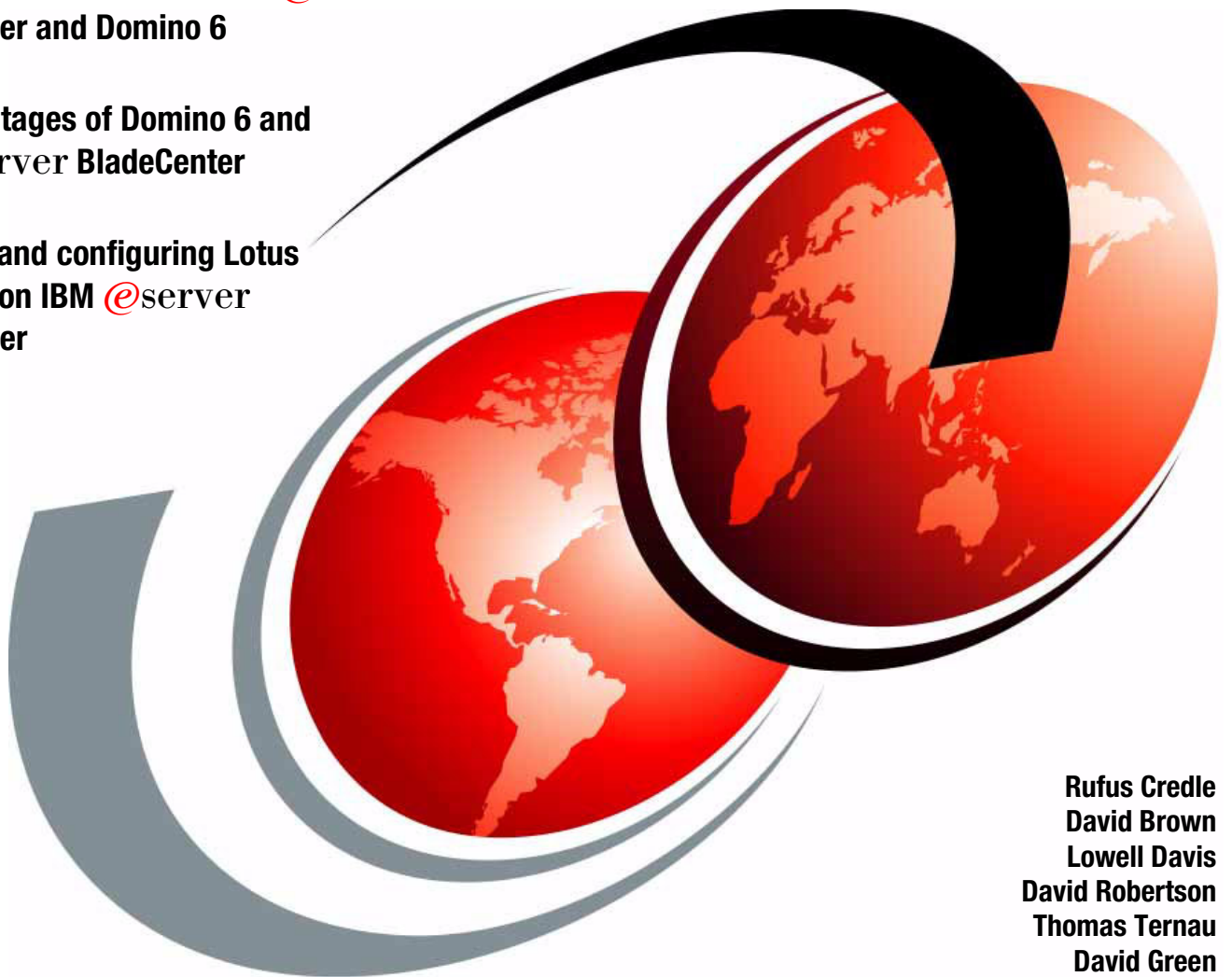


Deploying Lotus Domino on IBM @server BladeCenter

Blazing new trails with IBM @server
BladeCenter and Domino 6

The advantages of Domino 6 and
IBM @server BladeCenter

Installing and configuring Lotus
Domino 6 on IBM @server
BladeCenter



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Thomas Ternau
David Green



International Technical Support Organization

Deploying Lotus Domino on IBM @server BladeCenter

November 2003

Note: Before using this information and the product it supports, read the information in “Notices” on page v.

Second Edition (November 2003)

This edition applies to IBM @server BladeCenter (8677-1xx), IBM @server BladeCenter HS20 (8678-21x and 8678-41x) and Lotus Domino V6.0.

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Preface

This IBM® Redpaper gives you a broad understanding of the latest features included in the IBM @server BladeCenter™ and the advantages this system presents in the marketplace.

This Redpaper will help you to set up and configure your IBM @server BladeCenter to run Lotus® Domino® 6 on Windows® 2000 Advanced Server. Both IBM @server BladeCenter and Lotus Domino offer robust tools that can simplify your system management tasks and increase network performance and uptime. IBM @server BladeCenter and Lotus Domino 6 achieve better administrative control and enhance your Lotus messaging solutions to meet marketplace demands.

This Redpaper helps you tune Lotus Domino 6 for better performance while running in an IBM @server BladeCenter environment.

The team that wrote this Redpaper

This Redpaper was produced by a team of specialists from around the world working at the International Technical Support Organization, Raleigh Center.



The team, left to right: (standing) Rufus Credle, Lowell Davis, David Robertson, (seating) Thomas Ternau and David Brown (not shown, David Green)

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Summary of changes

This section describes the technical changes made in this edition of the Redpaper and in previous editions. This edition may also include minor corrections and editorial changes that are not identified.

Summary of Changes
for Deploying Lotus Domino on IBM @server BladeCenter
as created or updated on November 19, 2003.

November 2003, Second Edition

This revision reflects the addition, deletion, or modification of new and changed information described below.

New information

- ▶ Added 1.2.7, “BladeCenter Layer 2-7 GbE Switch Module” on page 13
- ▶ Added Chapter 6, “A brief introduction to Layer 4-7 Switching” on page 53
- ▶ Added new information in 1.2.4, “BladeCenter 1200W Power Supply Module”
- ▶ Added URLs to bibliography

Changed information

- ▶ Changed the incorrect name of IBM xSeries BladeCenter to IBM @server BladeCenter in a few places within Chapter 1, “Introduction to IBM eServer BladeCenter technology and its advantages” on page 1.



Introduction to IBM eServer BladeCenter technology and its advantages

In this chapter, we will introduce the IBM @server BladeCenter server. This introduction includes an overview of the BladeCenter technology and hardware for the chassis and the blades, as well as a look at blade management and options that are currently available. We will also look at the advantages of blade servers over other servers in the market, where the blade servers fit in the market and why the market is driven towards blade servers.

1.1 Introduction to blade server technology

Blade servers are a relatively new technology that has captured industry focus because of its modular design, that can reduce cost with a more efficient use of valuable floor space and its simplified management which can help to speed up such tasks as deploying, reprovisioning, updating and troubleshooting hundreds of blade servers. All this can be done remotely with one graphical console using IBM Director systems management tools. In addition, blade servers will provide improved performance, by doubling current rack density. By integrating your resources and sharing key components not only will you reduce cost but also increase availability.

1.1.1 BladeCenter and BladeCenter HS20 features

In this section, we list the key features of the IBM @server BladeCenter and the BladeCenter HS20 servers. First, the IBM @server BladeCenter:

- ▶ Rack-optimized, 7U modular design enclosure - Holds up to 14 hot-swap BladeCenter HS20 blades with up to six enclosures in a 42U rack.
- ▶ Contains a high availability MidPlane supporting the hot-swap of individual blades.
- ▶ Two 1200-watt, hot-swap power modules and support for two optional 1200-watt power modules - Provides redundancy and power for robust configurations. See guidelines in 1.2.4, "BladeCenter 1200W Power Supply Module" on page 9.
- ▶ Two hot-swap 325 CFM blowers and thermal sensors throughout to monitor and alert over-temperature conditions
- ▶ Management module - Lets you manage and control components in the enclosure
- ▶ Optional hot-swap redundant Ethernet and Fibre Channel switch modules. (Supports up to four network switch modules)
- ▶ Control panel - Contains USB port and status LEDs.

The IBM @server BladeCenter HS20 features are as follows:

- ▶ Choose between 2.0 or 2.4 GHz(1) Xeon processors with quad-pumped 400 MHz front-side bus (FSB) and full-speed 512 KB ECC L2 caches.
- ▶ Standard 512 MB system memory with Chipkill ECC support - Supports 8GB maximum, when 2GB memory module becomes available.
- ▶ Dual Broadcom Gigabit Ethernet controllers with teaming and failover support.
- ▶ Integrated service processor - Monitors critical components on each blade for remote and local systems management.
- ▶ ATA-100 IDE controller - Economical interface for up to two optional 40 GB IDE HDDs.
- ▶ SCSI expansion connector - Supports optional storage unit containing an Ultra320 RAID 1 SCSI controller and backplane support for two hot-swap HDDs.

Each of these features will be discussed in greater detail later in the paper as well as a few other important points.

1.2 Technical overview

In this section, we will look at each of the key components individually and explain their function within the BladeCenter chassis and the BladeCenter HS20.

1.2.1 BladeCenter chassis

The IBM eServer BladeCenter is a 7U modular chassis that is capable of housing up to 14 blade servers. The BladeCenter chassis allows individual blades to share resources such as power, switch, management and blower modules. The front view of the BladeCenter chassis is shown below in Figure 1-1. From this we can see the 14 slots which, in this example, has been populated by 1 blade server and 13 Processor Blade Fillers. These Processor Blade Fillers are required if a slot is not populated by a blade server or the HS20 SCSI Expansion Option, which will be discussed later, to provide proper airflow and system cooling. The BladeCenter Media Tray is also shown, it is located at the top of the chassis above the blade slots, this is shown in greater detail in Figure 1-2 on page 4.



Figure 1-1 Front view of BladeCenter chassis

The Media Tray is a hot-pluggable unit that contains an interface card, CD-ROM and diskette drive. Mounted on the interface card is a USB 1.1 port and system information LED's which provide status information for your IBM eServer BladeCenter and BladeCenter HS20's.

There are five LEDs on the front panel. Figure 1-2 on page 4 illustrates the location of these LED's. The five LEDs are:

Power	This is a green LED which indicates the presence of power in the BladeCenter chassis. If this LED is not on, it could indicate one of the following conditions: <ul style="list-style-type: none">• There could be no power to the chassis,• The management module is not present or has failed or• The LED has failed.
Location	This LED is used to locate or identify the particular BladeCenter unit. When on this LED is bright blue and can be set to blink or remain constant. This LED will be on as a result of a request from the systems administrator via the Management Module or if a component requires maintenance.

Over- temperature	This is an amber LED which will report any over-temperature conditions that occur either in the BladeCenter chassis or the blade servers. If an over-temperature condition occurs the IBM @server BladeCenter may increase the speed of the blower to correct this, in which case the LED will automatically be turned off.
Information	The information LED is also amber, this LED reports non-critical events. These events are recorded in the Error log. This LED must be manually switched off via the management module.
System- Error	Again an amber LED which reports when a system error occurs. This LED reports errors such as a failure on a power, blower or switch modules. It will also be on if a system error occurs on a blade. The failed component's LED will also be on to help isolate the error.

These system LEDs are also located on the rear of the BladeCenter chassis under blower module 2

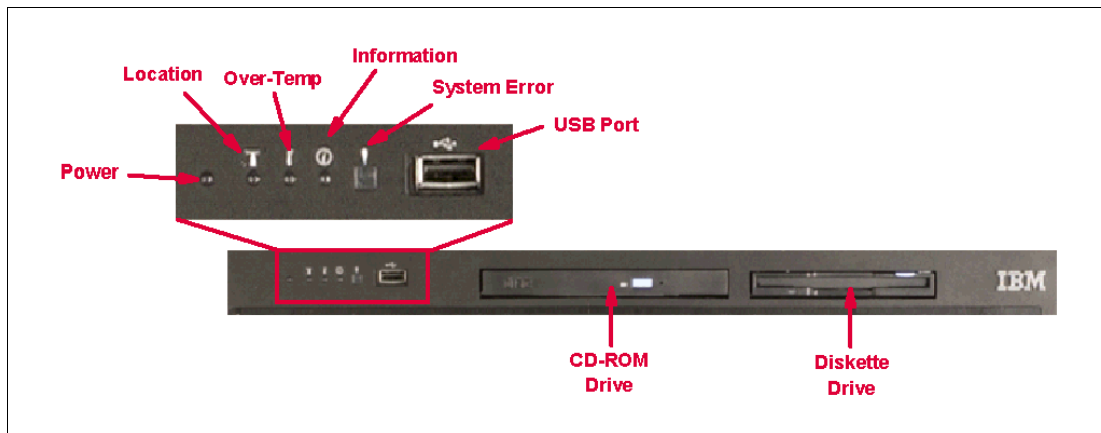


Figure 1-2 Media tray front view

As we discussed earlier the BladeCenter chassis is capable of housing several hotswap and redundant components such as:

- ▶ Power supply modules
- ▶ Switch modules
- ▶ Management modules
- ▶ Blower modules

In Figure 1-3 on page 5, you can see where each of these components should be located in the rear of the IBM @server BladeCenter.

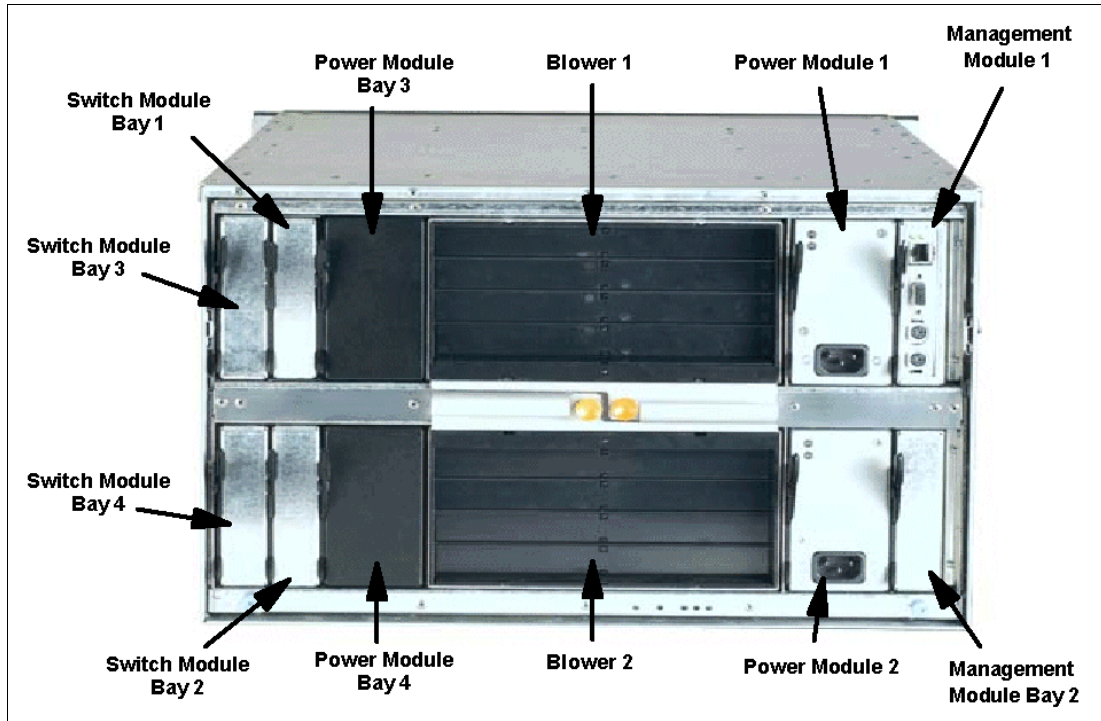


Figure 1-3 Rear view of BladeCenter chassis

The IBM eServer BladeCenter automatically detects all blades and modules that are installed.

1.2.2 IBM eServer™ BladeCenter HS20

The BladeCenter HS20 blades are high-throughput, two-way SMP-capable Xeon-based blade servers, highly scalable by adding memory and a second processor. Two Intel Xeon connectors are standard on the blade board to support installation of a second processor. High-speed, PC2100 DDR SDRAM is synchronized for up to 400 MHz processor-to-memory subsystem performance with current processors. There are four memory DIMM connectors, due to two-way interleaving, installation of memory options in pairs is required. Current memory option available are 256 MB, 512 MB and 1 GB size DIMMs, which support a minimum of 512 MB and a maximum of 4 GB of system memory. In the future, IBM will release a 2 GB memory option which will see the maximum system memory double from 4 GB to 8 GB.

Figure 1-4 on page 6 shows the BladeCenter HS20 server with its top cover removed.

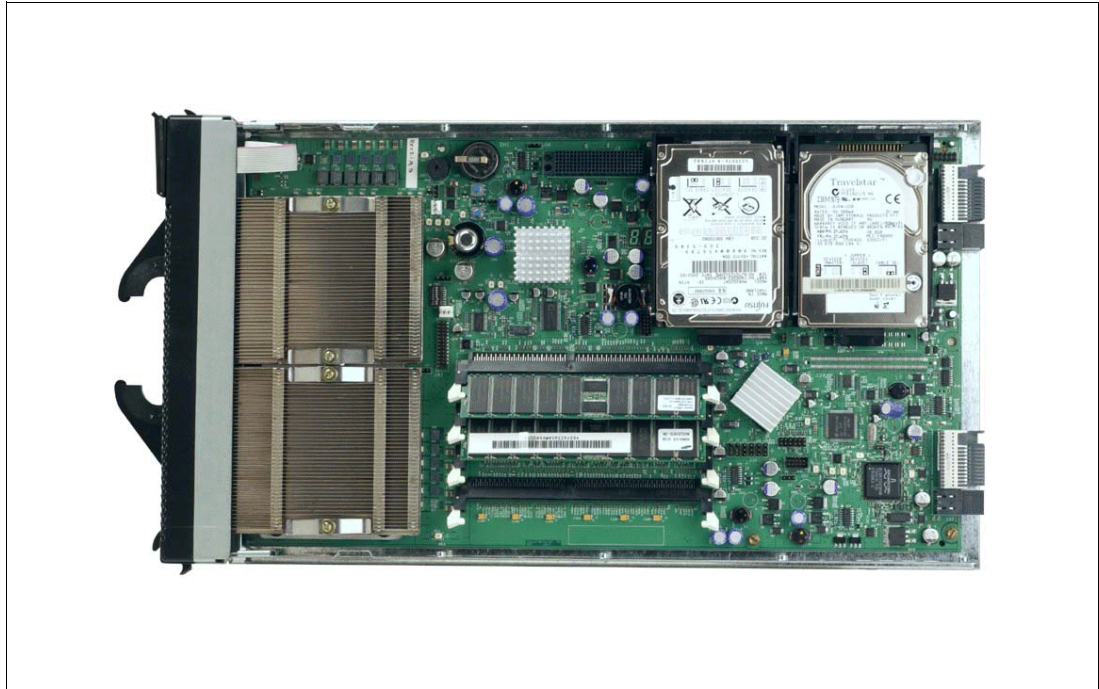


Figure 1-4 BladeCenter HS20 server with top cover removed

Each BladeCenter HS20 server has an integrated service processor on-board that communicates with the BladeCenter Management Module to enable blade server management remotely, see 1.2.3, “BladeCenter Management Module” on page 8 for more details on the management module. The service processor provides the following functions:

- ▶ Loader and OS Watch Timer
- ▶ Remote soft shutdown
- ▶ POST Watchdog Timer
- ▶ Light Path support
- ▶ VPD support
- ▶ PFA for VRM/CPU/Memory/HD
- ▶ Numeric based Error log
- ▶ ASM interconnect support (RS485)
- ▶ Environmental querying and alerts (TEMP/Voltages)
- ▶ Automatic Server Restart
- ▶ Remote Power On/Off
- ▶ In-band support for UMS/Director
- ▶ I2C interface to core logic (CSB5 chip)
- ▶ Local Environmental Monitoring
- ▶ Local LED control
- ▶ RS-485 interface to the Management Modules

The BladeCenter HS20 server also has two integrated Ethernet controllers for redundancy. If redundancy is required you must install Ethernet switch modules in switch module bays one and two, see 1.2.6, “BladeCenter 4-Port Ethernet Switch Module” on page 12 for more

details. Each controller is auto-sensing and will connect at the appropriate rate, even if the transfer rate is 10 Mbps, 100 Mbps or 1000 Mbps. The controller will also set the appropriate duplex state.

The Ethernet controller is capable of providing several teaming options that increase throughput and fault tolerance. In your blade server, a team consists of the two Ethernet controllers to utilize the below options:

- Adapter fault tolerance (AFT) Provides automatic redundancy for your Ethernet controllers. You can configure either one of the integrated Ethernet controllers as the primary Ethernet controller. If the primary link fails, the secondary controller takes over. When the primary link is restored to an operational state, the Ethernet traffic switches back to the primary Ethernet controller.
- Adaptive load balancing (ALB) Enables you to balance the transmission data flow among the two controllers. ALB also includes the AFT option. You can use ALB with any 100BASE-TX/1000BASE-T switch.
- Cisco Fast EtherChannel (FEC) Creates a team of the two controllers to increase transmission and reception throughput. FEC also includes the AFT option. You can use FEC only with a switch that has FEC capability.

The BladeCenter HS20 server has a control panel which is located at the top of the blade servers, Figure 1-5.

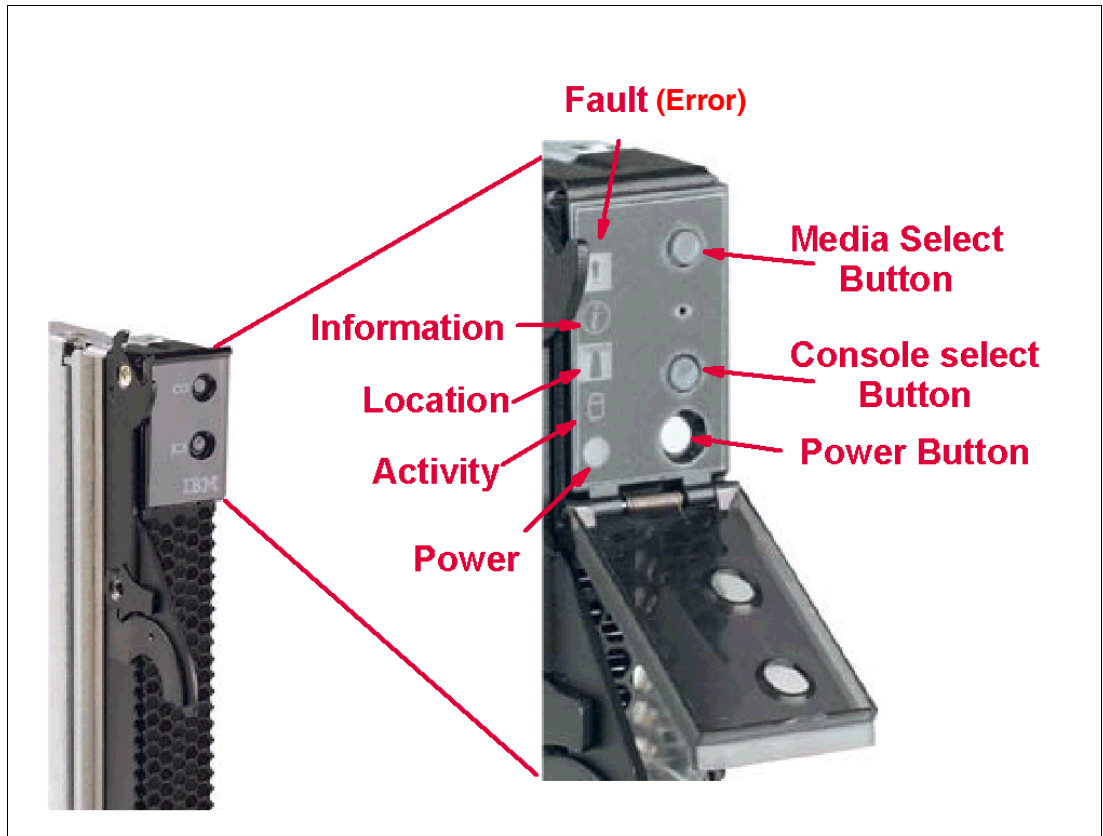


Figure 1-5 Blade server operators panel

Like the IBM @server BladeCenter's media tray, this control panel also has system information LEDs. The only difference is that the blade's panel also has control switches, these are detailed below:

Media-select button	Press this button to associate the CD-ROM drive, diskette drive, and USB port with this blade server. This button lights when the ownership of the CD-ROM drive, diskette drive, and USB port transfers to this blade server.
Blade-error LED	This LED is also known as the blade system-error LED. When this amber LED is on, it indicates a system error has occurred in the blade.
Information LED	When this amber LED is on, it indicates information about a system error for this server has been placed in the BladeCenter System Error log.
Location LED	This blue LED has been turned on in response to a programmed condition, or remotely by the system administrator, to aid in blade identification for maintenance. The location LED on the BladeCenter unit will be on also. Turn off the location LED after maintenance is complete.
Activity LED	When this green LED is on, it indicates that there is activity in the blade server, this includes hard disk and network activity
Power-on LED	While the BladeCenter unit has AC power, this green LED turns on and stays on when you turn on your blade server.
Console select button	Press this button to associate the keyboard, mouse, and video ports with this blade server. This button lights when the ownership of the keyboard, mouse, and video transfers to this blade server.
Power-control button	This button is located behind the control panel door. Press this button to manually turn the blade server on or off.

Note: The power-control button only has effect if the local power control option is enabled via the management module.

1.2.3 BladeCenter Management Module

The BladeCenter Management Module's primary function is to provide systems management for your IBM @server BladeCenter and blade servers, however it does have other important functions like multiplex the keyboard/video/mouse (KVM) to provide a local console for the individual blade servers as well as configuring the BladeCenter unit and switch modules. The management module communicates with all of the key components of the BladeCenter unit including the switch, power and blower modules as well as the blade servers themselves. The management module detects the presence, absence and condition of each of these components. A picture of the BladeCenter Management Module is shown in Figure 1-6 on page 9



Figure 1-6 BladeCenter Management Module

The management module has a standard RJ45 connector for a 10/100MB Ethernet remote console connection, as well as two PS/2® connectors for keyboard, mouse and a 15-pin D-shell connector for video which are provided for local console. Although the connectors for the keyboard and mouse are PS/2 type connectors these devices are routed to a USB bus enabling them to be switched between blades.

Note: The operating system in each blade must provide USB support for the blade server to recognize and make use of the keyboard and mouse

The management module will retrieve and monitor critical information about the chassis and blade servers such as, temperature, voltages, power supply, memory, fan and HDD status, this information will then be fed into an error and status log.

The manageability functions of the BladeCenter unit are accessible via a Web GUI that is contained in the management module. This GUI allows you to view the status and control each blade server, this includes shutting down and restarting.

1.2.4 BladeCenter 1200W Power Supply Module

The standard BladeCenter chassis will ship with two 1200W Power Supply Modules. However, depending on the configuration of your BladeCenter unit, you may require all four power modules. The standard two power modules provide power for the following components:

- ▶ Blade slots one through six
- ▶ Blowers
- ▶ Management modules
- ▶ Switch modules
- ▶ Media tray



Figure 1-7 BladeCenter 1200W Power Supply Module

Power modules three and four are required to provide power to blade slots seven to 14. Figure 1-8 on page 11 shows how power is distributed by each power module. One power module is capable of providing enough power in the event of a power module failure. Power module two provides redundancy for power module one and power module four does the same for power module three, although these power modules will effectively share the load under normal operating conditions. Supported configurations require either two or four power supplies, which is why when you order the optional BladeCenter 1200W Power Supply Module kit you will receive two of the power modules.

Important: Nonredundant power is not supported in BladeCenter products. Power modules must always be present in power bays 1 and 2. When any blade server or option is in blade bay 7 through 14, power modules must be present in power bays 1 and 2, as well as in power bays 3 and 4. If a power module fails or an ac power failure occurs, BladeCenter units configured for redundant power operation, as described in this document, will operate in a nonredundant mode, and the blower modules will run at full speed. You must replace the failing power module or restore ac power as soon as possible to regain redundant power operation and to reset the blower modules to their normal operating speed.

BladeCenter power module upgrade guidelines

This section contains information that will help you determine whether you need to upgrade the power modules in your IBM @server BladeCenter unit when installing IBM @server BladeCenter HS20 blade servers.

As of the date of this printing, three BladeCenter power-module options are available: v IBM BladeCenter 1200W Power Supply Module (part number 48P7052), v IBM BladeCenter 1200W to 1400W Power Supply Upgrade Kit (part number 90P0197), and v IBM BladeCenter 1800W Power Supply Module (part number 13N0570). Go to <http://www.ibm.com/pc/compat/> for information about ordering these options. Obtain and use the Technical Update with your BladeCenter and blade server documentation for future reference.

The Technical Update can be obtained from the following URLs:

<http://www-1.ibm.com/support/docview.wss?uid=psg1MIGR-53353>

ftp://ftp.software.ibm.com/pc/pccbbs/pc_servers_pdf/13n0308.pdf

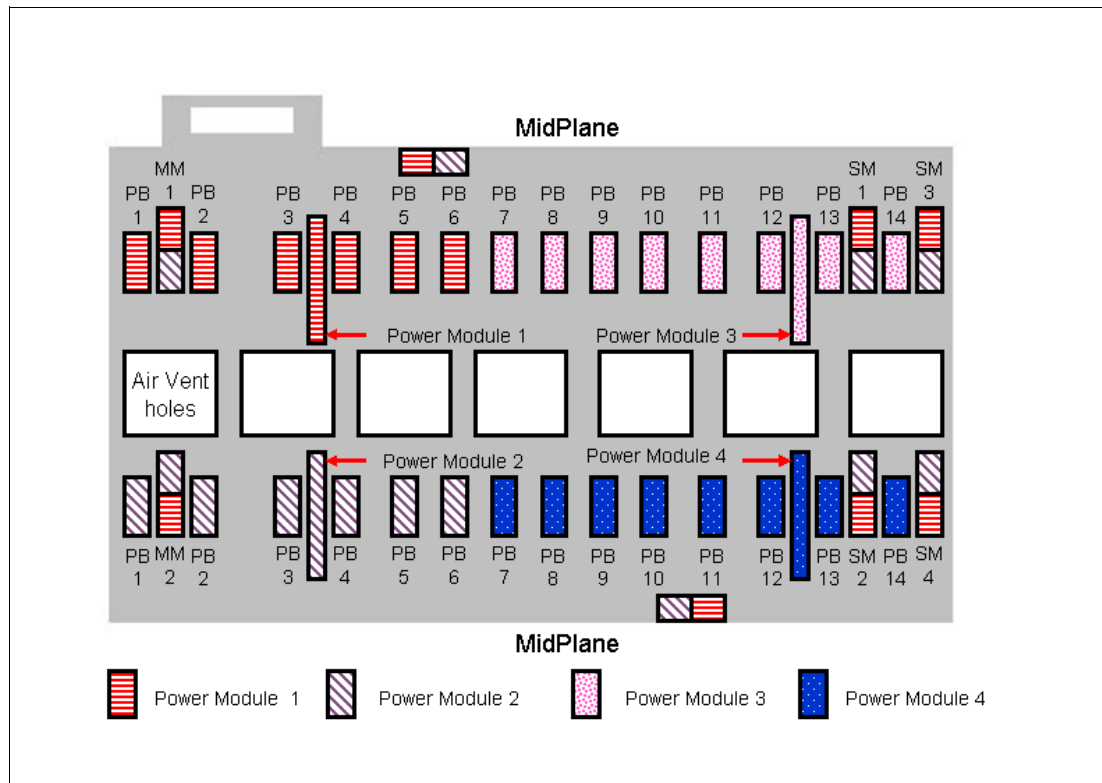


Figure 1-8 MidPlane power connector

1.2.5 BladeCenter blowers

The IBM @server BladeCenter ships with both hot-swap blowers which are required to provide adequate cooling, these blowers provide a total airflow of approximately 325 CFM, however, each blower will run at approximately 50% under normal conditions. If one blower fails, the other blower is capable of providing enough cooling for the entire chassis. However, the failed blower should be replaced within 48 hours. The speed of the blowers is controlled via the management module which receives signals from thermal monitors which are located in critical locations. There are two scenarios which will cause both blowers to function at full speed, they are listed below:

- ▶ If the management module fails and the redundant module is not present.
- ▶ If one of the power supply modules fails.

In Figure 1-9 on page 12, you can see that there are four fins which are currently closed as the blower is not operational. When operational the blower draws the air from the front to the rear. Each blower also has an LED which will light up in the event of an error.



Figure 1-9 BladeCenter Blower Module

1.2.6 BladeCenter 4-Port Ethernet Switch Module

The Ethernet switch module (Figure 1-10 on page 13) has several purposes as well as providing network connectivity for the BladeCenter unit and blade servers it also provide interconnectivity between the blades and management modules. The Ethernet switch module does not come standard with the IBM @server BladeCenter, it is available for purchase as an option but it is required in most cases and should be installed in switch bay 1. This module is a fully functional Ethernet switch which has four 1000 Mbps ports externally, two internal 10/100 Mbps links to the management modules and fourteen 1000 Mbps links to the blades, which are also internal. Two of these switch modules can be added for redundancy. The switch module is configured via the management module.



Figure 1-10 BladeCenter 4-Port Ethernet Switch Module

In Figure 1-10, the two LED's at the top of the switch module indicate power-on and Ethernet switch error. There are also LEDs next to each port which indicate Ethernet link and activity.

1.2.7 BladeCenter Layer 2-7 GbE Switch Module

The Ethernet switch module (Figure 1-11 on page 14) has several purposes. In addition to providing network connectivity for the BladeCenter unit and blade servers, it also provides interconnectivity between the blades and management modules. The Layer 2-7 GbE switch module does not come standard with the IBM *@server* BladeCenter. It is available for purchase as an option, but it is required in most cases and should be installed in switch bay 1. This module is a fully functional Ethernet switch that has four 1000 Mbps ports externally, two internal 10/100 Mbps links to the management modules and 14 1000 Mbps links to the blades, which are also internal. Two of these switch modules can be added for redundancy. The switch module is configured via the Management Module. For a more in-depth look at Layer 2-7 Switching, refer to the Redpaper *IBM @server BladeCenter Layer 2-7 Network Switching*, REDP3755.



Figure 1-11 BladeCenter 4-port Ethernet Switch Module

In Figure 1-11, the two LEDs at the top of the switch module indicate power-on and Ethernet switch error. There are also LEDs next to each port that indicate Ethernet link and activity.

1.2.8 BladeCenter 2-Port Fibre Channel Switch Module

If you require Fibre Channel connectivity for your IBM @server BladeCenter, there are two things you are required to do:

1. Install the IBM HS20 Fibre Channel Expansion Card in each blade that requires a FC connection.
2. Install one BladeCenter 2-Port Fibre Channel Switch Module (Figure 1-12 on page 15) in switch bay three. If redundancy is required, a FC switch module must be installed in switch bay four.

Each port on the FC Switch Module is capable of supporting transmission speeds of either 1 or 2 Gbps and must auto-negotiate to match the speed of any connected devices. A Small Form factor Pluggable (SFP) transceiver is required to populate these ports, these SFP transceivers are hot pluggable. The FC Switch Module is also managed through the management module.



Figure 1-12 BladeCenter 2-Port Fibre Channel Switch Module

The storage options for the IBM @server BladeCenter are covered in Chapter 3, “Storage options for the BladeCenter” of the Redpaper *The Cutting Edge: IBM @server BladeCenter*, REDP3581.

1.2.9 BladeCenter Acoustic Attenuation Module

In environments where it is important to minimize sound emissions, there is a noise reduction option available that can be installed on the rear of the BladeCenter unit. This option is called the BladeCenter Acoustic Attenuation Module (acoustic module or muffler). The acoustical noise emissions for a single BladeCenter unit configured with 14 BladeCenter HS20 servers are:

- ▶ 7.4 bels (operating)
- ▶ 7.4 bels (idling)

The acoustical noise emissions for a single BladeCenter unit with a BladeCenter Acoustic Attenuation Module option installed and configured with 14 BladeCenter HS20 servers are:

- ▶ 6.9 bels (operating)
- ▶ 6.9 bels (idling)

For visibility purposes the system LEDs on the rear of the IBM @server BladeCenter have been replicated on the acoustic module as these are covered when this option is fitted. The acoustic module also fully covers the blower modules and partly covers the other modules installed.

Note: The BladeCenter Acoustic Attenuation Module requires approximately eight inches between the rear of the IBM @server BladeCenter the rack door. For this reason the NetBay 42 Enterprise Rack Cabinet should be used when installing the BladeCenter unit with this option.

1.3 The advantages of IBM eServer BladeCenter

Unlike typical server architecture which scales up, the IBM @server BladeCenter allows for the scale out approach, yet it balances performance and density. In this chapter we discuss topics which help you identify the advantages of the IBM @server BladeCenter for your business, such as:

- ▶ Systems management
- ▶ High density computing
- ▶ Redundancy

1.3.1 System management

The systems management component for the IBM @server BladeCenter is the combination of IBM Director, the Web interface and Rapid Deployment Manager (RDM). With these tools you are able to reduce system outages, increase IT personnel productivity and reduce support costs.

IBM Director

IBM Director is a comprehensive workgroup hardware manager designed for use with IBM @server xSeries servers, PCs, notebooks and now IBM @server BladeCenter.

IBM Director provides a comprehensive view of the xSeries servers.

- ▶ Remote access to the server regardless of its status
- ▶ Reset or cycle the server
- ▶ Server inventory, AssetID, blade slot numbers utilized
- ▶ Monitor and set thresholds on the server events including PFA
- ▶ Flash BIOS
- ▶ Monitor and identify potential performance bottlenecks

IBM Director allows you to reduce system outages, increase IT personnel productivity and reduce support costs.

These can be accomplished by:

- ▶ Monitoring server health
- ▶ PFA - Predictive Failure Analysis®
- ▶ Integration with enterprise system management environments

Monitoring server health

By setting thresholds on components within IBM Director you are able to monitor the following:

- ▶ Operating system load
- ▶ POST time-out
- ▶ Voltage
- ▶ Temperature

PFA - Predictive Failure Analysis

Setting alerts on disk, memory and processors via PFA, this allows you to identify imminent component failure. PFA can monitor the following:

- ▶ Processors
- ▶ Memory
- ▶ Fans
- ▶ Power supplies
- ▶ SCSI HDDs

Integration with enterprise system management environments

IBM Director agents should be installed on each of the blade servers as this allows system management of the blades and it also provides the advanced management capabilities of the xSeries servers to be accessed from such products as:

- ▶ Tivoli® Enterprise and Tivoli Netview
- ▶ Computer Associates CA Unicenter TNG
- ▶ HP OpenView
- ▶ Microsoft SMS
- ▶ BMC Patrol
- ▶ NetIQ

This is an important consideration for organizations who have already spent time, money and resources on existing system management tools.

Web interface

The Web interface allows you to configure and remotely manage your IBM @server BladeCenter via a browser, this is built into the management module.

Supported browsers and required components:

- ▶ Microsoft Internet Explorer 4.0 Service Pack 1, or later
- ▶ Netscape Navigator 4.72, or later (version 6.0 is not supported)
- ▶ Java™ enabled Web browser
- ▶ Support for JavaScript 1.2 or later
- ▶ HTTP 1.0, or later
- ▶ Minimum display resolution 800*600 pixels and 256 colors

Note: The Web interface does not support double-byte character set languages (DBCS).

The management module Ethernet port either receives a DHCP assigned address within 2 minutes of connecting to the LAN or it defaults to the following IP address 192.168.70.125 with a subnet address of 255.255.255.0. The default hostname is MMxxxxxxxxxxx where xxxxxxxxxxxx is the MAC address.

Note: If multiple BladeCenter units are to be configured only one can be assigned the default IP address of 92.168.70.125, otherwise IP address conflicts will occur.

If your DHCP server is not on the same subnet as the BladeCenter Management Module console, DHCP traffic needs to be allowed to traverse the router to the Management Module console to receive an DHCP assigned address. Or IBM Director Server needs to be on the same subnet as the IBM @server BladeCenter.

The Web interface allows you to manage and check the status of each of the modules and blade servers. Below is a list of the functions and sub-functions available:

- ▶ Monitor
 - System status
 - Event log
 - Vital product data
- ▶ Blade Tasks
 - Power/restart
 - Firmware update
 - Configuration
- ▶ Switch tasks
 - Power/restart
 - Management
- ▶ MM console - (management module)
 - General settings
 - Login profiles
 - Alerts
 - Network interface
 - Network protocols
 - Security
 - Configuration file
 - Fireware update
 - Restore defaults
 - Reset MM
- ▶ Log off

RDM - Rapid Deployment Manager

This powerful tool allows you to deploy system images to the blade servers from the administrator's console.

RDM supports the following environments:

- ▶ Windows 2000
- ▶ Windows 2000 Advanced Server

The advantages of Rapid Deployment Manager are:

- ▶ Rapid deployment of Operating System image to the destination server
- ▶ Hot-spare blade option, described in “Hot-spare blades” on page 22.

1.3.2 High density computing

As data centers have grown with the proliferation of Wintel servers over recent years, it is important to note that rack space and floor space can be more efficiently taken up with the use of blade servers. A fully populated 42U rack is capable of holding six BladeCenter units and 84 dual processor blade servers, which provides a total of 168 CPUs per rack. This is twice the current density of a non-blade server. The IBM @server BladeCenter supports a minimum of one 4 port 1 GB Ethernet switch for up to 14 blade servers. A total of four switch modules can be utilized within the BladeCenter unit. This can be a combination of either Fiber Channel or Ethernet.

We recommend the use of blade servers for the following situations:

- ▶ Space constrained environments
- ▶ WebSphere®
- ▶ Linux clusters
- ▶ Web caching
- ▶ Collaboration applications (Lotus Notes®, Microsoft Exchange and Citrix)
- ▶ Dynamic Web serving - Load balancing
- ▶ Firewall
- ▶ Telecommunications
- ▶ Active directory services
- ▶ Scientific and technical computing

These applications are typically processor and memory intensive, and lend themselves to the scale out option rather than the scale up option. The scale out option is where the strength of the IBM @server BladeCenter becomes obvious. Due to the highly scalable range of components available with the BladeCenter unit, the blade server has a huge market.

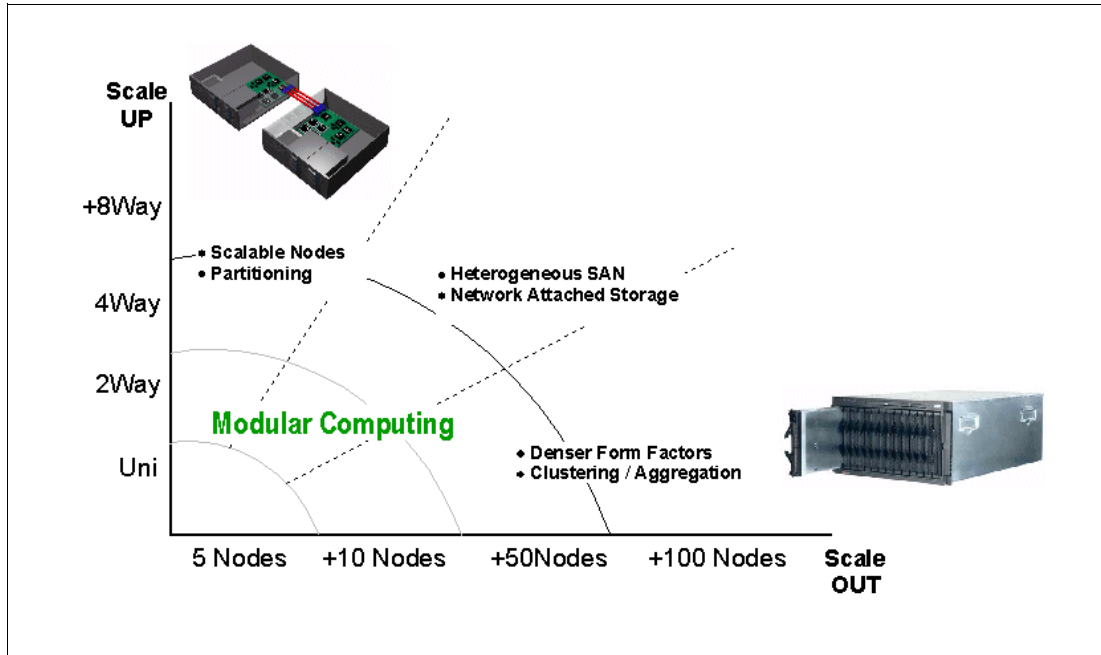


Figure 1-13 Scale up versus scale out

Attractive cost savings are also possible where a large number of rack installed servers are required. These savings run from power usage to hardware procurement due to not duplicating components, through to server management. Table 1-1 demonstrates the input voltage required for different servers providing the same number of CPUs. It also shows the heat output in BTUs, which can affect the cooling of your computer room and other equipment within the computer room.

Table 1-1 Power and BTU usage

	Number of Servers	Processor	Maximum load watts	BTU
IBM x330 4MX	14	Pentium® III 1.4GHz	3080	10502
IBM x335	14	Xeon 2.4GHz	4760	16231
IBM x342 - Dual Power	14	Pentium III 1.4GHz	5250	19821
IBM x345 - Dual Power	14	Xeon 2.4GHz	7000	23870
IBM @server BladeCenter	14	Xeon 2.4GHz	2500	8530

Note: The IBM @server BladeCenter in Table 1-1 is using the onboard IDE controller.

The deployment of the IBM @server BladeCenter is far simpler than deploying fourteen 1U servers and the associated cables. A single BladeCenter unit only requires a KVM cable, one power cable, one Ethernet cable and a single system management cable. Even with redundancy of these components, cabling can be reduced by eighty-three percent (see Table 1-2 on page 21 for a typical example).

Table 1-2 Cable utilization

	1U Solution (2 - 42U Racks)	IBM @server BladeCenter Solution (2 - 42U Racks)
Power	84	12
Ethernet	168	48
KVM	84	6 (ACT)
Switch	6 (boxes)	1 (ACT)
KVM interconnect	5	0
Management connect	84	6
Total	431	73

The IBM @server BladeCenter is not intended to replace any of the xSeries suite of products, but rather to provide additional configuration options.

1.3.3 Redundancy

We all know failures occur occasionally; we also know that redundancy of key components increases system availability. Although previously, it was expensive to purchase redundant options for individual servers, the high availability features found in conventional xSeries rack servers have also been included within IBM @server BladeCenter. These features include:

- ▶ Hot-spare blades
- ▶ Processor
- ▶ Memory protection
- ▶ Disk mirroring
- ▶ MidPlane
- ▶ Hot-swap power and cooling modules
- ▶ Switch modules

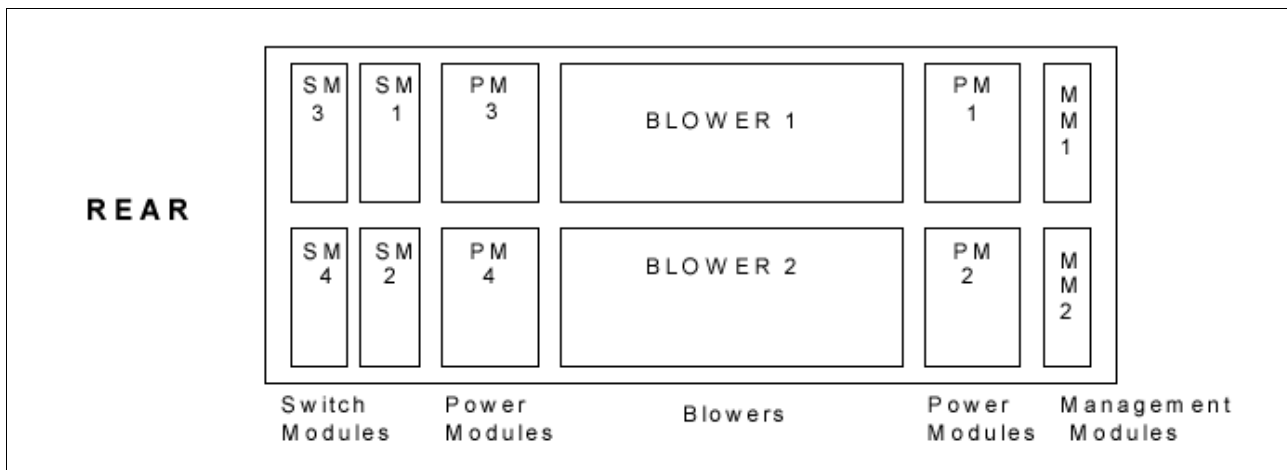


Figure 1-14 Module location on the rear of the BladeCenter unit

Table 1-3 outlines which components can be redundant, hot swap, PFA or have Light Path diagnostics.

Table 1-3 Redundant, hot-swap, PFA or Light Path

	Redundant	Hot Swap	PFA	Light Path
Blade	Yes	Yes	No	Yes
Processor	Auto Recovery	No	Yes	Yes
Memory	ECC w/Auto down size	No/Tool less	Yes	Yes
Power Supplies	Yes	Yes	Yes	Yes
Cooling Fans	Yes	Yes	Yes	Yes
Management Module	TBD	TBD	TBD	TBD
Switch Module	Yes	Yes	TBD	TBD
Backplane	Yes	No	No	No
Front Plane /Media Tray	No	Yes	No	No
CD ROM Drive	No	No	No	No
Floppy Drive	No	No	No	No
Hard Drive	Raid	Only with Blade Storage expansion (HS SCSI drives)	Yes	Yes
Power Cable	Yes	Yes	No	No

Hot-spare blades

MidPlane supports hot-spare blade servers; this operates in the same way as the hot-spare drive. By creating events within IBM Director, you can deploy an operating system to a hot-spare blade server automatically.

Processor

In a dual processor blade server, if a CPU fails, the system takes the following steps.

1. Force failed processor offline
2. Automatically re-boot the server
3. Generate alerts
4. Continue operating with the working processor

Memory

There are four memory slots; memory must be installed in matching pairs. The following redundancy options are available:

- ▶ Chipkill™ ECC - provides correction for up to 4 bits per DIMM
- ▶ Memory hardware scrubbing - corrects soft memory errors automatically
- ▶ PFA - Creates alerts of imminent failure

Disk mirroring

Refer to Chapter 3, “Storage options for the BladeCenter” of the Redpaper *The Cutting Edge: IBM @server BladeCenter*, REDP3581 for hardware and software mirroring options of IDE and SCSI disks.

MidPlane

The middle plane provides connectivity between the blades and the modules at the rear of the IBM @server BladeCenter. There are two connections on each blade server to independent middle planes for redundancy.

Hot-swap power and cooling modules

By sharing fans, power supplies, cables and other components within a BladeCenter unit and installing the redundant options for these, your organization can reduce the number of points of potential failure, thus increasing system availability.

Blowers

Two hot-swap blowers are standard in the BladeCenter unit; the blower speed varies depending on the temperature. A failed blower needs to be replaced within 48 hours.

Note: An Acoustic Attenuation Module can be fitted to reduce noise.

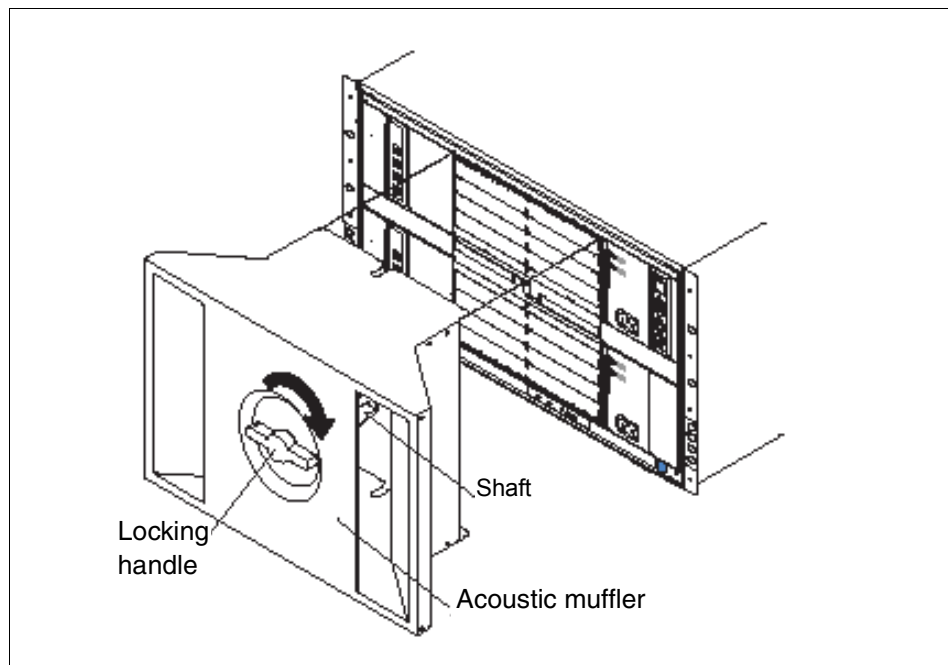


Figure 1-15 Acoustic Attenuation Module

Power

The IBM @server BladeCenter comes with two 220 volt 1200 watt hot-swap power modules in power bay 1 and 2. Table 1-4 on page 24 outlines the power module bays and their functions.

Table 1-4 Power module bays

Power module bays	Power module function
1	Provides power to all the BladeCenter modules in server bay slots 1-6.
2	Redundancy for Power module bay 1.
3	Provides power to all the BladeCenter modules in server bay slots 7-14.
4	Redundancy for Power module bay 3.

Note: A blade server in bay 6 with the SCSI storage expansion option requires a power module in power module bays 3 and 4 to support the SCSI storage expansion.

Cabling modules

The IBM @server BladeCenter is capable of managing four switch modules of either Ethernet or Fibre; the minimum requirement is a single Ethernet switch.

Ethernet

Two hot-swap 1 GB Ethernet four port switch models can be installed in switch module bays 1 and 2.

Fibre

Two hot-swap Fibre channel network interface switch modules can be placed in switch module bays 3 and 4.

Note: The IBM @server BladeCenter also includes a hot-swap media tray, which includes the CD-ROM and floppy drive.



Lotus Domino

Lotus Domino and Notes have had great appeal for thousands of companies, with developers and Lotus business partners building robust applications that enable people to work together in innovative ways. Much has changed since the introduction of Domino and Notes. Companies have seen the number of operating systems, server platforms and vendors they need to support continue to grow. Development teams are challenged to build sophisticated applications with fewer resources and less time than ever before. New standards continue to emerge that change the way applications are delivered to users, integrated with other enterprise applications, and secured against prying eyes.

More than ever, companies need to bring applications to market quickly, with relevant, reliable features. Yet they must also build applications that will keep pace with demands for new features, new clients, and new platforms. These solutions must be fully scalable and reliable in a complex environment and extensible to integration with enterprise and relational data stores. Within the development team, companies must plan on leveraging a broad range of skills while having the flexibility required for teams in disparate locations to work together to get the job done.

2.1 Lotus Domino 6

Lotus Domino is an application and messaging server that enables a broad range of secure, interactive business solutions for the Internet and intranet. With Domino, developers can rapidly build, deploy and manage applications that engage co-workers, business partners, and customers in online collaboration of critical business activities.

Lotus Domino 6 represents an evolution of the platform, adding features that increase the strength of Domino as a strategic platform for Web applications, messaging, and e-business. Domino 6 servers provides platform choice in both hardware and operating system, with further enhancements in security, administration, performance, enterprise data integration, and directory options. With Domino 6, many of the new features address improving the administration and performance of Domino. Domino 6 offers the performance and administration features that will make it easy to manage such complex needs as those of Application Service Providers while offering the simplicity and ease of administration demanded by mid-sized businesses with limited IT staffs. Security and integration with directories in Domino 6 are also improving to help enterprises achieve better administrative control with less overhead. Upgrading from R5 to Domino 6 will be much easier for customers because Domino 6 now has the ability to run both R5 and Domino 6 on the same system, through partitioning. In the Domino 6 release, Lotus has continued to expand and enhance Domino's collaborative Web application development and deployment services.

2.2 Features of Lotus Domino 6

Lotus Domino can coexist with the platform you already have in place. If you have an earlier version of Lotus Domino, Version 6 has the backward capability to allow the older version to coexist. Since Lotus Domino 6 supports mostly all protocol standards, it is easy to migrate from a competitive platform.

2.2.1 The feature and its benefits

Here are a few benefits of migrating to Lotus Domino 6:

- ▶ **Network compression** is a feature that requires compression to be enabled on both the client and the server. This will increase throughout the network and reduce bandwidth consumption.
- ▶ **Replication enhancement** actually places documents in the folder while they are being replicated instead of when the replication is complete. It is streaming replication, which has proved to be more efficient.
- ▶ **Domino 6 IMAP** is a new interface which stores folder content and message attributes inside IMAP-enabled mail files. This helps improve performance and increases the number of IMAP clients that the Domino server can support.
- ▶ **Formula engine** improves speed of view rebuilds, button execution and any other formula command.
- ▶ **Full-text search** updates data in place, which provides faster, more efficient search processing.

- ▶ **Shared mail enhancements** supports distributed I/O, automatic decommissioning, support for transaction logging, simplified one screen configuration, and automatic clean up after message deletion.
- ▶ **Server startup and performance** support transaction logging for database view indexes, automated fault recovery for all server platforms; a directory manager cache has also been added. This provides faster startups and restarts.



Lotus Domino 6 prerequisites for IBM eServer BladeCenter

This chapter will discuss the requirements for installation of Lotus Domino 6. Before you begin to install Domino, you must plan the structure of your organization. If you are adding Domino to your existing network configuration, know how Domino will fit into the network. Here are a few other things you need to consider when you are about to deploy Domino.

1. Determine your company's server needs. Know where each server will physically be located. This will determine network functions, as in local or WAN (wide-area network).
2. Develop a hierarchal naming system. Hierarchal names provide unique identifiers for servers and users in a company. When you register new servers and users, the hierarchical names drive certification, or their level of access to the system, and control whether users and servers in different organizations and organizational units can communicate with each other.
3. Determine how many Domino domains you need. A Domino domain is a group of Domino servers that share the same Domino directory.
4. Understand how server name format affects network name-to-address resolution for servers. Ensure that the DNS records for your company are the correct type for the server names.
5. Determine which server service to enable.

3.1 Lotus Domino supported platforms

Listed are the supported operating system platforms:

- ▶ Microsoft Windows NT® 4.0 (Inter processor)
- ▶ Microsoft Windows 2000 (Server and Advanced Server editions)
- ▶ Sun Solaris Operating Environment 2.8/SPARC
- ▶ IBM AIX® operating system, Version 4.3.3x and 5.1
- ▶ IBM OS/400® V5R1 or later, using the IBM @server iSeries™ (formerly IBM AS/400®)
- ▶ IBM z/OS® V2R6 or later, using the @server zSeries® (formerly IBM S/390®)
- ▶ Red Hat Linux, Version 7.2 or SuSE Linux, Version 8.0 (using an Intel processor)

3.2 Lotus Domino 6 system requirements

Listed are the Lotus Domino 6 system requirements and operating systems currently supported by IBM @server BladeCenter:

- ▶ Microsoft Windows NT 4.0 (Intel):
 - 256 MB of RAM or more recommended.
 - Disk space: 750 MB, 1 GB or more recommended
- ▶ Microsoft Windows 2000:
 - 256 MB of RAM minimum or more recommended.
 - Disk space: 2 GB (with a minimum of 1 GB free space).
- ▶ Linux:
 - Only Red Hat 7.2 and SuSE 8.0 supported (Server and Enterprise)
 - 128 MB of RAM minimum; 192 MB or more recommended
 - Disk space: 1 GB minimum, 1.5 GB or more recommended
 - Swap space: three times the physical RAM installed

3.3 Preparation for Lotus Domino 6 install

Before you install the Domino server program files on a Windows system, do the following:

- ▶ Make sure that the required hardware and software components are in place and working.
- ▶ Read the *Release Notes* for operating system and network protocol requirements and for any last-minute changes or additions to the documentation.
- ▶ Temporarily disable any screen savers and turn off any virus-detection software.
- ▶ Make sure that all other applications are closed. Otherwise, you may corrupt any shared files and the install program may not run properly.
- ▶ If you are upgrading to Domino from a previous release, see the book *Upgrade Guide*.

3.4 How to install Windows 2000 on the BladeCenter

In this section, we will demonstrate how to install the Windows 2000 Server via CD-ROM, RIS and RDM.

3.4.1 Installation from CD-ROM

When installing Windows 2000 Server on the BladeCenter from a CD-ROM, you have to modify the CD-ROM to include Service Pack 3. This is because the operating system cannot be installed from the original CD-ROM or diskette drive since they reside on a USB bus. To create a bootable CD-ROM with Service Pack 3, follow the steps below.

1. Download and extract the service pack with the /x option to the directory d:\images\sp3\. This will unpack the service pack without installing it. Note that from this machine, you should be able to create a new CD-ROM image.
2. Copy the i386 directory from the Windows 2000 CD to the machine with the CD-writer to the directory d:\images\bootcd\i386.
3. Apply the service pack with the /s option to the d:\images\bootcd\ directory.
4. Extract the bootsector from the Windows 2000 installation CD-ROM using an appropriate application. Several CD-writing applications have this functionality.

Note: At the time this Redpaper was written, an official Microsoft Windows 2000 Server with integrated Service Pack 3 CD-ROM was not available. Check the World Wide Web for numerous procedures on how to create a bootable Windows 2000 Server CD-ROM with Service Pack 3.

5. Copy the bootsector to the machine with the CD-writer to directory d:\images\bootsect\.
6. Make sure the following files are located in the d:\images\bootcd\ directory; the files not present should be copied to d:\images\bootcd directory from the original CD-ROM.
 - CDROM_NT.5
 - CDROM_IA.5, CDROM_IS.5 or CDROM_IP.5 depending on the version of Windows 2000. Advanced, Standard or Professional
 - CDROMSP3.TST
 - Optionally, copy the following files: Autorun.inf, Read1st.me, readme.doc and setup.exe from the original CD-ROM
7. Use a CD-writer software that is capable of creating a bootable CD-ROM.
8. Use the following settings in your CD-writer application. Settings might look slightly different or not exist at all, depending on the CD-writer application used.
 - Set Load segments to 07C0.
 - Set sector count to 4.
 - Set emulation-mode to no emulation
 - Enable Joliet extensions
 - Set CD format to mode 1
 - Set file/directory length to ISO level 2
 - Set file system to ISO9660

- Use disc-at-once as recording method
 - Point out the Bootsector file located in d:\images\bootsect\
9. Write the CD-R and finalize the disc.

3.4.2 Remote Installation Service (RIS)

With RIS, you require a RIS Server that has Service Pack 3 to provide support to deploy Windows 2000 Server and Windows 2000 Advanced Server. The requirements on the RIS Server are that the RIS images cannot be located on the system drive and the file system has to be NTFS 5. The installation has to be run over the network via PXE-boot. As the BladeCenter NIC is not supported from the RIS-start disk, you will receive the following error.

Example 3-1 Error from RIS boot floppy

Windows 2000 Remote Installation Boot Floppy

Error: Could not find a supported network card. The boot floppy currently supports a limited set of PCI based network cards for use with the Windows 2000 Remote Installation Service. Ensure this system contains one of the supported network cards and try the operation again. For assistance, contact your system administrator.

To create an RIS installation image of Windows 2000 server, perform the following steps:

1. Download and extract the service pack with the /x option to d:\images\sp3. This will unpack the service pack without installing it.
2. Apply the service pack to the RIS-server and reboot by running the update.exe file located in d:\images\sp3\i386\update.
3. Copy the information from the installation directory on the CD-ROM onto the RIS-server using directory d:\images\w2kad\i386.
4. Run the update application from the unpacked service pack with the /s option located in d:\images\sp3\i386\update. The command should look like this:

```
update.exe
/s:d:\images\w2kad\.
```

5. Install the Remote Installation Service:
 - a. Click **Start -> Settings -> Control Panel**.
 - b. Click **Add/Remove Programs**.
 - c. Click **Add/Remove Windows Components**.
 - d. Scroll down to Remote Installation Services (Figure 3-1 on page 33).

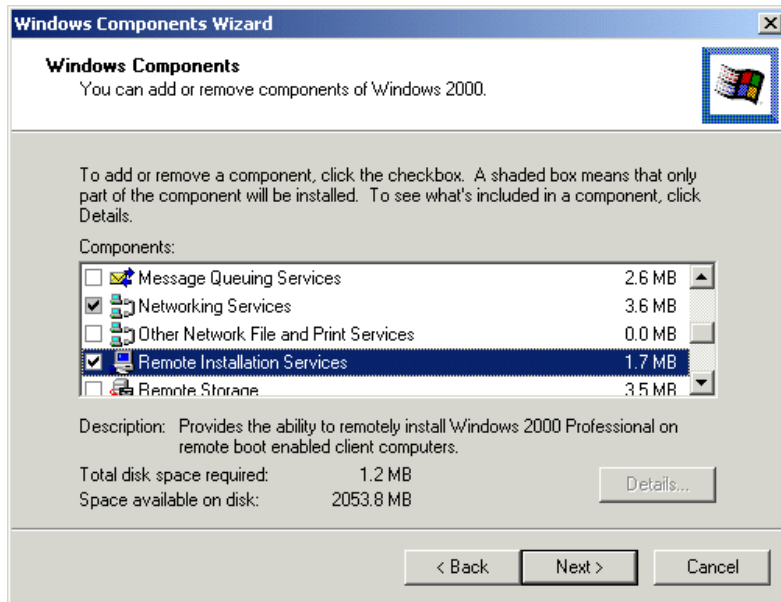


Figure 3-1 Installation of RIS onto a Windows 2000 Server

- e. Select **Remote Installation Services**.
 - f. Click **Next**.
 - g. Click **Finish**.
 - h. Restart the server.
6. Run **RISSETUP** to create an installable image of the operating system.

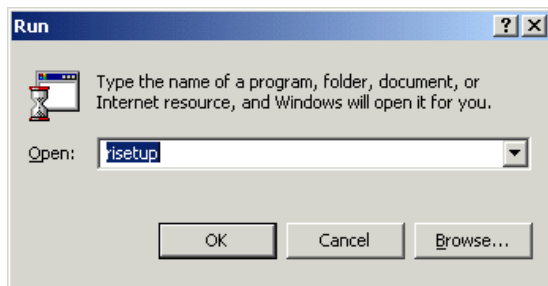


Figure 3-2 Starting remote installation setup

7. Click **OK**.
8. Click **Next**.
9. Choose a folder for RIS installation. It must be an NTFS volume and cannot be the system drive. An example could be e:\remoteinstall.

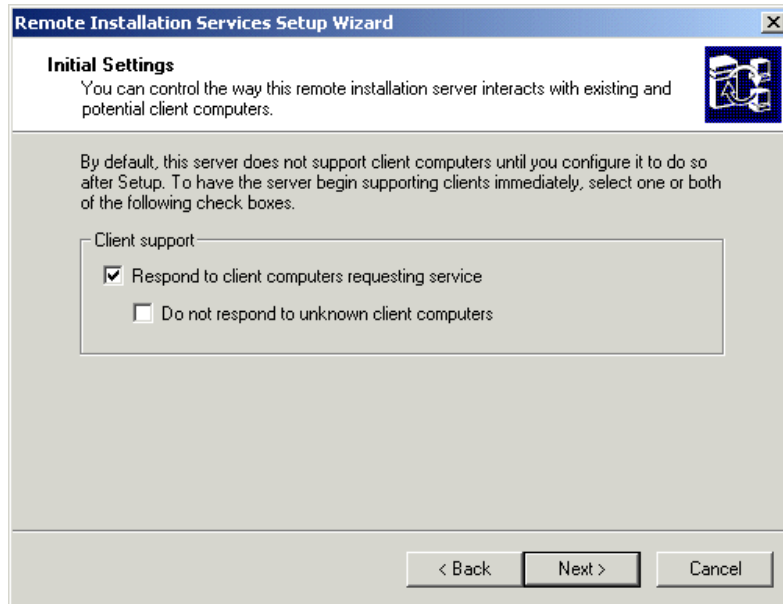


Figure 3-3 Settings for RIS-installation

10. Select **Respond to client computers requesting service** (Figure 3-3) and click **Next**.
11. Enter the directory where the i386 directory resides: d:\images\w2kadv\i386.
12. Enter an appropriate name for the installation, for example, win2000.adv.
13. Click **Next -> Next -> Finish**.
14. Wait for the installation to complete and click **Finish**.
15. Download the driver for the Broadcom gigabit network interface and unpack it.
16. Copy the .inf file and the .sys file to the i386 directory located in d:\remoteinstall\setup\english\win2000.adv\i386.
17. Start a command prompt and restart the RIS-server.

```
net stop binlsvc
net start binlsvc
```


Example 3-2 Restarting the RIS service

Microsoft Windows 2000 [Version 5.00.2195]
<C> Copyright 1985-2000 Microsoft Corp.

```
C:\>net stop binlsvc
The Boot Information Negotiation Layer service is stopping.
The Boot Information Negotiation Layer service was stopped successfully.
```

```
C:\>net start binlsvc
The Boot Information Negotiation Layer service is starting.
The Boot Information Negotiation Layer service was started successfully.
```

```
C:\>
```

- ▶ Installing a BladeServer with this configuration will result in our having two unknown drivers in Device Manager which are the Broadcom drivers. To modify the installation to avoid this, see 3.4.4, “Modifying the installation to incorporate network drivers” on page 36.
- ▶ Boot the blade server and press **F12** during startup; when the Broadcom network card prompts you, you will be able to choose **PXE-boot**. Booting from the network has to be enabled in the BIOS.

Example 3-3 Booting from the network

Broadcom UNDI, PXE-2.1 (build 082) v2.2.10
Copyright (C) 2000-2002 Broadcom Corporation
Copyright (C) 1997-2000 Intel Corporation
All rights reserved.

CLIENT MAC ADDR: 00 09 6B 00 12 60 GUID: 82A30F31-48B4-4A12-A86E-30C4F887C967
PXE-E51: No DHCP or proxyDHCP offers were received.

PXE-MOF: Exiting Broadcom PXE ROM.

Broadcom UNDI, PXE-2.1 (build 082) v2.2.10
Copyright (C) 2000-2002 Broadcom Corporation
Copyright (C) 1997-2000 Intel Corporation
All rights reserved.

CLIENT MAC ADDR: 00 09 6B 00 12 61 GUID: 82A30F31-48B4-4A12-A86E-30C4F887C967
CLIENT IP: 9.1.1.16 MASK: 255.0.0.0 DHCP IP: 9.1.1.1
GATEWAY IP: 9.1.1.11

Press F12 for network service boot

18. Choose the operating system you want to have transferred to the server if several RIS images have been created.
19. Enter the information about Userid/Password/Domain.
20. A warning will be displayed indicating that you are about to delete everything on drive 1.

3.4.3 Remote Deployment Manager (RDM)

RDM is a manageability tool that runs on your IBM xSeries server. This beneficial tool simplifies and automates the deployment, redeployment, lower-level management and disposal of xSeries servers. RDM uses imaging technology from industry leader PowerQuest to provide high performance cloning, recovery, and re-provisioning solutions.

Because Remote Deployment Manager gains control of a PC before it starts its local operating system, many of the lower-level tasks that previously required a visit to each computer can now be performed over the network. Using Remote Deployment Manager, a network administrator can remotely flash a selected system's BIOS, modify CMOS settings, perform automated installation of Microsoft Windows 2000 and back up and recover the primary partition.

Remote Deployment Manager will save the user time from running around from system to system. It helps make systems management simpler and less time-consuming.

3.4.4 Modifying the installation to incorporate network drivers

The Broadcom gigabit Ethernet adapter is not included on the Windows 2000 installation, which means that the installed server will end up with two unknown devices, one for each network interface. To avoid this, you need to modify the installation file `risstndrd.sif` in the RIS installation.

RIS-based installation

Below are the steps we followed to update the Windows 2000 Service Pack 3 RIS installation with the Broadcom drivers included.

1. Download and unpack the Broadcom driver from the IBM homepage.
2. Copy the *.inf and *.sys from the unpacked Broadcom driver directory to the `d:\remoteinstall\setup\english\win2000.ad\i386` directory.
3. Modify the [unattended] section of `risstndrd.sif` located in `d:\remoteinstall\setup\english\win2000.ad\i386\templates`.
 - Add the line: `OemPreinstall = no`
 - Add the line: `OemPnpDriversPath = “\pnpdrvs”`
4. Copy all the information from the unpacked Broadcom directory to `d:\remoteinstall\setup\english\win2000.ad\%oem%\$1\pnpdrvs`.
5. Restart the RIS-server by starting a command prompt. Click **Start -> Run** and type `cmd` in the window. Click **OK -> Run**. Next, execute the following commands (see Example 3-2 on page 35).

```
net stop binlsvc
net start binlsvc
```



Installation of Lotus Domino 6

In this section, we will proceed with the installation of Lotus Domino 6 into our IBM @server BladeCenter environment.

4.1 Installation of Lotus Domino 6 Server

This is the installation of Lotus Domino 6 on a blade server within a BladeCenter unit. Our BladeCenter environment has one 2.0 GHz processor, 512 MB (2x256) of RAM, and two 40 GB IDE drives in a mirrored environment running Windows 2000 Advanced Server.

1. First, insert the Lotus Domino 6 Server CD into the CD-ROM drive and launch it. The following window should appear.



Figure 4-1 Lotus Domino 6 Server install window

2. In Figure 4-1, click **Servers** and the following three choices should appear:

Domino Mail Server	Installs a Domino Server that provides messaging services. This install does not include support for application services or Domino clusters.
Domino Application Server	Installs a Domino server that provides application services only, with support for Domino clusters.
Domino Enterprise Server	Installs a Domino server that provides both messaging and application services, with support for Domino clusters.

We chose to install the Domino Enterprise Server because it delivers all the functions of the Mail and Application servers.

3. Once you click the button of the server specified, you are prompted to choose from Custom install or Standard install, which is a personal preference. We chose a **Standard install**. Next, a window similar to Figure 4-1 will appear and you will be ready to install Lotus Domino 6 Server.

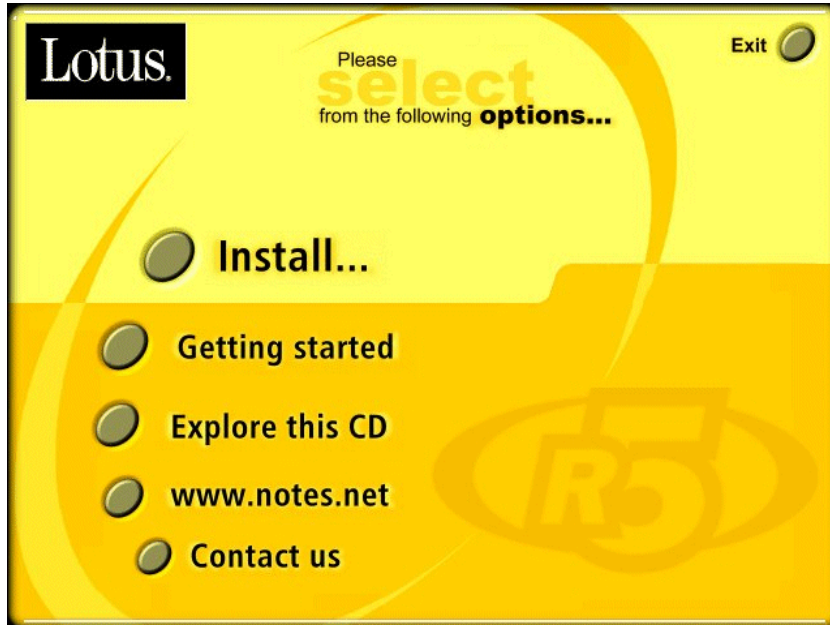


Figure 4-2 Install window

- Remember, it is always recommended that you exit all Windows programs before you begin the Setup process. Click **Install**. Next, you will see the license agreement window. Once you have read through this information, accept it and click **Yes**. This will launch a window similar to Figure 4-3.

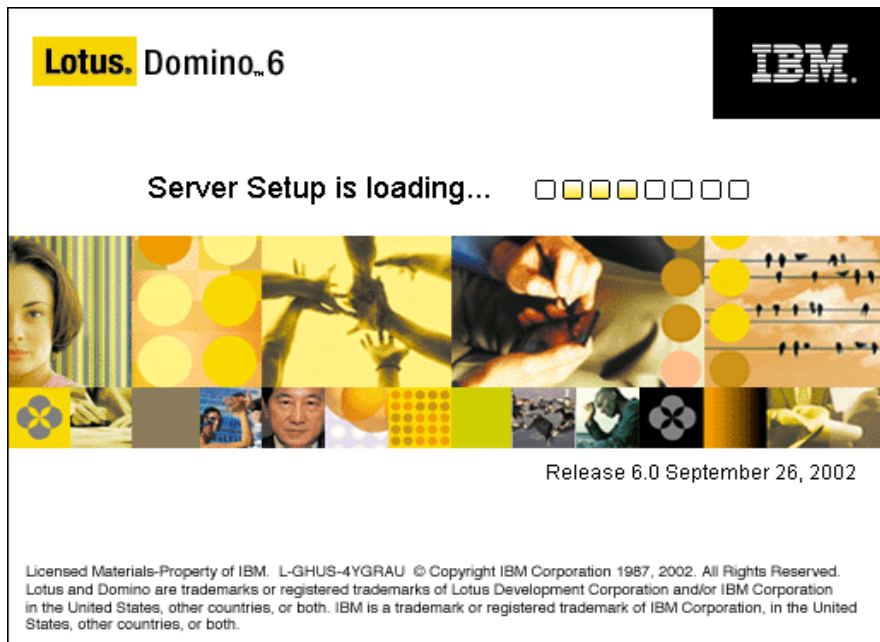


Figure 4-3 Server Setup Loading window

- Figure 4-3 shows the Server Setup Loading window. When Server Setup has finished loading, you will see a window similar to Figure 4-4 on page 40.

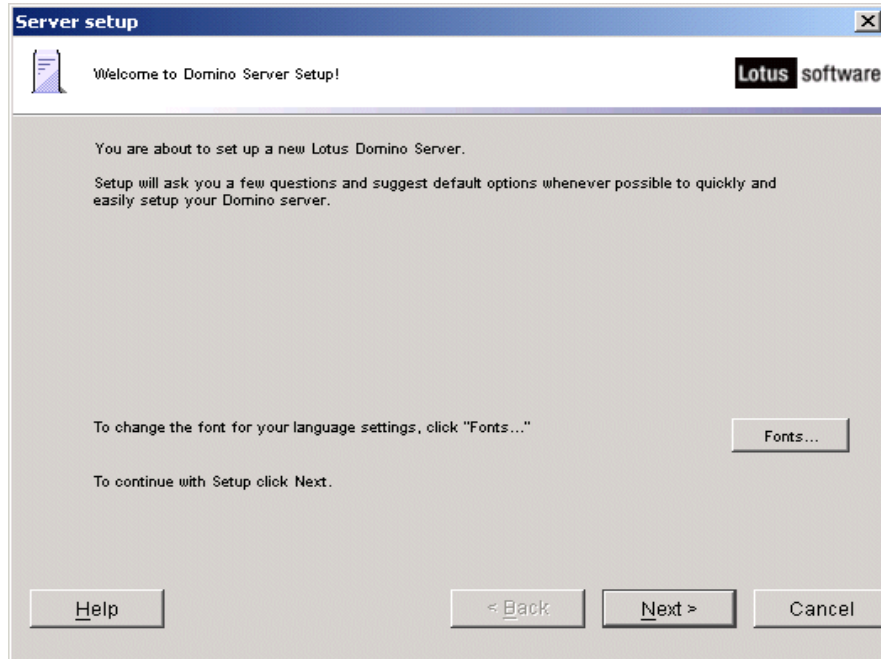


Figure 4-4 Server Setup window

6. You are about to set up the server and during this process you will be asked a few questions. In addition, Setup will offer suggestions of some default settings to help the installation go smoothly.

Click **Next**.

7. You will be presented with two options:
 - Set up the first server or a stand-alone server.
 - Set up an additional server.

If this is your first server of the Domino domain, you will choose the first option, as we did. The second option is used for setting up an additional Domino server into an existing Domino domain. It requires that the server already be registered in the Domain directory. That information can be obtained from the Domino Administrator.

8. After selecting the first option, click **Next**. You will be prompted about the naming functions on the server (see Figure 4-5 on page 41).

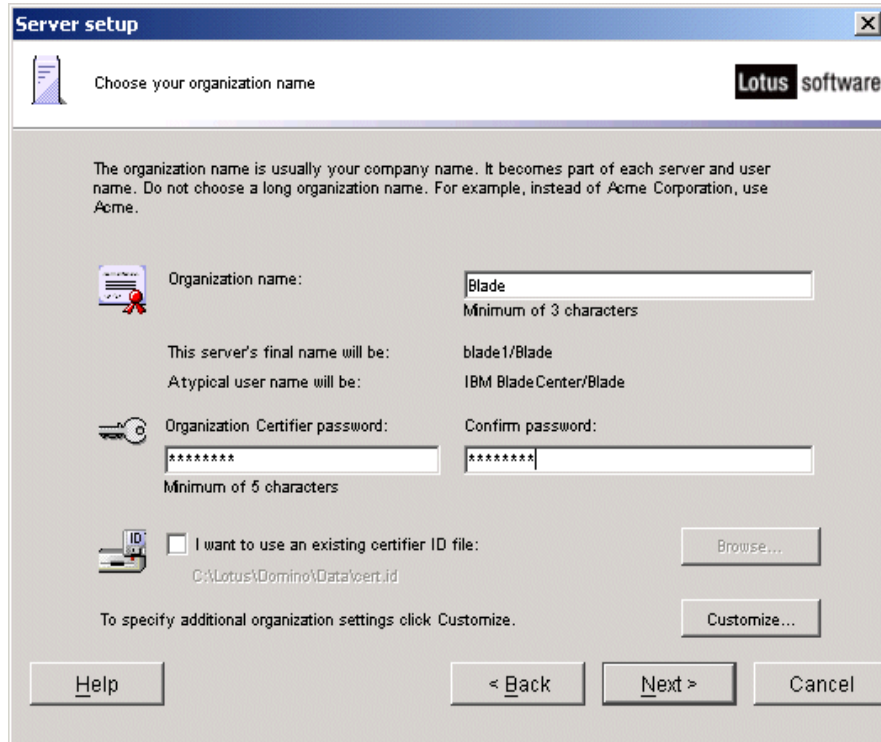


Figure 4-5 Organizational window

9. Type in your organization's name and a server's name and user name are generated by default. That can be easily changed with the Customize button. Make sure you remember and write down the password for this server. Click **Next** once you are done with this window.
10. The next step is to enter a Domino domain name. Do not make the domain name too difficult or complex. Make it short and easy. In fact, you can make the domain name the same as the organization's name. Click **Next**.
11. Now it is time to set up your Administrator name and password. You will see a window similar to Figure 4-6 on page 42.

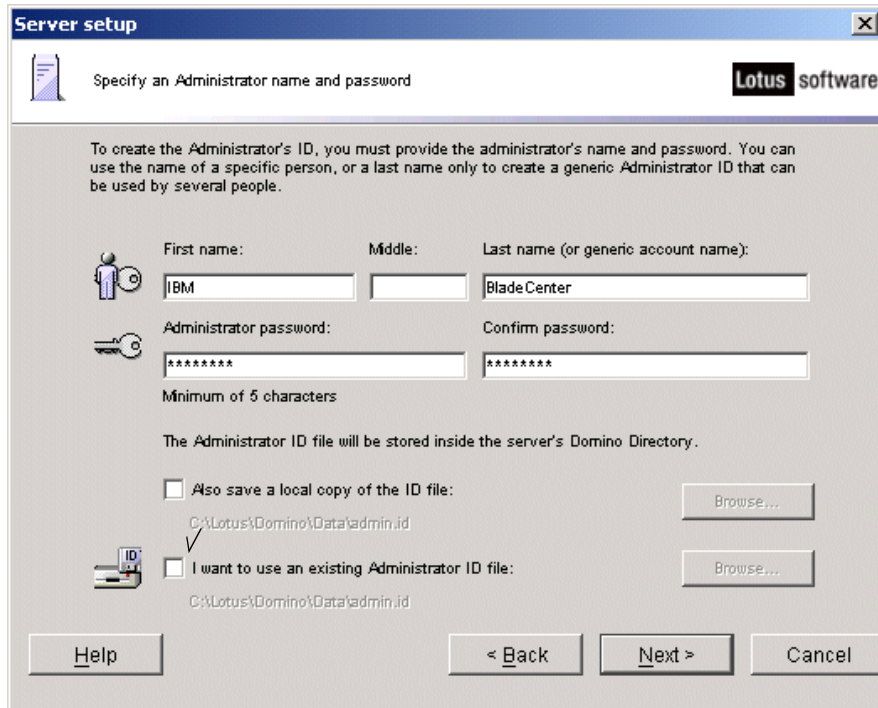


Figure 4-6 Administrator name and password window

12. It is a safe practice to save a local copy of this ID file. Click **Next**. The next window will allow you to select the Internet services this Domino server will provide. You can always go back and change these options in the Domino directory. Click **Next**.

13. Now it is time to set up the Domino network settings. This process will detect any network ports already on the computer. See Figure 4-7 on page 43.

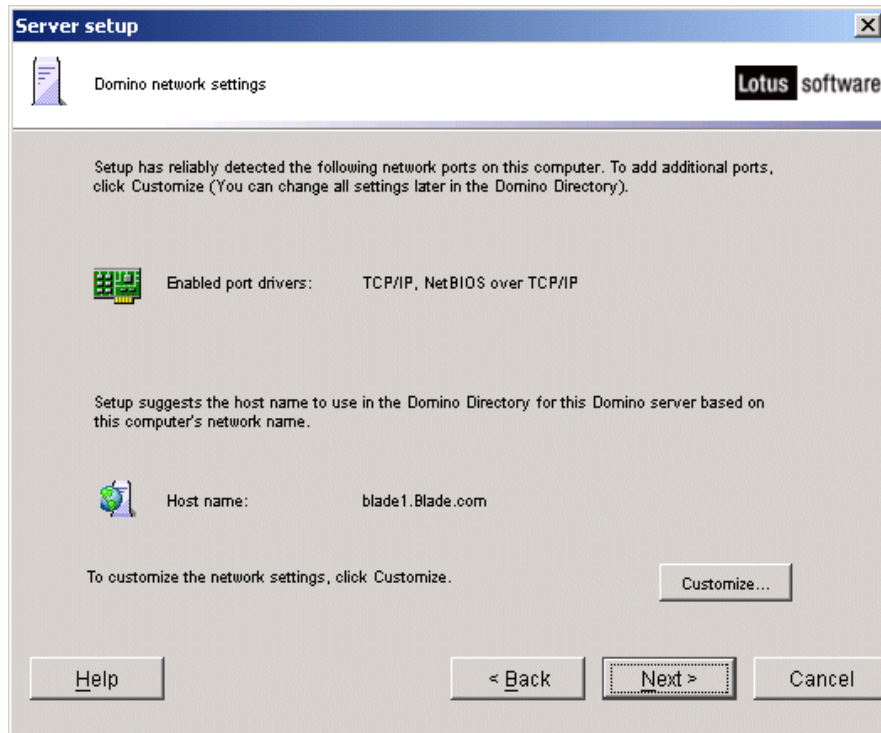


Figure 4-7 Network settings window

14. Click **Next** to advance to Secure Your Domino Server. You have the option to add Prohibit Anonymous Access to all databases and templates and to Add Local Domain Admins Group to all databases and templates.

- Prohibit Anonymous access means you will increase security and protect unauthenticated access of databases from the Internet.
- Add Local Domain Admins Group to all databases and templates will give you better manageability and administration.

For our example, we selected both items.

15. Click **Next** after making your selection. You will see a window similar to Figure 4-8 on page 44.

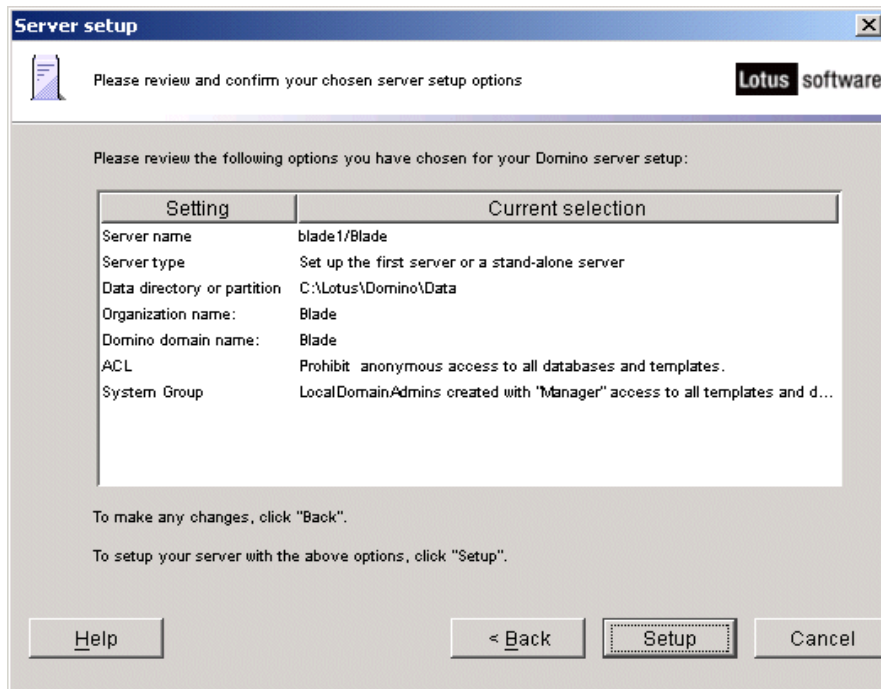


Figure 4-8 Server setup settings

16. Review your settings and click **Setup** to continue.

17. Lotus Domino Server will start the setup procedure then after a few moments, you will see a window indicating the process is finished. Click **Finish**. You have successfully installed Lotus Domino 6 Enterprise Server on your system.

4.1.1 Post install of the Domino Server

After installing the first Domino server and any additional server, you should configure the servers and build the environment. Listed are considerations about the features that you may want to include in your Domino environment.

1. Create Connection documents for server communication.
2. If you have mobile users, set up modems, dial-up support, and RAS.
3. Set up mail routing.
4. Establish a replication schedule.
5. Configure incoming and outgoing Internet mail (SMTP).
6. Customize the Administration Process for your organization.
7. Plan and create policies before you register users and groups.
8. Register users and groups.
9. Determine backup and maintenance plans and consider transaction logging.
10. Consider remote server administration from the Domino console or Web Administration console. Also consider the use of an extended administration server.
11. Set up a mobile directory catalog on Notes clients to give Notes users local access to a corporate-wide directory.
12. Consider implementing clustering on servers.

4.2 Installing Lotus Notes 6 on a client system

You can run a client and server on the same machine. However, you must use multiple NOTES.INI files. The client will even communicate with the server using the NetBIOS networking protocol on a single machine. Make sure you back up all the important server files before trying this. You will want to have the server's NOTES.INI file in the NT system's path and a completely separate NOTES.INI file for the client that is not in the path. You will then start the server normally and it will find the NOTES.INI file. You will then start the client from a command line prompt.

Before you install Lotus Notes clients on a Windows machine, make sure that you or your users do the following:

- ▶ If the computer which you are upgrading runs an anti-virus software, close the application.
- ▶ To successfully install, upgrade, and use Lotus Notes 6, users must be allowed both Write and Modify permissions to the Program directory, Data directory, and all associated subdirectories.
- ▶ If you are upgrading Lotus Notes on a Windows NT, 2000, or XP computer, you must have administrator rights to the system. On a Windows NT 4.0 computer, log in as an administrator or set administrator-level privileges for *all* users. This can be done from the command line.
- ▶ Windows NT, 2000, and XP users should log on to their computers with administrative rights to install Lotus Notes 6. If administrative rights are not available, enable the setting *Always install with elevated privileges*. Refer to the *Release Notes* for the most current information on permissions required when installing as a non-administrator.
- ▶ Options for installing the Lotus Notes client on Restricted or Standard / Power User computers are described in the Microsoft Windows 2000, Windows XP, and Windows Installer documentation.

4.2.1 Installation process

Now, to begin your installation, complete the following instructions.

1. Click the executable file to extract the file or run Setup using the Lotus Notes 6 CD. You will see a window similar to Figure 4-9 on page 46.



Figure 4-9 Lotus Notes Installation Wizard

2. Click **Next**. Read and accept the agreement. Click **Next**. You will see a window similar to Figure 4-10.

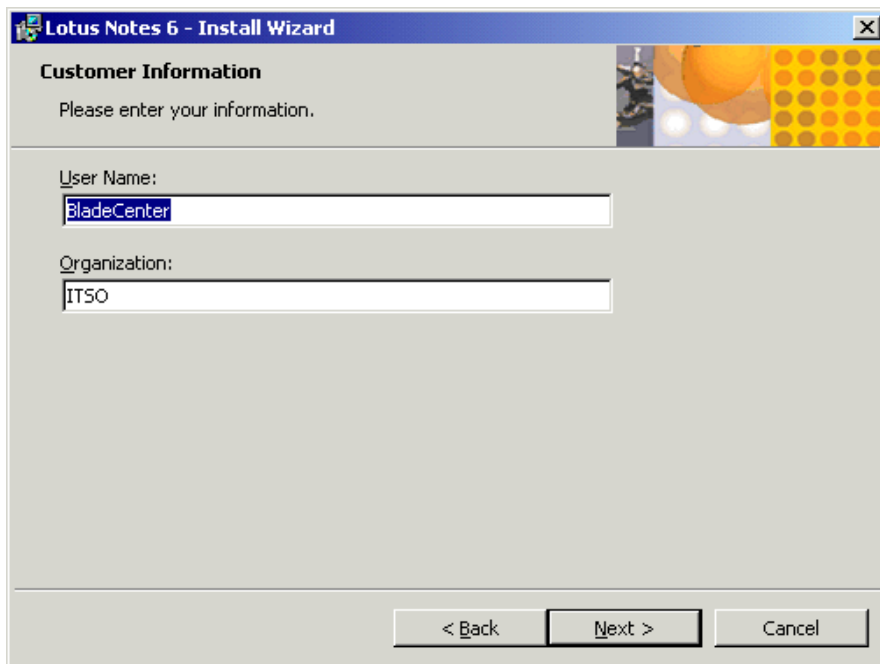


Figure 4-10 Customer Information window

3. Type in the user name and the organization name. Click **Next**. You will see a window similar to Figure 4-11 on page 47.

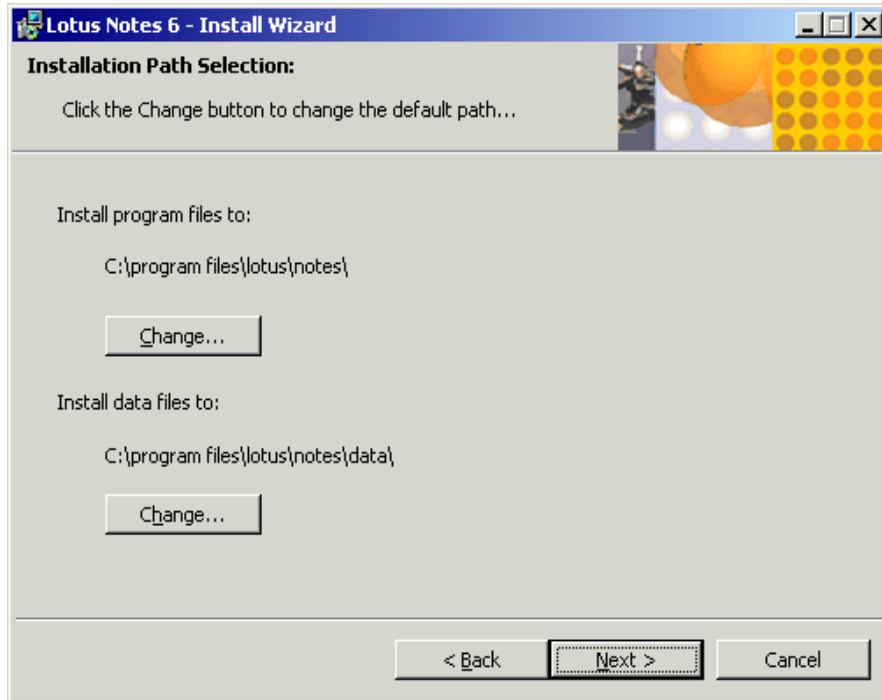


Figure 4-11 Data path

4. Now you can choose the path of your installation or accept the default.
5. Click **Next** once you are satisfied as to where you want your files installed. The next window is the Custom Setup window for the program features you want installed on your client. Once you (or your administrator) are satisfied with the chosen features, click **Next**. You will see a window similar to Figure 4-12.

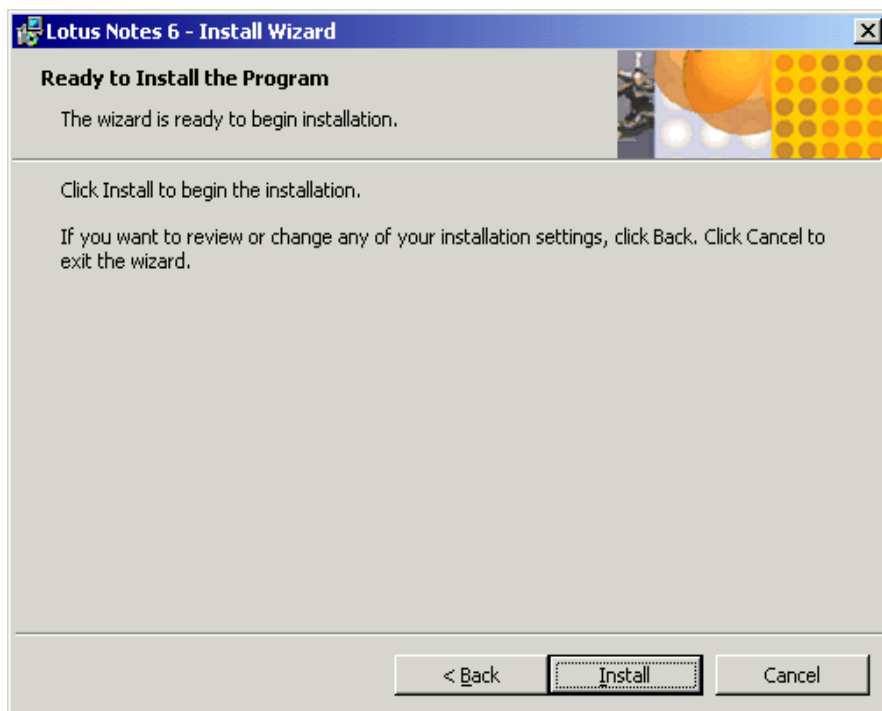


Figure 4-12 Install Wizard

6. Click **Install** and wait a few moments. Soon you will see a window similar to Figure 4-13.



Figure 4-13 Install complete

7. Click **Finish**; Lotus Notes 6 is installed on your client system.



Managing Lotus Domino for maximum performance

This chapter provides tips on how to get the maximum performance out of your Domino Server. Many times, the performance will suffer because the server is being overloaded, doing unnecessary work, and presents the potential for a bottleneck.

5.1 Server overload

Server overload could happen if there was not sufficient planning regarding potential growth. If you are going to scale Domino to higher user loads, you may need to use Domino partitioned servers and Clustering. This will divide the load among the servers and you can take advantage of high-end hardware configurations.

5.1.1 Views

Does it take a long time to display a view? If so, you can increase the view buffer on the server. This will increase performance because it will not force the server to read the view from the disk. You have to be careful because the maximum size you can increase to is about one-fourth of the physical memory.

5.1.2 Accessing databases

This section applies to the database settings:

- ▶ You can increase the maximum number of database open/close handles in the cache. The maximum size you can increase to is 1872. The file where you would do this is the NOTES.INI setting NSF_DBCACHE_MAXENTRIES.
- ▶ You can also decrease the size of the databases. The larger databases require more I/O and use more memory. This will use up other resources.
- ▶ Since some databases have to be large, you can increase the I/O subsystem or add more memory to the server.
- ▶ You can distribute access of highly used databases across replicas. You would want to do this so there will not be a burden on one database and server with all users. If you are using a cluster, put a replica of the database on the clustered node. If using a single server, put it on a different hardware array and refer to it via a link.

5.1.3 Uni-processor system

If you are running Lotus Domino 6 on a uni-processor system, you will need to increase the SERVER_MAXSESSIONS in the NOTES.INI. Only do this if you are running a Notes and browser client environment on the same machine. Domino will automatically delete any sessions or tasks that have been idle for more than ten seconds. You *do not* want to increase the indexer task and the number of replica tasks because of the one processor.

5.2 Unnecessary work

Many server tasks are started by default. You may not need every task to run your Domino environment because some tasks such as Scheduling could take up about 20% of your server's CPU.

5.2.1 Task monitoring

These task should be turned off when they are not in use.

- ▶ Router: turn off only if you are not using the server for electronic mail or workflow.
- ▶ Scheduling: turn off if you are not using the server for scheduling and calendaring.

- ▶ **AMgr:** turn off if you are not using the server to run scheduled agents. Remember, this function is not required for WebQuery Agents.
- ▶ **Collector / Reporter:** turn off if you are not using the server to automatically track server statistics on a regular basis. You can collect them on demand.

5.3 Bottlenecks

There are several things you can do to reduce the tension of the server and network.

- ▶ **Increase the indexer tasks:** multiple processors can handle more than one indexer task. It is recommended that you set the number of indexers to the number of CPUs minus one. For example, if you have a four processor machine or environment, set the indexer to three.
- ▶ **Increase the NOTES.INI setting UPDATE_SUPPRESSION_TIME, UPDATE_SUPPRESSION_LIMIT, UPDATE_NAB_SUPPRESSION_TIME.** This setting determines the minimum amount of time before the indexer runs again. Increasing this value will mean that the indexer will run less frequently.
- ▶ **Set the NOTES.INI setting UPDATE_NAB_VIEWS_DISABLE equal to 1.** This will disable the automatic updating of hidden views in the name and address book.
- ▶ **Set the NOTES.INI setting SERVER_NAMELOOKUP_NOUPDATE equal to 1.** This forces an immediate rebuild of namespace views and makes for faster name resolution.



A brief introduction to Layer 4-7 Switching

This chapter provides a brief overview of how Layer 4-7 Switching works. The goals are to present an alternative to traditional network design and to provide enough background to understand how a Layer 2-7 switch can be beneficial to a network. While this chapter provides a brief overview of the features and benefits of Layer 4-7 Switching, it also mentions the Layer 2-7 GbE Switch Module or GbESM. For a more in-depth look at Layer 4-7 Switching, refer to *IBM @server BladeCenter Layer 2-7 Network Switching REDP3755*.

6.1 Layer 4-7 Switching

Most networks employ multiple servers without server load balancing. Each server usually specializes in providing one or two unique services. However, a server that provides applications or data in high demand can become overutilized. If this occurs, it can strain network resources, since the users resubmit the requests for data when the server starts rejecting user requests. This often happens on networks where several other servers are sitting idle with resources available to service users.

Layer 4-7 Switching can harness these available idle servers without additional special equipment such as dedicated load-balancing servers. The term L4-7 is used because these switches are Layer 4 (TCP) aware. These switches use headers and data found at the OSI Layer 7 to accomplish many of their key features. Layer 2 and Layer 3 switches operate on and are aware of Layers 2-3 only.

Layer 4-7 Switching can be used to improve the reliability, scalability, and performance of a wide variety of applications and services. Layer 4-7 isolates the delivery of a service, from a user's point of view, from the physical reality of how that service is delivered. A Layer 4-7 switch is aware of the services provided by each server. Based on several load-balancing algorithms, a switch can direct user session traffic to an appropriate server. This means that in addition to using the available resources on otherwise idle servers, resources can be provisioned "on the fly". This lets network administrators add or subtract to the service delivery capability to react to server failures, meet demands during peak periods and scale back resources once demand is over. All of this happens with no knowledge or participation from the users of that service.

To take advantage of L4-7 Switching, services or applications advertise themselves using normal host names such as `www.ibm.com` to the outside world. However, DNS resolution will resolve that host name back to a Virtual IP Address (V_IP) assigned to a L4-7 switch. A service advertised by a V_IP is a Virtual Service. When application requests are sent from users to a V_IP, the L4-7 switch forwards the request to one or more real servers with real IP addresses.

The collection of real servers to which a request for a particular Virtual Service can be sent is called the Virtual Service Pool. By adding real servers to a Virtual Service Pool, the total application delivery throughput can be increased and application delivery times reduced. By moving real servers between Virtual Service Pools, shifting loads and demands between services can be met without having to provision enough servers for each application to meet the peak demands (which would result in several unused servers in off-peak times).

Figure 6-1 on page 55 shows how the Layer 2-7 GbE Switch Module installed in BladeCenter could be used to redeploy blades to service a few different applications according to demand.

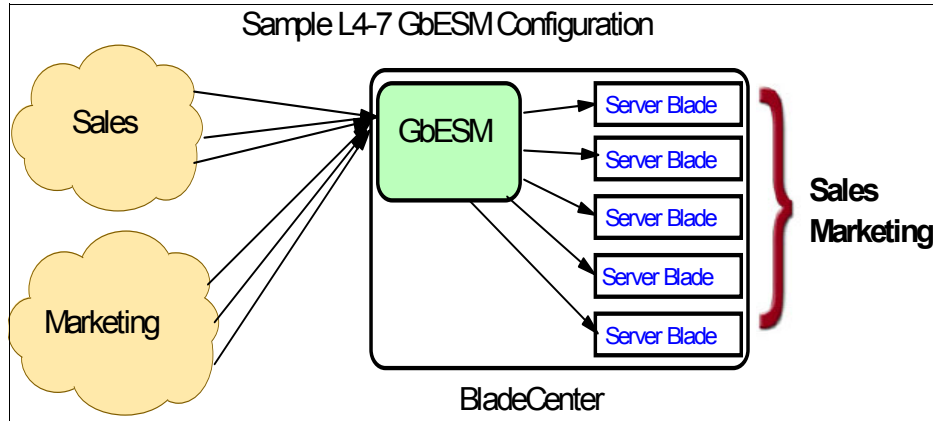


Figure 6-1 Sample L4-7 configuration

Figure 6-1 shows how services can be deployed using Layer 4-7 Switching. Using the GbESM in the BladeCenter, all server resources can be configured to support all applications, with the GbESM spreading the load among them at all times. Since the loads on Sales and Marketing vary throughout the day or week or month, resources are automatically allocated in real time to meet the need.

In this scenario, to provide load balancing for any particular type of service, each server blade in the pool must have access to identical content, either directly (duplicated on each server) or through a back-end network (mounting the same file system or database server).

The GbESM acts as a front end to the servers, interpreting user session requests and distributing them among the available servers. Load balancing in the GbESM can be done in the following ways.

Virtual server-based load balancing

This is the traditional load balancing method. The switch is configured to act as a virtual server and is given a V_IP for each service it will distribute. Each virtual server is assigned a list of the IP addresses (or range of addresses) of the real servers in the pool where its services reside. When the user stations request connections to a service, they will communicate with a virtual server on the switch. When the switch receives the request, it binds the session to the IP address of the best available real server and remaps the fields in each frame from virtual addresses to real addresses. HTTP, IP, FTP, RTSP, IDS, and static session WAP are examples of some of the services that use virtual servers for load balancing.

Filter-based load balancing

A filter allows you to control the types of traffic permitted through the switch. Filters are configured to allow, deny, or redirect traffic according to the IP address, protocol, or Layer 4 port criteria. In filter-based load balancing, a filter is used to redirect traffic to a real server group. If the group is configured with more than one real server entry, redirected traffic is load balanced among the available real servers in the group. Firewalls, WAP with RADIUS snooping, IDS, and WAN links use redirection filters to load balance traffic.

Content-based load balancing

Content-based load balancing uses Layer 7 application data (such as URL, cookies, and Host Headers) to make intelligent load balancing decisions. URL-based load balancing, browser-smart load balancing, and cookie-based preferential load balancing are a few examples of content-based load balancing.

In the example shown in Figure 6-1 on page 55, virtual server load balancing is used. The switch has two different V_IPs configured which correspond to each of the services (Sales and Marketing). DNS responds with these V_IPs when these services are requested. The GbESM is also configured for the real IP addresses (R_IPs) owned by blades that support requests coming into each V_IP. In this case, all server blades can respond to requests for all services, so each V_IP is assigned the entire set of R_IPs.

A TCP connection consists of a series of packets sent back and forth from two destinations. If packets are misrouted and sent to the wrong destination, the session will slow down due to retransmissions and possibly fail if misrouting continues. Therefore, a Layer 4-7 switch needs to be TCP-aware in the sense that it needs to be able to:

- ▶ Identify the beginning of a new TCP connection
- ▶ Assign that connection to a real server
- ▶ Make sure that all ensuing packets related to that TCP connection continue to be sent to the same real server

This requirement is what puts the “Layer 4” in L4-7. The GbESM provides this capability. All arriving packets that are destined to a V_IP are inspected to determine whether they are associated with an existing TCP connection (in which case they are re-directed to the real server already assigned) or whether they are a request to set up a new TCP connection. If the received packet is a request to establish a new TCP connection (a TCP SYN packet), the GbESM will determine the best available server to re-direct that request to and then do so. The “best available” consideration can be made based upon a number of factors that are beyond the scope of this chapter. It is enough to say that “best available” is based on a consideration of the present health and load of each of the candidate real servers.

This chapter introduces the concepts of Layer 4-7 Switching and how it benefits customers deploying applications on the IBM @server BladeCenter. For a more in-depth look at Layer 4-7 Switching, refer to *IBM @server BladeCenter Layer 2-7 Network Switching*, REDP3755. In addition to expanding on the concepts discussed here, this Redpaper is an excellent guide to deploying the GbESM in both Nortel and Cisco networking environments.

Related publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this Redpaper.

IBM Redbooks

For information on ordering these publications, see “How to get IBM Redbooks” on page 58.

- ▶ *Lotus Domino 6 for Linux*, SG24-6835
- ▶ *IBM @server BladeCenter Systems Management*, REDP3582
- ▶ *The Cutting Edge: IBM @server BladeCenter*, REDP3581
- ▶ *Deploying Citrix MetaFrame on IBM @server BladeCenter*, REDP3583
- ▶ *Deploying Microsoft Exchange on IBM @server BladeCenter*, REDP3585
- ▶ *Deploying Apache on IBM @server BladeCenter*, REDP3588
- ▶ *Deploying Samba on IBM @server BladeCenter*, REDP3595
- ▶ *IBM @server BladeCenter Layer 2-7 Network Switching*, REDP3755

Other resources

These publications are also relevant as further information sources:

- ▶ *Installing Domino Servers*, G210-1285
- ▶ *Maximizing Domino Performance*, White Paper
- ▶ *Domino.Doc*, Best Practices

Referenced Web sites

These Web sites are also relevant as further information sources:

- ▶ Lotus
 - <http://www.ibm.com/software/lotus/support>
 - <http://www.lotus.com/dominodoc>
 - <http://www.notes.net>
- ▶ IBM
 - http://www.pc.ibm.com/us/eserver/xseries/bladecenter_family.html - Main support
- ▶ Citrix
 - <http://www.citrix.com> (Main support)
 - *Advanced Concepts MetaFrame XP for Windows with Feature Release 2*
 - <http://www.citrix.com/products/metaframexp.asp> (Feature set)
 - http://download2.citrix.com/ctxlibrary/products/pdf/xp_deployment_whitepaper.PDF
(*Planning your MetaFrame deployment*)

- ▶ Microsoft
<http://www.microsoft.com> (Main support)
<http://www.microsoft.com/windows2000/technologies/terminal/default.asp> (Terminal Services)
- ▶ DABCC.COM
<http://www.dabcc.com> (NFuse and Project in a Box)
- ▶ IBM ServerProven
<http://www.ibm.com/pc/compat/>
- ▶ IBM @server BladeCenter - Power Module Upgrade Guidelines
<http://www-1.ibm.com/support/docview.wss?uid=p5g1MIGR-53353>
- ▶ IBM @server BladeCenter - Power Module Upgrade Guidelines
ftp://ftp.software.ibm.com/pc/pccbbs/pc_servers_pdf/13n0308.pdf

How to get IBM Redbooks

You can order hardcopy Redbooks, as well as view, download, or search for Redbooks at the following Web site:

ibm.com/redbooks

You can also download additional materials (code samples or diskette/CD-ROM images) from that site.

IBM Redbooks collections

Redbooks are also available on CD-ROMs. Click the **CD-ROMs** button on the Redbooks Web site for information about all the CD-ROMs offered, as well as updates and formats.



Deploying Lotus Domino on IBM @server BladeCenter



**Blazing new trails
with IBM @server
BladeCenter and
Domino 6**

**The advantages of
Domino 6 and IBM
@server
BladeCenter**

**Installing and
configuring Lotus
Domino 6 on IBM
@server
BladeCenter**

This IBM Redpaper gives you a broad understanding of the latest features included in the IBM @server BladeCenter and the advantages this system has in the marketplace.

This Redpaper will help you to set up and configure your IBM @server BladeCenter to run Lotus Domino 6 on Windows 2000 Advanced Server. Both IBM @server BladeCenter and Lotus Domino offer robust tools that can simplify your system management tasks and increase network performance and uptime. IBM @server BladeCenter and Lotus Domino 6 help you achieve better administrative control and enhance your Lotus messaging solutions to meet marketplace demands.

This Redpaper helps you tune Lotus Domino 6 for better performance while running in an IBM @server BladeCenter environment.

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