/O bottlenecks opens opportunities for increasing efficiency and utilization rates. In addition, it reduces the administrative burden in your data center.

Hitachi Command Suite

[Hitachi Command Suite](#) manages virtualized storage and server infrastructures. With new levels of usability, workflow, performance, scalability, and private cloud enablement, Hitachi Command Suite lets you build sustainable infrastructures with leading storage technologies. It helps you flexibly align with changing business requirements and maximize return on IT investments.

In this solution, Hitachi Command Suite creates LDEVs and dynamic provisioning pools. It assigns the newly created LDEVs to host groups.

Hitachi Storage Navigator Modular 2

[Hitachi Storage Navigator Modular 2](#) provides essential management and optimization of storage system functions. Using Java agents, Storage Navigator Modular 2 runs on most browsers. A command line interface is available.

Use Storage Navigator Modular 2 for the following:

- RAID-level configurations
- LUN creation and expansion
- Online microcode updates and other system maintenance functions
- Performance metrics

Hitachi Dynamic Link Manager Advanced

[Hitachi Dynamic Link Manager Advanced](#) combines all the capabilities of Hitachi Dynamic Link Manager and Hitachi Global Link Manager into a comprehensive multipathing solution. It includes capabilities such as the following:

- Path failover and failback
- Automatic load balancing to provide higher data availability and accessibility

Hitachi Dynamic Provisioning

On Hitachi storage systems, [Hitachi Dynamic Provisioning](#) provides wide striping and thin provisioning functionalities.

Using Hitachi Dynamic Provisioning is like using a host-based logical volume manager (LVM), but without incurring host processing overhead. It provides one or more wide-striping pools across many RAID groups. Each pool has one or more dynamic provisioning virtual volumes (DP-VOLs) of a logical size you specify of up to 60 TB created against it without allocating any physical space initially.

Deploying Hitachi Dynamic Provisioning avoids the routine issue of hot spots that occur on logical devices (LDEVs). These occur within individual RAID groups when the host workload exceeds the IOPS or throughput capacity of that RAID group. Dynamic provisioning distributes the host workload across many RAID groups, which provides a smoothing effect that dramatically reduces hot spots.

When used with [Hitachi Unified Storage](#), Hitachi Dynamic Provisioning has the benefit of thin provisioning. Physical space assignment from the pool to the dynamic provisioning volume happens as needed using 1 GB chunks, up to the logical size specified for each dynamic provisioning volume. There can be a dynamic expansion or reduction of pool capacity without disruption or downtime. You can rebalance an expanded pool across the current and newly added RAID groups for an even striping of the data and the workload.

PuTTY

Use [PuTTY](#) for the TELNET protocol when performing configuration tasks in this implementation guide. It is a free implementation of TELNET and Secure Shell (SSH) for Windows and UNIX platforms.

Oracle Database 11g Release 2

[Oracle Database 11g Release 2](#) has Oracle Database Automatic Storage Management (ASM). It combines the features of a volume manager and an application-optimized general-purpose file system. It is optimized for use with Oracle products. ASM is part of the grid infrastructure component in Oracle Database 11g Release 2.

Oracle Linux 5 Operating System

[Oracle Linux 5](#) is an enterprise-class operating system. It is fully compatible with the Red Hat Enterprise Linux kernel. Oracle Linux was built and tested to run Oracle hardware, databases, and middleware.

Fusion-io ioDrive PCIe Flash Card

When using PCIe flash acceleration, Hitachi Unified Compute Platform Select for Oracle Database uses the [Fusion-io ioDrive PCIe flash storage card](#). This solution uses four 320 GB Fusion-io PCI Express PCIe flash cards. These high-performance block devices accelerate Oracle database input and output performance. The PCIe flash card has very low access latency with very high IOPS.

Solution Implementation

The following are the processes used to deploy the Hitachi Unified Compute Platform Select for Oracle, using Oracle database 11g Release 2 on Hitachi Unified Storage 150 and Hitachi Compute Blade 2000.

- Preparation
- Configure Hitachi Compute Blade 2000
- Configure SMP Connection
- Configure LAN Switch Modules
- Configure the Storage System
- Configure Storage for Oracle Database Server
- Set Up SAN Operating System Boot
- Install Oracle Enterprise Linux 5U5 on Oracle Database Server
- Install and Configure Hitachi Dynamic Link Manager Advanced
- Install and Configure Fusion-io ioDrive PCIe Flash Card Acceleration (only when using PCIe flash acceleration)
- Install Oracle Database 11g Release 2 Automatic Storage Management
- Configure Oracle Database 11g Release 2 Automatic Storage Management
- Install Oracle Database 11g Release 2
- Create Oracle Database

Some of these processes require that you use the following Hitachi Compute Blade 2000 interfaces:

- **Management module web GUI**—Manages the entire chassis using a web-based GUI. Open a web browser and enter the IP address of the management module.
- **Blade server web GUI**—Manages a server blade using a web-based GUI. Open a web browser and enter the IP address of a server blade.
- **Blade server command-line interface**—Configure SMP using a command-line interface. Use PuTTY to open a TELNET session to the IP address of a server blade.
- **Oracle ILOM Remote Console**—Remote kernel-based [virtual machine for a server blade](#). Open a blade server web GUI and, when the logon window displays, click **Launch Remote Console**.

For more information, see the following documentation:

- Hitachi Storage Navigator Modular 2 online help
-

- Hitachi Dynamic Provisioning user guide
- Hitachi Dynamic Link Manager Advanced user guide
- Hitachi Compute Blade 2000 user guide
- Oracle 11g Release 2 database installation guide
- Fusio-io ioDrive knowledge base

Preparation

Prepare the following before implementing this solution:

- Verify that you have the following items:
 - USB DVD drive (comes with Hitachi Compute Blade 2000)
 - Microsoft® Windows® 2008 installation DVD or ISO image
 - Driver kit version 12-01 CD or ISO image [includes driver for mezzanine Emulex Host Bus Adapter (HBA)]
 - Seven IP addresses:
 - **Management module**—2
 - **Server blades**—2
 - **Blade management console (BMC)**—2
 - **Operating system**—1
 - Four IP addresses in environments where these items are not already in place and connected:
 - Two for the storage systems
 - Two for the Fibre Channel switches
- Make the following LAN connections:
 - Connect one network cable from each network switch module to your corporate LAN. Do not use the first network switch module port because it is reserved for system settings.
 - Connect one cable from each management module to your corporate management LAN.

Configure Hitachi Compute Blade 2000

These procedures to configure Hitachi Compute Blade 2000 assume that the following has happened:

- Racking of the blade chassis
-

- Installation of the server blades into the chassis
- Completion of all cabling (LAN and SAN)

Configure Required Management IP Addresses

To configure the IP addresses for the management module and the server blades using the management module web GUI, do the following.

1. Connect a system console (laptop or PC) to the MGMT0 port of the management module with an Ethernet cable.

If you have two management modules installed, connect to the management module with the solid green MSR LED lamp, as shown in Figure 3.

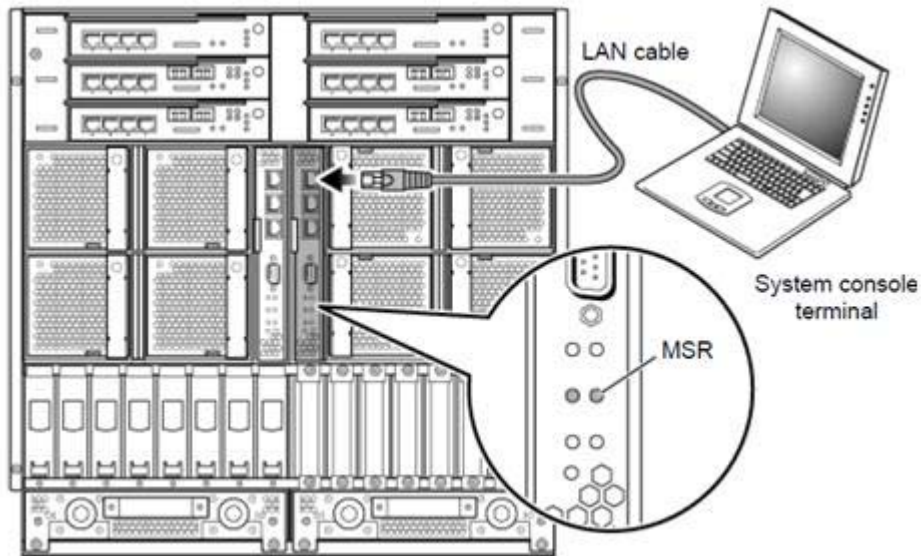


Figure 3

2. Open a browser and type `http://192.168.0.1/` in the address bar.
A logon screen displays.

3. Log on using these defaults:

User name: administrator

Password: password

The management module web GUI launches.

4. Open the **Management LAN network** window
 - (1) **Click** the **Settings** tab.
 - (2) In the navigation tree on the left, click **The configuration of network** link.
5. Configure the management LAN network.

(1) Click **Edit**.

The fields become editable.

(2) Configure the management LAN network by typing the following for the management module and each partition:

- IP address
- Subnet mask
- Default gateway

You need a different IP address for the management module and each partition (server blade).

(3) To save the settings, click **Confirm**, and then click **Apply** button.

6. Disconnect the Ethernet cable from the management module.
7. Connect an Ethernet cable from the management module to an external management LAN switch.
 - This allows you to perform management through any system console in the management LAN.

Configure SMP Connection

Before configuring SMP between the two blades, make sure that the two blades are connected using an SMP connector.

Complete the following procedures for configuring the SMP connection between the two blades.

To configure SMP for the two blades, do the following:

1. Open a PuTTY session, using the following information.
 - **IP address**—192. 168. 0. 1
 - **Connection type**—Tel net
 - **User name**—admi ni strator
 - **Password**—password
 2. To enter system command mode, type the following: S
 3. To change the physical partition setting, type the following;
 - (1) PR (physical partition setting)
 - (2) C (edit partition configuration)
 - (3) 0 (lowest number partition)
-

- (4) 2 (number of blades in the SMP configuration)
 - (5) Y (confirm the deletion of Partition1)
4. To save the physical partition settings, type the following:
- (1) W (write configuration)
 - (2) Y (confirm)

The configuration displays in the PuTTY session as in Figure 4.

```

172.17.170.150 - PuTTY
C. Edit partition configuration.
Q. Quit.
(S,P,R,C,[Q]) : C

-- Partition configuration --
                Server blade
P Power        0 1 2 3 4 5 6 7
-----
                S=S - - - - -
-----
0 On           X X - - - - -
1 -----
2 -----
3 -----
4 -----
5 -----
6 -----
7 -----

-- Edit partition configuration. --
C. Configure partition.
W. Write configuration.
Q. Quit.
(C,W,[Q]) :

```

Figure 4

Configure LAN Switch Modules

Table 3 has the default IP address for the switch modules.

Table 3. LAN Switch Module Settings

<i>Item</i>	<i>Default Setting</i>
Switch module 0	192.168.0.28
Switch module 1	192.168.0.29
Subnet Mask	255.255.255.0

The command line interface for the system supports two command input modes:

- Operation command mode
- Configuration command mode

Configuration of the LAN switch modules requires the use of both command input modes. Table 4 describes features of command input modes and details on how to access and exit command input modes.

Table 4. Command Input Modes

<i>Command Input Mode</i>	<i>User Level</i>	<i>Accessed by</i>	<i>Prompt</i>	<i>Exited by</i>	<i>Commands You Can Use</i>
Operation command	General user	Login: <user-ID>	>	>logout	Some operation commands
	System administrator	>enable	#	# disable	All operation commands
Configuration command	System administrator	# configure	(config)#	(config)# exit	All configuration commands

By default, the configuration of Switch 0 Port 1 is for dedicated VLAN management. It cannot communicate with a server blade and other external ports. If needed, reconfigure the other port to be Port 1.

Use a public network for the initial configuration.

To configure the LAN switch modules, do the following.

1. Connect the management PC to Switch 0 Port 1 with a LAN cable.
2. Connect to the default switch IP with TELNET, 192.168.0.28, using these defaults:

User name—admini strator

Password—password

3. Enter configuration mode in the TELNET session.
 - (1) To enter the switch module, type the following: SW
 - (2) To Select the switch module, type the following to select Module 0: 0
 - (3) To confirm Module 0, type the following: Y
 - (4) To log on, type the following: operator
A password is not required.
 - (5) To change to administrator mode, type the following: enabl e
 - (6) To display the current “running configuration” of the switch module, type the following: show run

Every VLAN, switch port, and VLAN port displays.

(7) To enter configuration mode, type the following: `confi g`

The cursor changes to this: `(confi g)#`

4. Create and name VLAN 100.

(1) To create VLAN 100, type the following: `vl an 100`

(2) To assign a name to VLAN 100, type the following: `test vl an`

5. Save the configuration changes.

(1) To change back to config mode, type the following: `exi t`

(2) To write the changes to the configuration, type the following: `save`

Repeat this procedure to configure LAN Switch Module 1.

Configure the Storage System

To install and configure Hitachi Storage Navigator Modular 2, do the following.

1. Connect the management PC to LAN Port 1 on the storage system with a LAN cable.
2. Use PuTTY to connect to a controller IP address.

The default management IP address for each controller is the following:

- **Controller 0**—172.17.46.142
- **Controller 1**—172.17.46.143

3. Power the controller on.

- Remove the front bezel panel to power the controller unit on.

4. Install Storage Navigator Modular 2.

(1) On the management laptop, insert the CD with the software.

(2) Follow the installation wizard to complete the install.

- Leave the default port as 23015

(3) Click **Finish** to close the wizard.

(4) Open a web browser and type the following in the address bar:

`http://127.0.0.1:23015/StorageNavigatorModular/Logi n`

(5) Use the following default user credentials to log on to Storage Navigator Modular 2:

User ID—system

Password—manager

5. Add the storage system to Storage Navigator Modular 2.
 - (1) On the **SNM2 Explorer** pane, click **Add Array** to add new managed storage.
 - (2) Type the following IP addresses for the storage system's IP addresses:
 - **Controller 0**—172.17.46.142
 - **Controller 1**—172.17.46.143
 - (3) Leave "Using Ports" as a non-secure port.
 - (4) Click **Next**.
 - (5) Click **Finish** to close the wizard.
 6. Perform the storage system initial setup.
 - (1) On the **Common Array Tasks** screen, click **Initial Setup**.
 - (2) Click **Next**.
 - (3) Leave **E-mail Alert** clear (unselected) and then click **Next**.
 - (4) Make the IP address settings.
 - i. Click the following for the **Protocol: IPv4**
 - ii. Click the following for **Network Information: Set Manually**
 - iii. Type the following for the controller **IP Address**: 172. 17. 46. 142 (Controller 0) and 172. 17. 46. 143 (Controller 1)
 - iv. Type the following as the **Subnet** for both controllers: 255.255.255.0
 - v. Type the following for the default **Gateway** for both controllers: 172.17.0.1
 - (5) On the **Set up Host Ports** page, only configure Fibre Channel Ports 0A, 1A, 0B, 1B.
 - Click the following for the **Transfer Rate: 8Gbps**
 - Click the following for the **Topology: Point-to-Point**
 - Click **Next**.Leave the other Fibre Channel ports with the default values.
 - (6) On the **Setup Spare Drive** page, select two drives to use as a spare, and then click **Next**.
 - (7) On the **Setup Date and Time** page, click **Set Manually**, type the correct date and time, and then click **Next**.
 - (8) Verify all the settings are correct and then click **Confirm** to finish the initial setup.
-

Configure the Storage Area Network

Port 0A, 1A, 0B, and 1B on Hitachi Unified Storage 150 are used for unified platform, with and without PCIe flash acceleration. Use Hitachi Dynamic Link Manager Advanced for multipathing with the extended least I/O load-balancing algorithm.

The following sections describe how to configure the SAN for this solution.

Zone SAN Switches

The Oracle database server has four Fibre Channel ports, with two ports from the mezzanine card on each server blade. These mezzanine cards connect internally to the Fibre Channel switch modules located in the Hitachi Compute Blade 2000 chassis.

Connect two ports from each of the two internal Fibre Channel switch modules to the four ports on the Hitachi Unified Storage 150 storage system as shown in Figure 1 and Figure 2. This provides a four-path connection.

Configure each connection with zones on fabric switches to provide four zones for the Oracle database server.

In addition, follow these recommended practices:

- Use World Wide Port Name (WWPN) identification for all zoning configuration.
- Connect a minimum of two HBAs per server for multipath high availability.
- Disable all unused switch ports to increase security.
- Configure ports for point-to-point topology.
- Set ports to a specific speed. Do not use the auto negotiate setting.
- Use single initiator zoning.

To configure zoning for the SAN switches, do the following.

1. Create aliases for ports.
2. Create zones.
3. Add members (aliases) to the zones.
4. Save the zones.
5. Enable the zones.

Your organization's guidelines for zoning might vary. Check with your IT department.

Table 5 has the zoning for this solution. Use the same zoning whether your implementation is with or without PCIe flash acceleration.

Table 5. Zoning for Unified Platform

<i>Server</i>	<i>HBA Ports</i>	<i>Switch Zone</i>	<i>Storage Port</i>	<i>Switch</i>
Database server	B0-HBA1-1	BS2K_13_B0_HBA1_1_ASE46_142_0A	0A	5300-05
	B0-HBA1-2	BS2K_13_B0_HBA1_2_ASE46_142_0B	0B	5300-06
	B1-HBA1-1	BS2K_13_B1_HBA1_1_ASE46_142_1A	1A	5300-05
	B1-HBA1-2	BS2K_13_B1_HBA1_2_ASE46_142_1B	1B	5300-06

Configure Storage for Oracle Database Server

These procedures to configure the storage assume you have installed all appropriate licenses on your storage system.

Configure Fibre Channel Port Settings

To configure your storage Fibre Channel ports using Hitachi Storage Navigator Modular 2 software, do the following.

- Log on to Storage Navigator Modular 2.
 - You must have **modify** privileges when using Storage Navigator Modular 2 software to complete this process.
- Click the **Array Name** link to open the Oracle database server environment storage system.
- Expand the **Settings** heading and click the **FC Settings** link.
- Check the **Topology** column to find the ports that are zoned to connect to the Oracle database server on the SAN.
- Click **Edit FC Port**.
- Click **Point-to-Point** from the **Topology** list and then click **OK**.

A message displays saying that the change will interrupt I/O to any currently-connected host to the port.

- Click **Confirm** and wait a few seconds for the change to take place.

After establishing the connection between the storage system and the host, the **FC Settings** window shows all ports in a **LinkUp(F_Port Connected)** status.

Create RAID Groups

This solution uses four RAID groups for O/S Boot, Oracle Online redo logs, and archived redo logs for this solution. Table 6 has the RAID group configuration.

Table 6. RAID Groups Assignment

<i>RAID Group</i>	<i>Purpose</i>	<i>RAID Level</i>	<i>Drive Type</i>	<i>Number of Drives</i>	<i>Capacity (GB)</i>
001	O/S Boot	RAID- 1 (1D+1D)	600 GB 10k RPM SAS	2	535.7
002	Oracle Online Redo Logs	RAID-10 (2D+2D)	600 GB 10k RPM SAS	4	1000
003	Oracle Online Redo Logs	RAID-10 (2D+2D)		4	1000
004	Oracle Archived Redo Logs	RAID-10 (2D+2D)		4	1000

To create a RAID group using Hitachi Storage Navigator Modular 2 software, do the following.

- Log on to Storage Navigator Modular 2.
 - You must have **modify** privileges when using Storage Navigator Modular 2 software to complete this process.
- Click the **Array Name** link to open the storage system.
- Expand the **Groups** heading in the storage system pane and then click the **Volumes** link.

The right pane displays three tabs: **Volumes**, **RAID Groups**, and **DP Pools**.

- Click the **RAID Groups** tab and then click **Create RG**.

The **Create Raid Group** window opens.

- Use Table 6 to configure the **RAID Level** and **Combination** for each RAID group in the **Create Raid Group** window.

The **Number of Parity Groups** changes based on your RAID level and combination choices.

- Click the **Automatic Selection** option.
 - If you have different types of drives installed in the storage system (either type or capacity), click the **Drive Type** value and **Drive Capacity** value from each list.

Using automatic selection is the recommended practice from Hitachi Data Systems.

Storage Navigator Modular 2 uses the next available drives of the type and capacity clicked.

- Click **OK**.

A message says that there is the successful creation of the RAID group.

- Click **Close**.

The formatting process to create the RAID group starts immediately in the background.

Use this process for all RAID groups in your solution.

Create Dynamic Provisioning Pools

This solution uses one dynamic provisioning pool. Table 7 has its details.

Table 7. Hitachi Dynamic Provisioning Pool

<i>Dynamic Provisioning Pool ID</i>	<i>DP RAID Group</i>	<i>RAID Level</i>	<i>Drive Type</i>	<i>No of Drives</i>	<i>Pool Capacity</i>
001	005 - 014	RAID-10 (4D+4D)	600GB 10k RPM SAS	80	20.8 TB

This solution uses 80 drives. However, RAID-10 (4D+4P) only permits adding eight drives at a time to the dynamic provisioning pool. This requires that you do the following:

- Create the dynamic provisioning pool initially with eight drives.
- Add the remaining drives eight at a time until you have added all drives.

To create a dynamic provisioning pool using Hitachi Storage Navigator Modular 2 software, do the following.

- Log on to Storage Navigator Modular 2.
 - You must have **modify** privileges when using Storage Navigator Modular 2 software to complete this process.
- Click the **Array Name** link to open the storage system.
- Expand the **Groups** heading in the storage system pane and then click the **Volumes** link.

The right pane displays three tabs: **Volumes**, **RAID Groups**, and **DP Pools**.

- Click the **DP Pools** tab and then click **Create Pool**.

The **Create DP Pool** window opens.

- Click **RAID 1+0** from the **RAID Level** list and **4D+4D** from the **Combination** list.

The **Number of drives** automatically changes, based on your RAID level and combination choices.

When created, the dynamic provisioning pool consists of a single RAID group. After initially setting the RAID level and combination, all RAID groups added to the dynamic provisioning pool have the same settings.

6. Click the **Automatic Selection** option.
 - If you have different types of drives installed in the storage system (either type or capacity), click the **Drive Type** value and **Drive Capacity** value from each list.

Using automatic selection is the recommended practice from Hitachi Data Systems.

Storage Navigator Modular 2 uses the next available drives of the type and capacity clicked.

7. Click the **Advanced** tab, change settings based on your requirements, and then click **OK**.

A message says that there is successful creation of the dynamic provisioning pool.

8. Click **Close**.

The pool immediately starts the formatting process in the background of the initial eight drives.

9. Add the remaining drives.

Repeat until you have added all 80 drives to the dynamic provisioning pool

- (1) Click the **DP Pools** tab, select the check box for the pool, and then click the **Add Pool Capacity** button.
- (2) Click the **Automatic Selection** option and then click **OK**.

Enabling automatic selection means that Storage Navigator Modular 2 selects the next available drives of the type shown in the box.

Create Volumes

This procedure creates the 25 storage volumes used for the operating system and Oracle database server. All the storage volumes are mapped to the storage ports 0A, 1A, 0B, and 1B. Table 8, Table 9, and Table 10 have the details of the LUs. Use Table 9 or Table 10, based on whether your implementation uses PCIe flash acceleration.

Table 8. Operating System and Oracle Database Server Volume Information

<i>RAID Group</i>	<i>LUNs</i>	<i>LUN Size (GB)</i>	<i>Purpose</i>	<i>Storage Port</i>
001	0001	150	<ul style="list-style-type: none"> ▪ OS Boot 	<ul style="list-style-type: none"> ▪ 0A ▪ 1A ▪ 0B ▪ 1B
001	0002	250	<ul style="list-style-type: none"> ▪ Oracle software 	<ul style="list-style-type: none"> ▪ 0A ▪ 1A ▪ 0B ▪ 1B
002	0003	50	<ul style="list-style-type: none"> ▪ Oracle online redo logs 	<ul style="list-style-type: none"> ▪ 0A ▪ 1A ▪ 0B ▪ 1B
002	0004	50		<ul style="list-style-type: none"> ▪ 0A ▪ 1A ▪ 0B ▪ 1B
002	0005	50		<ul style="list-style-type: none"> ▪ 0A ▪ 1A ▪ 0B ▪ 1B
002	0006	50		<ul style="list-style-type: none"> ▪ Oracle control file

Table 8. Operating System and Oracle Database Server Volume Information (Continued)

<i>RAID Group</i>	<i>LUNs</i>	<i>LUN Size (GB)</i>	<i>Purpose</i>	<i>Storage Port</i>
003	0007	50	<ul style="list-style-type: none"> ▪ Oracle online redo logs 	<ul style="list-style-type: none"> ▪ 0A ▪ 1A ▪ 0B ▪ 1B
003	0008	50		<ul style="list-style-type: none"> ▪ 0A ▪ 1A ▪ 0B ▪ 1B
003	0009	50		<ul style="list-style-type: none"> ▪ 0A ▪ 1A ▪ 0B ▪ 1B
003	0010	50	<ul style="list-style-type: none"> ▪ Oracle control file 	<ul style="list-style-type: none"> ▪ 0A ▪ 1A ▪ 0B ▪ 1B
004	0011	300	<ul style="list-style-type: none"> ▪ Oracle archived redo logs 	<ul style="list-style-type: none"> ▪ 0A ▪ 1A ▪ 0B ▪ 1B
004	0012	300		<ul style="list-style-type: none"> ▪ 0A ▪ 1A ▪ 0B ▪ 1B
004	0013	300		<ul style="list-style-type: none"> ▪ 0A ▪ 1A ▪ 0B ▪ 1B

Table 9. Hitachi Dynamic Provisioning Pool Volume Information Without PCIe Acceleration

Dynamic Provisioning Pool ID	LUNs	LUN Size (GB)	Purpose	Storage Port
001	0014 - 0025	200	<ul style="list-style-type: none"> ■ Oracle System ■ Sysaux ■ Undo ■ Temp ■ OLTP application tablespaces 	<ul style="list-style-type: none"> ■ 0A ■ 1A ■ 0B ■ 1B

Table 10. Hitachi Dynamic Provisioning Pool Volume Information With PCIe Acceleration

Dynamic Provisioning Pool ID	LUNs	LUN Size (GB)	Purpose	Storage Port
001	0014 - 0020	200	<ul style="list-style-type: none"> ■ Oracle ASM Preferred Mirror Read ■ 2nd Failure Group to host application tablespace 	<ul style="list-style-type: none"> ■ 0A ■ 1A ■ 0B ■ 1B
	0021 - 0025	200	<ul style="list-style-type: none"> ■ Oracle System ■ Sysaux ■ Undo ■ Temp 	<ul style="list-style-type: none"> ■ 0A ■ 1A ■ 0B ■ 1B

To create volumes using Hitachi Storage Navigator Modular 2, follow these steps.

1. Log on to Storage Navigator Modular 2.
 - You must have **modify** privileges when using Storage Navigator Modular 2 software to complete this process.
2. Click the **Array Name** link to open the storage system.
3. Expand the **Groups** heading in the storage system pane and then click the **Volumes** link.
4. Click **Create VOL**.

The **Create Volume** window opens.

5. Create the volume.
 - (1) For **Type**, click either the **RAID Group** option or the **DP Pool** option.
 - (2) From the **RAID Group/DP Pool Number** list, click 001.
 - (3) In the **VOL** field, type the logical unit number from one of the tables.
 - (4) Type the LUN size from one of the tables in **Capacity**, and then click **GB** from the list.
 - (5) Do not select the **Accelerate Wide Striping Mode** check box.
 - (6) Click **OK**.

The **Create Volume** pane refreshes, populated with the new LUN information.

Repeat this process for every Oracle database server volume.

Set Up SAN Operating System Boot

SAN boot is the capability to boot the operating system from a volume on Hitachi Unified Storage 150 without using the internal disks of the server. The following describes how to set up the SAN operating system boot.

Register Boot Device

To configure HBAs on the Oracle database server using [Oracle Integrated Lights Out Manager Remote Console](#), do the following:

1. Open a browser and type the server blade IP address in the address bar.

A logon screen opens.
 2. Click **Launch Remote Console** and log on to Remote Console.
 - The default User ID is **user01** and the default password is **pass01**.Remote Console launches.
 3. Enter the system BIOS.
 - (1) From the **Keyboard** menu, click **Ctrl+Alt+Del** to start the system.
 - (2) When "Press <Alt+E> or <Ctrl+E> enter Emulex BIOS configuration Utility" displays during system startup, press Ctrl+E.
-

4. Change a BIOS setting.
 - (1) Type the number shown on the LightPulse BIOS Utility screen for the BIOS to be changed.
 - (2) Select **Configure Boot Devices**.
 - (3) Type the boot entry number to register the boot device and then press Enter.

A list of boot devices appears.
 - (4) Type the 2-digit number of the boot device to register and then press Enter.
 - (5) Type the 2-digit number (in hexadecimal) of the LUN of the boot device to register and then press Enter.

The volumes display in the ascending order of LUNs, starting with volume of the boot device to register.
 - (6) Type 01 and then press Enter.
5. Check the registration of the boot device.
 - (1) Type 1 and then press Enter to boot the device.

A screen with a list of saved boot devices displays.
 - (2) Verify device registration in the boot entry.
6. Reboot so change takes effect.
 - (1) To terminate the BIOS utility, type x.
 - (2) To reboot, press Y.

Mount the Oracle Enterprise Linux 5U5 ISO Image From a Remote CD/DVD Image

To perform this procedure, you need the Remote Console session from "Register Boot Device."

To mount the Oracle Enterprise Linux 5U5 ISO image from a Remote CD/DVD Image, do the following steps.

1. From the **Remote CD/DVD** menu, click **Redirect CD/DVD Image**.
2. From the **Keyboard** menu, click **Ctrl+Alt+Del** to start the system.
3. When "Press or <F2> to enter setup" displays during system startup, press F2.

The Extensible Firmware Interface (EFI) setup screen opens.

4. From the EFI menu, select **Boot**.
5. From the Boot Option Priorities area, select the boot device **HITACHI Remote CD/DVD** for **Boot Option #1**.
6. From the EFI menu, select **Save & Exit**, and then **Save Changes**.

Install Oracle Enterprise Linux 5U5 on Oracle Database Server

This procedure assumes that the configuration of the Oracle database server is to boot the operating system from an ISO image on a remote CD/DVD image. See "Mount the Oracle Enterprise Linux 5U5 ISO Image From a Remote CD/DVD Image."

The Oracle database server starts with a splash screen for Oracle Enterprise Linux. The bottom of the screen lists instructions, function keys, and the boot prompt.

To install Oracle Enterprise Linux 5U5 on Oracle database server, do the following.

1. Boot Hitachi Compute Blade 2000.
 2. Display the installation instructions.
 - On the Oracle Enterprise Linux splash screen, at the **boot** prompt, type the following:

```
l i n u x   t e x t
```
 3. Follow the on-screen instructions to complete the installation.
 4. Change to boot the Compute Blade 2000 server from the Hitachi Unified Storage 150 storage system.
 - (1) Reboot the system.
 - (2) When "Press or <F2> to enter setup" displays during system startup, press F2.
 - (3) From the Boot Option Priorities area, select Hitachi Unified Storage 150 for **Boot Option #1**.
 - (4) From the EFI menu, select **Save & Exit**, and then **Save Changes**.
-

Install and Configure Hitachi Dynamic Link Manager Advanced

This solution uses the extended least I/O load-balancing algorithm. Your choice of load-balancing algorithm depends on the specific environment and access patterns of the application. In some environments, such as an environment shared with other applications, one of the other algorithms might give the best overall performance.

To install Hitachi Dynamic Link Manager Advanced on the Oracle database server, do the following:

1. Log on to the Oracle database server as the root user.
 2. Prepare the license key. Use either of the following methods to store the license key file in the specified directories:
 - Store the license key file (*.plk) in the /var/tmp directory, under the name hdl_m_license.


```
/var/tmp/hdl_m_license
```
 - Execute the following commands to create the license key file (dlm_license_key) in the /etc/opt/DynamicLinkManager directory.


```
# mkdir /etc/opt/DynamicLinkManager
# echo "license-key" >/etc/opt/DynamicLinkManager/dlm_license_key
```
 3. Insert the installation media, such as a CD-ROM, for Hitachi Dynamic Link Manager Advanced into the I/O device.
 4. Check the version of Dynamic Link Manager Advanced.
 - Execute installux.sh using the "v" switch.

How to execute the command when the mount point for the DVD-ROM is /media/cdrom:

```
#/media/cdrom/installux.sh -v
```

Use this information to verify what version is being installed.
 5. Install Dynamic Link Manager Advanced.
 - Execute installux.sh.

How to execute the command when the mount point for the DVD-ROM is /media/cdrom:

```
#/media/cdrom/installux.sh
```

A message displays to confirm that you want to perform a new installation.
 6. If the Dynamic Link Manager Advanced version is correct, type y.
-

7. Verify that installation of Dynamic Link Manager Advanced.

- Execute the following command to display detailed information about the installed package.

```
rpm -qi HDLM
```

8. Simplify the execution of Dynamic Link Manager Advanced commands and utilities easier by adding `/opt/DynamicLinkManager/bin` to the environment variable `PATH` in the environment setup file of the root user.

- When using the Bourne shell or Korn shell:

```
PATH=$PATH: /opt/DynamicLinkManager/bin ; export PATH
```

- When using the C shell:

```
set path= ( $path /opt/DynamicLinkManager/bin )
```

9. Restart the Oracle database server.

Execute the following command to restart the host:

```
# shutdown -r now
```

10. Check the settings, status, and path configuration of Dynamic Link Manager Advanced.

- (1) To check the settings and status, execute the following command:

```
dl nkmgr view -sys
```

- (2) To check the path configuration, execute the following command:

```
# /opt/DynamicLinkManager/bin/dl nkmgr view -path
```

There should be four paths for each LUN.

Install and Configure Fusion-io ioDrive PCIe Flash Card Acceleration

Note—Using Fusion-io ioDrive PCIe flash card acceleration in your installation is optional.

When using flash acceleration, Hitachi Unified Compute Platform Select for Oracle Database uses four 320 GB Fusion-io PCI Express PCIe flash cards.

Install Fusion-io ioDrives

To Install Fusion-io ioDrives in the Oracle database server, do the following.

1. Shut the Oracle database server down.
2. Log on to the server blade with Remote Console, using the IP address and default user credentials.
 - Click **Launch Remote Console**.
3. Power the server blades off.
 - From the **Power and Reset** menu, click **Forced Power Off**.
4. Install the Fusion-io ioDrive storage devices in the PCIe expansion Slot 0 and PCIe expansion Slot 1 for each server blade.
 - This solution uses two server blades and four Fusion-io ioDrives.
5. Power on the server blades.
 - From the **Power and Reset** menu, click **Power On**.

Configure Fusion-io ioDrives

You need an account on the [Fusion-io Dashboard](#) to complete this process.

To configure Fusion-io ioDrive storage devices, do the following.

1. Download the driver for the Fusion-io ioDrive from the Fusion-io Dashboard.
2. Follow the instructions in the knowledge base on the Fusion-io Dashboard to configure the driver.
3. Check the status of the Fusion-io ioDrives by typing the following command:

```
chkconfig --list iomemory-vsl  
fi o-status -a
```

4. Check the path of the Fusion-io ioDrives by typing the following command:

```
ls -l /dev/fct*
```

5. In case the Fusion-io ioDrives are not attached, including after the reboot of the Oracle database server, attach the drives by typing the following command:

```
fi o-attach /dev/[drive number]
```

For example, for drive /dev/fct0, type the following:

```
fi o-attach /dev/fct0
```

Repeat this command for each Fusion-io ioDrive:

- /dev/fct0
- /dev/fct1
- /dev/fct2
- /dev/fct3

After configuration, an ioDrive re-labels as a block device (/dev/fcta, /dev/fctb, /dev/fctc, and /dev/fctd).

Install Oracle Database 11g Release 2 Automatic Storage Management

Installing Oracle Grid Infrastructure successfully creates an instance of Oracle Database 11g Release 2 Automatic Storage Management (ASM). To install Oracle Grid Infrastructure Software, follow the steps in [Oracle Database 11g Release 2 Installation Guide](#).

Configure Oracle Database 11g Release 2 Automatic Storage Management

Use "Without PCIe Flash Acceleration" or "Using PCIe Flash Acceleration," depending on your installation.

Without PCIe Flash Acceleration

Table 11 defines Oracle ASM disks and disk groups for online redo logs, control file, and archived redo logs when not using PCIe flash acceleration.

Table 11. Oracle ASM Disks and Disk Groups for Online Redo Logs, Control File, and Archived Redo Logs Without PCIe Flash Acceleration

<i>RAID Group</i>	<i>LUNs</i>	<i>LUN Size (GB)</i>	<i>Purpose</i>	<i>Oracle ASM Disks</i>	<i>Oracle ASM Disk Group</i>	<i>Storage Port</i>
002	0003	50	<ul style="list-style-type: none"> ▪ Oracle Online Redo logs 	RGDISK01	REDODG01	<ul style="list-style-type: none"> ▪ 0A ▪ 1A ▪ 0B ▪ 1B
002	0004	50		RGDISK02		<ul style="list-style-type: none"> ▪ 0A ▪ 1A ▪ 0B ▪ 1B
002	0005	50		RGDISK03		<ul style="list-style-type: none"> ▪ 0A ▪ 1A ▪ 0B ▪ 1B
002	0006	50	<ul style="list-style-type: none"> ▪ Oracle Control File 	CTDISK01		<ul style="list-style-type: none"> ▪ 0A ▪ 1A ▪ 0B ▪ 1B

Table 11. Oracle ASM Disks and Disk Groups for Online Redo Logs, Control File, and Archived Redo Logs Without PCIe Flash Acceleration (Continued)

<i>RAID Group</i>	<i>LUNs</i>	<i>LUN Size (GB)</i>	<i>Purpose</i>	<i>Oracle ASM Disks</i>	<i>Oracle ASM Disk Group</i>	<i>Storage Port</i>
003	0007	50	<ul style="list-style-type: none"> ■ Oracle Online Redo Logs 	RGDISK11	REDODG11	<ul style="list-style-type: none"> ■ 0A ■ 1A ■ 0B ■ 1B
003	0008	50		RGDISK12		<ul style="list-style-type: none"> ■ 0A ■ 1A ■ 0B ■ 1B
003	0009	50		RGDISK13		<ul style="list-style-type: none"> ■ 0A ■ 1A ■ 0B ■ 1B
003	0010	50	<ul style="list-style-type: none"> ■ Oracle Control File 	CTDISK11	ARCHDG	<ul style="list-style-type: none"> ■ 0A ■ 1A ■ 0B ■ 1B
004	0011	300	<ul style="list-style-type: none"> ■ Oracle Archived Redo Logs 	ARDISK01		<ul style="list-style-type: none"> ■ 0A ■ 1A ■ 0B ■ 1B
004	0012	300		ARDISK02		<ul style="list-style-type: none"> ■ 0A ■ 1A ■ 0B ■ 1B
004	0013	300		ARDISK03	<ul style="list-style-type: none"> ■ 0A ■ 1A ■ 0B ■ 1B 	

Table 12 defines Oracle ASM disks and disk groups for Oracle database application data when not using PCIe flash acceleration.

Table 12. Oracle ASM Disks and Disk Groups for Application Data Without PCIe Flash Acceleration

<i>Dynamic Provisioning Pool ID</i>	<i>LUNs</i>	<i>LUN Size (GB)</i>	<i>Purpose</i>	<i>Oracle ASM Disks</i>	<i>Oracle ASM Disk Group</i>	<i>Storage Port</i>
001	0014 - 0025	200	<ul style="list-style-type: none"> ▪ Oracle System ▪ Sysaux ▪ Undo ▪ Temp ▪ OLTP Application Tablespaces 	DADISK01 - DADISK12	DATADG	<ul style="list-style-type: none"> ▪ 0A ▪ 1A ▪ 0B ▪ 1B

To configure Automatic Storage Management when not using PCIe Flash Acceleration, do the following.

1. Create Automatic Storage Management disk groups.
 - (1) Log on as a grid user from the bin directory located in Oracle Grid Infrastructure home.
 - Verify that you enable X Terminal. Follow the documentation on how to enable X Terminal for the X server software that you are using.
 - (2) Configure the Oracle Grid Infrastructure home as the following:


```
/u01/app/gri d/product/11. 2. 0/gri d
$/u01/app/gri d/product/11. 2. 0/gri d/bi n/asmca
```
2. Follow the on-screen instructions to create the ASM disk groups.

Using PCIe Flash Acceleration

Install and configure Fusion-io ioDrive PCIe flash acceleration before doing this process. See "Install and Configure Fusion-io ioDrive PCIe Flash Card Acceleration."

Table 13 lists Oracle ASM disks and disk groups for online redo logs, control file, and archived redo logs using PCIe flash acceleration.

Table 13. Oracle ASM Disks and Disk Groups for Online Redo Logs, Control File, and Archived Redo Logs Using PCIe Flash Acceleration

<i>RAID Group</i>	<i>LUNs</i>	<i>LUN Size (GB)</i>	<i>Purpose</i>	<i>Oracle ASM Disks</i>	<i>Oracle ASM Disk Group</i>	<i>Storage Port</i>
002	0003	50	<ul style="list-style-type: none"> ▪ Oracle Online Redo logs 	RGDISK01	REDODG01	<ul style="list-style-type: none"> ▪ 0A ▪ 1A ▪ 0B ▪ 1B
002	0004	50		RGDISK02		<ul style="list-style-type: none"> ▪ 0A ▪ 1A ▪ 0B ▪ 1B
002	0005	50		RGDISK03		<ul style="list-style-type: none"> ▪ 0A ▪ 1A ▪ 0B ▪ 1B
002	0006	50	<ul style="list-style-type: none"> ▪ Oracle Control File 	CTDISK01		<ul style="list-style-type: none"> ▪ 0A ▪ 1A ▪ 0B ▪ 1B

Table 13. Oracle ASM Disks and Disk Groups for Online Redo Logs, Control File, and Archived Redo Logs Using PCIe Flash Acceleration (Continued)

<i>RAID Group</i>	<i>LUNs</i>	<i>LUN Size (GB)</i>	<i>Purpose</i>	<i>Oracle ASM Disks</i>	<i>Oracle ASM Disk Group</i>	<i>Storage Port</i>
003	0007	50	<ul style="list-style-type: none"> ■ Oracle Online Redo Logs 	RGDISK11	REDODG11	<ul style="list-style-type: none"> ■ 0A ■ 1A ■ 0B ■ 1B
003	0008	50		RGDISK12		<ul style="list-style-type: none"> ■ 0A ■ 1A ■ 0B ■ 1B
003	0009	50		RGDISK13		<ul style="list-style-type: none"> ■ 0A ■ 1A ■ 0B ■ 1B
003	0010	50	<ul style="list-style-type: none"> ■ Oracle Control File 	CTDISK11	ARCHDG	<ul style="list-style-type: none"> ■ 0A ■ 1A ■ 0B ■ 1B
004	0011	300	<ul style="list-style-type: none"> ■ Oracle Archived Redo Logs 	ARDISK01		<ul style="list-style-type: none"> ■ 0A ■ 1A ■ 0B ■ 1B
004	0012	300		ARDISK02		<ul style="list-style-type: none"> ■ 0A ■ 1A ■ 0B ■ 1B
004	0013	300		ARDISK03	<ul style="list-style-type: none"> ■ 0A ■ 1A ■ 0B ■ 1B 	

Table 14 defines Oracle ASM disks and disk groups using Fusion-io block devices for application data for Oracle database.

Table 14. Oracle ASM Disks and Disk Groups for Application Data Using Fusion-io Block Devices

<i>Fusion-io block devices</i>	<i>Device Size (GB)</i>	<i>Purpose</i>	<i>Oracle ASM Disks</i>	<i>Oracle ASM Disk Group</i>
fioa - fioid	320	<ul style="list-style-type: none"> ■ 1st Failure Group to host application tablespace 	ASMFIOA - ASMFIOD	PFMDG850:FIOGROUP1

Table 15 defines Oracle ASM disks and disk groups for application data for Oracle database using PCIe flash acceleration.

Table 15. Oracle ASM Disks and Disk Groups for Application Data Using PCIe Flash Acceleration

<i>Dynamic Provisioning Pool ID</i>	<i>LUNs</i>	<i>LUN Size (GB)</i>	<i>Purpose</i>	<i>Oracle ASM Disks</i>	<i>Oracle ASM Disk Group</i>	<i>Storage Port</i>
001	0014 - 0020	200	<ul style="list-style-type: none"> ■ 2nd Failure Group to host application tablespace 	DADISK01 - DADISK07	PFMDG850:SANDISKGROUP1	<ul style="list-style-type: none"> ■ 0A ■ 1A ■ 0B ■ 1B
001	0021 - 0025	200	<ul style="list-style-type: none"> ■ Oracle System, Sysaux ■ Undo ■ Temp 	DADISK08 - DADISK12	DATADG	<ul style="list-style-type: none"> ■ 0A ■ 1A ■ 0B ■ 1B

To configure Automatic Storage Management when using PCIe Flash Acceleration, do the following.

1. Map the Fusion-io ioDrives to Oracle ASM.

- Typing the following command:

```
/usr/sbin/asmtool -C -l /dev/oracleasm -n ASMFIOA -s /dev/[drive name] -a force=yes
```

For example, for drive /dev/fioa, type the following:

```
/usr/sbin/asmtool -C -l /dev/oracleasm -n ASMFIOA -s /dev/fioa -a force=yes
```

Repeat this command for each Fusion-io ioDrive:

- /dev/fioa
- /dev/fiob
- /dev/fioc
- /dev/fiod

2. To verify the labeling of the Fusion-io ioDrives as Oracle ASM disks, type the following command:

```
oracleasm listdisks | grep -i fio
```

3. Follow the instructions to create disk groups as described in "Without PCIe Flash Acceleration."
4. Configure ASM_PREFERRED_READ_FAILURE_GROUPS initialization parameter in the Oracle ASM instance to specify a list of failure groups as preferred read disks by typing the following:

```
ASM_PREFERRED_READ_FAILURE_GROUPS=PFMDG850.FIOGROUP1
```

Install Oracle Database 11g Release 2

To install Oracle Database 11g Release 2, follow the instructions in *Database Quick Installation Guide for Linux x86-64*. This document (in HTML and PDF) is in [Installing and Upgrading](#) of the Oracle Database Documentation Library.

Create Oracle Database

To create the Oracle database, you can use customized scripts or the dbca tool that is packaged in the Oracle software library. This solution uses the dbca tool.

Make sure you have enabled X Terminal. Follow the documentation on enabling X Terminal for the X server software that you are using.

To create the Oracle database, do the following:

1. Launch the dbca tool.
 - (1) Log on as Oracle User from the bin directory located in Oracle Software home.
 - (2) Type the following to configure the Oracle software home:

```
/u01/app/oracle/product/11.2.0/dbhome  
$/u01/app/oracle/product/11.2.0/dbhome/bin/dbca
```
 2. Follow the instructions in the wizard to create the Oracle database.
-

For More Information

Hitachi Data Systems Global Services offers experienced storage consultants, proven methodologies and a comprehensive services portfolio to assist you in implementing Hitachi products and solutions in your environment. For more information, see the Hitachi Data Systems [Global Services](#) website.

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