

Deploying SAP® on Oracle® with Distributed Instance using Hitachi Virtual Storage Platform

Implementation Guide

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August 2011



Feedback

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Implementation Guide

This implementation guide introduces the basic file system structure that underpins a distributed SAP implementation. Also, this guide explains how to use a Hitachi Virtual Storage Platform and Hitachi Compute Blade 2000 to maximize the value of SAP® ERP 6.0 Enhancement Pack 5 deployments that use Red Hat® Enterprise Linux® 5.5 and Oracle® Database 11G.

There are descriptions of the hardware and software required to build the solution and links to supporting documentation needed to build, test, and validate the solution. Although this document does not provide step-by-step, detailed instructions for each and every task required to deploy the solution, it does provide a consolidated resource where administrators can locate related materials needed to construct a functional solution.

Storage administrators need to have a high-level understanding of SAP architecture to ensure that the storage systems meet requirements of the SAP environment. This paper provides that understanding for storage administrators who are beginning SAP deployments or those who might be attempting to remedy problems in existing deployments.

This guide is written for storage administrators at businesses that are charged with deploying SAP on the Hitachi Virtual Storage Platform and Hitachi Compute Blade 2000, with Red Hat Enterprise Linux 5.5 and Oracle Database 11G.

This white paper assumes the following:

- Familiarity with SAN technologies and tools
- Basic knowledge of Hitachi storage management software, including Hitachi Command Suite and Hitachi Dynamic Link Manager

It does not assume detailed knowledge of SAP's products or architecture. For more information about SAP architecture, see the *Master Guide* at [SAP Service Marketplace—Installation Guides](#). That guide is available to licensed SAP customers.

Tested Solution Components

This solution uses a Hitachi Compute Blade 2000 and Hitachi Virtual Storage Platform as the hardware platform for an SAP ABAP instance. It includes a central SAP Solution Manager instance and a distributed SAP ABAP instance. As an advanced SAP Environment, this solution is positioned to enhance the performance and future growth of an SAP installation.

Figure 1 diagrams the environment described in this installation guide using a Hitachi Compute Blade 2000 and Hitachi Virtual Storage Platform for a basic SAP environment.

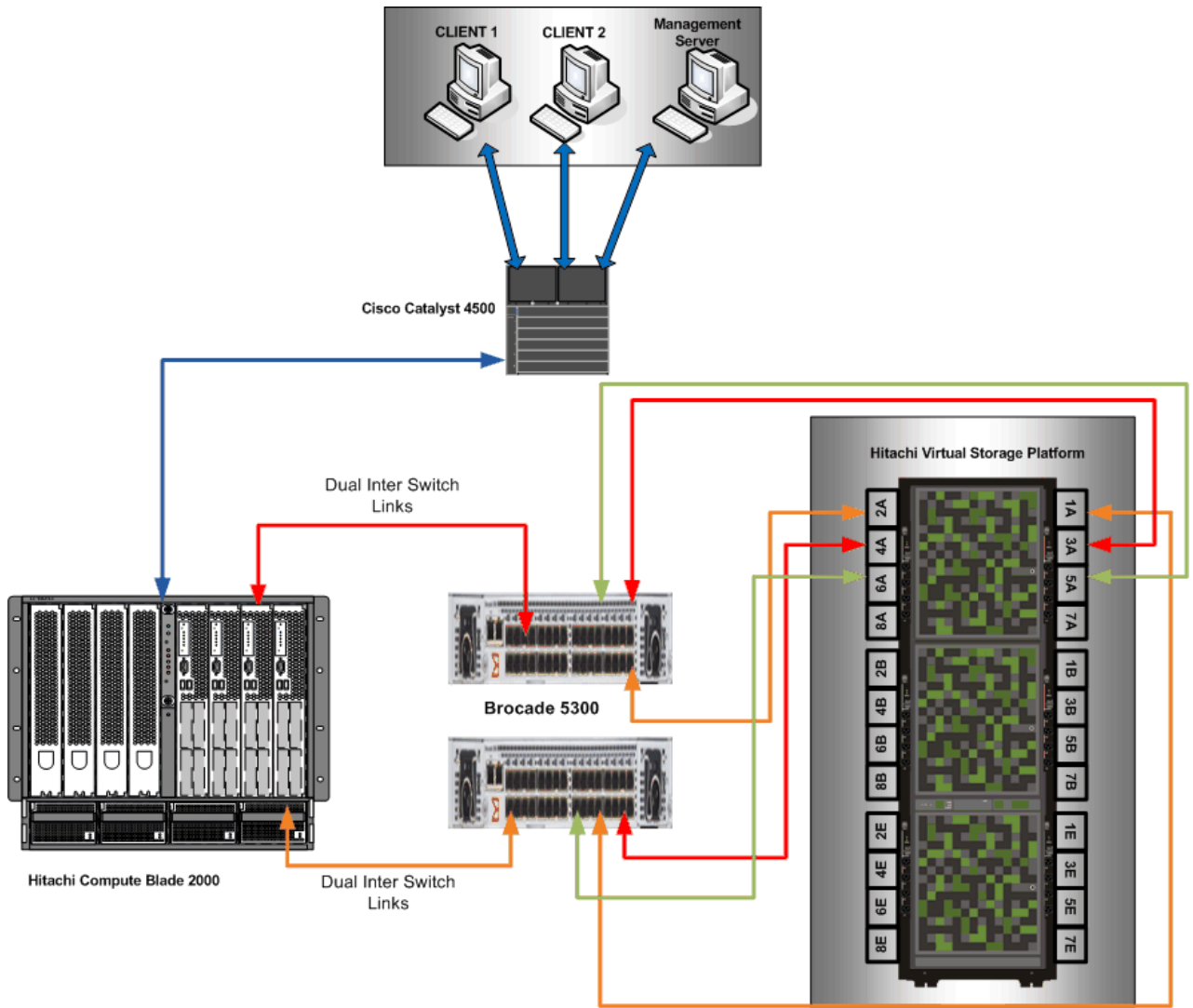


Figure 1

SAP offers numerous architectural designs to maximize performance and to suit the individual needs of every SAP customer. Consult with your implementation partner for more information. Also consult the planning guides for SAP ERP 6.0 at the [SAP Service Marketplace](#), available to licensed SAP customers:

- **First Steps Document**—This helps you get started with the installation of the SAP ERP 6.0 instance.
- **Master Guide**—The de-facto guide containing information about the sequence and the components available for SAP ERP 6.0. It also contains links to all of the SAP ERP 6.0 documentation from SAP.

Hardware Components

Table 1 describes the hardware used to implement this solution.

Table 1. Hardware Components

<i>Hardware</i>	<i>Qty</i>	<i>Configuration</i>	<i>Role</i>
Hitachi Virtual Storage Platform storage system	1	8 Fibre Channel ports used 2 pair of front-end directors 2 pair of back-end directors 64 × 300GB 10K RPM SAS drives 64GB cache	SAP storage system
Hitachi Compute Blade 2000 chassis	1	8-blade chassis 2 Fibre Channel switch modules 8 × 1Gb/sec network ports 2 management modules 8 cooling fan modules 4 power supply modules	Blade chassis
Hitachi Compute Blade 2000 server blade	1	2 × 8 Core processor with 64GB of RAM	SAP Solution Manager Instance
Hitachi Compute Blade 2000 server blade	1	2 × 8 Core processor with 64GB of RAM	SAP ABAP Instance
Hitachi Compute Blade 2000 server blade	1	2 × 8 Core processor with 64GB of RAM	SAP Database Instance with Oracle 11g
Brocade 5300 SAN Fibre Channel switch	2	FOS 5.3.1a 14 4Gb/sec Fibre Channel ports used	SAN switch
Server	1	Intel Pentium 3.0GHz processor 1GB memory	Management server with access to Hitachi Storage Navigator and NetBackup Administration Console.

Hitachi Virtual Storage Platform

The Hitachi Virtual Storage Platform is a 3D scaling storage platform. With the ability to scale up, scale out, and scale deep at the same time in a single storage system, the Virtual Storage Platform flexibly adapts for performance, capacity, connectivity, and virtualization.

- **Scale Up**—Increase performance, capacity, and connectivity by adding cache, processors, connections, and disks to the base system.
- **Scale Out**—Combine multiple chassis into a single logical system with shared resources.
- **Scale Deep**—Extend the advanced functions of the Hitachi Virtual Storage Platform to external multivendor storage.

The switch matrix architecture of the Virtual Storage Platform makes all of this possible. It connects the basic components, front-end directors, back-end directors, global cache modules, and virtual storage directors. Add redundant pairs of directors and cache modules without disruption to connected host servers. A global cache couples these resources, creating a common pool of storage resources. These resources can include external storage that is connected through front-end director initiator ports.

For more information, see the [Hitachi Virtual Storage Platform](#) on the Hitachi Data Systems website.

Hitachi Compute Blade 2000

The Hitachi Compute Blade 2000 is an enterprise-class blade server platform. It features the following:

- A balanced system architecture that eliminates bottlenecks in performance and throughput
- Configuration flexibility
- Eco-friendly power-saving capabilities

While the Hitachi Compute Blade 2000 supports logical partitions, they are not used in this solution. Currently, SAP and Hitachi Data Systems do not support the use of logical partitions in SAP environments.

SAP Servers

Servers hosting SAP Solution Manager, SAP ABAP and SAP Database instances must meet specific requirements for the SAP solutions they are hosting. For more information about server requirements for SAP ERP, SAP Solution Manager, and SAP clients, see the following SAP Notes and websites, which are available to licensed customers:

- SAP Note 901070, Resource Requirements for SAPECC6
- SAP Note 1539748, Resource Requirements for SAP ECC 6.0 with Enhancement Package 5
- [SAP Service Marketplace: Sizing](#)

Software Components

Table 2 lists the key software components used in this solution.

Table 2. Key Software Components

<i>Software</i>	<i>Version</i>
Hitachi Dynamic Provisioning	70-02-05-00/00
Hitachi Command Suite	7.0
Hitachi Dynamic Link Manager Advanced	6.0.1.0.804
SAP ERP (ABAP instance)	ECC 6.0 with Upgraded Enhancement Package 5 SAP Kernel
SAP Solution Manager	7.0 Enhancement Package 1 on SP 25
SAP GUI	7.2
Oracle Database 11g	11.0.2.0
Red Hat Enterprise Linux	5.5

Hitachi Dynamic Provisioning

On the Hitachi Virtual Storage Platform, Hitachi Dynamic Provisioning provides wide striping and thin provisioning functionalities.

Using Hitachi Dynamic Provisioning is similar to 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 within a Hitachi Virtual Storage Platform. Each pool has one or more dynamic provisioning virtual volumes (DP-VOLs) of a user-specified logical size of up to 60TB created against it (with no initial physical space allocated).

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. This distributes the host workload across many RAID groups, which provides a smoothing effect that dramatically reduces hot spots.

Hitachi Dynamic Provisioning has the benefit of thin provisioning. Physical space assignment from the pool to the DP-VOL happens as needed using 42MB pages, up to the logical size specified for each DP-VOL. There can be a dynamic expansion or reduction of pool capacity without disruption or downtime. An expanded pool can be rebalanced across the current and newly added RAID groups for an even striping of the data and the workload.

For more information, see the [Hitachi Dynamic Provisioning datasheet](#) and [Hitachi Dynamic Provisioning](#) on the Hitachi Data Systems website.

Hitachi Command Suite

Hitachi Command Suite manages virtualized storage and server infrastructures. With 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.

For this solution the Hitachi Command Suite was used to create logical devices (LDEVs) and dynamic pools for the SAP Solution Manager Instance and SAP ERP 6.0 Enhancement Pack 5 ABAP instance. Also, it was used to assign the newly created LDEVs to host groups.

For more information, see the Hitachi Command Suite User Guide shipped with the product.

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

Configuration of Hitachi Dynamic Link Manager Advanced, used for SAN multipathing, used its round-robin load balancing policy. This policy selects a path by rotating through all available paths. Balancing the load across all available paths optimizes IOPS and response time.

Hitachi Dynamic Link Manager is installed on the SAP ERP and SAP Solution Manager.

For more information, see [Hitachi Dynamic Link Manager](#) on the Hitachi Data Systems website.

SAP Software

SAP ERP combines scalable and effective software for enterprise resource planning (ERP) with a flexible, open technology platform that can leverage and integrate SAP and non-SAP systems. SAP provides end-to-end software functionality for enterprise management.

SAP Solution Manager is a service and support platform that provides the integrated content, tools, and methodologies to implement, support, and monitor operations of SAP implementation. Solution Manager is installed on a separate system. Hitachi Data Systems uses the Solution Manager server for these functions:

- Configuring installation keys for the install of any SAP instance
- Approving the download of any updates from SAP like service packs or enhancement packs
- Installing SAP enhancement packs onto ABAP instances
- Obtaining support from SAP

SAP GUI is the client software that allows SAP users to access various functionalities in SAP ABAP instances and SAP Solution Manager.

SAP systems can be used with a variety of databases available from different vendors. The business transactions in SAP systems are processing units grouped to provide specific functions. These processing units execute changes to the database that are consistent.

Oracle Database 11g

Oracle provides a state-of-the-art, high performance database management system. This solution used Oracle Database 11g, Enterprise Edition.

Solution Implementation

Deploying this solution requires these following steps:

1. Configure the Storage Area Network
2. Configure Storage
3. Configure Management Servers
4. Configure Hitachi Compute Blade 2000
5. Deploy the Red Hat Enterprise Linux 5.5 Operating Systems
6. Deploy Hitachi Dynamic Link Manager
7. Deploy SAP Solution Manager
8. Deploy Distributed SAP ABAP Installation
9. Enhancement Pack 5 Upgrade

Your installation checklist might vary based on your environment. More information about each of these steps is included in the following sections.

Configure the Storage Area Network

Install a two port Fibre Channel mezzanine card in each Hitachi Compute Blade 2000 server blade. These cards connect internally to the Fibre Channel switch modules located in the Hitachi Compute Blade 2000 chassis.

Connect inter-switch links from the internal Fibre Channel switch modules to the Brocade 5300 switches. Also connect the Brocade switches to four ports of the Hitachi Virtual Storage Platform storage system. Configure each connection with zones on fabric switches, according to the manufacturer's guidelines.

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.

When deploying a SAP system made up of SAP Solution Manager and SAP ABAP instances, the storage used by these servers must be logically isolated from each other in the SAN by using zones and host groups.

Table 3 lists the path configurations used in this solution.

Table 3. Path Configuration

<i>Initiator</i>	<i>Host HBA Number</i>	<i>Switch</i>	<i>Zone Name</i>	<i>Storage System Port (Target)</i>
SAP Solution Manager	HBA 1 Port 1	Brocade 5300 -1	SAP_SOLMAN_HBA1_1_VSP_5A	VSP 5A
SAP Solution Manager	HBA 1 Port 2	Brocade 5300 -2	SAP_SOLMAN_HBA2_2_VSP_6A	VSP 6A
SAP ABAP Instance	HBA 1 Port 1	Brocade 5300 -1	SAP_ABAP_HBA1_1_VSP_3A	VSP 3A
SAP ABAP Instance	HBA 1 Port 2	Brocade 5300 -2	SAP_ABAP_HBA2_2_VSP_4A	VSP 4A
SAP DB Instance	HBA 1 Port 1	Brocade 5300 -1	SAP_DB_HBA1_1_VSP_5A	VSP 5A
SAP DB Instance	HBA 1 Port 2	Brocade 5300 -2	SAP_DB_HBA1_2_VSP_6A	VSP 6A

Figure 2 shows the storage network configuration of the SAP instances. This solution uses eight connections from the SAP instances to the Virtual Storage Platform. This includes two HBA connections to each of the SAP instances.

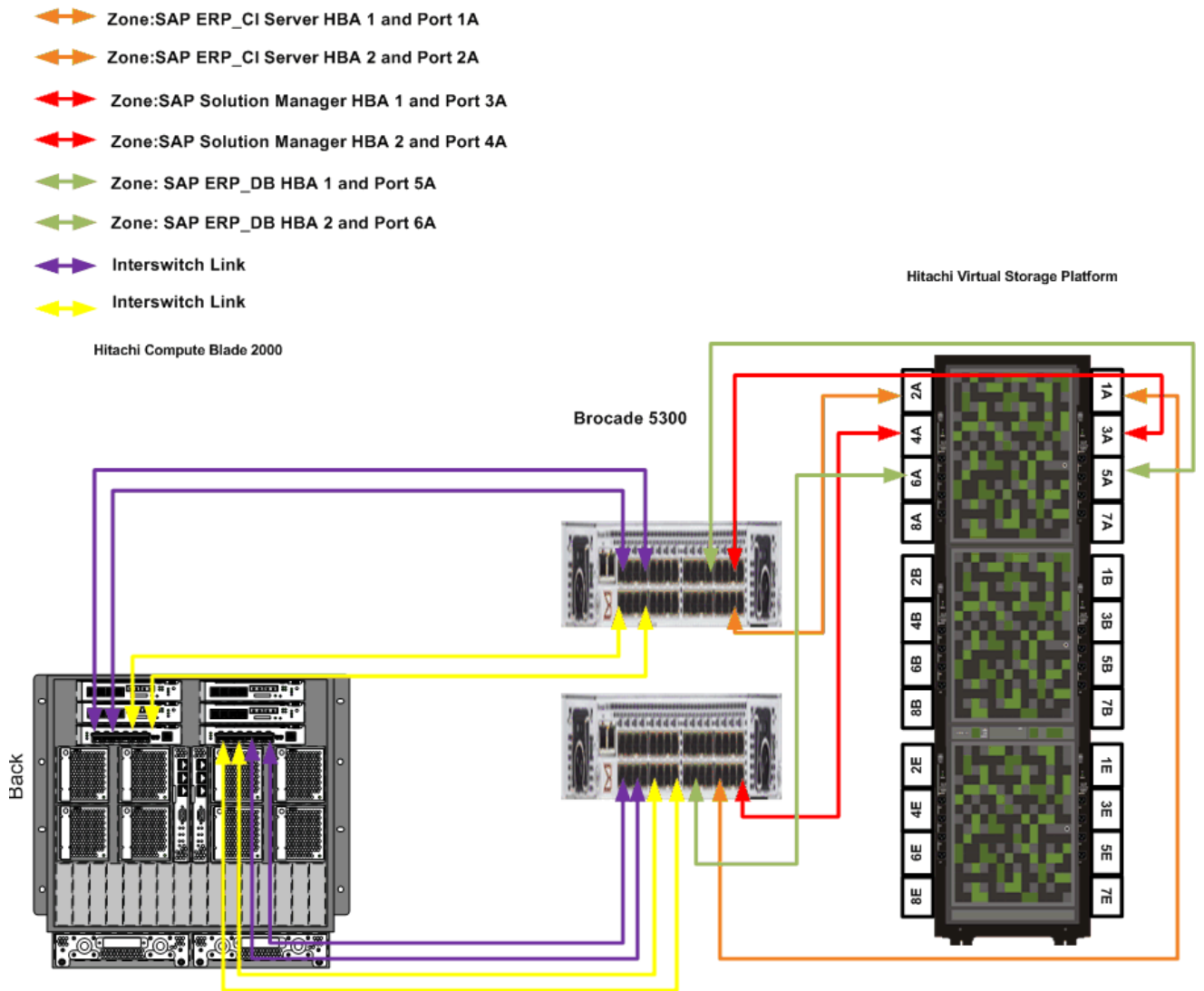


Figure 2

Configure Storage

Create two dynamic provisioning pools for the SAP Solution Manger and two dynamic provisioning pools for the SAP ERP distributed instance. Configure dynamic provisioning pools with RAID-5 (3D+1P).

All drives are 300GB 10K RPM SAS drives. A total of four RAID groups are used for each of the dynamic provisioning pools, giving each pool a storage capacity of 3.12TB. Nine dynamic provisioning virtual volumes (DP-VOLs) are configured for each dynamic provisioning pool.

Table 4 lists the dynamic provisioning pool configuration created for the SAP servers.

Table 4. Hitachi Dynamic Provisioning Pool Configuration

<i>Dynamic Provisioning Pool</i>	<i>Role</i>
SAP_SOL	SAP Solution Manager
SAP_ERP	SAP ERP server

Table 5 lists storage configuration details for LDEVs created for the SAP Solution Manager server in the SAP_SOL pool. All LDEVs were mapped to storage ports 3A and 4A.

Table 5. LDEV Storage Configuration for the SAP Solution Manager Server

<i>LDEV</i>	<i>Host LUN</i>	<i>Size (GB)</i>
00:02:60	00	50
00:02:61	01	50
00:02:63	02	50
00:02:64	03	50
00:02:70	09	100
00:02:71	10	100
00:02:73	11	100
00:02:74	12	100
00:02:75	13	100

Table 6 lists storage configuration details for LDEVs created for the SAP Central, and Database servers in the SAP_ERP pool. All LDEVs were mapped to storage ports 1A, 2A and 5A, 6A.

Table 6. LDEV Storage Configuration for the SAP ERP Server

<i>LDEV</i>	<i>Host LUN</i>	<i>Size (GB)</i>	<i>Server</i>
00:02:76	00	50	SAP Central Instance
00:02:77	01	50	SAP Central Instance
00:02:78	03	50	SAP Central Instance
00:02:79	01	50	SAP Database Instance
00:02:85	07	100	SAP Database Instance
00:02:86	08	100	SAP Database Instance
00:02:87	09	100	SAP Database Instance
00:02:88	10	100	SAP Database Instance
00:02:89	11	100	SAP Database Instance

One RAID-10 (2D+2P) group was used to store the SAP transaction logs.

All drives were 300GB 10K RPM SAS drives. The RAID group had a storage capacity of 600GB. Oracle 11g logs for SAP Solution Manager and SAP ERP systems are located within the RAID Group ID 2-12.

Table 7 lists the LUN configuration of RAID group 2-12 for the logs of SAP Solution Manager.

Table 7. Solution Manager LDEV Configuration of RAID Group 2-12

<i>LDEV</i>	<i>Host Group</i>	<i>Host LUN</i>	<i>Size (GB)</i>	<i>Server</i>	<i>Virtual Storage Platform Port</i>
00:02:65	2-12	04	10	SAP Solution Manager	3A, 4A
00:02:66	2-12	05	10	SAP Solution Manager	3A, 4A
00:02:67	2-12	06	10	SAP Solution Manager	3A, 4A
00:02:68	2-12	07	10	SAP Solution Manager	3A, 4A
00:02:69	2-12	08	150	SAP Solution Manager	3A, 4A

Table 8 lists the LUN configuration of RAID group 2-13 for the logs of SAP ERP.

Table 8. SAP ERP LDEV Configuration of RAID Group 2-13

<i>LDEV</i>	<i>Host Group</i>	<i>Host LUN</i>	<i>Size (GB)</i>	<i>Server</i>	<i>Virtual Storage Platform Port</i>
00:02:80	2-13	02	10	SAP Database Instance	5A, 6A
00:02:81	2-13	03	10	SAP Database Instance	5A, 6A
00:02:82	2-13	04	10	SAP Database Instance	5A, 6A
00:02:83	2-13	05	10	SAP Database Instance	5A, 6A
00:02:84	2-13	06	150	SAP Database Instance	5A, 6A

Create LDEVs in a RAID Group

This procedure creates the LDEVs for the SAP logs. To create one or more LDEVs in a RAID group using Hitachi Command Suite, follow these steps:

1. Under **Resources** on the **Resources** tab, click the name of the Virtual Storage Platform system.
An area for **Summary** and **Detailed Information** displays.
2. Under **Detailed Information**, click the **Parity Groups** link.
The Parity Groups area replaces the Detailed Information area.
3. From the **Actions** list in the **Summary** area, click **Create Volumes**.
The **Create Volumes** dialog box opens.
4. Enter the **No. of Volumes** you want to create.

5. Enter the **Volume Capacity**.
6. Click the **Advanced Options** link to display more options on the **Create Volumes** dialog box.
7. For **LDEV ID**, click **manual**
Initial LDEV ID: is added to the **Create Volumes** dialog box.
8. In the **CU** list, click a value.
9. In the **DEV** list, click a value.
10. Click **Show Plan** and then click **Create**.

Create Dynamic Provisioning Pools

To create dynamic provisioning pools on a Hitachi Virtual Storage Platform using Hitachi Command Suite, follow these steps:

1. Under **Resources** on the **Resources** tab, click the name of the Virtual Storage Platform system.
An area for **Summary** and **Detailed Information** displays.
2. Under **Detailed Information**, click the **DP Pools** link.
The **DP pools** area replaces the **Detailed Information** area.
3. From the **Actions** list in the **Summary** area, click **Create Pool**.
The **Create Pool** dialog box opens.
4. Type a name in **Pool Name**.
5. Click **Add Parity Groups**.
The **Available Parity Groups** dialog box opens.
6. Click a parity group from the table on the **Available Parity Groups** dialog box.
7. Click **Add to Pool**.
The selected parity group is added to the table in the **Additional Parity Groups** area.
8. Click **Show Plan**.
9. Review the **Plan Summary** area and select **Submit**.

Create Logical Devices (LDEVs) within a Dynamic Provisioning Pool

This procedure assumes that dynamic pool creation in your environment is complete.

To create one or more logical devices (LDEVs) within a dynamic provisioning pool using Hitachi Command Suite, follow these steps:

1. Under **Resources** on the **Resources** tab, click the name of the Virtual Storage Platform system.

An area for **Summary** and **Detailed Information** displays.

2. Under **Detailed Information**, click the **DP Pools** link.

The **DP pools** area replaces the **Detailed Information** area.

3. From the **DP pools** pane, click the **Pool** link where you want to create the LDEV.

The **Summary** area shows information about the pool. The **DP Vols** tab shows the volumes in that pool.

4. From the **Actions** list in the **Summary** area, click **Create Volumes**.

The **Create Volumes** dialog box displays.

5. Enter the **No. of Volumes** you want to create and then enter the **Volume Capacity**.

6. Click the **Advanced Options** link to display more options on the **Create Volumes** dialog box.

7. For **LDEV ID**, click **manual**

Initial LDEV ID: is added to the **Create Volumes** dialog box.

8. In the **CU** list, click a value.

9. In the **DEV** list, click a value.

10. Click **Show Plan** and then click **Create**.

Create Host Groups

To create host groups using Hitachi Command Suite, follow these steps:

1. Under **Resources** on the **Resources** tab, click the name of the Virtual Storage Platform system.

An area for **Summary** and **Detailed Information** displays.

2. Click **Hosts** in the **Resources** area.

The **Hosts** area displays.

3. Click **Add Hosts** at the bottom of the **Hosts** area.

The **Add Hosts** dialog box displays.

4. Select the **OS Type:** from the list.

5. Click the **Add Hosts Manually** option.

The **Add Hosts** dialog box changes to add the host manually.

6. Type the **Host Name**:

7. Do one of the following to add each WWN to the **Selected WWNs** list:

- Type a value in **Enter WWN:** and press ENTER.
- Find the WWN in the **Known WWNs** list and click **Add**.

To remove a WWN from the **Selected WWNs** list, select the WWN and click **Remove**.

8. Click **OK**.

Map LDEVs from Parity Groups

To map LDEVs using Hitachi Command Suite, follow these steps:

1. Under **Storage Systems** in the **Resources** area on the **Resources** tab, click the name of the Virtual Storage Platform system.

An area for **Summary** and **Detailed Information** displays.

2. Under **Detailed Information**, click the **Open-Unallocated** link.

The **Volumes** area replaces the **Detailed Information** area.

3. Select one or more records in the **Volume** column.

- Do not click the link for the volume to make your selection. Make your selection by clicking another place on that volume's record in the table.
- More than one volume may be selected by holding down SHIFT when clicking the record.

4. Click **Allocate Volumes** from the **Actions** list at the top of the **Summary** area. Do *not* click the **Allocate Volumes** button at the bottom of the **Volumes** area.

The **Allocate Volumes** dialog box opens.

5. Click a **Host:** from the list.

6. Click the **No. of Volumes** you want to create from the list.

7. Enter the **Volume Capacity**.

8. Click **Show Plan**.

9. Review the details in the **Plan Summary** area

10. Do one of the following to allocate the volume or make changes.

- Click **Allocate** to make the allocation.
- Click **Back** to make changes.

Map Dynamic Pool Volumes

To map the volumes of dynamic pools using the Hitachi Command Suite, follow these steps:

1. Under **Resources** on the **Resources** tab, click the name of the Virtual Storage Platform system.

An area for **Summary** and **Detailed Information** displays.

2. Under **Detailed Information**, click the **DP Pools** link.

The **DP pools** area replaces the **Detailed Information** area.

3. From the **DP pools** pane, click the **Pool** link where you want to map the volume.

The **Summary** area shows information about the pool. The **DP Vols** tab shows the volumes in that pool.

4. Select one or more records in the **Pool** column.

Do not click the link for the pool to make your selection. Make your selection by clicking another place on that pool's record in the table. More than one pool may be selected by holding down SHIFT when clicking the record.

5. Click **Allocate Volumes** from the **Actions** list at the top of the **Summary** area.

Do *not* click the **Allocate Volumes** button at the bottom of the **DP Pools** area.

The **Allocate Volumes** dialog box displays.

6. For **Host**, click a value from the **Share a Host** list.

7. In the **No. of Volumes** box, type or select how many volumes you want to create.

8. In the **Volume Capacity** box, type the capacity. If necessary to change to units on the capacity (such as GB), click a value from the list.

9. Click **Show Plan**.

10. Review the details in the **Plan Summary** area

11. Do one of the following to allocate the volume or make changes.

- Click **Allocate** to make the allocation.
- Click **Back** to make changes.

Configure Management Servers

Install one management server to access Hitachi Command Suite.

Configure Hitachi Compute Blade 2000

This describes how to configure the Hitachi Compute Blade 2000. These procedures assume the following:

- The blade chassis is racked.
- The blades are installed into the chassis.
- All LAN and SAN cabling are complete.

This solution has a Hitachi Compute Blade 2000 connected to a Hitachi Virtual Storage Platform. Because the Hitachi Compute Blade 2000 configuration has no internal disks, all operating systems are booted from the SAN.

Configure Required Management IP Addresses

Follow these steps to configure the IP addresses for the management module and the blades using the management module web GUI:

1. Connect a laptop or personal computer to the MGMT0 port of the management module with an Ethernet cable. See Figure 3. If two management modules are installed, connect it to the management module with the MSR LED that is lit solid green.

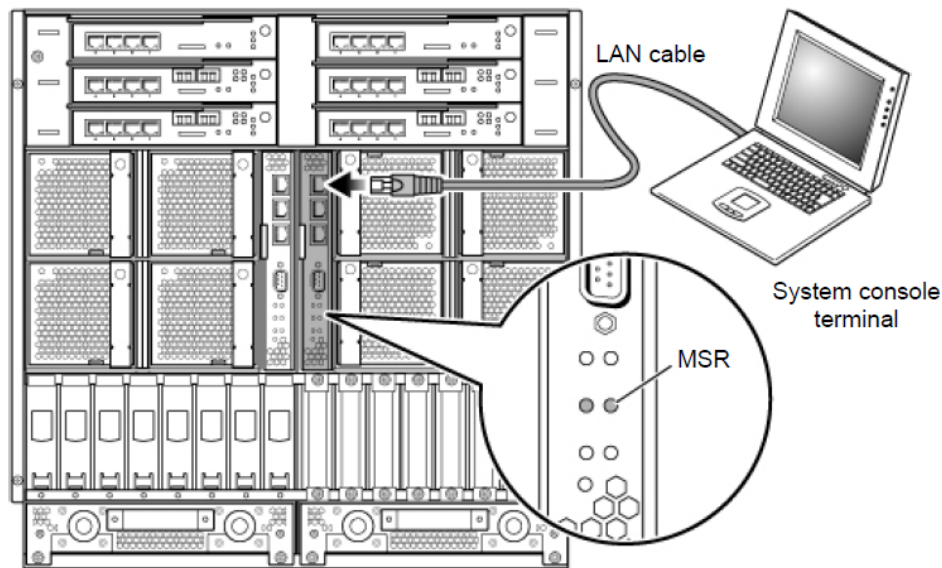


Figure 3

2. Open a browser and type this in the address bar: `http://192.168.0.1/`

A log on screen displays.

3. Log on using the default user name and password:
 - User name: **adminstrator**
 - Password: **password.**The management module web GUI launches.
4. Click the **Settings** tab.
5. In the navigation area on the left, click **The configuration of network** link.
The Management LAN Network area displays.
6. Click **Edit** in the **Management LAN network** area.
The fields become editable.
7. Enter an IP address, subnet mask, and default gateway for all of the following:
 - The management module
 - Each active partition (blade)You need one IP address for the management module and one IP address for each partition (blade).
8. Click **Confirm**, and then click **Apply**.
The IP settings are saved.
9. Disconnect the Ethernet cable from the management module.
10. Connect an Ethernet cable from the management module to an external management LAN switch. Then you can perform management through any system console in the management LAN.

Configure Blades

Complete the following procedures for each active blade (partition). Complete both configuration methods for each blade.

Configure Hitachi Compute Blade 2000 to Boot from SAN

To configure the Hitachi Compute Blade 2000 to boot from the SAN, follow these steps:

1. Open a browser and type the blade IP address in the address bar.
2. Log on to the blade web GUI using the default user name and password:
 - User name: **user01**
 - Password: **pass01**The blade web GUI launches.
3. Click **Launch Remote Console**.
The Remote Console opens in a new Window.

4. From the top menu, click **Power and Reset**, and then click **Power On**.

A warning message confirms the server will power on.

5. Click **Yes**.

6. When prompted to enter the BIOS during the system boot, press Ctrl + R.

This message appears on the screen: <Ctrl - R> Detected. Please Wait...

7. Change the BIOS settings.

- (1) From the << **Select Operation** >> screen, use an arrow key to move up or down to highlight **SELECT HBA**, and press ENTER.

The << **SELECT HBA** >> screen displays with a list of available HBAs.

- (2) From the <<**SELECT HBA** >> screen, use the appropriate arrow key to move up or down to highlight the first HBA to configure for SAN boot.

The << **MAIN MENU** >> screen of the selected HBA shows on the same screen.

- (3) Press ENTER to select the first option, **1. SET HBA BIOS ENABLE/DISABLE**.

The <<**SET HBA BIOS**>> screen appears.

- (4) Press ENTER to change the **HBA BIOS:** from **DISABLE** to **ENABLE**.

The **HBA BIOS:** is set to **ENABLE**.

- (5) Press ESC on your keyboard.

The <<**MAIN MENU**>> screen appears.

- (6) Press DOWN ARROW to select the option **2. SET BOOT PRIORITY**.

The << **SET BOOT PRIORITY** >> screen appears in the same screen.

- (7) Press ENTER to change the **BOOT PRIORITY:** from **DISABLE** to **ENABLE**.

The **BOOT PRIORITY:** is now set to **ENABLE**.

- (8) Press DOWN ARROW to select **1. Boot priority option**.

The highest boot priority is highlighted.

- (9) Press ENTER to discover the provisioned LUN from storage.

The << **SELECT BOOT DEVICE** >> screen appears on the same screen. Confirm that the WWN of the storage port of the Virtual Storage Platform where you have configured the boot LUN is discovered by the blade BIOS.

If no WWN exists, check the connection and configuration of the storage area network.

- (10) Press ESC to return to the << **SET BOOT PRIORITY** >> screen, press ESC to return to the << **MAIN MENU** >> screen, and then press ESC to exit the BIOS configuration.

8. Select **YES: SAVE SETTING** on the << **SETUP CONFIRMATION** >> screen.

9. Press ENTER on your keyboard to save the HBA BIOS settings.

Boot from SAN is now configured.

10. From the top menu, click **Power and Reset**, and then click **Power Off**.

Leave the remote console session open for “Configure Hitachi Compute Blade 2000 to Boot from Installation ISO image.”

Configure Hitachi Compute Blade 2000 to Boot from Installation ISO image

The following assumes that the remote console session from “Configure Hitachi Compute Blade 2000 to Boot from SAN” is still open.

To mount the Red Hat Enterprise Linux 5.5 installation ISO image from a remote DVD, follow these steps:

1. From the top menu bar, click **Remote CD/DVD**, and then click **Redirect CD/DVD Image**.

The **Open** dialog box displays.

2. Navigate to the ISO image and click **Open**.

The **Open** dialog box closes, returning you to the **Remote Console** screen.

3. From the top menu bar, click **Power and Reset**, and then click **Power On**.

The Red Hat Enterprise Linux 5.5 installation DVD starts.

Deploy the Red Hat Enterprise Linux 5.5 Operating Systems

After the blade boots from the ISO image, follow the installation prompts and see the following SAP Notes, which are available to licensed SAP customers:

- SAP Note 1048303, Red Hat Enterprise Linux 5.x: Installation and upgrade.
- SAP Note 171356, Linux Only SAP Software on Linux: Essential Requirements

Deploy Hitachi Dynamic Link Manager

To install and configure Hitachi Dynamic Link Manager and create file systems, follow these steps:

1. Execute the following command on the server on which you want to install Hitachi Dynamic Link Manager:

```
./installhdlm
```

When completing the installation, Hitachi Dynamic Link Manager displays a successful installation message.

Hitachi Dynamic Link Manager names your disk device using the following format, where `<disk-device>` is a combination of alphabetic characters identifying the disk device:

```
sddl m<disk-device>
```

- Using logical volume manager “LVM” on each server with the following syntax, create a physical volume (PV) on each disk device,:

```
pvccreate /dev/sddl m<di sk- devi ce>
```

- Using LVM on each server with the following syntax, create volume groups:

```
vgcreate -s 64 <vol ume group name> <physi cal vol ume name(s)>
```

Table 5 has the volume groups needed for this solution.

- On each server with the following syntax, create logical volumes,:

```
lvcreate -l <size of logi cal vol ume> -n <vol ume vol ume name> <vol ume group name>
```

Table 5 has the logical volumes and respective volume groups needed for this solution.

- On each server with the following syntax, create a file system for each logical volume:

```
mkfs -t ext2 /dev/<vol ume group name>/<logi cal vol ume name>
```

- Mount each file system using the following syntax:

```
mount -t ext2 -o async /dev/<vol ume group name>/<logi cal vol ume name> /<mount poi nt>
```

Tables 9-11 has the file systems and mount points needed for this solution.

Table 9 lists the file system layout details about the **SAP Solution Manager**

Table 9. File System Layout for SAP Solution Manager Server

<i>LUN</i>	<i>Disk Group</i>	<i>Logical Volume</i>	<i>File System Mount Point</i>	<i>Usage</i>
00	appbi n_vg	appbi n_sap_l v	/sapmnt	File system for central repository for SAP Solution Manager, SAP binaries, and central location for moving data to another system when required
01	appbi n_vg	appbi n_usrsa p<SID>_l v	/usr/sap/<SID>	File System fro SAP Binaries
02	appbi n_vg	Appbi n_usrsa p_trans_l v	/usr/sap/trans	File System for central location of transports
03	appbi n_vg	Appbi n_oracl e_l v	/oracle	File system for Oracle binaries for installation of Oracle, Oracle Client, Home directory of ora<SID> and any temporary oracle files.

<i>LUN</i>	<i>Disk Group</i>	<i>Logical Volume</i>	<i>File System Mount Point</i>	<i>Usage</i>
04	appl og_vg	appl ogA_lv	/oracl e/<SID>/ori gl ogA	File system for online redo logs
05	appl og_vg	appl ogB_lv	/oracl e/<SID>/ori gl ogB	File system for online redo logs
06	appl og_vg	appmi rrl ogA_lv	/oracl e/<SID>/mi rrl ogA	File system for online redo logs
07	appl og_vg	appmi rrl ogB_lv	/oracl e/<SID>/mi rrl ogB	File system for online redo logs
08	appl og_vg	apparch_lv	/oracl e/<SID>/saparch	File system for archived logs
09	appdata_vg	appdata_sapdata1_lv	/oracl e/<SID>/sapdata1	File system for SAP Solution Manager data
10	appdata_vg	appdata_sapdata2_lv	/oracl e/<SID>/sapdata2	File system for SAP Solution Manager data
11	appdata_vg	appdata_sapdata3_lv	/oracl e/<SID>/sapdata3	File system for SAP Solution Manager data
12	appdata_vg	appdata_sapdata4_lv	/oracl e/<SID>/sapdata4	File system for SAP Solution Manager data
13	appdata_vg	appdata_oradata_lv	/oracl e/<SID>/oradata	File system for Oracle data dictionary, temporary, UNDO and users table space data

Table 10 lists the file system layout details about the **SAP Central Instance**

Table 10. File System Layout for SAP Central Instance

<i>LUN</i>	<i>Disk Group</i>	<i>Logical Volume</i>	<i>File System Mount Point</i>	<i>Usage</i>
00	appbin_vg	appbin_sap_lv	/sapmnt	File system for central repository for SAP Central Instance, SAP binaries, and central location for moving data to another system when required
01	appbin_vg	appbin_usrsap<SID>_lv	/usr/sap/<SID>	File System for SAP Binaries
02	appbin_vg	Appbin_usrsap_trans_lv	/usr/sap/trans	File System for central location of transports

Table 11 lists the file system layout details about the **SAP Database Instance**

Table 11. File System Layout for SAP Database Instance

<i>LUN</i>	<i>Disk Group</i>	<i>Logical Volume</i>	<i>File System Mount Point</i>	<i>Usage</i>
00	appbin_vg	appbin_oracle_lv	/oracle	File system for Oracle binaries for installation of Oracle, Oracle Client, Home directory of ora<SID> and any temporary oracle files.
01	appl og_vg	appl ogA_lv	/oracle/<SID>/origlogA	File system for online redo logs
02	appl og_vg	appl ogB_lv	/oracle/<SID>/origlogB	File system for online redo logs
03	appl og_vg	appmirrlogA_lv	/oracle/<SID>/mirrlogA	File system for online redo logs
04	appl og_vg	appmirrlogB_lv	/oracle/<SID>/mirrlogB	File system for online redo logs
05	appl og_vg	apparch_lv	/oracle/<SID>/saparch	File system for archived logs
06	appdata_vg	appdata_sapdata1_lv	/oracle/<SID>/sapdata1	File system for SAP Solution Manager data
07	appdata_vg	appdata_sapdata2_lv	/oracle/<SID>/sapdata2	File system for SAP Solution Manager data
08	appdata_vg	appdata_sapdata3_lv	/oracle/<SID>/sapdata3	File system for SAP Solution Manager data
09	appdata_vg	appdata_sapdata4_lv	/oracle/<SID>/sapdata4	File system for SAP Solution Manager data
10	appdata_vg	appdata_oradata_lv	/oracle/<SID>/oradata	File system for Oracle data dictionary, temporary, UNDO and users table space data

In the tested solution, network file share (NFS) was configured on the SAP central and database instances of the operating systems. NFS was used to connect the central Instance SAP profiles, binaries, and global parameters to the database instance. Also, NFS was used to connect the SAP database instance Oracle binaries to the SAP central instance. For more information about the SAP NFS procedure, see the *SAP Installation Guide* at [SAP Service Marketplace—Installation Guides SAP ERP 6.0 EHP4 Ready SR1](#), which is available to licensed SAP customers.

Adjust Linux Kernel Parameters

Certain kernel parameters have to be adjusted. SAP requires these changes to the Linux kernel to ensure that the SAP system runs properly. For more information please see the following SAP note

- [SAP Note 1048303, Red Hat Enterprise Linux 5.x: Installation and Upgrade](#)

Install JAVA Runtime Environment

Install the Java Runtime Environment for the SAPinst GUI. SAPinst checks two environment variables for validation of the Java Runtime if SAPINST_JRE_HOME is not found. SAPinst checks JAVA_HOME as well.

For more information on the installation of the Java Runtime Environment, see the following SAP Notes and websites, which are available to licensed customers:

- [SAP ERP Installation Guide](#)
- [SAP Note 723909, Java VM settings](#)
- [SAP Note 1090932, IBM download site for special JDK builds — iFix](#)

Deploy SAP Solution Manager

Install SAP Solution Manager on a dedicated server. This dedicated server will be highly customized for your own company. Follow these high level steps to install SAP Solution Manager.

1. Copy SAP Solution Manager from the installation media to a staging directory on the Solution Manager server.
2. Execute this command from a subdirectory in the staging area:

```
./sapi nst
```

The SAP Installation Master starts.
3. In the Choose Option phase navigating the service tree as follows:
SAP Solution Manager 7.0 EhP1 > SAP Systems > Oracle > Central System
4. Provide any inputs during the Define Parameters phase for the SAP Installation Master
5. After all the steps are complete, SAP Installation Master displays a message indicating a successful installation.

For more detailed information please see the following Installation guide available to licensed SAP customers.

- [SAP Solution Manager Installation Guide](#)

Deploy Distributed SAP ABAP Installation

The SAP ABAP distributed installation differs greatly from the SAP ABAP central instance installation on Oracle. Storage administrators must plan ahead in order to minimize the complexity of this type of installation. Follow these steps to install the distributed SAP ABAP instance.

SAP Distributed Instance Checklist

The following sections in [Installation Guide SAP ERP 6.0 – EHP4 Ready SR1 ABAP on Linux: Oracle](#), are needed to complete the preparation of the SAP Distributed ABAP Installation. This guide is available to licensed SAP customers. :

- Creating Operating System Users and Groups
- Exporting and Mounting the Global Transport Directory
- Installing the Front-End Software
- Generating the SAP Solution Manager Key
- Preparing the Installation DVDs

Install SAP Database Instance

Install the SAP database instance on a dedicated server. Follow these steps to install and configure the SAP database instance with Oracle 11g:

1. Copy the software with SAP ERP 6.0 with Enhancement Pack 4 from the installation media to a staging directory on the SAP database instance server.
2. Execute this command from a subdirectory in the staging area:

```
./sapi nst
```

The SAP Installation Master launches.

3. When in **Choose Option**, navigate through the service tree, as follows:
 - (1) SAP Installation Master
 - (2) SAP ERP 6.0 EHP4 Ready- Support Release 1
 - (3) SAP Application Server ABAP
 - (4) Oracle
 - (5) Distributed System
 - (6) Database Instance
4. When in **Define Parameters**, provide inputs for the following these parameters for your environment. For more information for any of the parameters, press F1 in SAPinst.
 - Default Settings (Click **Customize** and then click **Next**)
 - SAP System Parameters
 - Master Password
 - Database Parameters
 - Software Packages
 - Instance Memory Management

- Database Schema Parameters
 - Advanced Database Options
 - Advanced Configuration Enablement
 - SAPdata Directory Location on Database
 - Table space Information
 - General Load Parameters
5. When in **Summary**, review the inputs you have made. Revise the incorrect inputs.
 6. Click **Next** to execute the SAP installation using your inputs.

During execution, you will be instructed to install Oracle 11g database software. The steps to install Oracle 11g Enterprise are not located within the SAP Installation guide for ERP 6.0 Enhancement Pack 4.

For more detailed information of the Oracle11g Installation, see “Oracle” in “Database Upgrades” in [Database Upgrade Guide Upgrade to Oracle Database 11g Release 2\(11.2\): UNIX](#). From **Installation & Upgrade Guides**, click **Database Upgrades and Oracle**.

After completing all steps, SAP Installation Master displays a successful installation message.

Install SAP Central Instance

Install the SAP central instance on a dedicated server. Customize this dedicated server for your own company.

Follow these steps to install SAP ERP 6.0 with Enhancement Pack 4 on the SAP ABAP central instance:

1. Copy SAP ERP 6.0 with Enhancement Pack 4 from the installation media to a staging directory on the SAP Central Instance server.
2. Execute this command from a subdirectory in the staging area:

```
. /sapi nst
```

The SAP Installation Master launches.

3. Navigate through the service tree, as follows:
 - (1) SAP Installation Master
 - (2) SAP ERP 6.0 EHP4 Ready- Support Release 1
 - (3) SAP Application Server ABAP
 - (4) Oracle
 - (5) Distributed System
 - (6) Central Instance

4. When in **Define Parameters**, provide inputs for the following. For more information for any of the parameters, press F1 in SAPinst.
 - Default Settings (Click **Customize** and then click **Next**)
 - Java Runtime Environment
 - SAP System Parameters
 - Master Password
 - Database Schema Parameters
 - Central Instance Parameters
 - Software Packages
5. When in **Check Parameters**, review and revise any inputs you have made.

During **Execution Service**, you will give the SAP Solution Manager Key.

Enhancement Pack 5 Upgrade

For more information about upgrading an SAP ERP 6.0 system to Enhancement Pack 5, see the following SAP guides, which are available to licensed customers at the [SAP Service Marketplace](#):

- **Master Guide**—SAP enhancement package 5 for SAP ERP 6.0
- **First Steps** — Overview of the fundamental changes and the new implementation procedure
- **How to Install SAP Enhancement Package 5 Guide**— Step-by-step installation instructions

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