Installing Linux and Oracle9*i*
on
IBM *e*.server BladeCenter™

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IBM®

Contents

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INTRODUCTION

This document is intended to help those who are installing an Oracle9*i* database on an IBM BladeCenter.   It is based on experiences gained by installing a test environment at the IBM / Oracle International Competency Center.

In the sections that follow, we describe activities needed to prepare for and successfully install Linux and Oracle9*i* on individual blade servers. The installation described in this paper is for single-instance databases and does not involve Oracle9*i* Real Application Clusters (RAC).

In addition to helping those who are installing Oracle on the BladeCenter, this paper provides a proof point for a basic installation of Oracle on the IBM BladeCenter. Future projects planned for the BladeCenter at the IBM / Oracle International Competency Center include installation of Oracle9*i* RAC and Oracle E-Business Suite with the IBM TotalStorage FAStT900 Storage Server. These will be the subjects of future white papers or updates to this white paper.

ABOUT IBM ^ BLADECENTER

With the recent launch of IBM ^ BladeCenter, IBM's mainframe-inspired technology now extends to the entire ^ product line.

The unique BladeCenter design addresses today's customers' most serious issues: space constraints, efficient manageability, resiliency, and the physical environment, which includes cooling and power. The BladeCenter servers take less time to install, fewer people to manage and maintain, and cost less than traditional server solutions. These new blade servers are so compact -- just about an inch thick -- and so easy to use that customers can increase the performance of their systems by simply sliding an additional BladeCenter server into the integrated chassis. It's just like putting books on a shelf. Since BladeCenter servers share a common, integrated infrastructure, basic components such as power, system ports and fans, they also lower power consumption and reduce system complexity.

Here are key benefits of using a BladeCenter:

- IBM ^ BladeCenter provides a shared infrastructure designed to minimize single points of failure. Resiliency is maximized with a high availability midplane, and hot-swappable power and cooling modules.

- IBM ^ BladeCenter offers one of the densest form factors in the industry. Fourteen BladeCenter servers can occupy a chassis only 7U in height. That means a standard full height rack can hold 84 HS20 2-way blades.

- Optional integrated Gigabit Ethernet and Fibre Channel switches provide quick access to external storage and network services. This integration reduces cabling by an impressive 83%.

- Included with IBM ^ BladeCenter is IBM Director 4.1 which provides systems management tools and the ability to manage the entire BladeCenter from a single remote console.

- Each IBM ^ BladeCenter HS20 server can have two Xeon processors, up to 80GB of IDE storage and 8GB of Chipkill memory.

- An optional SCSI storage expansion kit allows up to 144GB of storage in one BladeCenter server slot.

OUR CONFIGURATION

HARDWARE

We used a BladeCenter consisting of:
- Four BladeCenter HS20 servers, each with:
  - Two 2.0GHz processors
  - One 40GB IDE drive
  - 2.5GB RAM
  - Two Gigabit Ethernet adapters
  - One fibre channel adapter
- Two Gigabit switch modules
- One fibre channel switch module
- One CD-ROM drive and one floppy drive
- A mouse, keyboard and monitor connected to the management port on the BladeCenter

SOFTWARE

Linux

We installed Red Hat Enterprise Linux Advanced Server 2.1 (new name for Red Hat Advanced Server 2.1) and UnitedLinux 1.0 (SuSE Linux Enterprise Server 8, or SLES8) for our test.

For the latest information on supported operating systems for the BladeCenter, refer to:

http://www.pc.ibm.com/us/compat/nos/matrix.shtml

The BladeCenter has been certified for Red Hat Enterprise Linux AS 2.1 and SLES8. Refer to Red Hat's web site:

http://hardware.redhat.com/hcl/?pagename=hcl&view=certified&vendor=4&class=8#list

and SuSE's web site:

http://www.suse.com/de/business/certifications/certified_hardware/ibm/bladecenter_8677/

for information regarding these certifications.

*Oracle9*i

Oracle9*i* Release 2 is the current release of Oracle's database product on the 32-bit Linux/Intel platform. Version 9.2.0.1 is the installable version, available on CD's or by download from Oracle Technology Network (OTN). 9.2.0.2 and 9.2.0.3 are available as patch sets, and can be downloaded from Oracle*MetaLink*.

Oracle9*i* is currently certified for Red Hat Enterprise Linux AS 2.1 and SLES8. For the latest information on Oracle product certification, refer to:

http://otn.oracle.com/support/metalink/content.html

SETTING UP THE HARDWARE

The first step was to provide 220V power to the BladeCenter. Once plugged into the power source, the BladeCenter powers up automatically.

Figure 1 shows a front view of the BladeCenter. The control panel on each blade server contains buttons used to switch the keyboard, monitor and mouse to that blade. The control panel also features a cover, which can be flipped down to access the power button for that blade server.
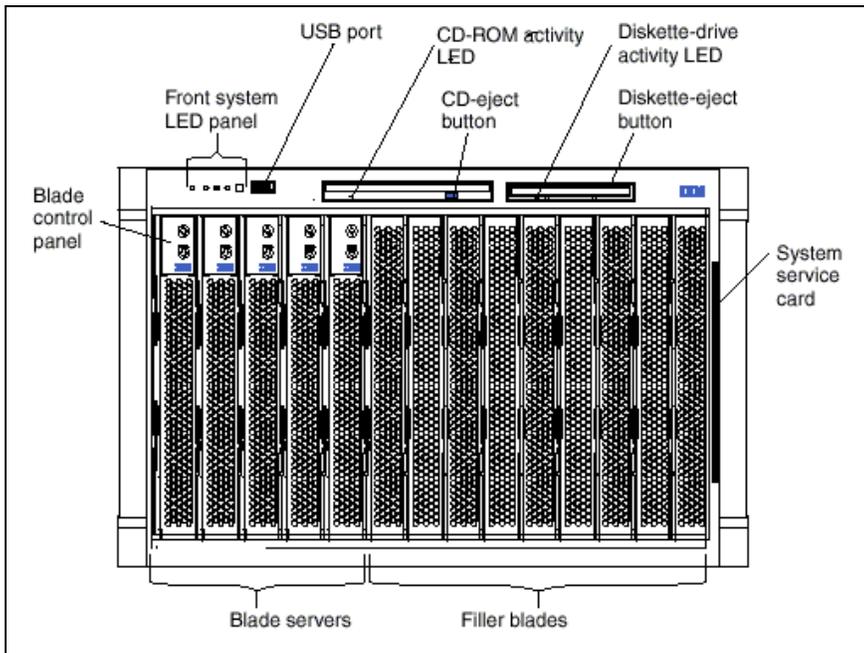

Figure 1. BladeCenter front view

Figure 2 shows a rear view of the BladeCenter. The BladeCenter comes with one hot-swap management module in the management bay. Note the location of the management module on the upper right hand corner.
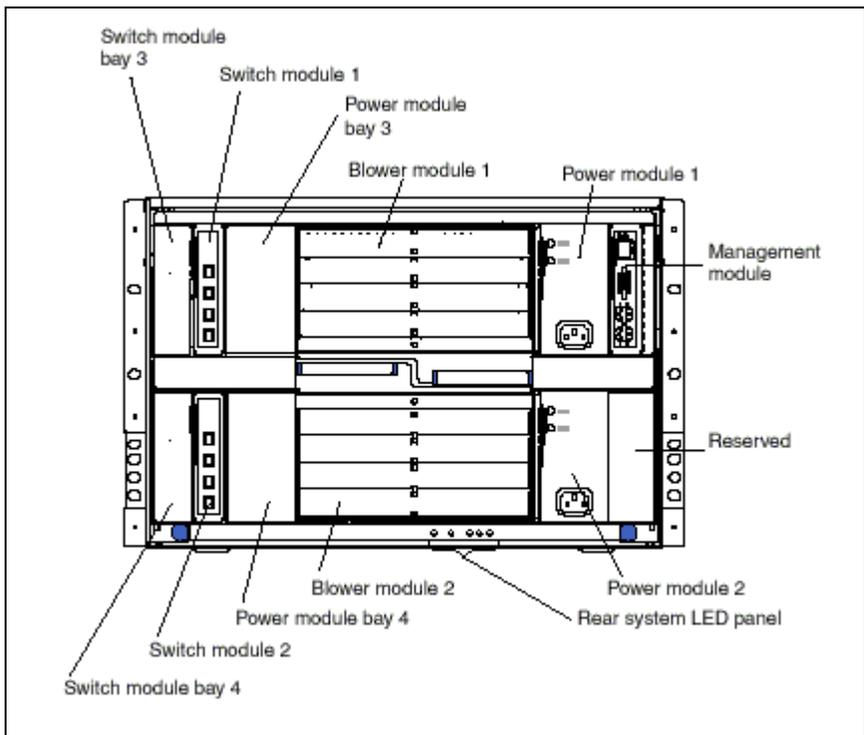

Figure 2. BladeCenter rear view

The management module functions as a system-management processor and a keyboard/video/mouse-multiplexing switch for the blade servers. It provides the following external connections:
− Keyboard, video, and mouse ports for a local console
− One RJ-45 port for a 10/100 Ethernet connection, which provides access to the system management processor

The system management processor communicates with other BladeCenter components, providing functions such as:
− Status monitoring of the blade servers, switch modules, power modules, blower modules
− Blade server management and control, e.g. power/restart, upgrading firmware, switching the keyboard/video/mouse, etc., in conjunction with the blade server service processors
− Switch modules configuration, such as enabling/disabling external ports
− Remote console

Communication with other BladeCenter components occurs over an internal management network. The system management process and managed components are assigned default IP addresses, which can be changed for deployment in a larger network. Though not required for deployment, it is recommended that the management network be on a separate network segment, with access limited only to those responsible for administering the BladeCenters. For our test, we did not change the default IP addresses on the internal management network.

Figure 2 shows two switch modules, located on the left hand side of the BladeCenter. These provide Gigabit Ethernet connections from the blade servers to external networks. Optional fibre switch modules may be installed in the Switch module bays for connections to external storage, e.g. TotalStorage FAStT controllers, from optional fibre channel adapters on the blade servers.

The Gigabit Ethernet controller located nearer the bottom of the blade server, routed through switch module 2, is associated with the first Ethernet interface in Linux (eth0). The Ethernet controller located near the top of the blade, routed through switch module 1, is associated with the second Ethernet interface (eth1). This association is summarized in the table below.

Ethernet controller location on blade server	Routed through switch module	Linux interface
Top of blade server	1	eth1
Bottom of blade server	2	eth0

We connected eth0 on our blade servers to our campus network. To do this, we needed to enable the external ports on Ethernet switch 2. This was done through the system-management processor as follows:

1. Connect another system or server to the management module Ethernet port. We used a crossover cable to connect a laptop running Windows 2000 to the management module (upper right hand corner shown in Figure 2). Change the laptop's IP address to 192.168.70.124, subnet mask 255.255.255.0, in order to be on the same subnet as the management module's default IP address and subnet. Using Netscape, type the address 192.168.70.125 in the Location field and press Enter to access the BladeCenter Management Module.

2. A popup window is displayed, prompting for a userid and password. Enter:

    Userid: USERID
    Password: PASSW0RD   (zero in place of the letter O)

    Be sure that you enter the information in capital letters.

3. The BladeCenter Management Module welcome screen, shown in Figure 3, is displayed. Change the Inactive session timeout value to `no timeout`, and click **Continue**.
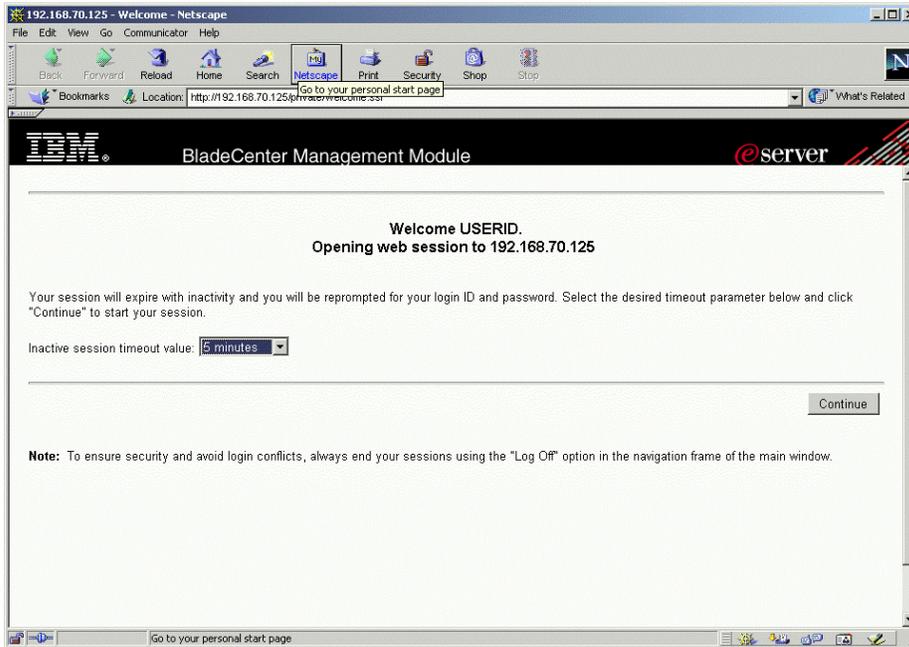
Figure 3. BladeCenter Management Module welcome screen

4. The System Status Summary screen is displayed, as shown in Figure 4. Click **Management** on the left hand panel, under **Switch Tasks**.
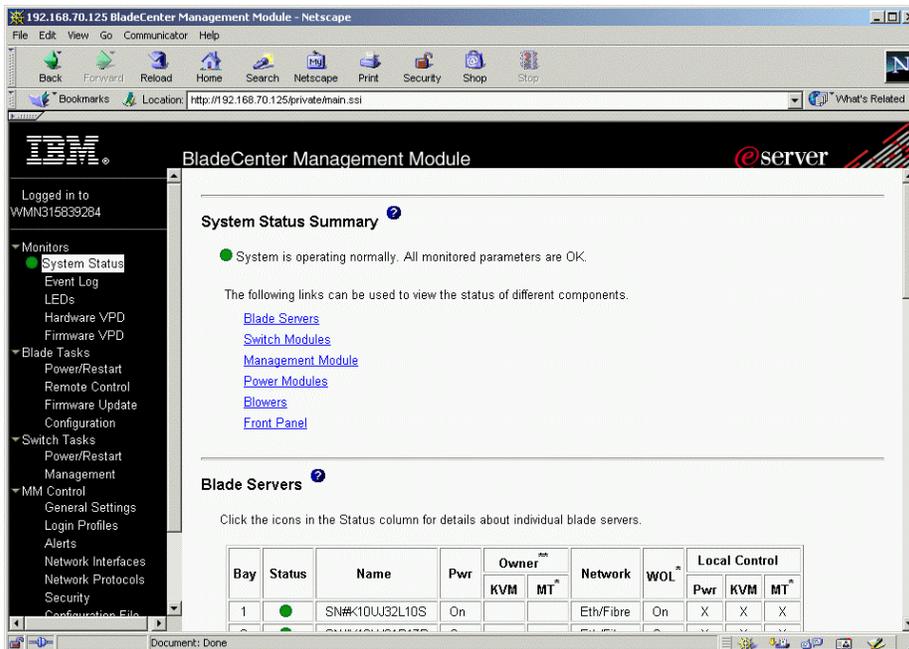

Figure 4. System Status Summary

5. The Switch Management screen, shown in Figure 5, is displayed. Click **Switch Module 2** to access the section for switch module 2.
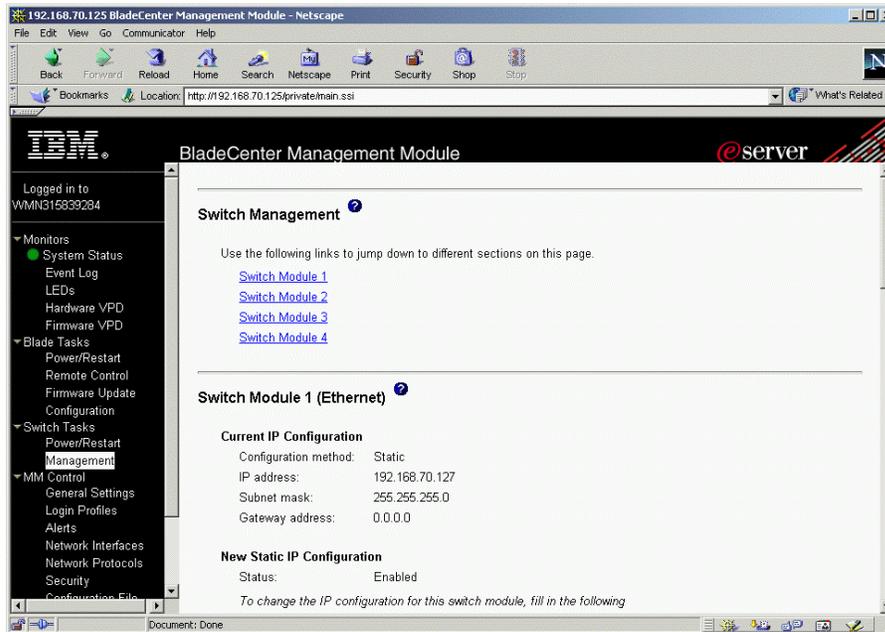
Figure 5. Switch Management

6. On the Switch Module 2 section (Figure 6), click **Advanced Switch Management** or scroll down to the Advanced Switch Management section.
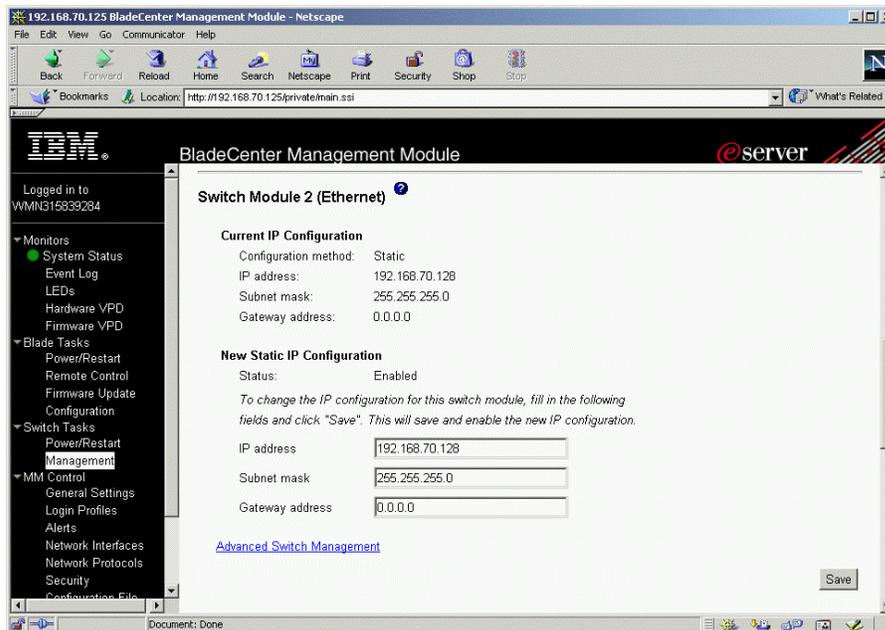
Figure 6. Switch Module 2 (Ethernet)

7. On the Advanced Setup section (Figure 7), click the pull-down list for External ports and select **Enabled**, as shown. Click **Save** to activate the change.

   If you want to connect eth1 on the blade servers to the external network, scroll up to the top of the screen and repeat the procedure to enable external ports on Switch Module 1.
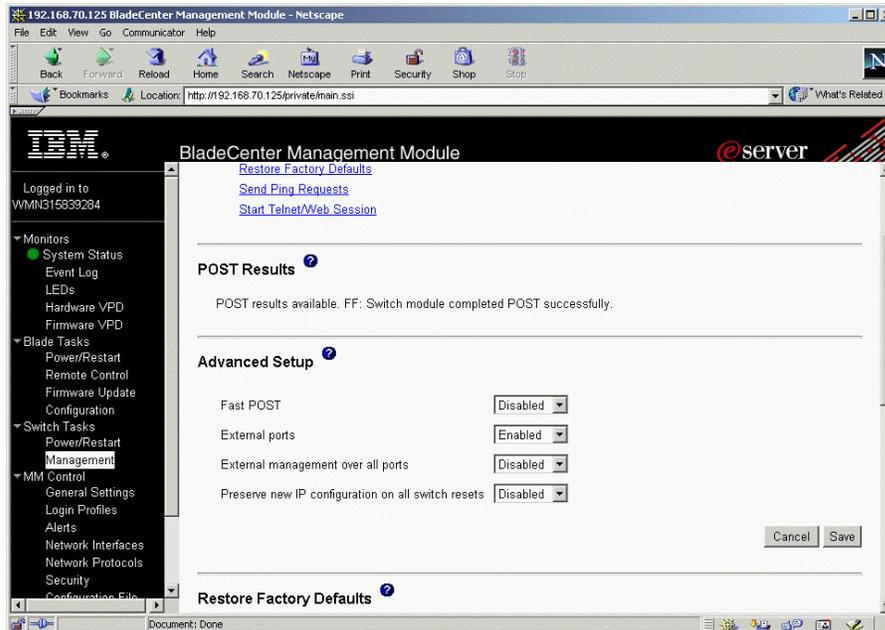

Figure 7. Advanced Setup

The next steps are focused on the individual blade server. When you have determined which blade server to install, perform the following:

1. Connect a keyboard, video monitor and mouse to the ports on the management module, shown in Figure 2, upper right hand corner.

2. On the blade server being installed, use the blade server's control panel buttons (see Figure 1) to obtain ownership of the keyboard/video/mouse and CD-ROM/diskette drive. This can also be done using the BladeCenter Management Module.

To use the BladeCenter Management Module, click **Remote Control** on the left hand panel, under Blade Tasks. Then click Redirect Server Console, shown in Figure 8. This will launch a new browser window for the remote console, shown in Figure 9. On the field labeled **Change KVM owner**, click the pull-down list and select the blade server you want to access. The local console screen will be displayed on your browser. To switch the CD-ROM and diskette drive, select the blade server in the field labeled **Change media tray owner**. For example, Figure 9 shows the SLES8 installation screen.

If you do not see the console screen, make sure that your browser is enabled for Java Plugin. For example, in Netscape 4.8 Communicator, this is found by clicking **Edit → Preferences → Advanced**. Check **Enable Java**, then **Enable Java Plugin**. In Microsoft Internet Explorer 5.5, click **Tools → Internet Options → Advanced** and uncheck **Use Java 2 1.4.1_01** under **Java (Sun) for <applet>**.
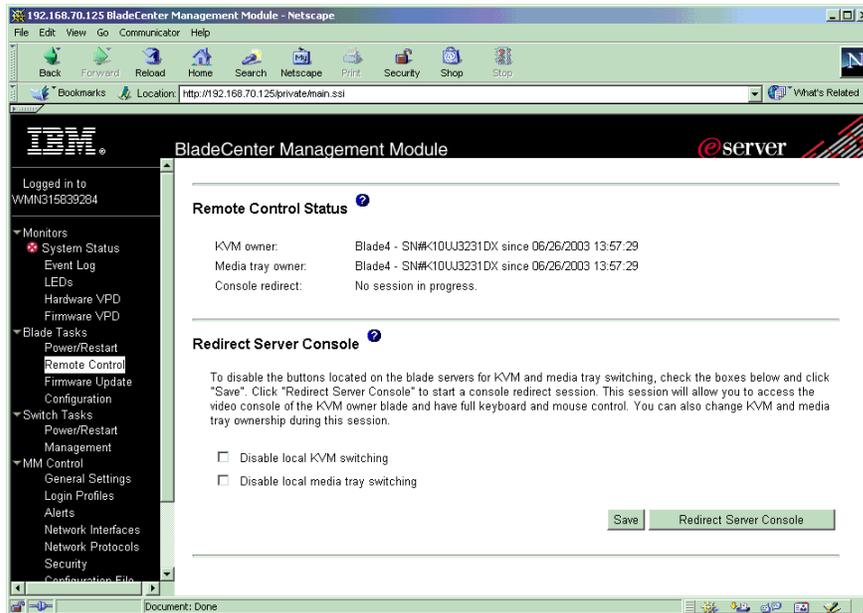
Figure 8. Remote Control screen
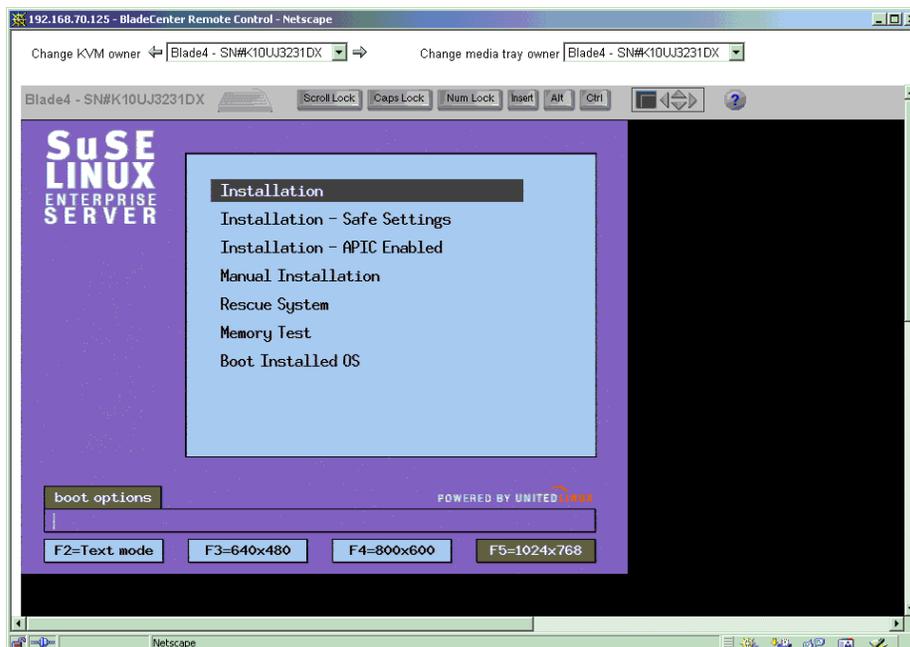
Figure 9. Remote console

3. Power on the blade server, using the power button behind the flip-down door on the blade server control panel. Again, this can also be done using the BladeCenter Management Module. Do this on the original browser window showing the BladeCenter Management Module screen (e.g. Figure 7). On the left hand panel, under Blade Tasks, click **Power/Restart**.

INSTALLING LINUX

This section describes our installation of Linux on the blade server. We installed both Red Hat Enterprise Linux AS 2.1 (RHELAS) and SuSE Linux Enterprise Server 8 (SLES8).

We installed Linux from the CDs. If you have multiple blade servers, you may wish to consider a network installation.

The next section describes our installation of SLES8. If you are installing Red Hat Enterprise Linux AS 2.1, skip to page 22.

SuSE Linux Enterprise Server 8

Immediately after powering on the blade server, insert the first CD into the CD-ROM. We started with the SuSE Linux Enterprise Linux Server 8 CD to get the SuSE YaST2 modules and other add-ons. You can install Linux using only the United Linux 1.0 CDs.

The installation program does not detect the USB mouse properly, so for the first 4 screens of this procedure, the keyboard was used to interact with the installation program. The screens shown below were captured on the remote console, but the local console was used to perform the installation.

1. Once the blade server is powered up, the SLES8 installation screen is displayed, shown in Figure 10. Press Enter to start the procedure.

Figure 10. SLES Installation screen

2. The SuSE End User License for SLES screen is displayed, shown in Figure 11. Press Enter to accept the license agreement.
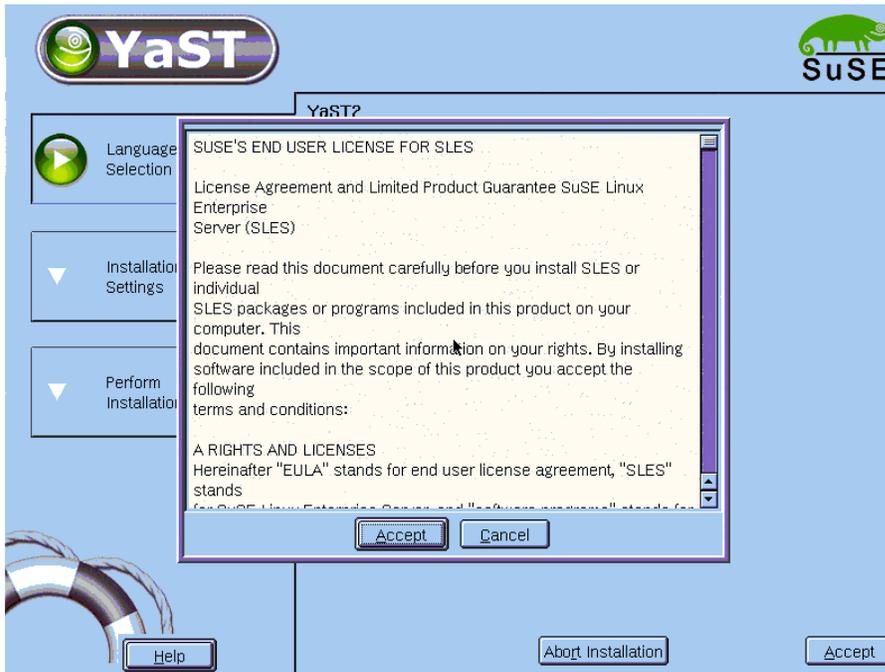

Figure 11. SLES End User License

3. The Language Selection screen is displayed, shown in Figure 12. Use the cursor keys to select the appropriate language. Press Alt-a to accept and continue.
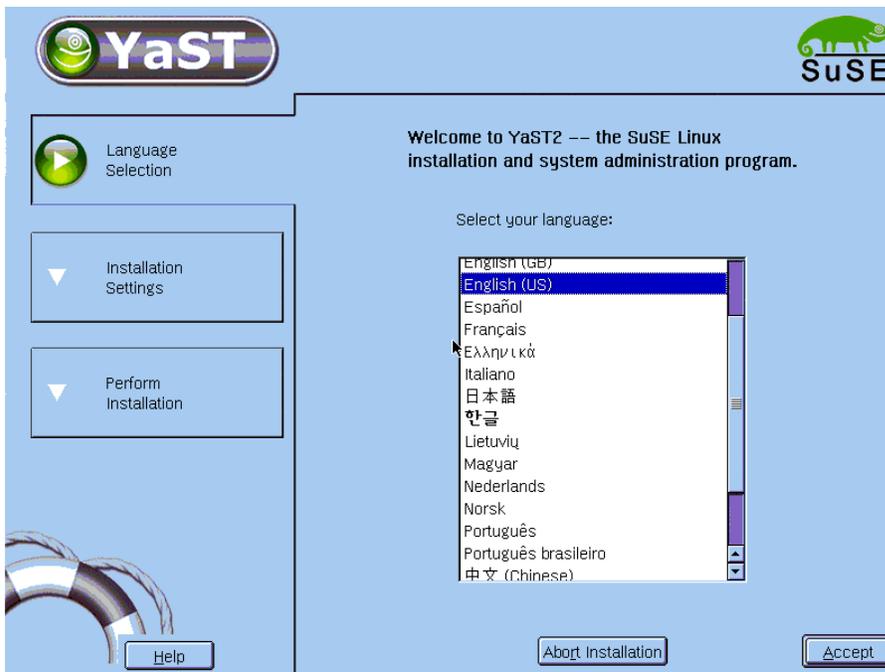
Figure 12. Language Selection

4. The Installation Settings screen is displayed, shown in Figure 13. Subsequent steps for changing the various installation settings will begin and end with this screen. Change the Mouse selection first in order to get the mouse functional for the remaining steps.
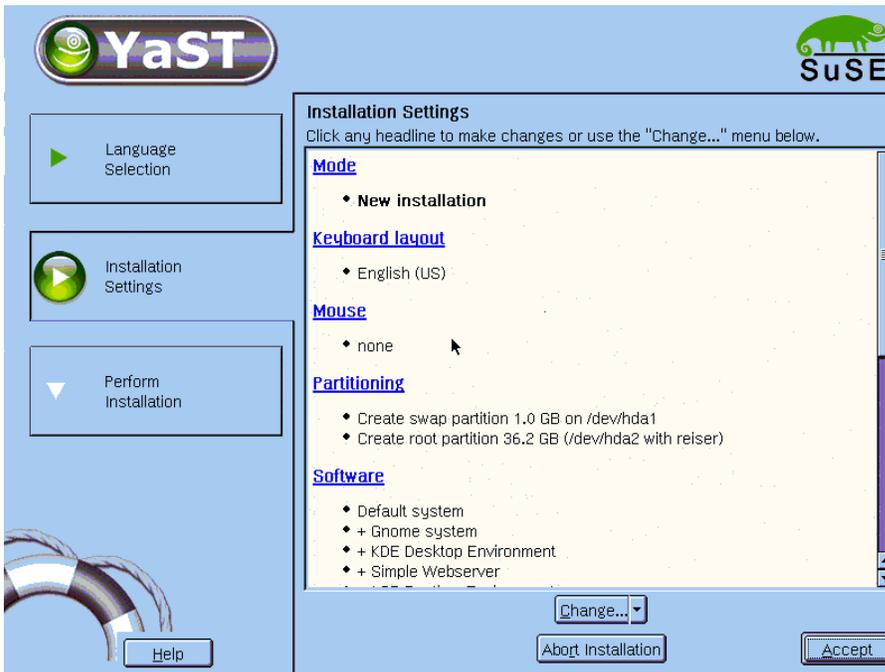
Figure 13. Installation Settings

5. Press Alt-c and use the cursor keys to select Mouse. Figure 14 illustrates this step.
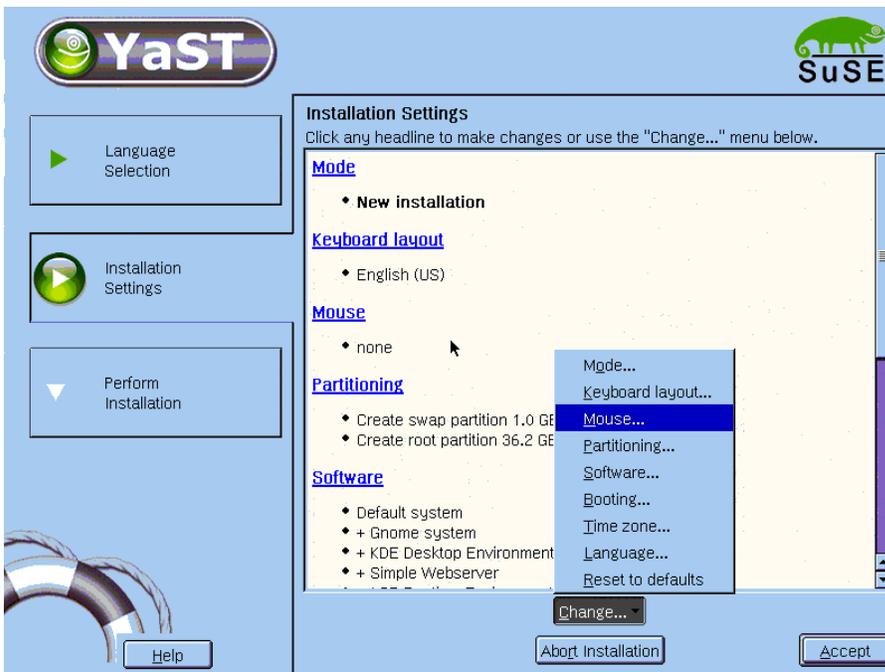

Figure 14. Change Mouse setting

6. The Mouse configuration screen is displayed. Select USB Mouse as shown in Figure 15 and press Alt-t to test. When finished, click **Accept** to continue. The installation program will return to the screen in Figure 13. The mouse will be functional from this point until the system is rebooted for the second part of the installation.
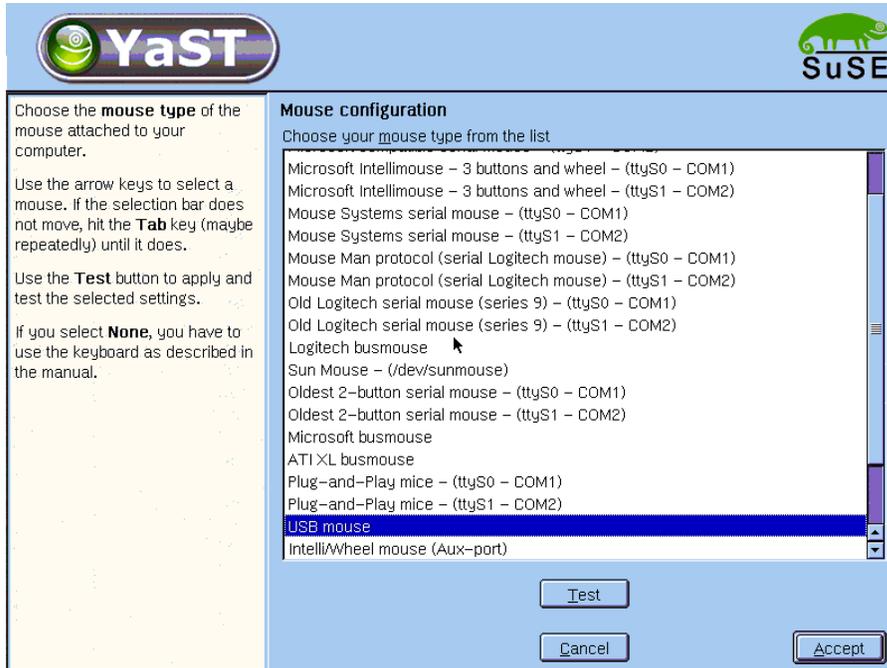

> Figure 15. Mouse configuration

7. Take note the settings under Partitioning on Figure 13. For our installation on one 40GB disk, SLES8 automatically configured one large partition for the root filesystem. If you have more disks, be sure to review this setting and modify the settings to suit your requirements.

For our installation, we used ext2. To change the default setting of reiser, click **Change** and select **Partitioning**. The Suggested Partitioning screen is displayed, shown in Figure 16. Select **Base partition setup on this proposal** and click **Next**.
.
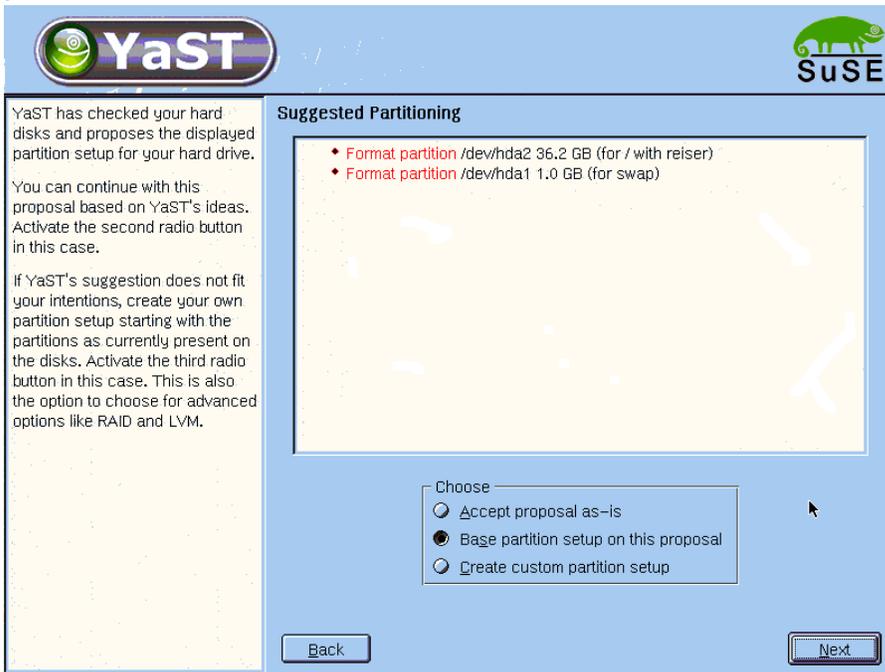
Figure 16. Suggested partitioning

8. The Expert Partitioner screen is displayed. Select the root filesystem and click **Edit**.
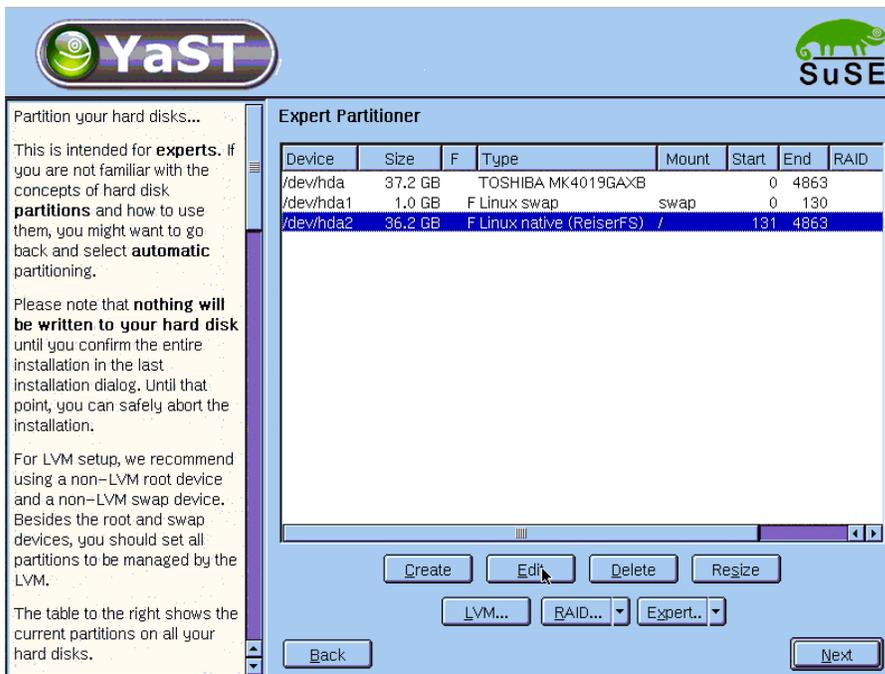
Figure 17. Expert Partitioner

9. A popup window is displayed for editing the selected partition. Select Ext2 File system and click **OK** to return to the Expert Partitioner screen. Click **Next** to return to the Installation Settings screen.
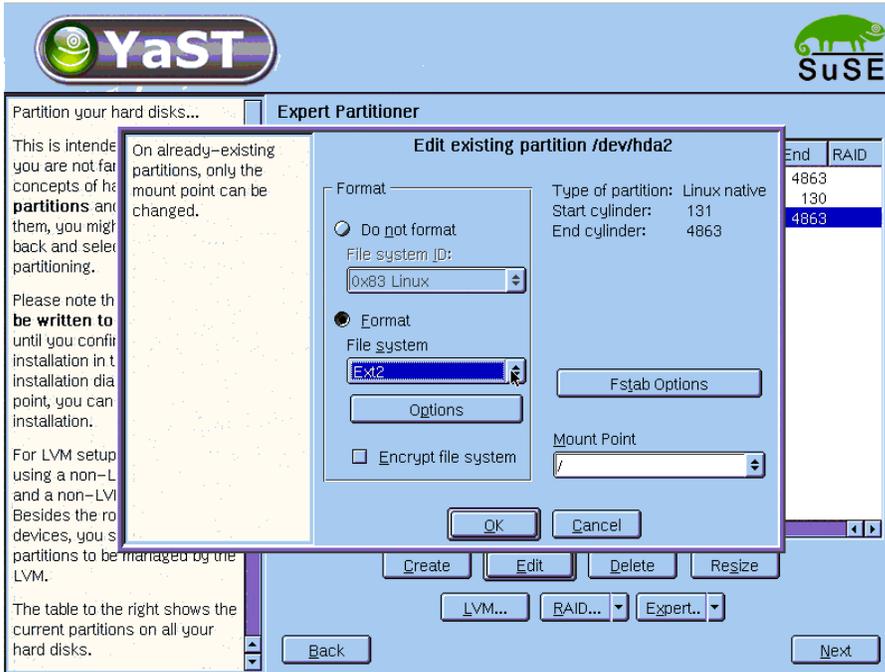

Figure 18. Edit partition popup window

10. On the Installation Settings screen (Figure 13), click **Change** and select **Software**. The screen shown in Figure 19 is displayed. Leave **Default system** as shown and click **Detailed selection** to continue.
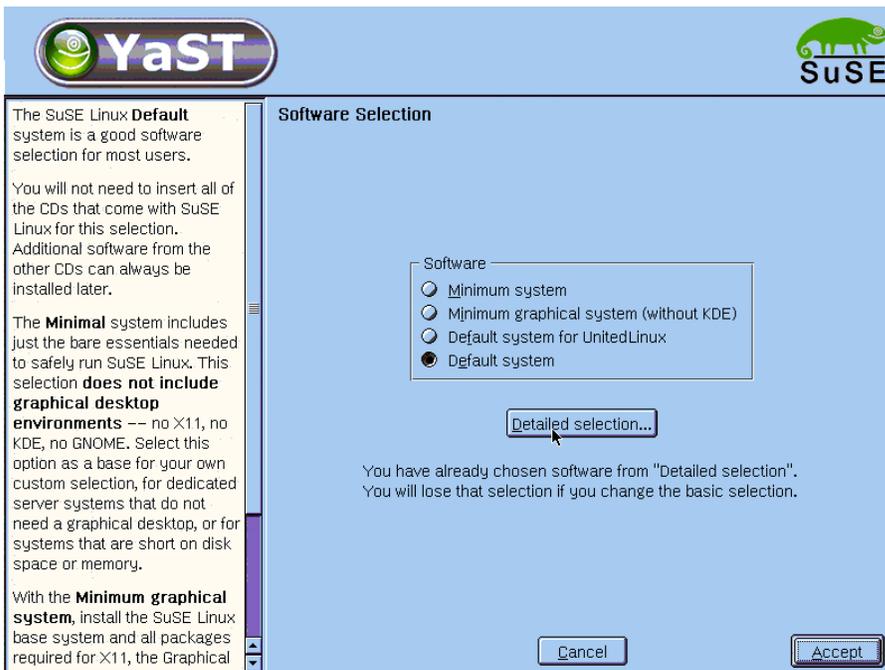

Figure 19. Software selection

11. A detailed software selection screen is displayed. Deselect items on the left hand panel to match Figure 20. Notice that C/C++ Compiler and Tools was not selected. This is because Oracle9*i* R2 was built using version 2.95 of the gcc compiler, while UnitedLinux 1.0 was certified with gcc 3.2. Our next step was to install gcc 2.95 and other development libraries.

If you choose to install C/C++ Compiler and Tools for other requirements, you will need to make sure that the gcc 2.95 is first in your path for Oracle.
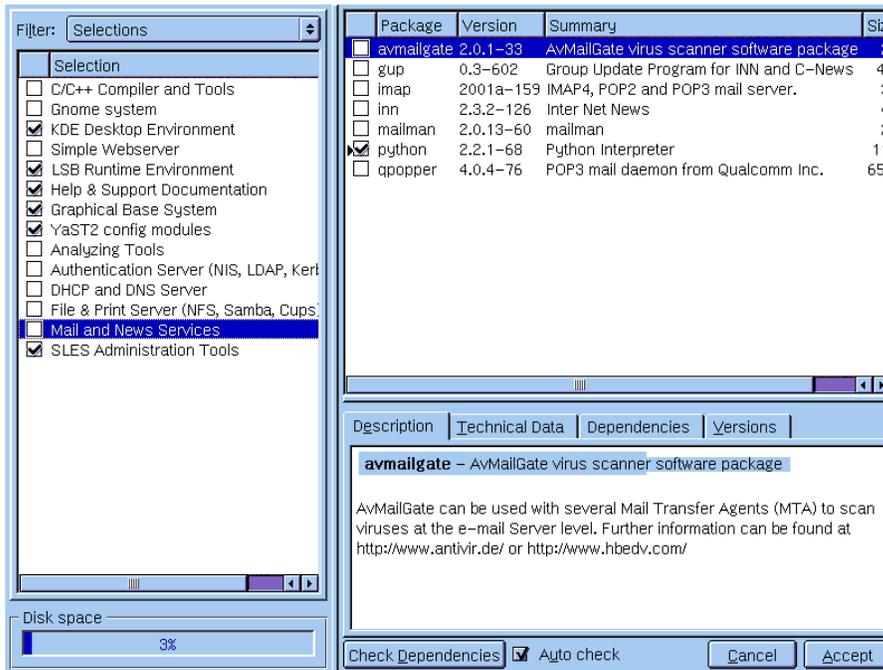

Figure 20. Detailed software selection

12. Install gcc_old, glibc-devel, and libaio-devel as follows. On the screen shown in Figure 20, click on the **Filter** field (upper left hand corner) and change it to **Search** as shown in Figure 21. Type gcc_old in the Search field and click **Search**. When the package is displayed in the upper right hand panel, check it.

Repeat the procedure for glibc-devel and libaio-devel. When finished, click **Accept** to return to the Installation Settings screen.
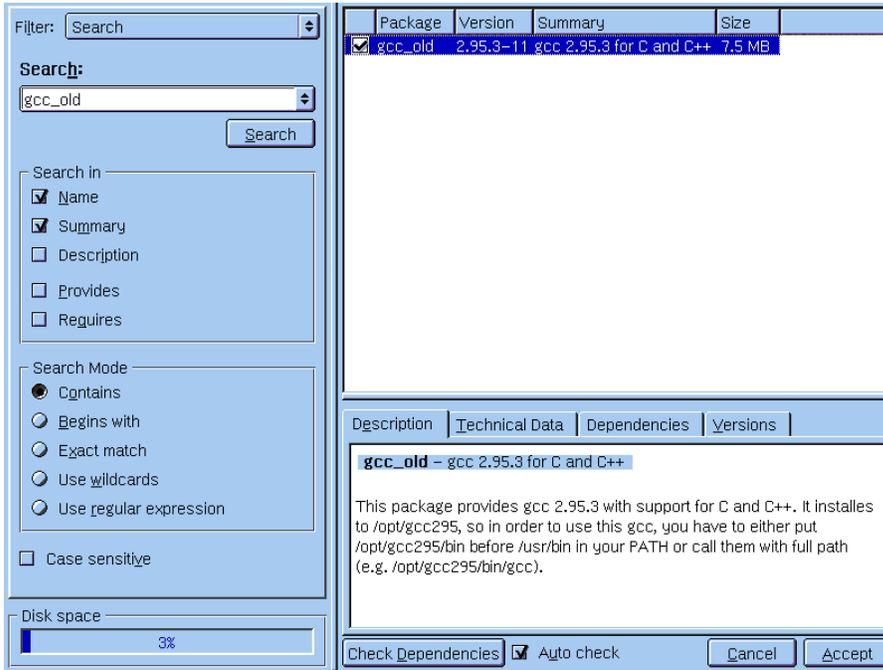

Figure 21. Detailed software selection - search filter

13. On the Installation Settings screen (Figure 13), scroll down and select Booting. The Custom boot manager installation screen shown Figure 22 is displayed. Type `acpi=oldboot` in the Kernel boot parameters field. Click **Accept** to continue.

    This parameter will be written in the file named `/boot/grub/menu.lst`, in the stanza for the default kernel. If you miss this step, you can specify this kernel boot parameter on the grub Boot Manager screen and make it permanent by editing `/boot/grub/menu.lst`.
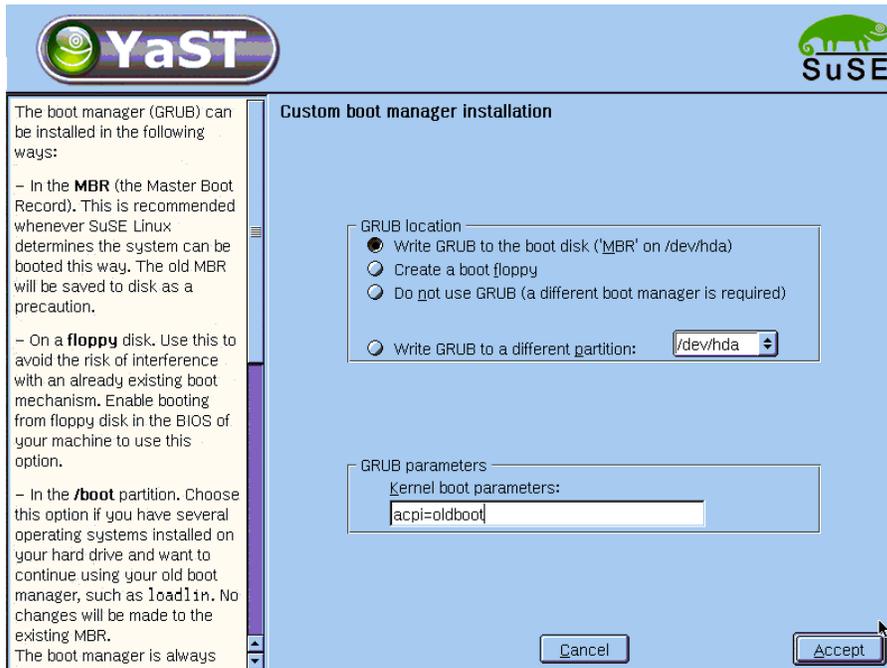

Figure 22. Custom boot manager installation

14. Finally, from the Installation Settings screen, select **Time Zone** to verify the time and time zone setting. When finished, click **Accept** on the Installation Settings screen to perform the installation.

15. The popup window shown in Figure 23 is displayed to confirm the start of installation. Click **Yes, install** to begin installation.
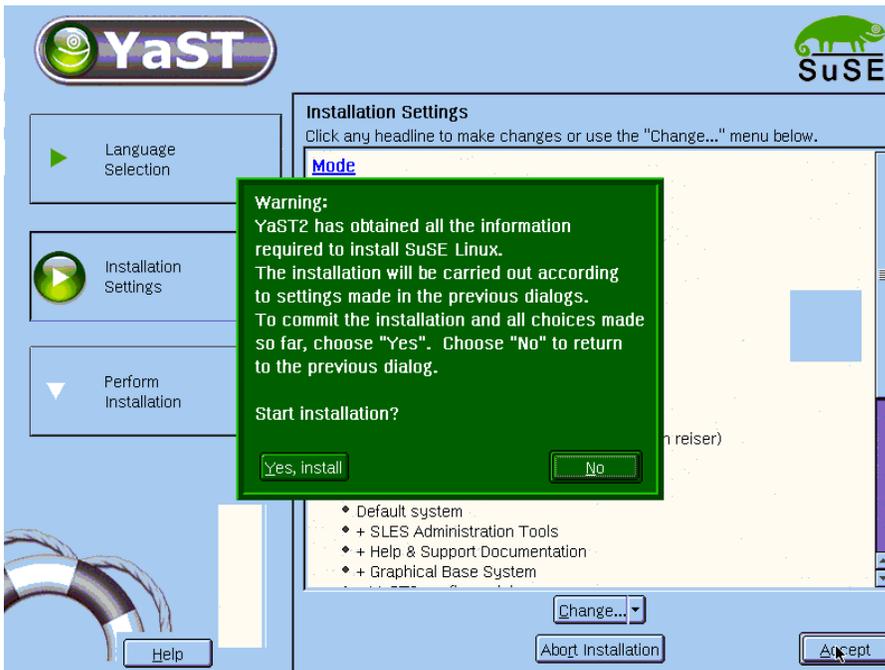

Figure 23. Popup window - confirm installation

16. A screen showing installation progress is displayed. Click **Detail** or **Slideshow** to change the information being displayed. When prompted, insert the requested CD into the CD-ROM drive.
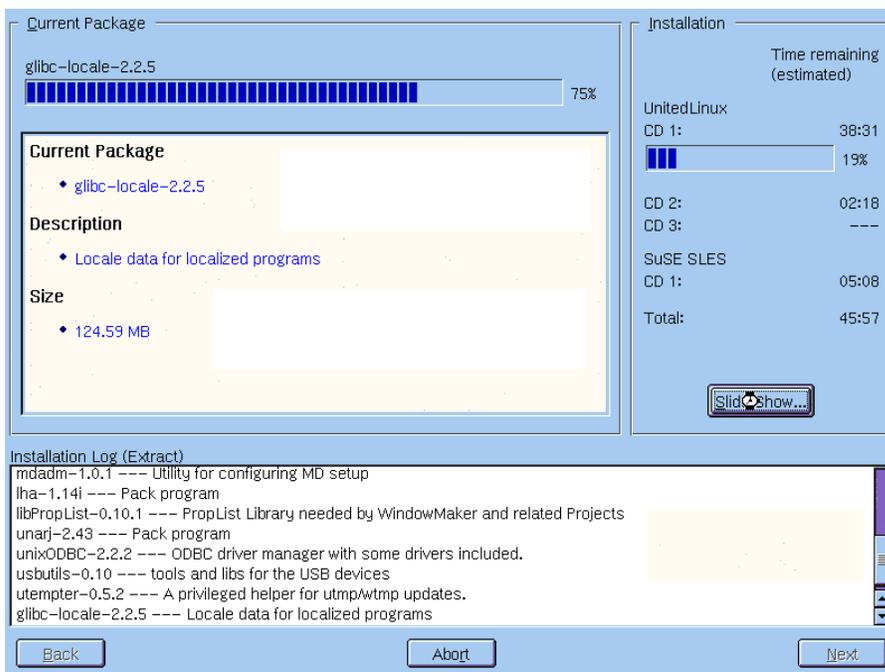

Figure 24. Installation progress

17. When installation is completed, the screen shown in Figure 25 is displayed. Remove the CD from the CD-ROM drive and press Enter. The system is restarted.
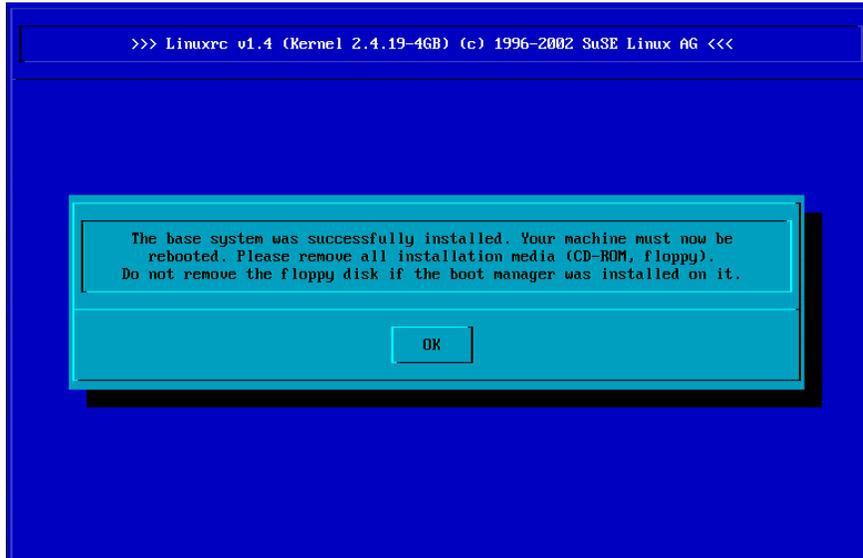

Figure 25. Successful installation

18. After reboot, the installation program goes through a series of steps to:
    a. Enter root password
    b. Create one or more user accounts
    c. Configure the graphical desktop environment
    d. Configure other devices, including network interfaces, printers, etc.

    The mouse will not work because the mouse driver needs to be loaded. Press Ctrl-Alt-F2 to access a shell prompt, type `insmod mousedev`, and then press Ctrl-Alt-F7 to return to the installation program. When finished, the login prompt will be displayed.

19. Post installation
    a. Setup to load the mouse driver during bootup
        As root user, edit the file named `/etc/sysconfig/hotplug`. Find the line beginning with `HOTPLUG_USB_STATIC_MODULES`. Add `mousedev,` to end up with the line shown below:

        ```
        HOTPLUG_USB_STATIC_MODULES="evdev joydev mousedev"
        ```

    b. The diskette drive is `/media/sr0`. If you are unable to mount this device, review `/etc/fstab` to verify the diskette drive's device name.
    c. We obtained and applied United Linux Service Pack SP-1 and SP2a.   Use YaST2 to apply the Service Packs. After applying service packs, our kernel version was k_smp-2.4.19-304.

This concludes the installation of SLES8. Skip to page 28 to install Oracle9*i*.

RED HAT ENTERPRISE LINUX AS 2.1

Install Red Hat Enterprise Linux AS 2.1 as follows:

1. Refer to the document entitled IBM eServer BladeCenter – Installing Red Hat Enterprise Linux AS Version 2.1 (References 1) for instructions on setting up the BladeCenter hardware, updating the firmware, and configuring the disk drives using the IBM ServeRAID and LSI SCSI controllers as applicable.

If you are using the original CDs for Red Hat Advanced Server 2.1, you will need to obtain boot disk and driver disk images as described in the current version of this document, dated April 9, 2003. We did not need to do this since we were using Red Hat Enterprise Linux AS (ELAS) 2.1 Update 2. The remaining steps describe our installation procedure using Red Hat ELAS Update 2.

2. Power on the BladeCenter HS20 and insert the first Red Hat ELAS CD into the CDROM drive.

3. The Red Hat text-mode welcome screen is displayed. Press Enter to install Red Hat Linux in graphical mode.

4. We will not describe all the steps to install Red Hat ELAS here, but rather refer you to The Red Hat Enterprise Linux AS Installation Guide (References, 11). However, a number of steps were important to our installation, and these were as follows:

    a. In the Mouse Configuration window (Figure 26), verify selection of a USB mouse, either Generic – 3 Button Mouse (USB) or Generic – 2 Button Mouse (USB).
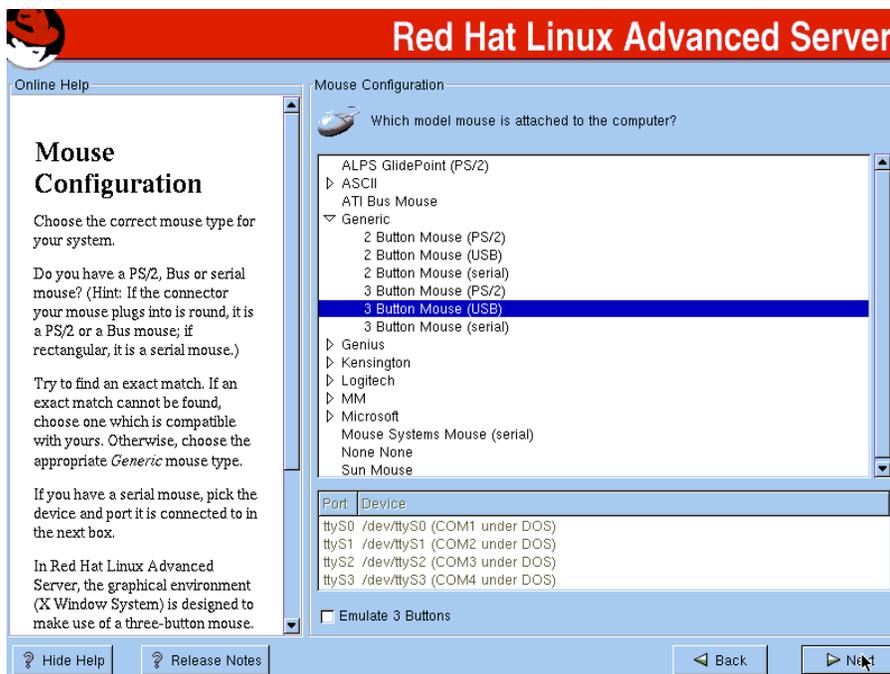

Figure 26. Mouse Configuration

b. In the Disk Partitioning Setup screen, we chose to have the installer automatically partition the disk, as shown in Figure 27. Click **Next** to continue.
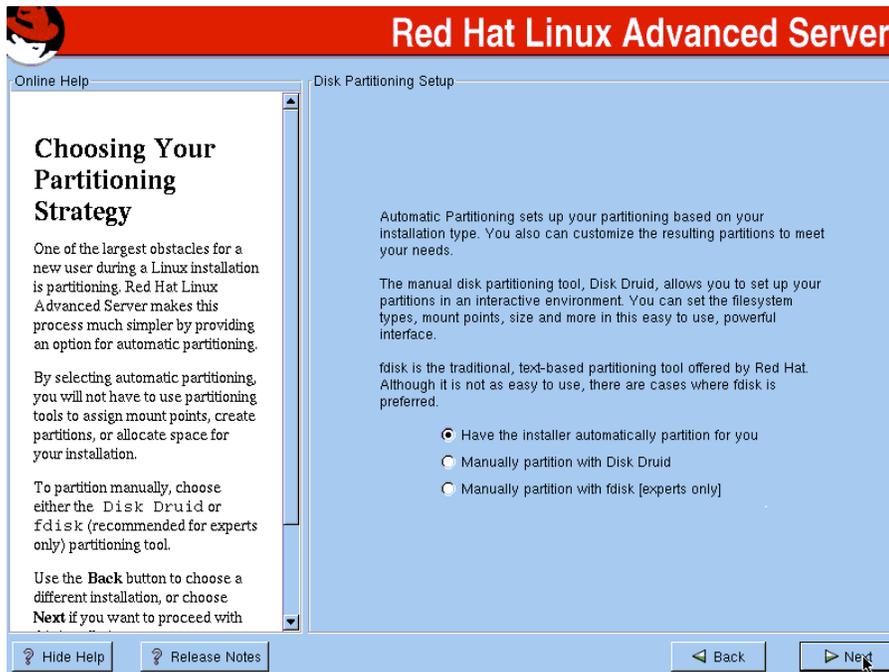

Figure 27. Disk partitioning Setup

c. On the Automatic Partitioning screen (Figure 28), check **Review** and click **Next**.
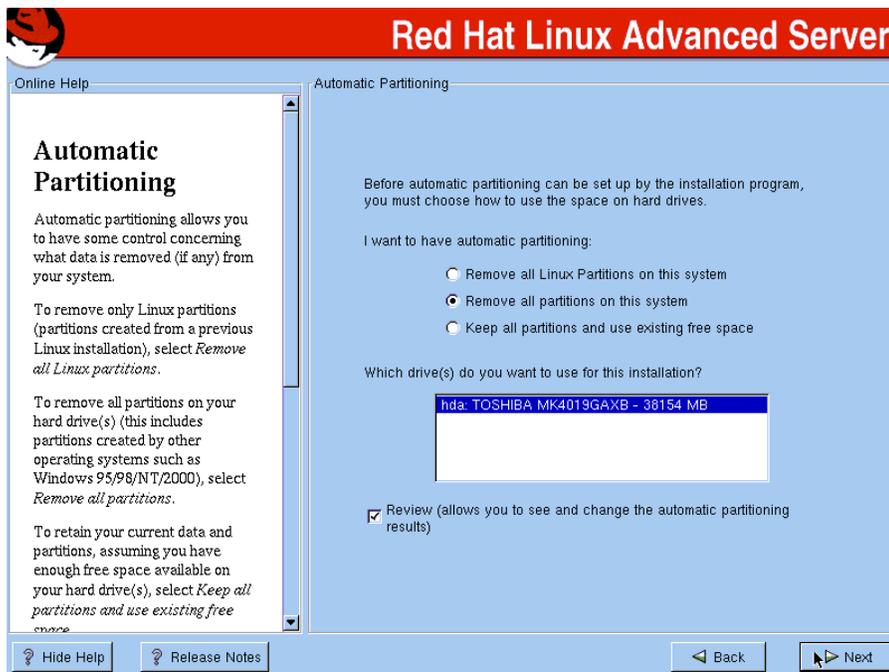

Figure 28. Automatic partitioning

d. On the Disk Setup screen, shown in Figure 29, notice the sizes of / (root filesystem), /user, and /home. The Oracle installer requires up to 400MB of temporary space, so we increased the root filesystem to provide a large enough /tmp. We also reduced both /usr and /home to create a new partition for our ORACLE_HOME.
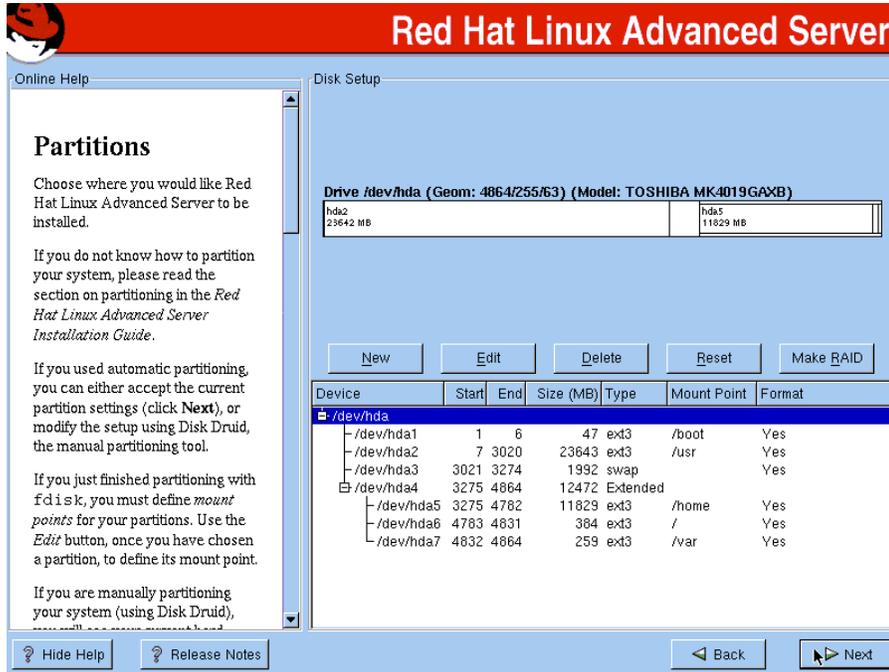

Figure 29. Disk Setup

Figure 30 shows the Disk Setup with our changes.
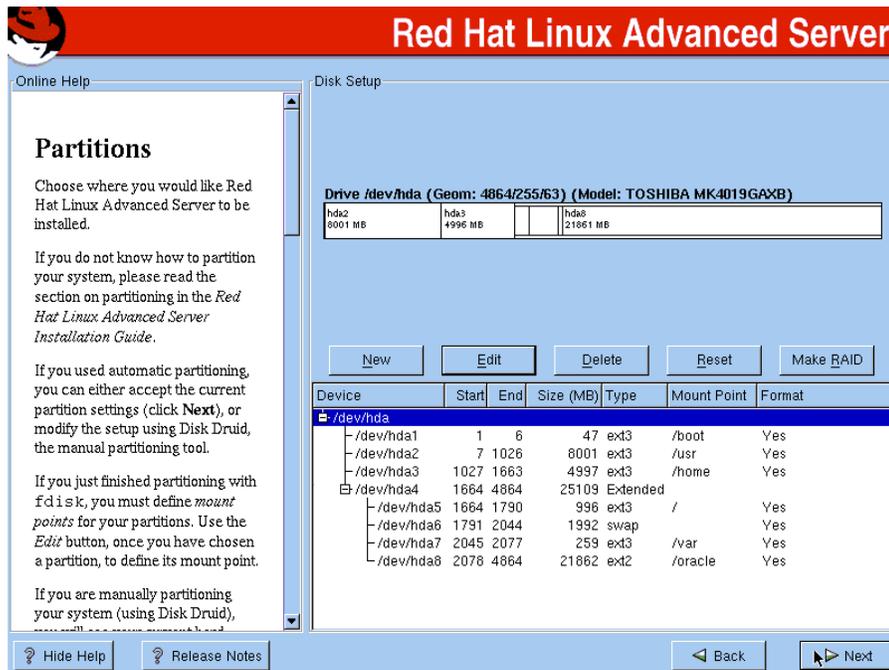
Figure 30. Disk setup with modified partitions

e.   On the Firewall Configuration screen, take note of the default selections. Leaving the default settings will interfere with setup activities later on that require network communications. Either configure the firewall at this time, or defer it for later by choosing No firewall. To simplify our installation, we chose No firewall (Figure 31).
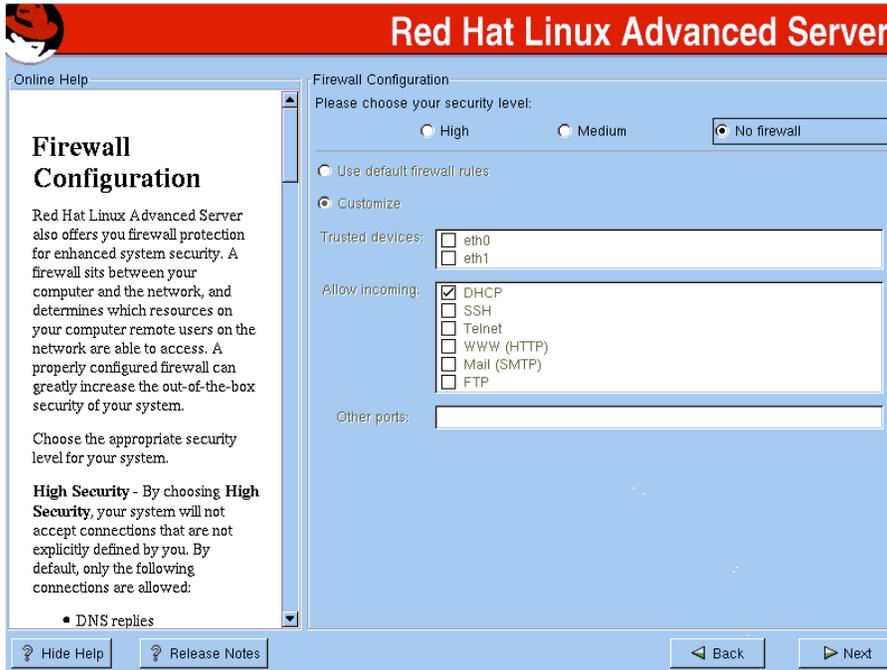

Figure 31. Firewall configuration

f.   When the Package Group Selection screen is displayed (Figure 32), select Software Development, which you will need for the Oracle9*i* installation.   Check Select individual packages to review and modify selections as needed.
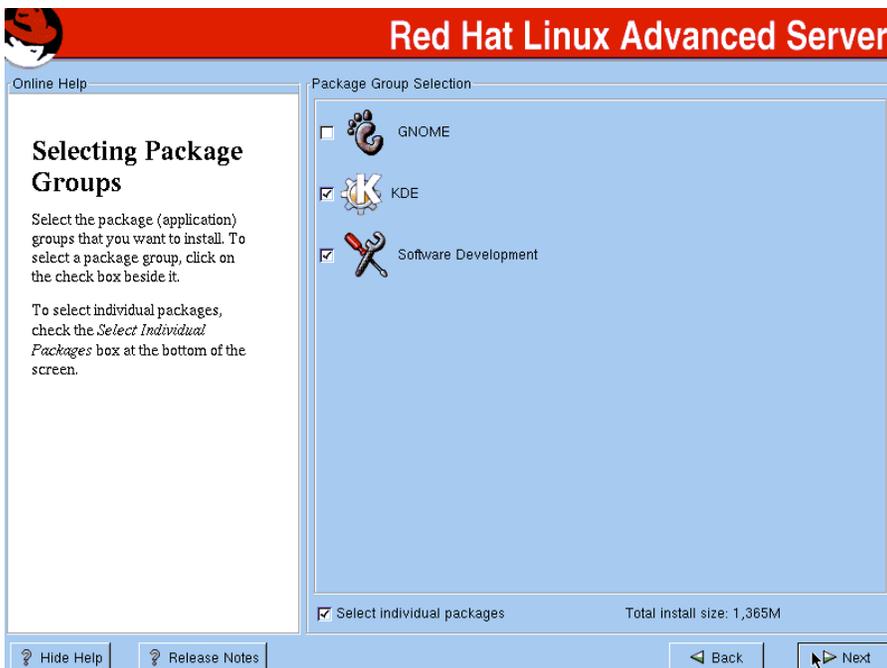

Figure 32. Package Group Selection

g. The Individual Package Selection screen is displayed. Review the selections and select additional packages as required. We added the ftp server, which is not one of the default selections. To do this, click **System Environment → Daemons** on the left hand panel. Scroll down on the right hand panel and select the wu-ftp daemon, wu-ftpd.
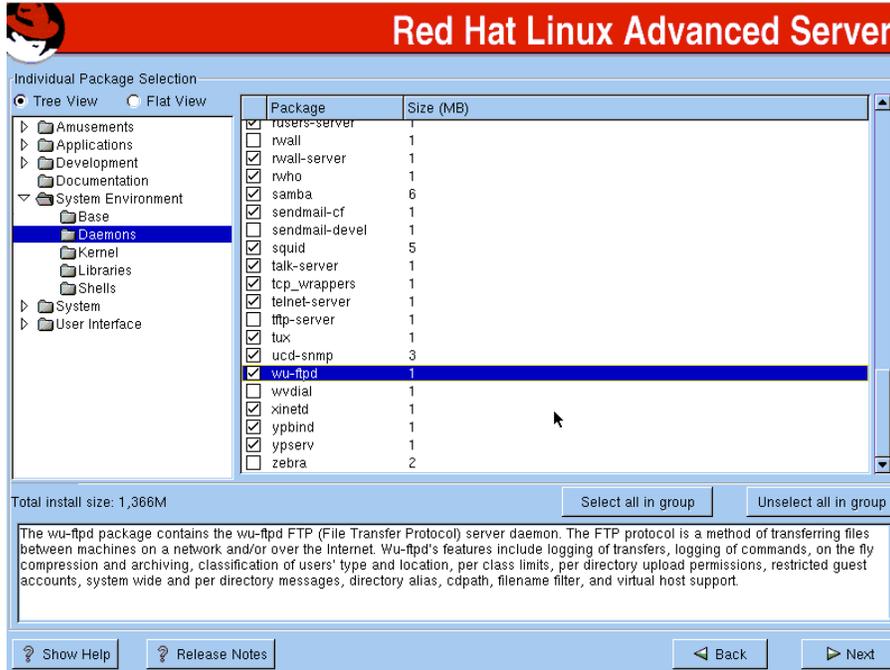
h. When the Red Hat installation is complete, a Congratulations window is displayed. Click **Exit** and remove the CD and diskette from their respective drives. Red Hat restarts the server.

Note: During our installation, the system did not shut down completely. The last message on the console was "`Unmounting file systems:`". We used Ctrl-Alt-Del to reboot the server manually.

5. Post-installation
    a. CD-ROM
        After installing Red Hat Enterprise Linux AS 2.1, the CD-ROM fails to mount if the drive has been previously switched to another blade server. To resolve this, do the following as root user:
        i)   Create the mount point for the CD-ROM under /mnt. Type the command:

                mkdir /mnt/cdrom

        ii) Edit `/etc/fstab`. Change the device in the entry for the CD-ROM from `/dev/cdrom` to `/dev/scd0`.
    b. Diskette drive
        Perform the following steps as root to enable mounting of the diskette drive:
        i)   Create the mount point for the diskette drive under /mnt. Type the command:

                mkdir /mnt/floppy

        ii) Edit /etc/fstab and add the following statement:

                /dev/sda   /mnt/floppy   auto   noauto,user   0 0

    c. The kernel version installed was 2.4.9-e.24smp.

INSTALLING ORACLE9*I*

PRE-INSTALLATION TASKS

To prepare the system for Oracle9*i* installation, perform the following:

1. Create the operating system group for the Oracle Universal Installer Inventory and the user ID that will be used to install, configure and run Oracle. In our test, we created the oinstall group and the oracle user ID. You will need to be root user to do this. From a shell prompt, type the following commands:

    ```
    groupadd oinstall
    groupadd dba
    useradd -g oinstall -G dba -m oracle
    ```

    Change oracle's password to enable login. Type the following command:

    ```
    passwd oracle
    < type the desired oracle password when prompted>
    ```

2. Oracle 9*i* Release 2 for Linux is supplied on three CDs, so it is necessary to switch product CDs during installation. Oracle Universal Installer (OUI) will manage the switching between CDs and ask you for the CD location when necessary.

    For our installation, we copied the Oracle9*i* product CDs to the hard disk. The three product CDs were copied to three subdirectories named /stage9i/Disk1, /stage9i/Disk2 and /stage9i/Disk3, respectively.

    If you chose to install from the CDs, do not run OUI while the CD is the current directory, or you will not be able to switch CDs when prompted.

3. Modify the kernel parameters that affect resources used by Oracle9*i*: This task must be performed as root user.
    a. Review kernel parameter recommendations in Reference 9. Use the sysctl command to do look at the current settings. For example, the default values for kernel.sem are shown below in Figure 33.

    ```
    blade4:~ # sysctl kernel.sem
    kernel.sem = 250        32000   32      128  ← semmsl semmns semopm semmni
    blade4:~ #
    ```

    Figure 33. Displaying kernel parameters

    b. In our test, we modified the kernel parameters shown in Figure 34, which may be different for your environment. Add the statements shown to /etc/sysctl.conf, which will cause the parameters to be set upon reboot. Set the parameters now using the sysctl -p command.

    ```
    kernel.sem = 250 32000 100 128
    kernel.shmmax = 1318072320
    ```

    Figure 34. Modified kernel parameters

4. Create ORACLE_HOME directory and make oracle user the owner. Issue the commands shown in Figure 35 as root user:

```
blade4:~ # mkdir /oracle
blade4:~ # mkdir /oracle/9i
blade4:~ # chown –R oracle:oinstall /oracle
```

Figure 35. Creating ORACLE_HOME

5. Set up environmental variables for the oracle user. Do this as oracle user.
    a. Modify .bash_profile in oracle's home directory, adding the statements shown in Figure 36. Note the additional subdirectory for gcc 2.95 in the PATH statement for SLES8.

```
export ORACLE_BASE=/oracle/9i
export ORACLE_HOME=$ORACLE_BASE
export ORA_NLS33=$ORACLE_HOME/ocommon/nls/admin/data

# Uncomment for Red Hat ELAS
#PATH=.:$ORACLE_HOME/bin:$PATH:$HOME/bin

# Uncomment for SLES8
#PATH=.:$ORACLE_HOME/bin:/opt/gcc295/bin:$PATH:$HOME/bin

export PATH
```

Figure 36. oracle user environmental variables

    b. Verify that the environmental variables are set correctly by logging in as oracle user and echoing an environmental variable to the console. For example:

```
oracle@blade4:~> echo $ORACLE_HOME
/oracle/9i
oracle@blade4:~>
```

ORACLE9*I* INSTALLATION TASKS

1. Log in as oracle and invoke the Oracle9*i* Universal Installer as follows:

```
cd /stage9i/Disk1
./runInstaller
```

2. The Welcome screen in Figure 37 is displayed. Click **Next** to continue.
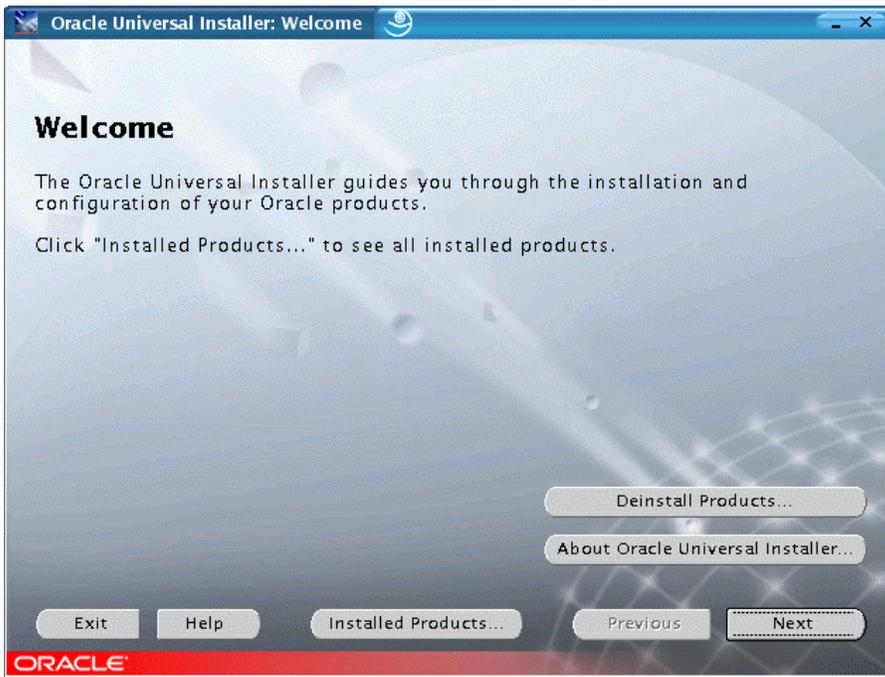
Figure 37. Welcome Screen

3. Since this is the first installation, the Inventory Location screen is displayed, as shown in Figure 38. The default directory for installation files is a subdirectory under ORACLE_HOME. Leave the default setting and click **OK** to continue.
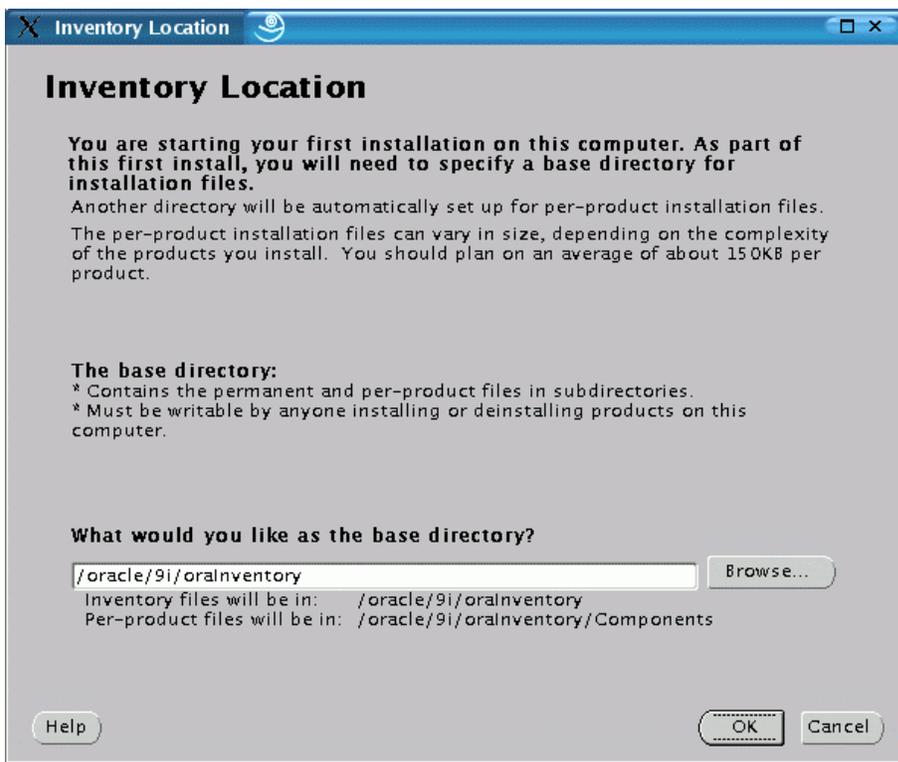

Figure 38. Inventory Location

Note: There are several files that are used to keep track of choices you make when using OUI. If you have to restart the installation process, information in these files will direct the OUI to default values. The best way to restart is to use OUI to de-install, then restart. However, if you have to manually restart the installation, look at these files and remove or modify the entries.

– `oraInst.loc`, located in either `/etc` or `/var/opt/oracle`, contains the following:
  ```
  inventory_loc=/oracle/9i/oraInventory
  inst_group=oinstall
  ```
– `/etc/oratab` has entries for **ORACLE_HOME** and **ORACLE_SID**

4. The screen entitled UNIX Group Name, Figure 39, is displayed. Enter oinstall as shown. Click **Next** to continue.
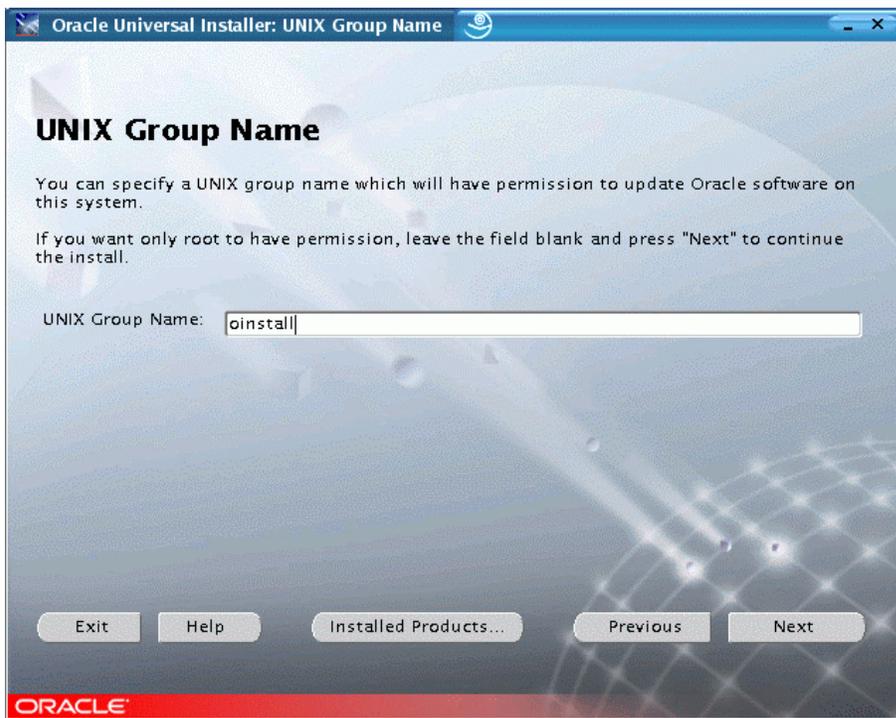
Figure 39. UNIX Group Name

---

5.   A popup window appears, asking to execute a shell script as root. Go to another window, switch to root and execute the specified shell script. When completed, return to the popup window and click **Continue**.
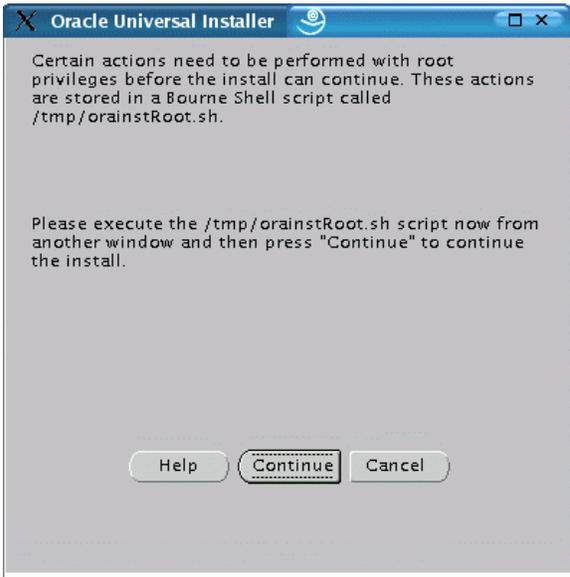
Figure 40. Popup window – root script execution

6.   Verify information on the File Locations screen, shown in Figure 41. Click **Next** to continue.
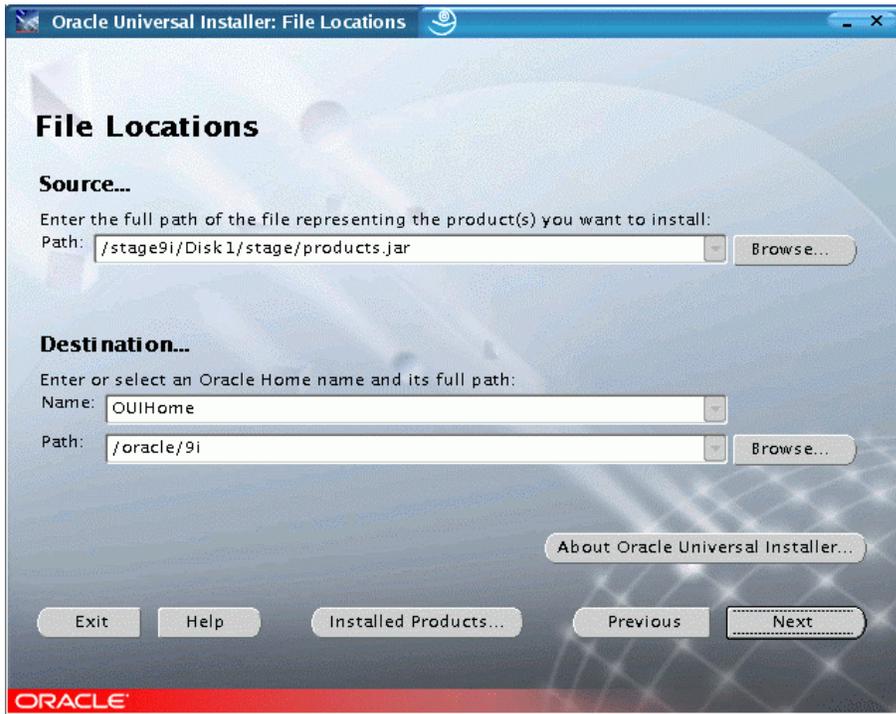
Figure 41. File Locations

---

7. Select Oracle9*i* Database 9.2.0.1.0 on the Available Products screen shown in Figure 42. Click **Next** to continue.
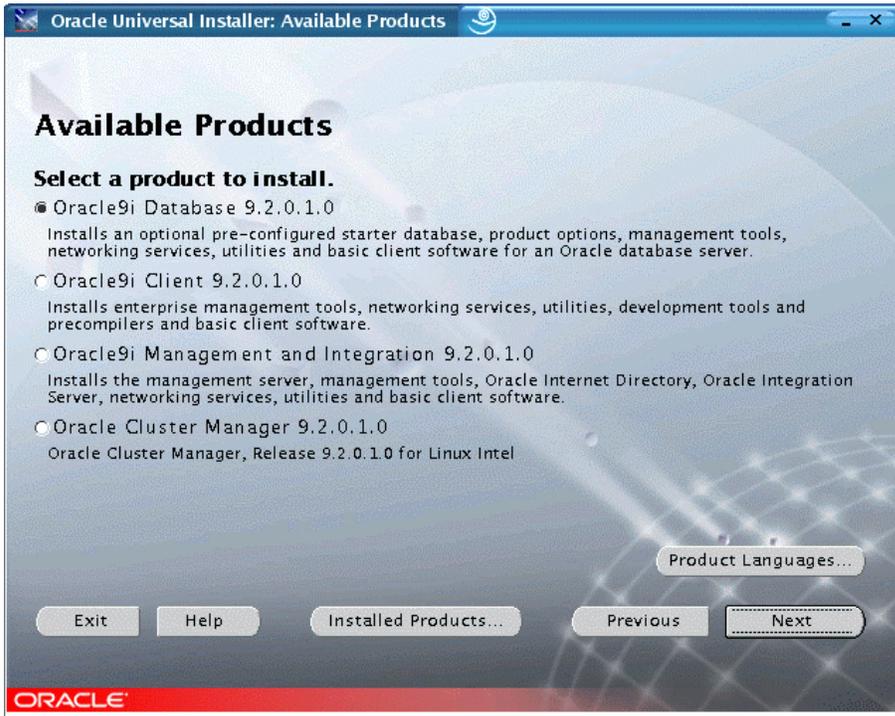
        Figure 42. OUI Available Products

8. The Installation Types screen is displayed, shown in Figure 43.   If you select Custom, the installer will display additional screens for more detailed product selection. For our example, we selected Enterprise Edition to install all the available products. Click **Next** to continue.
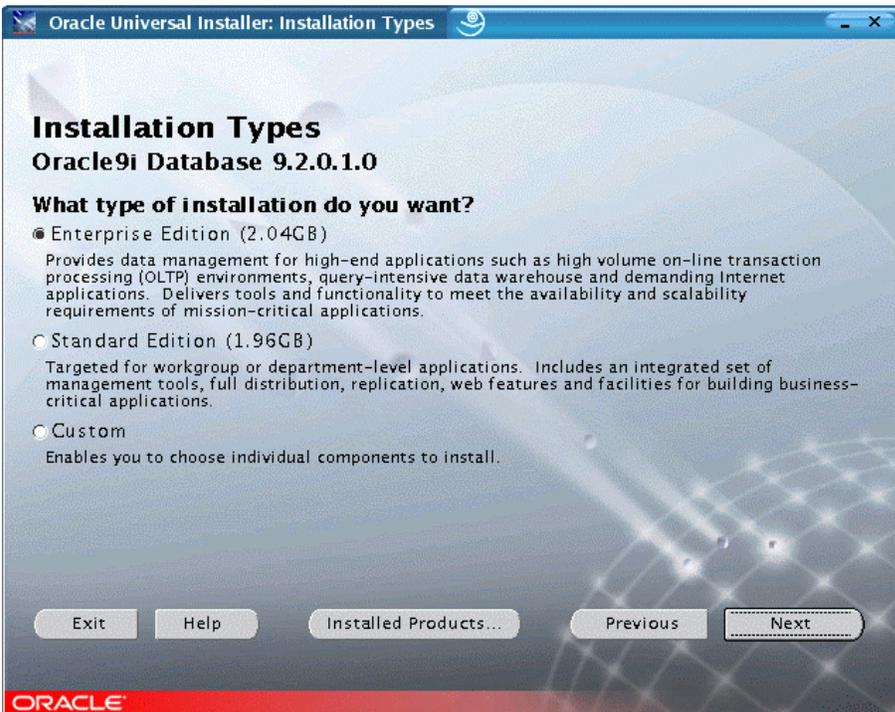
        Figure 43. Installation Types

9. On the Database Configuration screen (Figure 44), we chose Software Only.   Later on, we will manually invoke other Oracle configuration tools, or assistants. If you choose one of the other selections, OUI will automatically invoke the appropriate Oracle assistants. Click **Next** to continue to the next step.
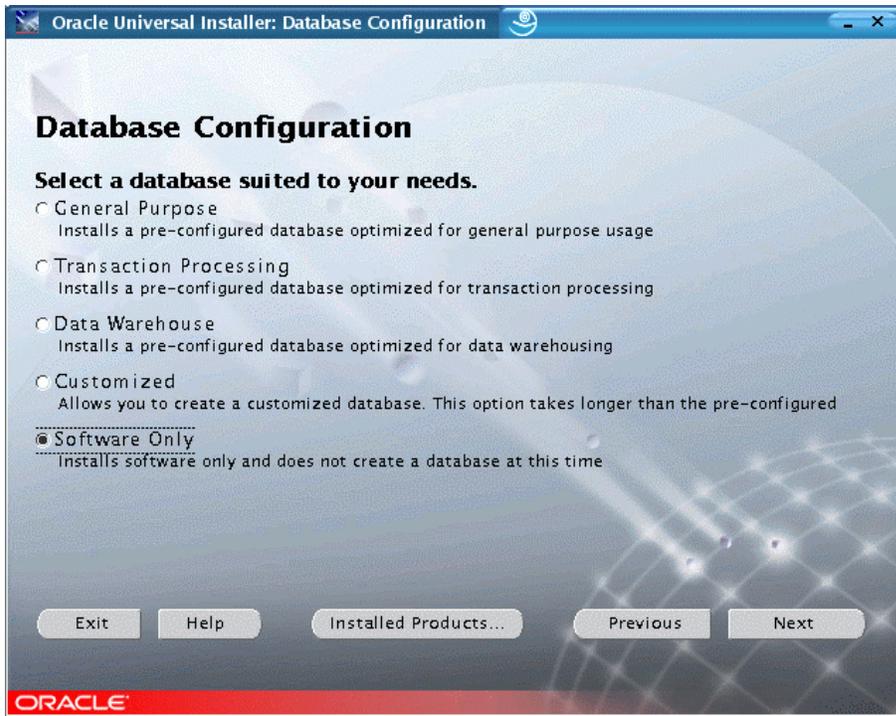

Figure 44. Database Configuration

10. The Summary screen in Figure 45 is displayed. Review the products being installed. If you want to change the products to be installed, click **Previous** and modify your selections. Otherwise, click **Install** to continue.
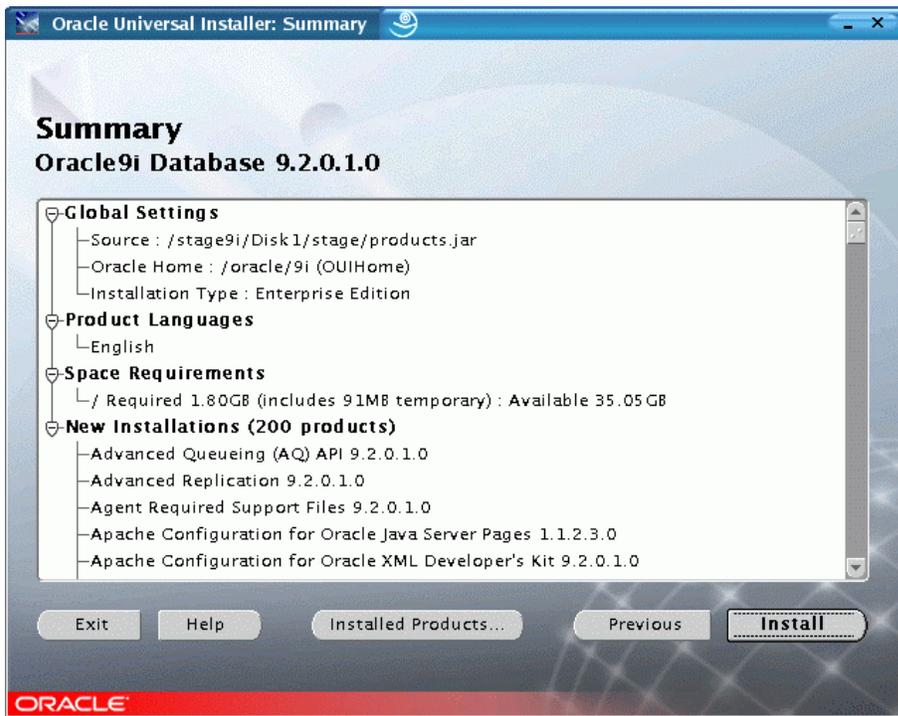

Figure 45. Summary

11. The Install window in Figure 46 shows progress of the installation.
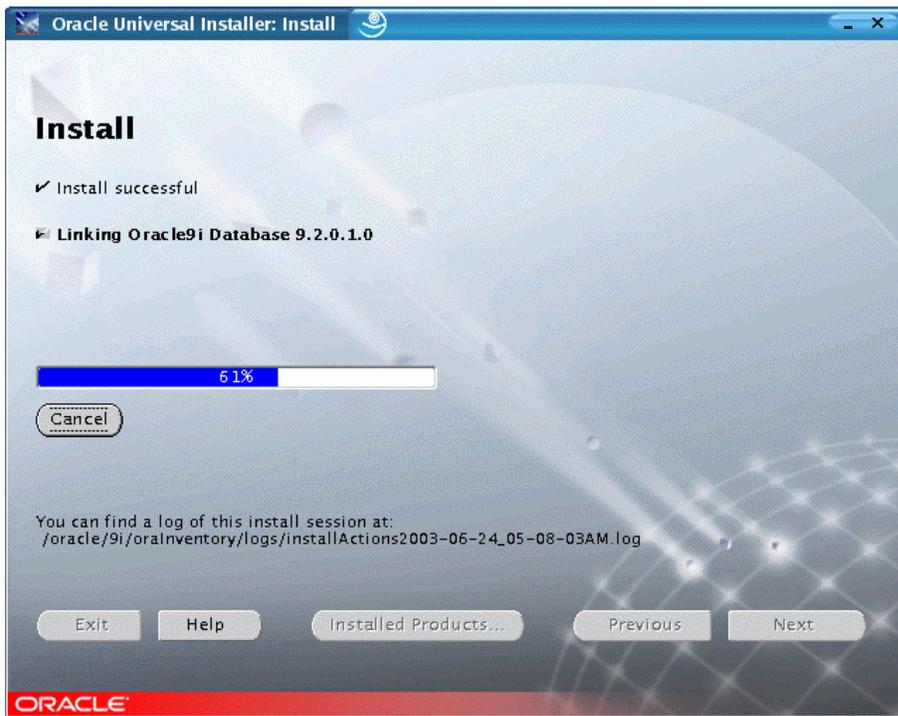

Figure 46. Install progress

---

12. When the installation is complete, a popup window is displayed, shown in Figure 47. Go to another window and execute the requested shell script as root. When done, return to the popup window and click **OK** to continue.
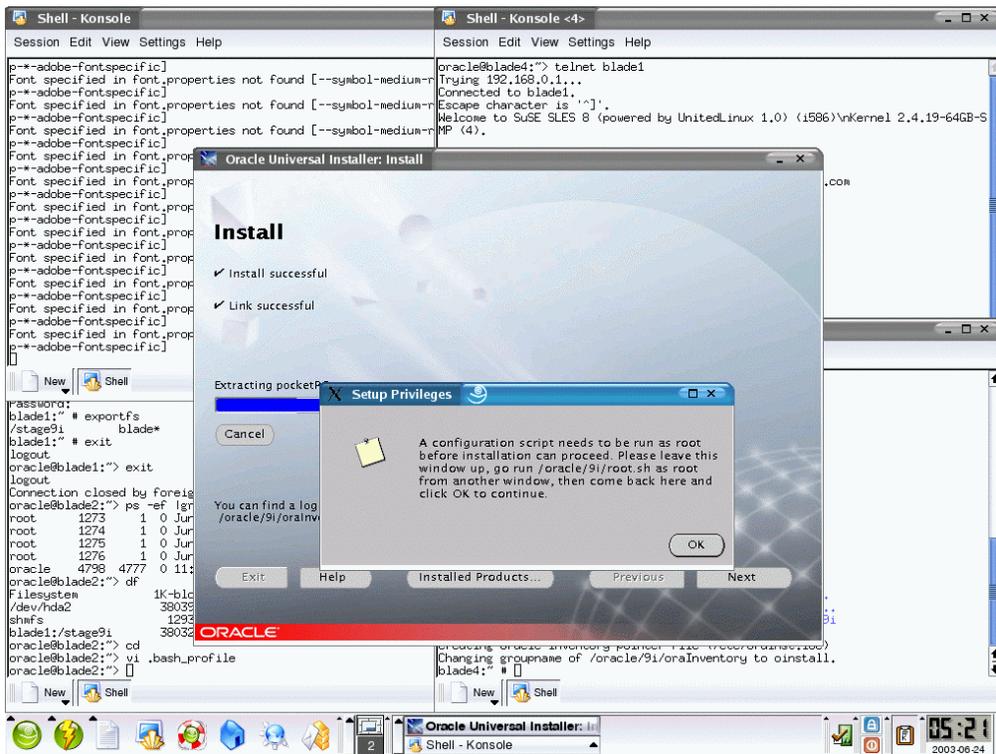
Figure 47. Popup window - Setup Privileges

13. The End of Installation screen, Figure 48, completes Oracle product installation. Click **Exit** to end the Oracle Universal Installer.


Figure 48. End of Installation

CREATING A TEST DATABASE

To test our installation of Oracle9*i*, we created a database using Oracle's Database Configuration Assistant, dbca. Do this as follows:

1. Log in as oracle and type the `dbca` command from a shell prompt. The dbca welcome screen is displayed, as shown in Figure 49.
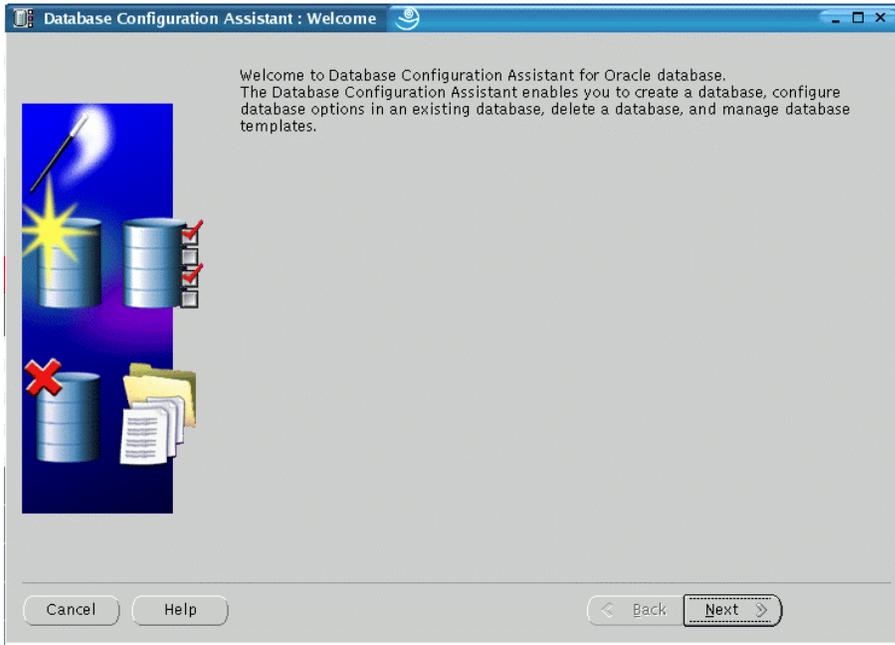

Figure 49. dbca Welcome

2. Select Create a database as shown in Figure 50. Click **Next** to continue.
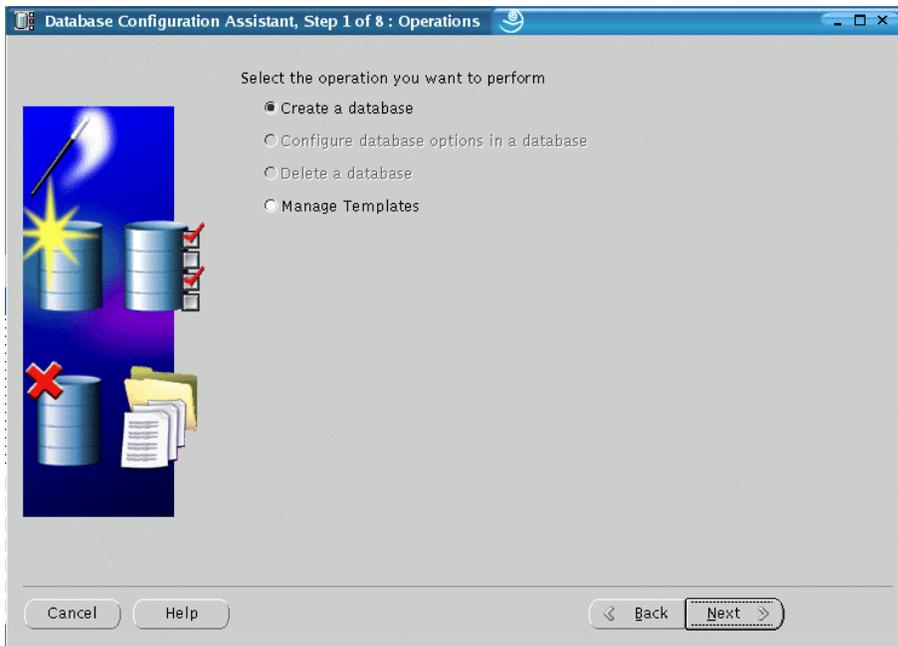

Figure 50. dbca Operations

3. Select a database template, shown in Figure 51. Click **Next** to continue.
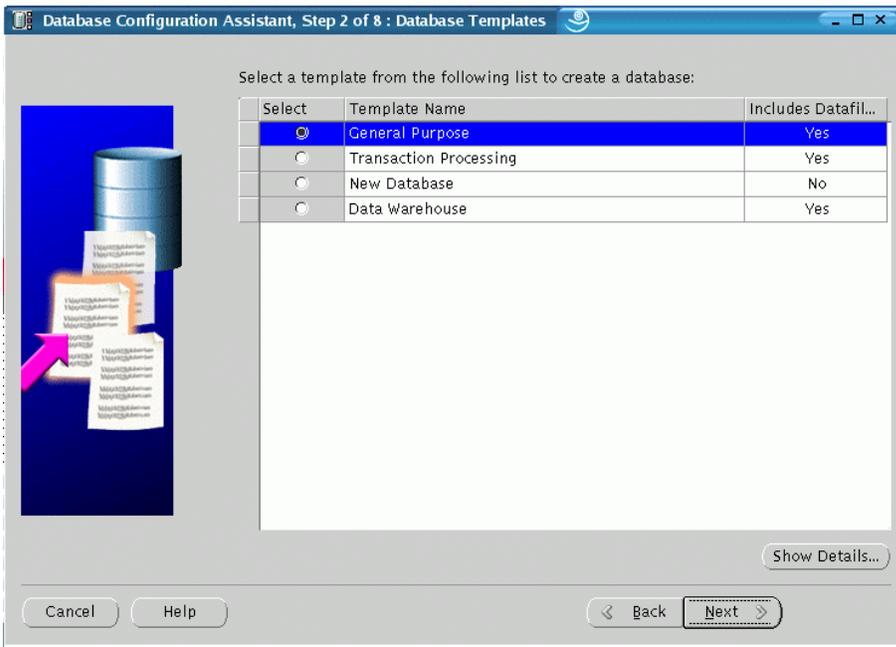
Figure 51. Database templates

4. Enter the global database name and Oracle System Identifier (SID). In our example, we used the name TEST4, as shown in Figure 52.
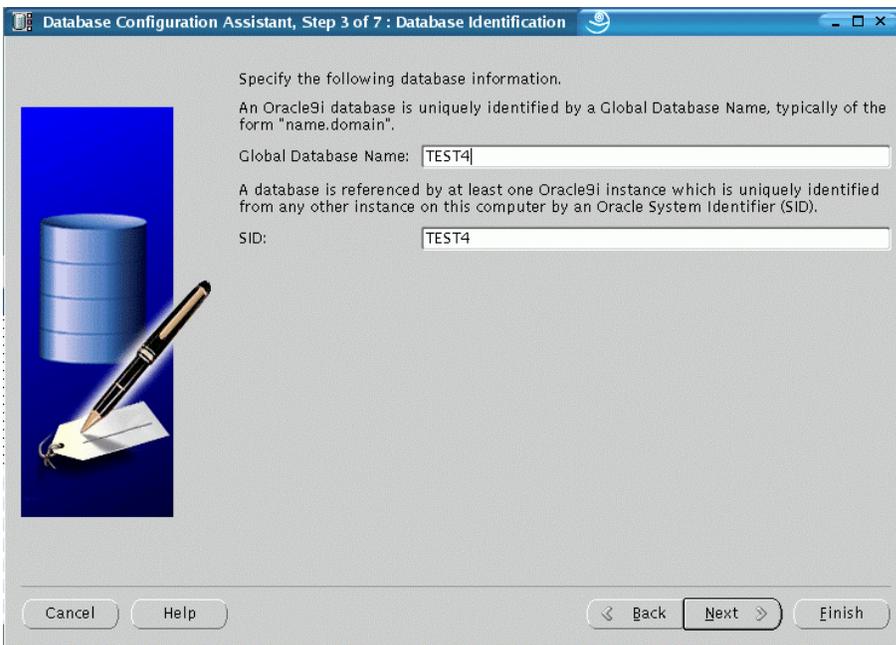
Figure 52. Database identification

5.   The Database Connection Options screen is displayed. Select **Dedicated Server Mode** as shown in Figure 53 and click **Next** to continue.
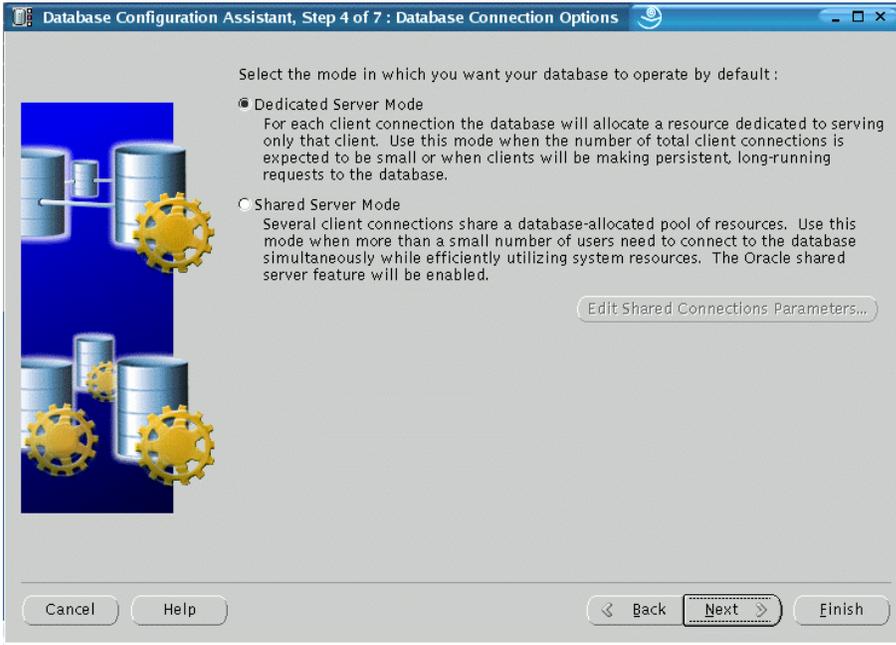
Figure 53. Database connection options

6.   The Initialization Parameters screen is displayed (Figure 54). Since we are just testing our installation, accept the default settings. Click on the different tabs to review the default settings. When finished, click **Next** to continue.
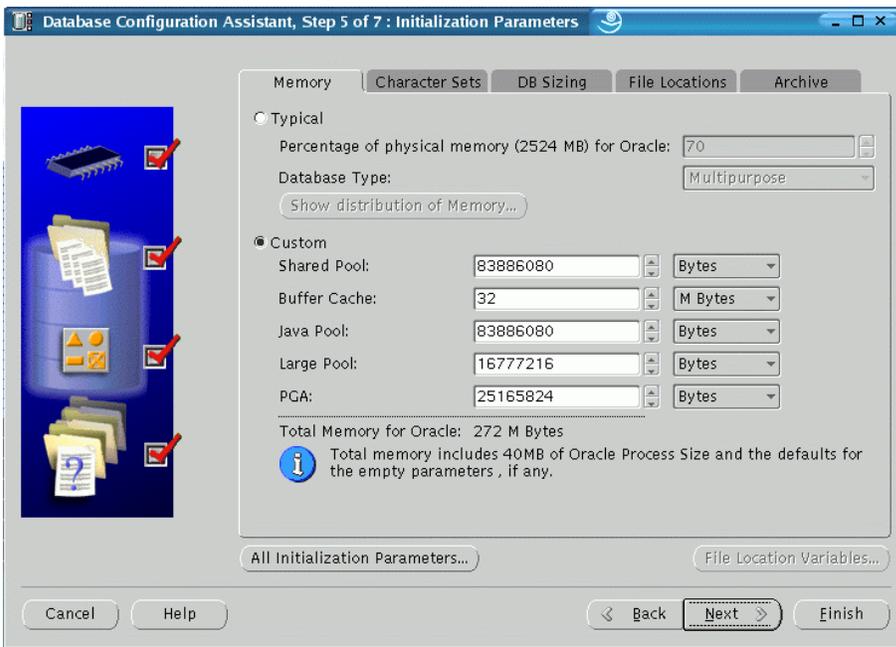
Figure 54. Database initialization parameters – memory settings

7. The next screen shows the file names and locations of the database storage. Select the entries on the left hand panel to view more detail on the right hand panel. Click **Next** to continue.
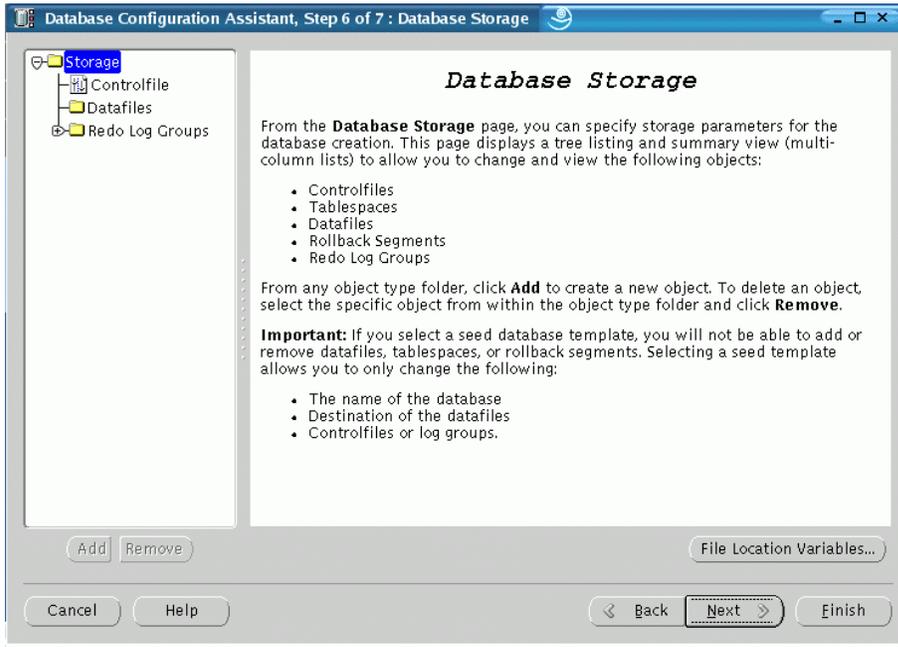
Figure 55. Database storage

8. The screen entitled Creation Options is displayed. Check Create Database and click **Next** to continue.
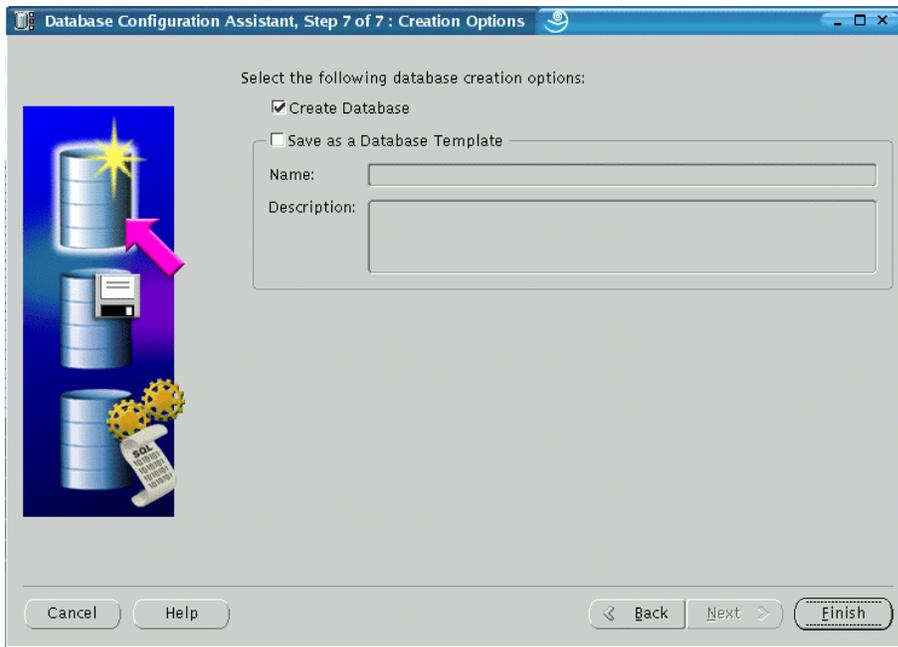
Figure 56. dbca database creation options

9. The Summary screen shown in Figure 57 is the last screen before actual creation of the database. Click **OK** to start database creation.
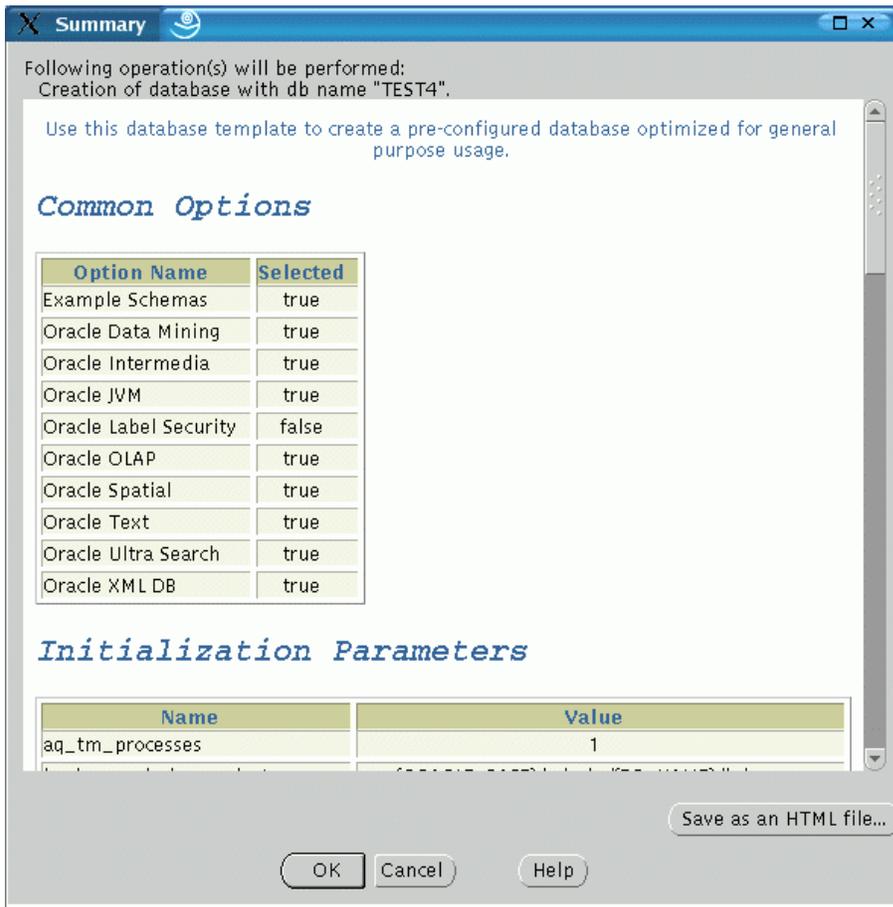
Figure 57. dbca Summary

10. A screen showing progress of database creation is displayed, shown in Figure 58. When dbca has completed database creation, a screen will prompt you to change the passwords for the SYS and SYSTEM. After changing the passwords, click **Exit** to end dbca.
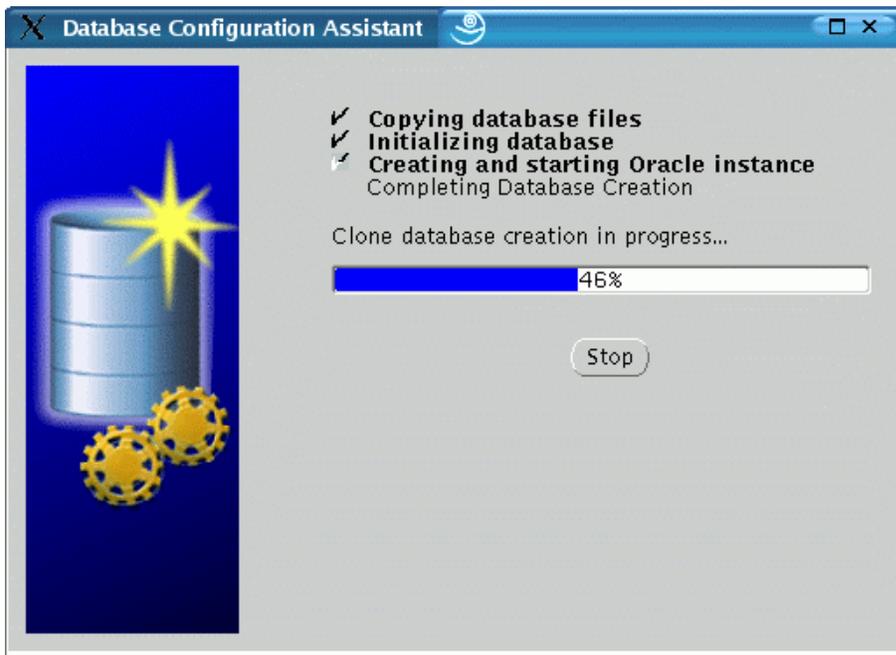
Figure 58. dbca progress

CREATING TEST LISTENER

At this point, we have completed the steps necessary to install and create a standalone, single-node database instance. However, database server environments typically include applications or users that access the database server from workstations or remote servers using Oracle client software. To enable client access to the database server, we need to configure a listener on the database server.

To create a listener for the test database, we used Oracle's Net Configuration Assistant (netca) as follows:

1. As oracle user, type `netca` from a shell prompt. The netca welcome screen is displayed, shown in Figure 59. Select Listener configuration and click **Next** to continue.

Figure 59. netca welcome screen

2. Select Add on the next screen, shown in Figure 60. Click **Next** to continue.

Figure 60. netca - add listener

3. Type the listener name on the screen shown in Figure 61. We named our listener TEST. Click **Next** to continue.
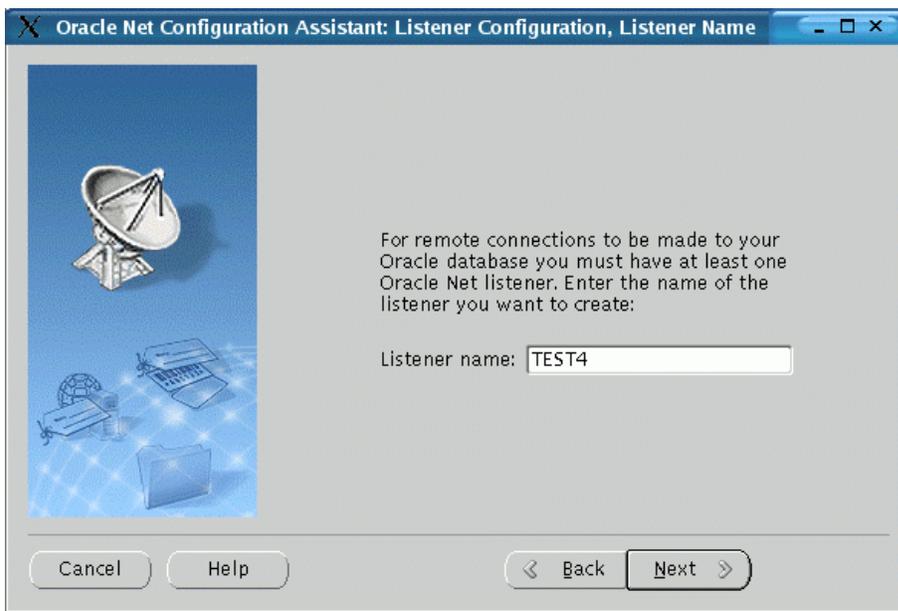
Figure 61. Listener name

4. For our test, we left the defaults (TCP) on the Select Protocols screen, shown in Figure 63. Click **Next** to continue.
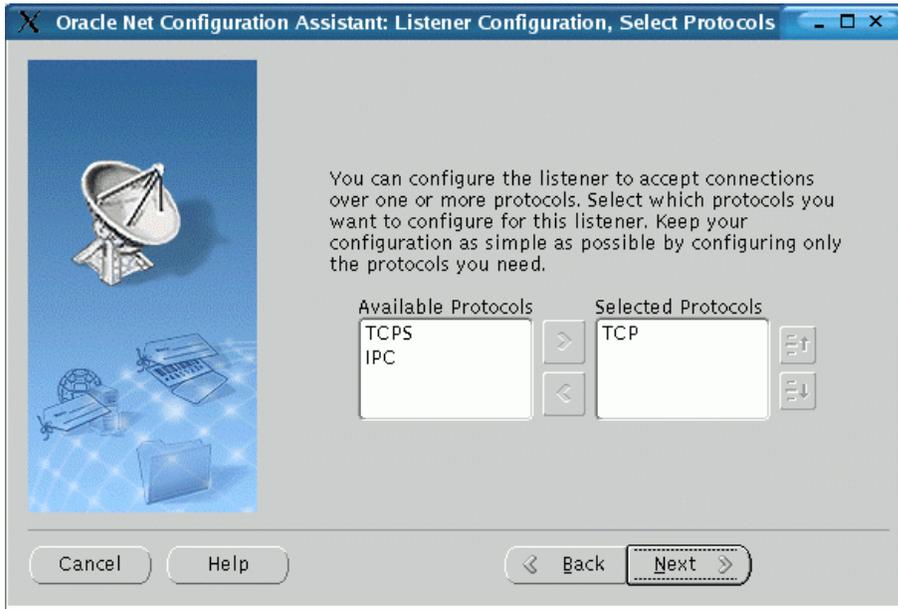
Figure 62. Listener protocols

5. Leave the default selection of standard port number on the TCP/IP configuration screen (Figure 63). Click **Next** to continue.
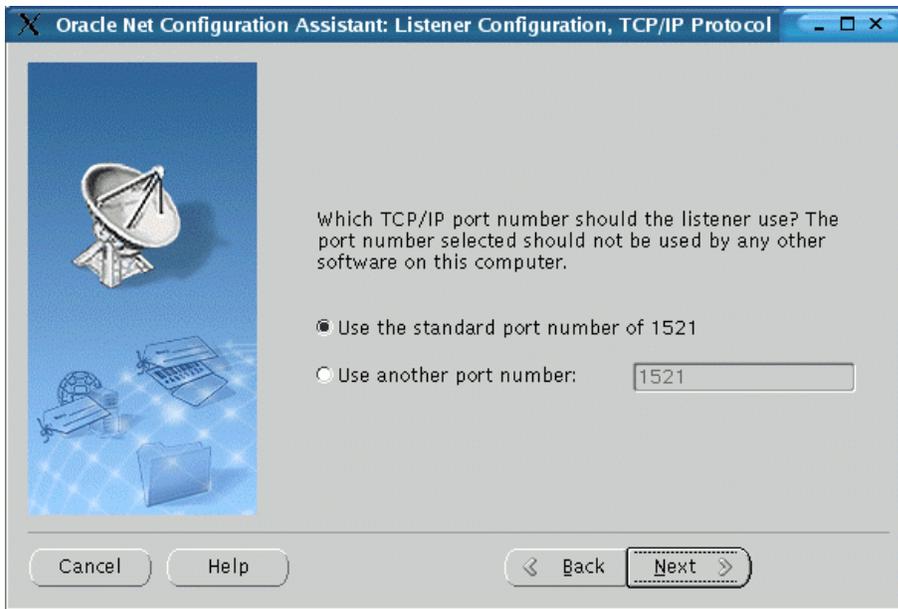

Figure 63. Listener protocol configuration

6. At this point, we're done with listener configuration. Select No on the More Listeners screen (Figure 64) and click **Next** to continue to the completion screen, shown in Figure 65.


Figure 64. netca more listeners

Figure 65. netca completion

TESTING THE INSTALLATION

Verify the installation as follows:

1. Connect to the database using sqlplus as shown in Figure 66. Do this on the blade4 as oracle user.

```
oracle@blade4:~> export ORACLE_SID=TEST4
oracle@blade4:~> sqlplus

SQL*Plus: Release 9.2.0.1.0 - Production on Wed Jun 23 10:50:20 2003

Copyright (c) 1982, 2002, Oracle Corporation.  All rights reserved.

Enter user-name: system
Enter password:

Connected to:
Oracle9i Enterprise Edition Release 9.2.0.1.0 - Production
With the Partitioning, OLAP and Oracle Data Mining options
JServer Release 9.2.0.1.0 - Production

SQL>
```
Figure 66. Connecting using sqlplus

2. Query some of the standard Oracle database views, for example, v$instance

```
SQL> select * from v$instance;

INSTANCE_NUMBER INSTANCE_NAME
--------------- ----------------
HOST_NAME
----------------------------------------------------------------
VERSION           STARTUP_T STATUS       PAR    THREAD# ARCHIVE LOG_SWITCH_
---------------- --------- ------------ --- ---------- ------- -----------
LOGINS    SHU DATABASE_STATUS   INSTANCE_ROLE     ACTIVE_ST
---------- --- ---------------- ------------------ ---------
           1 TEST4
blade4
9.2.0.1.0       23-JUN-03 OPEN         NO          1 STOPPED
ALLOWED   NO  ACTIVE            PRIMARY_INSTANCE   NORMAL


SQL>
```
Figure 67.   Query results of v$instance

3. Check whether your listener is running. Do this as oracle user using the `lsnrctl stat` command. Figure 68 shows the output from the `lsnrctl stat` command when the listener is not started.

```
oracle@blade4:~> lsnrctl stat TEST4

LSNRCTL for Linux: Version 9.2.0.1.0 - Production on 23-JUN-2003 10:53:07

Copyright (c) 1991, 2002, Oracle Corporation.  All rights reserved.

Connecting to (DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=blade4.sanmateo.ibm.com)
(PORT=1521)))
TNS-12541: TNS:no listener
 TNS-12560: TNS:protocol adapter error
  TNS-00511: No listener
   Linux Error: 111: Connection refused
oracle@blade4:~>
```
Figure 68. Output from `lsnrctl` command when listener is not started

---

4. If the listener is not running, start it using the `lsnrctl start` command (Figure 69)

```
oracle@blade4:~> lsnrctl start TEST4

LSNRCTL for Linux: Version 9.2.0.1.0 - Production on 23-JUN-2003 10:50:29

Copyright (c) 1991, 2002, Oracle Corporation.  All rights reserved.

Starting /oracle/9i/bin/tnslsnr: please wait...

TNSLSNR for Linux: Version 9.2.0.1.0 - Production
System parameter file is /oracle/9i/network/admin/listener.ora
Log messages written to /oracle/9i/network/log/test4.log
Listening on: (DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=blade4.sanmateo.ibm.com)
(PORT=1521)))

Connecting to (DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=blade4.sanmateo.ibm.com)
(PORT=1521)))
STATUS of the LISTENER
-----------------------
Alias                     TEST4
Version                   TNSLSNR for Linux: Version 9.2.0.1.0 - Production
Start Date                23-JUN-2003 10:50:29
Uptime                    0 days 0 hr. 0 min. 0 sec
Trace Level               off
Security                  OFF
SNMP                      OFF
Listener Parameter File   /oracle/9i/network/admin/listener.ora
Listener Log File         /oracle/9i/network/log/test4.log
Listening Endpoints Summary...
  (DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=blade4.sanmateo.ibm.com)(PORT=1521))
)
The listener supports no services
The command completed successfully
oracle@blade4:~>
```
Figure 69. Starting the listener

5. Check listener status again. Figure 70 shows the results when the listener is started.

```
oracle@blade4:~> lsnrctl stat TEST4

LSNRCTL for Linux: Version 9.2.0.1.0 - Production on 23-JUN-2003 10:51:55

Copyright (c) 1991, 2002, Oracle Corporation.  All rights reserved.

Connecting to (DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=blade4.sanmateo.ibm.com)
(PORT=1521)))
STATUS of the LISTENER
------------------------
Alias                     TEST4
Version                   TNSLSNR for Linux: Version 9.2.0.1.0 - Production
Start Date                23-JUN-2003 10:44:58
Uptime                    0 days 0 hr. 6 min. 56 sec
Trace Level               off
Security                  OFF
SNMP                      OFF
Listener Parameter File   /oracle/9i/network/admin/listener.ora
Listener Log File         /oracle/9i/network/log/test4.log
Listening Endpoints Summary...
  (DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=blade4.sanmateo.ibm.com)(PORT=1521))
)
  (DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=blade4.sanmateo.ibm.com)(PORT=8080))
(Presentation=HTTP)(Session=RAW))
  (DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)(HOST=blade4.sanmateo.ibm.com)(PORT=2100))
(Presentation=FTP)(Session=RAW))
Services Summary...
Service "TEST4" has 1 instance(s).
  Instance "TEST4", status READY, has 1 handler(s) for this service...
Service "TEST4XDB" has 1 instance(s).
  Instance "TEST4", status READY, has 1 handler(s) for this service...
The command completed successfully
oracle@blade4:~>
```
Figure 70. Output from lsnrctl when listener is started

6. To test the listener, create the file or add the statements shown in Figure 71 to the file named
    $ORACLE_HOME/network/admin/tnsnames.ora.

```
TEST4 = (DESCRIPTION=
        (ADDRESS=(PROTOCOL=tcp)(HOST=blade4)(PORT=1521))
        (CONNECT_DATA=(SID=TEST4))
      )
```
Figure 71. tnsnames.ora entry

7. To test to the listener, invoke sqlplus as shown in Figure 72. Note the error message ORA-12154 is
    displayed because TEST2 was not the listener we defined.

```
oracle@blade4:~> sqlplus scott/tiger@TEST2

SQL*Plus: Release 9.2.0.1.0 - Production on Thu Jun 23 10:44:51 2003

Copyright (c) 1982, 2002, Oracle Corporation.  All rights reserved.

ERROR:
ORA-12154: TNS:could not resolve service name


Enter user-name:
```
Figure 72. Connecting to undefined listener

8. Try again, this time with TEST4. See

```
oracle@blade4:~> sqlplus scott/tiger@TEST4

SQL*Plus: Release 9.2.0.1.0 - Production on Thu Jun 23 10:47:48 2003

Copyright (c) 1982, 2002, Oracle Corporation.  All rights reserved.


Connected to:
Oracle9i Enterprise Edition Release 9.2.0.1.0 - Production
With the Partitioning, OLAP and Oracle Data Mining options
JServer Release 9.2.0.1.0 - Production

SQL>
```

Figure 73. Connecting to listener

SUMMARY

This concludes our installation test of Oracle9*i* and Linux on the IBM BladeCenter.

For questions and comments, please send an email note to the IBM/Oracle International Competency Center at ibmoracl@us.ibm.com.

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