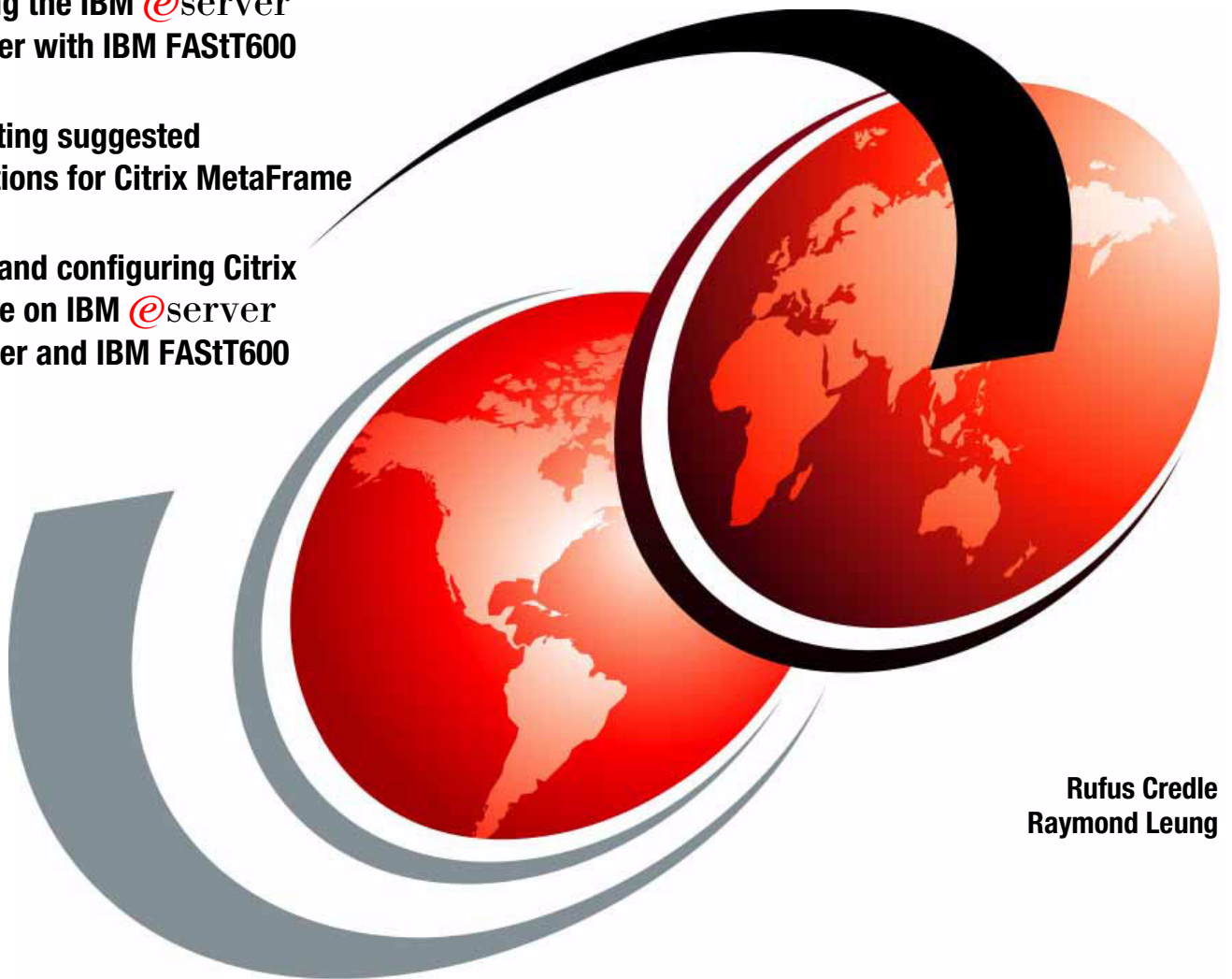# Deploying Citrix MetaFrame on IBM @server BladeCenter with IBM FAStT Storage

Supersizing the IBM @server BladeCenter with IBM FAStT600

Implementing suggested configurations for Citrix MetaFrame

Installing and configuring Citrix MetaFrame on IBM @server BladeCenter and IBM FAStT600

Rufus Credle
Raymond Leung

Redpaper

IBM

International Technical Support Organization

**Deploying Citrix MetaFrame on
IBM** *@*server **BladeCenter with IBM FAStT Storage**

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IBM

Third Edition (September 2004)

This edition applies to IBM @server BladeCenter (8677-1xx), IBM @server BladeCenter HS20 (8678-21x and 8678-41x), and Citrix MetaFrame Presentation Server 3.0.

Contents

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Preface

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 used with the IBM @server BladeCenter HS20 servers. Attractive cost savings are also possible in situations where a large number of rack installed servers are required. Combined with the latest IBM® storage, you have some winning options to consider.

This IBM Redpaper describes the technology, installation, functionality and advantages of Citrix MetaFrame Presentation Server running on HS20 blade servers. In addition, we discuss the use and benefits of the IBM TotalStorage FAStT600 Storage Server.

In Chapter 1, "Introduction to IBM eServer BladeCenter and its advantages" on page 1, we cover the features and functions of the IBM @server BladeCenter.

In Chapter 2, "Introduction to IBM TotalStorage FAStT600 Storage Server" on page 29, we cover the features and functions of the IBM TotalStorage FAStT600 Storage Server.

Chapter 3, "Planning and prerequisites for Citrix MetaFrame Presentation Server" on page 39 examines the different components required for a Citrix MetaFrame Presentation Server installation on the HS20 with the FAStT600.

Chapter 4, "Suggested configurations for Citrix MetaFrame Presentation Server" on page 49 provides a number of scenarios installing Citrix MetaFrame Presentation Server on the IBM @server BladeCenter and the IBM TotalStorage FAStT600 Storage Server.

Chapter 5, "Implementing and configuring Citrix MetaFrame Presentation Server" on page 55 describes the process we followed to install Citrix MetaFrame Presentation Server on the HS20 blade servers with the IBM TotalStorage FAStT600 Storage Server, as well as the different options for deploying Windows® 2003 on the blade servers, storage considerations and the processes of capturing and deploying RDM images.

Chapter 6, "Publishing applications" on page 143 describes the process we used to publish applications onto a Citrix server.

Chapter 7, "Web Interface for MetaFrame Presentation Server" on page 157 provide steps to set up a Web interface for users accessing Citrix MetaFrame Presentation Server via their Web browser.

Chapter 8, "Citrix Conferencing Manager installation" on page 167 describes the process we followed to install the productivity tool that allows users to share application sessions, perform editing, create documents, etc.

Chapter 9, "Managing a Citrix MetaFrame solution on IBM eServer BladeCenter" on page 181 provides an overview of considerations in managing Windows Server 2003 with Citrix MetaFrame Presentation Server on the IBM @server BladeCenter with the IBM TotalStorage FAStT600 Storage Server.

This Redpaper assumes that the reader has above average skills in the setup and configuration of Citrix MetaFrame Presentation Server and the IBM TotalStorage FAStT600 Storage Server.

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.

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1

Introduction to IBM eServer BladeCenter and its advantages

In this chapter, we will introduce the IBM @server BladeCenter. This introduction includes an overview of the IBM @server BladeCenter technology and hardware, including the chassis and the blades, and 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 into the market and why the market is driven toward blade servers.

1.1 Introduction to the blade server technology

Blade servers are a relatively new technology, one that has captured industry focus because of its modular design, which can reduce cost through 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 provide improved performance by doubling current rack density. By integrating your resources and sharing key components, not only will you reduce cost but you will also increase availability.

1.1.1 IBM eServer™ BladeCenter and BladeCenter HS20 and HS40 features

In this section, we list the key features of the IBM @server BladeCenter and the BladeCenter HS20 and HS40 servers. First, the IBM @server BladeCenter features:

► Rack-optimized, 7U modular design enclosure:
  – Holds up to 14 hot-swap IBM @server BladeCenter HS20 blades with up to six enclosures in a 42U rack
  – Holds up to seven hot-swap IBM @server BladeCenter HS40 blades
► A high availability midplane supporting the hot-swap of individual blades.
► Two 1800-watt, hot-swap power modules and support for two redundant 1800-watt power modules with load balancing and failover capabilities. See guidelines in 1.2.5, "IBM eServer BladeCenter Power Supply Module" on page 11.
► Two hot-swap and redundant 325 CFM blowers and thermal sensors throughout to monitor and alert of over-temperature conditions.
► One management module (standard) lets you manage and control components in the enclosure. Add a second module for redundancy.
► 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:

► Intel Xeon Processor of up to 3.2 GHz (maximum of two processors) with quad-pumped 533 MHz front-side bus (FSB) and up to 2 MB L3 cache.
► Standard 1 GB PC2100 ECC DDR memory and support of a maximum of 8 GB.
► Dual integrated Gigabit Ethernet controllers with teaming and failover support.
► Integrated service processor that monitors critical components on each blade for remote and local systems management.
► ATA-100 IDE controller that provides an economical interface for up to two optional 40 GB IDE HDDs.
► RAID support - integrated IDE RAID standard on blade server, integrated RAID with SCSI Storage Expansion Unit option.
► Maximum internal storage - 293.6 GB SCSI/80 GB IDE.
► One expansion card connection.
► Integrated systems management processor.

Each of these features, and a few other important points, will be discussed in greater detail later in this Redpaper.

The IBM @server BladeCenter HS40 features:

► Intel Xeon Processor MP of up to 3.0 GHz (maximum of four processors) with 400 MHz front-side bus (FSB) and up to 4 MB L3 cache.

► Memory up to 16 GB DDR ECC Chipkill™.

► Four integrated Gigabit Ethernet controllers.

► Integrated service processor that monitors critical components on each blade for remote and local systems management.

► Up to two hot-swap Ultra320 SCSI drives for 293.6 GB U160, or U320 SCSI maximum internal storage via the optional SCSI Storage Expansion Unit.

► RAID support - integrated RAID with SCSI Storage Expansion Unit option.

► Maximum internal storage - 293.6 GB SCSI.

► Two expansion card connections.

► Integrated systems management processor.

Each of these features, and a few other important points, will be discussed in greater detail later in the Redpaper.

1.2 Technical overview

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

1.2.1 IBM eServer BladeCenter chassis

The IBM @server BladeCenter is a 7U modular chassis that is capable of housing up to 14 blade servers. The IBM @server BladeCenter chassis allows individual blades to share resources such as power, switch, management and blower modules. The front view of the IBM @server BladeCenter chassis is shown in Figure 1-1 on page 4. Here, we can see the 14 slots; in this example, these have been populated by a 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 IBM @server 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 5.

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 LEDs which provide status information for your IBM @server BladeCenter and IBM @server BladeCenter HS20s.

There are five LEDs on the front panel. Figure 1-2 on page 5 illustrates the location of these LEDs. The five LEDs are:

Power   This is a green LED which indicates the presence of power in the IBM @server BladeCenter chassis. If this LED is not on, it could indicate one of the following conditions:

- There is no power to the chassis.
- The management module is not present or has failed.
- The LED has failed.

Location   This LED is used to locate or identify the particular IBM @server BladeCenter. 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 IBM @server 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, this is 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 IBM @server BladeCenter chassis under blower module 2.
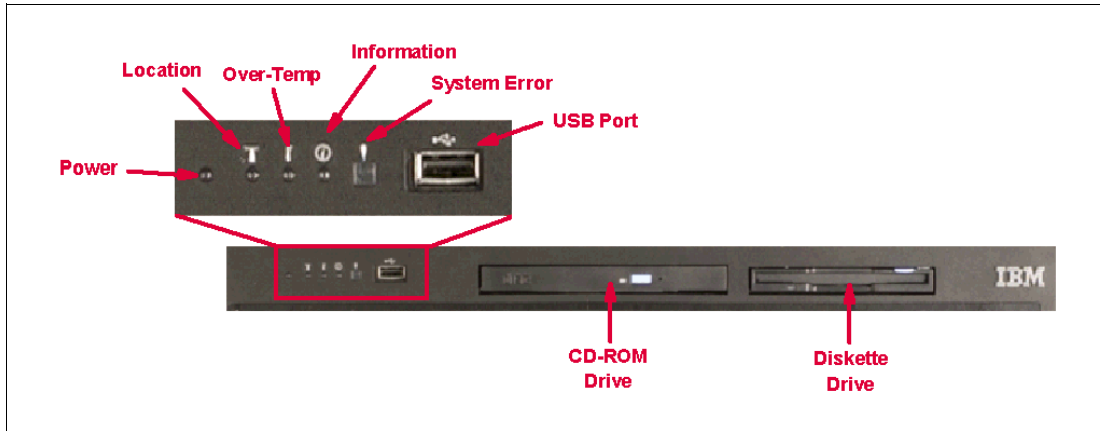
Figure 1-2   Media tray front view

As we discussed earlier, the IBM @server BladeCenter chassis is capable of housing several hot-swap and redundant components such as:

► Power supply modules
► Switch modules
► Management modules
► Blower modules

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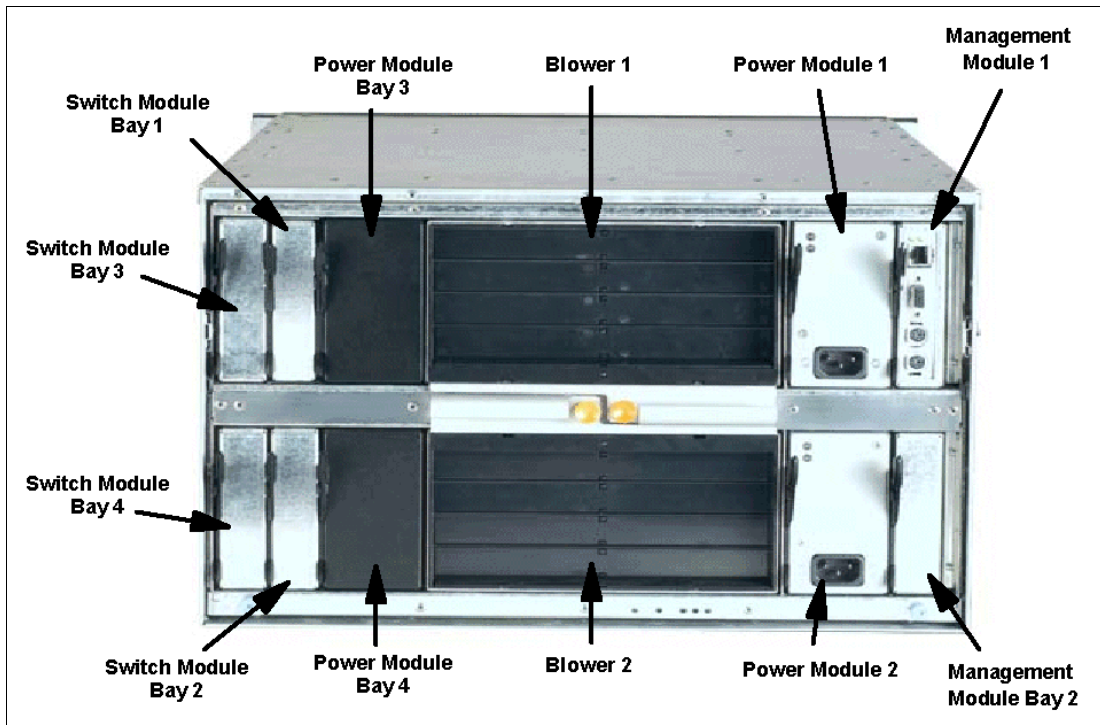
Figure 1-3   Rear view of BladeCenter chassis

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

1.2.2 IBM eServer BladeCenter HS20

The IBM @server 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 ECC DDR SDRAM is synchronized for up to 533 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 options available are 256 MB, 512 MB, 1 GB and 2 GB size DIMMs, which support a minimum of 512 MB and a maximum of 8 GB of system memory.

Figure 1-4 shows the IBM @server BladeCenter HS20 with its top cover removed.
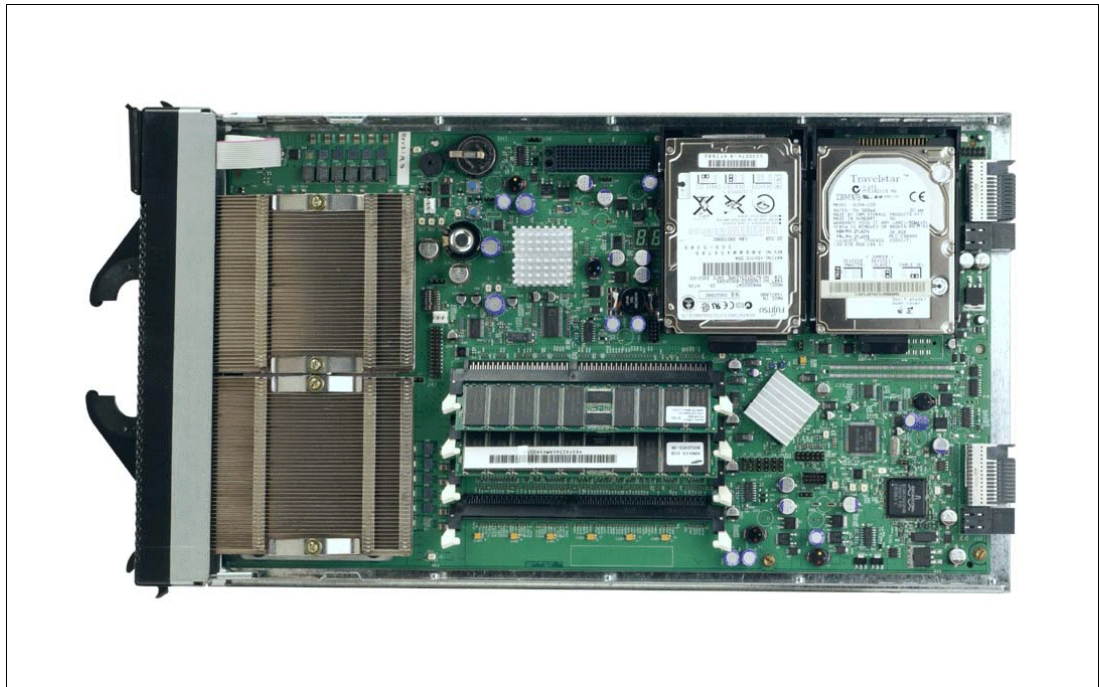

Figure 1-4   BladeCenter HS20 with top cover removed

Each IBM @server BladeCenter HS20 has an integrated service processor on-board that communicates with the IBM @server BladeCenter Management Module to enable blade server management remotely (see 1.2.4, "IBM eServer BladeCenter Management Module" on page 10 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 IBM @server BladeCenter HS20 also has two integrated Ethernet controllers for redundancy. If redundancy is required, you must install Ethernet switch modules in switch module bays 1 and 2 (see 1.2.7, "IBM eServer BladeCenter 4-Port Ethernet switch module" on page 14 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 following 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 IBM @server BladeCenter HS20 has a control panel which is located at the top of the blade servers, as shown in Figure 1-5 on page 8.
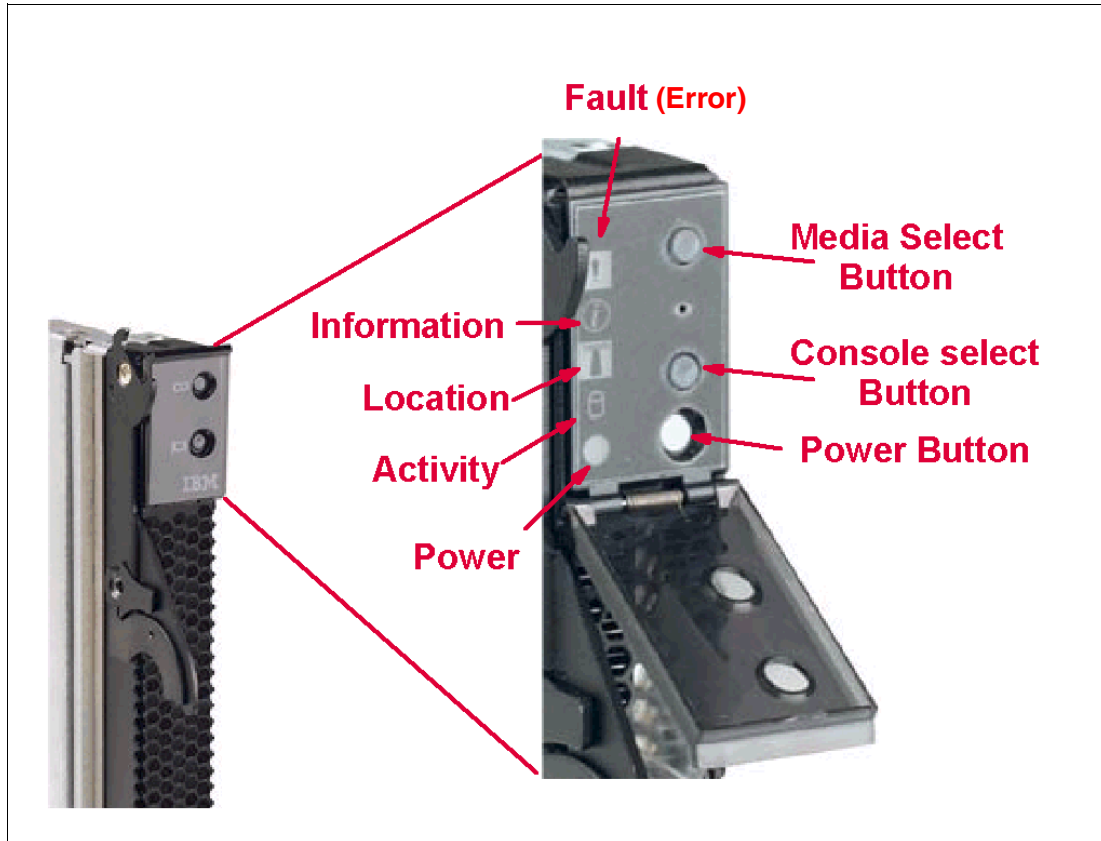
Figure 1-5   Blade server operators panel

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 IBM @server BladeCenter System Error log.

Location LED   This blue LED is 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 IBM @server BladeCenter 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 IBM @server BladeCenter 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 IBM eServer BladeCenter HS40

The IBM @server BladeCenter HS40 (Figure 1-6) is a blade server for high-performance enterprise applications requiring four-processor SMP capability. The IBM @server BladeCenter chassis supports up to seven 4-way servers and is an excellent platform for commerce, database, and ERP/CRM applications, as well as next-generation network applications requiring high performance and scalability. These include control plane (VoIP/softswitch), and transport plane (I/O/gateways) as well as value-add, business support and operations support applications. This is also ideal for server consolidation, where simplification and collapsing data center complexity are a priority. You will note that the HS40 outside features are very similar to the HS20's, but it does have a much wider frame.

Figure 1-6   IBM BladeCenter HS40

In Figure 1-7 on page 10, we take you inside the IBM @server BladeCenter HS40 to view its components.
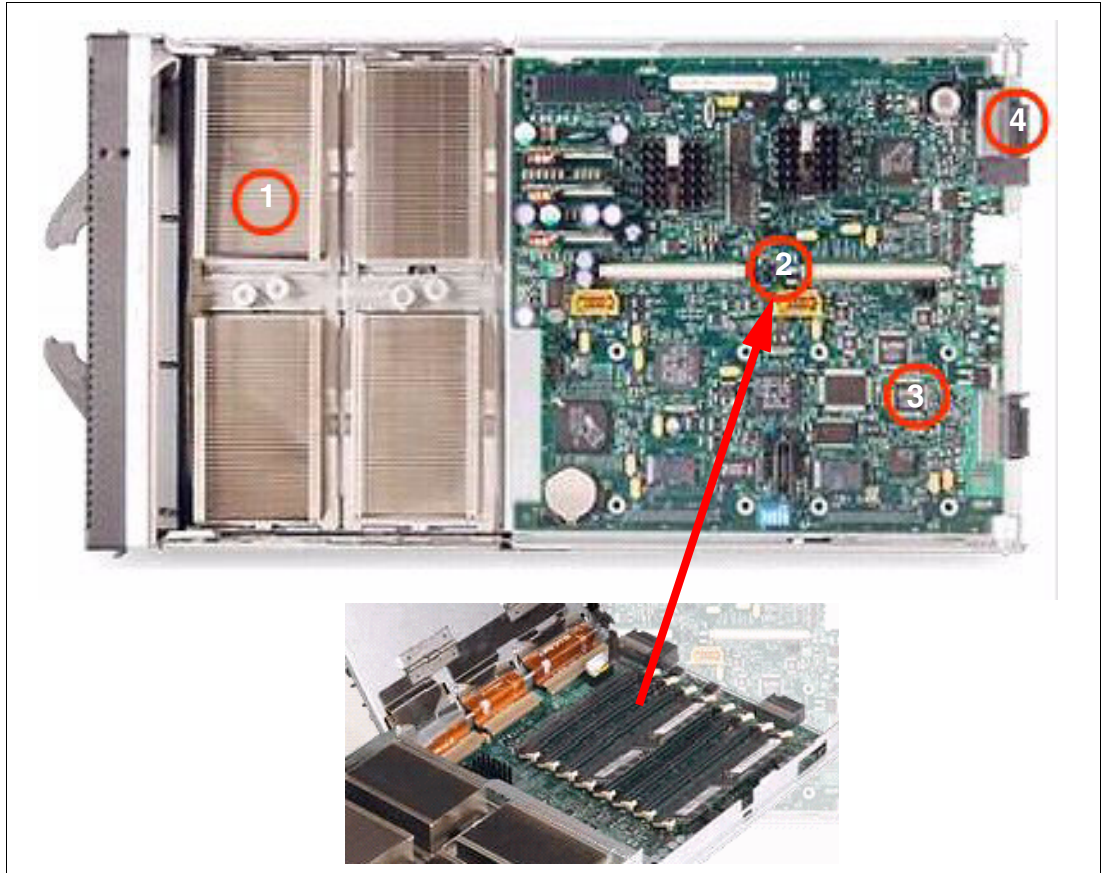
Figure 1-7   IBM BladeCenter HS40

Item 1 shows the location of one of the four full-power Intel Xeon MP processors.

Item 2 shows the location where the memory is stored. Up to 16 GB DDR ECC Chipkill memory can be stored underneath this board.

Item 3 shows the four 1 GB fast Ethernet channels that can transmit large amounts of data at high speeds for high-performance network applications.

Item 4 illustrates the four high-availability midplane connections to all chassis resources.

For more information regarding the IBM @server BladeCenter HS40, visit the following Web site:

http://www-1.ibm.com/servers/eserver/bladecenter/

1.2.4 IBM eServer BladeCenter Management Module

The IBM @server BladeCenter Management Module's primary function is to provide systems management for your IBM @server BladeCenter and blade servers, but it does have other important functions like multiplexing the keyboard/video/mouse (KVM) to provide a local console for the individual blade servers as well as configuring the IBM @server BladeCenter unit and switch modules. The management module communicates with all of the key components of the IBM @server BladeCenter 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 IBM @server BladeCenter Management Module is shown in Figure 1-8 on page 11.

Figure 1-8   BladeCenter Management Module

The management module has a standard RJ45 connector for a 10/100 MB Ethernet remote console connection, as well as two PS/2® connectors for keyboard and mouse and a 15-pin D-shell connector for video which are provided for the 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 IBM @server BladeCenter 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.

1.2.5 IBM eServer BladeCenter Power Supply Module

The standard IBM @server BladeCenter chassis will ship with two power supply modules, but, depending on the configuration of your IBM @server BladeCenter, 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
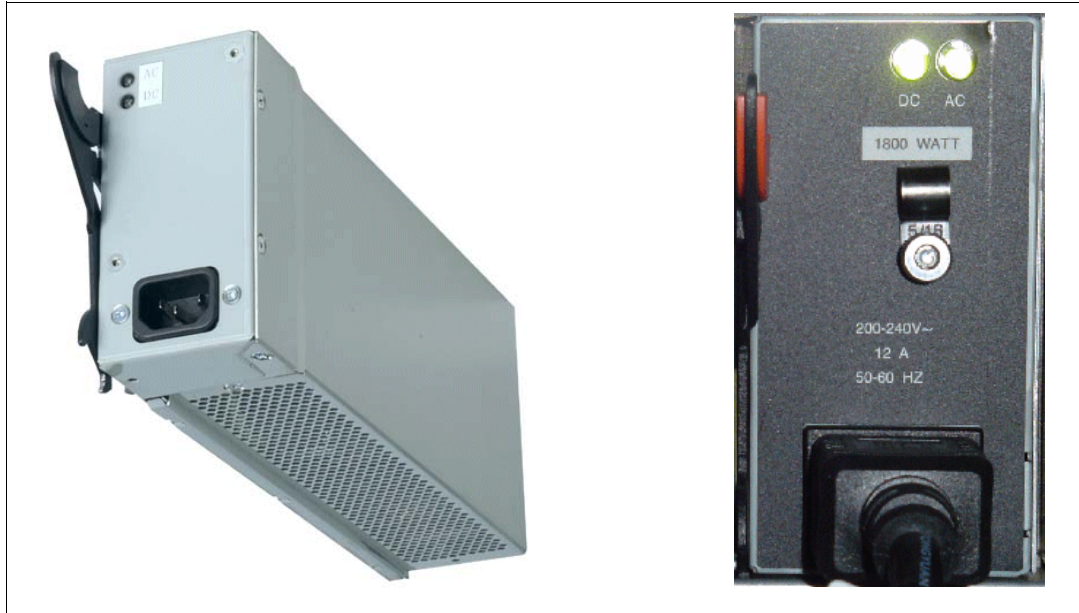
Figure 1-9   BladeCenter 1200W and 1800W Power Supply Modules

Power modules 3 and 4 are required to provide power to blade slots 7 to 14. Figure 1-10 on page 13 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 2 provides redundancy for power module 1 and power module 4 does the same for power module 3, 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 IBM @server BladeCenter 1200W Power Supply Module kit, you will receive two of the power modules.

> **Important:** Nonredundant power is not supported in IBM @server 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, and power modules must be present in power bays 3 and 4. If a power module fails or an AC power failure occurs, IBM @server BladeCenter units configured for redundant power operation, as described in this document, will operate in 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.

IBM @server 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.

Today, three IBM @server BladeCenter power module options are available and depending upon the configuration of the type/model of blades you intend to use, you will need to select from these:

► IBM @server BladeCenter 1200W Power Supply Module (part number 48P7052),
► IBM @server BladeCenter 1200W to 1400W Power Supply Upgrade Kit (part number 90P0197), and
► IBM @server 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 IBM @server 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
```
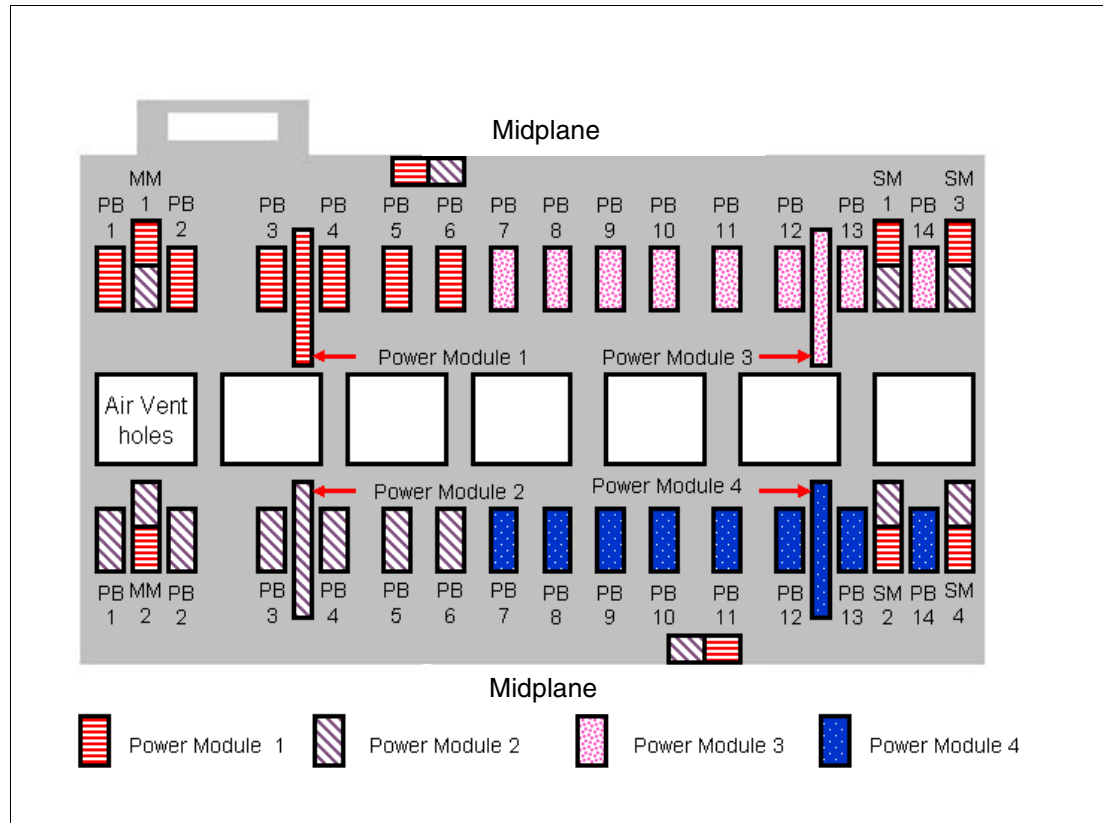

Figure 1-10   Midplane power connector

1.2.6 IBM eServer 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, but 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 located in critical locations. There are two scenarios which will cause both blowers to function at full speed:

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

In Figure 1-11 on page 14, 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 1-11   BladeCenter blower module

1.2.7 IBM eServer BladeCenter 4-Port Ethernet switch module

The Ethernet switch module (Figure 1-12 on page 15) has several purposes; in addition to providing network connectivity for the IBM @server BladeCenter and blades, it also provides 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 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. A second switch module can be installed in switch module bay 2 to provide redundancy. When used in conjunction with the IBM @server BladeCenter Gigabit Ethernet Expansion Card, up to two additional 4-port Gigabit Ethernet Switch modules can be installed into the IBM @server BladeCenter chassis. The switch module is configured via the management module.

Figure 1-12   BladeCenter 4-Port Ethernet switch module

In Figure 1-12, the two LEDs at the top of the switch module indicate power-on and Ethernet switch errors. There are also LEDs next to each port which indicate Ethernet link and activity.

1.2.8 Cisco Systems Intelligent Gigabit Ethernet Switch Module

The Cisco Systems Intelligent Gigabit Ethernet Switch Module (Figure 1-13 on page 16) provides layer 2 switching functions for the IBM @server BladeCenter server chassis. It provides up to 250 virtual LANs for assigning different users to VLANs associated with network resources, traffic patterns and bandwidth. It also supports trunking protocols (IEEE 802.1Q) and Link Aggregation for the automatic creation of EtherChannel links. It provides security for ports so that traffic can be limited to media access control (MAC) addresses allowed to access only specific ports (Internet Group Management Protocol (IGMP) snooping). Up to four Cisco Systems Intelligent Gigabit Ethernet Switch Module can reside in the switch module bays of the IBM @server BladeCenter chassis. The modules can be hot-plugged into the IBM @server BladeCenter without disrupting normal operations. The switch connects to the server blades via the 14 internal GbE (Gigabit) interfaces (server ports) over the IBM @server BladeCenter Midplane. It supplies four external copper GbE interfaces for outside communication which are fully compatible with all other Cisco equipment. The GbE switch is managed via two internal 100 Mbps ports for communication to the IBM @server BladeCenter Management Module. A Web-based or Telnet-based interface is available for diagnostics and direct communication between the Cisco Systems Intelligent Gigabit Ethernet Switch Module and the IBM @server BladeCenter Management Module. It also supports all standard Cisco management applications.

For a more in-depth look at this switch module, refer to the Redpaper *Cisco Systems Intelligent Gigabit Ethernet Switch Module for the IBM @server BladeCenter,* REDP3869 at:

http://www.redbooks.ibm.com/abstracts/redp3869.html

For more information regarding the Cisco Systems Intelligent Gigabit Ethernet Switch Module, please visit the following URL:

http://www-1.ibm.com/servers/eserver/bladecenter/switch/more_info.html
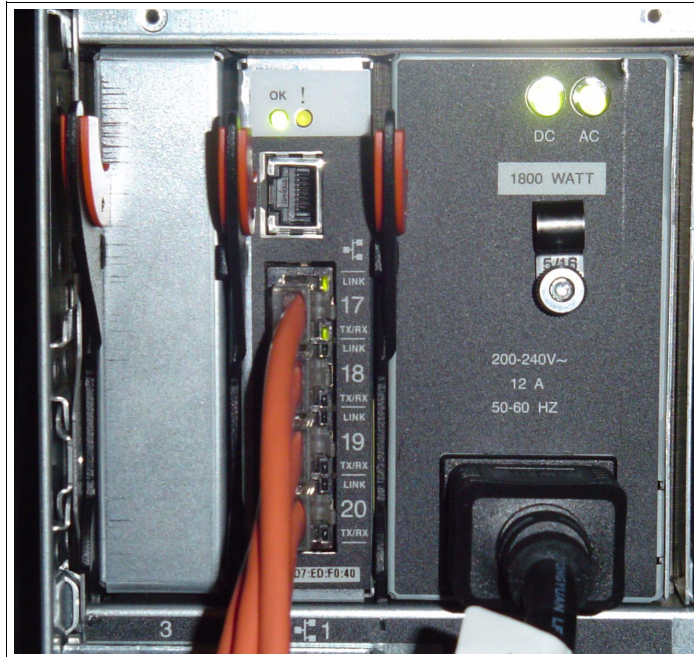
Figure 1-13   Cisco Systems Intelligent Gigabit Ethernet Switch Module (product number 13N2281)

1.2.9 Nortel Networks Layer 2-7 Gigabit Ethernet Switch Module

The Nortel Networks Layer 2-7 Gigabit Ethernet Switch Module (Figure 1-14 on page 17) has several purposes. In addition to providing network connectivity for the IBM @server 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 at:

http://www.redbooks.ibm.com/abstracts/redp3755.html

For more information regarding the Nortel Networks Layer 2-7 Gigabit Ethernet Switch Module, please visit the following URL:

http://www-1.ibm.com/servers/eserver/bladecenter/switch/more_info.html

Figure 1-14   BladeCenter 4-port Ethernet Switch Module

In Figure 1-14, 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.

1.2.10 IBM eServer BladeCenter 2-Port Fibre Channel switch module

If you need 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 an FC connection.

2. Install one IBM @server BladeCenter 2-Port Fibre Channel Switch Module (Figure 1-15 on page 18) in switch bay 3. If redundancy is required, an FC switch module must be installed in switch bay 4.

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.
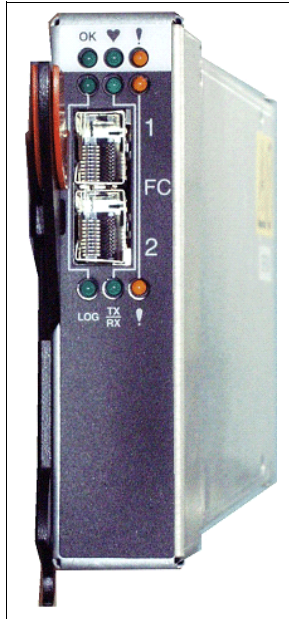
Figure 1-15   BladeCenter 2-Port Fibre Channel Switch Module

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 at http://www.redbooks.ibm.com/abstracts/redp3581.html.

1.2.11 Brocade SAN Switch Modules for IBM eServer BladeCenter

This Storage Area Network (SAN) switch module integrates Brocade technology into the IBM @server BladeCenter architecture. The first IBM @server BladeCenter product of its kind, this embedded Brocade Entry Switch Module can connect to fabrics that consist of two switches (including the entry switch module installed in the chassis). This switch is ideal for smaller Brocade Storage Area Networks still providing the option to expand and grow as needed. Integration of SAN switching capabilities reduces complexity and increases SAN manageability. This switch option's base features include 14 internal fabric ports, two 1 Gb/2 Gb auto-sensing uplinks, real-time health monitoring through Fabric Watch, Brocade Fabric OS, WebTools and Advanced Zoning. It delivers the advanced Brocade functions, performance, manageability, scalability and security required by the most demanding SANs.

Highlights:

► Full integration of SAN switching reduces infrastructure complexity

► Compatibility with IBM TotalStorage SAN Switch platforms such as 2109-F16, 2109-32, 2005-H08 and 2005-H16

► Delivers Brocade Advanced Fabric Service software options such as ISL Trunking, Advanced Performance Monitoring, Fabric Manager v4, Extended Fabrics and Remote Switch

For more information on this product, visit the following Web site:

http://www-1.ibm.com/servers/eserver/bladecenter/switch/more_info.html

1.2.12 IBM eServer 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 IBM @serverBladeCenter. This option is called the IBM @server BladeCenter Acoustic Attenuation Module (acoustic module or muffler). The acoustical noise emissions for a single IBM @server BladeCenter unit configured with 14 IBM @server BladeCenter HS20 servers are:

► 7.4 bels (operating)
► 7.4 bels (idling)

The acoustical noise emissions for a single IBM @server BladeCenter unit with a IBM @server BladeCenter Acoustic Attenuation Module option installed and configured with 14 IBM @server 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 unit 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 IBM @server BladeCenter Acoustic Attenuation Module requires approximately eight inches between the rear of the IBM @server BladeCenter and the rack door. For this reason, the NetBay 42 Enterprise Rack Cabinet should be used when installing the IBM @server BladeCenter with this option.

1.3 The advantages of IBM eServer BladeCenter

Unlike a typical server architecture which scales up, the IBM @server BladeCenter allows for the scale-out approach, yet balances performance and density. In this section, 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 Systems 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 can 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
► Resetting or cycling of the server
► Server inventory, AssetID, blade slot numbers utilized

- ► Monitoring and setting of thresholds on the server events including PFA
- ► Flash BIOS
- ► Monitoring and identification of 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 can monitor the following:

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

PFA - Predictive Failure Analysis

Setting alerts on disk, memory and processors via PFA 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 since this allows system management of the blades and 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 which 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 are as follows:

- ► 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 of 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 two 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 MMxxxxxxxxxxxx, where xxxxxxxxxxxx is the MAC address.

Note: If multiple IBM @server BladeCenters 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 IBM @server BladeCenter Management Module console, DHCP traffic needs to be allowed to traverse the router to the management module console to receive a DHCP assigned address, *or* the 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
  – LEDs
  – Hardware VPD (virtual product data)
  – Firmware VPD

► Blade tasks

  – Power/restart
  – On demand
  – Remote control
  – Firmware update
  – Configuration
  – Serial over LAN

► I/O module tasks

  – Power/restart
  – Management
  – Firmware update

► MM control (management module)

  – General settings
  – Login profiles
  – Alerts
  – Port assignments
  – Network interfaces
  – Network protocols
  – Security
  – Configuration file
  – Fireware update
  – Restore defaults
  – Restart 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 Server 2000 Advanced Server
► Windows Server 2003

The advantages of Rapid Deployment Manager are:

► Rapid deployment of an operating system image to the destination server
► Hot-spare blade option ("Hot-spare blades" on page 25)

1.3.2 High-density computing

Data centers have grown with the proliferation of Wintel servers over recent years; rack space and floor space can now be more efficiently taken up with the use of blade servers. A fully populated 42U rack is capable of holding six IBM @server BladeCenter 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 four-port 1 GB Ethernet switch for up to 14 blade servers. A total of four switch modules can be used within the IBM @server BladeCenter. This can be a combination of either Fiber Channel or Ethernet.

We recommend the use of blade servers for the following:

► Space constrained environments
► WebSphere®
► Linux® clusters
► Web caching
► Collaboration applications (Lotus® Domino®, 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 therefore 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 IBM @server BladeCenter unit, the blade server has a huge market.
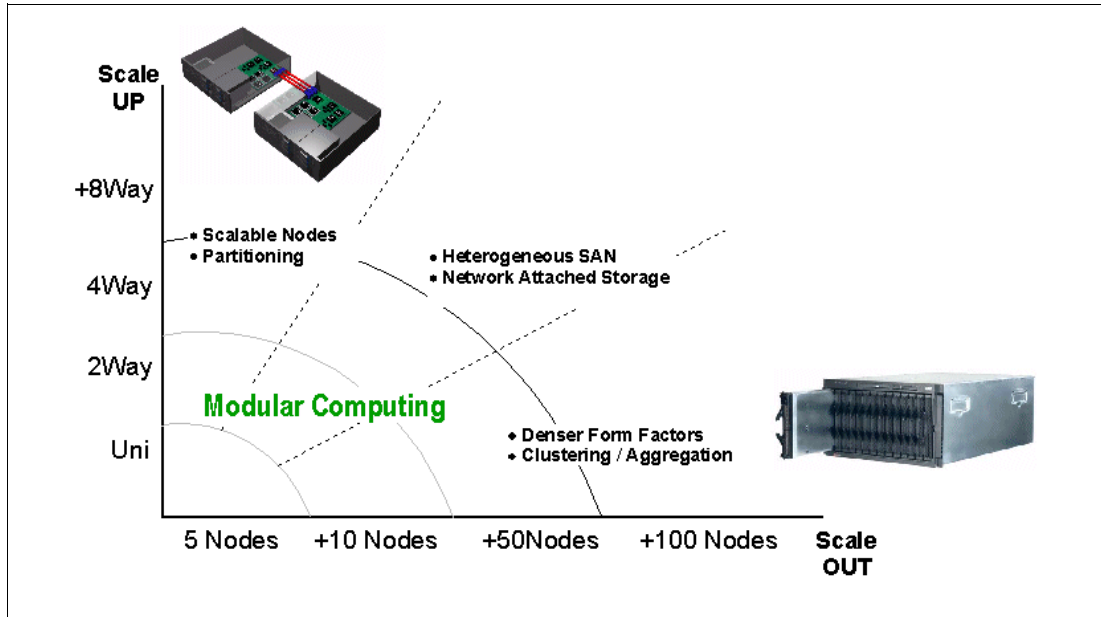
Scale
UP

+8Way

• Scalable Nodes
• Partitioning

• Heterogeneous SAN
• Network Attached Storage

4Way

2Way

Modular Computing

Uni

• Denser Form Factors
• Clustering / Aggregation

5 Nodes   +10 Nodes   +50Nodes   +100 Nodes   Scale
OUT

Figure 1-16   Scale-up versus scale-out

There are also attractive cost savings 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 @serverBladeCenter in Table 1-1 is using the onboard IDE controller.

The deployment of an IBM @server BladeCenter is far simpler then deploying 14 1U servers and the associated cables. A single IBM @server BladeCenter 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 24 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 that failures occur occasionally; we also know 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
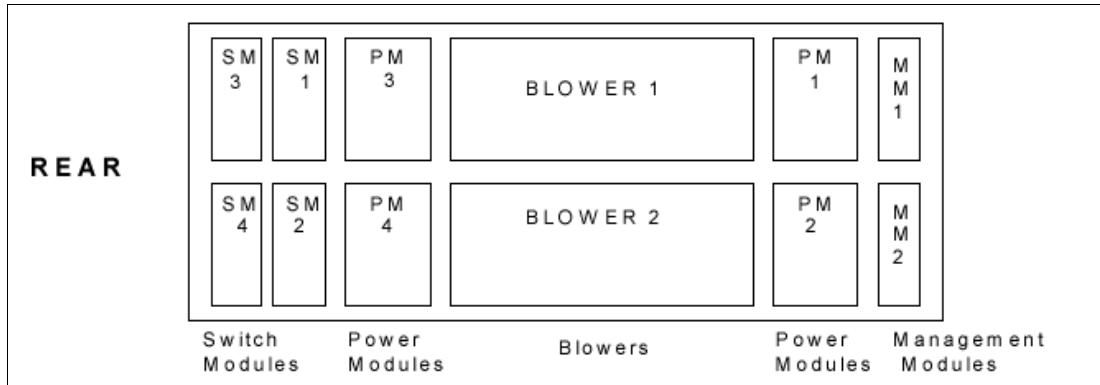► Switch modules

Figure 1-17   Module location on the rear of the IBM @server BladeCenter

Table 1-3 on page 25 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 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 midplane provides connectivity between the blades and the modules at the rear of the IBM @server BladeCenter unit. 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 IBM @server 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 IBM @server BladeCenter; 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.
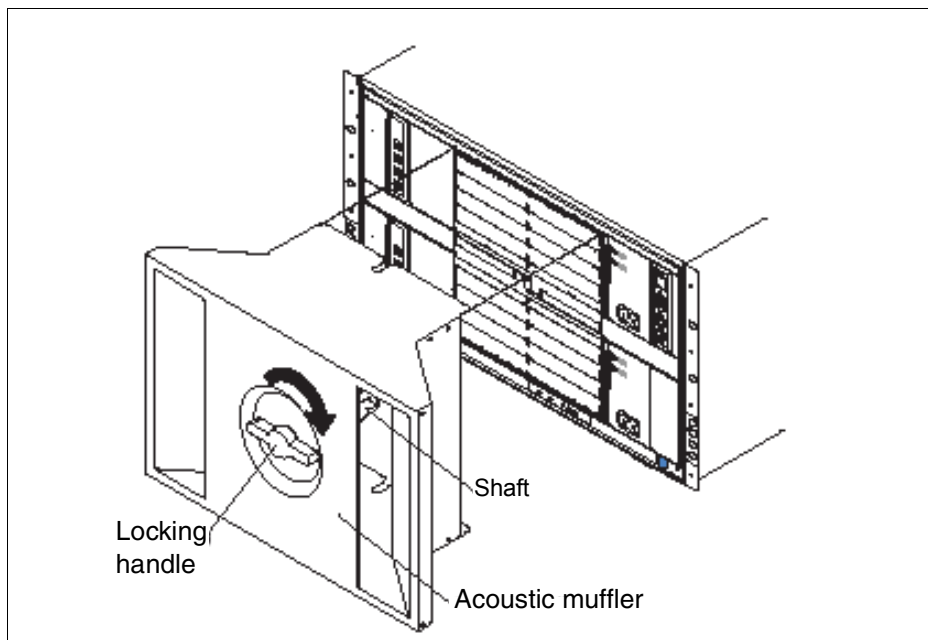
Figure 1-18   Acoustic Attenuation Module

Power

The IBM @server BladeCenter comes with two 220 volt 1200 watt (1400W or 1800W) hot-swap power modules in power bays 1 and 2. Table 1-4 on page 27 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 IBM @server BladeCenter modules in server bay slots 1-6.
2	Redundancy for Power module bay 1.
3	Provides power to all the IBM @server BladeCenter modules in server bay slots 7-14.
4	Redundancy for Power module bay 3.

Note: A blade server in bay 6 with 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 being 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. When used in conjunction with the IBM @server BladeCenter Gigabit Ethernet Expansion Card, up to two additional 4-port Gigabit Ethernet Switch modules can be installed into the IBM @server BladeCenter chassis (bays 3 and 4).

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.

2

Introduction to IBM TotalStorage FAStT600 Storage Server

In this chapter, we discuss a new entry-level storage server which is more scalable, yet costs less than a similarly configured competing product from EMC. This storage server is known as the IBM TotalStorage FAStT600 Storage Server. In addition, we discuss the different reasons why you should consider the IBM TotalStorage FAStT600 Storage Server when implementing new technology into your business environment.

2.1 FAStT Storage Servers on demand

Today's on demand business environment is intense and fast-moving. Your e-business needs to be nimble and agile enough to adjust to the constant change. The family of IBM TotalStorage FAStT Storage Servers enables your business to keep pace with the rapidly growing storage requirements and provide flexibility to thrive in today's on demand era. With high availability features that support multi-platform servers running multiple operating systems and comprehensive storage management tools, you can dynamically adjust to the constant changing requirements of an e-business, delivering what you want, when you need it.

Key business reasons for selecting the FAStT Storage Server

Listed are the key reasons you should take a closer look at the IBM TotalStorage FAStT Storage Servers:

► The FAStT 2 Gb family of storage products offers industry-leading performance and throughput in their respective market segments with competitive solution pricing.

► The FAStT products share a common storage management platform that enables a customer to easily add controllers and manage them from a central point.

► The FAStT products include FAStT Storage Manager, which provides a central point of management for disk storage. Many functions are included in FAStT Storage Manager that our competition sells separately.

► The FAStT products all offer heterogeneous OS support of Intel and UNIX® platforms while our competition does not offer this capability in their entry level products.

► The FAStT products are designed to optimize performance and high availability. The products feature e-business on demand™ capabilities such as Dynamic Volume Expansion, Dynamic Capacity Expansion, dynamic firmware upgrades and support of advanced function FlashCopy® and Remote Volume Mirror Options.

2.2 IBM TotalStorage FAStT600 Storage Server

The IBM TotalStorage FAStT600 Storage Server has been featured in this Redpaper to demonstrate its role in a Citrix server farm environment using the latest IBM @server BladeCenter technology.

The IBM TotalStorage FAStT600 Storage Server can provide up to three times the I/O performance and throughput of the previous FAStT200 model. The Tivoli SRM Express Edition is designed to deliver comprehensive storage resource monitoring and planning tools for heterogeneous storage environments. Together, these solutions offer medium businesses running Linux, Windows and UNIX applications, an enterprise-like capability for managing heterogeneous storage networks at an affordable cost. Built with IBM autonomic capabilities, which allows for self-diagnosis and repair, the IBM FAStT and Tivoli SRM Express can help manage business data more efficiently.
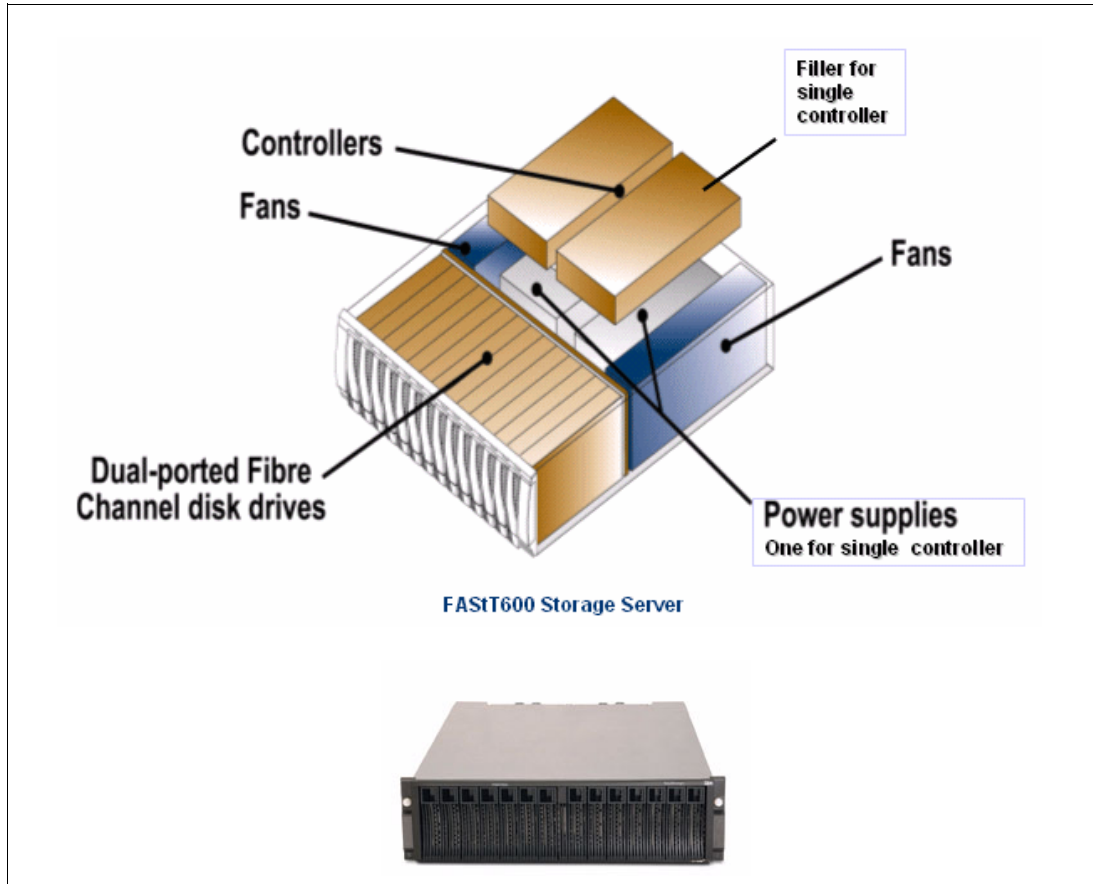
Figure 2-1   IBM TotalStorage FAStT600 Storage Server single controller

The IBM TotalStorage FAStT600 Storage Server is a mid-level storage server that can scale to over eight terabytes of Fibre Channel disk using three EXP700s, and over sixteen terabytes of Fibre Channel disk with the Turbo feature using seven EXP700s. It uses the latest in storage networking technology to provide an end-to-end 2 Gbps Fibre Channel solution. As part of the IBM FAStT family, the Model 600 with Turbo uses the same common storage management software and high-performance hardware design, providing clients with enterprise-like capabilities found in high end models, but at a lower cost. The new FAStT Storage Manager V8.4 enables up to 256 logical volumes (LUNs) per storage partition, definition of array groups greater than 2 TB, and SCSI-3 Persistent Reservation. FlashCopy with VolumeCopy, a new function for a complete logical volume copy within the FAStT Storage Server, is available on the FAStT600 Turbo.

Coupled with the EXP100, the FAStT600 and FAStT600 with Turbo feature allow you to configure RAID protected storage solutions of up to 28 TB to help provide economical and scalable storage for your rapidly growing application needs for limited access, data reference, and near-line storage.

There are three FAStT600 models:

► FAStT600 Single RAID controller
► FAStT600 Dual RAID controller
► FAStT600 Dual RAID controller w/Turbo feature

IBM TotalStorage FAStT600 Storage Server highlights are as follows:

- ► SAN ready, Fibre Channel and Serial ATA attach storage server models
- ► Ideal for small to medium enterprises and departments
- ► Low cost, entry level solution for UNIX platforms (AIX®, Sun, HP), Windows and Linux environments
- ► High availability features designed to avoid single points of failure
- ► Intuitive storage management tools
- ► Event log and Recovery Guru with FAStT Storage Manager
- ► Performance monitoring tool
- ► RDAC - which provides redundant paths to the storage subsystem if you have two adapters in the host system.
- ► Allows size expansion of an actual logical drive
- ► Add new disk drives to the Storage Server and start the expansion procedure while the system remains fully operational
- ► Up to 70% performance improvement with new FSM v8.4 that ships with Turbo
- ► FAStT600 and FAStT600 with Turbo feature can scale up to 28 terabytes of Serial ATA disk storage by attaching eight EXP100s
- ► Increased cache from 512 MB on base FAStT600 to 2 GB on Turbo
- ► Future releases are planned to support intermix of EXP100 and EXP700 disk drive enclosures to a FAStT900 or FAStT600
- ► Autonomic functions such as Dynamic Volume Expansion and Dynamic Capacity Addition, allowing unused storage to be brought on-line without stopping operations, and FAStT Service Alert, which is capable of automatically alerting IBM if a problem occurs
- ► Host interface on base FAStT600 is 2 Gb, Turbo auto senses to connect to 1 Gb or 2 Gb
- ► Up to 64 storage partitions with Turbo

In Chapter 5, "Implementing and configuring Citrix MetaFrame Presentation Server" on page 55, we combine the technology of Citrix MetaFrame Presentation Server, IBM @server BladeCenter, and the IBM TotalStorage FAStT600 Storage Server to create a more robust and automated solution. The benefit of doing so will allow your business to:

- ► Give remote clients access to their applications running IBM @server BladeCenter utilizing its high availability and clustering capability.
- ► Connect your application servers directly to the FAStT600 Storage Server.
- ► Attach an HS20 blade server to the IBM TotalStorage FAStT600 Storage Server to serve as a file server and share storage space to the other blade servers or remote clients.
- ► Connect a tape library to the IBM TotalStorage FAStT600 Storage Server bridging SCSI tape drives into the Fibre Channel based SAN so that all the servers connected into the Storage Server can view and share the library.
- ► Define a back-up server to determine which servers get access to specific tapes within the tape library and allow your servers to back up their data across a high speed SAN environment.

To summarize, you can effectively allocate storage to servers, centralize and automate back-up, and optimize your Citrix solution.

For more information regarding the IBM TotalStorage FAStT600 Storage Server, please visit the following URL:

http://www-6.ibm.com/jp/storage/library/products/disk/fastt600.pdf

2.3 FAStT Storage Manager 8.40

As your business continues to grow along with your need to increase your storage capacity and performance, the IBM TotalStorage FAStT600 Storage Server may be upgraded with the Turbo option, which includes Storage Manager version 8.4 (the FAStT600 base model includes version 8.3). The turbo option helps extend the high-availability and scalability characteristics of the entry-level FAStT600 base model, and may be added during the initial order or later as an upgrade. Both the base model and turbo option are designed to offer high-performance, low-cost storage and the flexibility to grow with your business.

The FAStT Storage Manager 8.40 supports the following FAStT storage servers:

► FAStT900
► FAStT700
► FAStT600 Turbo

The key new features of the FAStT Storage Manager 8.40 are:

► VolumeCopy (premium feature)
► Performance improvements
► 256 logical drives per partition
► Improved integration with Veritas DMP
► Persistent reservations
► Greater than 2 TB array groups

In the following sections, we have expounded on some of these features.

VolumeCopy (premium feature)

VolumeCopy is designed to provide the ability to create a full volume copy of a point-in-time logical drive generated by FlashCopy on a single FAStT Storage Server. The source logical drive for VolumeCopy would be a FlashCopy logical drive. An example is shown in Figure 2-2 on page 34.

Listed is a technical overview of VolumeCopy:

► Supports eight concurrent active copies

► Configured via intuitive GUI or CLI

► Five priority settings

   – Control speed of copy / impact on storage I/O

► Must be used with FlashCopy to maintain normal I/O to production logical drive during the copy process

   – Writes to source are suspended during copy for PiT integrity
   – No read or write access to target during copy
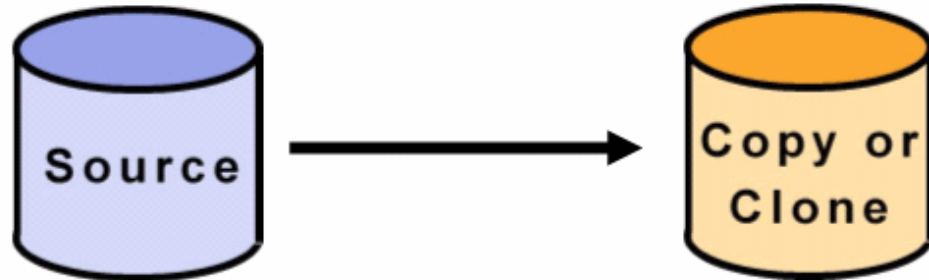
Figure 2-2   FAStT VolumeCopy feature

The benefits provided by VolumeCopy are:

► Full PiT data set available for analysis, mining, or testing

  Does not degrade performance of production logical drive

► Backup and restore improvements
  – Higher application performance during backup
  – Eliminates I/O contention on the primary logical drive
  – Faster backups and restoration compared to tape

Shown in Figure 2-3 on page 35, is another diagram that demonstrates how VolumeCopy is integrated with FlashCopy. A complete logical volume copy is created within the FAStT Storage Server and is available on the FAStT600 Turbo.

VolumeCopy integration with FlashCopy

Copying the FlashCopy creates a full PiT clone copy while I/O continue to base logical drive

Production Server

Production Server

Production Server

Logical Drive

Flash Copy

An instantaneous Flash Copy of a logical drive is created.

Logical Drive

Volume Copy

Flash Copy

Normal I/O continues to the logical drive while the Flash Copy is copied.

Logical Drive

Volume Copy

Once the copy is complete, the Flash Copy can be deleted - leaving a full PiT clone.
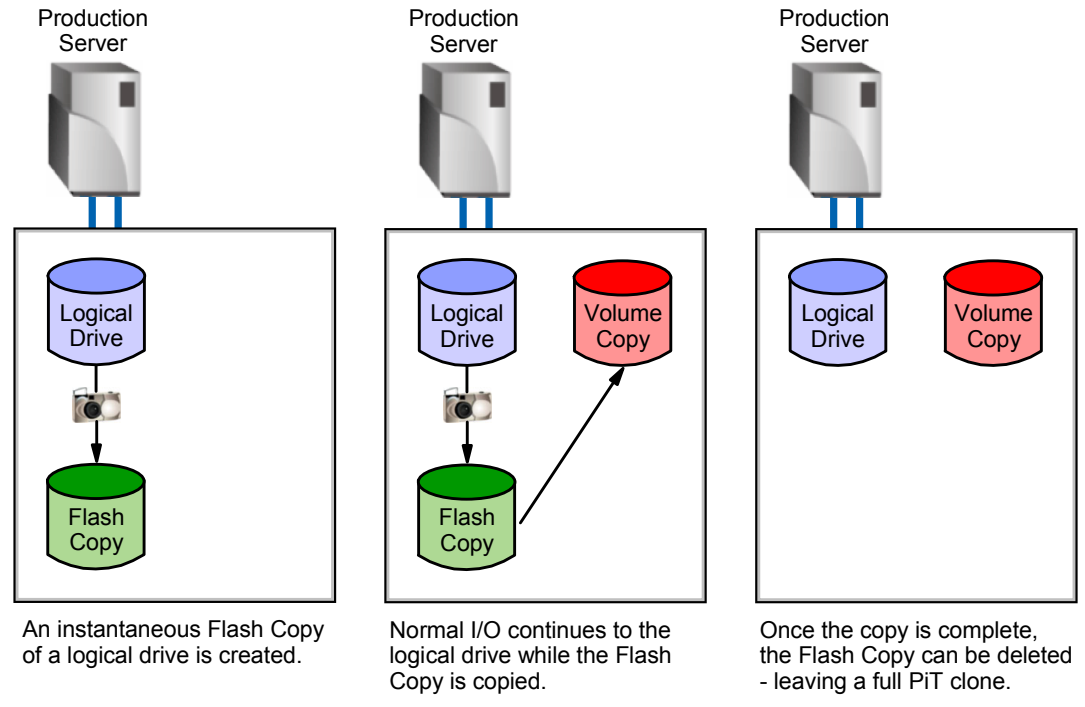
Figure 2-3   VolumeCopy integration with FlashCopy

256 logical drives per partition

The IBM TotalStorage FAStT600 Storage Server allows FAStT storage to present up to 256 host-addressable LUNs (0 - 255) to a given host port:

► Operating system dependent
► Up from maximum of 32

The benefits of this feature are:

► Support for larger databases
► Greater connectivity and capacity for SAN environments
► More "slots" for FlashCopy and VolumeCopy (clone) logical drives

OS	Highest LUN OS will look for	Max# of volumes in 8.40
Windows NT®	254	31
Windows 2000	256	64 (1)
Windows 2003	254	255
Solaris	255 (2)	255 with DMP - 32 with RDAC
HP-UX 11.0	32 with VSA	32
HP-UX 11.11	127	127

OS	Highest LUN OS will look for	Max# of volumes in 8.40
IRIX	~ 1000	255
NetWare 5.1	31	31
Netware 6	255	255
AIX	31 / 1000+	(3)
Linux RedHat	255	128 (4)
Linux SUSE	255	255

1. Windows 2000 will be restricted due to registry limitations and the possibility for file system corruption
2. Number of volumes supported is driver-dependent, LSI and QLogic will both go to 255
3. 255
4. Limit is 128 DEVICES due to an OS limitation

Persistent reservations

The SCSI-3 persistent reservations provides SCSI-3 standard command set for logical drive access control (actual reservation of logical drive handled by host application).

The main benefit of this feature is that it enables FAStT to integrate with multi-node, or cluster, solutions that utilize shared logical drives for increased availability, scalability and performance:

► Required storage functionality for multi-node applications
► Allows multiple nodes to access a logical drive(s)

There is support for Oracle 9i Real Application Cluster (RAC) with Veritas DB/AC (Database Edition/Advance Cluster).

Persistent reservations enable Veritas DMP to manage FAStT when Veritas Cluster Server is in use.

Greater than 2 TB array groups

Supported are 30-disk-drive array groups (29+1 RAID or 15+15 RAID 10) at all capacities. 146 GB (14 disk drives max) and 73 GB (28 disk drives max) capacities were limited by a 2 TB boundary.

The main benefit of this feature is that more spindles per logical drive actually improves IOPS performance.

2.4 FAStT resources

You should use the following resources to ensure a successful installation:

FAStT Hands-on Training: Course Code: J3805

► Customers who attended the FAStT Hands-on Training class successfully installed and implemented FAStT on their own!

  http://www.ibm.com/services/learning/us

► FAStT Installation Checklist (SA477) and Systems Assurance Product Guide (SA02-014) are useful tools to prepare for an install

Checklist:

http://w3-1.ibm.com/support/assure/assur30i.nsf/PubAllNum/SA477

► SAPR Guide:

http://w3.ibm.com/support/assure

► IGS offers FAStT Installation services

http://www.ibm.com/services/its/us/drmjgd17.html

► FAStT Support Line services for ongoing "how to" support

http://www.ibm.com/services/its/us/mus62d1.html

or call 888-426-4343 (option 1)

3

Planning and prerequisites for Citrix MetaFrame Presentation Server

In this chapter, we will provide the requirements and considerations to deploy Citrix MetaFrame Presentation Server 3.0 within an IBM @server BladeCenter and FAStT 600 environment. For more information on the deployment and the performance of Citrix MetaFrame Presentation Server, we recommend you go to the following URL:

    http://www-306.ibm.com/pc/support/site.wss/document.do?lndocid=MIGR-52686

39

3.1 IBM eServer BladeCenter, FAStT600 and management system prerequisites

In this section, we discuss the firmware and software that was applied to our IBM @server BladeCenter chassis, the IBM FAStT600 and our management system (IBM xSeries 345) prior to building our Citrix Server environment.

3.1.1 IBM eServer BladeCenter firmware

Listed in this section is the firmware we applied to our BladeCenter chassis and integrated hardware features, the Ethernet Switch Module and Fibre Channel Switch Module:

► IBM @server BladeCenter Management Module firmware version 1.12
► 4-Port Ethernet Switch Module firmware version 1.06
► Two port Fibre Channel Switch Module firmware version 2.0.0.19

3.1.2 IBM TotalStorage FAStT600 Storage Server requirements

Listed is the firmware and drivers uploaded to our IBM TotalStorage FAStT600 Storage Server:

► IBM FAStT Controller Firmware and NVSRAM v05.40.11.03_04
► IBM FAStT Fibre hard disk driver and ESM firmware update pack version 1.40

3.1.3 Management system

The following software was installed on our management system (IBM xSeries 345):

► IBM FAStT Storage Manager for Microsoft Windows 2003 8.4 Client
► SAN Utility version 1.02.25 IBM @server BladeCenter 8677 for Microsoft Windows 2000 and Microsoft Windows 2003
► Sun Java 2 Platform - Standard Edition 1.4
► IBM Director version 4.12 and IBM RDM 4.11Console
► Citrix MetaFrame Presentation Server Console
► Citrix MetaFrame Access Suite Console

3.2 Citrix MetaFrame installation requirements

The Citrix MetaFrame Presentation Server requirements for an IBM @server BladeCenter deployment have been listed into the following categories:

► Server requirements
  – Software
  – Hardware
► Client requirements
  – Software
  – Hardware

3.2.1 Server requirements

Listed in this section are the software and hardware requirements for the Citrix MetaFrame Presentation Server.

Software requirements

Listed below are the software requirements for servers running MetaFrame Presentation Server:

► Update Express CD version 3.03

► Fibre Channel Expansion Card BIOS 1.38

Using the following Microsoft operating systems:

► Microsoft Windows 2000 Server, Windows 2000 Advanced Server, and Windows 2000 Datacenter Server, Service Pack 4 or later.

► Microsoft Windows 2003, Standard Edition, Enterprise Edition, and Datacenter Edition.

Listed are the minimum Microsoft operating systems required to run MetaFrame Management Tools.

► MetaFrame Access Suite Console can be installed on 32-bit workstations running Windows 2000, Windows 2003, or Windows XP.

► Presentation Server Console can be installed on 32-bit workstations running Windows NT4.0, Windows 2000, Windows Server 2003, or Windows XP.

For our lab scenario, we used Microsoft Windows 2003 Enterprise Edition for our installation.

> **Note:** We do not recommend installing Citrix MetaFrame Presentation Server on a domain controller. The Terminal Services component must be installed before installing Citrix MetaFrame Presentation Server. Terminal Services can be installed through Manage your Server in the Windows 2003 server. Citrix does not recommend using a 3 GB switch in boot.ini since Citrix MetaFrame Presentation Server and Terminal Services use kernel memory space rather heavily.

Database installation

Databases supported on a Citrix MetaFrame Presentation Server installation can be any of the following:

► Microsoft Jet 4.0, Service Pack 1 through Service Pack 8
► Microsoft MSDE 8.00.760 for Windows 2000, Service Pack 3 or higher
► Microsoft SQL 7 Service Pack 2 or Microsoft SQL 2000
► Oracle 7.3.4 for NT
► Oracle 8.0.6 for NT
► Oracle 8.1.5 or 8.1.6 for NT or UNIX
► Oracle 9.0.1 for NT
► Oracle 9i R2 for NT and Solaris
► IBM DB2® with FixPack 5 for NT
► IBM DB2 version 8.x

For our lab scenario, we used Microsoft SQL 2000 (Service Pack 3a) for our installation.

Hardware requirements

Listed are the minimum hardware requirements for running Citrix MetaFrame Presentation Server:

► Processor, memory and free disk space minimum requirements vary with the Microsoft operating system that you are using.

– Microsoft recommends a 166 MHz or faster processor if running Windows 2000 Server and Advanced Server, with a minimum 256 MB of RAM and at least 1GB of free space.

– Microsoft recommends an eight-way or greater array of Pentium III Xeon processor if running Windows 2000 Datacenter Server, with a minimum 256 MB of RAM and at least 1GB of free space.

– Microsoft recommends a 550 MHz or faster processor if running Windows 2003, Standard Edition, with a minimum 256 MB of RAM and at least 1.5 GB of free space.

– Microsoft recommends a 733 MHz or faster processor if running Windows 2003, Enterprise Edition, with a minimum 256 MB of RAM and at least 1.5 GB of free space.

For our lab scenario, we used the IBM @server BladeCenter HS20 with the following hardware configurations at a minimum.

► An HS20 with single Xeon 2.0 GHz Processor running Windows 2003 Enterprise Edition
► 2.5 GB of RAM
► Single IDE 40 GB hard disk.

The following are the disk space requirements for MetaFrame Presentation Server 3.0:

► 250 MB for installation of MetaFrame Presentation Server 3.0 Standard Edition
► 150 MB for all citrix client software
► 400 MB for MetaFrame Presentation Server, Enterprise Edition
► 50 MB for the Management Console for MetaFrame Presentation Server
► 25 MB for the Management Console for the MetaFrame Access Suite
► 35 MB for the Document Center

The following is the minimum memory requirement for Presentation Server 3.0 Console:

► 64 MB of RAM for Presentation Server 3.0 Console

3.2.2 Client requirements

Listed in this section are the software and hardware requirements for the client.

Software requirements

Listed are the software components for the client installation:

► Windows 9x of higher
► MetaFrame Presentation Server Clients for 32 bit Windows
► Internet Explorer 5.0 or higher
► Netscape Navigator 4.78, 6.2 or later

Hardware requirements

Listed are the minimum hardware requirements for the client system:

► 386 processor or higher
► VGA or greater adapter
► RAM for operating systems:
  – 8 MB of RAM for Windows 9x
  – 16 MB of RAM for NT 3.51 or 4.0

- 32 MB of RAM for Windows 2000
- 128 MB of RAM for Windows XP

We had the following desktop configuration for our installation:

► IBM NetVista™ Pentium 4 processor
► 4X AGP Video Graphic adapter
► 1.5 GB of RAM running Windows 2000

3.3 Planning

With the deployment of a Citrix farm, it is important to consider the life cycle of the product and the applications which will be published through it. We recommend that you do the following:

► Define requirements
► Consider system growth
► Keep it simple

Each of these actions will help define your hardware and software design considerations.

3.3.1 Hardware

When determining your hardware configuration, you need to consider the number of users, how intensive your applications are and the number of applications you will deploy to each server. Citrix is suited to the scale-out approach, where there are multiple servers load balancing applications.

The only way to determine an appropriate number of servers for your Citrix farm is to stress test the applications you will be deploying to the farm in a test environment. In this environment, you need to consider the initial number of Citrix users and those expected to be added in the future.

3.3.2 Database

With Citrix MetaFrame Presentation Server, you have the choice of what type of database you would like to utilize for your Citrix farm.

For small to medium Citrix farms, you can use the Microsoft Access database. For medium and large farms, or if you require high availability, it is suggested you use one of the following:

► MS SQL
► Oracle
► DB2

Shown in Table 3-1 are the recommendations Citrix makes to determine the size of your Citrix deployment:

Table 3-1   Environment sizing

	Small	**Medium**	**Large**	**Enterprise**
Servers	1-50	25-100	50-100	100 or more
Named users	<150	<3000	<5000	>3000
Applications	<100	<100	<500	<2000

Refer to *MetaFrame Presentation Server Administrator's Guide*, included in the software from Citrix, for more details.

In our example, we installed Windows 2003 Server Enterprise Edition with Microsoft SQL 2000, SP3a on an IBM HS20 (Blade 1 - BC1SRV1) with the following hardware options:

- ► Single Xeon 2.0 GHz Processor
- ► 2.5 GB of RAM
- ► IDE controller
- ► A single 40 GB hard disk

This system serves as our SQL Server, as illustrated in Figure 5-2 on page 58.

3.3.3 Citrix MetaFrame Presentation Server V3.0

There are three Citrix MetaFrame Presentation Server products: Standard Edition, Advanced Edition and Enterprise Edition. The following highlights their new product features:

- ► Management Console for the MetaFrame Access Suite
- ► Customer dashboard views - Enterprise Edition only
- ► Report Center - Enterprise Edition only
- ► Delegated administration
- ► User policies
- ► Zone preference and failover - Enterprise Edition only
- ► Workspace control - Advanced and Enterprise Editions
- ► Session reliability Advanced and Enterprise Editions
- ► Dynamic display reconfiguration
- ► SpeedScreen Acceleration Audio and Video - Advanced and Enterprise Editions
- ► SpeedScreen Acceleration Images
- ► SpeedScreen Acceleration Macromedia Flash - Advanced and Enterprise Edition
- ► Bi0directional audio Advanced and Enterprise Editions
- ► Support for Remote Desktop Client (RDC)
- ► Standards-based encryption
- ► Section 508 compliance
- ► Centralized license architecture

For more information, please refer to:

> http://www.citrix.com/products/metaframexp.asp

Standard Edition
Standard Edition is installed with all base features present in Advanced and Enterprise Edition; it is aimed at small deployments that do not require load balanced MetaFrame servers.

Advanced Edition
Advanced Edition has all the features found in Standard Edition plus the capability of Advanced Load Management using Load Manager.

Enterprise Edition
Enterprise Edition has all the features found in Advanced Edition plus Installation Manager, Resource Manager, Network Manager and the ability to integrate to Microsoft Operations Manager.

3.3.4 MetaFrame design

When designing a Citrix farm, you need to consider your requirements and the growth of the farm. The simpler your farm design, the simpler it will be to maintain. The following components should be considered when designing the Citrix farm:

► License server
► Farm
► Zone
► Data collector
► Data store
► Load Manager
► Installation Manager
► Resource Manager
► Network Manager
► Application delivery
  – Web Interface
  – Citrix Program Neighborhood
► Printing
► Software

License Server

Table 3-2 outlines the recommendation for the deployment of the License Server(s).

Table 3-2   License Server deployment recommendations

Number of servers	Recommendation
Less than 50	Shared license server
Between 50 and 500	Dedicated license server
More than 500	Dedicated license server for each MetaFrame Access Suite product

Farm

When designing your Citrix farm, you have the option to choose either a single farm or multiple farms. A single farm is the simplest to manage. Multiple farms are more appropriate for a distributed environment where considerations of network, geographical locations, etc., apply. In our configuration, we installed a single farm.

Zone

A zone represents all of your servers in the farm within a single subnet or a group of Citrix servers sharing a common data collector. In our installation, we have a single zone.

Data collector

The data collector receives and maintains the load and session information about each server within the zone.

Data store

The data store is the database which holds the following configurations:

► Farm information
► Published applications
► Server details
► MetaFrame administrator accounts

- ► Trust relationship
- ► Printer

This database can be either MS Access, MS SQL, Oracle or DB2.

Load Manager
Load Manager allows you to publish applications to multiple servers. When a user starts a published application, Load Manager balances the load based on published application limits or servers.

The Load Manager allows you to load balance applications across your Server farm based on the following components (on which you can apply thresholds):

- ► Application User Load
- ► Context Switches
- ► Disk Data I/O
- ► Disk Operations
- ► IP Range
- ► License Thresholds
- ► Memory Usage
- ► Page Faults
- ► Page Swaps
- ► Scheduling
- ► Server User Load

Installation Manager
Installation Manager allows you to package an application and then push the packaged application to other Citrix Servers. It provides a single point of control in deploying applications across your Citrix farm. You have the ability to schedule the reboot of your server if a reboot is required by the package. Microsoft Installer (MSI) and unattended installs are also supported.

Application delivery
Published Citrix applications can be delivered directly from the Citrix farm or from a MetaFrame Web Interface server. MetaFrame Web Interface allows you to deliver Citrix published applications to a client's browser.

Printing
MetaFrame Presentation Server allows you to replicate printer drivers and registry entries across your server farm. Printer properties such as paper size or tray settings are not replicated.

Clients
MetaFrame Presentation Server client for 32-bit Windows now comes in a single package for Win95 and later devices. It includes Program Neighborhood, Program Neighborhood Agent and Web Client. Using Windows Installer technology, users have the ability to install, uninstall, modify and repair.

Software
When loading software onto the Citrix farm, you need to consider whether the application is 32-bit or 16-bit. 16-bit software will impact the performance of the server.

Storage

The obvious storage consideration for the IBM @server BladeCenter on Citrix is whether to utilize the onboard Integrated Drive Electronics (IDE) drives or Small Computer System Interface (SCSI) option. You need to remember that only seven blade servers with the SCSI option can be configured per IBM @server BladeCenter system.

Testing of your applications will determine whether the SCSI or the IDE option is the appropriate choice. If you test using the IDE disks and you regularly exceed a Disk Queue Length of 2 then you either need to change the disk subsystem or spread the load across more servers.

> **Important:** We strongly recommend only installing applications on the Citrix servers and not using them as a location to store data associated with the applications.

In our example, we used the onboard IDE controller.

We do recommend that you schedule defrags on your disk regularly to get the best performance out of your disk subsystem.

Networking

Your existing network infrastructure will strongly influence the decision to use Ethernet or Fibre Channel. With the IBM @server BladeCenter, you can team the network interface adapters, which will increase performance; the Ethernet adapters run at 10/100/1000 Mb. Teaming of the NICs also provides redundancy, load balancing and can auto-recover if a failed NIC is replaced.

Performance

Resource Manager Services (RMS) is a system management product specifically designed to analyze and tune Citrix MetaFrame servers.

Key features are:

Audit Trailing	This provides the administrator with the percentage of time the applications are in use and the resources required.
System Monitoring	A single console allows users to analyze performance counters to view the health of the servers within the farm.
Alert Notification	Alerts can be created regarding server health and sent to either an e-mail address or a pager number.
Capacity Planning	You can track historical information regarding the servers to determine growth trends.

4

Suggested configurations for Citrix MetaFrame Presentation Server

In this chapter, we discuss several Windows Server 2003 and Citrix MetaFrame Presentation Server design examples. When designing your Windows Server 2003 and Citrix MetaFrame Presentation Server environment, you need to consider your specific needs and your existing environment.

49

4.1 Small Citrix MetaFrame configuration

The customer wants to install Windows Server 2003 and Citrix MetaFrame Presentation Server for 100 users. There is an existing Windows 2000 Active Directory, utilizing TCP/IP, DHCP and DNS for all clients and servers on a 10/100 Mbps Ethernet network. The clients are a combination of Windows NT 4, Windows 2000 and XP Professional.

The clients will have the ICA client deployed to the desktop and there will be 24 applications published to the users. The applications are a combination on 16-bit and 32-bit.

Only applications will be stored on the Citrix servers, all other data will be stored on existing file servers or storage subsystems. An existing IBM Director server will manage the IBM @server BladeCenter, which utilizes a Microsoft Access database.

The Citrix MetaFrame farm will have the following configuration:
- All servers will be of the same hardware and software configuration
- Four IBM HS20 blade servers will represent Citrix MetaFrame Servers
  - Single 2.4 GHz Xeon processors
  - 2.5 GB of memory
  - 2 * 40 GB IDE disk drives
  - One IBM @server BladeCenter to house the blade servers
  - Windows Server 2003
  - Citrix MetaFrame Presentation Server 3.0 Standard Editions
  - OS and applications on drive 1
  - Swap file and printer spooler on drive 2
- A single zone
- Two server groups with two servers per group
- 16-bit applications will have resources limited to them
- Microsoft Access is utilized for the Citrix farm
- License Server is shared with MetaFrame Presentation Server

4.2 Medium Citrix MetaFrame configuration

A medium organization wishes to deploy Windows Server 2003 and Citrix MetaFrame Presentation Server to 3000 users who are distributed across two sites. There is an existing Windows NT 4 domain, utilizing TCP/IP, DHCP and WINS for all clients and servers on a 10/100 Mbps Ethernet network. The clients are all Windows 2000 with Internet Explorer 5.5 Service Pack 2. The two sites are connected via a high speed connection.

The clients will utilize either Internet Explorer 5.5 SP2 or the ICA client to access the published applications on the Citrix MetaFrame farm. Internet Explorer clients will access the Citrix farm via MetaFrame Web Interface.

The clients will utilize either the 32-bit ICA client or the ICA Web Client to access the published applications. There are 100 published applications which are a combination of 16-bit and 32-bit.

Only applications will be stored on the Citrix servers, all other data will be stored on existing file servers or storage subsystems. An existing IBM Director server will manage the IBM @server BladeCenter, which utilizes a shared Microsoft SQL Server database.

The Citrix MetaFrame farm will have the following configuration:

- All servers will be of the same hardware and software configuration
- 70 IBM HS20 blade servers will represent Citrix MetaFrame Servers
  - Dual 2.0 GHz Xeon Processors
  - 4 GB of memory
  - 2 * 40 GB IDE disk drives
  - Six IBM @server BladeCenter in total to house all of the blades
  - Two racks to house the IBM @server BladeCenters
  - Three IBM @server BladeCenter at each site
  - Windows Server 2003
  - Citrix MetaFrame Presentation Server
  - OS and applications on drive 1
  - Swap file and printer spooler on drive 2
- Two zones, 1500 users per zone
- 35 servers at each location
- Seven server groups, five servers per group
- 16-bit applications will have resources limited to them
- Microsoft SQL Server 2000 is utilized for the Citrix farm
- Two Web Interface Servers, one at each site
- Web Interface Server are blade servers
- Dedicated License Server shared by these two sites

4.3 Large Citrix MetaFrame configuration

A large organization of 10000 users wishes to deploy Windows Server 2003 and Citrix MetaFrame Presentation Server. There is an existing Windows 2000 Active Directory, utilizing TCP/IP, DHCP and DNS. The clients are either Windows 2000 or XP Professional.

There are 9000 head office users and their environment is as follows:

- Centralized head office
- All clients are Windows 2000 and are on a 10/100 Ethernet network

There are also 1000 external users:

- 1000 laptops
- These users connect via the Internet

The head office users will run the 32 bit ICA client, all external users will use the Web client via Internet Explorer 6. There are a total of 300 published applications which are a combination of 16-bit and 32-bit.

The Citrix servers will only have applications installed on them. All other data will be located on either file servers, database servers, or storage subsystems. A dedicated IBM Director server will manage the IBM @server BladeCenter, which utilize a shared Microsoft SQL Server database.

The Citrix MetaFrame farm will have the following configuration:

- External User farm configuration

  - All servers will be of the same hardware
  - 10 Citrix servers (HS20 blade servers)
    - Dual 2.4 GHz Xeon Processors
    - 4 GB of memory
    - 2 * Fiber Channel Switch Modules connecting to a SAN
    - One QLogic daughter board per blade server

- SAN has 10 LUNs (Logical Unit Numbers)
- 40 GBs mirrored per LUN
  – One IBM @server BladeCenter to house all of the blades
  – Shared rack to house the IBM @server BladeCenter
  – Windows Server 2003
  – Citrix MetaFrame Presentation Server
  – OS and applications installed on a 30 GB partition on the SAN
  – Swap file and printer spooler on the 10 GB partition on the SAN
  – Single farm on a secure network (see Figure 4-1 on page 53)
  – 50 applications published
  – Clustered IIS and Web Interface on two servers in a DMZ (Demilitarized Zone)
  – Secure Gateway Server in a DMZ
  – Secure Ticket Authority Server on a secure network
  – Web Interface and Secure Gateway in the same DMZ
  – Citrix farm and Secure Ticket Authority Server on same secure network
  – Microsoft SQL 2000, SP3a
  – 16-bit applications will have resources limited to them

► Head Office farm configuration:

  – Head office will have one farm
    - 50 IBM HS20 blade servers

      - Dual 2.4 GHz Xeon Processors
      - 4 GB of memory
      - 2 * Fibre Channel Switch Modules connecting to a SAN
        - One Qlogic daughter board per blade server
        - SAN has 50 LUNs
    - Four IBM @server BladeCenter to house all of the blades
    - Three racks to house all the IBM @server BladeCenter
    - Windows Server 2003
    - Citrix MetaFrame Presentation Server
    - OS and applications installed on 30 GB partition on the SAN
    - Swap file and printer spooler on the 10 GB partition on the SAN
    - 250 published applications
    - 25 server groups, 10 applications per group
    - 16-bit applications will have resources limited to them.
    - Microsoft SQL 2000, SP3a
    - One dedicated Citrix License Server
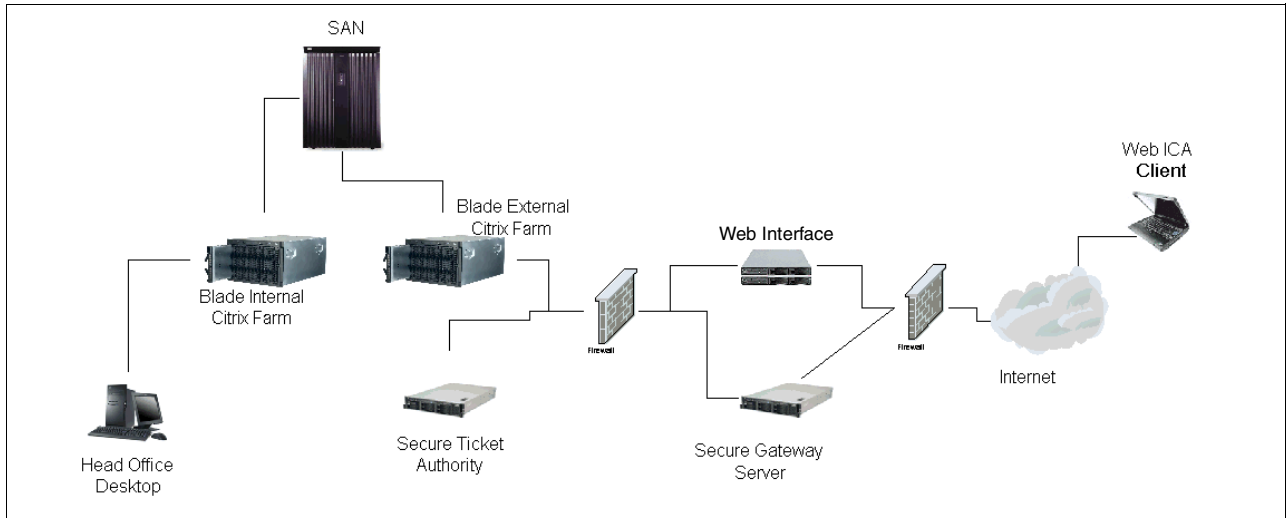
Figure 4-1   Internal/External infrastructure

5

Implementing and configuring Citrix MetaFrame Presentation Server

In preparation for creating our Citrix MetaFrame environment, we will install Windows Server 2003 Enterprise on eight HS20 blade servers. The following applications will be installed across our servers:

► Microsoft SQL Server 2000, Service Pack 3a (Blade server 1)

In our lab scenario, we installed Microsoft SQL Server 2000 on Microsoft Windows 2003 server, Enterprise Edition. It was installed on Blade 1 - BC1SRV1. We used the SQL server to store the Citrix data store database and for IBM Director to store its own database.

► Microsoft 2003 Enterprise Server Domain Controller (Blade server 6)

In our lab scenario, we set up Blade 6 - BC1SRV6 as our Domain Controller for the IBMBlade domain first. We installed and configured DNS ibmblade.com on bc1srv6. For DHCP and WINS, we utilized existing servers in our lab environment. All other Citrix servers and management servers are members of the IBMBlade domain.

► Citrix MetaFrame Presentation Server (Blade server 2, 3, 4, 7, 8)

The main purpose is still the same for MetaFrame Presentation Server; it serves and delivers applications to users as if the applications were installed locally on their PC, laptop, handheld PC, etc. In our lab scenario, we set up Presentation Server 3.0 on Blades 2, 3, 4, 7, and 8. For Blade 3 and Blade 8, we installed Presentation Server 3.0 without IIS. We installed the majority of applications on these two servers.

► Citrix Licensing Server (Blade server 5)

In our lab scenario, we installed MetaFrame License Server on Blade 5 - BC1SRV5. It is new in MetaFrame Presentation Server and part of the new MetaFrame Access Suite. It allows you to share licenses between Citrix products on your network, provided they communicate with the same license server.

55

- ► Citrix Web Interface for MetaFrame Presentation Server (Blade server 2, 4, 7)

  In our lab scenario, we set up Web Interface for MetaFrame Presentation Server on Blade 4. We used that for users accessing MetaFrame via their Web browser. The concept is still aligned with centralized application management and control over the application deployment process. Administrators create Web sites for application access or integrate their Web sites into their company portal. In earlier releases, this was called Web Interface for MetaFrame XP, or NFuse. This activity will be performed in Chapter 7, "Web Interface for MetaFrame Presentation Server" on page 157.

- ► Citrix Conferencing Manager 3.0 (Blade server 2, 7)

  In our lab scenario, we installed MetaFrame Conferencing Manager 3.0 on Blade 2 and Blade 7. It is a productivity tool that allows users to share application sessions, performing editing, creating documents, etc. Users are still able to access published applications, files, network printers, folders and drives depending on their Citrix design and setup. This activity will be performed in Chapter 8, "Citrix Conferencing Manager installation" on page 167.

> **Note:** In Figure 5-2 on page 58, the diagram actually displays additional Blade servers 9 and 10. These were included to illustrate other type of servers that might be included in a similar configuration.

In this section, we present the software that was installed to build our management server (IBM xSeries 345 server):

- ► Microsoft Windows 2003 Enterprise Edition

  In our lab scenario, we used Microsoft Windows 2003 Enterprise Edition for both Management Server and Citrix MetaFrame Presentation Servers.

- ► IBM Director 4.12

  This is a useful and valuable tool for managing your systems. In our lab scenario, we set up IBM Director to use SQL 2000 to store its database.

- ► IBM RDM 4.11

  In our lab scenario, we use RDM to create and deploy clone images. RDM, however, can also perform system firmware updates, modify configuration settings, install operating systems and applications, back up and recover primary partitions, and securely erase data from disks.

- ► Microsoft Remote Installation Services

  This is included in teh Microsoft Windows 2003 Server family; its purpose is the same as in Microsoft Windows 2000. For example, it allows client computers to connect by booting from a network adapter to install an operating system. In our lab scenario, we install RIS and deploy an installation of Windows 2003 server for a Blade server.

The Citrix servers are installed on IBM @server BladeCenter HS20 servers with Windows 2003 and Citrix MetaFrame Access Suite.

5.1 System configuration

The Citrix environment that we configured in the ITSO test lab is illustrated in Figure 5-1. This configuration includes the setup of a client system, a domain controller running Microsoft Active Directory, a management server, and application servers contained in the IBM @server BladeCenter.
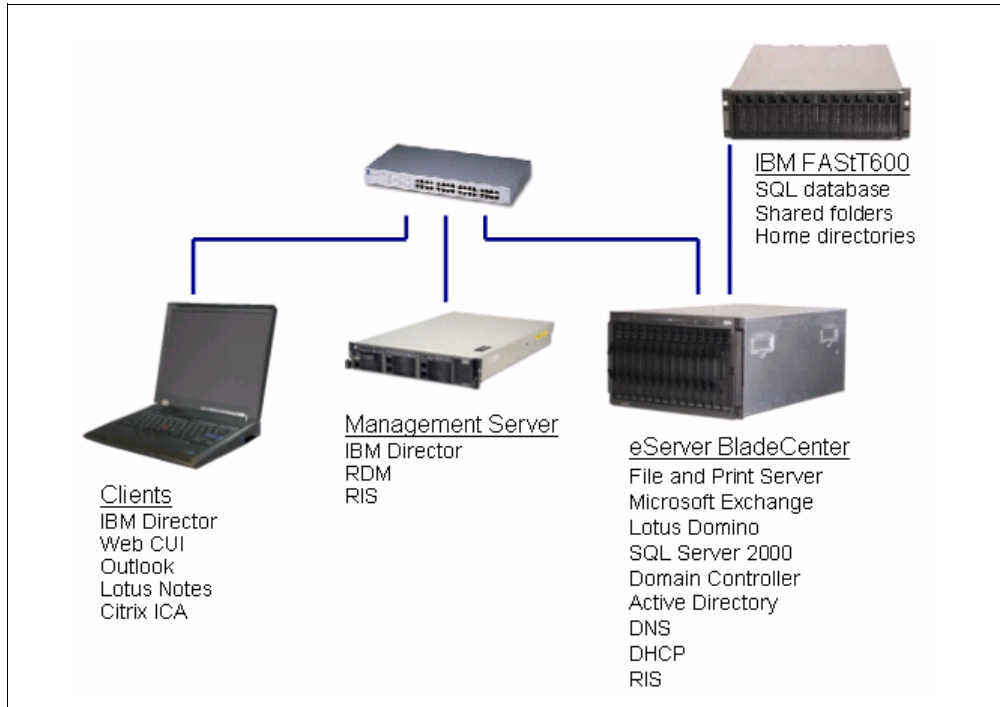
Figure 5-1   The Citrix environment in the ITSO test lab

Important: To help streamline the setup and configuration of the HS20 servers with Fibre Channel cards installed, we recommend that your FAStT be set up and zoning configured on both Fibre Channel switches prior to the upcoming steps.
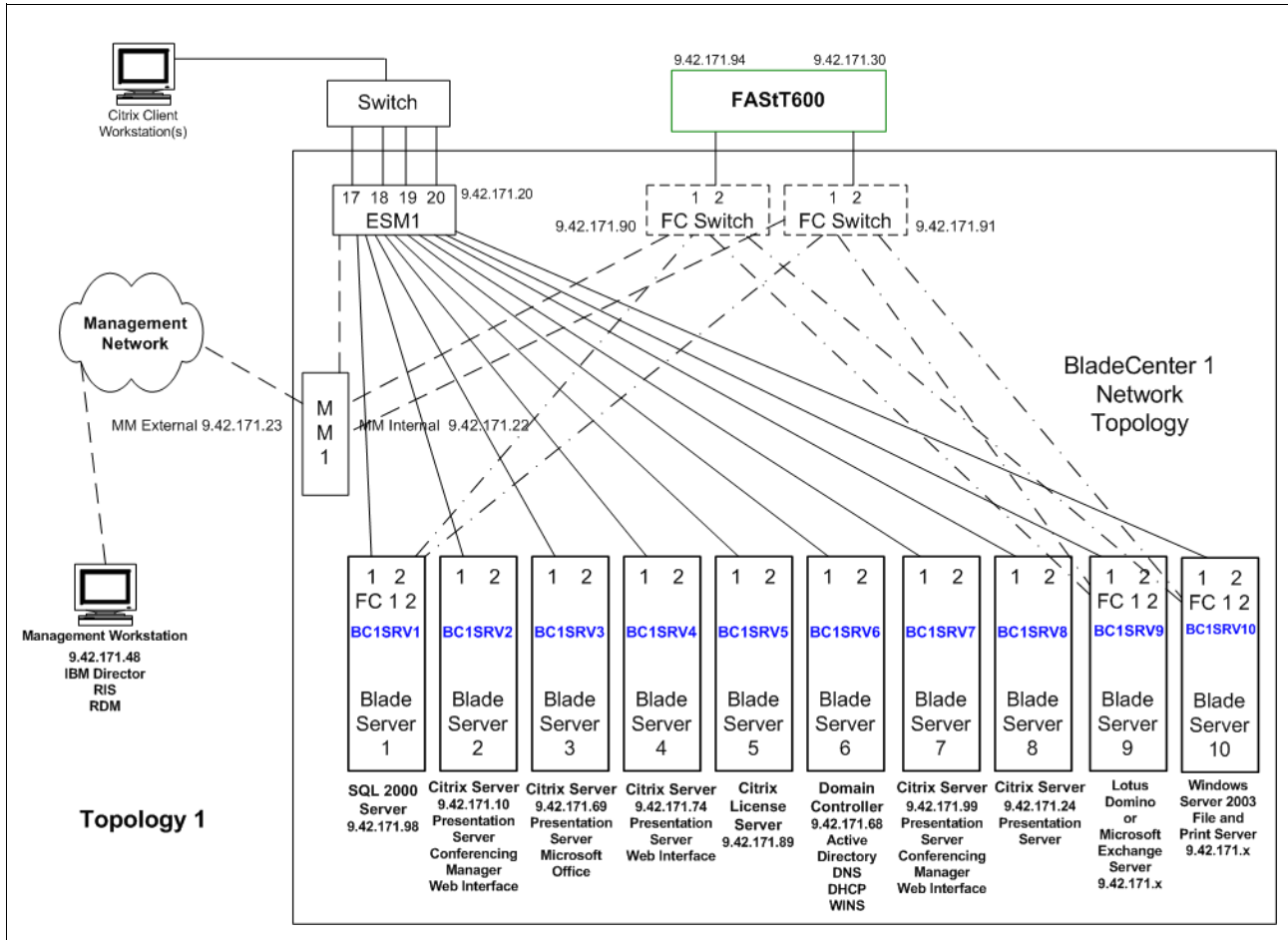
Figure 5-2   ITSO Citrix farm lab environment

Specified in Table 5-1 is the hardware configuration for the IBM @server BladeCenter.

Table 5-1   IBM eServer BladeCenter configuration

Component	Description
IBM @server BladeCenter HS20 servers	Ten
Processor per blade server	1 * 2.0 GHz Xeon Processor
Memory per blade server	2.5 GB of RAM
Controller per blade server	Dual channel IDE
Disk per blade server	IDE 1* 40 GB
Ethernet switch	One, 4 port 1 GB per port
Power supplies	Four
Blowers	Two
Power Step-Up invertors	Four

5.2 Hardware

The following section outlines hardware components and the BIOS configurations which we used.

5.2.1 Disk configuration

In our blade server configuration, we used the onboard IDE controller with the 40 GB drives and without software mirroring. Note that other drive configuration options include SCSI with the expansion option or Fibre to an external disk.

5.2.2 Processor

It is important to have the processor configured to write-back rather than write-through, since there will be a significant performance increase.

5.2.3 MAC address

If you are using Remote Deployment Manager (RDM) or Remote Installation Service (RIS) to deploy the OS either by image or unattended.txt, you need to remember to enable the network boot.


```
                 Startup Sequence Options

  Primary Startup Sequence:
  First Startup Device      [ CD ROM          ]
  Second Startup Device     [ Diskette Drive 0 ]
  Third Startup Device      [ Network          ]
  Fourth Startup Device     [ Hard Disk 0      ]


  Wake On LAN               [ Enabled ]

  Wake on Lan Startup Sequence:
  First Startup Device      [ Network          ]
  Second Startup Device     [ Diskette Drive 0 ]
  Third Startup Device      [ CD ROM           ]
  Fourth Startup Device     [ Hard Disk 0      ]
```

Figure 5-3   System boot sequence

5.3 Software

In this section, we describe how we deployed and configured the above Citrix MetaFrame Test Environment.

The software configuration on each of these servers is as follows:

► Management server

  – Windows 2003 Enterprise Edition
  – IBM Director 4.12
  – IBM RDM 4.11
  – Microsoft Remote Installation Services

- IBM Storage Management Client 8.4 Console
- IBM SAN Utility version 1.02.25 for Windows 2000 and Windows 2003 - Blade Center 8677

► Citrix servers

- Windows 2003 Edition
- Terminal Services
- SNMP Services
- ChkRoot
- ASP.Net for MetaFrame Web Interface
- Citrix MetaFrame Presentation Server
- Deployed Office XP

5.4 Operating system installation

In this section, you will begin the setup of your systems by installing the operating system on the IBM @server BladeCenter HS20 servers and the management server.

We will demonstrate how to install the Windows Server 2003 via CD-ROM, RIS and RDM on the IBM @server HS20s and x345.

5.4.1 Installation from CD-ROM

The following steps should be completed on all blade servers:

1. Insert Microsoft Windows 2003 Server Enterprise CD into the CD-ROM drive and power up HS20 blade server.

2. Since we are using an IDE drive in our lab scenario, F6 and F5 are not needed.

> **Note:** F5 and F6 are not needed for BladeCenter. However, for the x345, you will need to press **F6** to install your update to the LSI SCSI controller driver and/or the latest ServeRAID™ controller device driver.

3. During the text mode setup phase, server components are loaded and the kernel will be started. Read the license agreement carefully and accept it if you agree with its terms.

4. Like Windows 2000 and NT Server Family, setup will display disks and partitions information found during the hardware device detection. Create the disk partition size that you have planned and press **Enter**.

5. A summary window will be displayed and once you have confirmed and pressed **Enter** for the partition highlighted C:, the next window will ask you to select how the partition will be formatted. Select **Format the partition using the NTFS File system**.

6. After format is finished, the setup will copy files to the Windows installation folders; follow with a reboot once it is finished copying.

7. Once the server is rebooted, the graphical installation phase will begin.

8. Regional Settings is the first user input screen, where you will define Regional Options and Location. Click **Advanced** if you want to select a language to match the language version of the non-unicode programs you want to use. Click **Details** if you need to select a different keyboard layout.

9. Next, personalize your software by filling in your user name and organization. When finished, click **Next**.

10. Next, fill in Product key details. When finished, click **Next**.

11. Select a licensing mode based on your license agreement with Microsoft, then click **Next**.

12. Fill in the Computer name and Administrator Password, then click **Next**.

13. Check/adjust Date and Time settings based on your server geographical locations, then click **Next**.

14. Next, you will see the Networking Settings window. HS20 onboard network adapters are automatically detected during the installation of Microsoft Windows 2003 software. Select **Custom Settings**. Fill in TCP/IP protocol details, then click **Next**.

15. Next, the Workgroup or Computer Domain configuration window is presented. Select the workgroup or domain, then click **Next**.

16. Next, setup will proceed with the installation. When finished, the system will reboot automatically.

17. Log on to the server once it has restarted and adjust display settings.

> **Note:** At this phase of the implementation, you should create a Domain Controller with an Active Directory. In our example, we perform this activity on BC1SRV6, as shown in Figure 5-2. Our domain is named IBMBlade.

5.4.2 Fibre Channel card setup

For HS20 blade server with a Fibre Channel daughter board installed, we installed the Fibre Channel Expansion Card signed device driver version 8.2.2.62 for Microsoft 2003 HS20 and HS40.

The Fibre Channel Expansion Card device driver can be downloaded from the following URL:

  http://www-307.ibm.com/pc/support/site.wss/document.do?lndocid=MIGR-53295
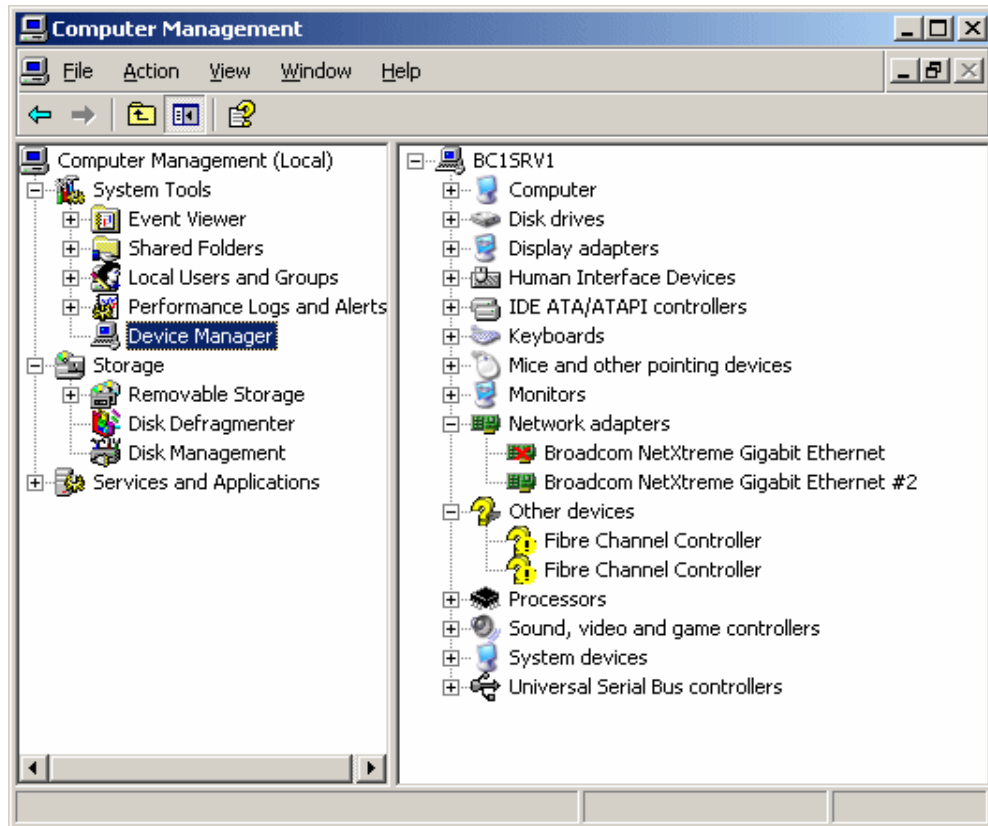
Figure 5-4   Computer management window

Complete the following steps:

1. Click **Start -> Control Panel -> System -> Hardware -> Device Manager**.

2. Right-click **Fibre Channel Controller** and select **Reinstall Drivers**.

Figure 5-5   Hardware Update Wizard window

3. Select from a list or specify the location, then click **Next**.

4. Specify the location of the drivers,;click **Next**.

5. When finished, click **Finished**.

Figure 5-6   Hardware Update Wizard window

6. Click **Close**.

7. Reboot the server. Once the server is rebooted, the second Fibre Channel Adapter will be installed by Windows Server 2003 automatically.
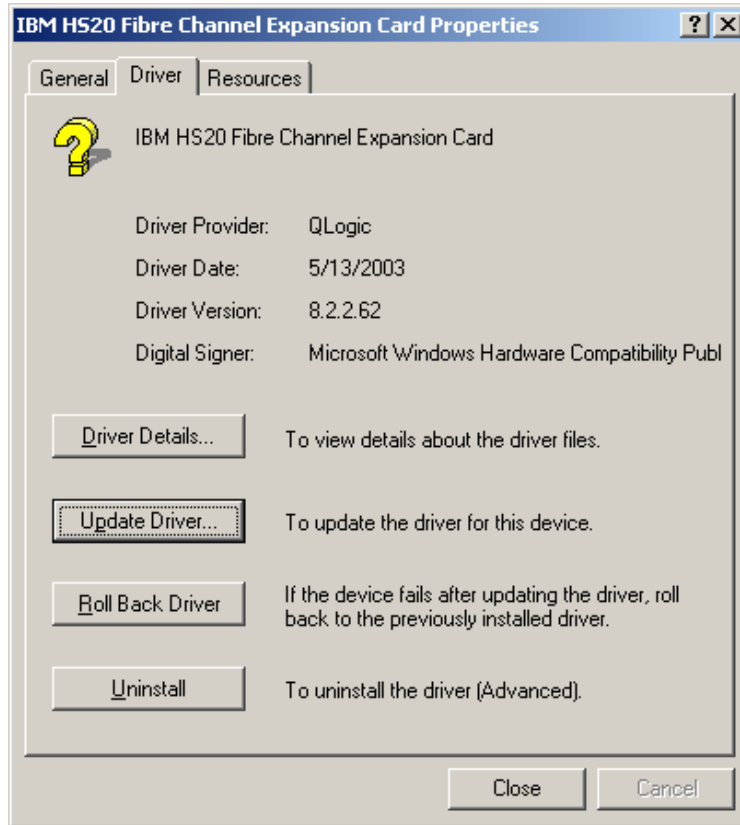
Figure 5-7   IBM HS20 Fibre Channel Expansion Card Properties window

In our lab scenario, it is connected to the IBM TotalStorage FAStT600 Storage Server.

RDAC setup
Because we have a multiple path connection to the FAStT600, RDAC is installed at this time. We install RDAC using IBM Storage Manager for Microsoft Windows 2003 version 8.4.

Note: We recommend that your FAStT be set up and zoning configured on both Fibre Channel switches and the FAStT before installing RDAC.

IBM FAStT Storage Manager version 8.4 for Microsoft Windows Server 2003 (32-bit) can be downloaded from the following IBM Web site:

   http://www-1.ibm.com/support/docview.wss?rs=572&uid=psg1MIGR-52940&loc=en_US

The file name is 25r4998.exe. Once downloaded, double-click it and follow the instructions to extract it to a temp folder.

The package includes the RDAC installation executable.

Complete the following steps to begin your installation:

1. Launch the installation executable for RDAC (SMrdac-WS32-08413503.exe).
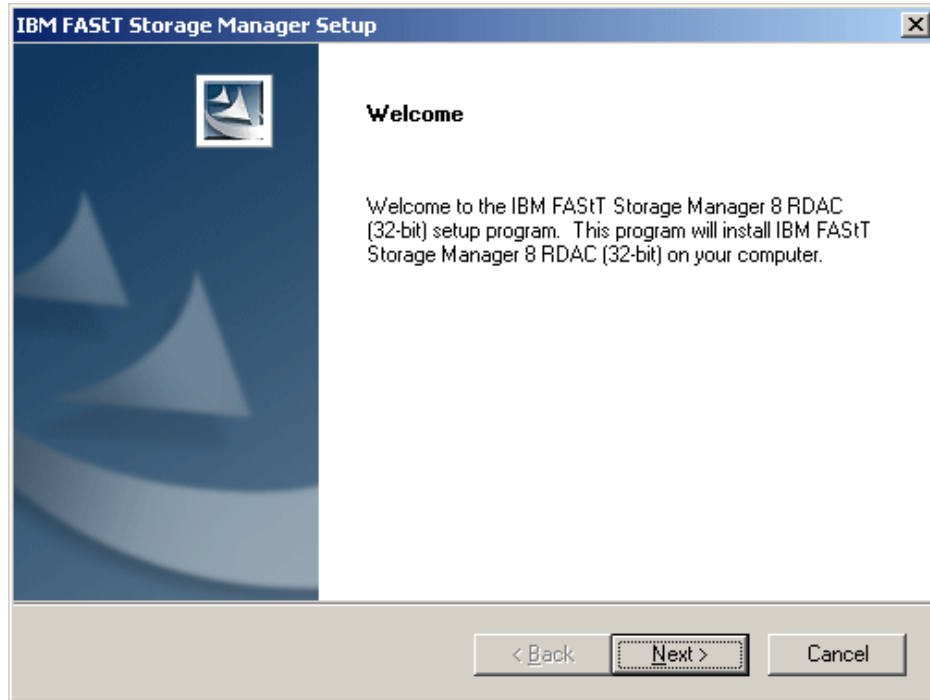
Figure 5-8   IBM FAStT Storage Manager Setup window

2. Click **Next**.

3. Click **OK**.

4. Read and accept the License Agreement. Click **Yes**.

5. Accept the default destination folder, then click **Next**.

6. Setup will proceed; when finished, reboot the server.

5.4.3 Management Server

After installing Microsoft Windows 2003 on our IBM @server x345 management server, install Microsoft SNMP Services. To begin, complete the following steps:
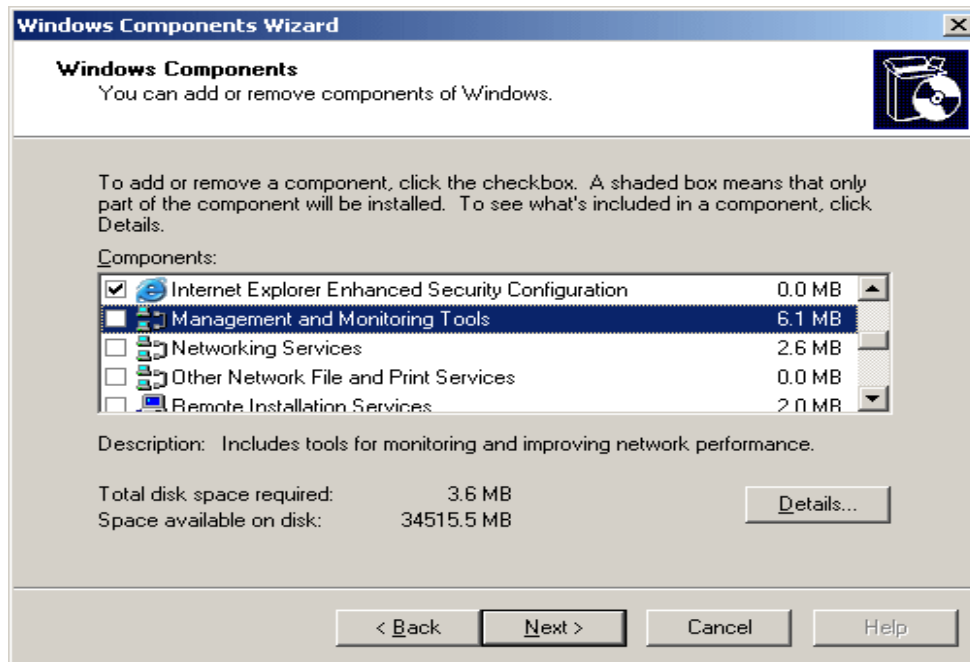
Figure 5-9   Windows Components window

1. Click **Start -> Control Panel -> Add/Remove Programs -> Add/Remove Windows Components**.

2. Highlight **Management and Monitoring Tools**, and then click **Details**.
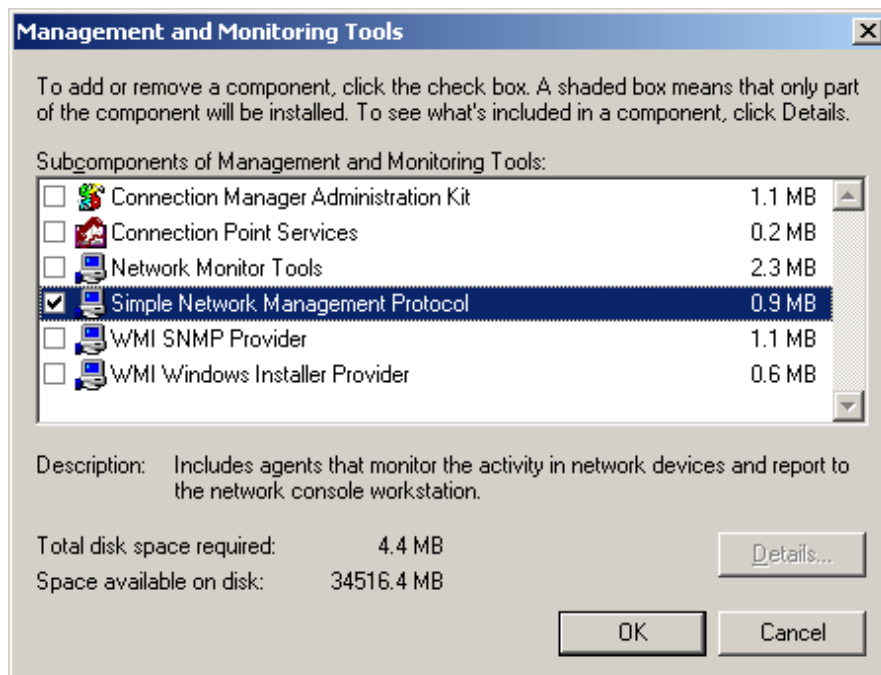
Figure 5-10   Management and Monitoring Tools window

3. Check **Simple Network Management Protocol** and click **OK**.
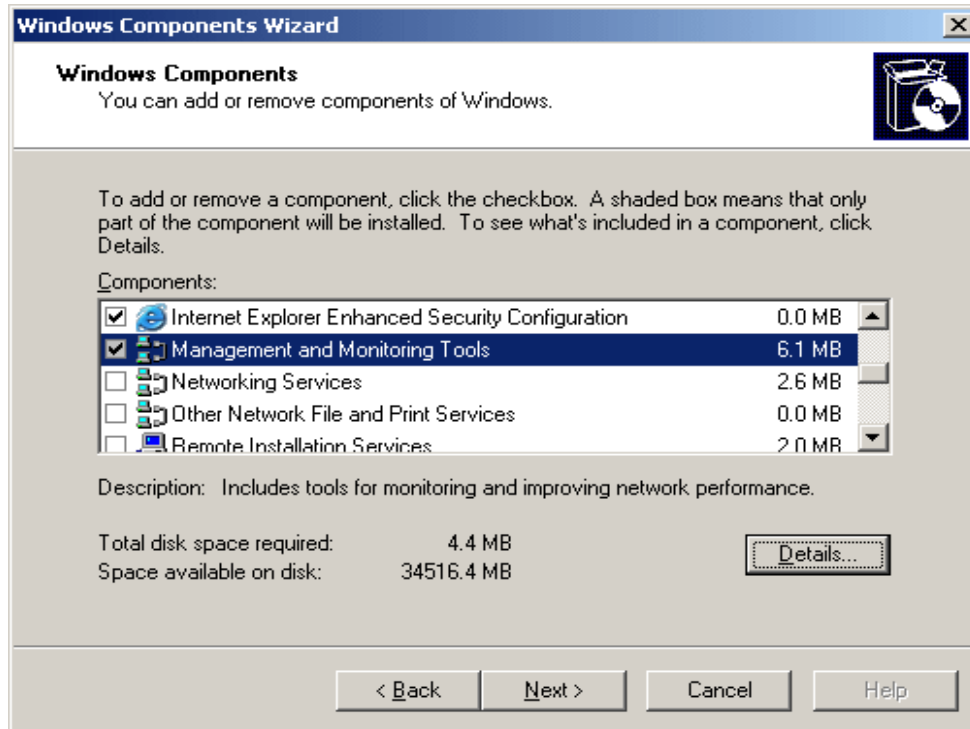
Figure 5-11   Windows Components window

4. Click **Next**.

5. Click **Finish** and reboot the server.

5.5 Creating user accounts

Create the CitrixAdmin user in Active Directory (AD) and add it to the Domain Admin group. The same user name is also created in SQL Enterprise Manager for the database owner of the Citrix database.

In our lab scenario, we created the following user ID and groups.

► User accounts:

– CitrixAdmin - for administration of Citrix, domain admin account; this is created in Windows 2003 active directory.

– CitrixAdmin - for the DB owner of the Citrix database; this is created in SQL Enterprise Manager.

– CitrixCM - Citrix Conferencing Manager Account Operator; this is created in the Windows 2003 active directory.

– Installation - Installation Manager, account for Installation Manager to connect to the package share. It is created in the Windows 2003 active directory.

– sql - SQL service, domain admin account for SQL 2000 services; this is created in the Windows 2003 active directory.

– director - Director service, for IBM Director services, domain admin account; this is created in the Windows 2003 active directory.

– director - for the DB owner of the Director database; it is created in SQL Enterprise Manager.

► Global groups:

– CitrixRDP - Nested Group for CitrixCMUsers, CitrixUsers, CitrixWebUsers

– CitrixCMUsers, global group for Citrix Conferencing Manager Users

– CitrixUsers, global group for Citrix Users

– CitrixWebUsers, global group for Citrix Web Interface Users

– CCMGuest, global group for Citrix Conferencing Manager Guest Attendee Interface.

5.6 Microsoft SQL Server 2000 installation

Do not install Microsoft SQL Server 2000 on a Citrix Server. In our example, we deployed Microsoft SQL Server 2000 to blade server 1 (BC1SRV1) as depicted in Figure 5-2 on page 58.

Installation of SQL Server 2000

Below are the steps we followed to deploy Microsoft SQL Server 2000 to blade server 1.

1. Insert the SQL Server 2000 CD into the CD-ROM drive.

2. If the CD does not autostart, browse to the root of the CD and click **Autorun.exe**. You will see a window similar to Figure 5-12.
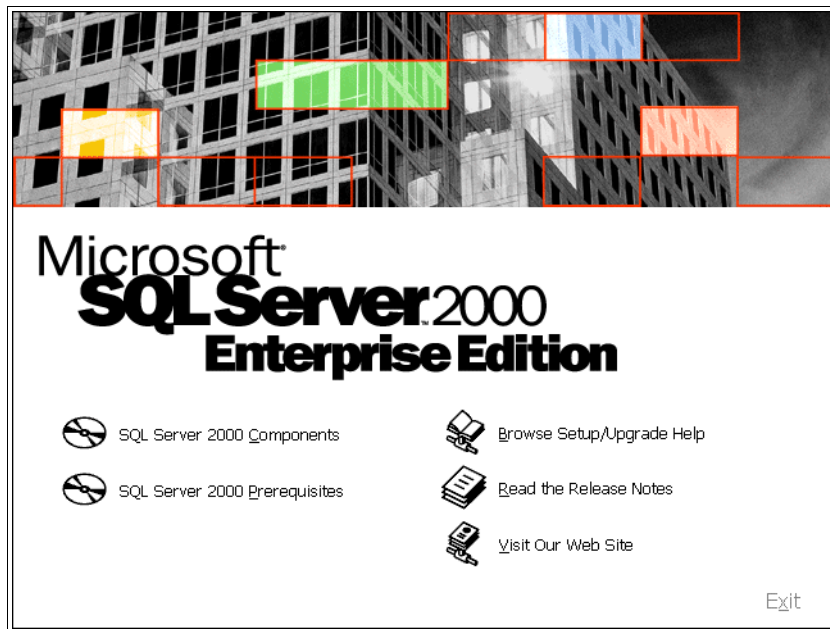
Figure 5-12   Autorun of SQL Server 2000

3. Click **SQL Server 2000 Components**.

4. Click **Install Database Server**.
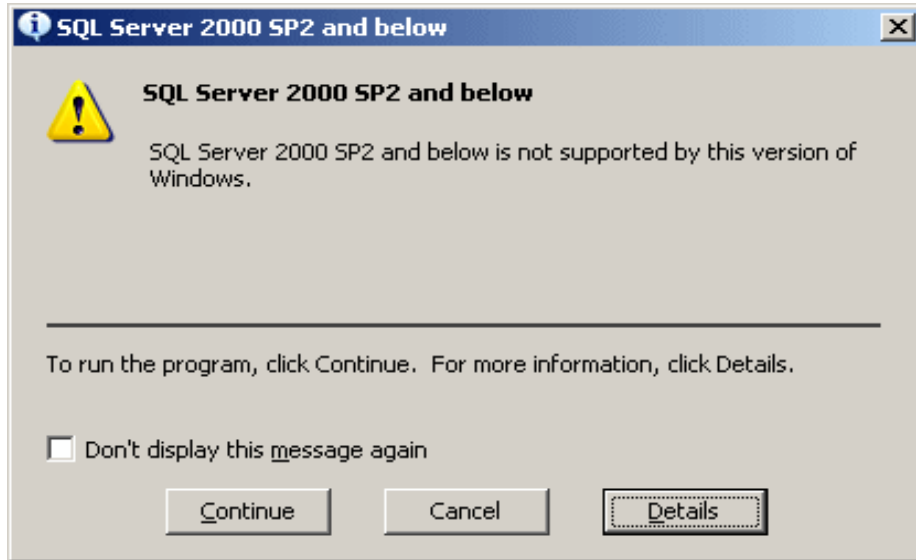
Figure 5-13   SQL Server 2000 SP2 support window

5. Click **Continue**.
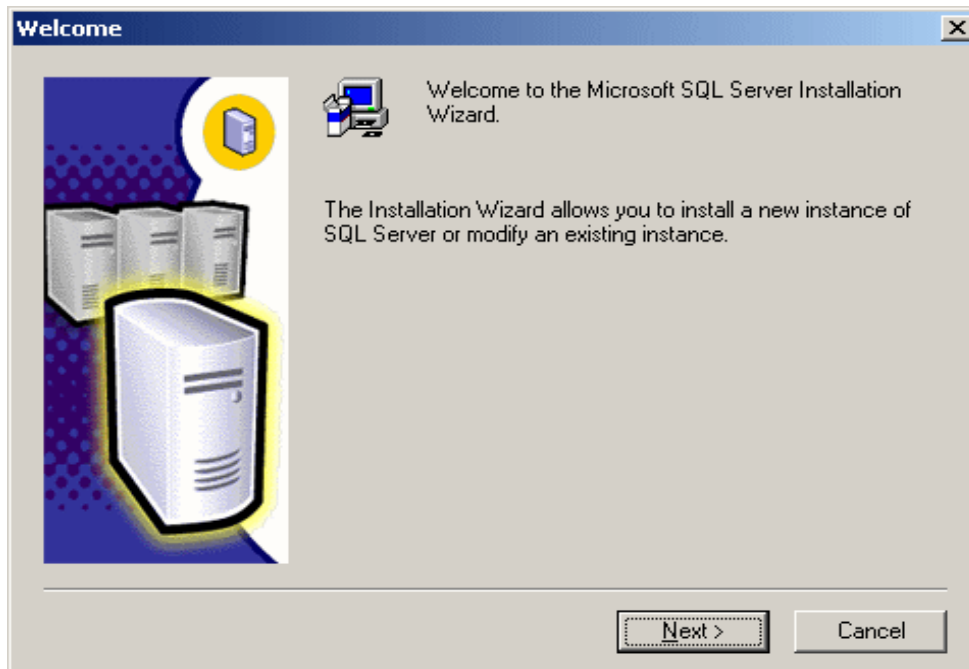
Figure 5-14   Welcome window

6. Click **Next**. You will see a window similar to Figure 5-15 on page 70.
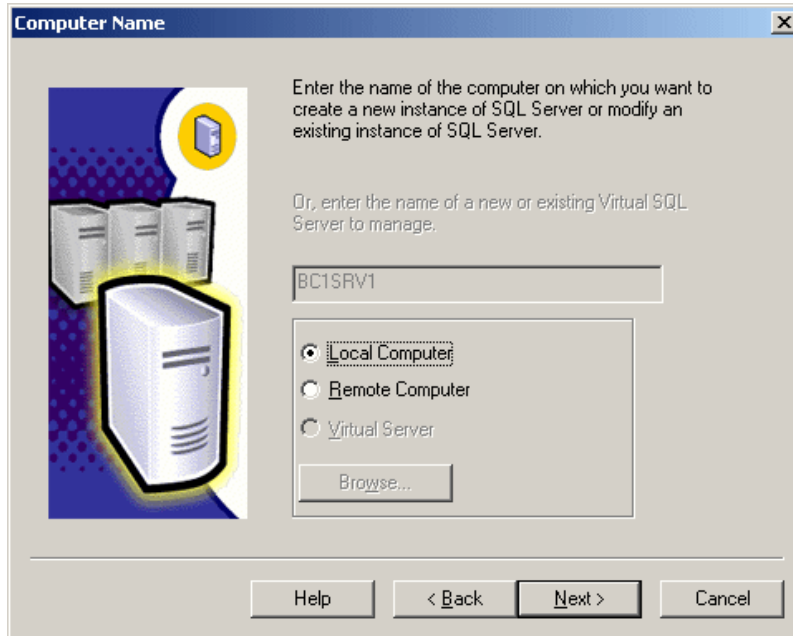
Figure 5-15 Computer Name window

7. Enter the name of the computer SQL to be installed, for our example, `BC1SRV1`. Select **Local Computer** and then click **Next**. You will see a window similar to Figure 5-16.
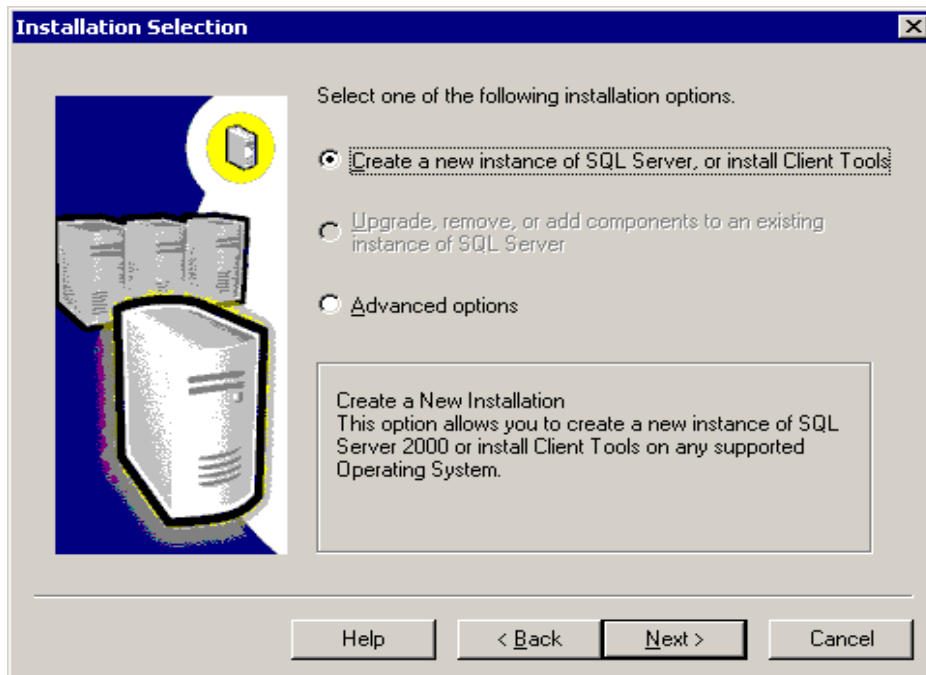
Figure 5-16 Creating a new instance of SQL

8. Select **Create a new instance of SQL Server, or install Client Tools** and then click **Next**.

9. Enter the name and company details and click **Next**.

10. Read and accept the Software License Agreement and then click **Next**. You will see a window similar to Figure 5-17.
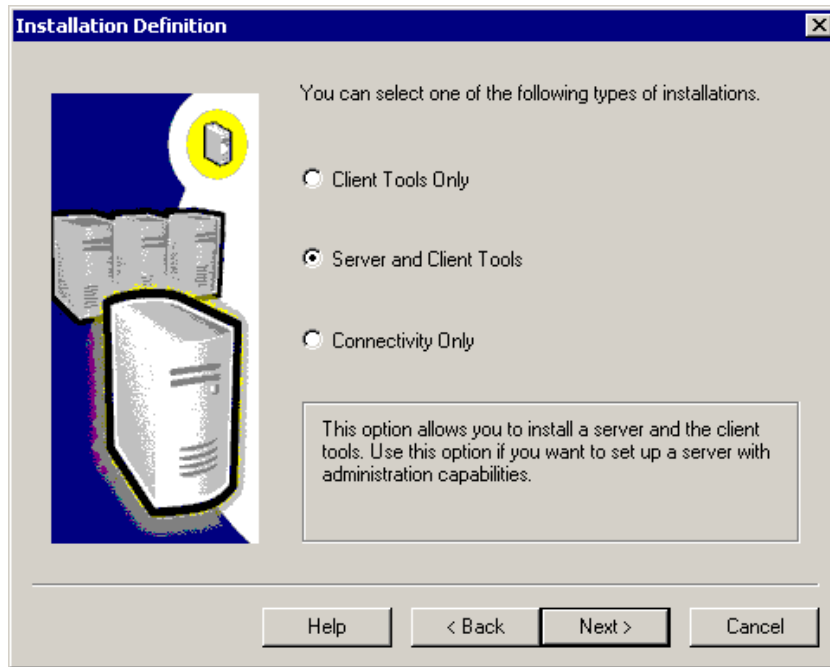
Figure 5-17   Installation type of SQL

11. Select **Server and Client Tools** and then click **Next**.

12. Confirm that **Default** is selected and then click **Next**. You will see a window similar to Figure 5-18.
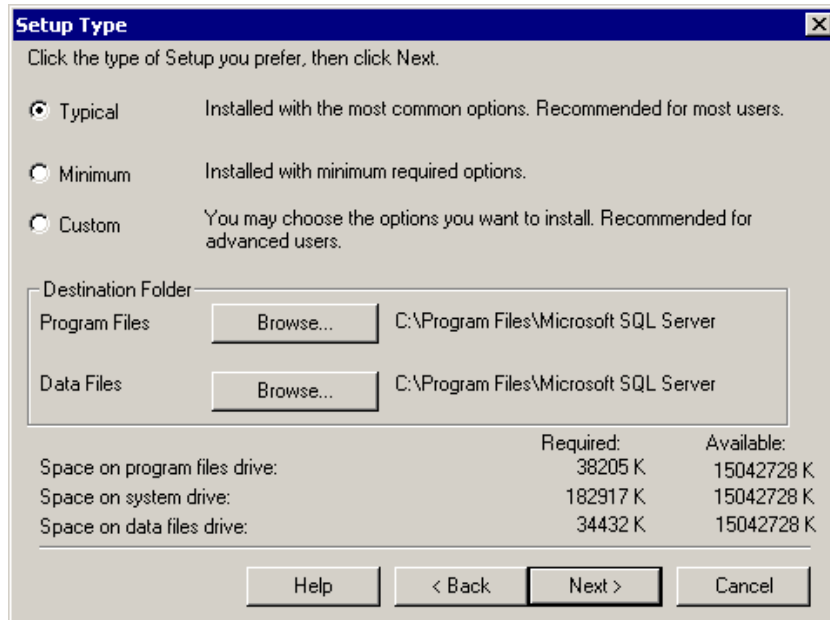
Figure 5-18   SQL typical install

13. Select a **Typical** install and click **Next**. You will see a window similar to Figure 5-19 on page 72.
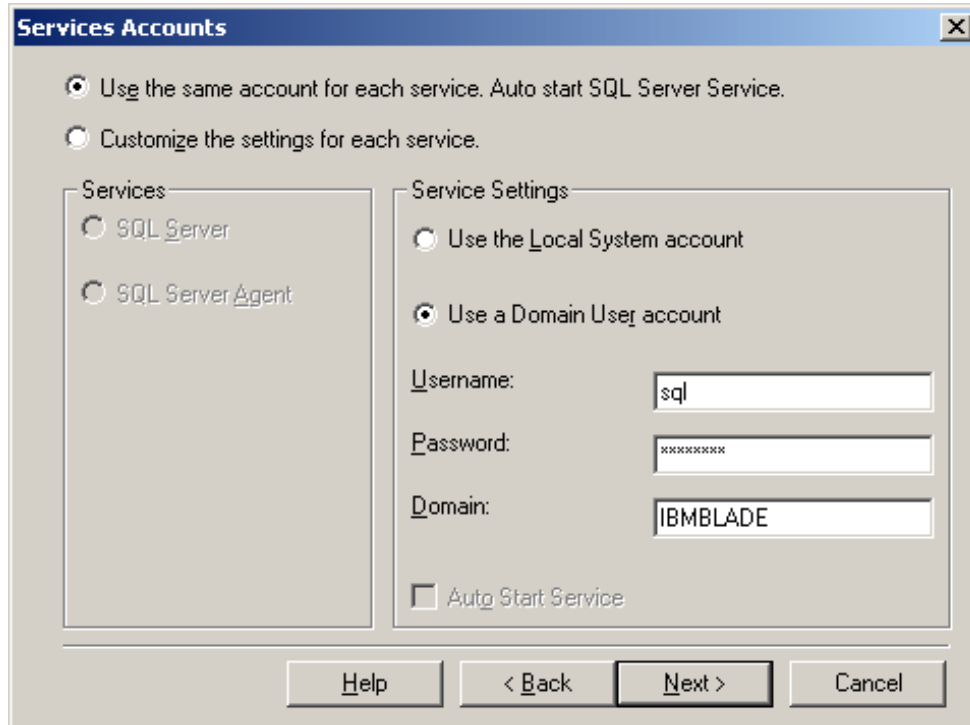
Figure 5-19   Services Accounts window

14. Select **Use the same account for each service. Auto start SQL Server Service**. Under the Service Settings section, select **Use a Domain Admin user account** and enter the user name, password and the domain name of the account which you require to start SQL. The reason we select a domain admin user is so that the account has domain-wide security access.

15. Click **Next**.

16. Select **Mixed Mode (Windows Authentication and SQL Server Authentication)** and enter the sa password.

17. Click **Next**.

18. Click **Next** at the Start Copying window.

19. Enter the appropriate Microsoft SQL license and click **Continue**.

20. Click **Finish**.

Installation of SQL 2000 Service Pack 3a

In this section, we will install the SQL 2000 Service Pack 3a. Complete the following instructions:

1. Download SQL 2000 Service Pack 3a from:

   http://www.microsoft.com/sql/downloads/2000/sp3.asp

2. Run the SQL2KSP3.exe file to expand the service pack to the default directory of c:\sql2ksp3.

3. Click **Finish** in the Installation Folder window.

4. Click **OK** in the Package for the Web window.

5. Execute setup.bat from the c:\sql2ksp3 directory.

6. Click **Next**.

7. Read and accept the License Agreement and click **Yes**.

8. Click **Next**.

9. Click **Next**.

10. Click **Next**. Check the box Upgrade Microsoft search and apply SQL Server 2000 SP3 (required) to continue.
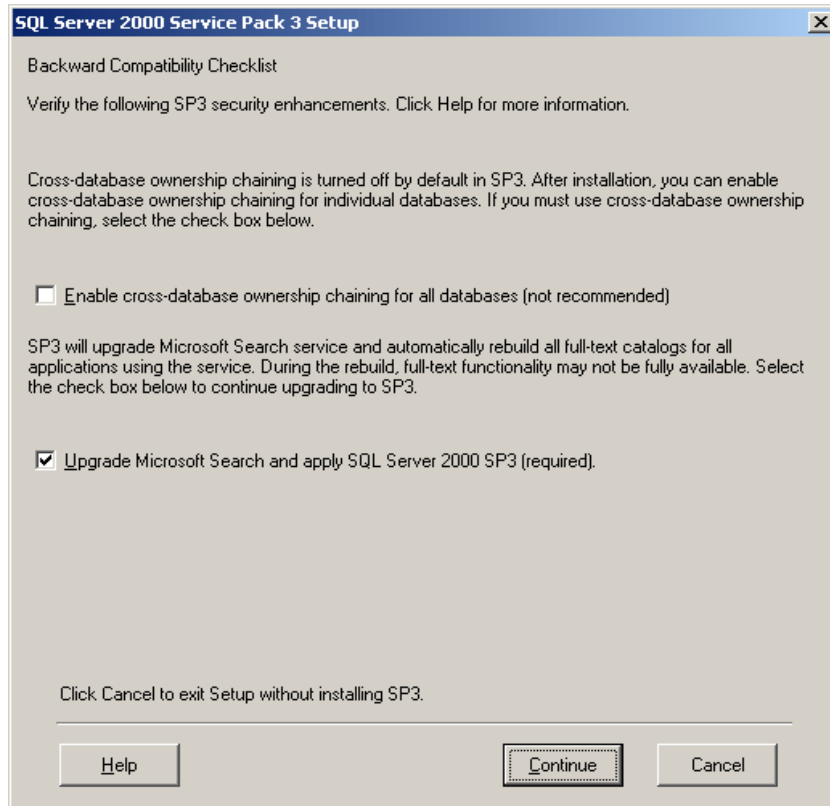
Figure 5-20   Backward Compatibility Checklist window

11. Click **Continue**.
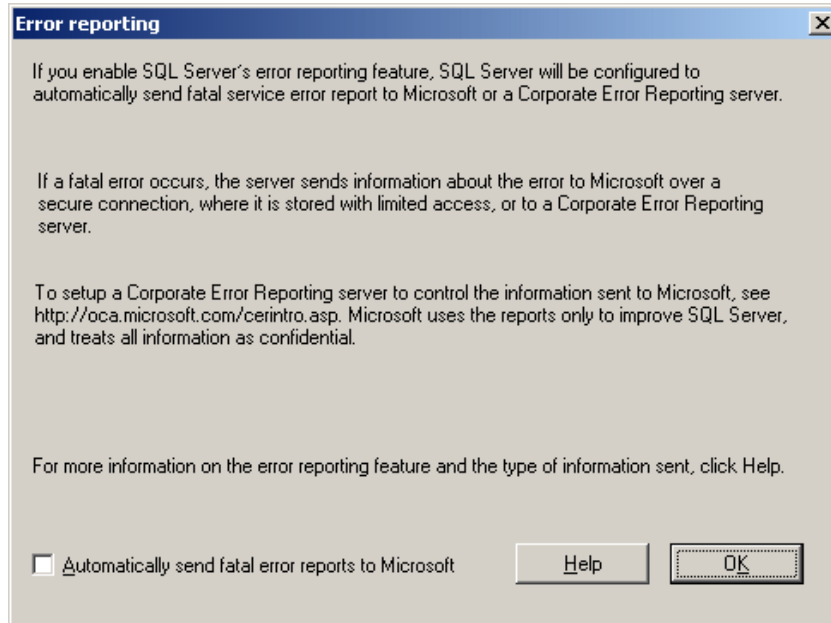
Figure 5-21   Error reporting window

12. Click **OK**.

13. Click **Next**.

14. Click **OK**.

15. Click **Finish**.

5.6.1 Database creation

Below are the steps we followed to create the database for the Citrix MetaFrame Presentation Server installation.

1. Click **Start -> Programs -> Microsoft SQL Server -> Enterprise Manager**. You will see a window similar to Figure 5-22 on page 75.
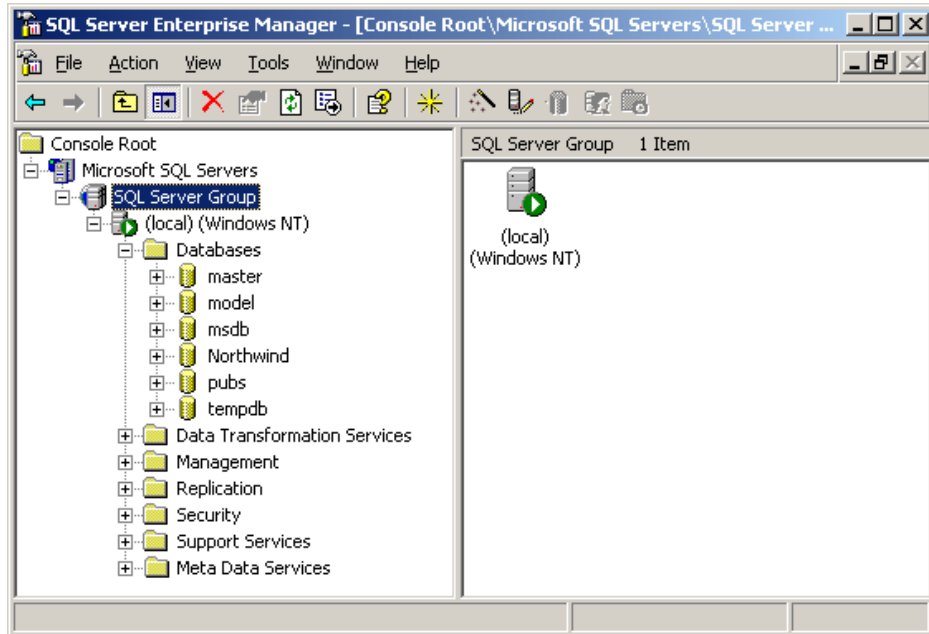
Figure 5-22   SQL Server Enterprise Manager window

2. In the left panel, expand the tree until you see Databases and then expand the Databases.

3. Right-click **Databases** and then click **New Database**. You will see a window similar to Figure 5-23.
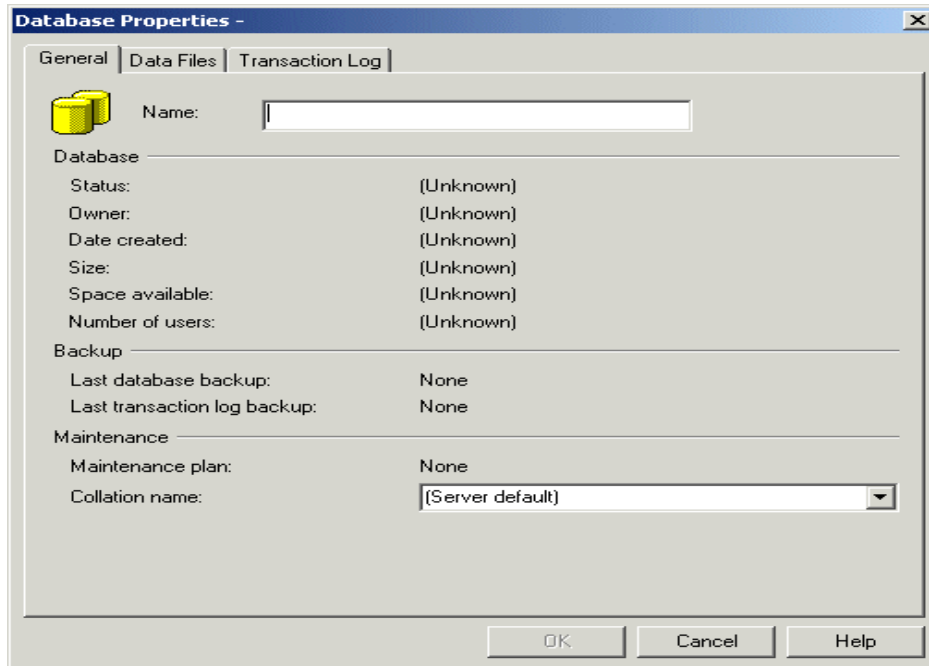
Figure 5-23   Database properties

4. In the Name field, enter the name of the Citrix database and click **OK**.
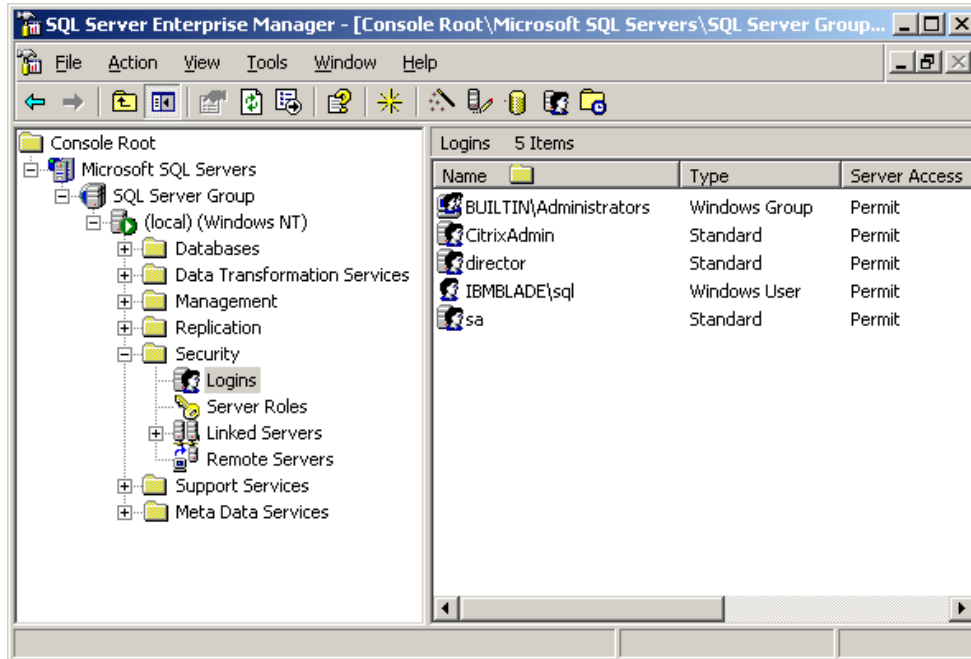
Figure 5-24   Create new database user

5. In the Enterprise Manager-Tree panel, click **Security** and select **Logins**, then right-click and select **New Login**. You will see a window similar to Figure 5-25.

.
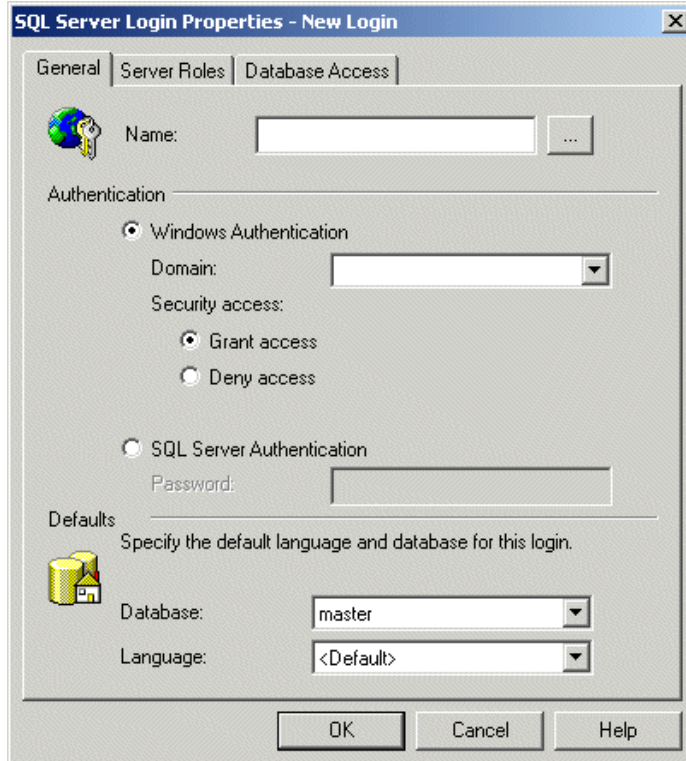
Figure 5-25   SQL Server login details

6. Click the square beside the Name field, then select the appropriate user ID from the list. Click **SQL Server Authentication** and insert the password, then click the **Database**

Access tab and assign the user ID you defined for your Citrix DataStore connector to the database you have just created. For our example, we used the CitrixAdmin user. Click **OK**. You will see a window similar to Figure 5-26.
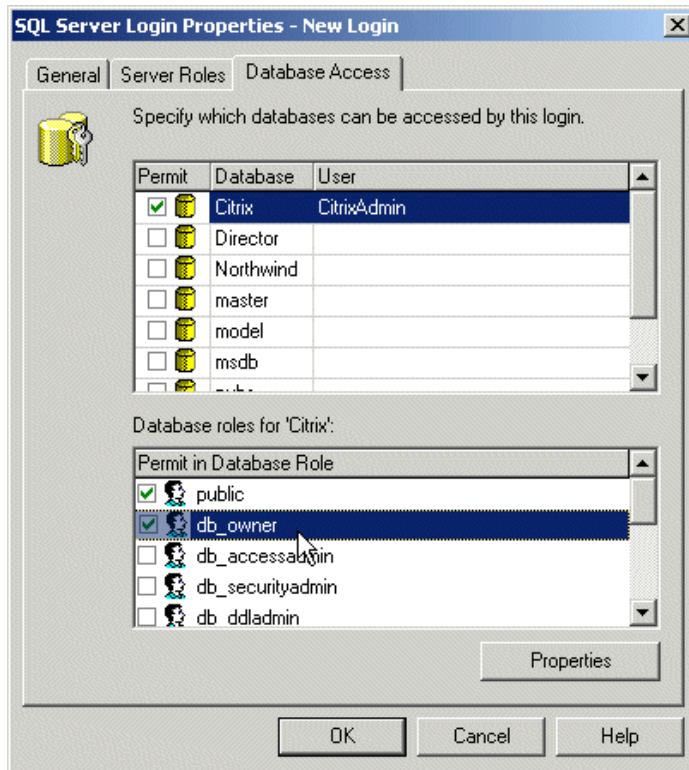
Figure 5-26   Assigning DBO access to the Citrix database

7. Click the **Database Access** tab and then in the Database roles for Citrix, click **db_owner**. Click **OK**. This will assign the user as the database owner of the newly created database.

8. You will be prompted to confirm the password; afterwards, click **OK**.

5.7 Installation of IBM Director 4.12

Insert the IBM Director 4.12 CD into the CD-ROM drive of the management server.

Figure 5-27   IBM Director setup window

1. Click **Install IBM Director**.

Figure 5-28   IBM Director installation window

2. Click **IBM Director Server installation**.
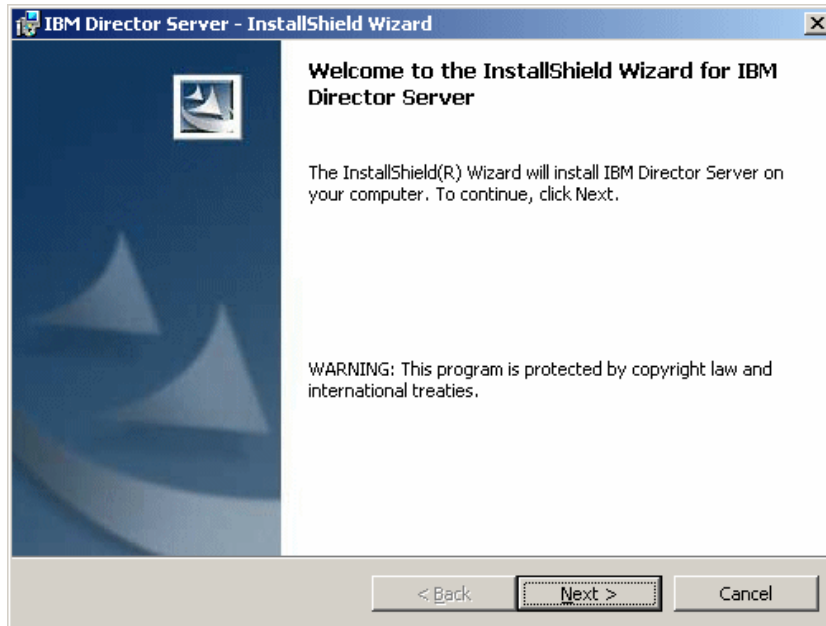
Figure 5-29   InstallShield Wizard window

3. Click **Next**.

4. Read and accept the License Agreement, then click **Next**.
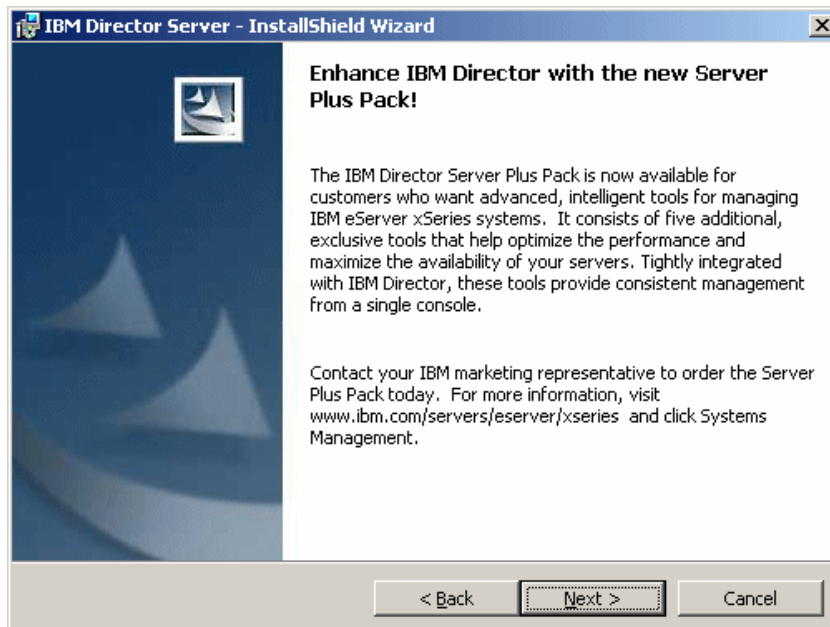
Figure 5-30   IBM Director Server Plus Pack install window

5. Click **Next**.
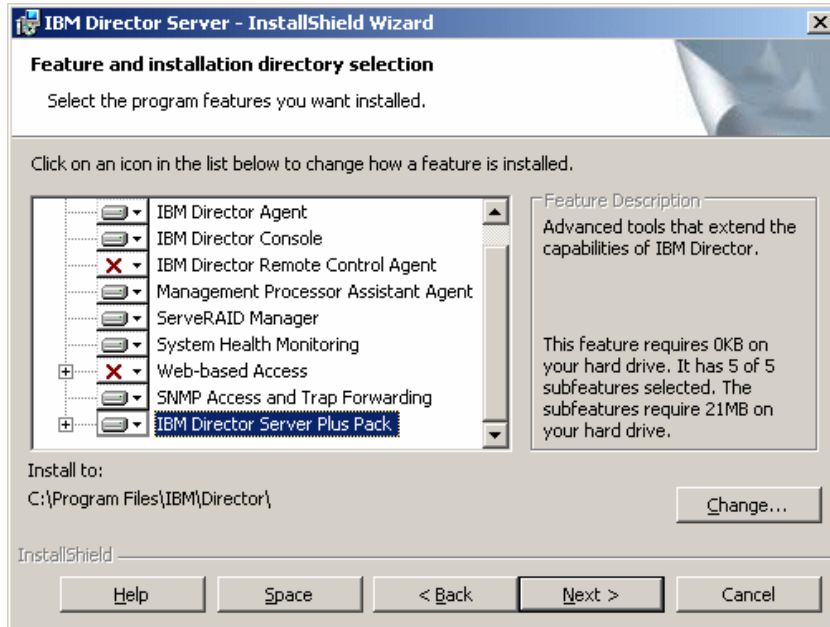
Figure 5-31   Feature and installation directory selection window

6. Click the appropriate icon for the following to be installed:
   – ServeRAID Manager
   – Management Processor Assistant Agent
   – SNMP Access and Trap Forwarding
   – IBM Director Server Plus Pack

   Select **This feature; and all subfeatures** to be installed on the local hard drive.

7. Click **Next**.
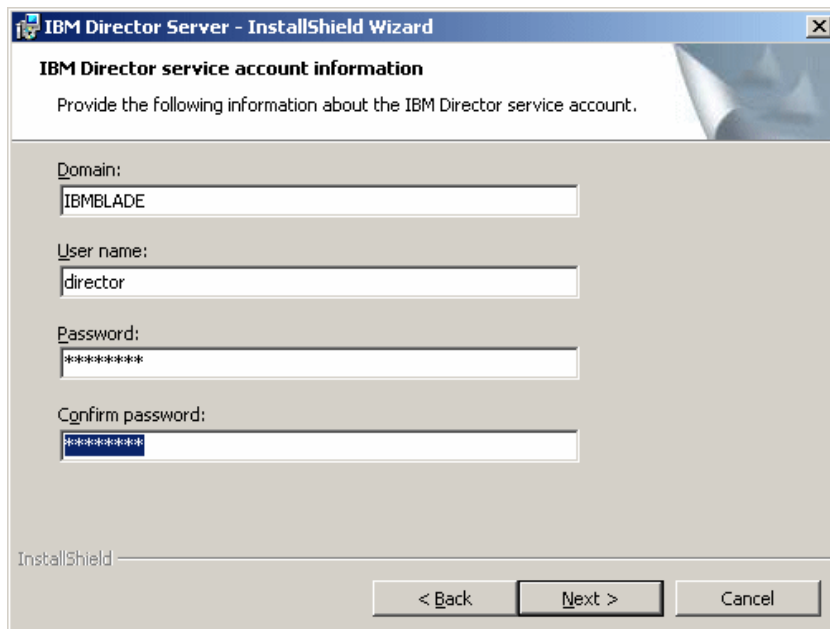
Figure 5-32   IBM Director service account information window

8. Complete the fields as shown in Figure 5-32 on page 80. Note that the user (service account) was created in 5.5, "Creating user accounts" on page 67. In our example, the management server is part of the domain.

9. Fill in the details, then click **Next**.
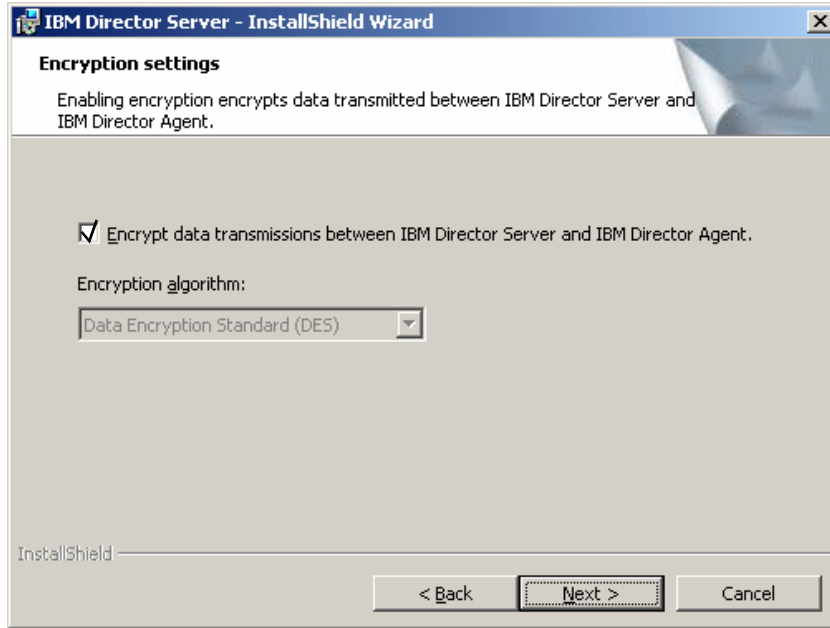
Figure 5-33   Encryption settings window

10. For our example, we enabled **Encrypt data transmissions between IBM Director Server and IBM Director Agent** and selected **Data Encryption Standard (DES)**.

11. Click **Next**.
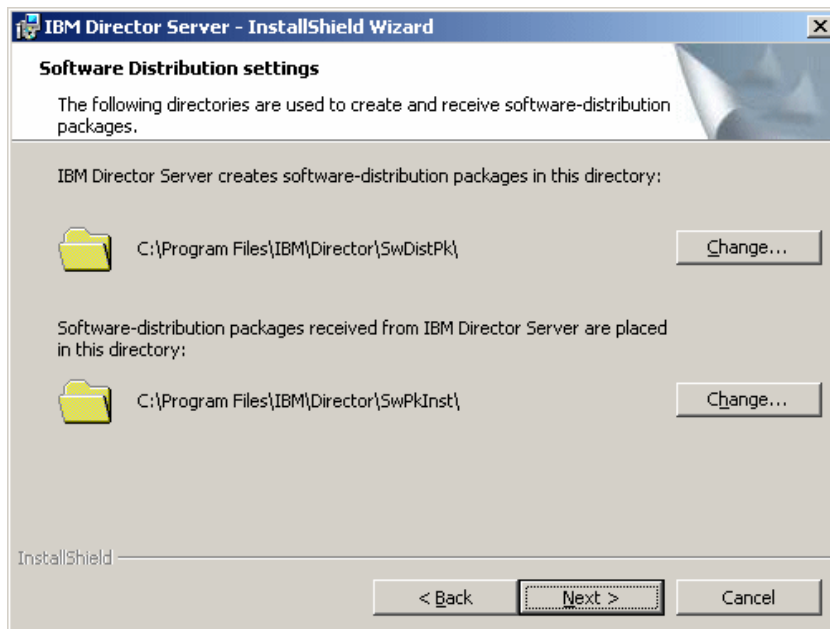
Figure 5-34   Software Distribution settings window

12. For our example, we accepted defaults and clicked **Next**.
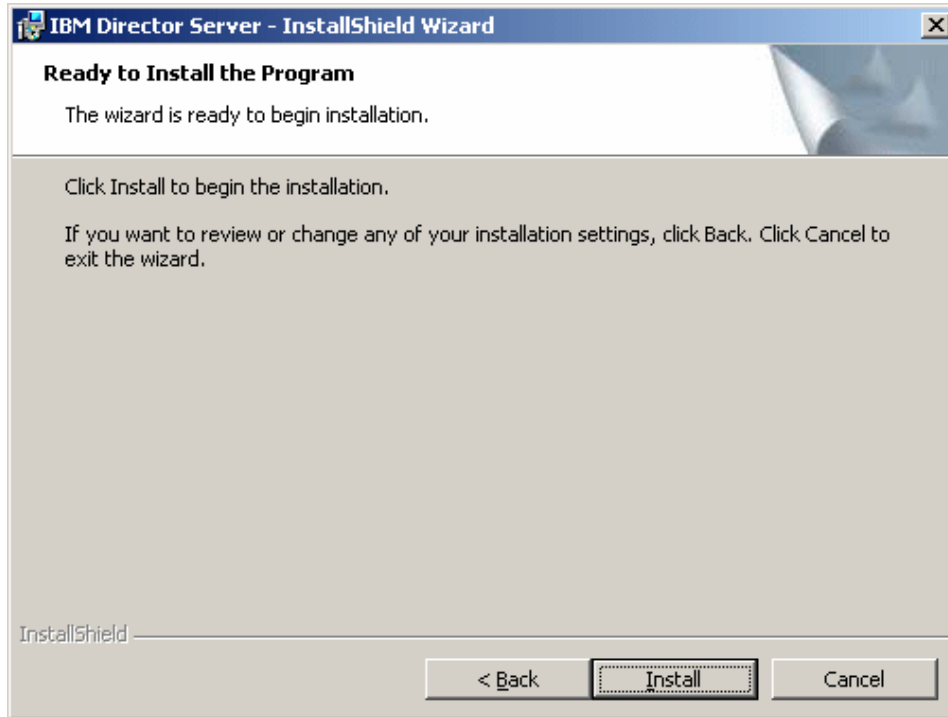
Figure 5-35   Ready to Install the Program window

13. Click **Install**.

Figure 5-36   Security Alert window

14. Click **Yes**.
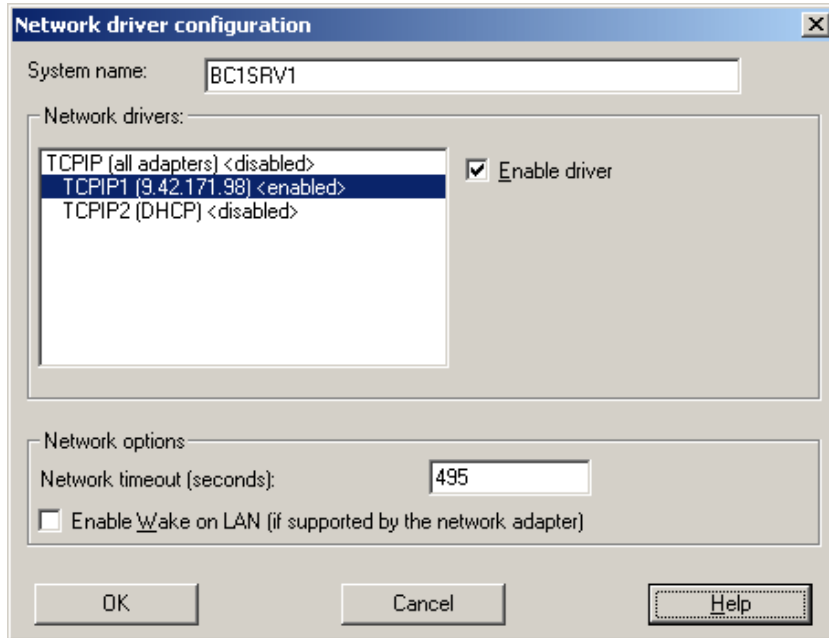
Figure 5-37   Network driver configuration window

15. Click **OK**.
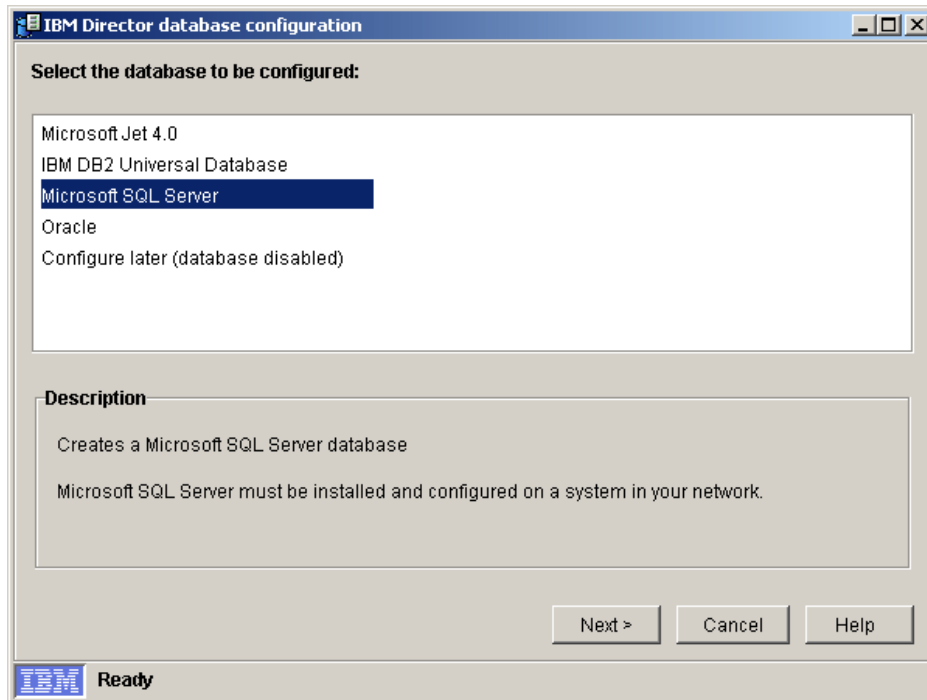
Figure 5-38   Selection of database

16. Select **Microsoft SQL Server** and click **Next**.

Ensure you have already create a database for IBM Director in SQL and created an SQL user ID (DB owner of IBM Director database in SQL Enterprise Manager) before performing the steps below.

17. Fill in ODBC name, SQL DB Name, SQL user ID, password and server name.
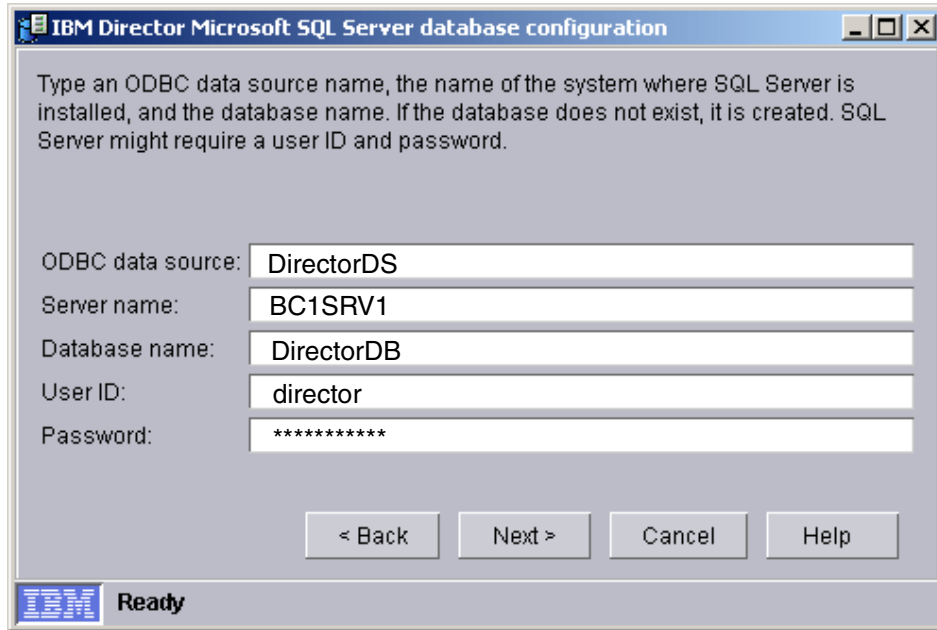
Figure 5-39   SQL Server database configuration window

18. Click **Next**.

19. Click **Finish**.

20. Click **Yes**. The server will restart.

Installation of IBM Remote Deployment Manager (RDM) 4.11

IBM RDM 4.11 is an add-on and is integrated into IBM Director. It is purchased as an optional add-on product. For our example, it is installed onto the Management Server where IBM Director was installed.

This is a manageability tool integrated with IBM Director that runs on your IBM xSeries server. This 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 IBM Remote Deployment Manager, a function in IBM Director Console, the network administrator can remotely flash a selected system's BIOS, modify CMOS settings, perform automated installation of Microsoft Windows 2003 and back up and recover the primary partition.

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

For additional information on the use of IBM Remote Deployment Manager, see 5.10.1, "IBM Remote Deployment Manager (RDM) 4.11" on page 129.

Complete the following steps:

1. Insert IBM RDM 4.11 CD into the CDROM drive where IBM Director server was installed.
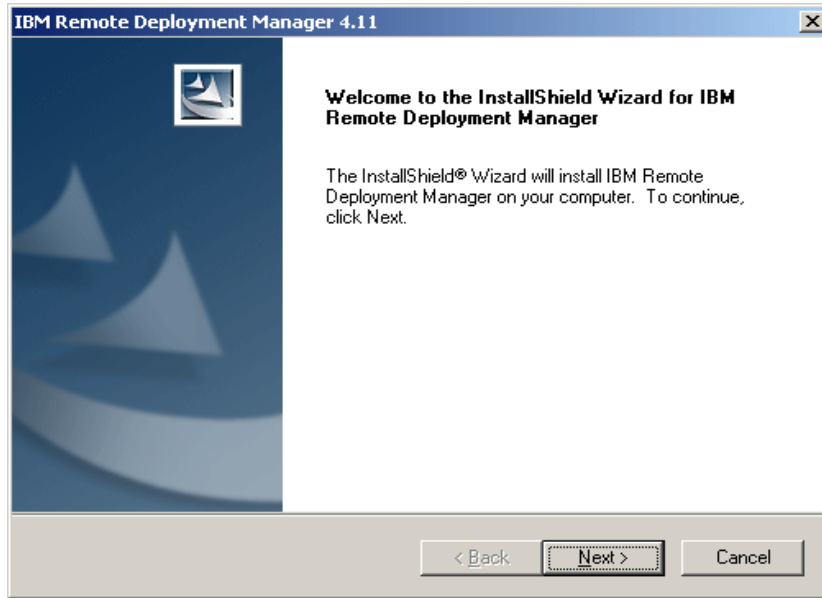
Figure 5-40   RDM InstallShield Wizard window

2. Click **Next**.

3. Read and accept the License Agreement and click **Yes**.
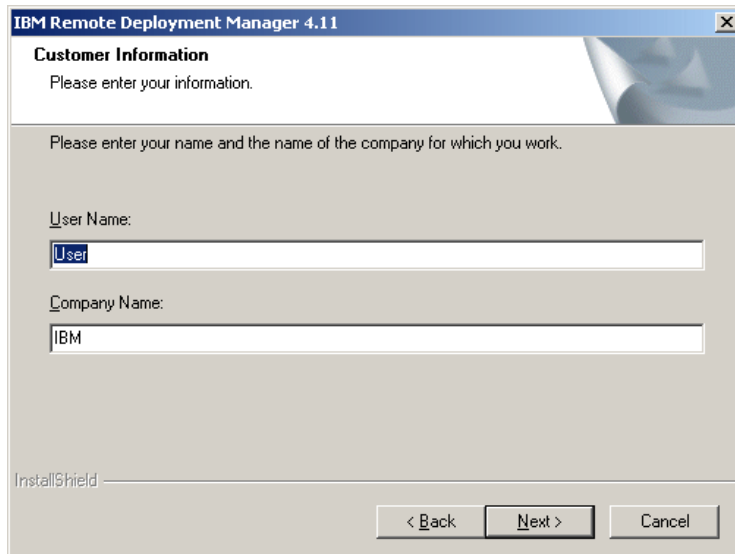
Figure 5-41   Customer Information window

4. Fill in the User Name and Company Name, then click **Next**.

5. Accept the default for the destination folder. Click **Next**.
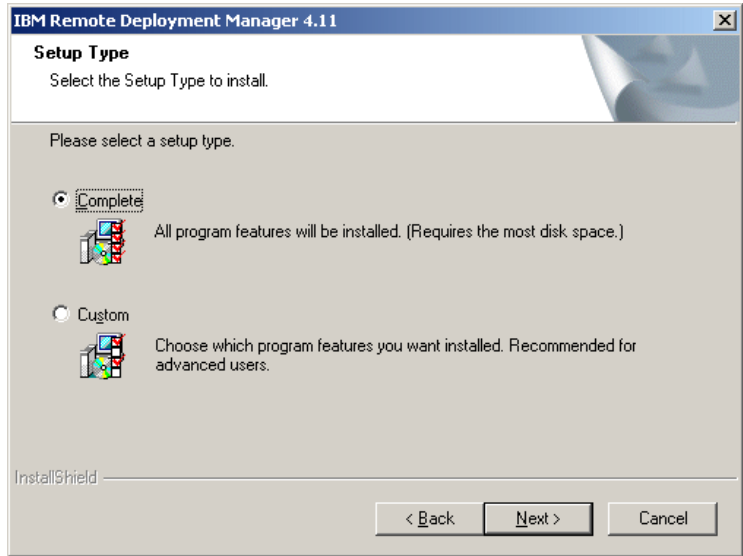
Figure 5-42   Setup Type window

6. Select **Complete** and click **Next**. You should read RDM install guide if you want to customize.

7. Setup is prepared to start copying files. Click **Next**.
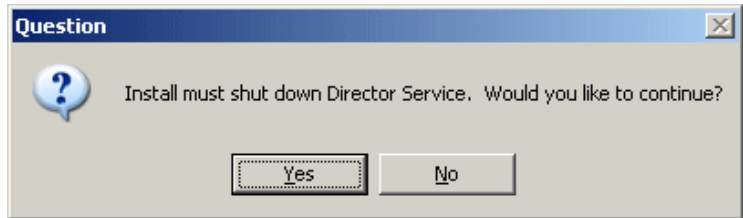
Figure 5-43   Dialog box

8. If the Director Service is running and the dialog box in Figure 5-43 appears, click **Yes** to shut down Director Service.
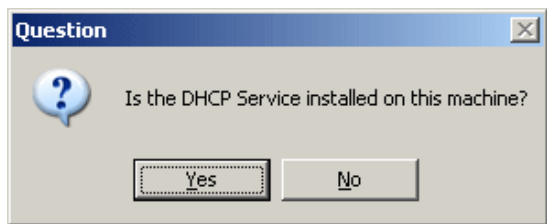
Figure 5-44   Dialog box

9. Click **No**. DHCP Service is not installed on this machine.
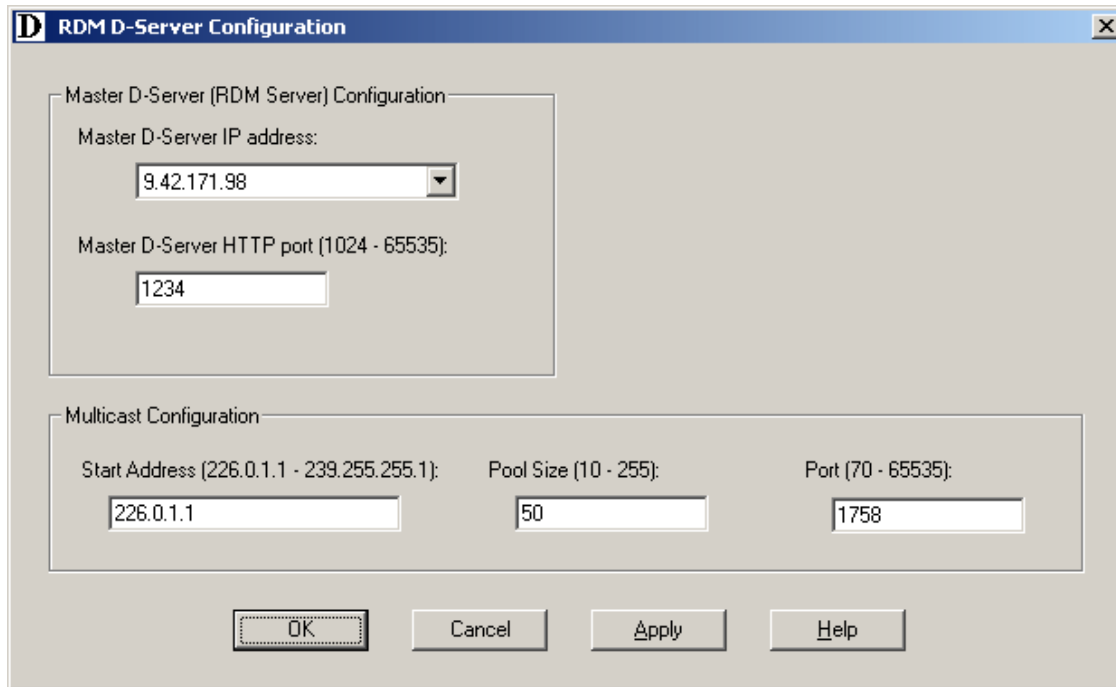
Figure 5-45   RDM D-Server Configuration window

10.For our example, we accepted the default. Click **OK**.
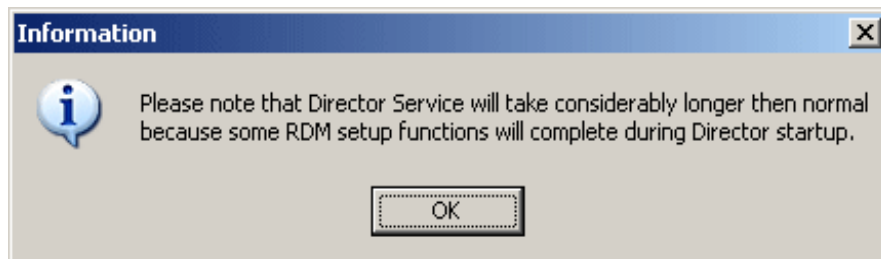
Figure 5-46   Information window

11.Click **OK**.

12.We do not want to view the readme.txt file. Click **No**.

13.Director Service starts. IBM Remote Deployment Manager installation is finished.

14.Click **Finish**.

Note: Do not reboot the server until all processes of IBM Director and RDM are finished; this is also true after the reboot.
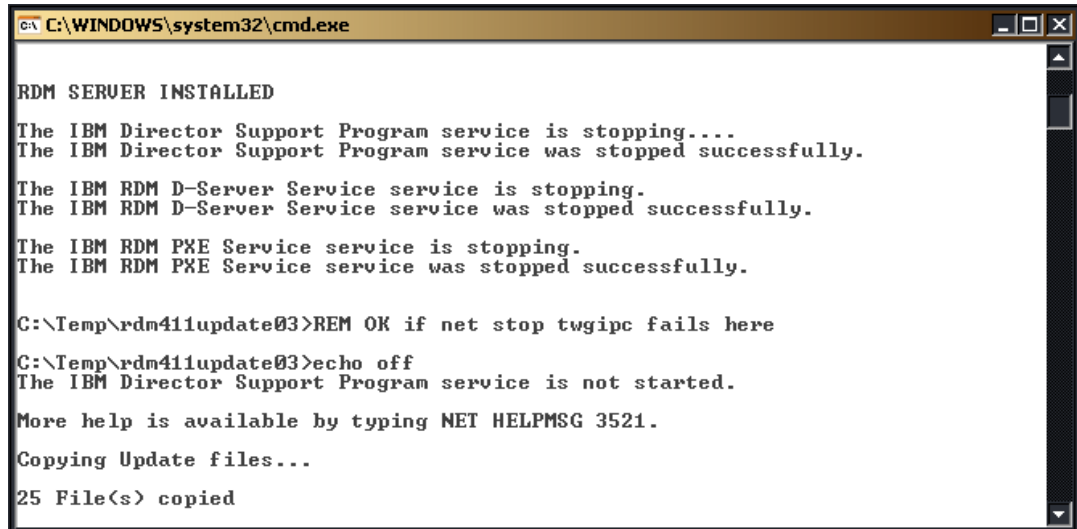
Installation of IBM Remote Deployment Manager V4.11 Update3

Download IBM RDM Update3 (rdm411update3.exe) from IBM Web site:

http://www-307.ibm.com/pc/support/site.wss/MIGR-53153.html

1. Double- click **rdm411update3.exe**.

2. Click **Next**.

3. Type in the path where you want to put the source file, for example, `c:\temp\rdm411up`, and click **Next**.

4. Execute rdm411update03_install.bat.

Figure 5-47   RDM Server response window

5. Reboot the server when you are finished.

Installation of Remote Installation Service (RIS)

In our lab environment, we set up RIS on Microsoft Windows 2003 Server. The requirements on the RIS Server are still the same with Windows 2000: 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.

To create a RIS installation image of Windows Server 2003, perform the following steps:

1. Copy the information from the installation directory on the CD-ROM onto the RIS-server using directory e:\images\w2003ent\i386.

2. Install the Remote Installation Service:

   a. Click **Start -> Settings -> Control Panel**.

   b. Click **Add/Remove Programs**.

   c. Click **Add/Remove Windows Components**. You will see a window similar to Figure 5-48 on page 89.
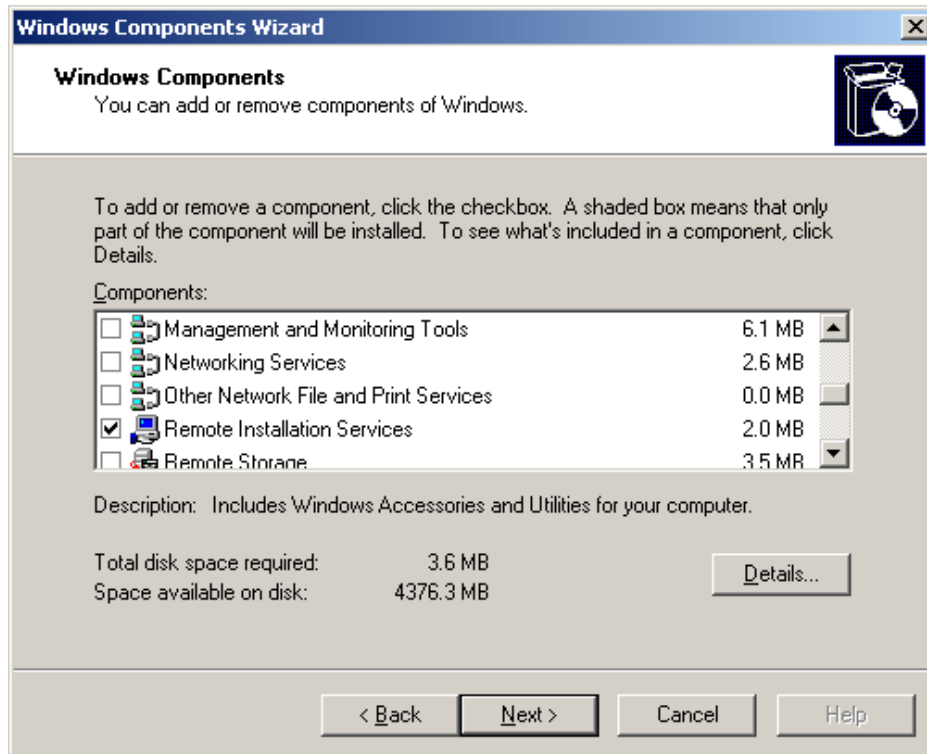
Figure 5-48   Windows Components window

    d. Scroll down to Remote Installation Services.

    e. Select **Remote Installation Services**.

    f. Click **Next**.

    g. Click **Finish**.

    h. Restart the server.

3. At the Windows desktop, click **Start -> Run**. Run RISETUP to create an installable image of the operating system. RISETUP is located in C:\Windows\System32\.
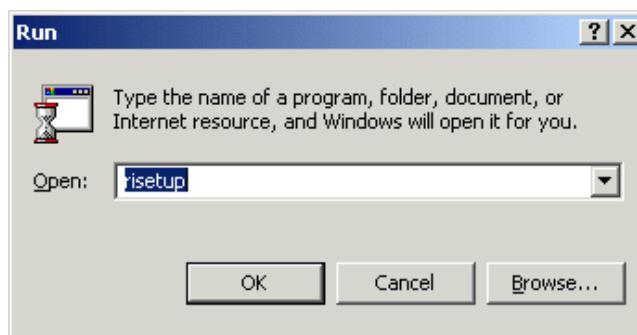
Figure 5-49   Starting Remote installation setup

4. Click **OK**.

5. Click **Next**.

6. Choose a folder for the RIS installation. It must be a NTFS volume and cannot be the system drive. For example, e:\remoteinstall.
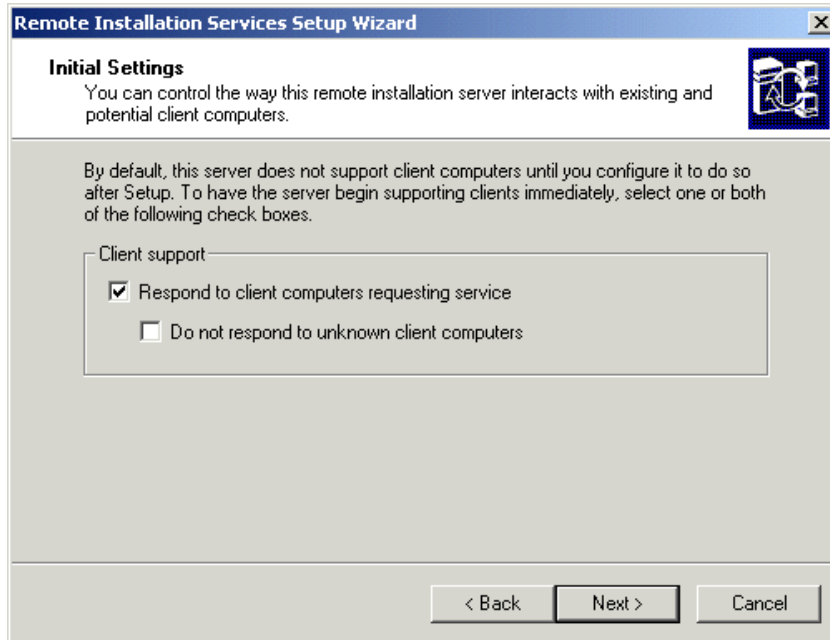
Figure 5-50   Settings for RIS-installation

7. Select **Respond to client computers requesting service** and click **Next**.

8. Enter the directory where the i386 directory resides: e:\images\w2003ent\i386.

9. Enter an appropriate name for the installation, for example, w2003.ent.

10. Click **Next**.

11. Type a friendly description and help text for this installation image.
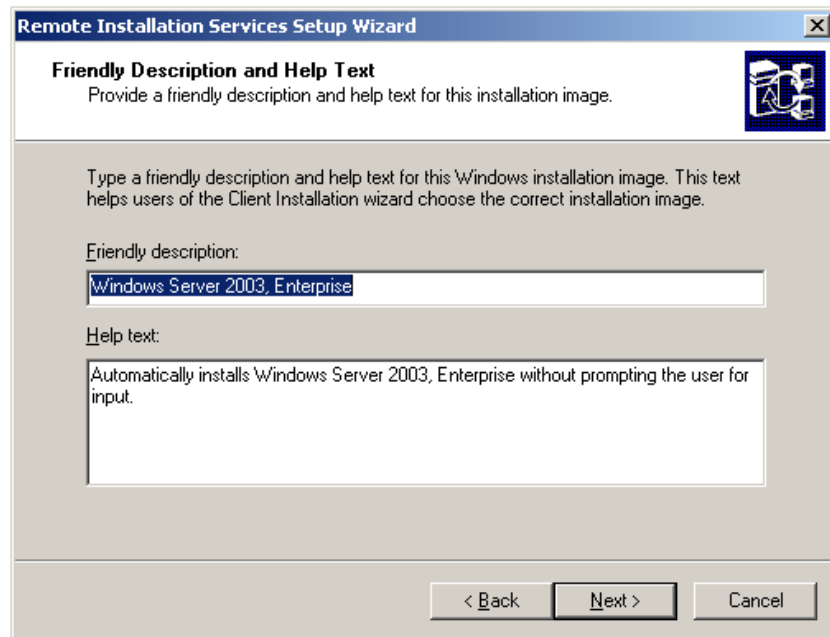
Figure 5-51   Friendly Description and Help Text window

12. Click **Next -> Finish**.

13. Wait for the installation to complete and click **Done**.

14. Start a command prompt and restart the RIS-server:
   – `net stop binlsvc`
   – `net start binlsvc`

Example 5-1   Restarting the RIS service

```
Microsoft Window 2003 [Version 5.2.3790]
<C> Copyright 1985-2003 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:\>
```

15. 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 5-2   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
```

16. Press **12**, then press **Enter** to continue.

17. Choose the operating system you want to have transferred to the server, if several RIS images have been created.

18. Enter the information about User ID/Password/Domain, press **Enter** to continue.

19. A warning will be displayed indicating that you are about to delete everything on drive 1. Press **Enter** to continue.

20. The window will display the computer account, Global Unique ID and Server supporting this computer. If everything looks correct, press **Enter** to continue.

5.8 Deploying Citrix MetaFrame Presentation Server

The following describes the implementation we followed to deploy Citrix MetaFrame Presentation Server to blade servers within the IBM @server BladeCenter.

5.8.1 Additional OS installation requirements for Citrix MetaFrame

► Install Microsoft SNMP services
► Install the necessary Microsoft hotfix for Microsoft Windows 2003. For example, Microsoft KnowledgeBase 824141 - MS03-45 patch.

With the RIS deployment of Windows 2003, we did not deploy Terminal Servers, the following steps outline the deployment of Terminal Services.

1. Log on to the server with local administrator rights. Click **Start -> Manage Your Server**. You will see a window similar to Figure 5-52**.**

Figure 5-52   Manage Your Server window

2. Click **Add or remove a role**.
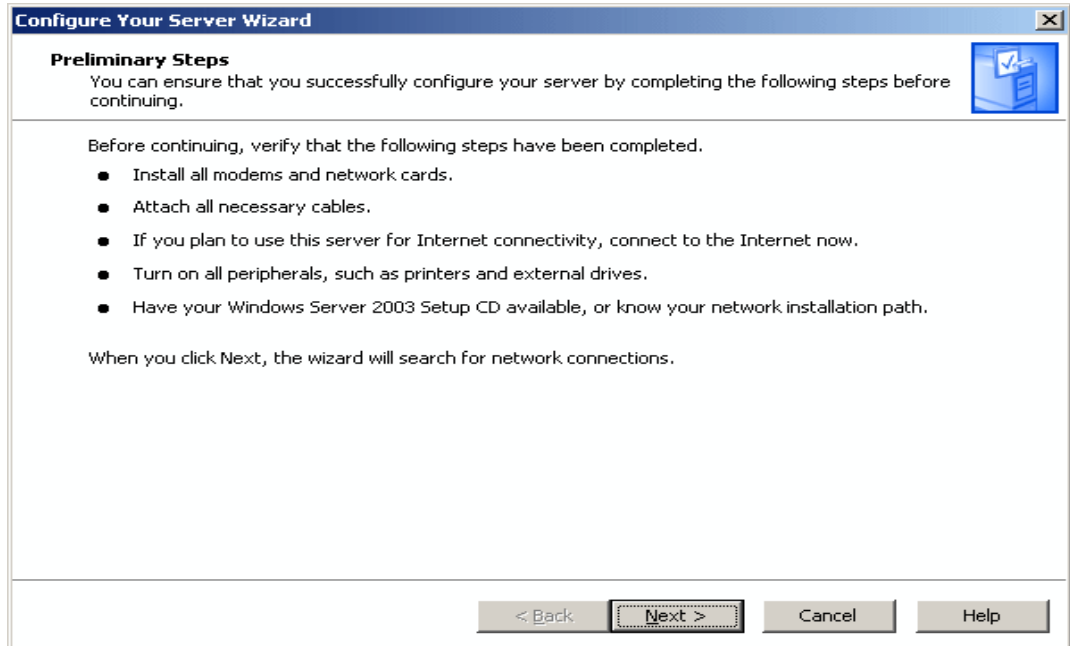
Figure 5-53   Configure Your Server Wizard - Preliminary Steps window
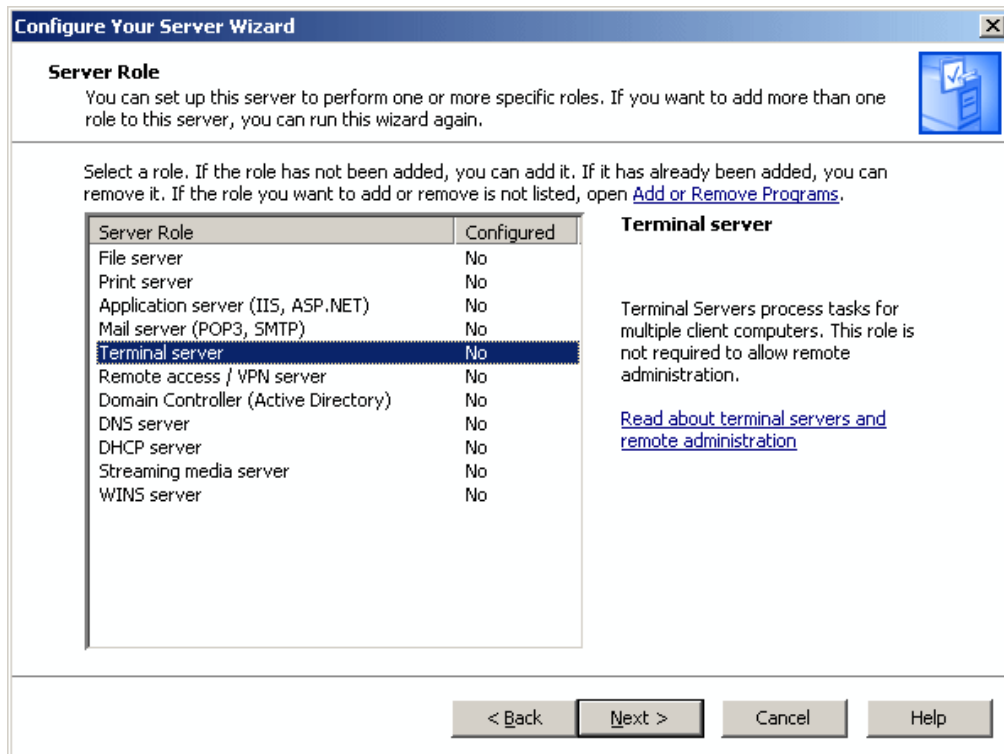
3. Click **Next**.

Figure 5-54   Server Role window

4. Select **Terminal Server** then click **Next**.

5. At the Summary of Selections window, view and confirm the options you have selected. Click **Next**.

6. Click **OK**.

7. The system will reboot after the installation process is finished.
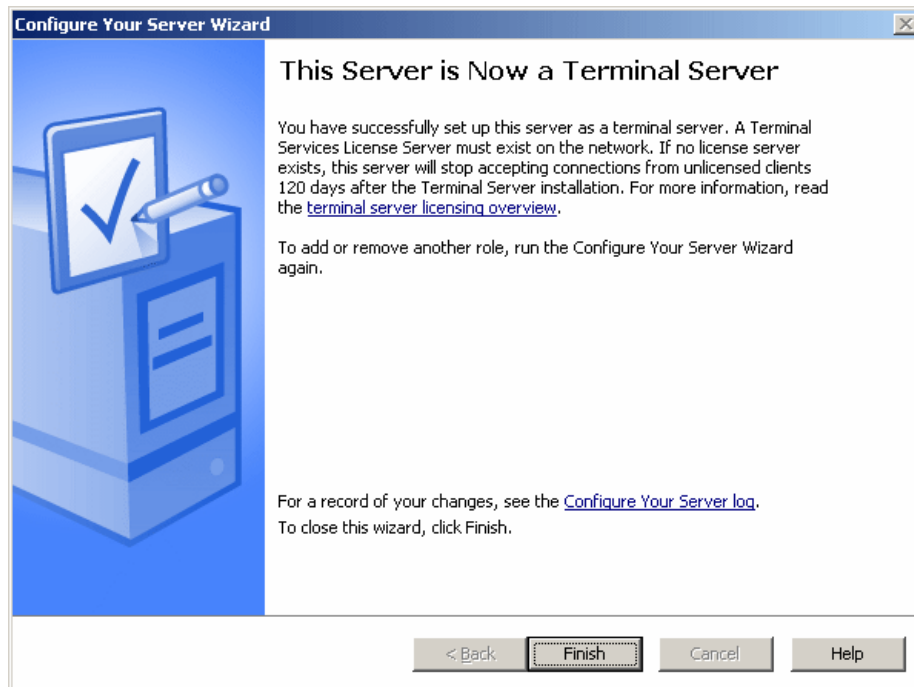
Figure 5-55   Terminal Server installed

8. After the server reboots and you log on to the server, the *This Server is Now a Terminal Server* window is displayed; click **Finish**.

5.8.2 Recovery console installation

Follow the steps below to install the recovery console on the Citrix servers to aid in troubleshooting (for example, in the event that your operating system is unable to boot up due to the installation of device drivers or corrupt drivers, the recovery console is a very helpful tool):

1. Insert the Windows Server 2003 CD into the CD-ROM drive.

2. From the Start menu, click **Start -> Run**. Type `CMD` and click **OK**.

3. Change to the CD-ROM drive and type `\i386\winnt32.exe /cmdcons`.
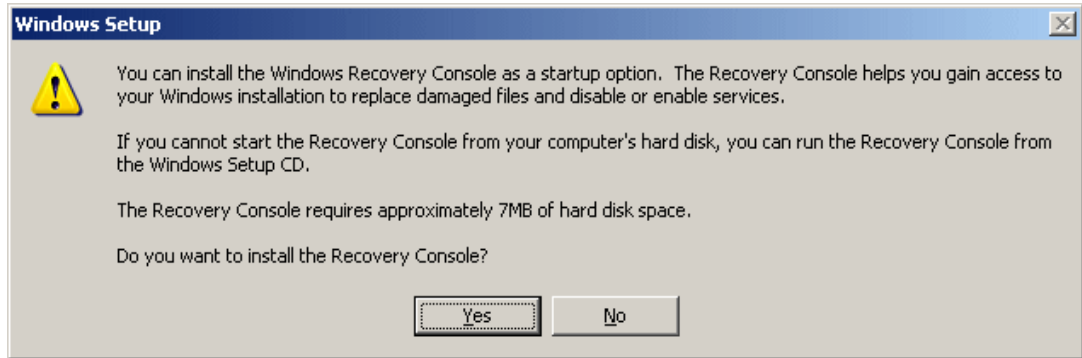
Figure 5-56   Recovery Console setup

4. Click **Yes** to install the Recovery Console from the Windows 2003 Setup window.
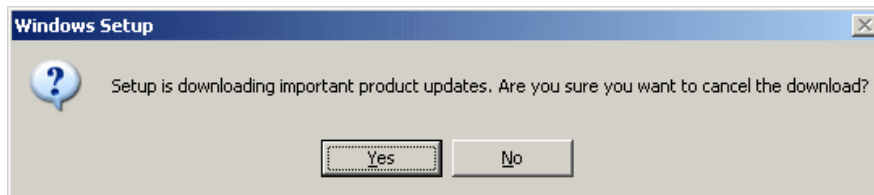
Figure 5-57   Windows Setup window

5. Click **Yes**.
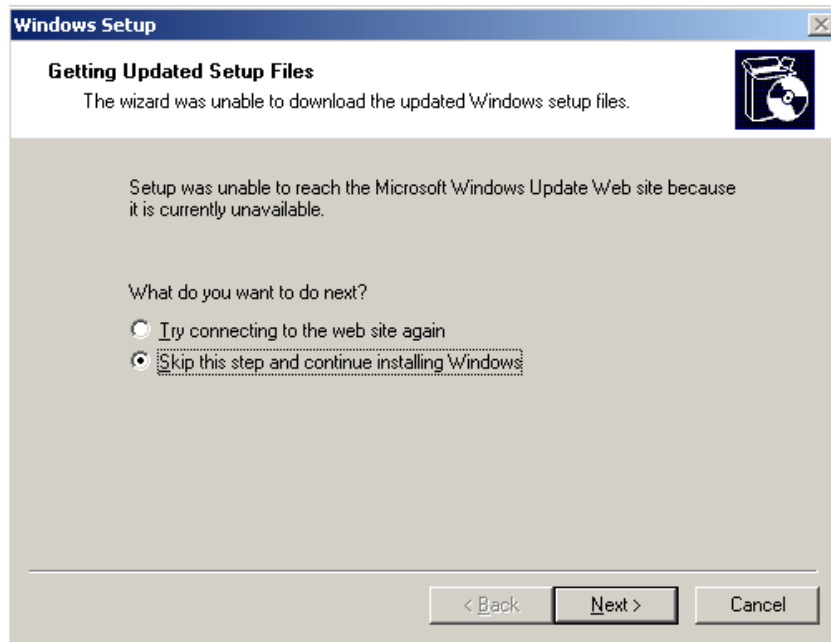
Figure 5-58   Getting Updated Setup Files window

6. Click **Skip this step and continue installing Windows**, then click **Next**.
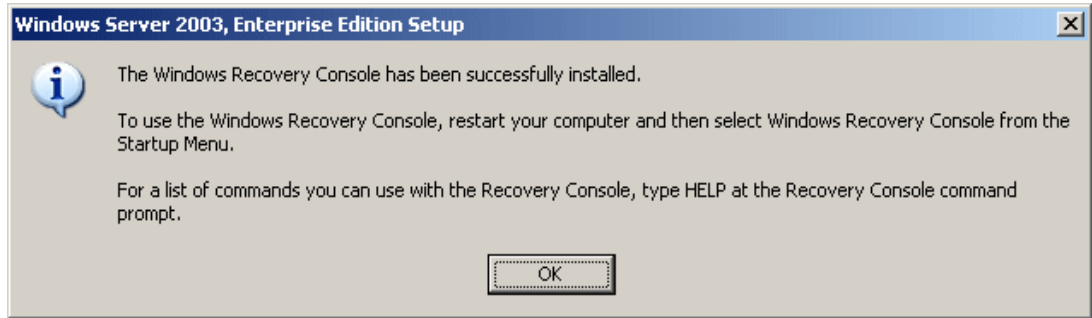
Figure 5-59   Windows Recovery Console Setup window

7. Click **OK**. Reboot the server.

The recovery console has been inserted into the boot.ini file and will appear as a choice during startup.

Running ChkRoot

ChkRoot is used when we map a user home directory as a root drive. It is useful because most applications are not written for multi-users environment.

Follow the steps below to install ChkRoot on the Citrix MetaFrame servers:

1. Run the ChkRoot.bat from the C:\WINNT\Application Compatibility Scripts directory.

2. Enter `W:` and save the document. This creates a drive mapping to each user's home directory.
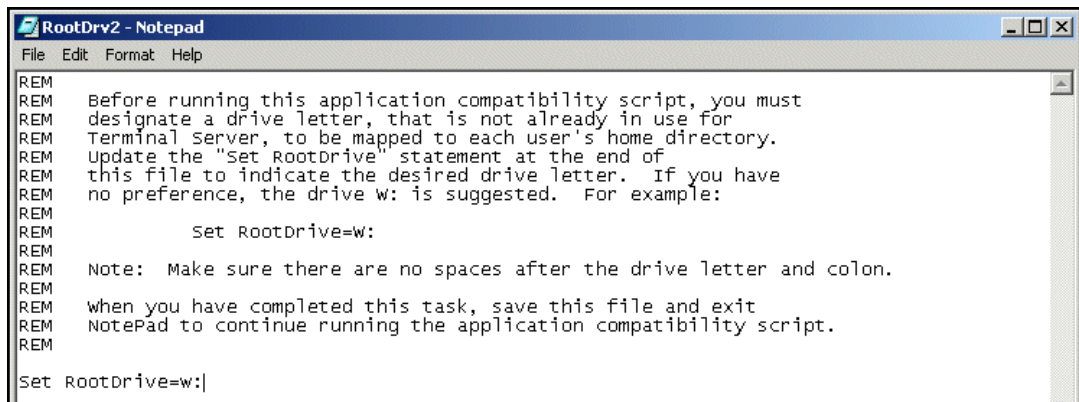
Figure 5-60   ChkRoot.bat to create a personnel drive

ASP.NET

When installing ASP.NET, IIS will automatically be installed. Install ASP.NET if you want to install MetaFrame Web Interface for users using a Web browser or Program Neighborhood Agent.

To install ASP.NET, complete the following steps.

1. Click **Start -> Control Panel -> Add/Remove Programs -> Add/Remove Windows Components**.
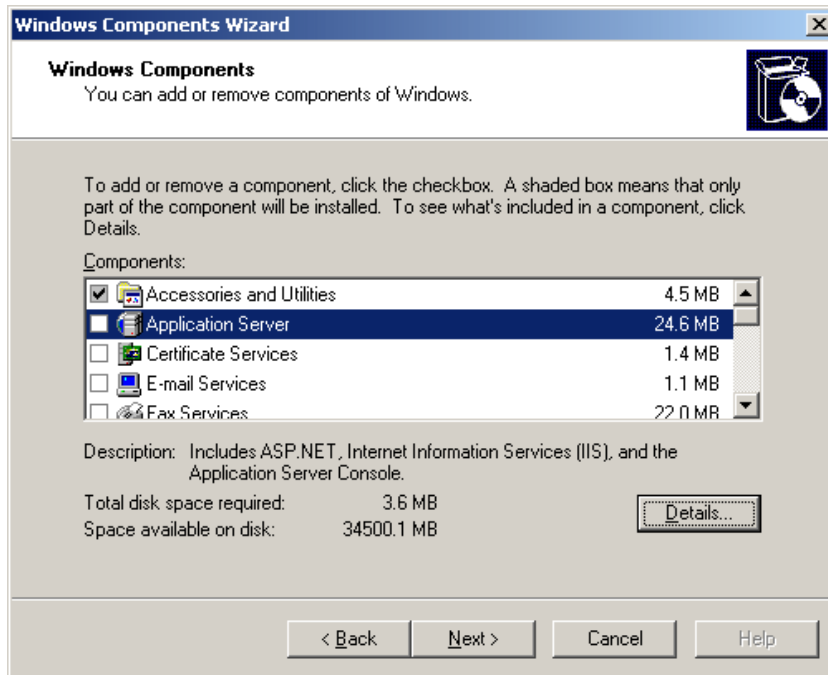
Figure 5-61   Windows Components window
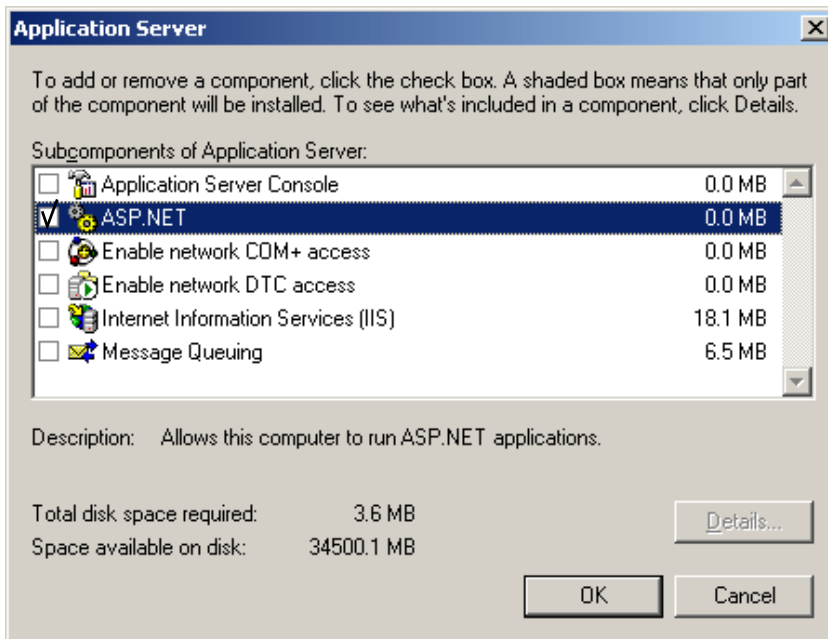
Figure 5-62   Subcomponents of Application Server window

2. Place a mark in the checkbox ASP.NET and click **OK**.
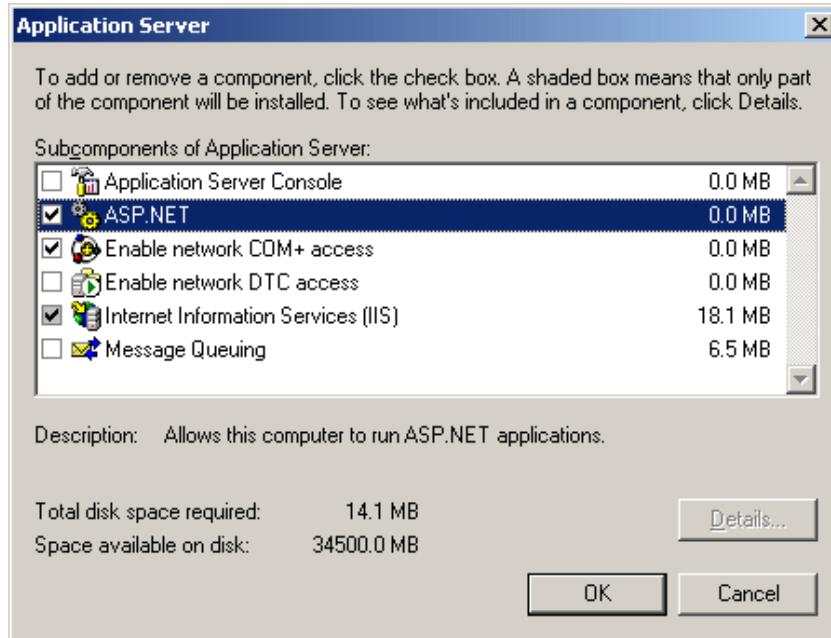
Figure 5-63   Application Server window

Internet Information Server IIS

IIS has to be installed on Citrix MetaFrame Licensing server when License Management Console is installed.

If IIS is not installed, License Management Console cannot install. You cannot generate licensing reports without using the License Management Console.

The License Management Console, however, can still be managed by using command-line tools known as the License Administration Commands.

To install IIS, complete the following steps

1. **Click Start -> Manage Your Server**.

Figure 5-64   Manage Your Server window

2. Click **Add or remove a Role**.
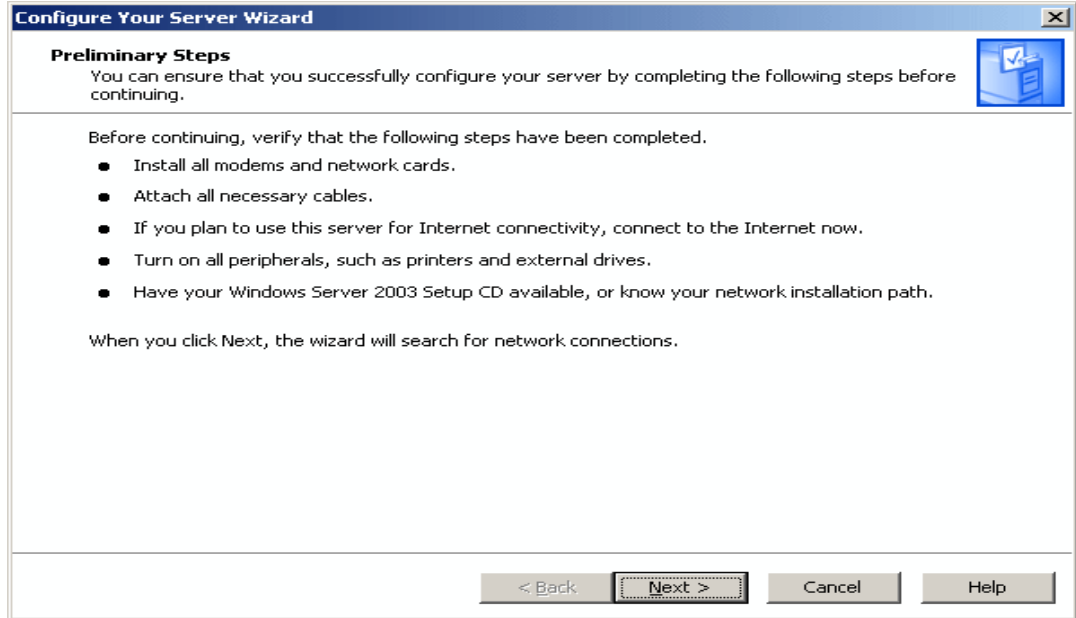
Figure 5-65   Preliminary Steps window
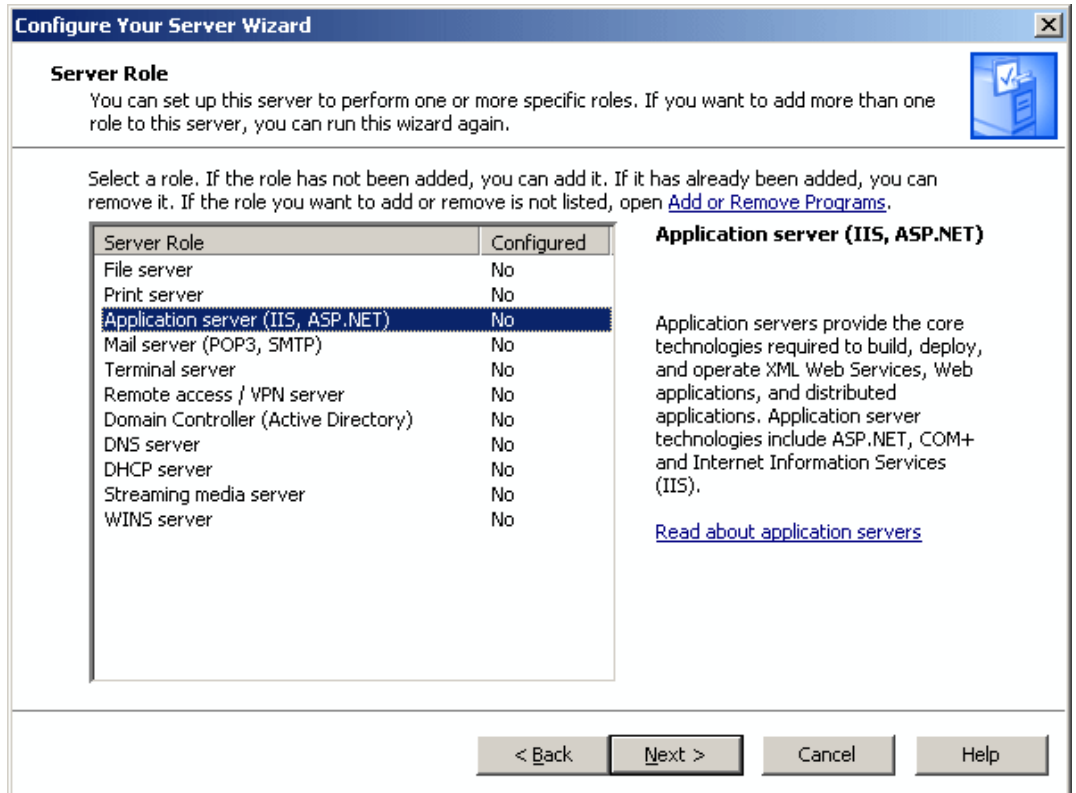
3. Click **Next**.

Figure 5-66   Server Role window

4. Click **Application Server**. Click **Next**.
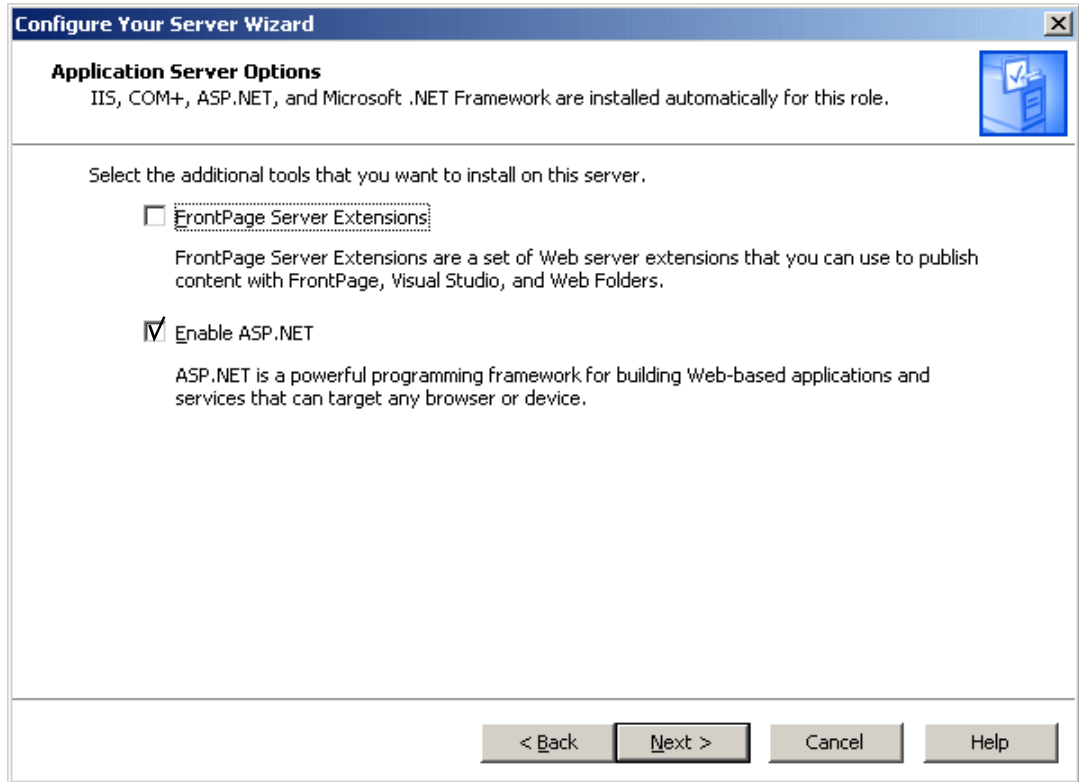
Figure 5-67   Application Server Options window

5. In our lab scenario, for blade server 5, which is the Citrix Licensing Server, we mark the checkbox **Enable ASP.NET** and click **Next**.

> **Note:** *Enable ASP.NET by default* is unchecked when you install IIS.

6. In the Summary of Selections windows, view and confirm the options you have selected. For our example:

   – Install Internet Information Services (IIS)
   – Enable COM+ for remote transactions
   – Enable Microsoft Distributed Transaction Coordinator (DTC) for remote access

   Click **Next**.

7. The selected role is added to the server. A progress window appears illustrating install and configuration changes.
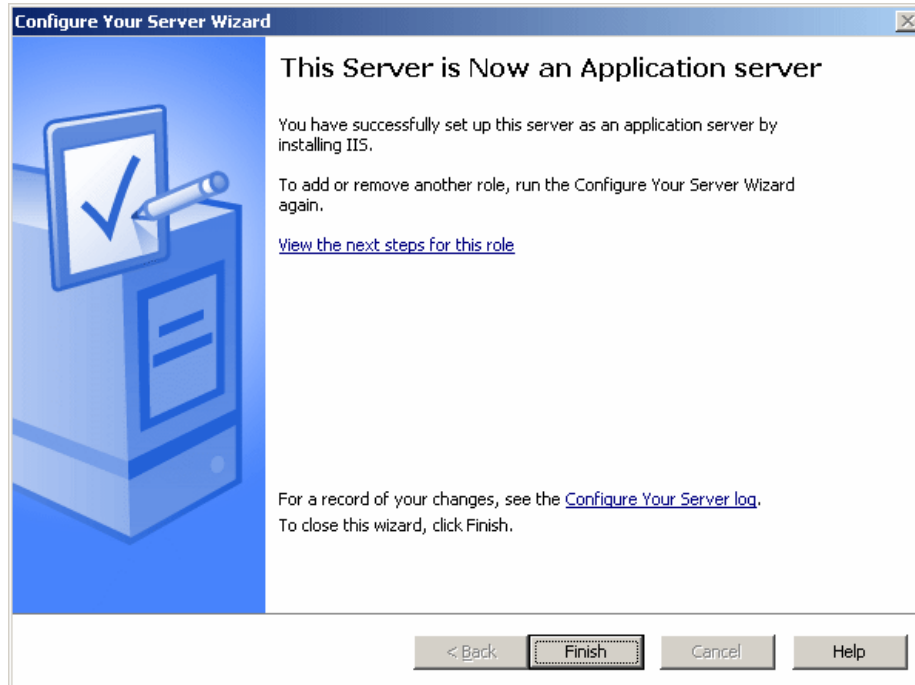
Figure 5-68   Configure Your Server Wizard window

8. Click **Finish**.

5.9 Citrix MetaFrame Presentation Server

In this section, we will be installing:

► Citrix Licensing Server
► Citrix MetaFrame Presentation Server
► MetaFrame Access Suite Console
► Presentation Server Console
► Document Center

5.9.1 Installation of Citrix Licensing Server

Below are the steps we followed to install Citrix Licensing Server to BC1SRV5.

1. Insert the Citrix MetaFrame Presentation Server 3.0 CD into CD-ROM drive.

2. If the Autorun.exe does not execute, browse the CD-ROM and execute autorun.exe. You will see a window similar to Figure 5-69 on page 102.
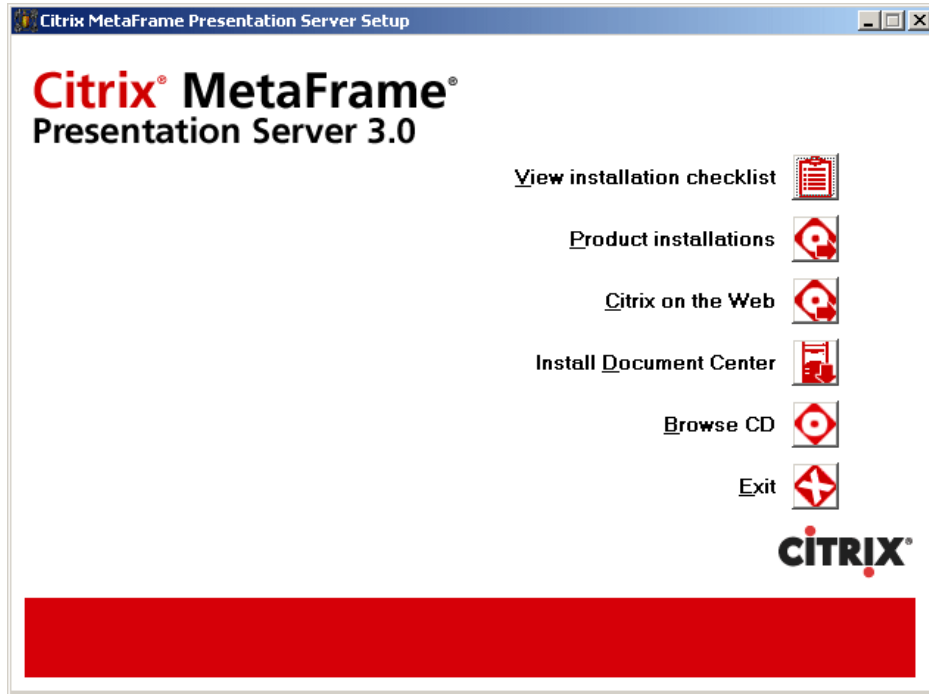
Figure 5-69   Citrix MetaFrame Presentation Server Setup window

3. Click **Product installations**.
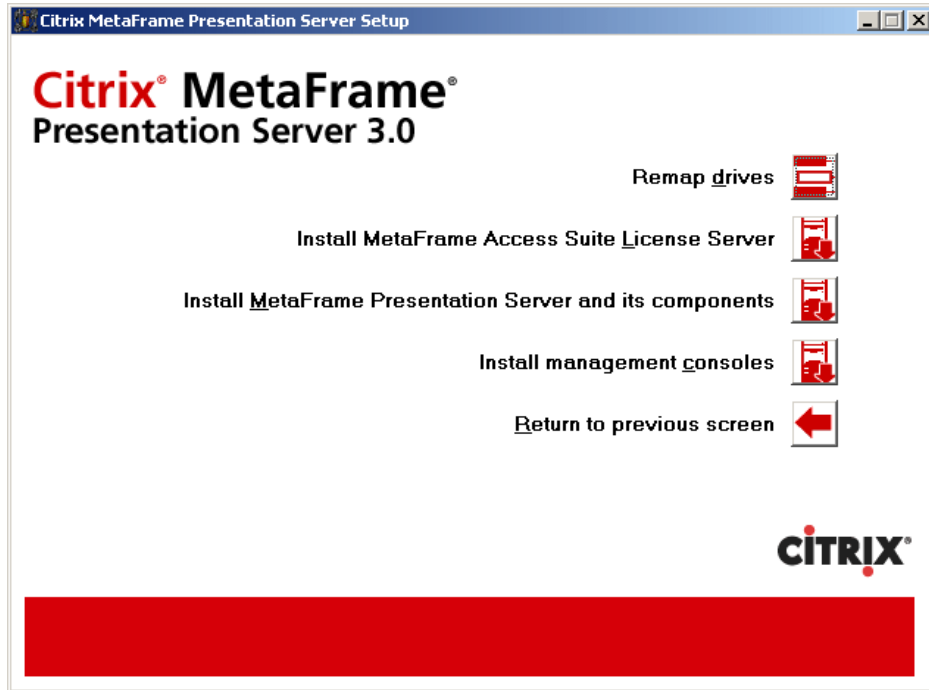
Figure 5-70   Citrix MetaFrame Presentation Server Setup window

4. Click **Install MetaFrame Access Suite License Server**.

5. Read and accept the License Agreement. Click **Next**.
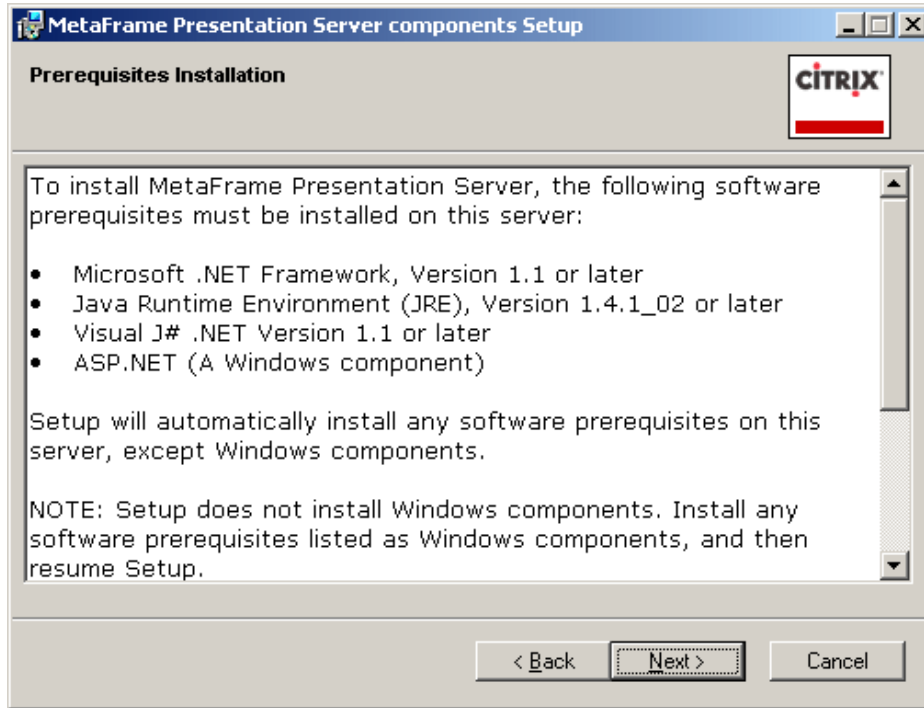
Figure 5-71   Prerequisites Installation window

6. ASP.NET is required only if MetaFrame Web Interface needs to be installed and the client are using their Web browser and or Program Neighborhood agent.

    In our example, we have a mix of MetaFrame Presentation Server running with or without ASP.NET. Click **Next**.
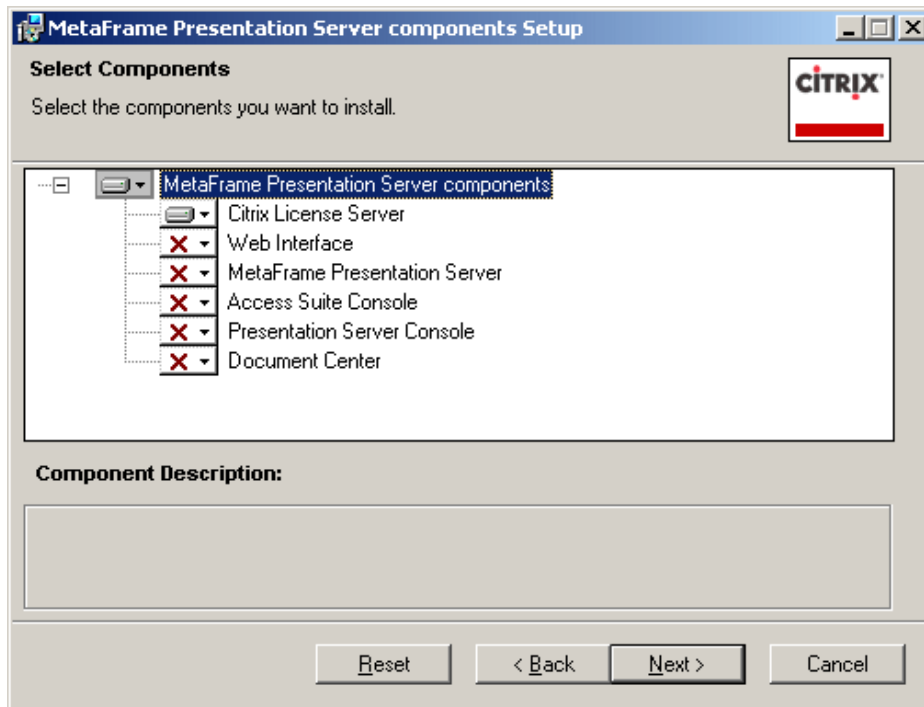
Figure 5-72   Select Components window

7. In Figure 5-72 on page 103, only the Citrix License Server is selected. Click **Next**.
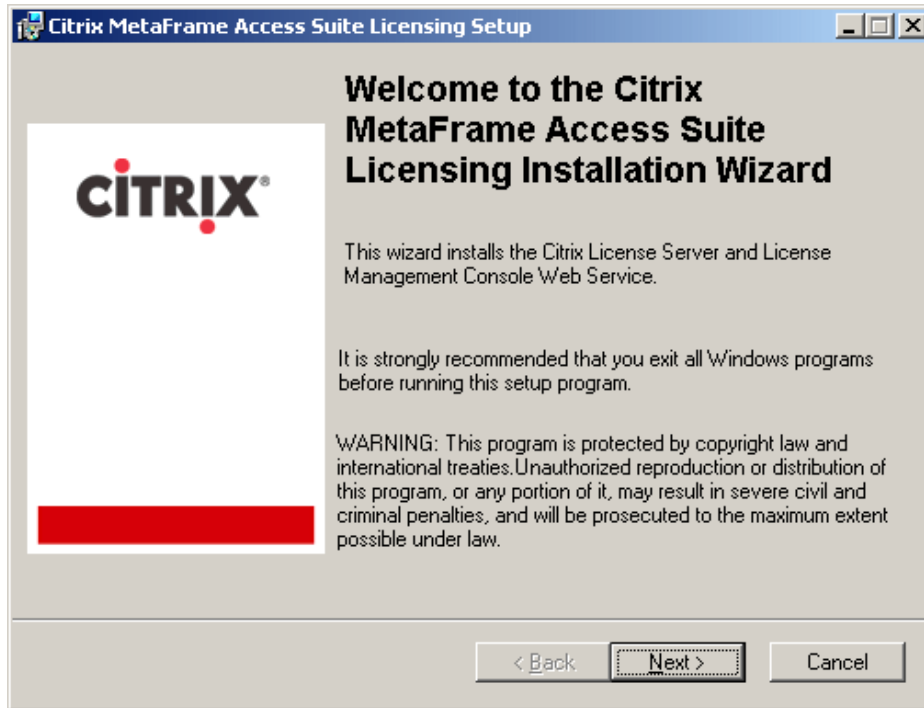
Figure 5-73   Citrix MetaFrame Access Suite Licensing Installation Wizard window

8. Click **Next**.

9. Read and accept the License Agreement. Click **Next**.

10. Accept the default Destination Folder. Click **Next**.
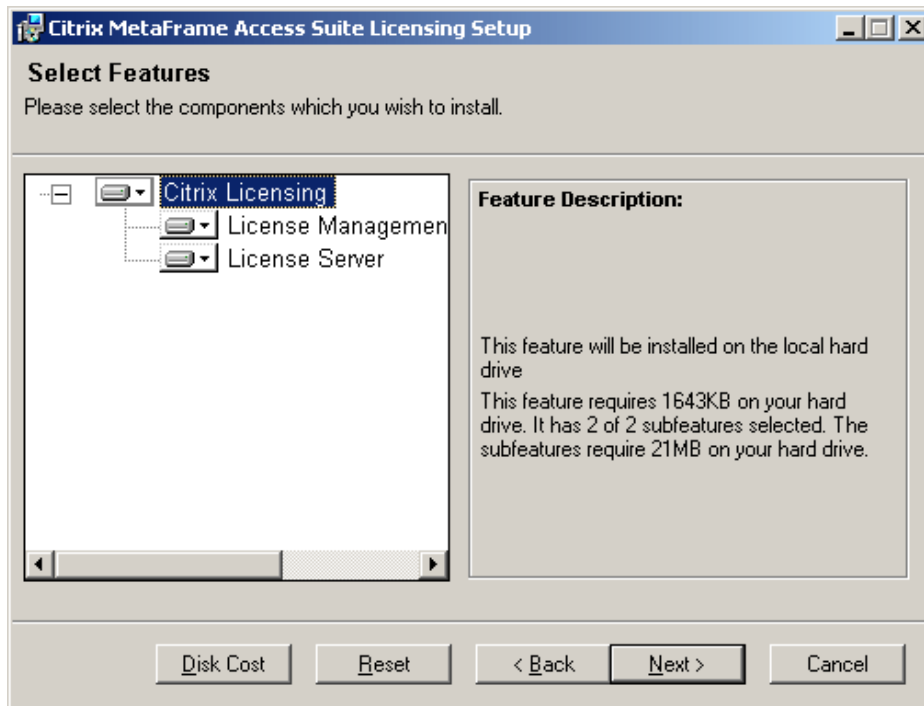
Figure 5-74   Select Features window

11. Click **Next**. In our example for the License Server, we have IIS and ASP.NET enabled.

Figure 5-75   License Files Location window

12. In our example, we accept the default path. Click **Next**.

Figure 5-76   Restart IIS Web Server service window

13. It is all right to restart IIS. Click **Next**.

14. The application is ready to be installed. Click **Next**.

15. Citrix MetaFrame Access Suite Licensing has been successfully installed. Click **Finish**.
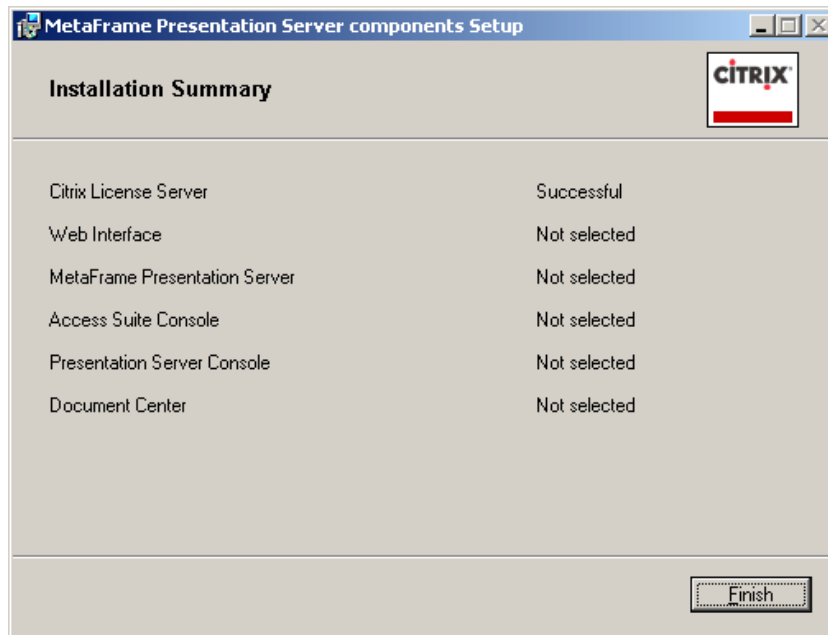
Figure 5-77   Installation Summary window

16. Click **Finish**.

5.9.2 Installation of Citrix MetaFrame Presentation Server 3.0

Below are the steps we followed to install Citrix MetaFrame Presentation Server 3.0 to BC1SRV3.

1. Insert the Citrix MetaFrame Presentation Server 3.0 CD into the CD-ROM drive.

2. If the Autorun.exe does not execute, then browse the CD-ROM and execute autorun.exe. You will see a window similar to Figure 5-78 on page 107.
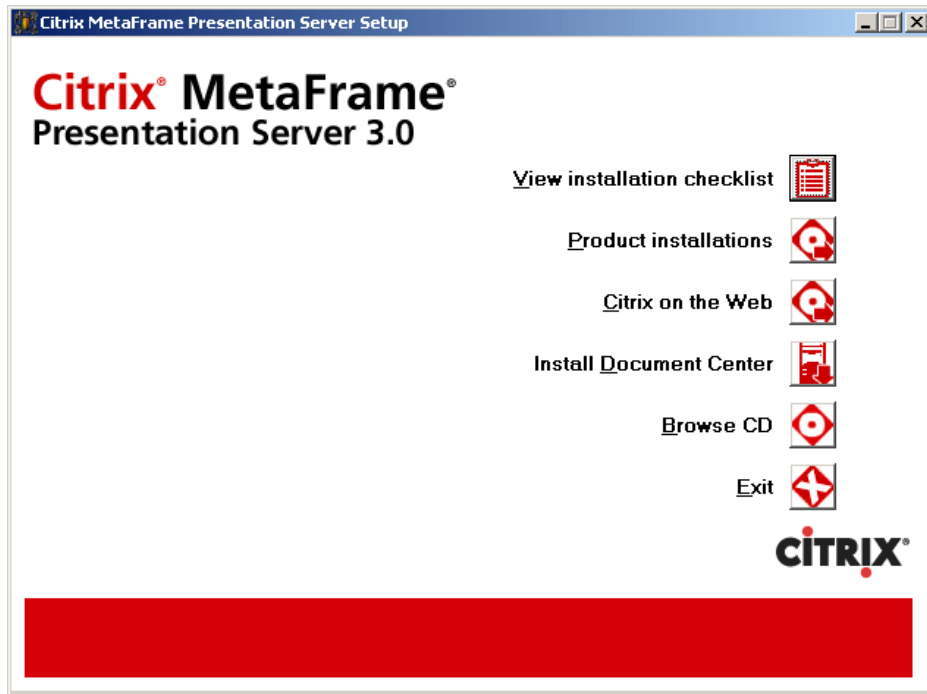
Figure 5-78   Presentation Server 3.0 window

3. Click **Product installations**.
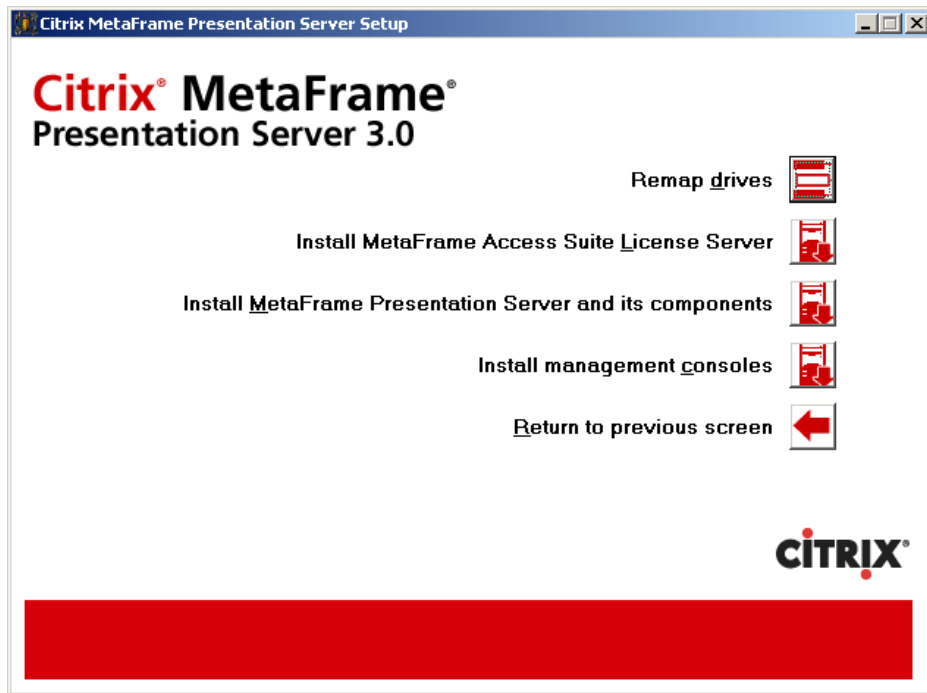
Figure 5-79   Presentation Server 3.0 window

4. Click **Install MetaFrame Presentation Server and its components**.
5. Read and accept the License Agreement. Click **Next**.
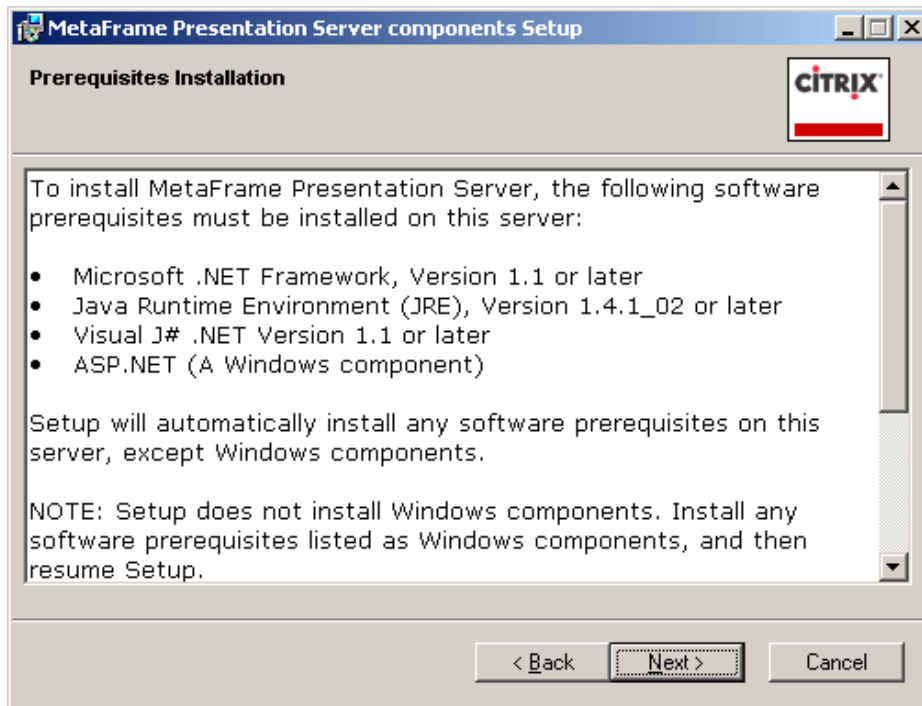
Figure 5-80   Prerequisites Installation window

6. ASP.NET is required only if MetaFrame Web Interface needs to be installed and the clients are using their Web browser and or Program Neighborhood agent.

   In our example, we have a mix of MetaFrame Presentation Server running with or without ASP.NET. Click **Next**.
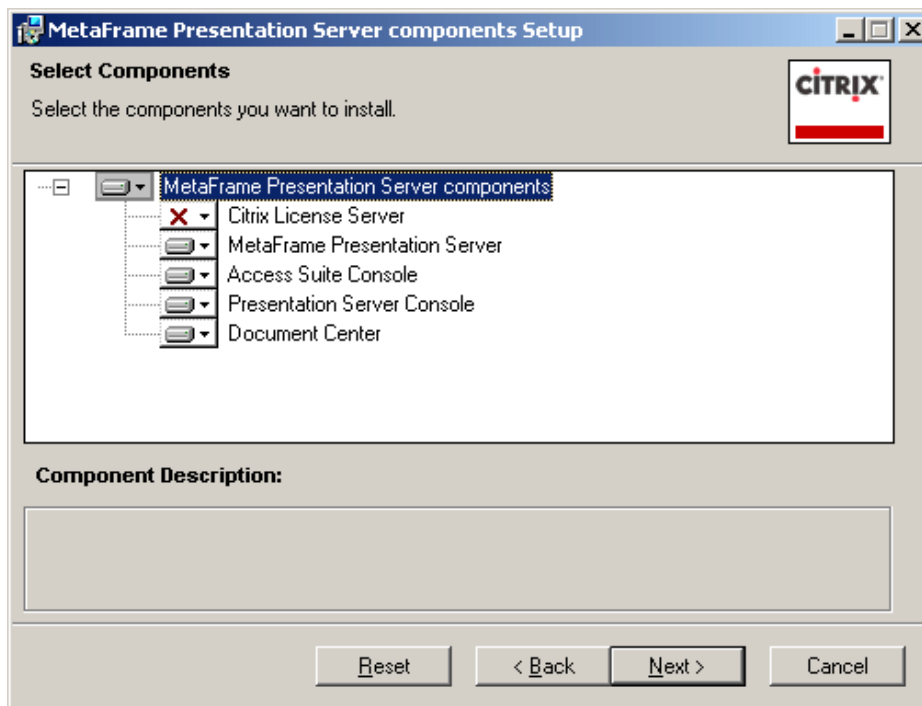
Figure 5-81   Select Components window

7. In our example, we accept the default selection. Click **Next**.
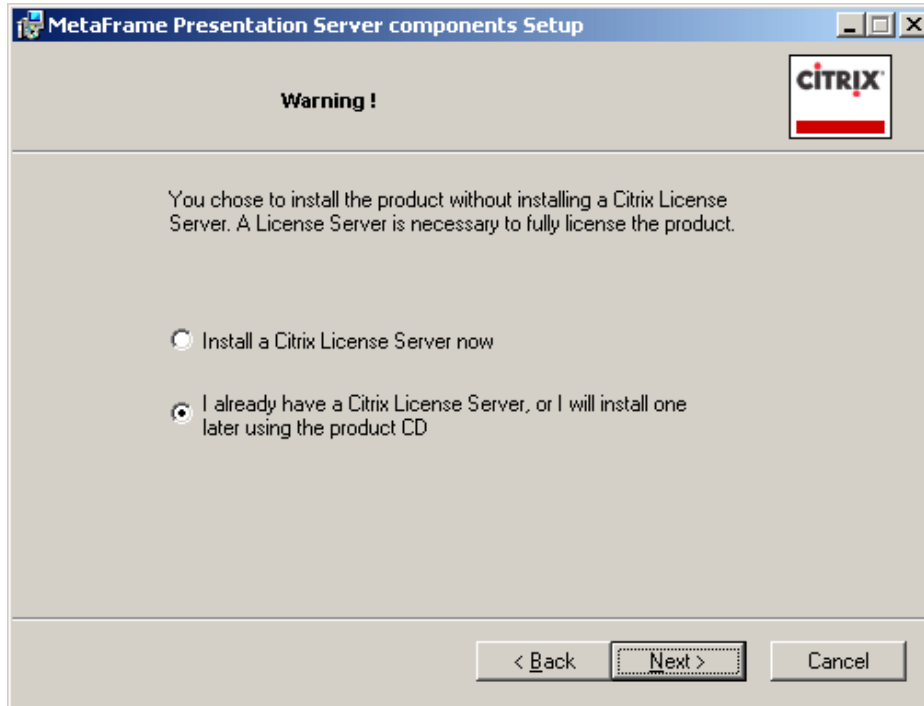
Figure 5-82   Warning window

8. Click **I already have a Citrix License Server, or I will install one later using the product CD**. Click **Next**.

Figure 5-83   Citrix MetaFrame Presentation Server for Windows Setup window

9. Click **Next**.

10. Read and accept the License Agreement. Click **Next**.
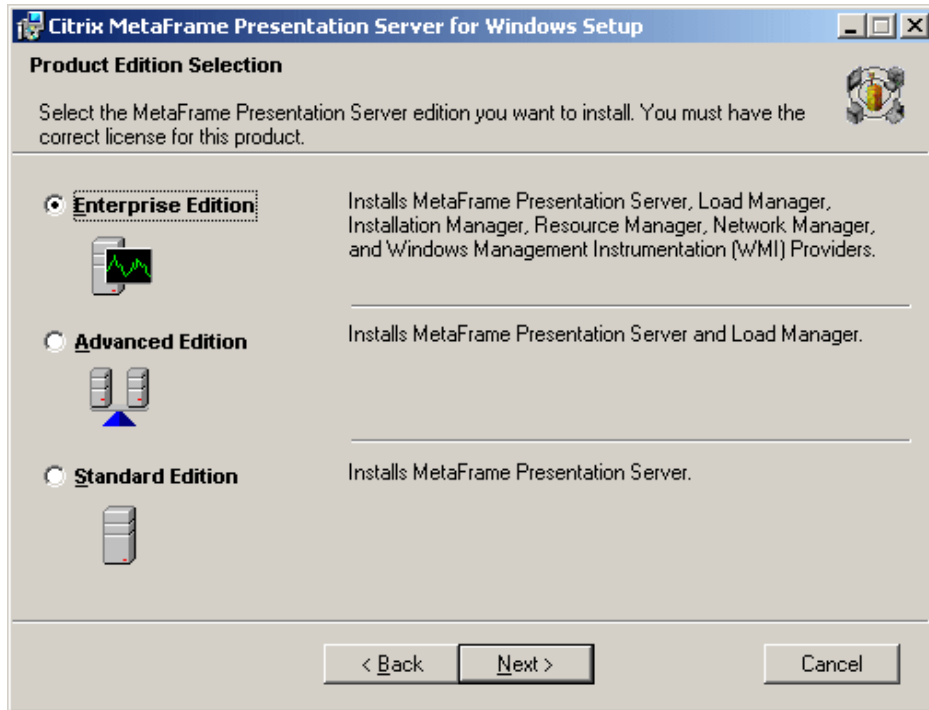
Figure 5-84   Product Edition Selection window

11. In our example, we used Enterprise Edition. Click **Next** to continue.
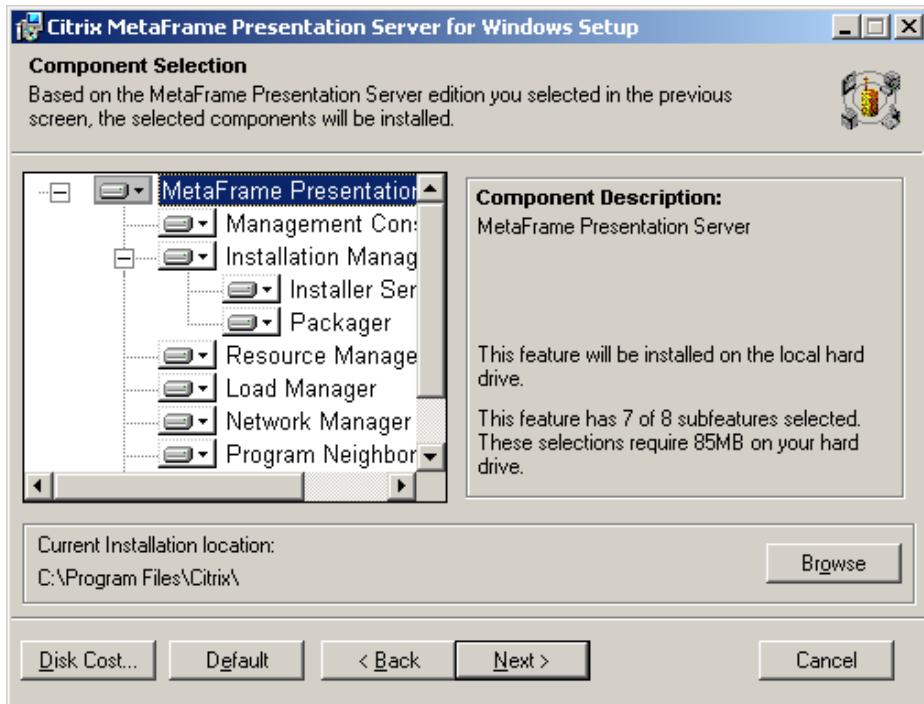
Figure 5-85   Component Selection window

12. Accept the defaults and click **Next**.
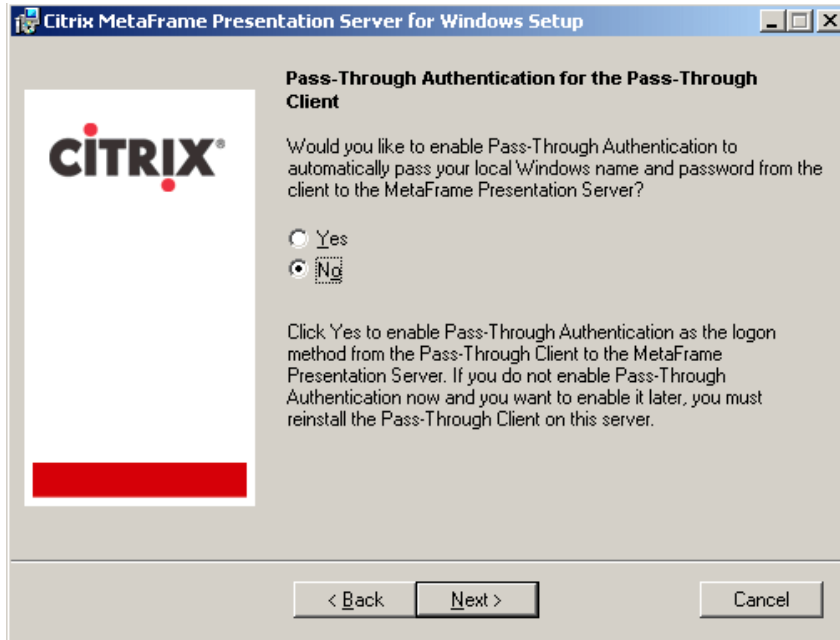
Figure 5-86   Pass-Through Authentication for the Pass-Through Client window

13. In our lab scenario, we have a mixture of MetaFrame servers that had enabled Pass-Through Authentication. For BC1SRV3, in this installation, we click **No** and click **Next**. Please evaluate your applications needs, Citrix server role and company security requirements to determine whether or not you want to enable Pass-Through Authentication.
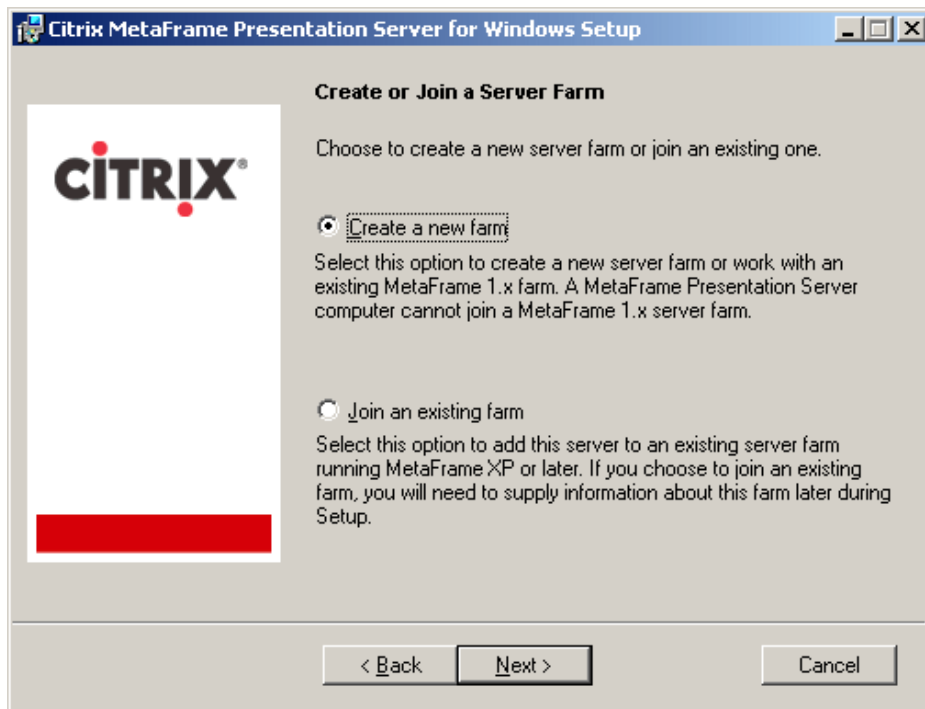
Figure 5-87   Create of Join a Server farm window

14. In our example, this is our first server in the Citrix farm. Click **Create a new farm and** click **Next**. You will see a window similar to Figure 5-88.
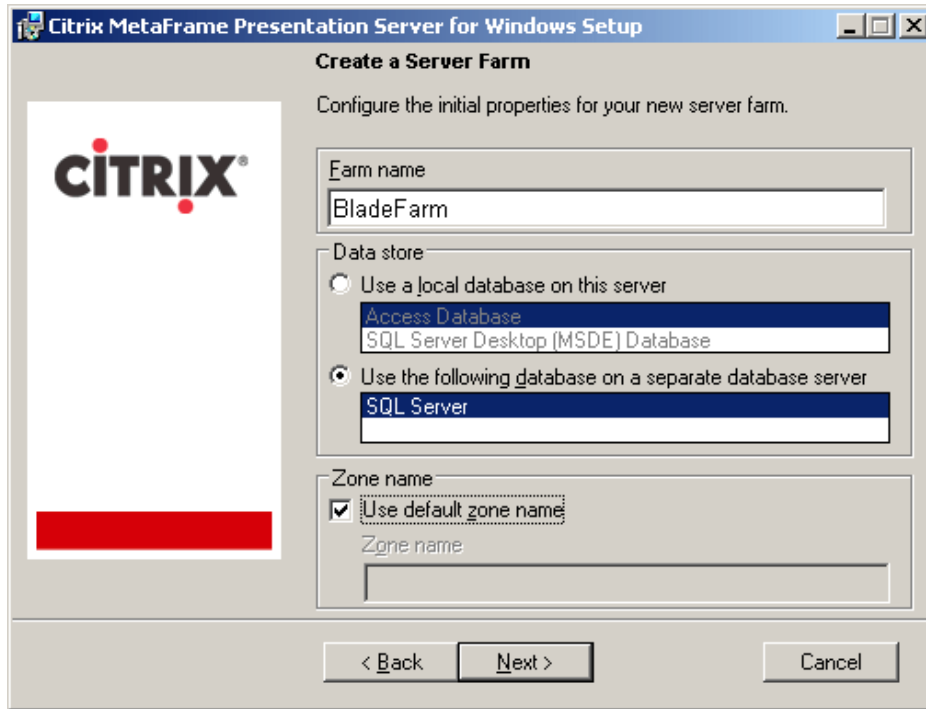
Figure 5-88   Create a Server farm window

15. Enter the name of the new Citrix farm in the farm name field. For our example, enter `BladeFarm`. In the Data store field, select **Use the following database on a separate database server**. Select **SQL Server**. Click **Next** to continue.
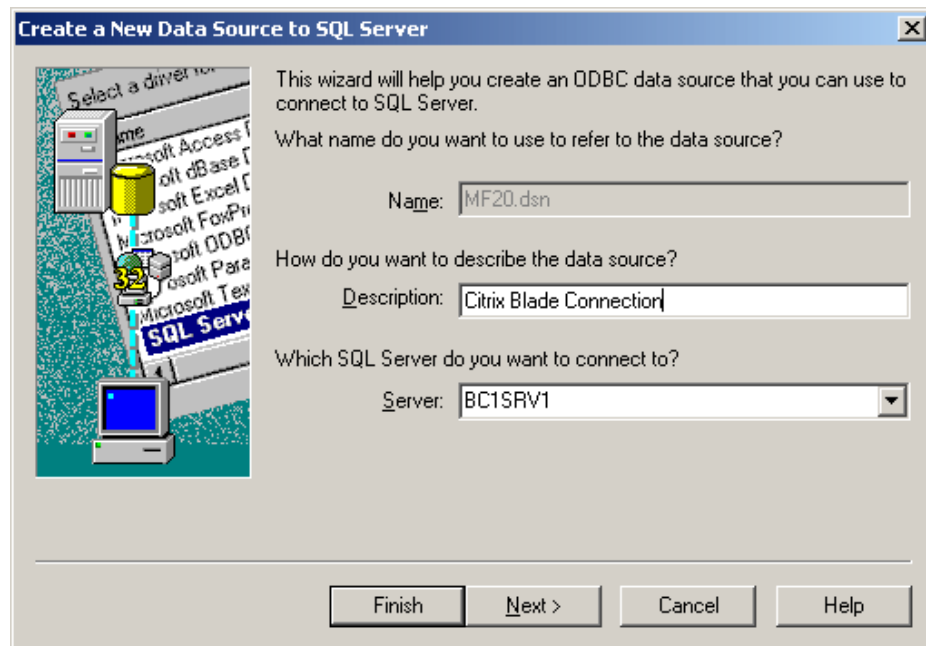
Figure 5-89   Create a New Data Source to SQL Server window

16. For this installation, we chose an SQL Server installation, so we required an ODBC connection to the database. In the Description field, enter an appropriate name for the database connection, for our example, `Citrix Blade Connection`. In the Server field, click the pull-down arrow and select the database server where the Citrix database will reside. In our example, we selected **BC1SRV1**. Click **Next**. You will see a window similar to Figure 5-90.
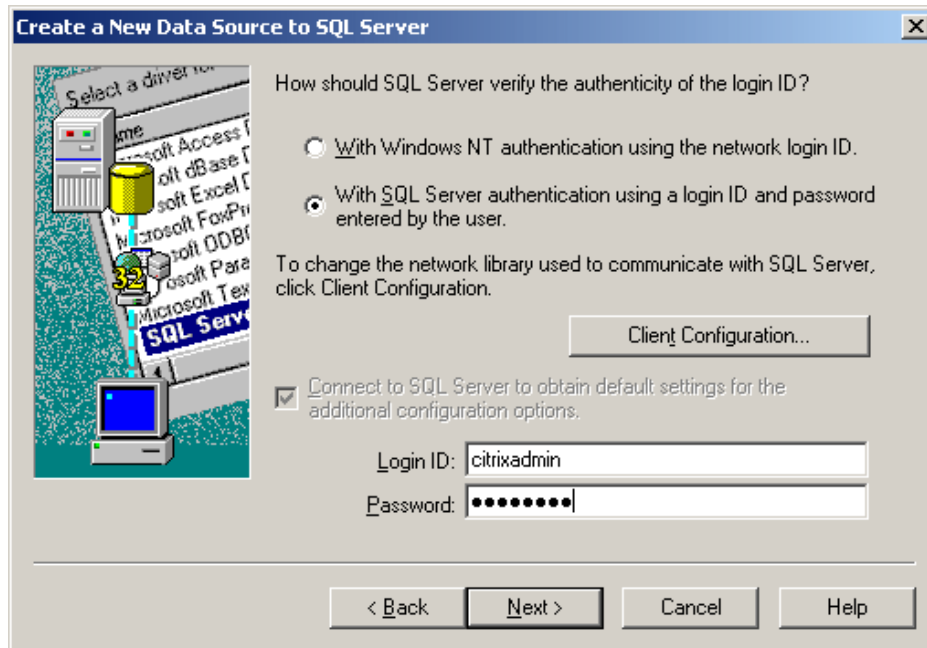
Figure 5-90   Create a New Data Source to SQL Server window

17. Select **With SQL Server authentication using a login ID and password entered by the user.** Enter the user ID which you created earlier (and which gives the database owner access to the Citrix database) into the Login ID field; for our example, this was `citrixadmin`. Enter the password into the Password field. Click **Client Configuration...**. You will see a window similar to Figure 5-91.
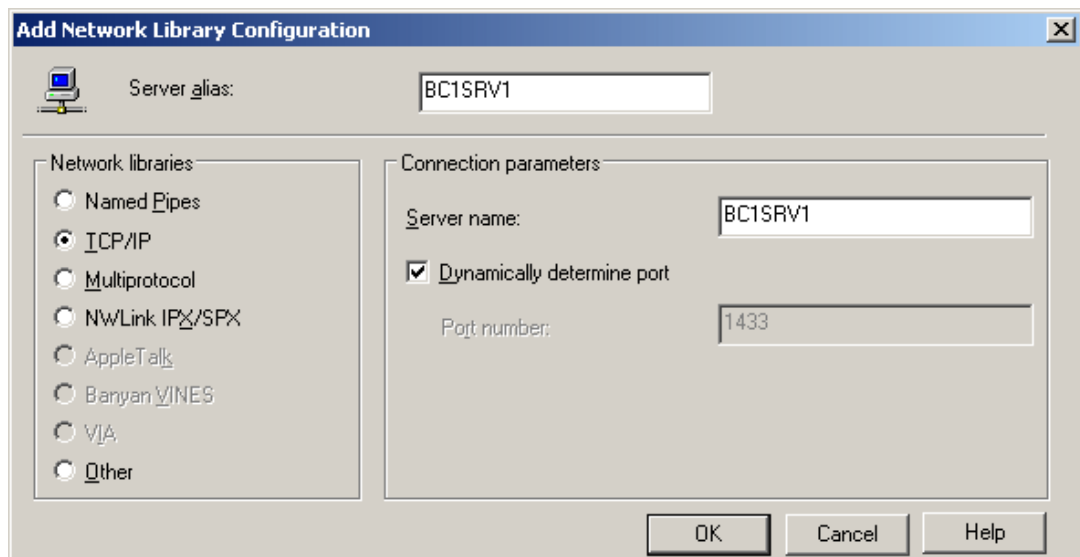
Figure 5-91   Add Network Library Configuration window

18. Click **TCP/IP**. Click **OK**.
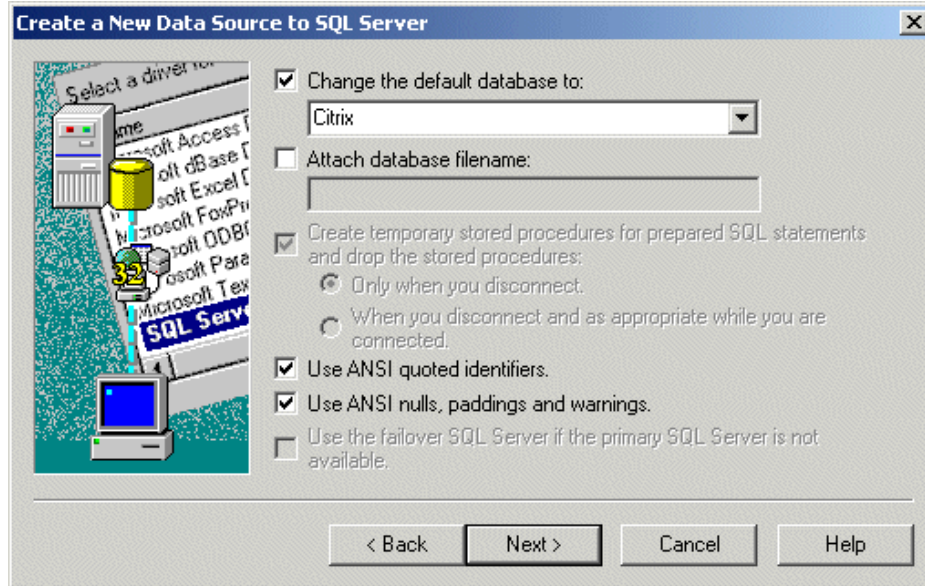
Figure 5-92   Create a New Data Source to SQL Server

19. Select **Change the default database to:**. In the blank field, ensure that the database which we created earlier has been entered; this was `Citrix`. Click **Next**.

20. Click **Finish**.

21. Click **Test Data Source**. You will see a window similar to Figure 5-93.
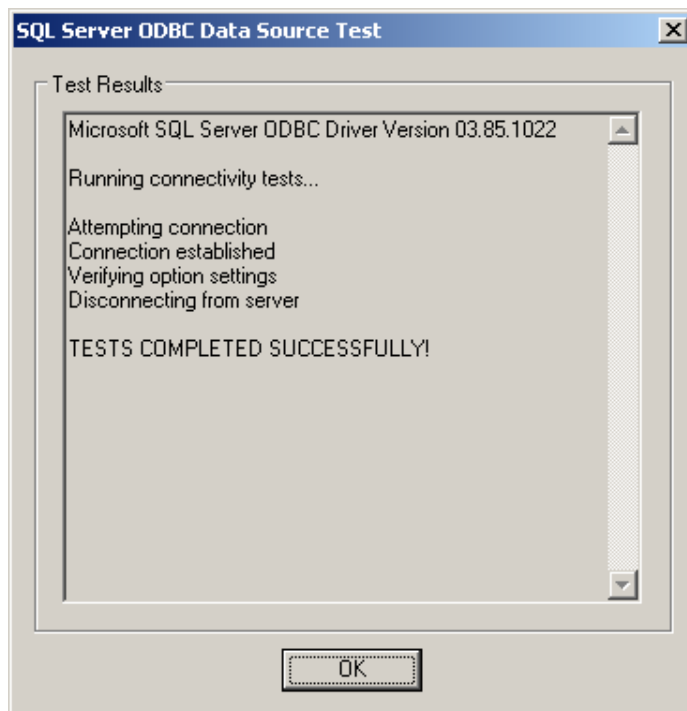
Figure 5-93   Test Results window

22. Click **OK**.
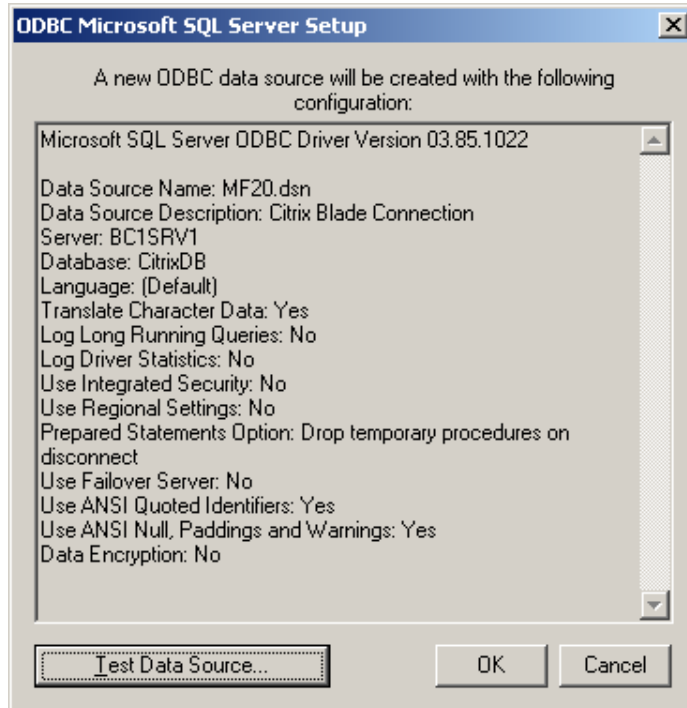
Figure 5-94   ODBC Microsoft SQL Server Setup window

23. Click **OK**.
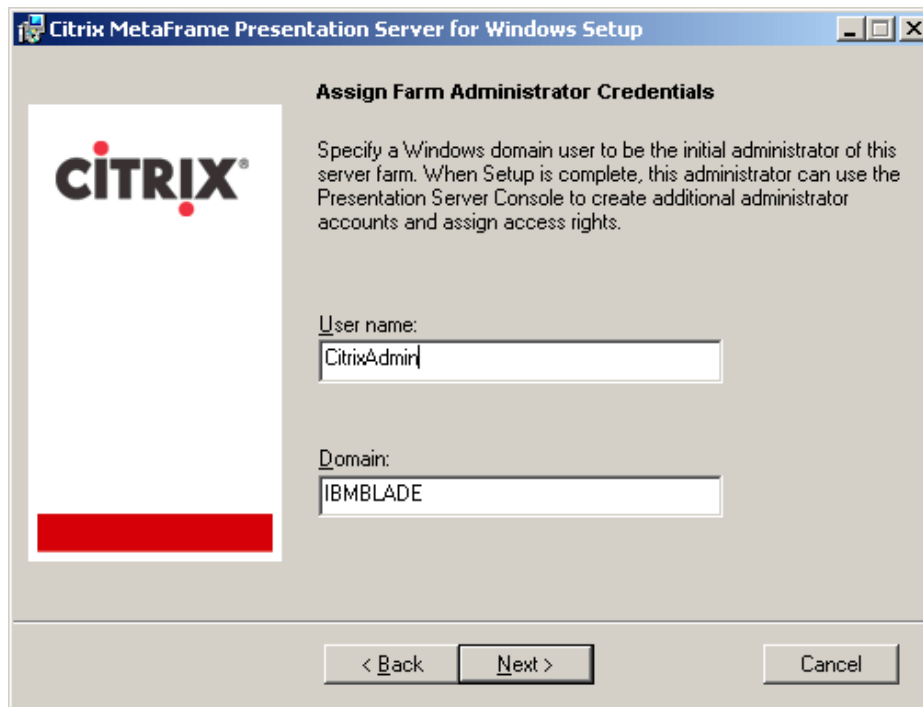
Figure 5-95   Assign Farm Administrator Credentials window

24. In the User Name field, enter the user ID and the domain of the database owner of the Citrix database. We used `CitrixAdmin`. Click **Next**.
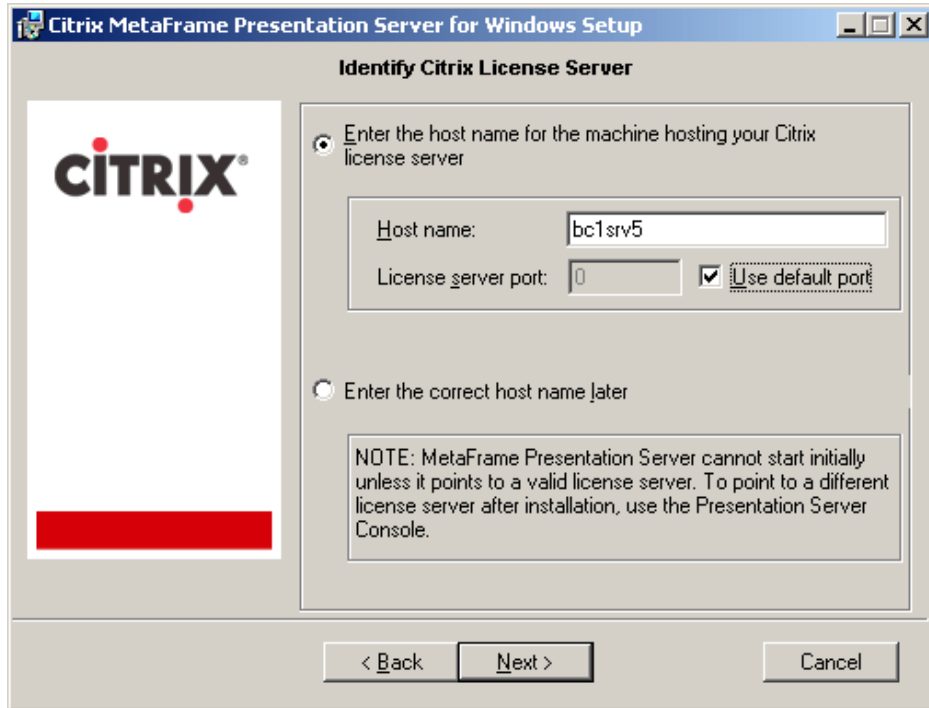
Figure 5-96   Identify Citrix License Server window

25.Click **Enter the host name for the machine hosting your Citrix license server**.

26.In the Host name field, we entered `bc1srv5`. Select **Use default port**.

27.Click **Next**.
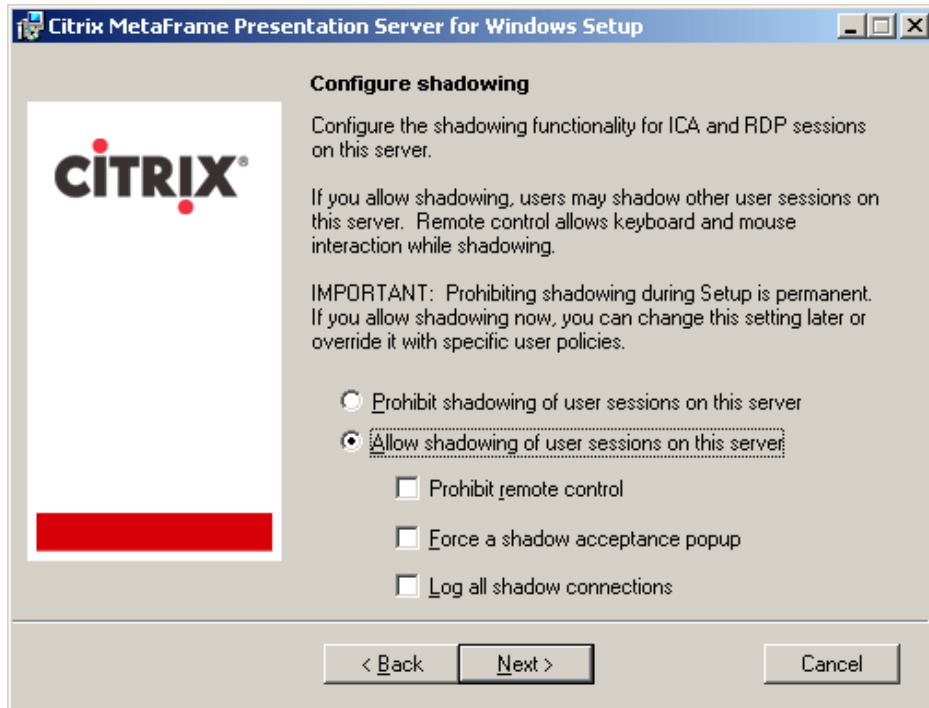
Figure 5-97   Configuring shadowing window

28. Click **Allow shadowing of user sessions on this server** and click **Next**.

29. Accept the default of port 80, unless your site uses a different port, and then click **Next**.
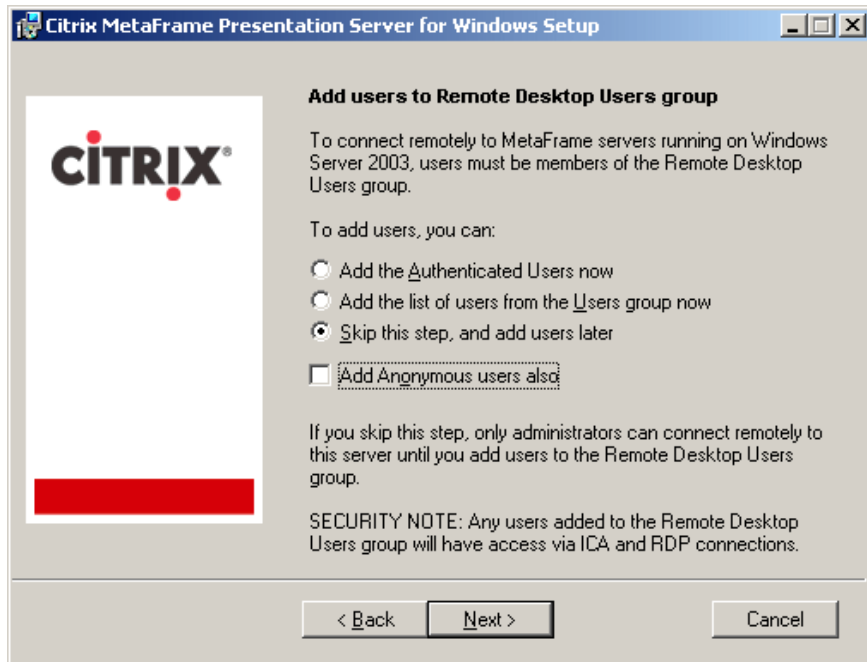
Figure 5-98   Add users to Remote Desktop Users group window

30. Click **Skip this step, and add users later**; we unchecked the box for Add Anonymous users also. We manually added our defined group into the Remote Desktop Users group.
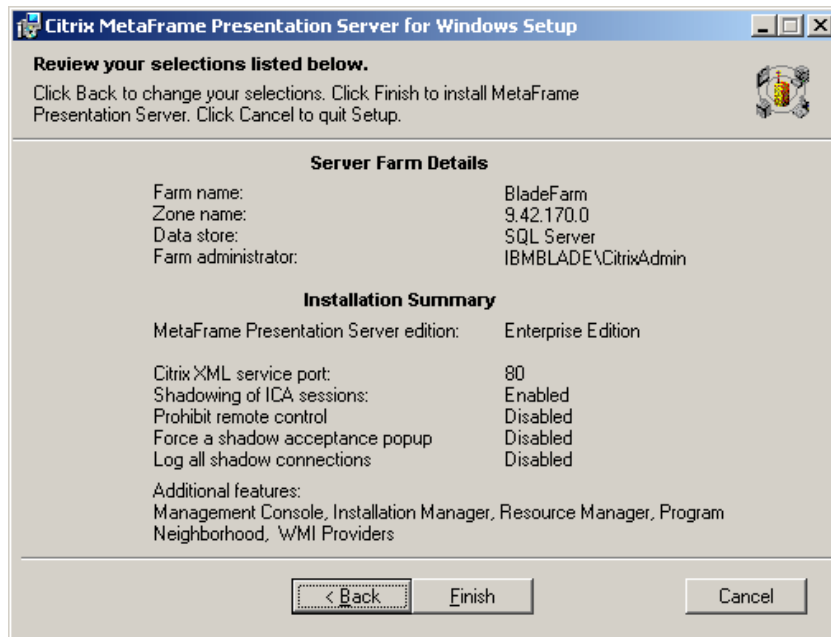
Figure 5-99   Server Farm Details window

31. Click **Finish**.
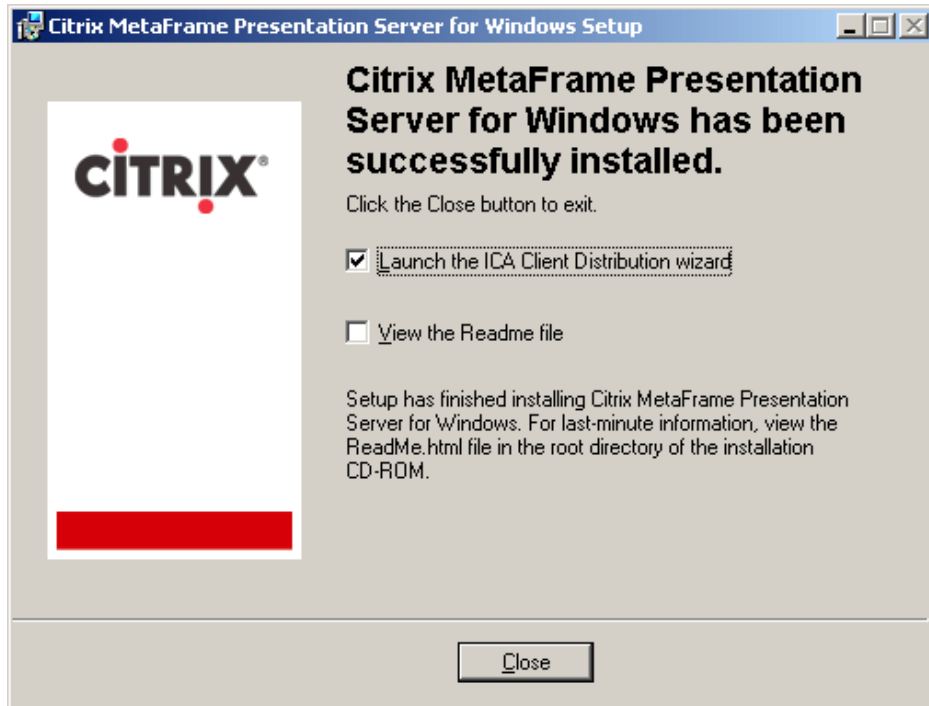
Figure 5-100   Installation complete window

32. Click **Close**.

5.9.3 Citrix ICA Client Distribution

Citrix ICA Client Distribution automatically launches after we click **Close**. It copies Citrix ICA clients software from the Citrix MetaFrame Components CD to the Citrix Server.
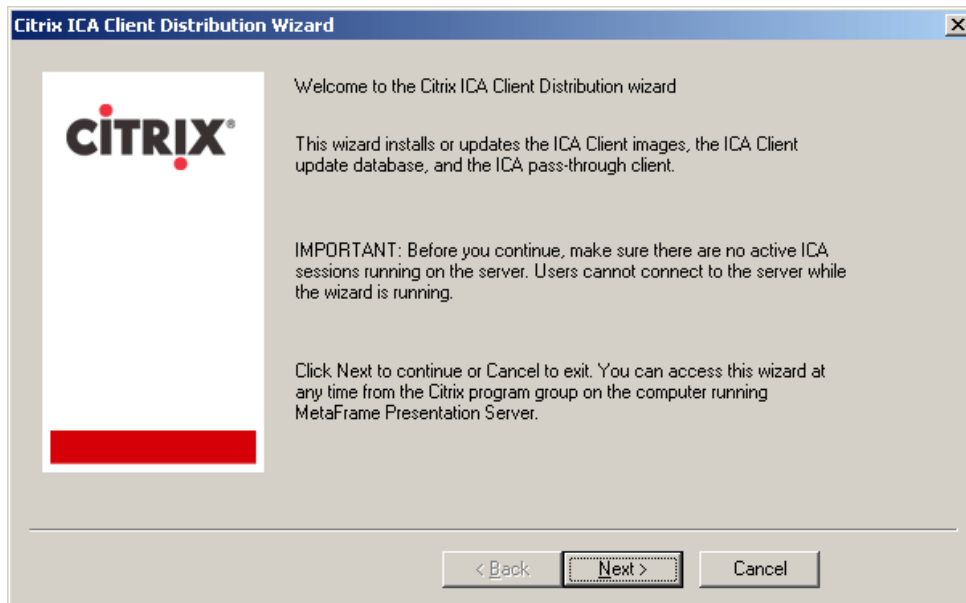
Figure 5-101   Citrix ICA Client Distribution wizard window

1. Click **Next**.
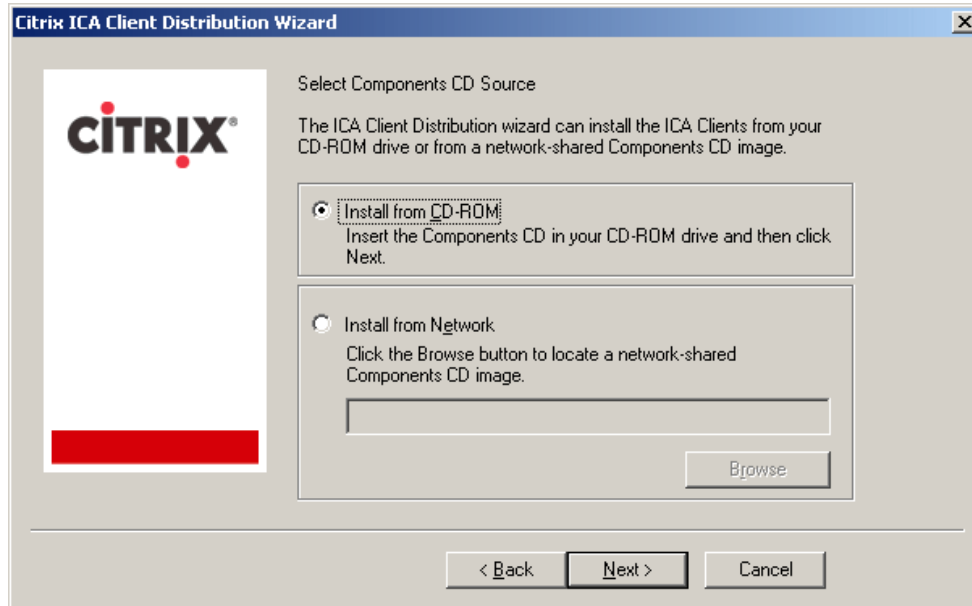
Figure 5-102   Select Components CD Source window

2. Accept the default, *Install from CD-ROM*. Click **Next**.
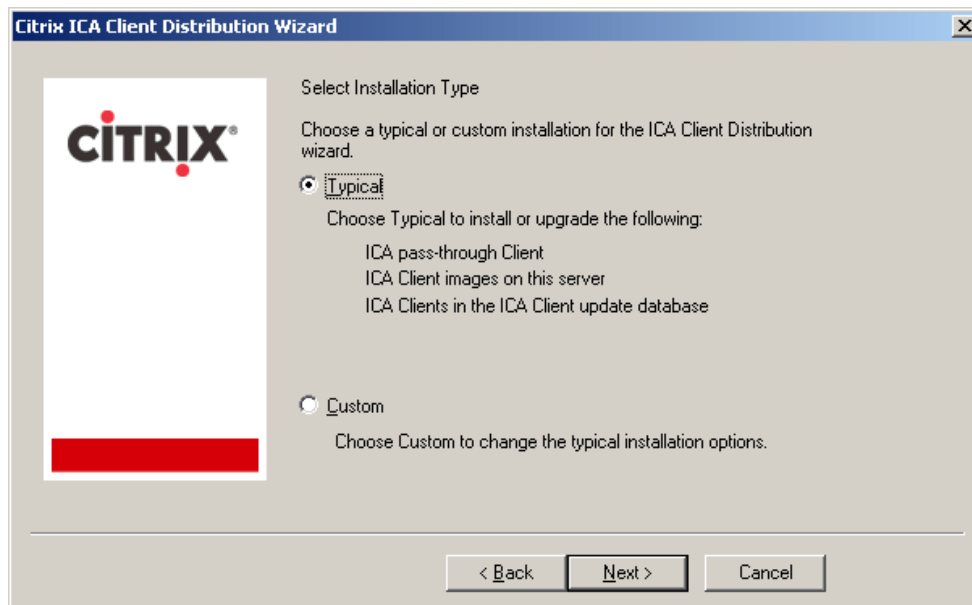
Figure 5-103   Select Installation Type window

3. Accept the default, Typical. Click **Next**.

Figure 5-104   Installation Complete window

4. Click **Finish**.

5.9.4 MetaFrame Access Suite Console install

After we click **Finish**, MetaFrame Access Suite Console installation will begin automatically.

Figure 5-105   MetaFrame Access Suite Console Installation welcome window

1. Click **Next**.

2. Read and accept the License Agreement. Click **Next**.
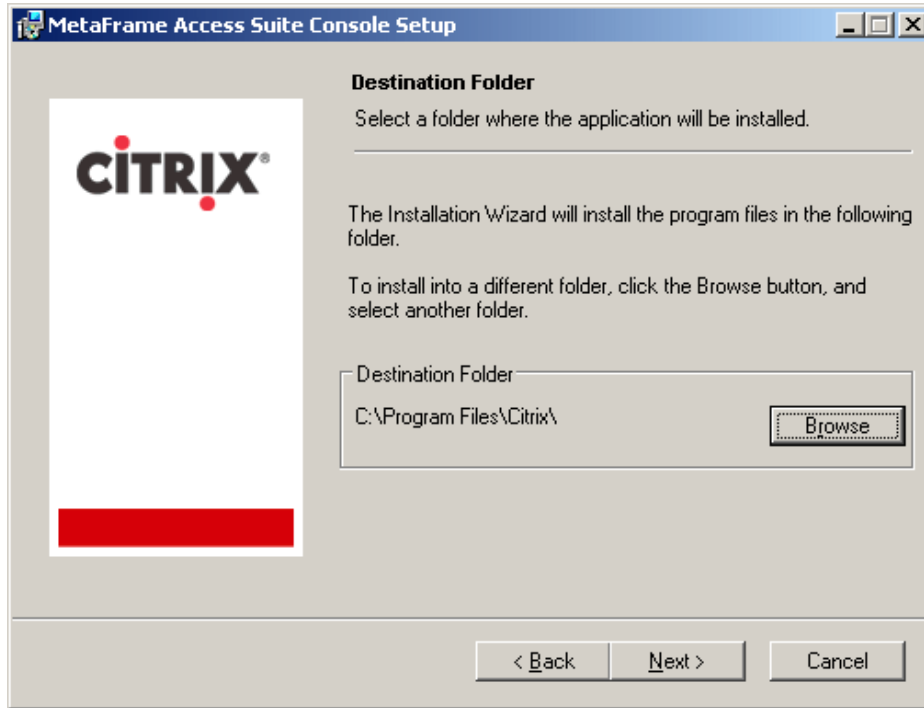
Figure 5-106   Destination Folder window

3. Accept the default destination folder and click **Next**.
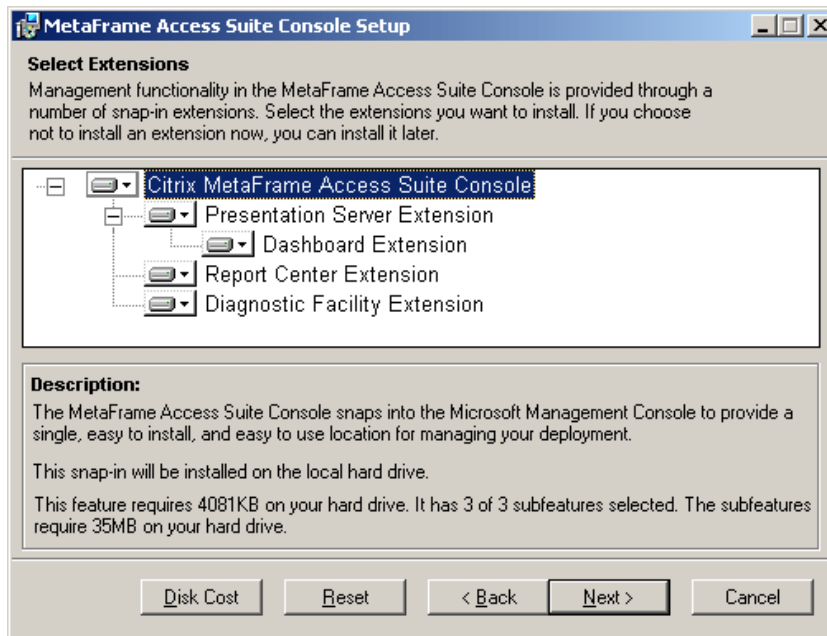
Figure 5-107   Select Extensions window

4. Accept the default and click **Next**. You are now ready to install the application. Click **Next**. After the console install, click **Finish**.

5.9.5 Management Console for MetaFrame Presentation Server

After we click **Finish**, Management Console for MetaFrame Presentation Server installation will begin automatically.

Figure 5-108   Management Console for MetaFrame Presentation Server window

1. Click **Next**.
2. Read and accept the License Agreement. Click **Next**. You are ready to install the application. Click **Next**.
3. After the installation is complete, click **Finish**.

5.9.6 Document Center setup

After we click **Finish**, the Document Center installation will begin automatically.

Figure 5-109   Document Center Setup window

1. Click **Next**.
2. Accept the default destination folder, then click **Next**. After the install has completed, click **Finish**.
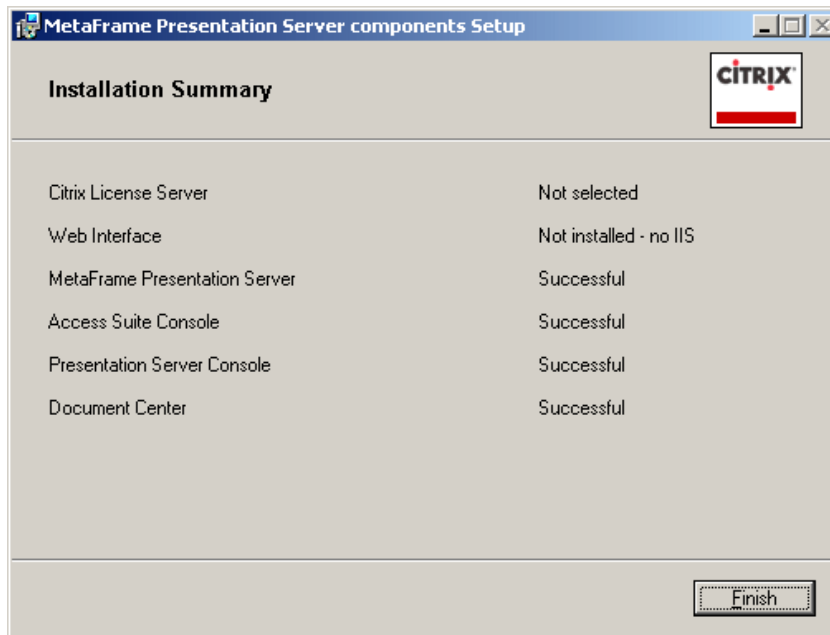
Figure 5-110   Installation Summary window

3. Click **Finish**.
4. Click **Yes** to restart.

5.9.7 Citrix MetaFrame Access Suite Products patch

For details on hotfixes and service packs for Citrix MetaFrame Access Suite Products Patch for Windows 2003, refer to the Citrix Support Web Site:

http://support.citrix.com

– For MetaFrame Presentation Server 3.0:

i.   Click **Knowledge Base**.
ii. Click **MetaFrame Presentation Server 3.0**. At the time of writing, there were two hotfixes:
  • CTX104152, Posted May 25, 2004 for Windows 2003
  • CTX104047, Posted May 5, 2004 for Windows 2003

– For MetaFrame Licensing Server:

i.   Click **Knowledge Base.**
ii. Click **MetaFrame Access Suite License Server 1.0.0**. At the time of writing, there was one hotfix:
  • CTX104078, Posted May 10, 2004 for Windows 2003

– For MetaFrame Conferencing Manager 3.0:

i.   Click **Knowledge Base.**
ii. Click **MetaFrame Conferencing Manager 3.0.** At the time of writing, there were two hotfixes:
  • CTX104168, Posted May 26, 2004 for Windows 2003
  • CTX104162, Posted May 26, 2004 for Windows 2003

For details on critical hotfixes and service packs for Citrix MetaFrame Presentation Server 3.0 for Windows 2003, refer to Citrix Support Web Site:

http://support.citrix.com/criticalupdates

At the time of writing, there were no critical updates. In our lab scenario, we installed the above hotfixes.

5.9.8 Installing additional servers to the farm

The steps below describe the process we used to add a Citrix MetaFrame Presentation Server to the Citrix farm.

1. Insert the MetaFrame Presentation Server 3.0 CD into the CD-ROM drive.

2. If autorun does not display the following screen, run autorun.exe from the root of the CD-ROM.
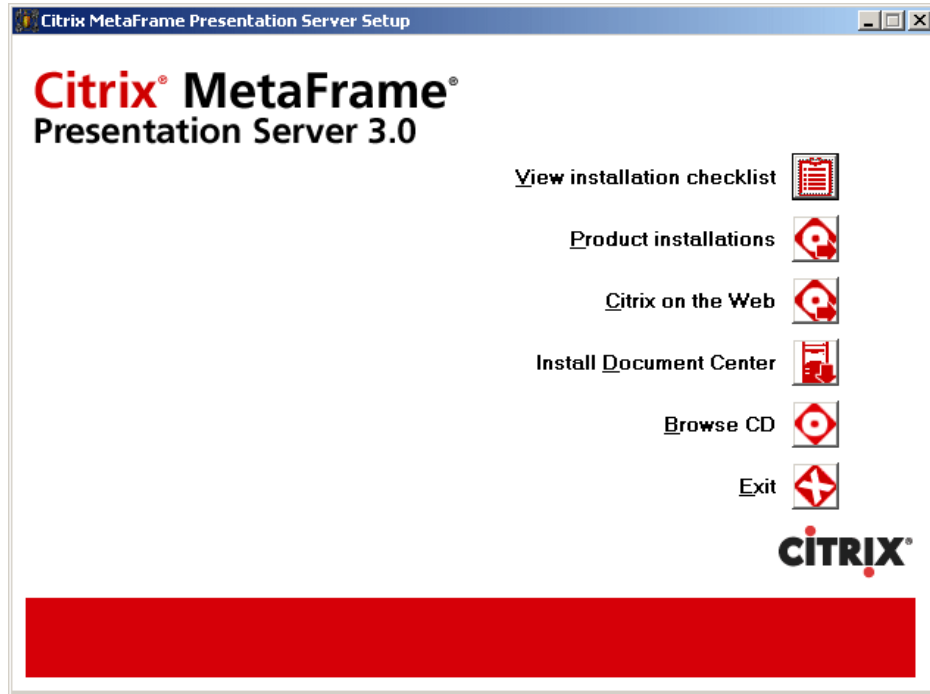
Figure 5-111 Autorun splash screen

3. Click **Product installations**.

4. Click **MetaFrame Presentation Server and its components**.

5. Read the License Agreement and click **I accept the License Agreement**.

6. Click **Next**.

7. Click **Next** (Prerequisites Installation).

8. In the Select Component window, uncheck **Document Center**, then click **Next**.

9. Click **Next**.

10. Click **Next (I already have a Citrix License Server, or I will install one later using the product CD)**.

11. Click **Next** (Welcome window).

12. Read and accept the License Agreement. Click **Next**.

13. Select **Enterprise Edition** and then click **Next**.

14. Select the components you wish to install; click **Next**.

15. Click **Join an existing farm**, then click **Next**.
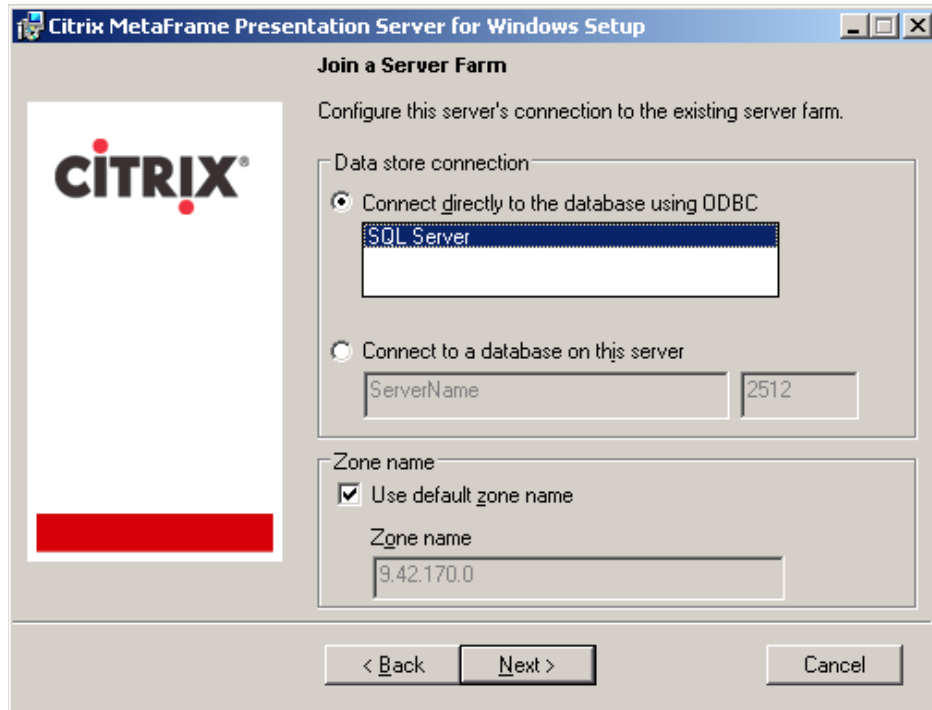
Figure 5-112   Join a Server Farm window

16. In the Join a Server Farm window, select **Connect directly to the database using ODBC**.

17. In the Data Store Connection section, confirm you have **Connect directly to the database using ODBC** selected, then click **Next**.

18. You are now prompted to Create a New Data Source to SQL Server connection; confirm **With SQL Server authentication using a login ID and password entered by the user** is selected and enter the login ID and password details of the user ID, which is the database owner of the database; select the database used by Citrix, then click **Next**.

19. Click **Next**.

20. Click **Test Data Source**.

21. Confirm that the test reads TEST COMPLETED SUCCESSFULLY!, then click **OK**.
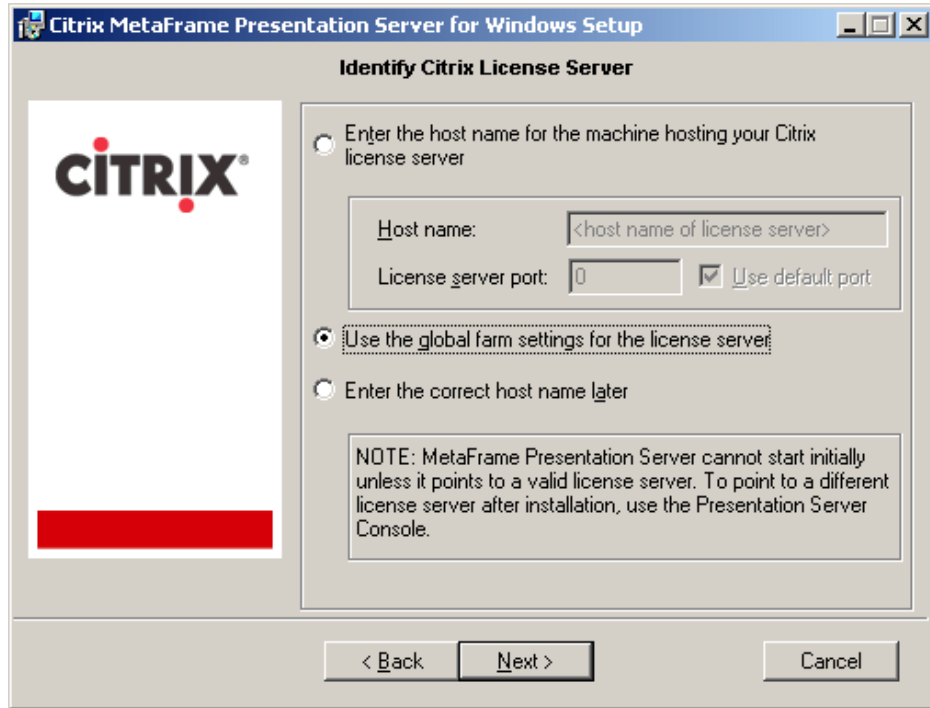
Figure 5-113   Identify Citrix License Server window

22.In our example, click **Use the global farm settings for the license server**.

23.Click **Next**.
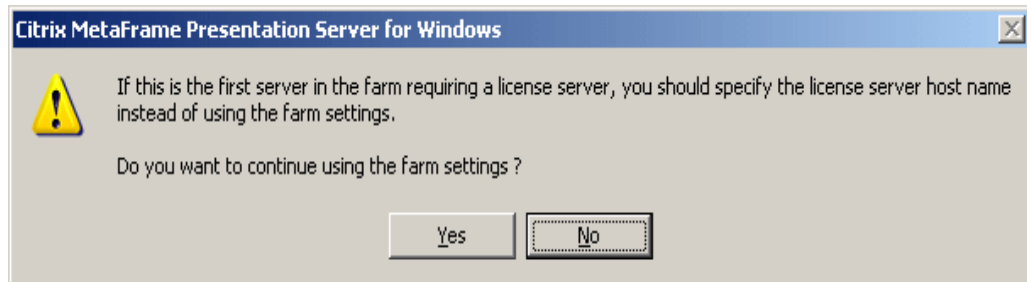
Figure 5-114   Citrix MetaFrame Presentation Server for Windows window

24.Click **Yes** to confirm that you are using the farm settings.

25.Confirm that **Allow shadowing of ICA sessions on this server** is selected, then click **Next**.

26.Accept the default of port 80 (Citrix XML Service Port) and click **Next**.
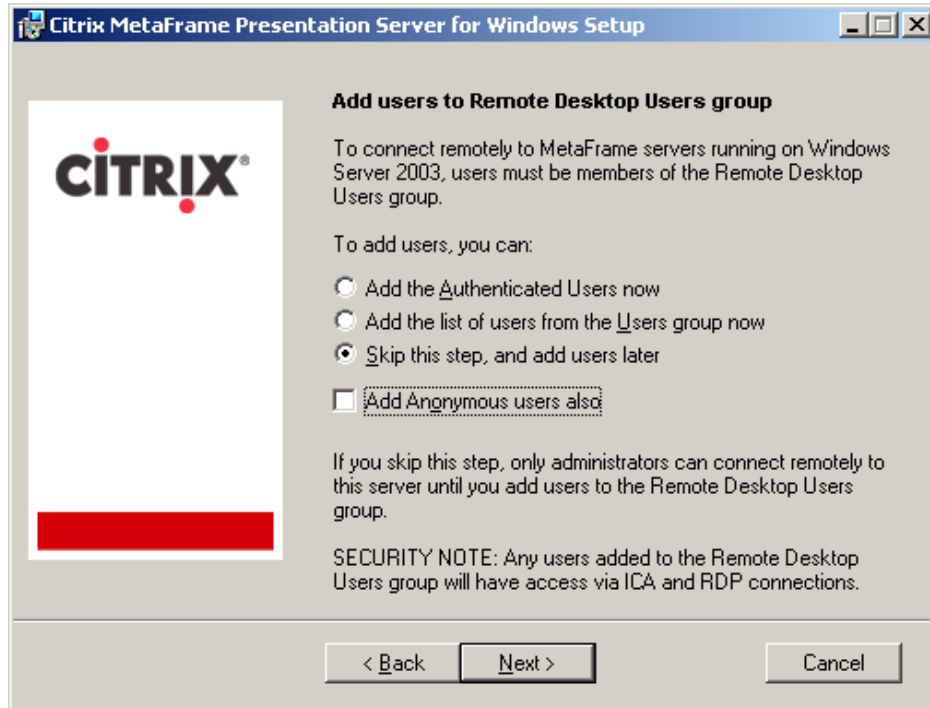
Figure 5-115   Add users to Remote Desktop Users group window

27. For our example, click **Skip this step, and add users later** and uncheck *Add Anonymous users also*. We added our own defined group in Windows Server 2003 Active directory to the Remote Desktop Users group.

28. Click **Finish** (*Review your selections listed below* window).

29. Select **Launch the ICA Client Distribution wizard** and deselect the *View the Readme file* option, then click **Close**.

30. Click **Next**.

31. Insert the Citrix MetaFrame Presentation Server Components CD and click **Next**.

32. Select **Typical** and click **Next**.

33. Click **Finish**.

34. Windows will execute a pop-up and ask you to insert Citrix MetaFrame Presentation Server 3.0 CD back into the CD-ROM drive.

35. Refer to section 5.9.4, "MetaFrame Access Suite Console install" on page 120 for details on the Console installation.

5.10 Server imaging

When imaging a Citrix Server, you need to consider the following:

► Which components will be deployed to the Citrix Server?
► What tool will be utilized to image the server?
► What tool will be used to generate a new SID?

5.10.1 IBM Remote Deployment Manager (RDM) 4.11

We used IBM RDM to capture an image then deployed the image to another blade server. The following steps outline this.

> **Note:** We disabled the RIS service to allow RDM to PXE boot the servers.

Capturing the image

Below is the process we used to capture an image of a server.

1. From the server which is having its image captured, create a sysprep directory and copy sysprep.exe and setupcl.exe. These files are extracted from the support/tools/deploy.cab file located on the Windows 2003 CD.

2. The server being imaged in this example has Presentation server 3.0 with no IIS installed.

3. In Control Panel, Services, set the following services from `Automatic` to `Manual`:
   – Citrix XML Service
   – Independent Management Architecture
   – MetaFrame COM Server.

4. Ensure the built-in Administrator password is blank.

5. Log on as an alternate admin user and copy the user profile you used to install the applications to the Default Users folder.

6. Run the sysprep.exe from the server which is being imaged.
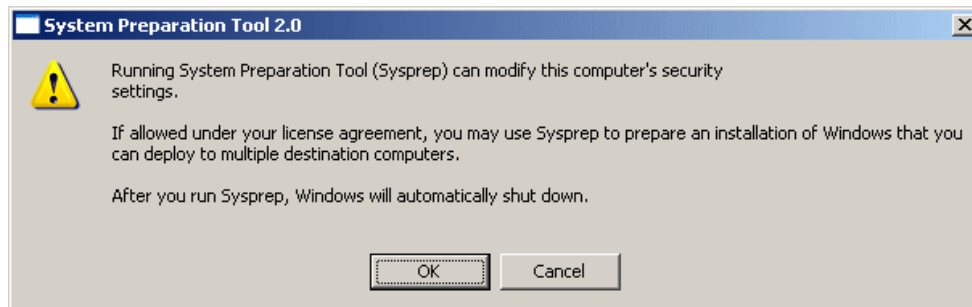
Figure 5-116   System Preparation Tool 2.0 window

7. Click **OK**.
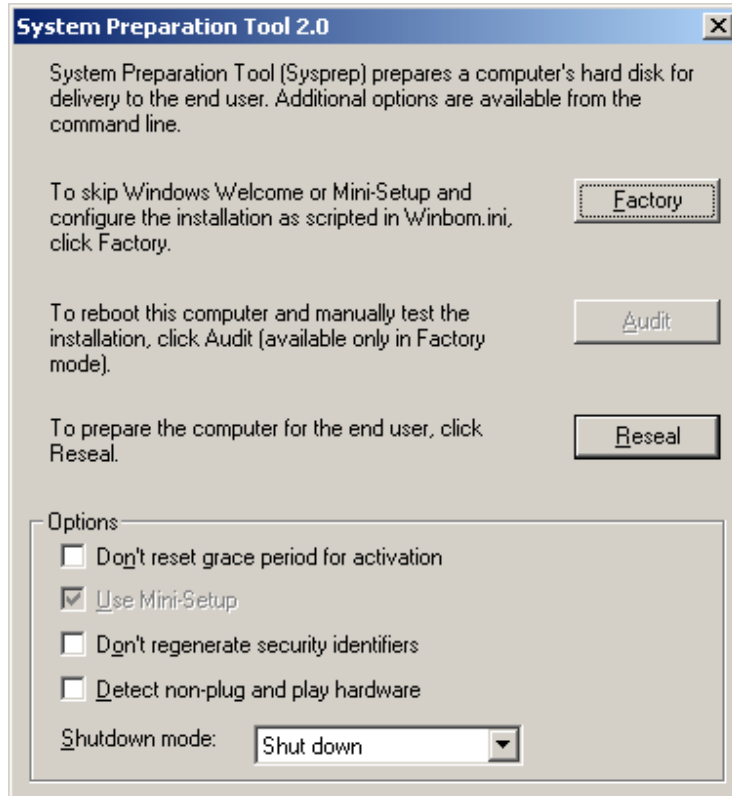
Figure 5-117   System Preparation Tool 2.0 window

8. Click **Reseal**.

9. The server will shut down. The server must be able to boot from the network adapter.

10. In our example, we use Management Server to launch IBM Director 4.12 Console to perform the RDM functions.
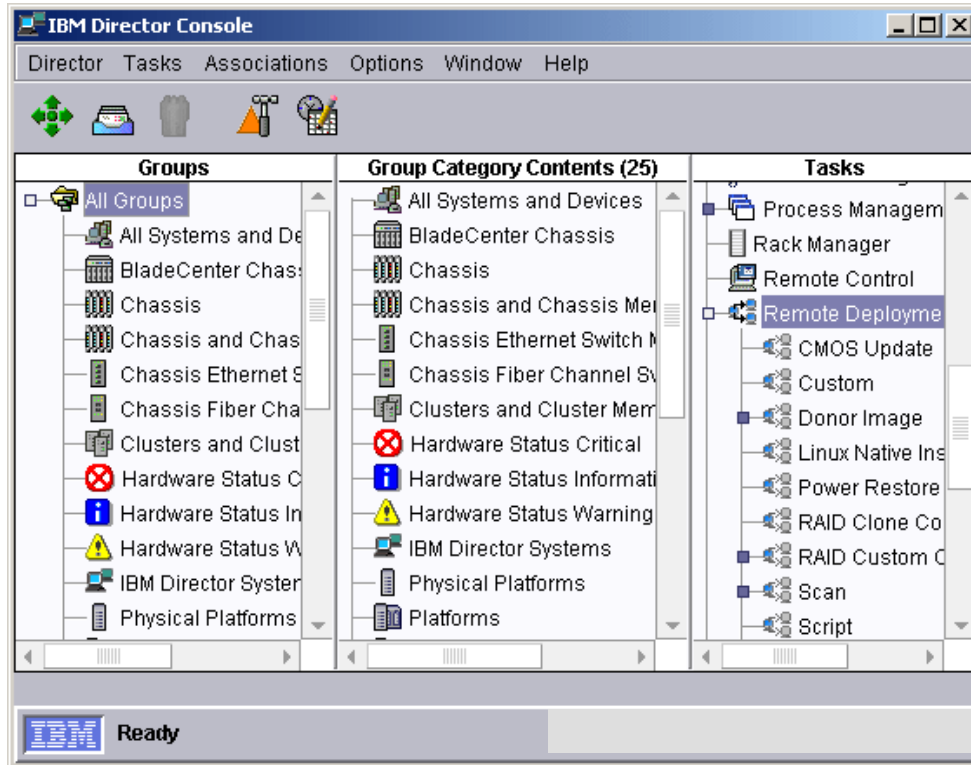
Figure 5-118   IBM Director Console window

11. To store this image into RDM, expand Remote Deployment Manager in the Tasks pane.

12. Expand Donor image and click **Get Donor**.
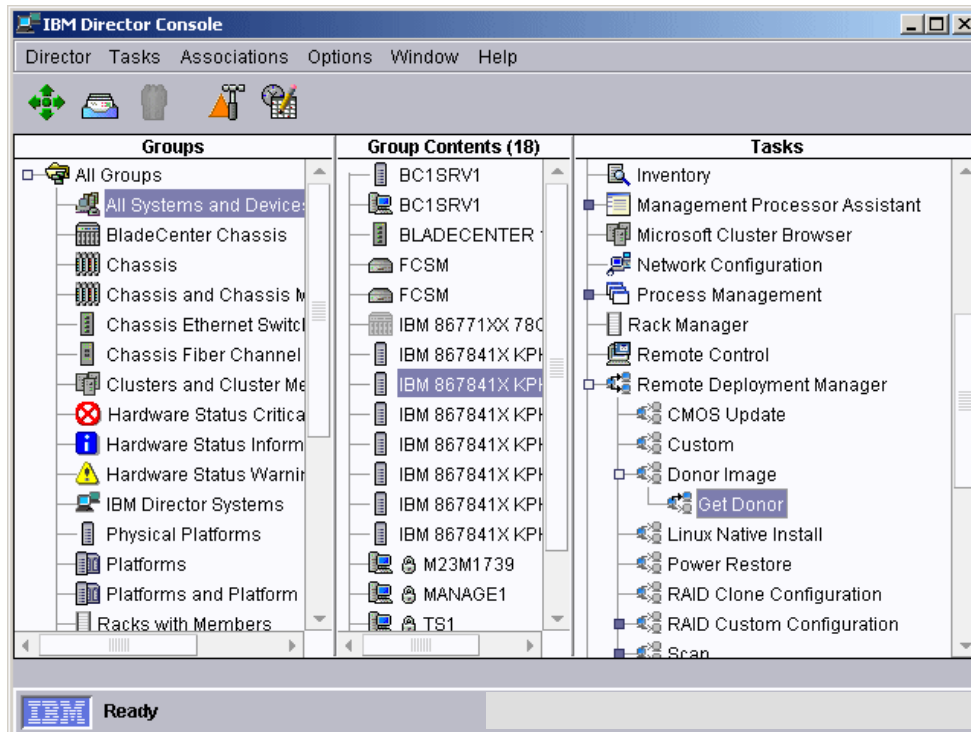
Figure 5-119   IBM Director Console window

13. Right-click the source server (with sysprep run), hold and drag it to Get Donor.
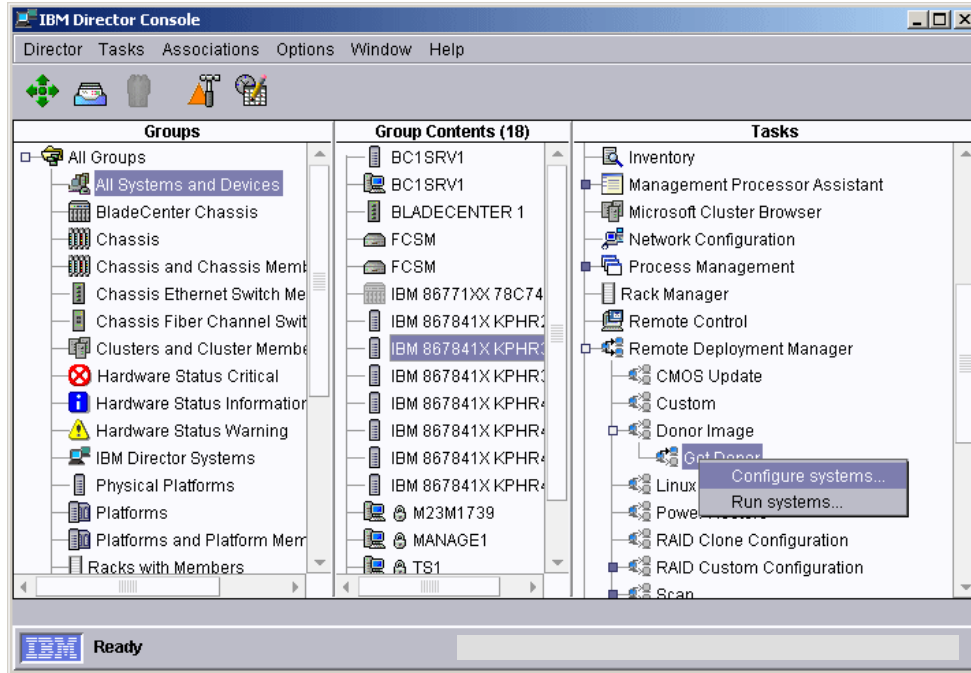
Figure 5-120   IBM Director Console window

14. Click **Configure systems**.
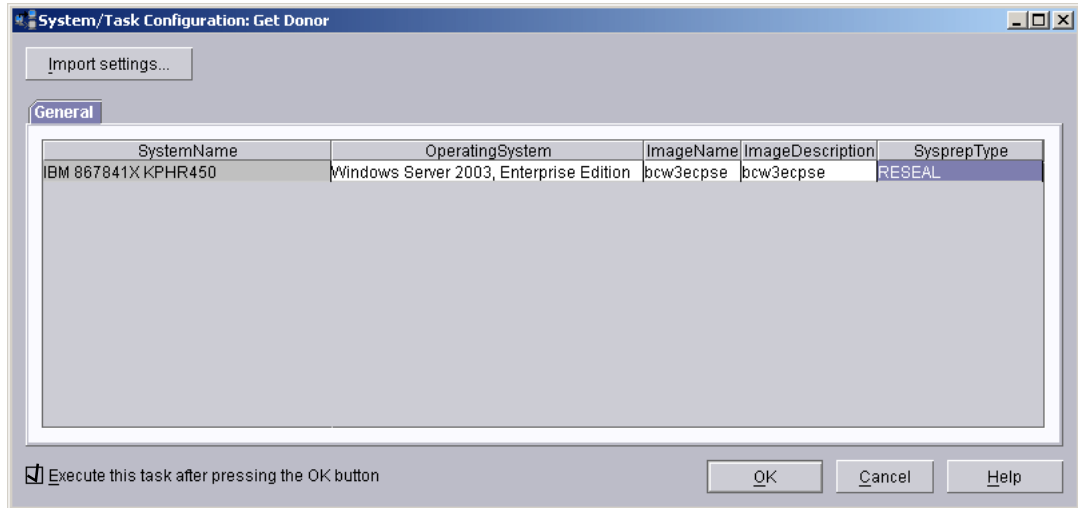
Figure 5-121   System/Task Configuration: Get Donor window

15. Highlight the field under OperatingSystem and type in a description.

16. Highlight the field under ImageName and ImageDescription and type in the image file name and an image description.

17. Select **Sysprep Type** in the Sysprep Type field.

18. Check the box **Execute this task after pressing the OK button**.

19. Click **OK**.
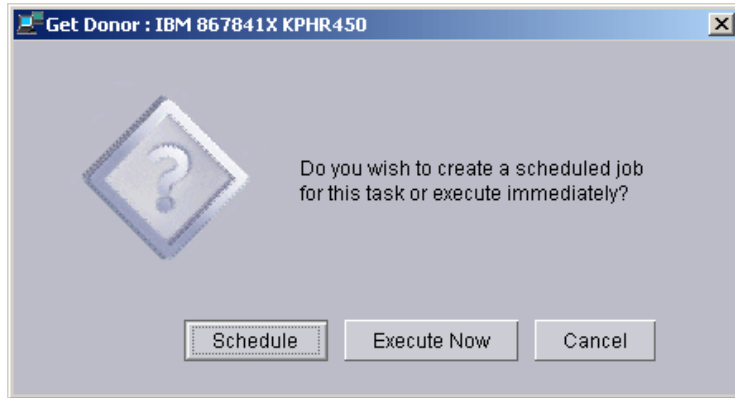
Figure 5-122   Get Donor window

20. Click **Execute Now**.

21. Power up the server and make sure it is booting up from the network. For HS20, pressing **F12** is necessary when the Broadcom network card bios screen comes up.

    Once connected to the RDM server, from the director console, we can see the following windows indicating the status (Figure 5-123 and Figure 5-124).
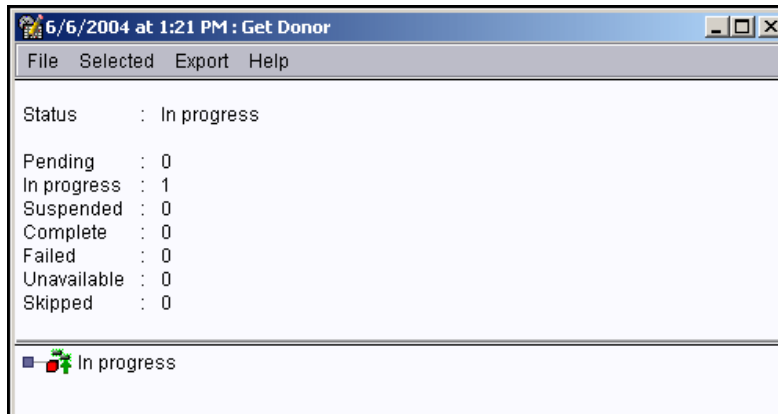
Figure 5-123   Get Donor window
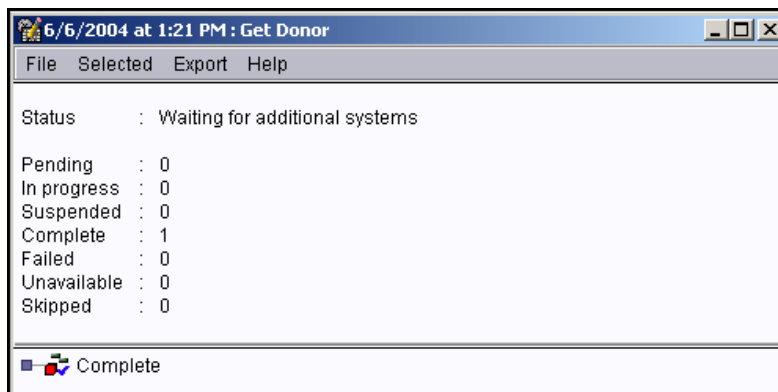
Figure 5-124   Get Donor window

22. Once the task is completed, the server will shut down completely.

Deploying the image to another server

Below are the steps we followed to deploy the image to another server.

1. From the Tasks pane, expand Remote Deployment Manager.

2. Right-click **Windows Clone Install** and click **Create new task.**..
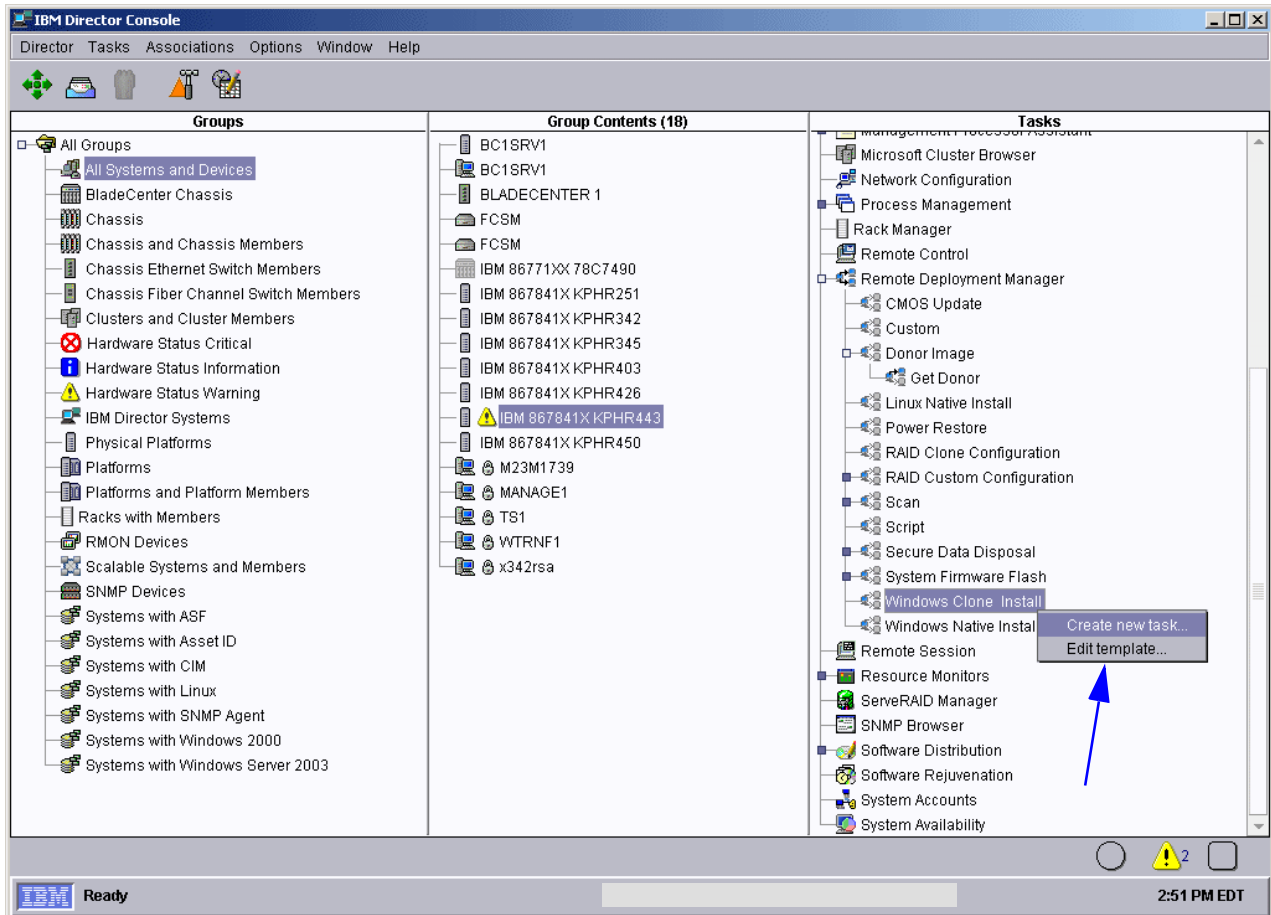
Figure 5-125   IBM Director Console window

3. Give a Task name and Task Description. In our example, we used `ibcw3ecpse` (image for BladeCenter Windows 2003 Enterprise Edition with Citrix Presentation Server Enterprise Edition).
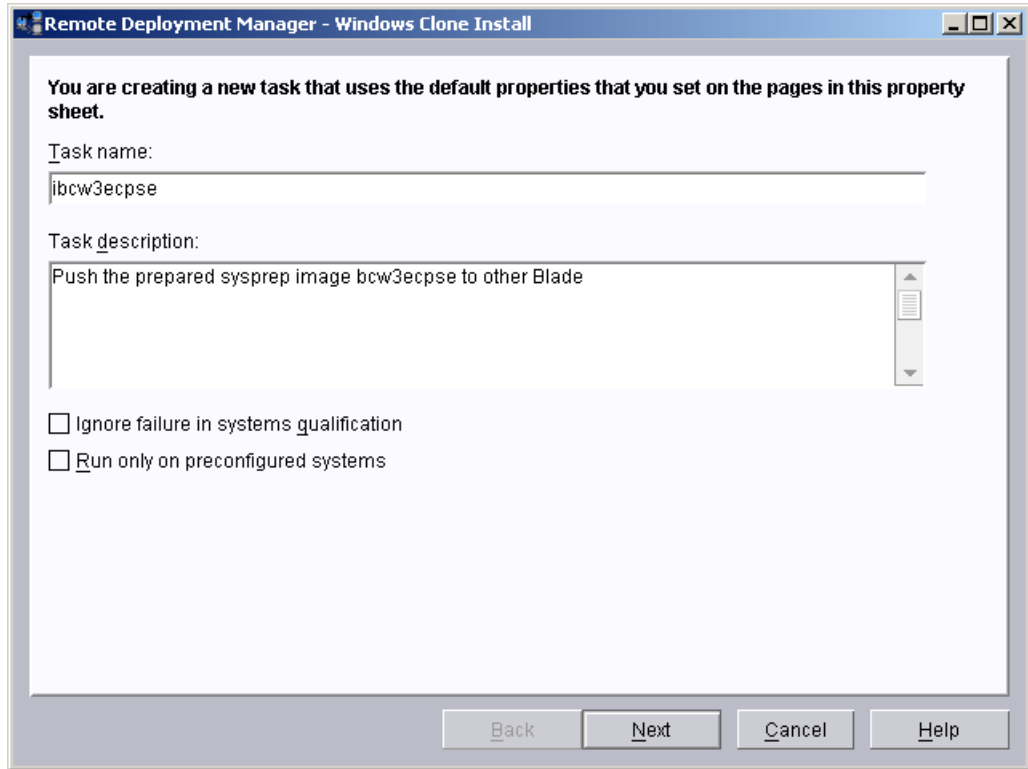
Figure 5-126   Remote Deployment Manager- Windows Clone Install window
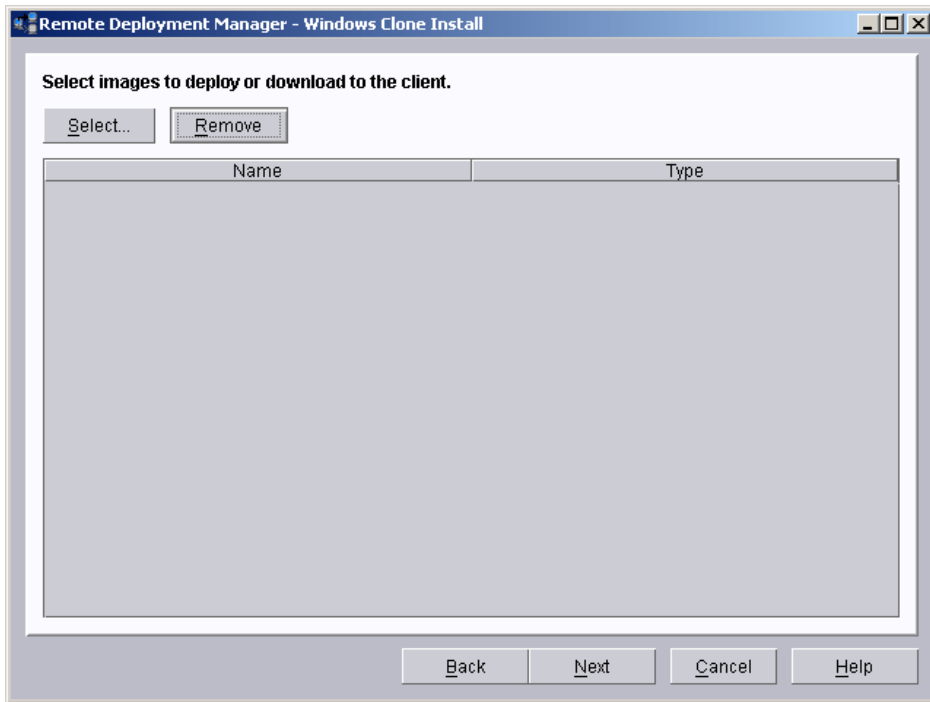
Figure 5-127   Remote Deployment Manager - Windows Clone Install window

4. Click **Select**.
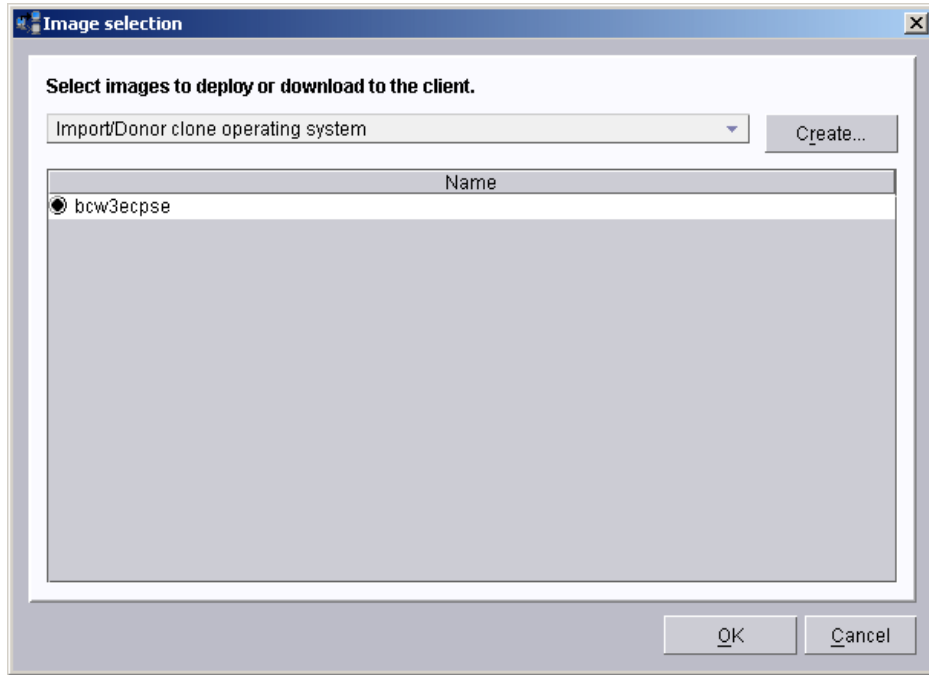
Figure 5-128   Image selection window

5. Click the image; in our example, we call the image that we made `bcw3ecpse`. Click **OK**.
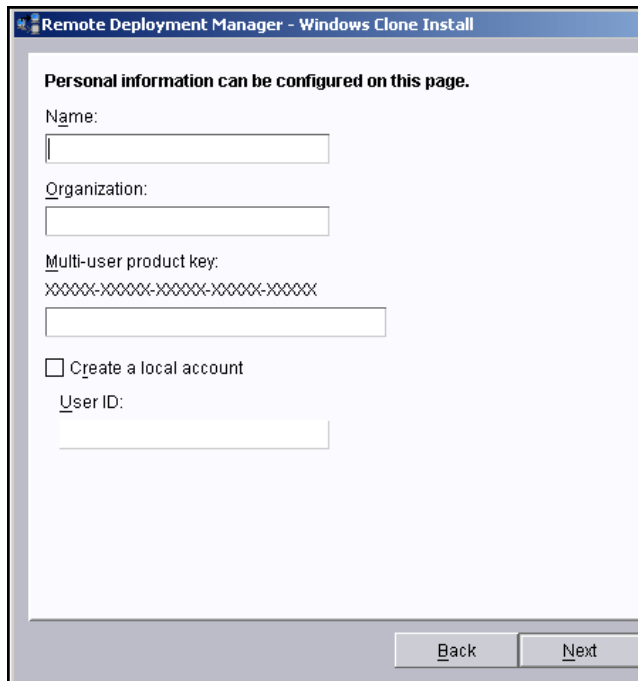
Figure 5-129   Personal information window

6. Fill in the Name, Organization and product key fields. Click **Next**.
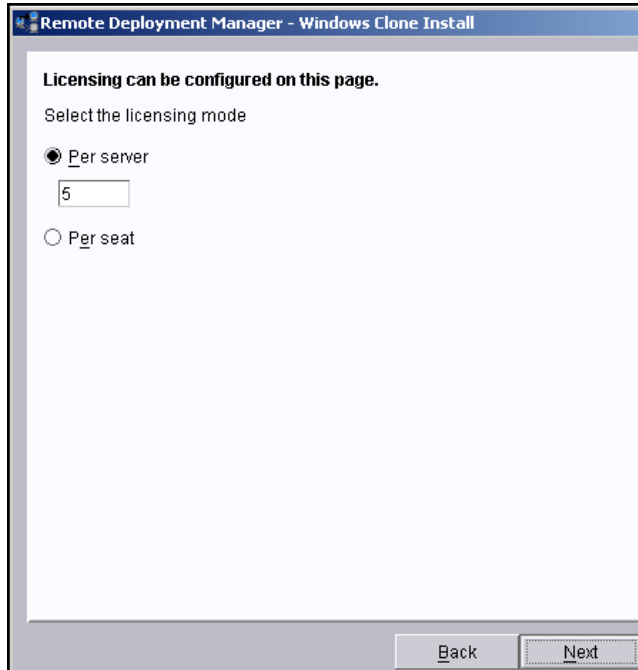
Figure 5-130   Licensing window

7. Select the license mode and click **Next**.

8. Select the appropriate Time zone and User locale then click **Next**.
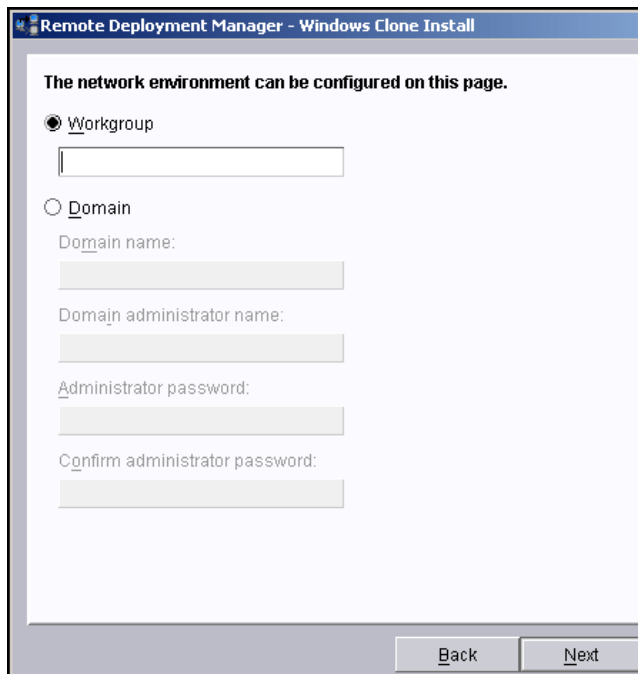
Figure 5-131   Network environment window

In our example, we selected **Workgroup** and typed in its field `Workgroup`. We joined the Domain manually later.

Figure 5-132   Network protocol window

9. Click **Next**.
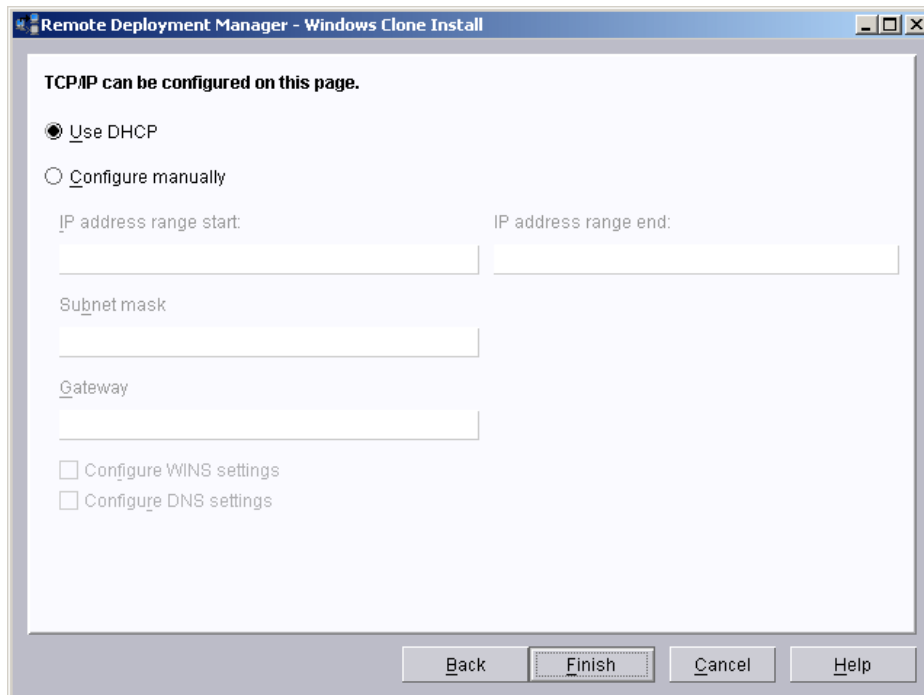
Figure 5-133   DHCP window

10.Click **Finish**.
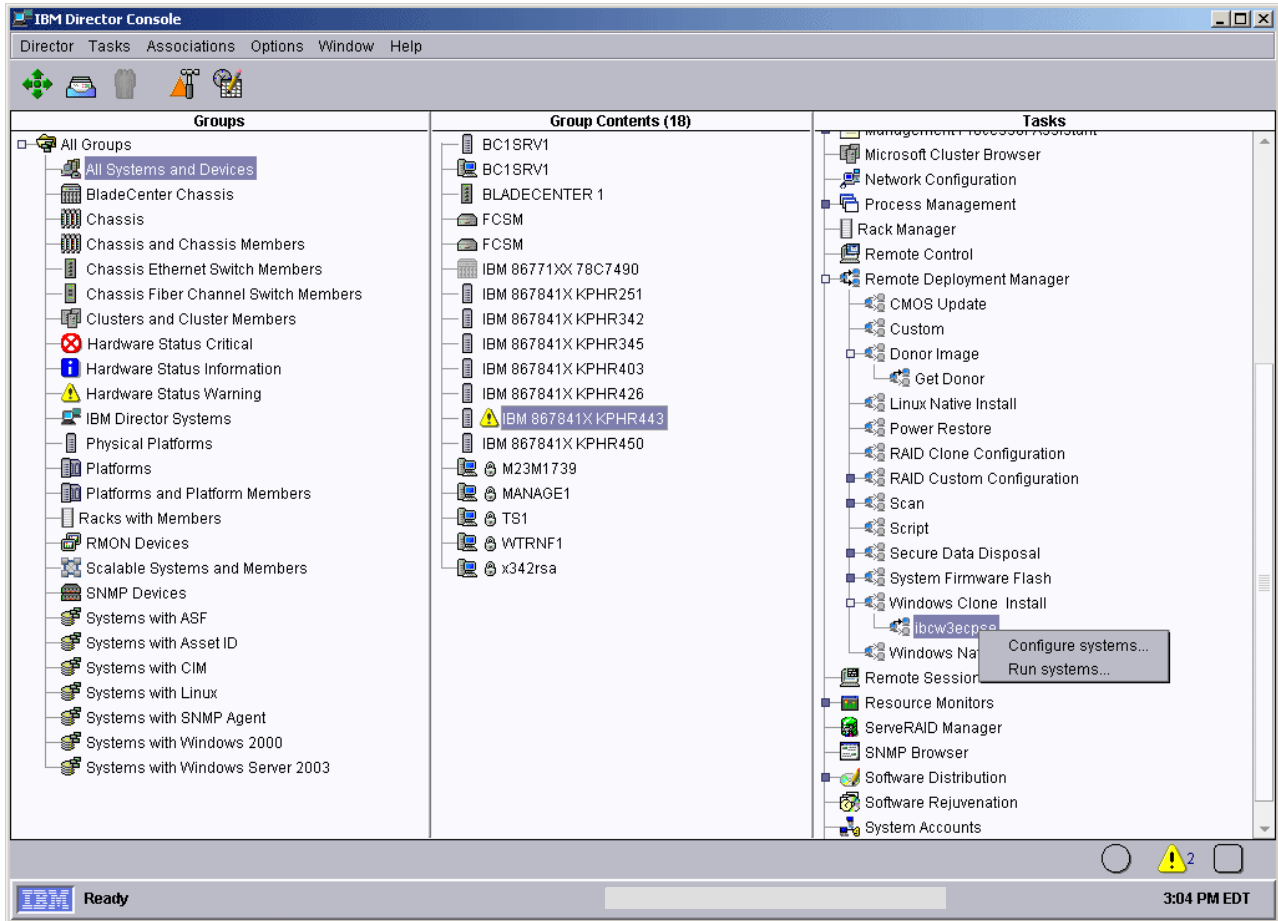
Figure 5-134   IBM Director Console window

11. In the Group Contents pane, right-click your target server and drag it to the task name created earlier, then click **Configure systems...**.
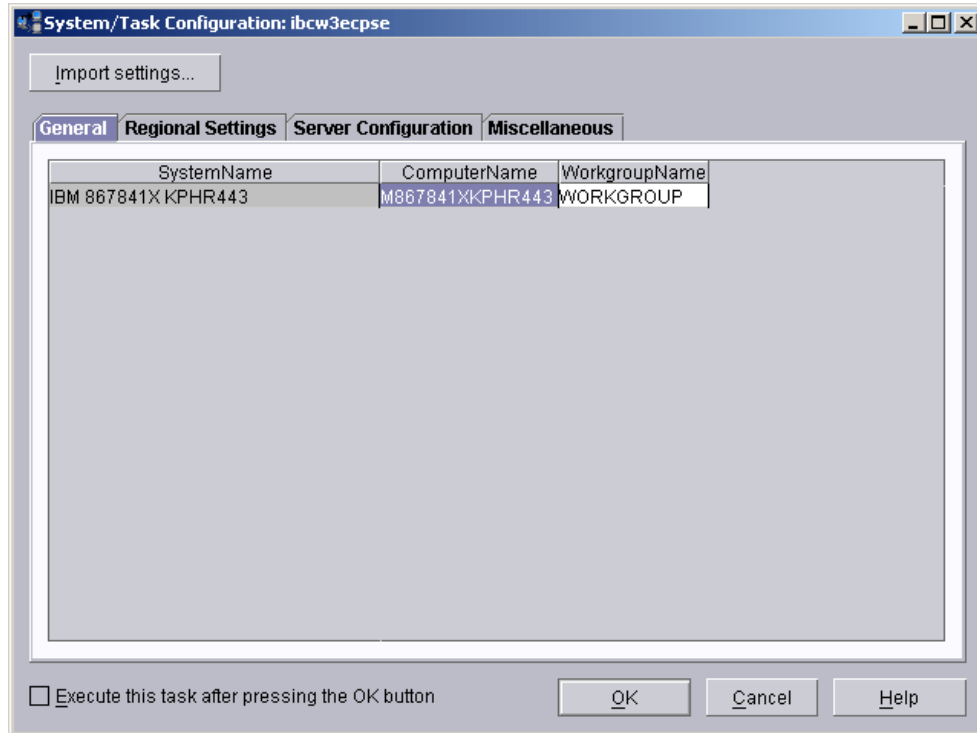
Figure 5-135   System/Task Configuration window

12. Click the field below ComputerName and type the computer name.
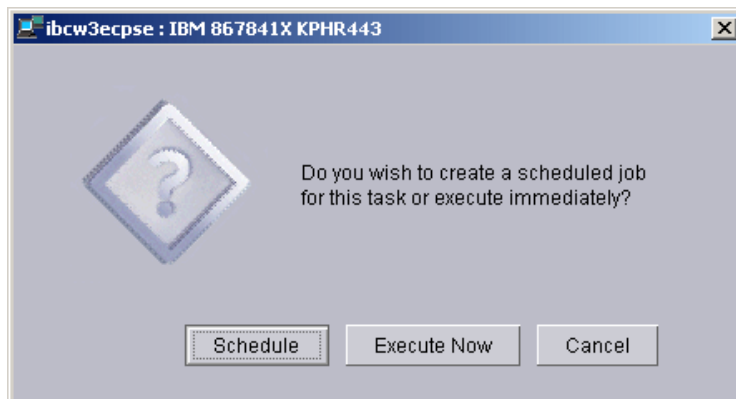
13. Check the box **Execute this task after pressing the OK button**, and click **OK**.

Figure 5-136   Scheduling job window

14. Click **Execute Now**.

15. Power up your target HS20 server and press **F1**; change the startup sequence to have Network first. Be sure to change it back after the whole image restore process is finished according to your environment standard. Save and exit the CMOS configuration.

16. Press **F12** when the onboard Broadcom Network Adapter Bios screen comes up.

Once connected to the RDM server, from the Director server console, we can see the following status windows (Figure 5-137 on page 141, Figure 5-138 on page 141, Figure 5-139 on page 141).
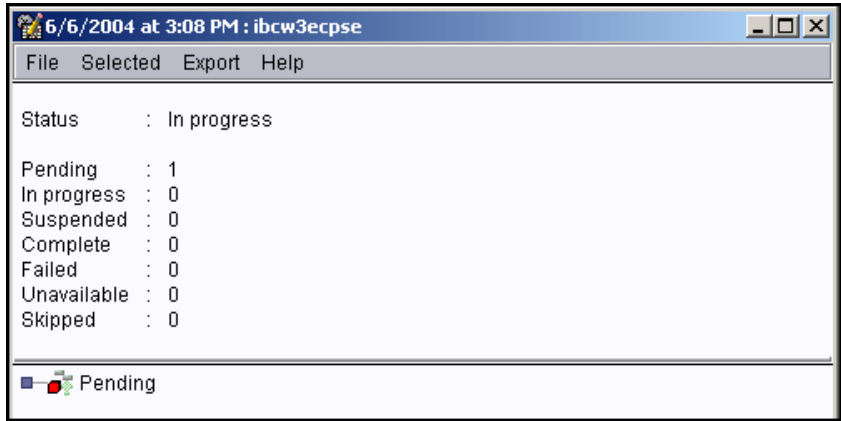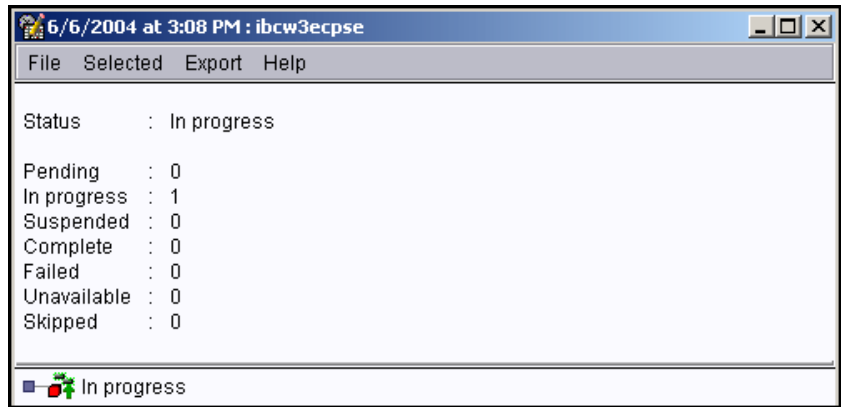
Figure 5-137   Task status for ibcw3ecpse window

Figure 5-138   Task status for ibcw3ecpse window
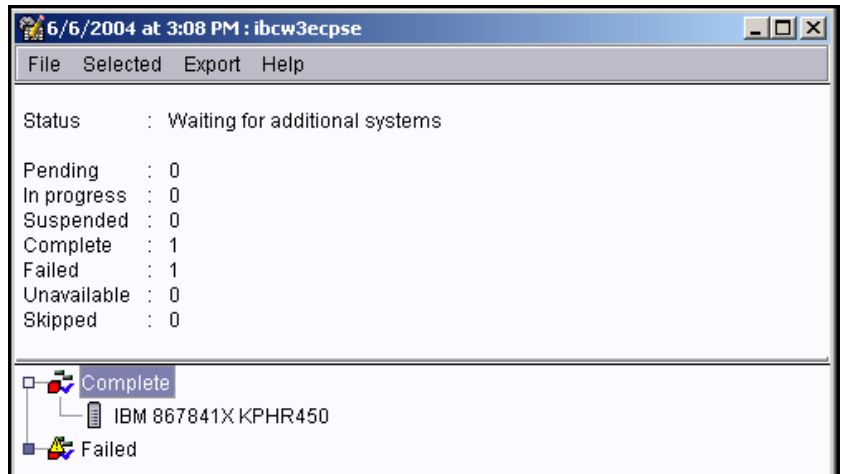

Figure 5-139   Task status for ibcw3ecpse window

17. When the process is finished, the target server should power down automatically.

5.10.2 Components deployed to an imaged Citrix server

When imaging a Citrix Server using a Microsoft SQL database, you need to modify the following files:

1. Modify c:\programfiles\Citrix\Independent Management Architecture\Mf20.dsn and remove `WSID=Blade4`; `Blade4` is the server name.

2. After the server has been imaged, you will need to modify c:\programfiles\Citrix\Independent Management Architecture\Mf20.dsn and add `WSID=Blade5`.

3. Change the registry - HKLM\SOFTWARE\Citrix\IMA. Add the `ServerHost Reg_SZ` value to your new target server name.

4. Delete the Resource Manager Local Database file on your new target server if it exists; it is used by Resource Manager. The default installation directory is in %systemdrive%\%Program Files%\Citrix\Citrix Resource Manager\LocalDB.

5. After checking and confirming that your new target server is working, change the following services back to `Automatic`:

   – Citrix XML Service
   – Independent Management Architecture
   – MetaFrame Com Server

6

Publishing applications

In this chapter, we discuss the publishing of applications to the Citrix MetaFrame Presentation Server.

6.1 Application installation and configuration

When installing an application manually on a Terminal Server, you need to change the mode of the installation. You can change the mode on the server by either using Add/Remove Programs or changing the mode at the command prompt, then installing the application. This ensures the application is being installed for a multi-user environment.

6.1.1 Manual installation

The steps below describe the process of manually installing an application on a Citrix Server.

Add/Remove Programs install

When installing an application manually on a Terminal Server, you need to change the mode of the installation. This can be accomplished with the following steps:

1. Click **Start -> Control Panel -> Add Remove Programs**. You will see a window similar to Figure 6-1.
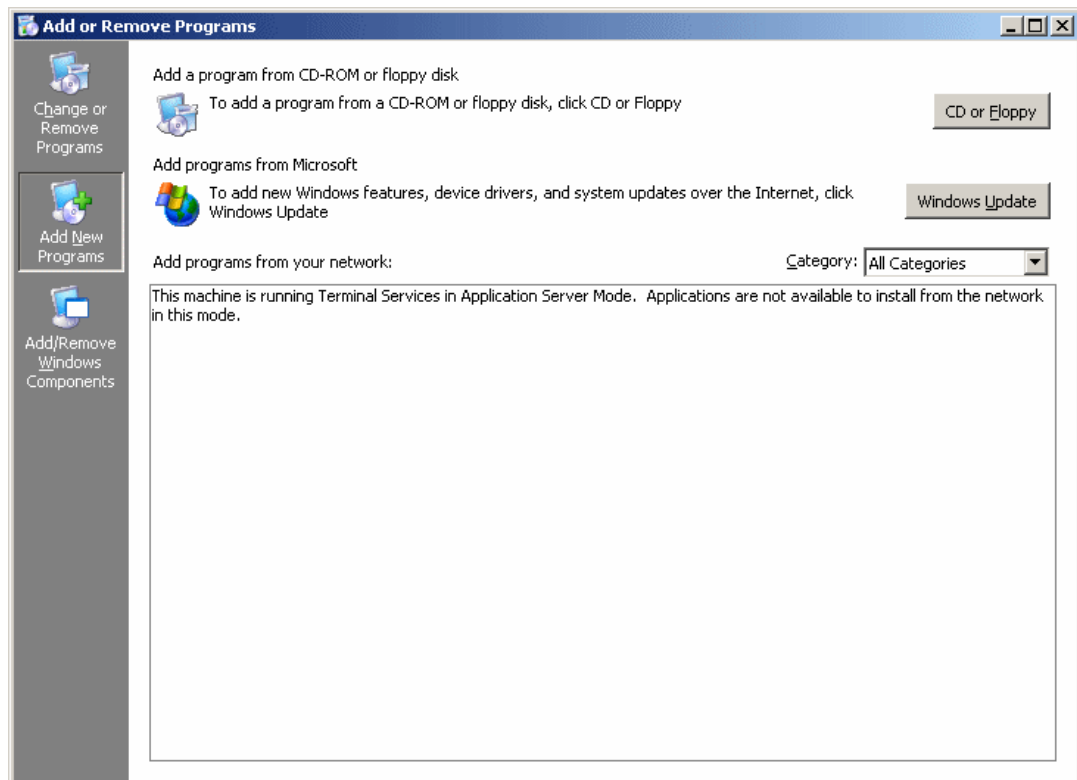

Figure 6-1   Add /Remove Programs function

2. Click **Add New Programs**.

3. Click the **CD or Floppy** button, click **Next**, navigate to the location of the application and install it.

4. Do not reboot your server! Click **Next** at the After Installation window.

5. Click **Finish** at the Finish Admin Installation window.

6. Reboot the server if required.

Command prompt installation

To change the mode of the installation via the command prompt, complete the following instructions:
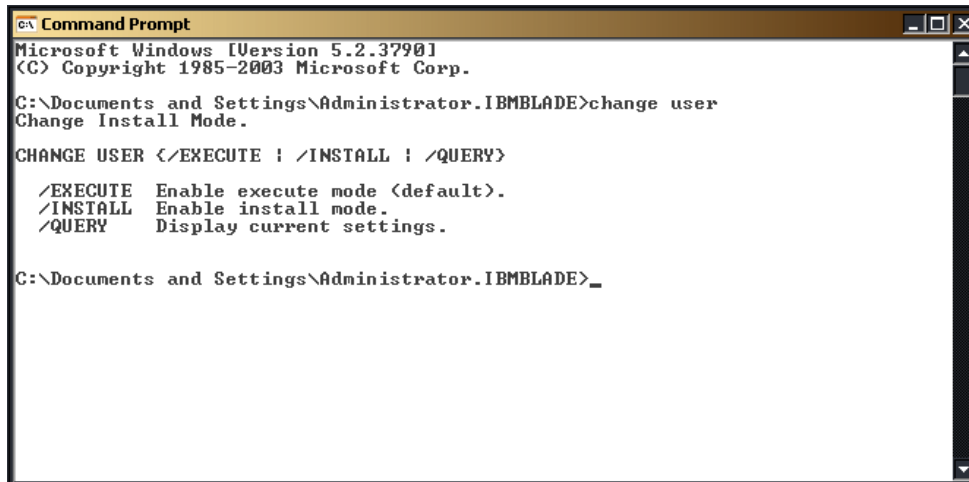
1. Prior to the installation, you need to change the mode with the following command:

   `change user /install`

2. Install the application.

3. At the completion of the installation, execute the command:

   `change user /execute`

```
Command Prompt                                              _ □ X
Microsoft Windows [Version 5.2.3790]
(C) Copyright 1985-2003 Microsoft Corp.

C:\Documents and Settings\Administrator.IBMBLADE>change user
Change Install Mode.

CHANGE USER </EXECUTE | /INSTALL | /QUERY>

  /EXECUTE   Enable execute mode (default).
  /INSTALL   Enable install mode.
  /QUERY     Display current settings.


C:\Documents and Settings\Administrator.IBMBLADE>_
```

Figure 6-2   Multi-user mode

6.1.2 Installation Manager

Installation Manager allows you to deploy Microsoft Installer (MSI) packages to servers or server groups.

The following steps outline the process of deploying an MSI pack to a server group.

1. From the Citrix MetaFrame Presentation Server Console, expand the farm. Select **Installation Manager,** then select **Packages**.
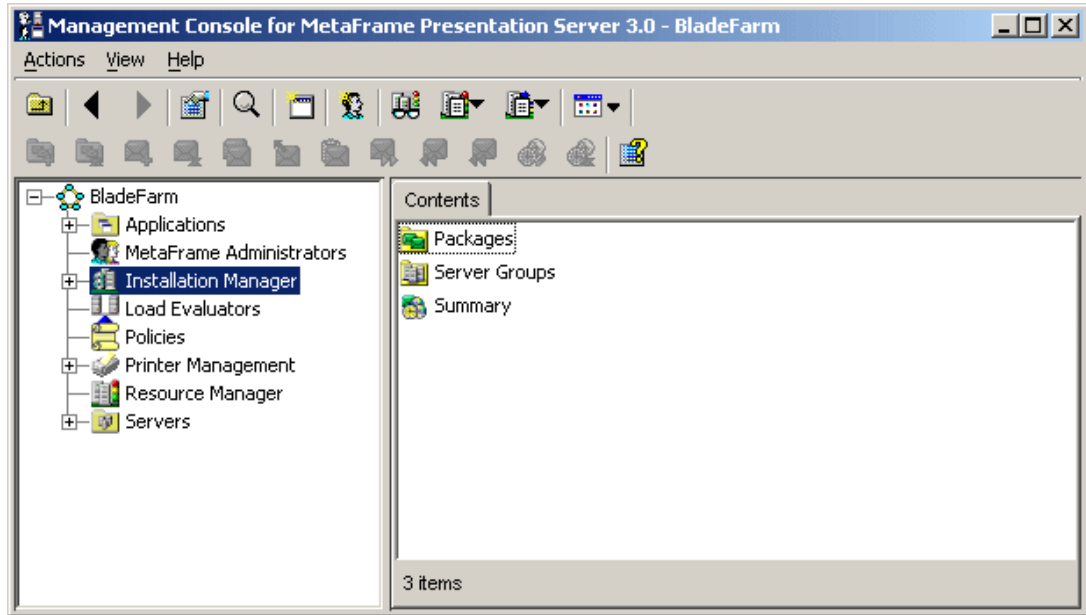
Figure 6-3   Citrix MetaFrame Presentation Server Console

2. Right-click **Packages** and select **Add Package**.

3. The first time you select **Add Package**, it will prompt you to create and specify a Network Account (see Figure 6-4).
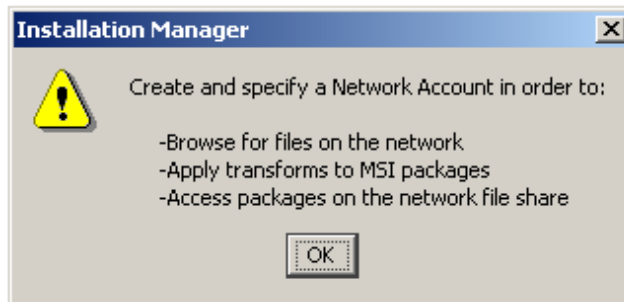

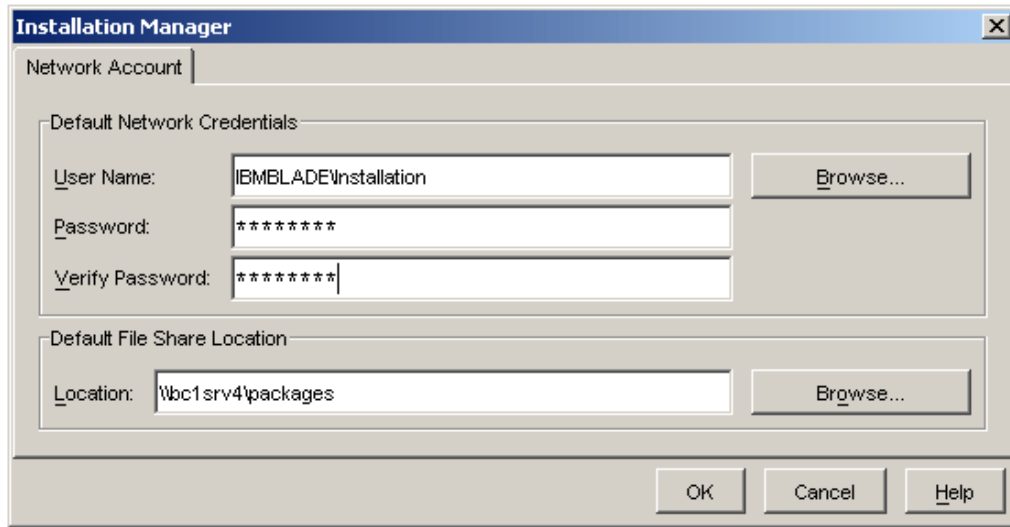*Figure 6-4   Installation Manager*

4. Click **OK**.

Figure 6-5   Installation Manager window

5. Ensure your user name and password have been entered. Click **OK**.
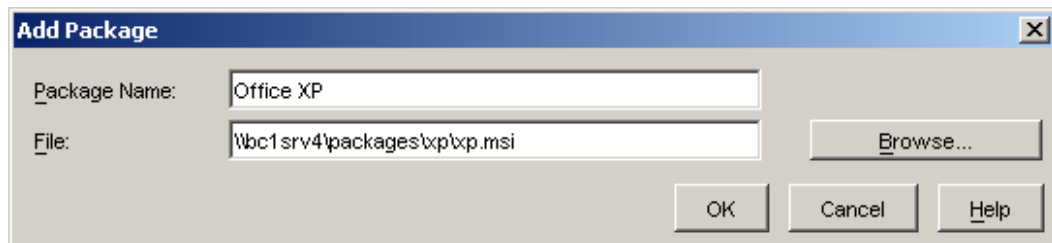

Figure 6-6   Add Package details

6. In the Add Package window, add the package name and the location where the file exists. This package is located on another server. The package is Office XP. Click **OK**.

7. If you need to add transforms or command line options, click **Yes**, then add the transform information. Otherwise, click **No**.

8. Click **OK** when the package has been added successfully.

9. Select **Packages**. Right-click the newly created package and select **Install Package**. You will see a window similar to Figure 6-7 on page 148.
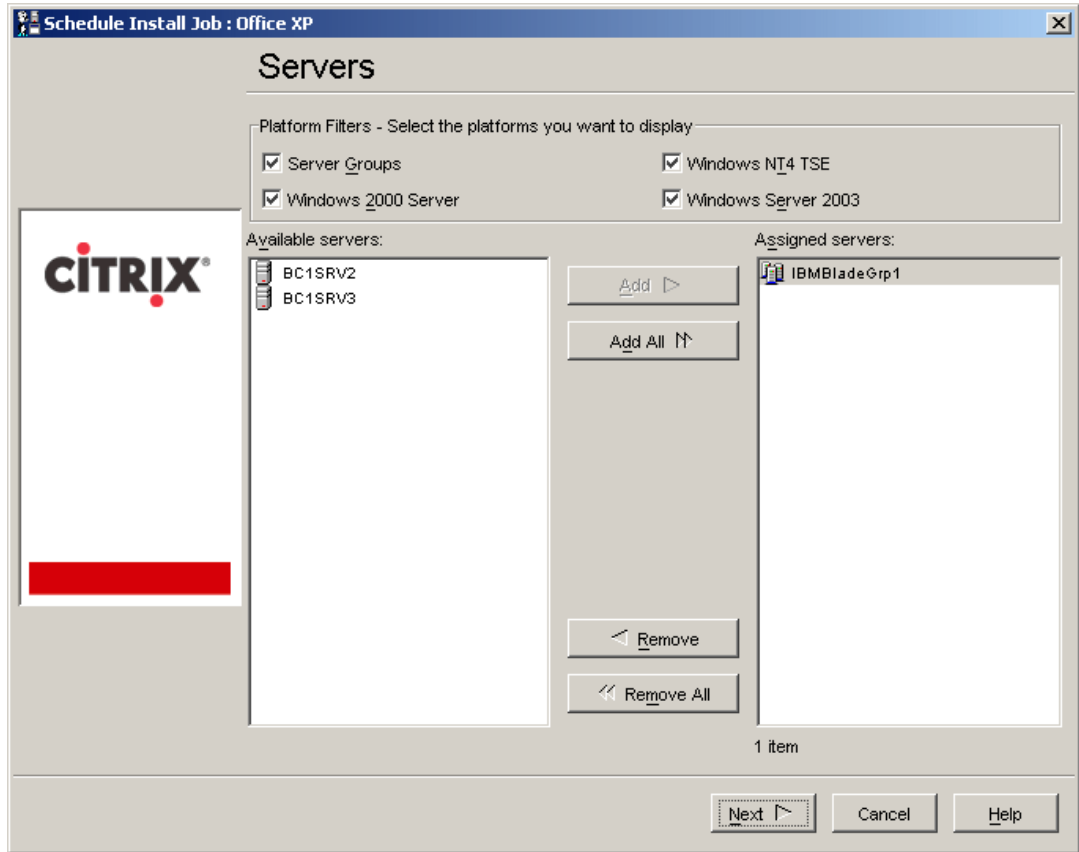
Figure 6-7   Schedule application deployment

10.In this window, you will select either the Server group or the specific server which is to receive the package; for our example, we selected Server group **IBMBladeGrp1**. Highlight **IBMBladeGrp1** and click **Add** and then click **Next**. You will see a window similar to Figure 6-8 on page 149.
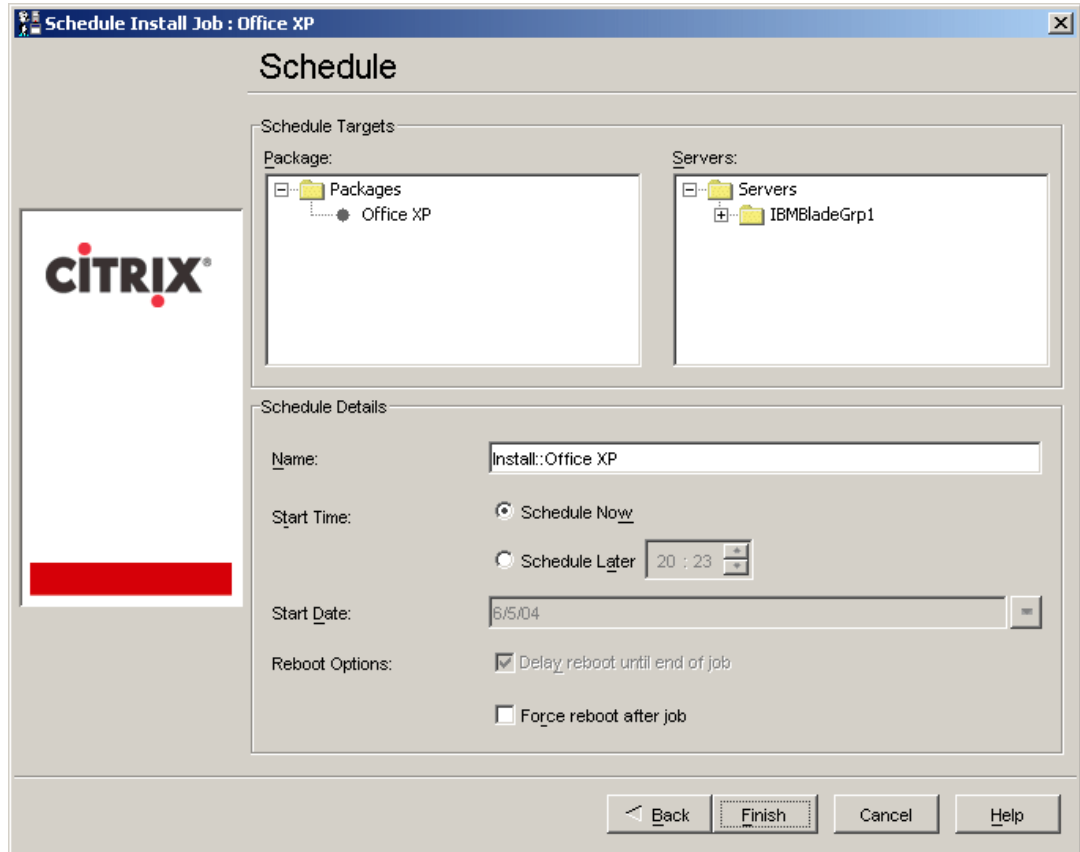
Figure 6-8   Package scheduled

11. You need to specify the time at which you require the server to receive the package; then click **Finish**.

6.1.3 Publishing an application

The final process is to publish the application and give appropriate registry security to the users of the application.

The following steps outline how to publish an application:

1. From the Citrix MetaFrame Presentation Server Console, select **Applications**. You will see a window similar to Figure 6-9 on page 150.
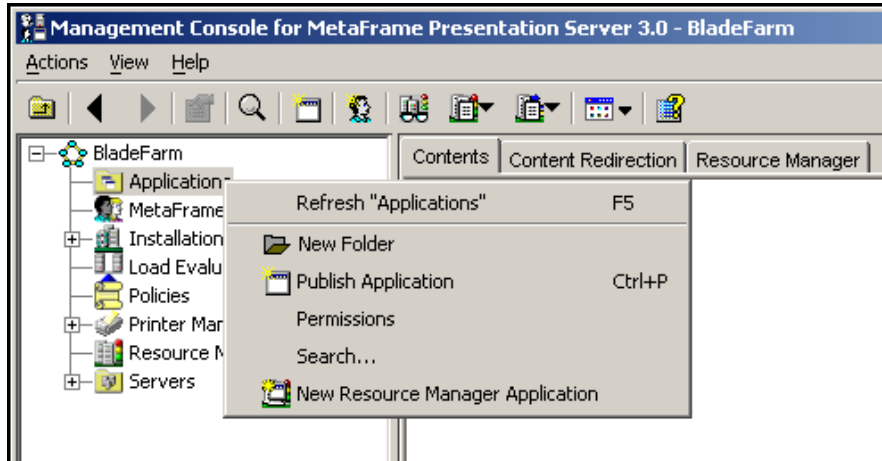
Figure 6-9   Citrix Management Console to initiate publishing an application

2. Right-click **Publish Application**. You will see a window similar to Figure 6-10.
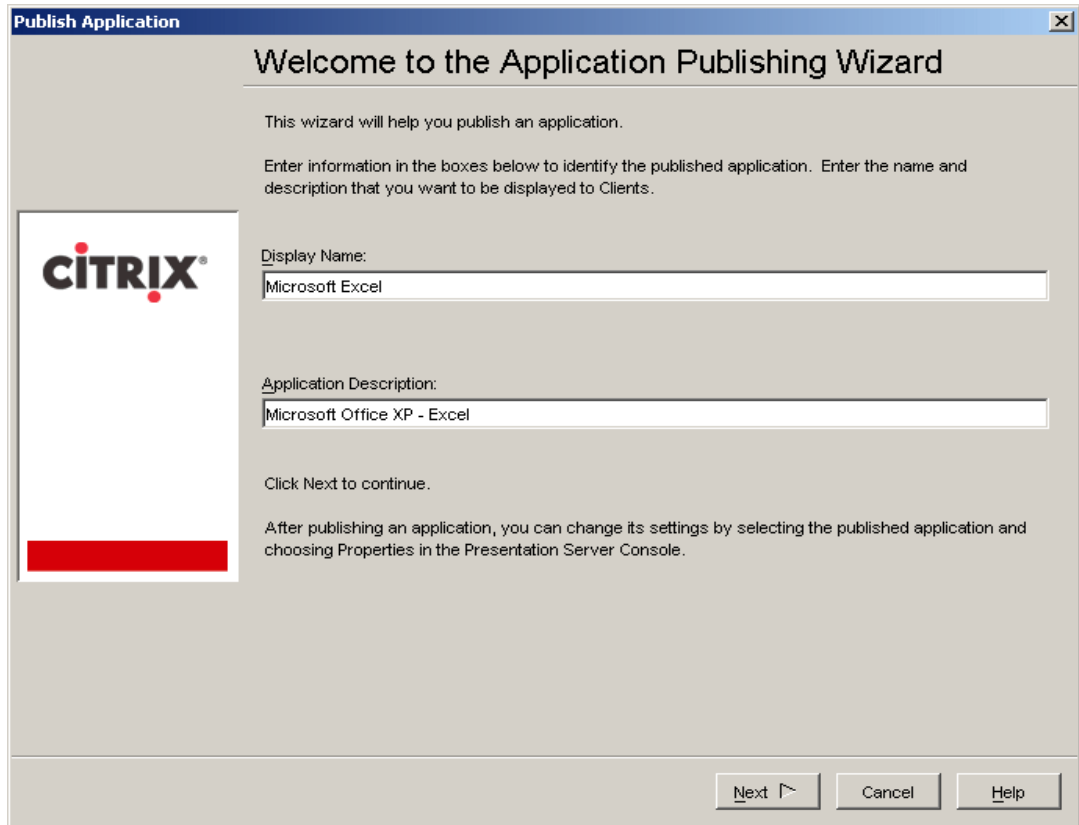

Figure 6-10   Application Publishing Wizard window

3. Enter the name of the application to be published and the description, then click **Next**. You will see a window similar to Figure 6-11 on page 151. For our example, the Display Name is `Microsoft Excel`. In the Application Description field, we typed `Microsoft Office XP - Excel`.
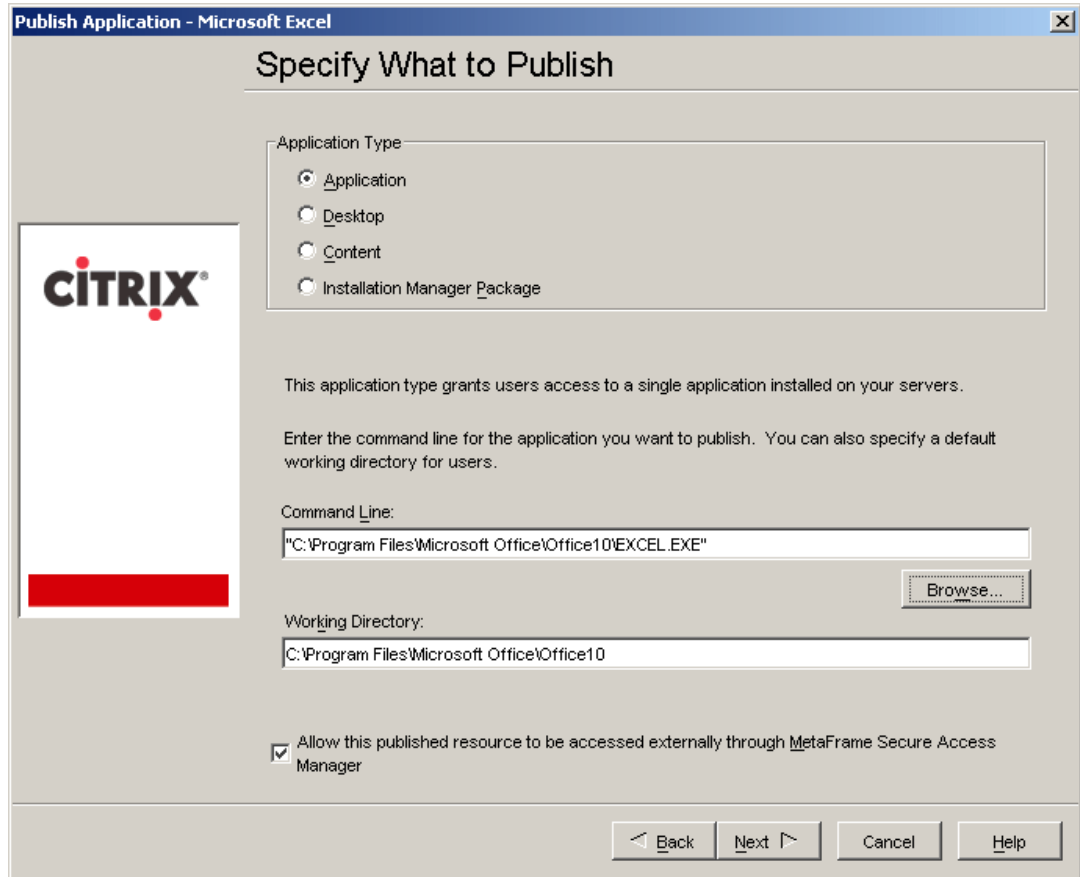
Figure 6-11   Location of the application

4. Under Application Type, ensure **Application** has been selected and the Command Line and Working Directory are correctly associated with the application.

   We accepted the default to **Allow this published resource to be accessed externally through MetaFrame Secure Access Manager**. Click **Next**.
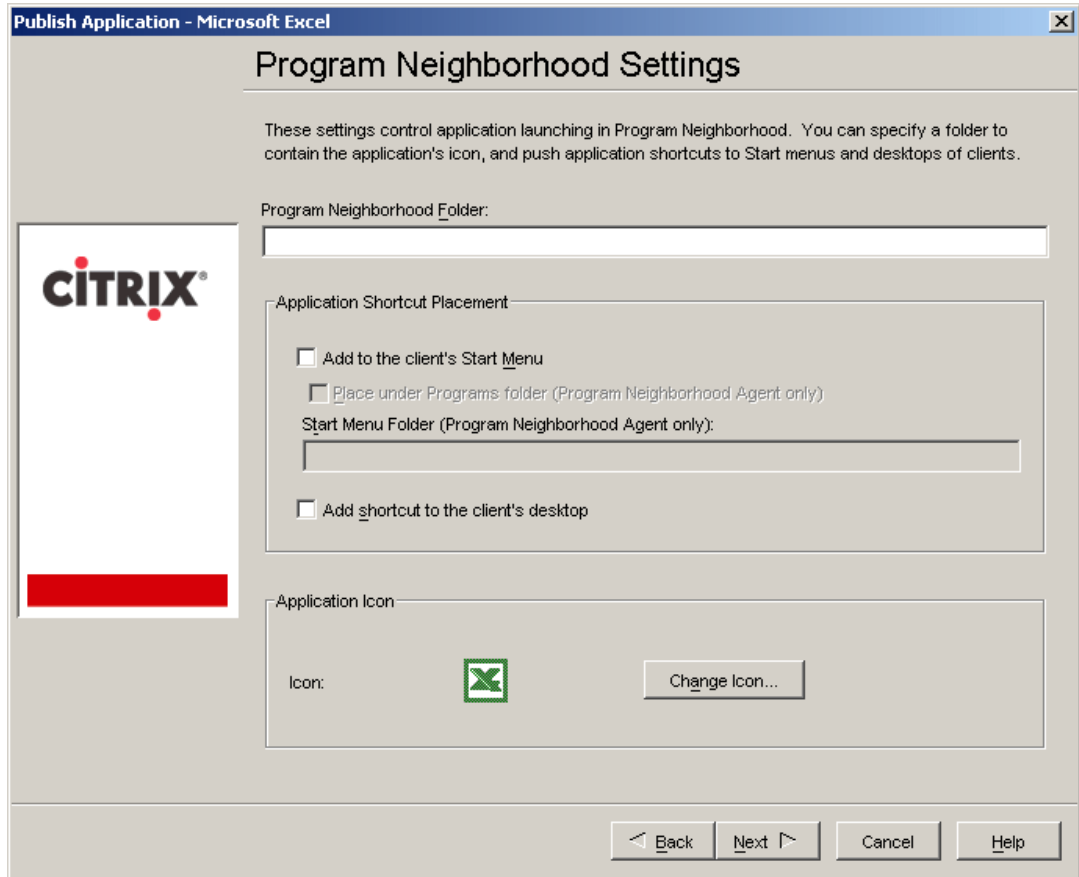
Figure 6-12   Program Neighborhood Settings window

5. In our example, we did not customize the Program Neighborhood Settings. All fields remain empty and checkboxes remained unmarked.

6. Click **Next**. You will see a window similar to Figure 6-13 on page 153.
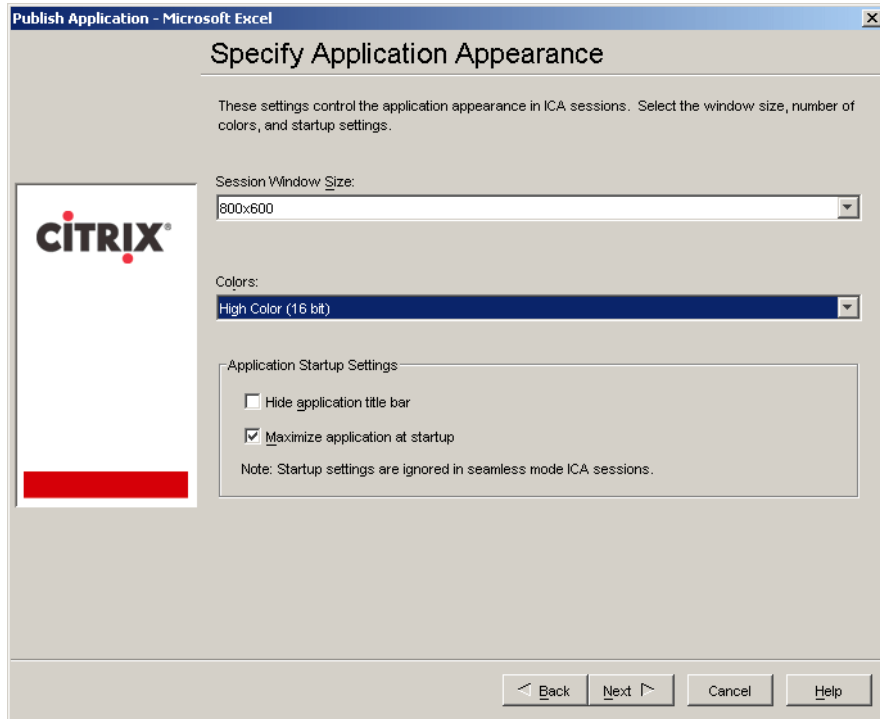
Figure 6-13   Application appearance window

7. Complete the Session Window Size and the Colors fields, then click **Next**.
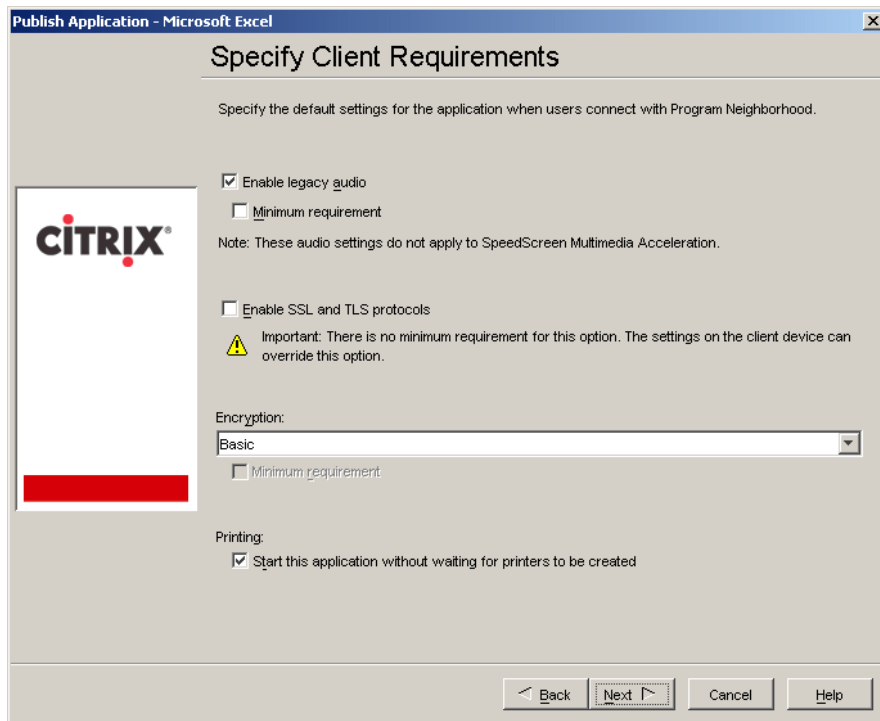

Figure 6-14   Application limits

8. Specify the ICA Client requirements. In our example, we accepted the defaults. Click **Next**.
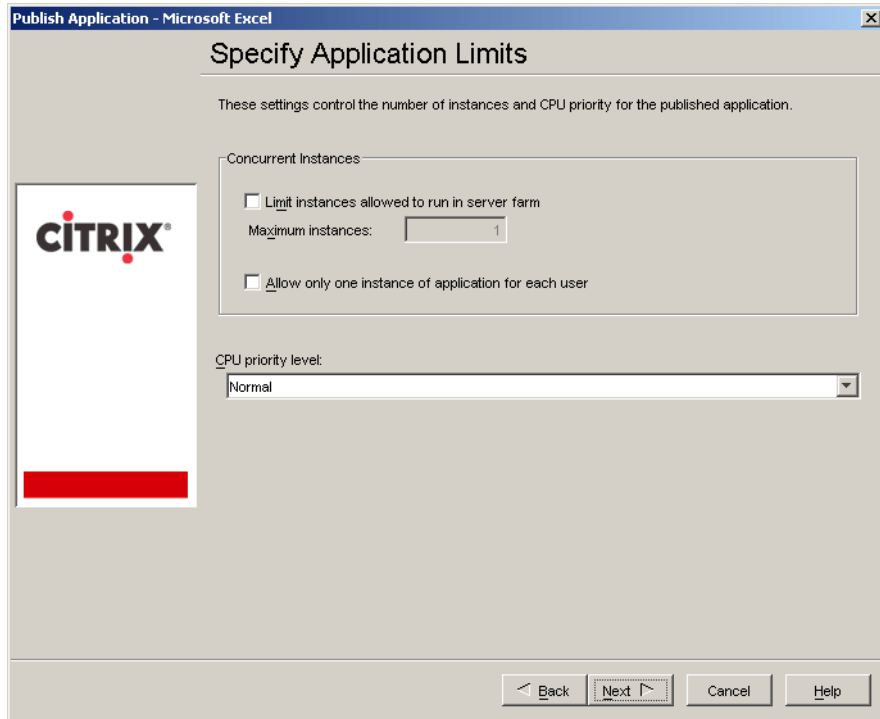
Figure 6-15   Server to publish the application

9. Specify the Concurrent Instances and the CPU level priority, then click **Next**. In our example, we accepted the defaults. You will see a window similar to Figure 6-16.
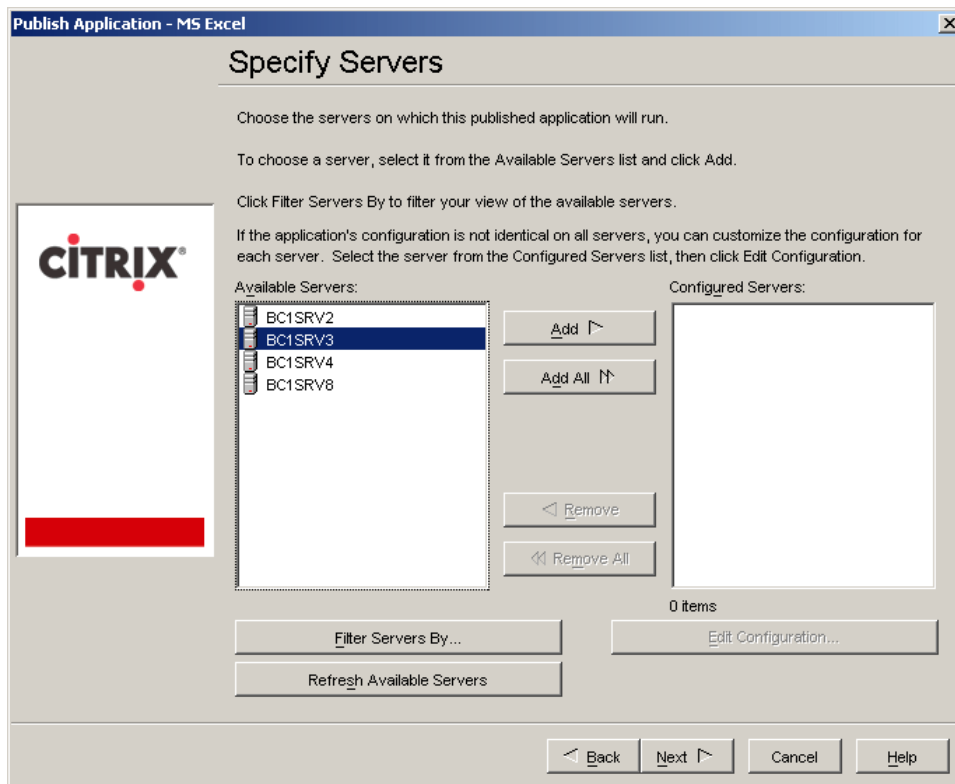

Figure 6-16   Specify Servers window

10. Specify which server will publish the application. In our example, we highlight **BC1SRV3**. Then click **Add**. BC1SRV3 has been moved under Configured Servers. Click **Next**.

Figure 6-17   Specify Users window
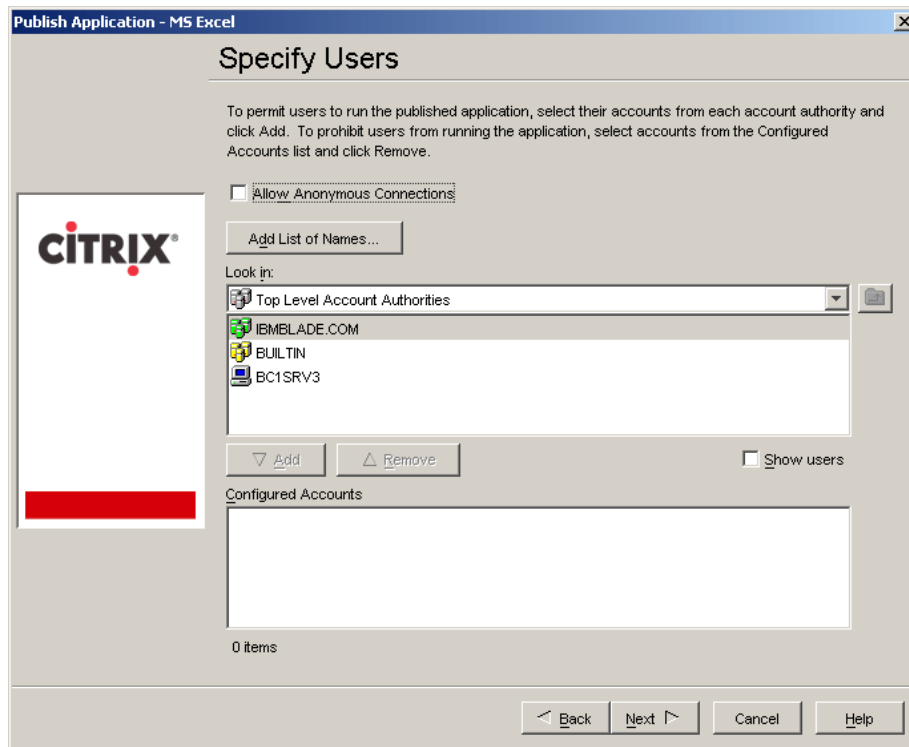
11. Specify the users and/or group which will have access to the Publish Applications. In our example, we want to give CitrixUsers global group access to Excel applications. We double-click **IBMBlade.com** and double-click organization units under the IBMBlade.com domain until we locate the CitrixUsers global group. Then we highlight the **CitrixUsers** global group and click **Add**.

Figure 6-18   Specify the users of the application
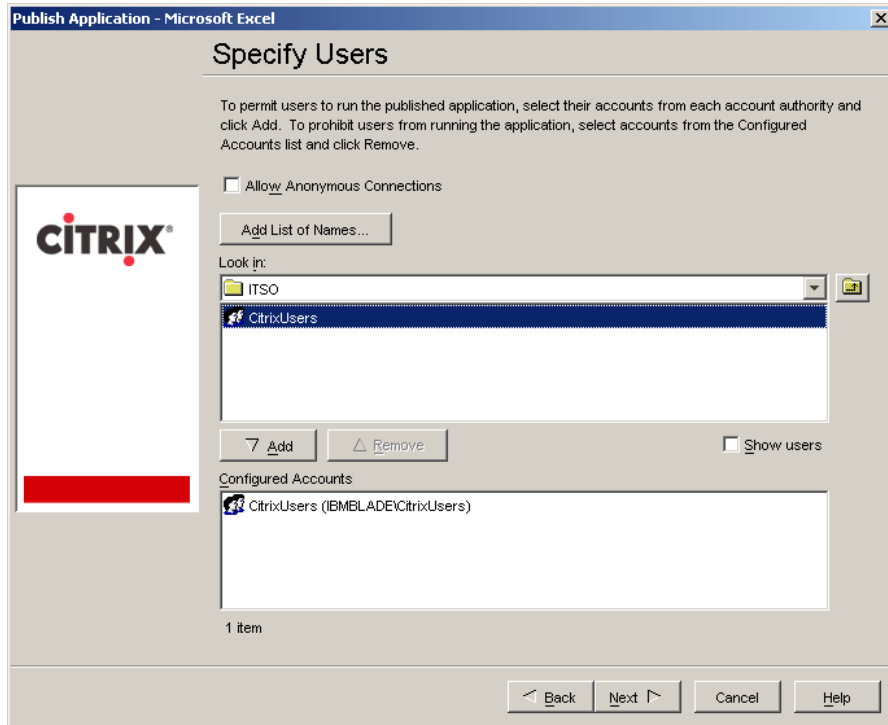
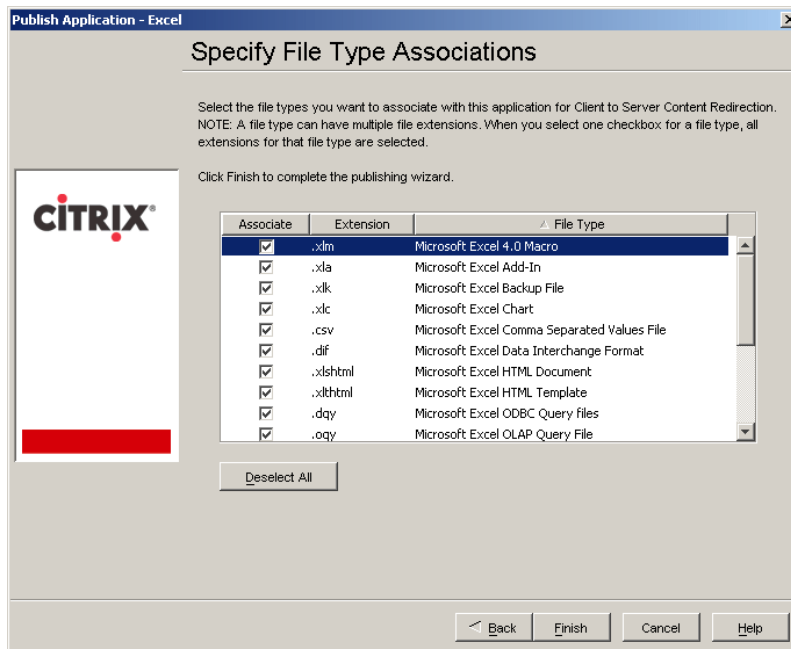12.Click **Next** and you will see a window similar to Figure 6-19.

.

Figure 6-19   File association to the application

13.Click **Select All** for those file types associated with the application. Click **Finish**.

Web Interface for MetaFrame Presentation Server

In this section, we will describe how to install Web Interface for MetaFrame Presentation Server.

7.1 Installing Web Interface for MetaFrame Presentation Server

In this example, we will install Web interface for Citrix MetaFrame Presentation Server on Blade server 4 - BC1SRV4.

Preparation:

We installed:

► Microsoft Windows 2003 Enterprise Edition, member of IBMBlade Domain
► Microsoft Terminal Services
► Microsoft SNMP
► ASP.NET
► IIS

We also ran Chkroot.cmd.

Web interface installation

Perform the following steps to install the Web interface:

1. Insert the MetaFrame Presentation Server 3.0 CD into the CD-ROM drive. Accept the defaults and click **Next** for the Prerequisites Installation, Select Components and Warning window.
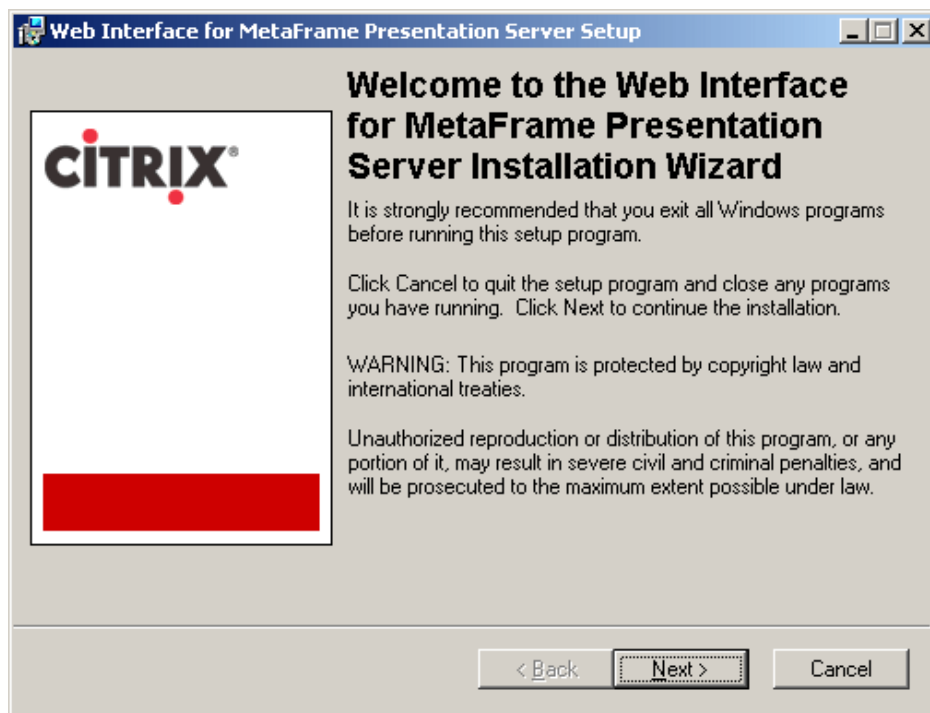
Figure 7-1   Web Interface welcome window

2. Click **Next**.

3. Read and accept the License Agreement. Click **Next**.
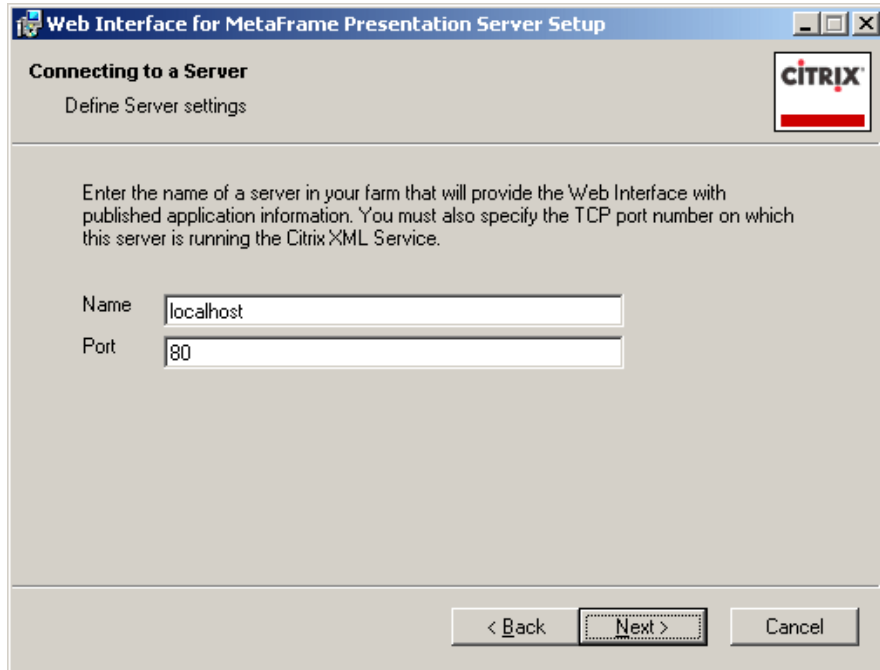
Figure 7-2   Connecting to a Server window

4. On the Connecting to a Server window, accept the default for Name and Port, for example, localhost and 80. Click **Next**.
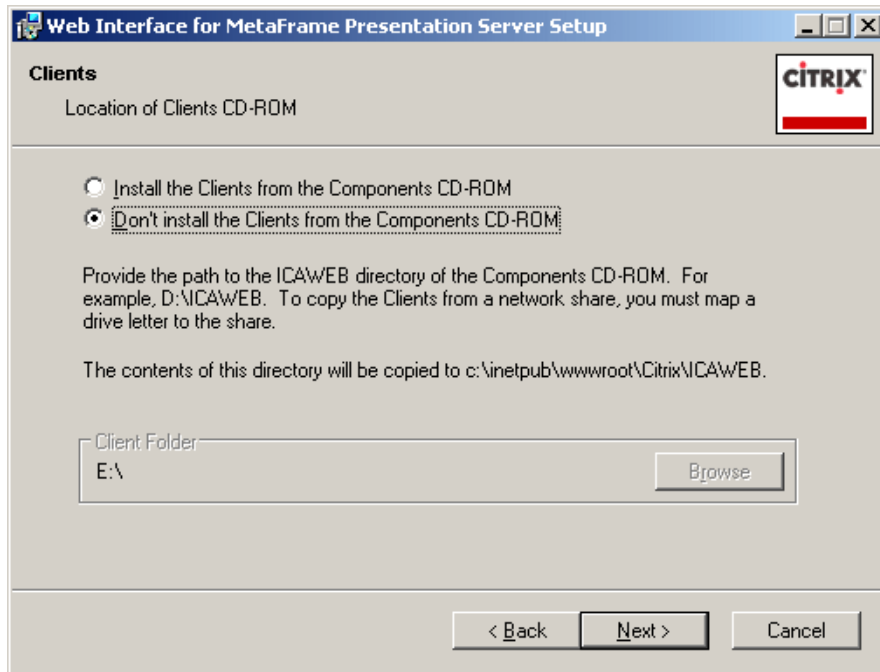
Figure 7-3   Clients window

5. In the Clients window, accept the default (`Don't install the Clients from the Component CD-ROM`). Click **Next**.
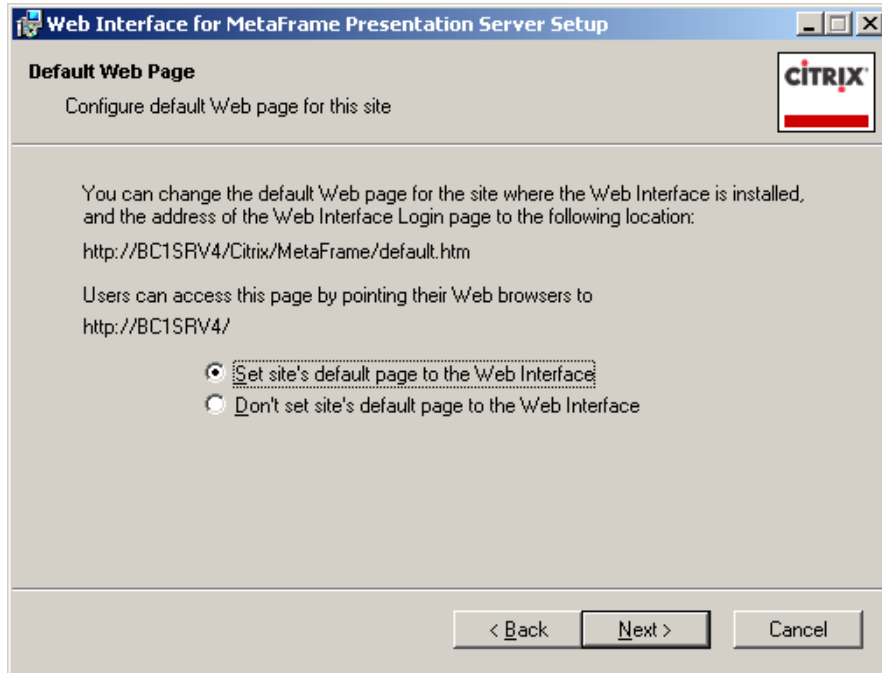
Figure 7-4   Default Web Page window

6. Accept the default Set site's default page to the Web Interface. Click **Next**.

7. When you are ready to install the application window, click **Next**.

8. Click **Finish** when the Web Interface for MetaFrame Presentation Server has been successfully installed.

9. Click **Next** in the Welcome to the Citrix MetaFrame Presentation Server for Windows Setup window.

10. Read and accept the License Agreement. Click **Next**.

11. Select **Enterprise Edition**. Click **Next**.

Figure 7-5   Component selection window

12. Select **Entire feature will be** *unavailable* **for Program Neighborhood**.

13. Select **Entire feature will be install on local hard disk for Program Neighborhood agent**.

Figure 7-6   Server Address for the Pass-Through Client window

14. Accept the default `localhost` on the Server Address for the Pass-Through Client window, then click **Next**.
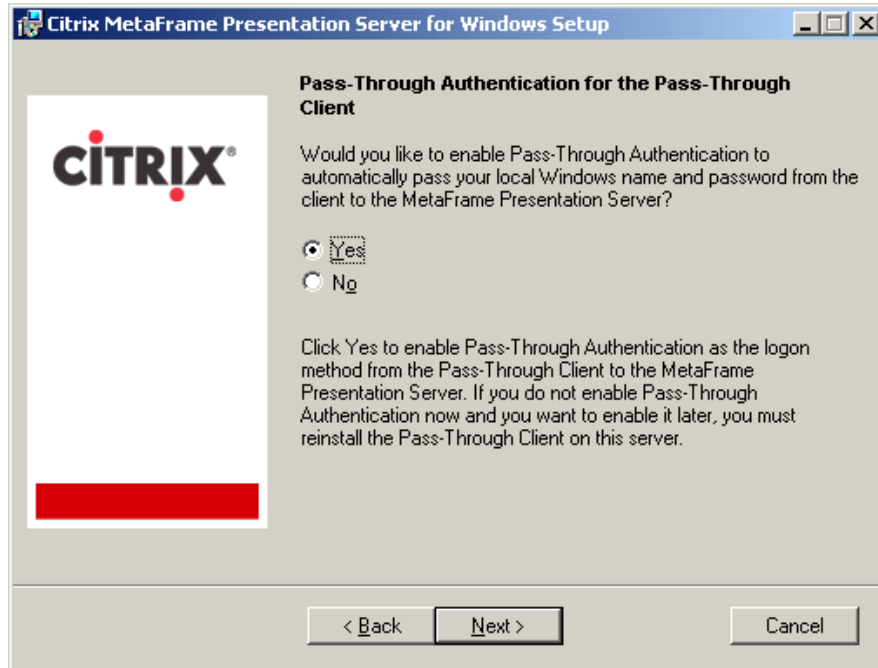
Figure 7-7   Pass-Through Authentication for the Pass-Through Client window

15. To enable Pass-Through Authentication for the Pass-Through Client, click **Yes**. Click **Next**.

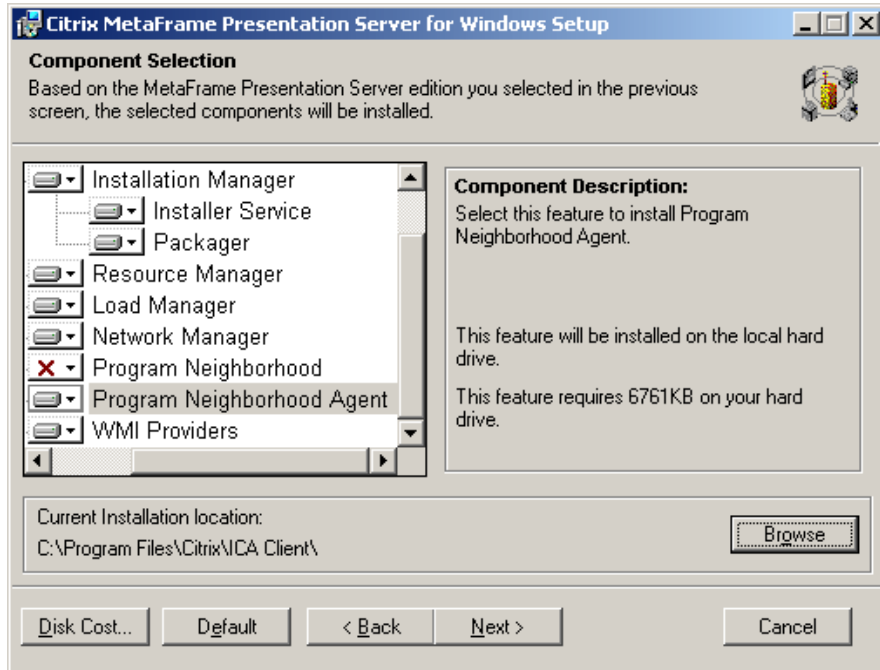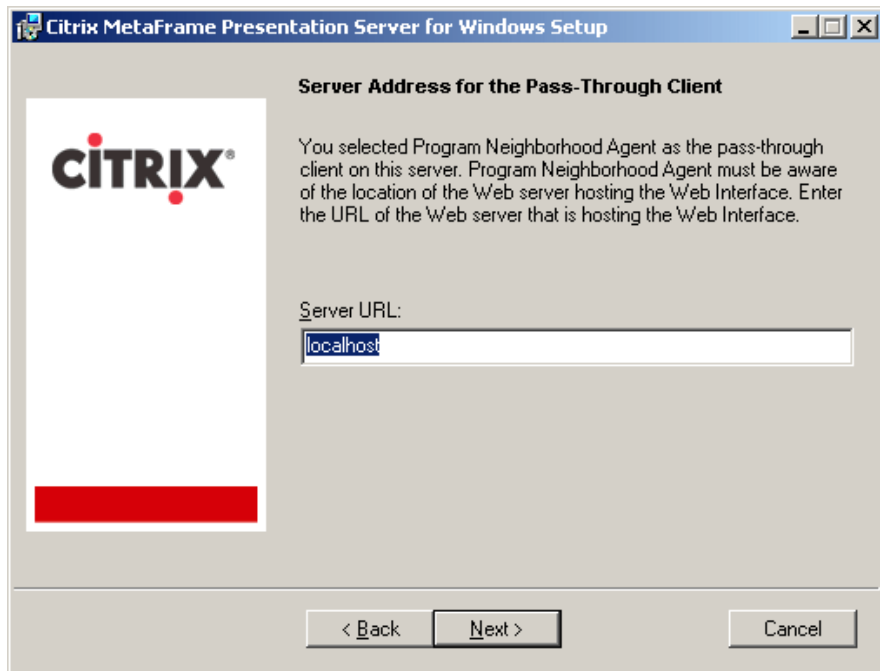16. Click **Join an existing farm** and click **Next**.

17. Select **Connect directly to the database using ODBC & use default zone name**. Click **Next**.

18. On the Create a New Data Source to SQL windows:

   a. Fill in a description for the data source and type in the server name of the SQL server running Citrix DB, then click **Next**.

   b. Select **SQL Server Authentication**.

      i. Type in the login ID and password that are defined in SQL as the owner of the Citrix database.

      ii. Click **Client configuration**. Click **TCP/IP**, then click **OK**.

      iii. Click **Next**.

      iv. Click **Finish**.

   c. Click **Test Data Source**.

   d. Click **OK**, then click **OK** again.

19. Click **Next** in the Identify Citrix License Server window.

20. Click **Yes** in the warning window.

21. Click **Next** in the Configure Shadowing window.

22. Click **Next** to share teh default TCP/IP port with Internet Information Server.

23. Click **Skip this step, and add users later** and deselect the box to **Add Anonymous users**.

24. Click **Next**.

25. Click **Finish** in the Review Your Selections window.
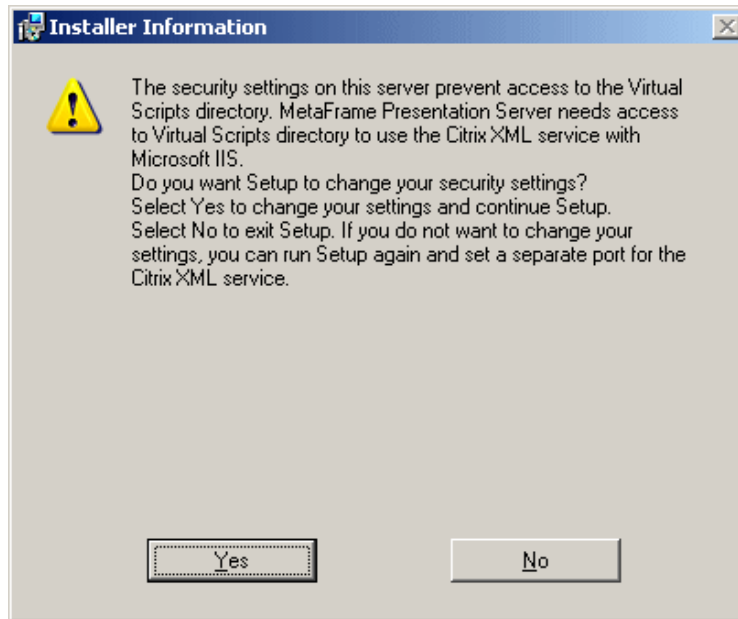
Figure 7-8   Setup security settings window

26. Click **Yes** in the Installer window.

27. Deselect **View the Readme file**. At the *Citrix MetaFrame Presentation Server for Windows has been successfully installed* window, click **Close**.

28. Continue with the installation of the MetaFrame Access Suite console, Management Console for MetaFrame Presentation Server 3.0 Document Center.

29. Click **Finish** in the Installation Summary window.

30. Click **Yes** to restart the system.

Web Interface requirement on MetaFrame Presentation Server and Client

For detail information, please refer to the Web Interface for MetaFrame Presentation Server guide.

Workspace Control

This new feature in MetaFrame Presentation Servers requires Client version 8.0 or higher. It gives users the ability to:

► Disconnect from all running publish applications
► Reconnect to publish applications
► Log off from all running publish applications

Web Interface Console for Presentation Server
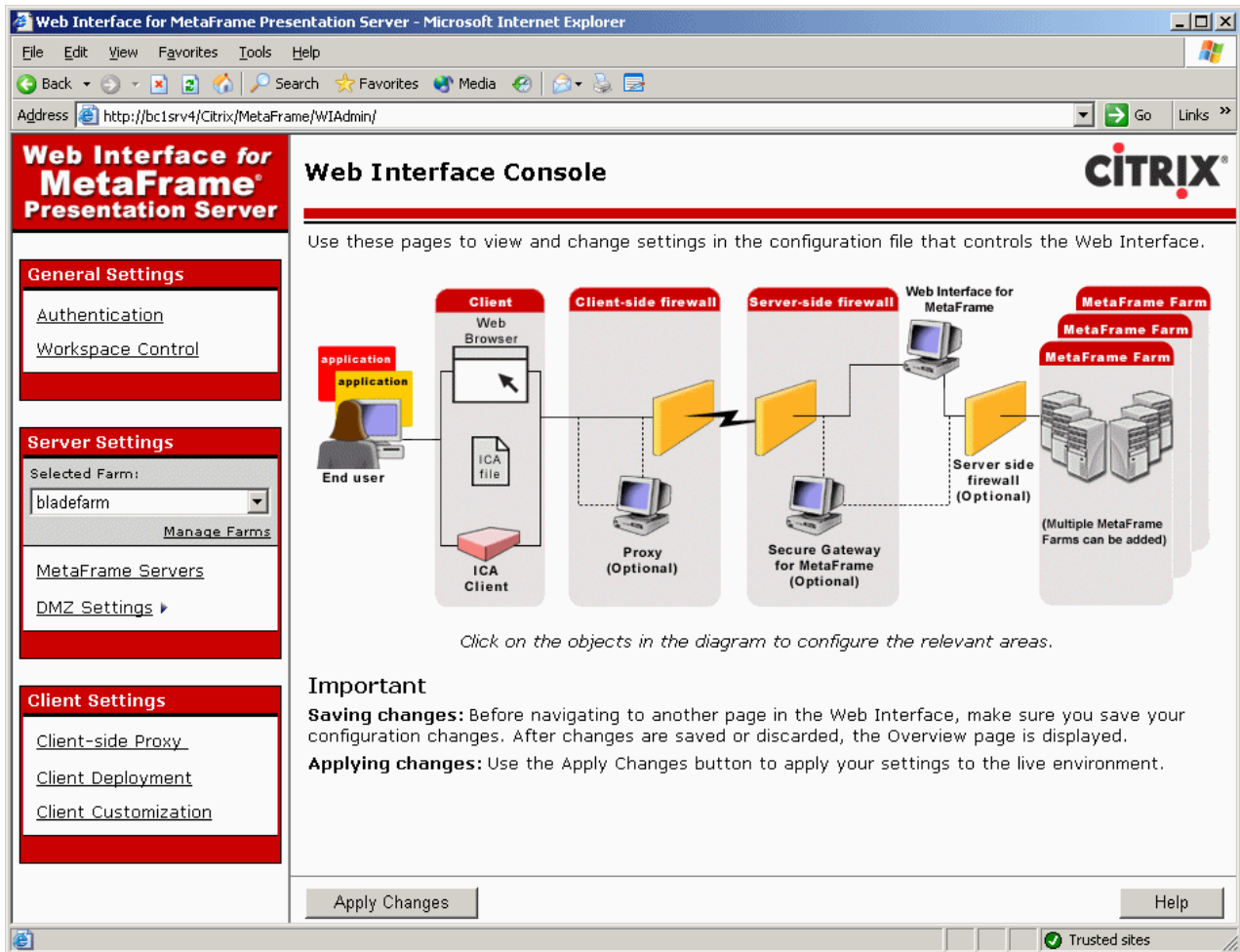
Figure 7-9   Web Interface Console sample window

- ► This gives administrators the ability to perform the administration and configuration of Web Interface in a graphical interface. You can :
  - – Perform authentication configuration
  - – Perform Workspace Control configuration
  - – Add or remove a farm for Web Interface access configuration
  - – Add or remove MetaFrame servers for communication between Web Interface and configure ports and transport types
  - – Configure how Web Interface interacts with clients and Secure Gateway such as in Network Address Translation, port to use to communicate through firewalls and Secure Ticket Authority listing
  - – Configure specific client settings, client deployment and customization, such as:
    - • The need to configure a proxy when clients access Web Interface applications on MetaFrame servers.
    - • The choice of launching a publish application on Web Interface using a supported version of the local client, native embedded client (ActiveX or Netscape), Client for Java and embedded Remote Desktop Connection software, provided users are using a supported version of Web browser.

- The ability to allow or disallow the users to override window size, color and audio quality.

Alternatively, the administrator can use the Web Interface configuration file or Web server scripts and Java servlets.

The following figure shows a sample window which appears when clients access Web Interface for Presentation Server.
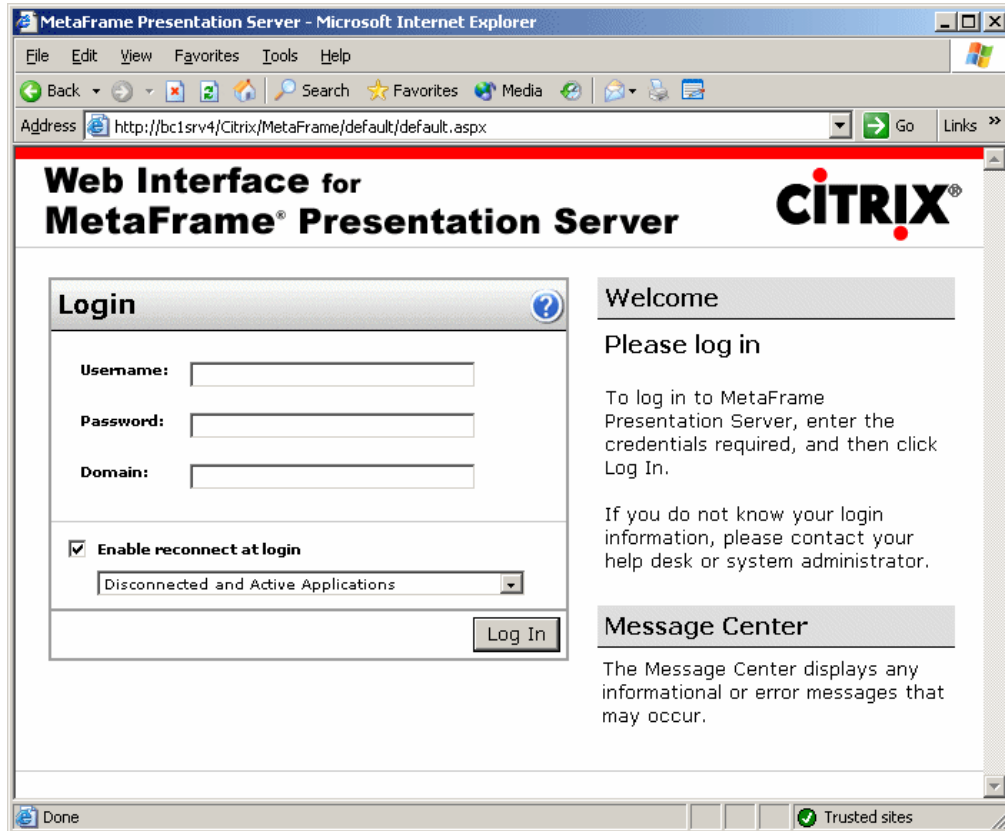

Figure 7-10   Web Interface window

8

Citrix Conferencing Manager installation

In this chapter, we discuss the installation of Citrix Conferencing Manager.

Citrix Conferencing Manager 3.0

In this example, we install Citrix Conferencing Manager 3.0 on Blade server 2 - BC1SRV2.

This is a full installation on one blade server with the following components selected:

► MetaFrame Conferencing Manager User Interface
► Conference Room
► Conference Organizer Service
► External Conference Service
► Guest Attendee Web Interface

In our lab scenario example, we move this server to a separate container in Windows Server 2003 Active Directory for easier security lockdown because:

► It has External Conference Service installed.

► It has Guest Attendee Web Interface installed.

► It also creates x number of users based on your selections of how many guest attendees are allowed and the group to which these users belongs.

   Depending on your Active Directory design, it may help with your group policies to control these objects more easily.

Preparation:
We installed:

► Microsoft Windows 2003 Enterprise Edition, member of the IBMBlade Domain
► Microsoft Terminal Services
► Microsoft SNMP
► ASP.NET
► IIS
► Ran Chkroot.cmd
► Citrix MetaFrame Presentation Server 3.0 - Enterprise Edition
► Pass-through Enabled
► Program Neighborhood
► MetaFrame Access Suite Console
► Presentation Server Console
► MetaFrame Presentation Server Client Distribution
► Web Interface for MetaFrame Presentation Server

Installing Citrix Conferencing Manager 3.0

Below are the steps to install Citrix Conferencing Manager 3.0 to BC1SRV2.

1. Insert the MetaFrame Component CD into the CD-ROM drive.
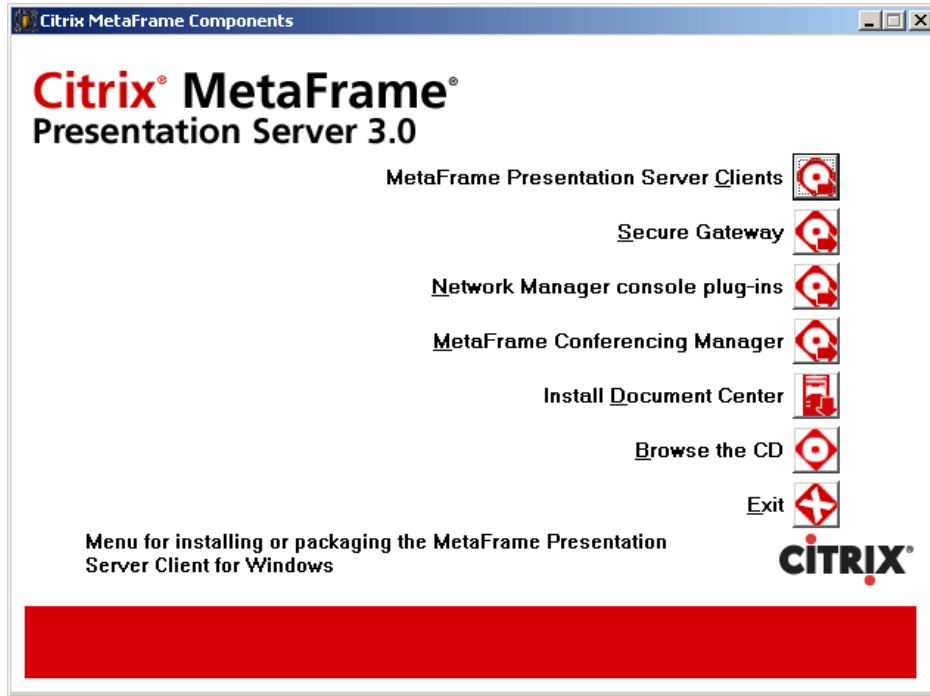
Figure 8-1   Presentation Server window

2. Click **MetaFrame Conferencing Manager**.
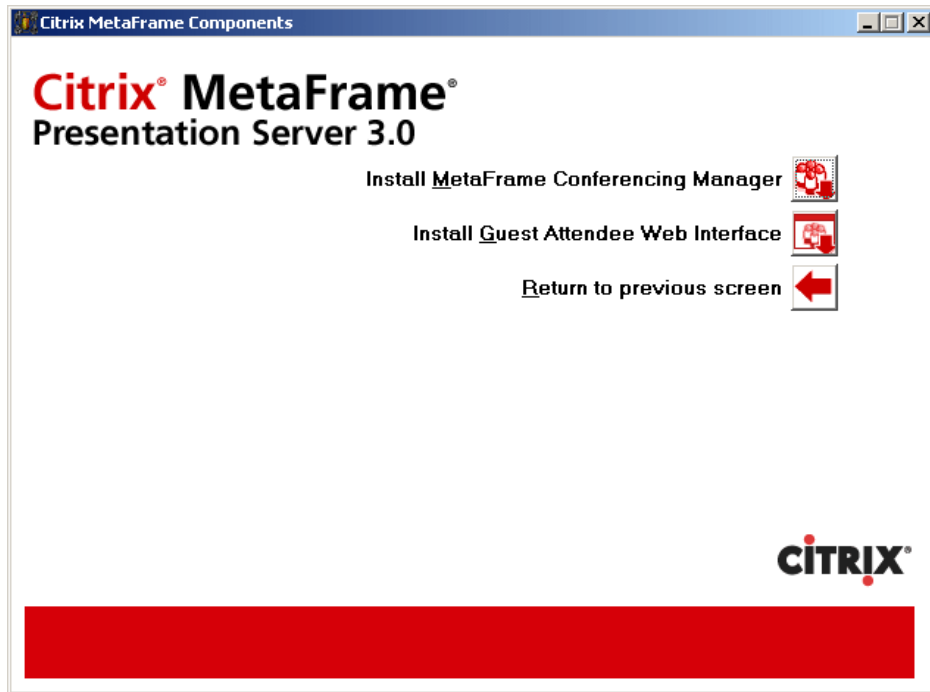
Figure 8-2   Presentation Server window

3. Click **Install MetaFrame Conferencing Manager**.
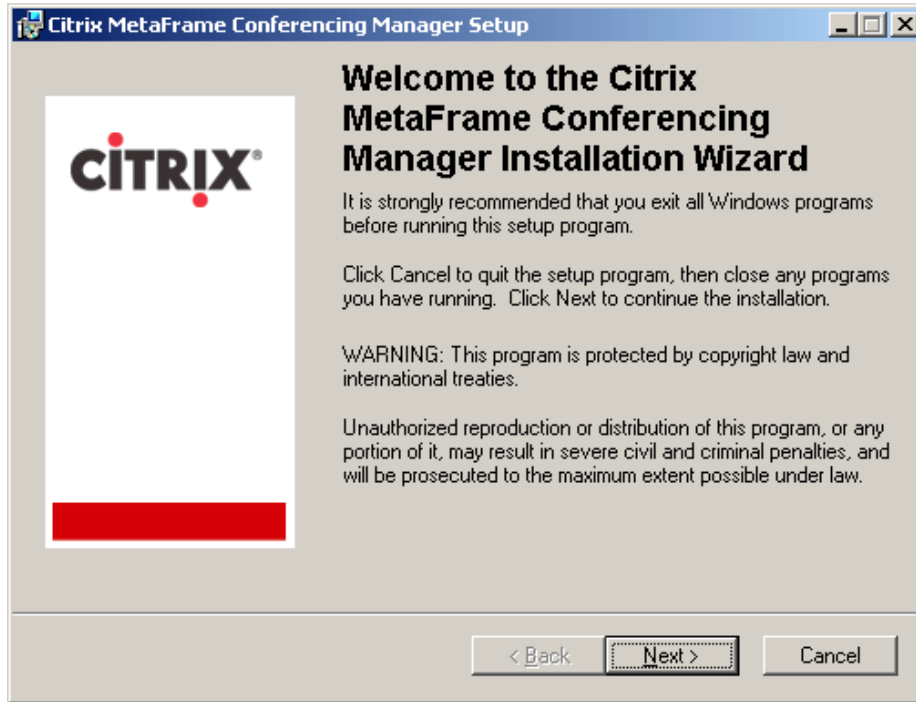
Figure 8-3   MetaFrame Conferencing Manager Installation Wizard window

4. At the Welcome to the Citrix Conferencing Manager Installation Wizard window, click **Next**.

5. Read and accept the License Agreement. Click **Next**.

6. Accept the default destination folder. Click **Next**.
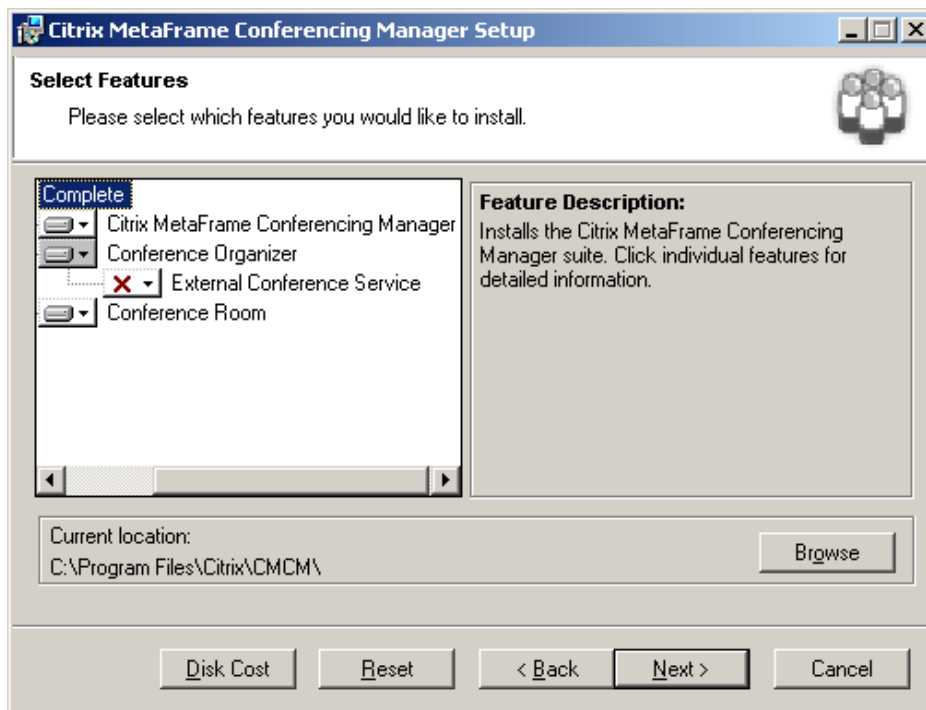
Figure 8-4   Select Features window

7. In this example, click **Complete** and select **Entire feature will be installed on the local hard drive**. Click **Next**.
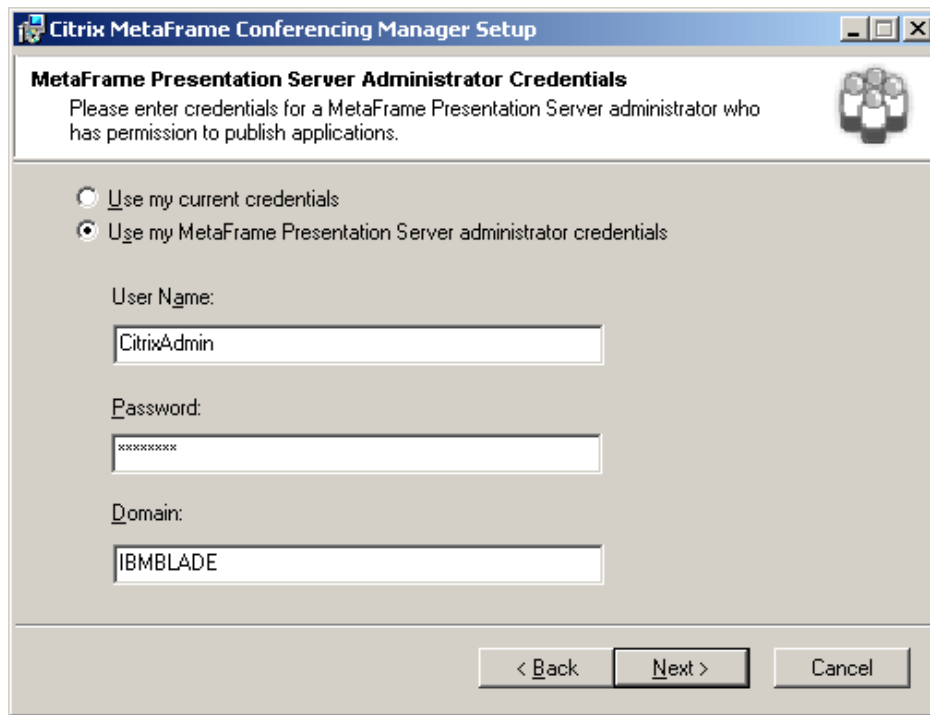
Figure 8-5   MetaFrame Presentation Server Administrator Credentials window

8. On the MetaFrame Presentation Server Administrator Credentials window, we select **Use my MetaFrame Presentation Server administrator credentials** and use the user ID CitrixAdmin that we created earlier. Click **Next**.

9. Click **Next** in the Ready to Install the Applications window.

10. Click **Finish**. The Conference Organizer window will automatically appear.
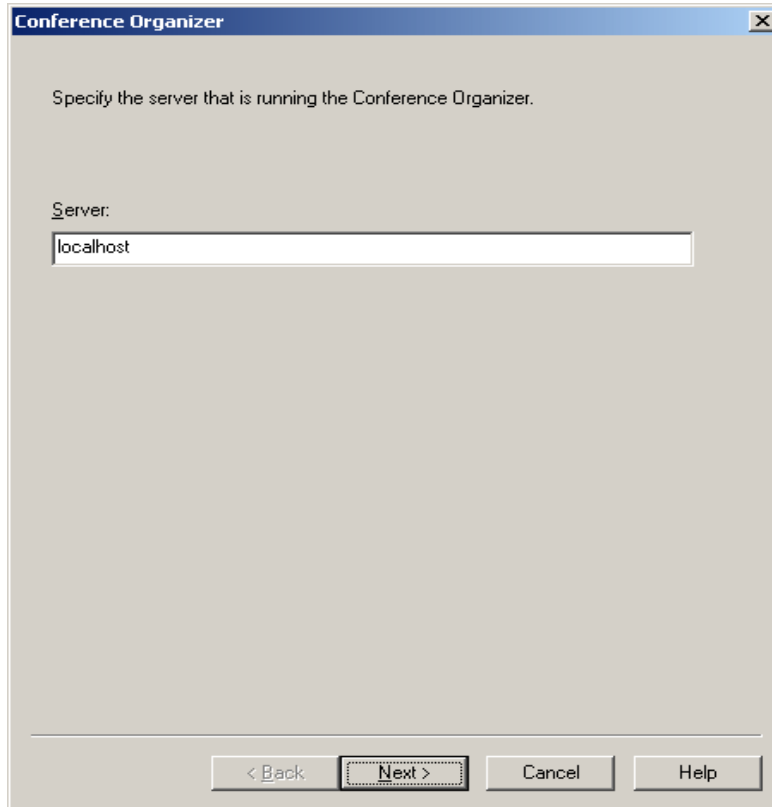
Figure 8-6   Conference Organizer window

11.In the Specify the server that is running the Conference Organizer window, change the server field from localhost to the name of your server in Fully Qualified Domain Name (FQDN) format. In our example, this is `bc1srv2.ibmblade.com`.

12.Click **Next**.
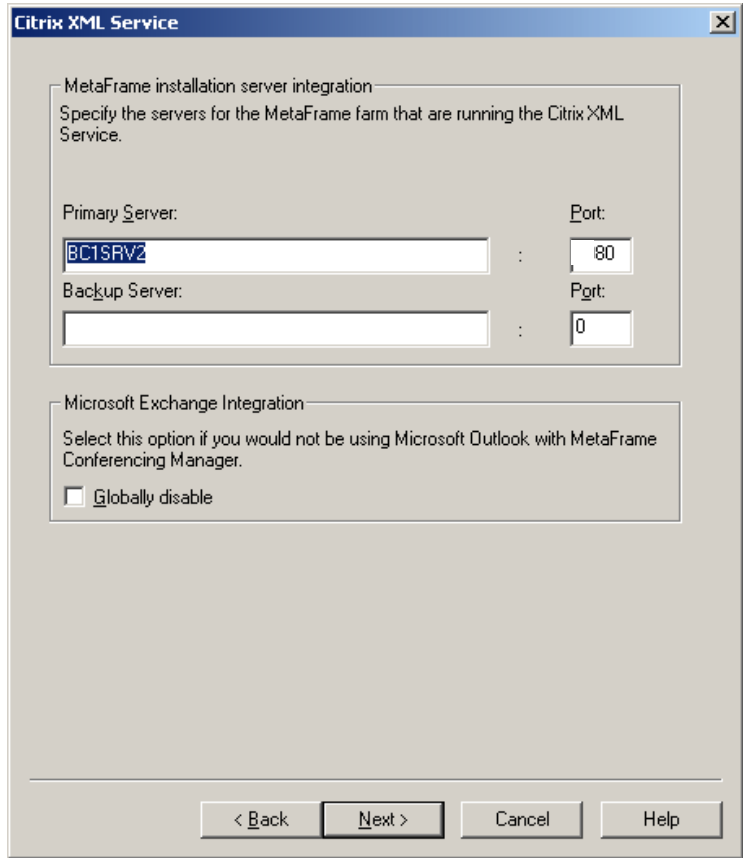
Figure 8-7   MetaFrame installation server integration window

13. In the window shown in Figure 8-7, we change the port to 80 since we are using the default Citrix XML port, which is port 80. We leave the check box blank. Click **Next**.
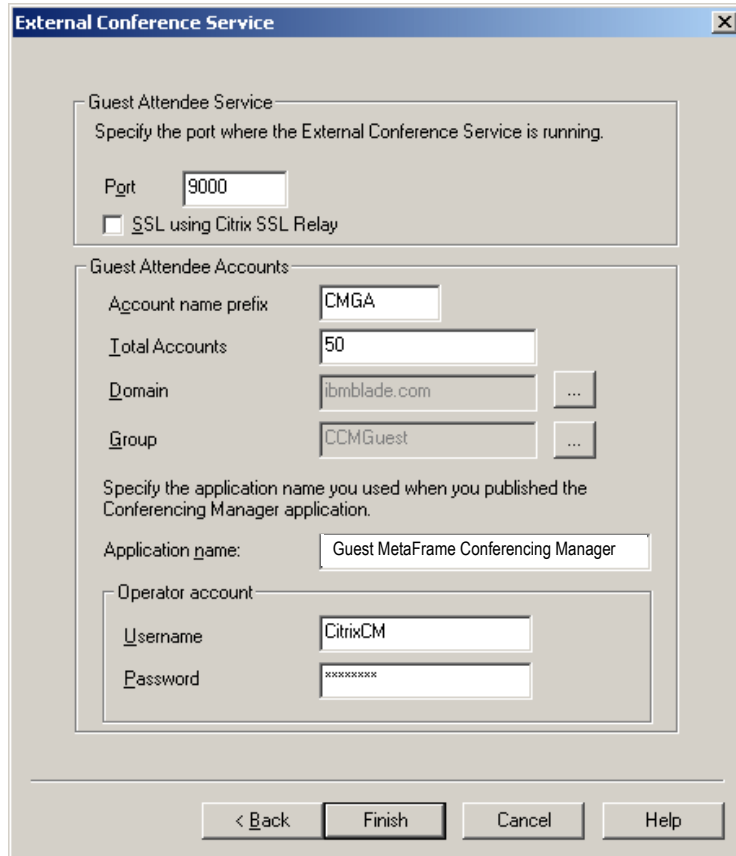
Figure 8-8   External Conference Service window

14. In the External Conference Service window, in our example, we fill in the following information:

  – Guest attendee accounts:

    • Account name prefix - `CMGA`

    • Total Accounts - `50`

    • Domain - `ibmblade.com`

    • Group - `CCMGuest`

  – Application name: Guest MetaFrame Conferencing Manager

  – Operator account: we use the user ID `CitrixCM` and te password that we created earlier.

15. Click **Finish**.
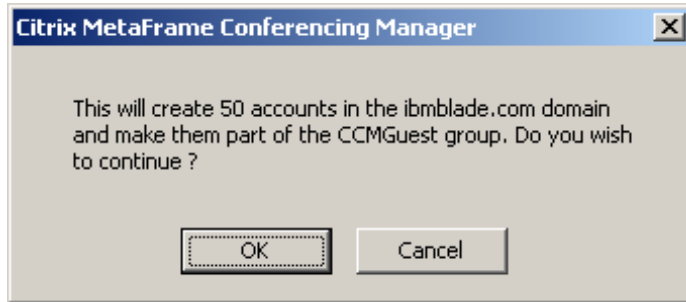
Figure 8-9   Citrix Conferencing Manager window

16. Click **OK**.

17. In our lab scenario, we reboot and check the server before we proceed to install Guest Attendee Interface.

Installing Guest Attendee Interface

In this section, we perform the steps to install Guest Attendee Interface.
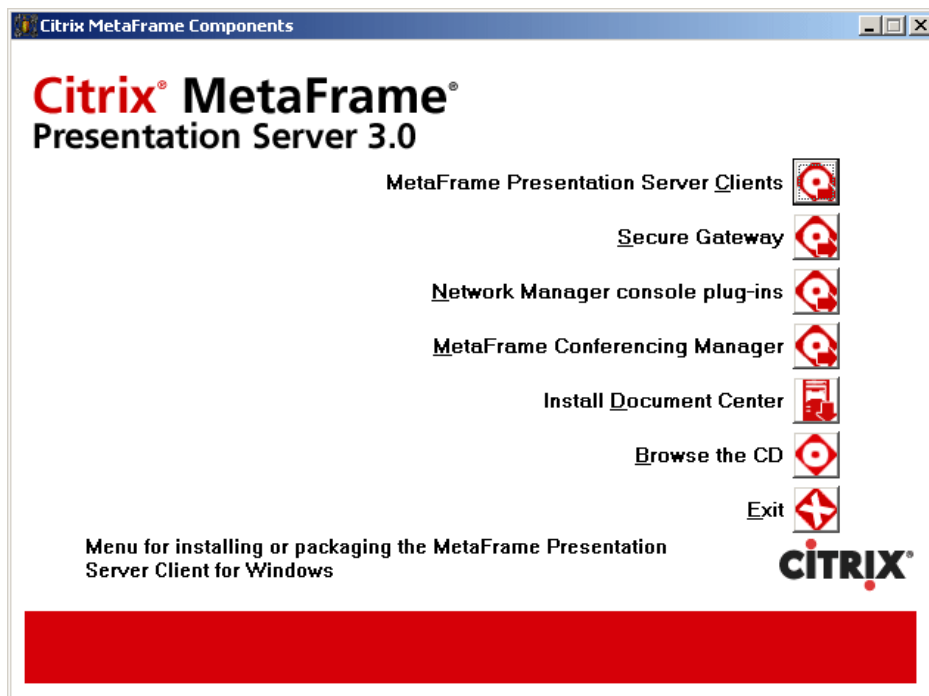
Figure 8-10   Presentation Server window

1. Click **MetaFrame Conferencing Manager**.
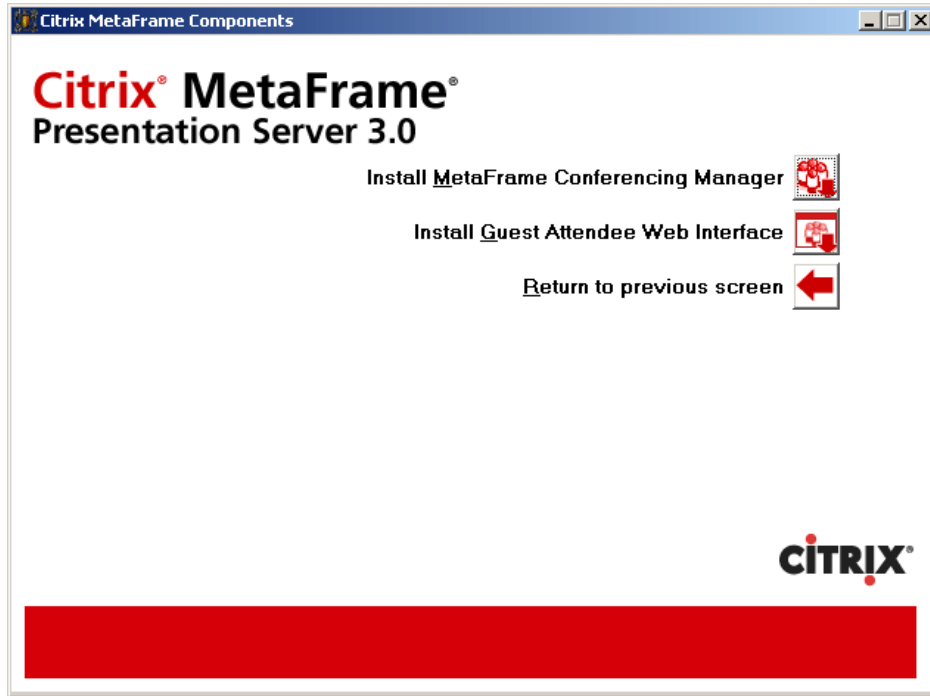
Figure 8-11   Presentation Server window

2. Click **Install Guest Attendee Web Interface**.

Figure 8-12   Guest Attendee Web Interface Installation Wizard window

3. Click **Next**.

4. Read and accept the License Agreement. Click **Next**.

5. When you are ready to install, click **Next**.
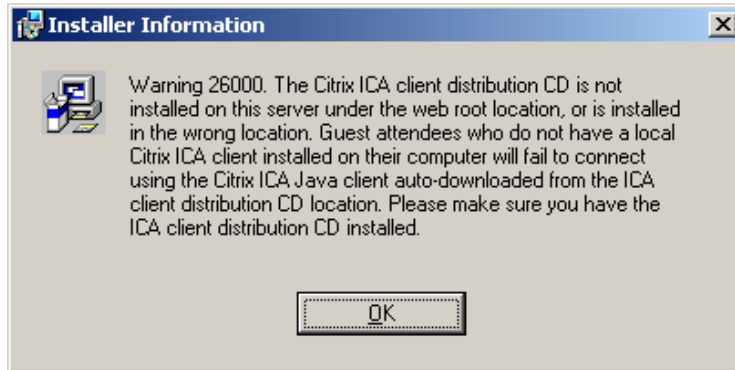
Figure 8-13   Installer Information window

6. In the Installer Information window, click **OK**. This window will come up during the installation of Web Interface for MetaFrame; you can choose not to install the Clients from the Components CD-ROM.

7. Click **Finish**. The Guest Attendee Web Interface configuration window will launch.
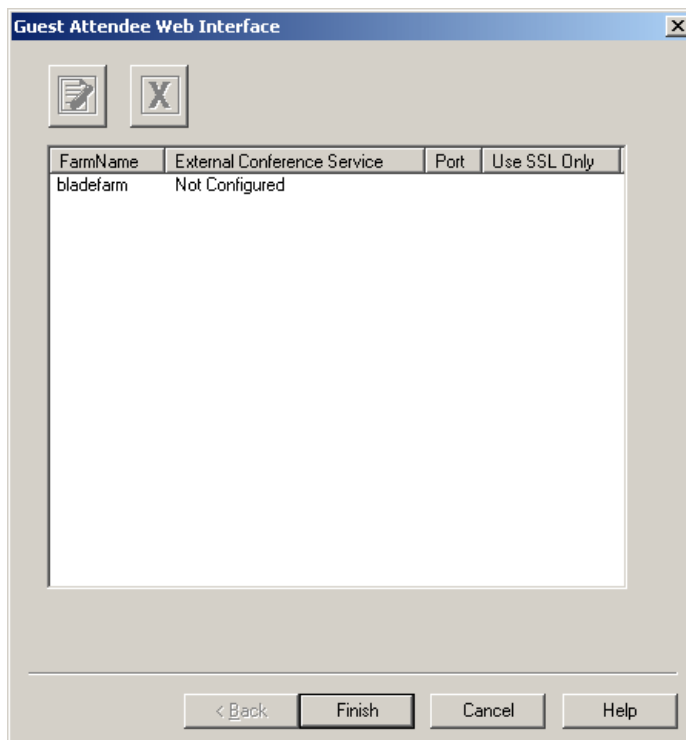
Figure 8-14   Guest Attendee Web Interface window

8. Click your farm name, in our example **Bladefarm**.

9. Click **Modify Farm**.
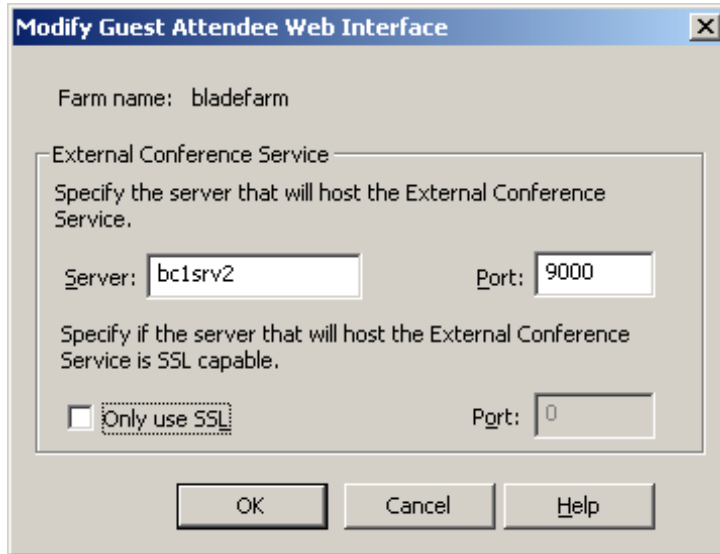
Figure 8-15   Modify Guest Attendee Web Interface window

10.In our lab scenario, in the Modify Guest Attendee Web Interface window, fill in the server name: `bc1srv2`, and the port number: `9000`. Click **OK**.
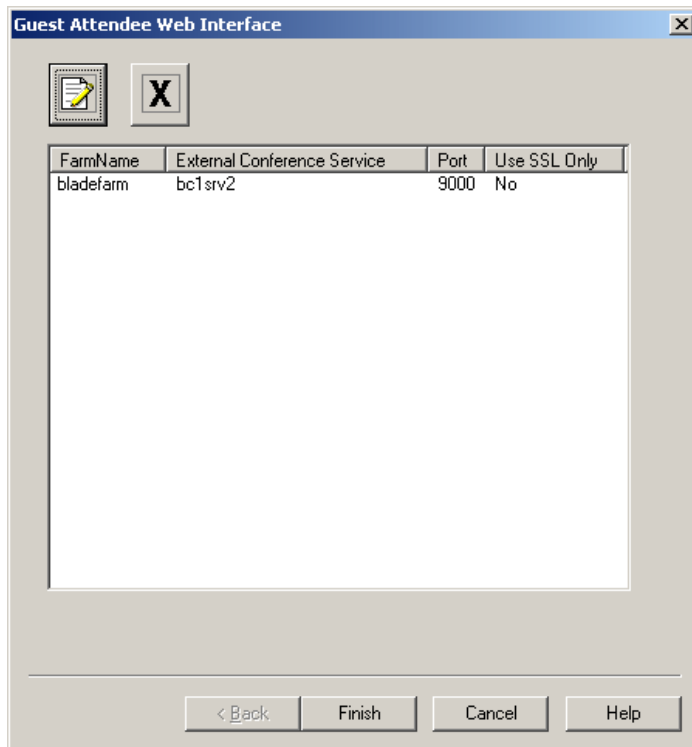
Figure 8-16   Guest Attendee Web Interface window

11.Click **Finish**.

Giving attendees access to MetaFrame Conferencing Manager

In this section, we discuss giving the attendees access to the MetaFrame Conferencing Manager:

► In order for users to be able to launch the publish applications in Conferencing Manager, make sure their user accounts are assigned both to the MetaFrame Conferencing Manager User Interface and to the Conference Room component and the publish applications.

► As in Step 14 on page 174, we created a guest attendee group call CCMguest in Active Directory prior to the installation of the guest attendee Web Interface. Since we are using Windows 2003, we need to add the guest attendee group to the remote desktop users' group in BC1SRV2.

> ► **Note:** Guest Attendee Web Interface only supports Microsoft Internet Explorer V5.5 or later.

► In our lab scenario, we tested the Guest Attendee Web Interface feature on its own. For example, we did not use Microsoft Outlook. We used the following URL in our lab scenario for testing the guest login: `http://bc1srv2/Citrix/mcmwi/login.aspx`.
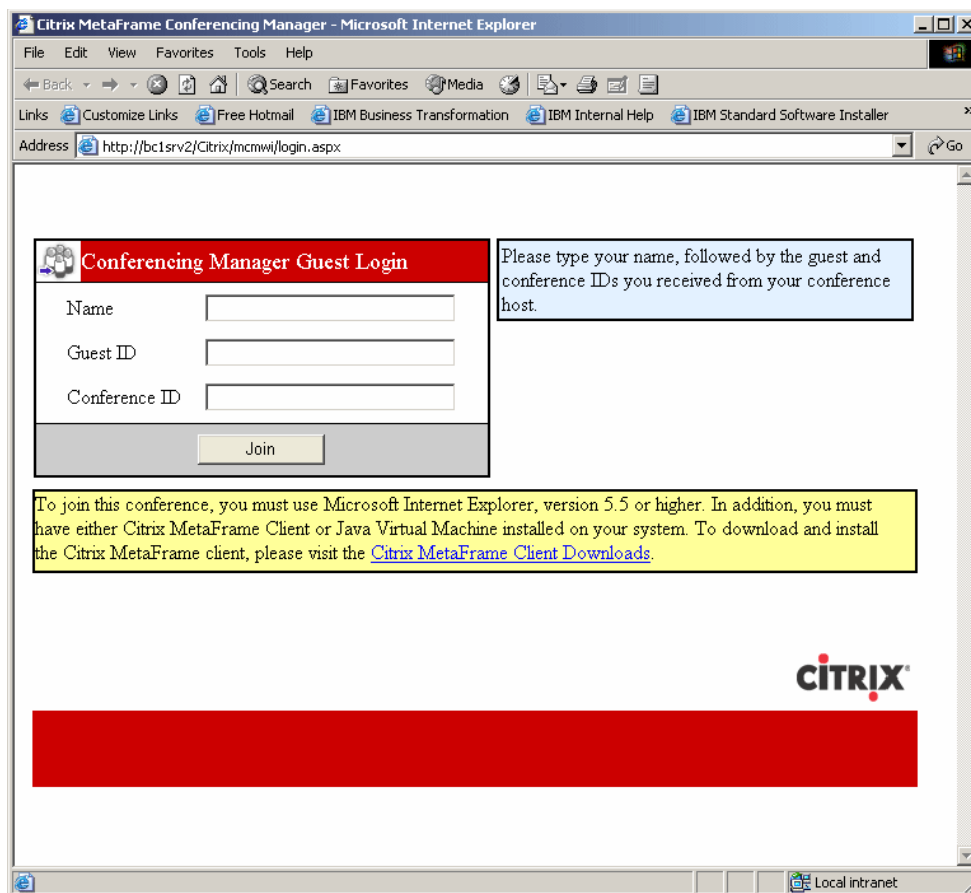
Figure 8-17   Conferencing Manager Guest Login window

For the guest to log in, they must:

► Type their name as they would like others to see it in the conference.

► Type the e-mail address or alias name that the host used to invite them to the conference.

- ▶ Type the conference identification string (supplied verbally or via e-mail).
- ▶ Have appropriate ICA Client software or the Java Virtual Machine installed on their system.

Clipboard issues

Hosts should be aware that whatever is on their clipboard, which is on their client devices, can be accessed and viewed by other attendees. We can change this by adding a line to the template.ica file. The following holds true:

- ▶ Attendees have access only to the session clipboard
- ▶ Hosts have access to their clipboards but some limits apply:
  - – Hosts can cut and paste between private applications on their own client device.
  - – Hosts can cut and paste between shared applications in their conference.
  - – Hosts cannot cut and paste between private applications and their client devices and shared applications in the conference.

Alternatively, to close off all hosts' clipboards:

1. Using a text editor, edit the template.ica file located in Citrix\CMCM directory.
2. Add `Clipboard=Off` underneath the line `winStationDriver=ICA3.0`.
3. Save the file.

Scenario example

At the time of writing, we could not find a Citrix support document for the scenario of converting a Citrix Presentation Server 3.0 to Citrix Presentation Server 3.0 with IIS and ASP.NET.

In our lab scenario example, we performed the following actions:

1. On the server that has only Citrix Presentation Server 3.0 installed, click **Start -> Manage Your Server -> Add** or remove a role and select **Install IIS with ASP.NET enable**.
2. Reboot the server.
3. Once the server has been rebooted, log on and insert the MetaFrame Presentation Server CD, then select **Install MetaFrame Presentation Server and its components**.
4. Select **Repair options**.
5. Once finished, reboot the server.

9

Managing a Citrix MetaFrame solution on IBM eServer BladeCenter

To better manage Citrix MetaFrame Presentation Server on IBM @server BladeCenter blade servers, you should consider the following areas:

- ► Windows Server 2003
- ► IBM Director
- ► IBM Remote Deployment Manager (RDM)
- ► Management Console for Citrix MetaFrame Presentation Server
- ► Resource Management Services (RMS)
- ► Installation Manager (IM)
- ► Load Manager
- ► Security
- ► Microsoft SQL Server

9.1 Windows Server 2003

With the IBM @server BladeCenter, when you switch from blade to blade from the KVM (keyboard, video and mouse) using the select buttons on each blade server, there can be a delay of a minute before the selected blade server recognizes the KVM.

If your IBM @server BladeCenter only has a single Ethernet switch plugged into it, you will receive the following screen displaying a problem with one of the network adaptors, as shown in Figure 9-1. This is because the blade server has the Broadcom driver loaded for both connections. You can disable the second network adapter.
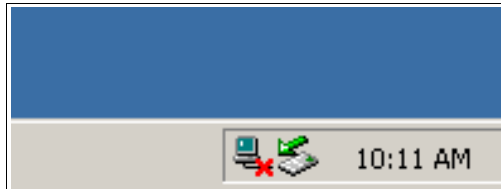
Figure 9-1   Network adaptor problem

If you install a second Ethernet switch into switch module 2 then the blade server can load balance across both Ethernet adaptors.

9.2 IBM Director

One way to monitor the health of your Citrix servers is to use IBM Director to supervise the functions of the machine and the operating system, such as memory, processor load, disk space and bottlenecks. You can configure IBM Director to monitor services on the server and restart them automatically or send an alert.

Note that prior to the release of this Redpaper, IBM Director 4.2 was announced. For more information on IBM Director 4.2, please visit the following Web site:

http://www-307.ibm.com/pc/support/site.wss/document.do?lndocid=MIGR-55606

9.3 IBM Remote Deployment Manager

IBM Remote Deployment Manager (RDM) is a useful tool to deploy images rapidly or to deploy server builds using unattended text files. It also has the function of remotely flashing a selected system's BIOS or modify CMOS settings.

RDM uses imaging technology from industry leader PowerQuest to provide high-performance cloning, recovery, and re-provisioning solutions.

For more information on IBM Remote Deployment Manager 4.11, please visit the following Web site:

http://www-1.ibm.com/servers/eserver/xseries/systems_management/sys_migration/rdm.html

9.4 Management Console for MetaFrame Presentation Server

In this version of Citrix, we have the following Management Console for MetaFrame Presentation Server.

Please be aware of the following name changes:

▶ Management Console for MetaFrame Presentation Server in earlier releases was called Management Console for MetaFrame XP or Citrix Management Console.

▶ Program Neighborhood Agent Console in earlier releases was called Program Neighborhood Admin Tool.

▶ Web Interface Console in earlier releases was called Web Interface Admin Tool.

Management Console for MetaFrame Presentation Server (Presentation Server Console)

This is still the central point for administrating your Citrix server farm: publishing applications, installing hotfixes, etc.

For best farm performance, disable the Presentation Server Console automatic refresh rate and run the console from within an ICA session. Also, by running Citrix Management Console from within a Citrix session, you increase the security.

MetaFrame Access Suite Console

This is new in the Citrix MetaFrame product family; Access Suite Console allows you to manage multiple farms, sessions, applications and servers, etc.

However, please be wary when you run two Access Suite Console sessions simultaneously on a machine with the same account credentials. When changes are saved in one session, this will overwrite changes made in the other.

Program Neighborhood Agent Console

Please be careful when making configuration changes in the Program Neighborhood Agent Console; configurations affect all users who use that configuration file. You can disable the option for the user to change the server URL or hide the Server tab if you do not want users to change the configuration of the server URL locally.

Web Interface Console

Please be aware of any configuration changes that you want to save in your Web Interface Console. Always click **Save** before going to another configuration page, otherwise your changes will be lost.

License Management Console

You can access the License Management Console through the Citrix supported version of the Web browser. It includes current usage, historical usage, configuration, and user administration functions.

For handling license files, always use the functions in Configuration under the License Management Console instead of manually copying license files to a license server. If you manually copy license files to a license server, you had to manually click **Update license data** in the license files page to force an update on the license server.

9.5 Resource Management Services

You should restrict the total number of items you track since they will ultimately impact the performance of the server. Alerts can be sent via the SNMP trap to specific e-mail addresses. If the threshold of the alert is too low, people will not be able to read the alert and outages can occur.

9.6 Installation Manager

Installation Manager (IM) allows you to define server groups to which applications will be deployed. With future growth of the farm in mind, you need to remember that the larger the number of applications in a group, the more user acceptance testing should be performed to confirm sociability between applications. This will also impact any future upgrades to individual servers or the farm.

If you need to remove an application from a server group, you will need to remove the application from each of the servers within the group.

Packager is a useful tool to record application installations. It is important to ensure that this server is not publishing applications, has no unnecessary software and that the hardware is as similar as possible to the target servers in the farm.

When determining the Deployment Server, you need to consider the disk subsystem because it will impact the time needed to deliver the applications. It is recommended that the package distribution occur during low network and Citrix farm usage to minimize impact to the users.

9.7 Load Manager

It is recommended that Load Manager be used to balance published applications across your Citrix farm and that the Load Manager Monitor tool track server load statistics.

To utilize the disk performance monitor on the Citrix Servers with Load Manager, you need to run `diskperf -y` to activate this functionality.

9.8 Security

Security is a large component for all areas of IT; following are several security precautions you should consider taking.

► Shadowing a user's session
► Delegating appropriate security access to manage different areas of the Citrix farm
► Using OS security
► Using SSL for NFuse
► Having appropriate security patches updated on the clients and servers

9.9 Microsoft SQL Server database

The Microsoft SQL database back-ups should be performed nightly and transaction logs every four hours. The Temp database on the SQL Server should be set to `auto grow` with at least 1 GB of free space, since this is the location where all sorting and queries take place. The farm database should be set to `auto grow` as well; make sure sufficient disk space is available.
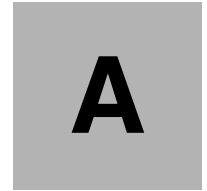
Performance tuning

To get the best performance out of your blade server HS20 for Citrix, you need to consider the following optimizations:

▸ Because the processors have 512 K of cache, you should modify the following registry settings:

  – HKEY_LOCAL_MACHINE\SYSTEM\Current Control Set\Control\FileSystem
  – Value : `SecondLevelDataCache`
  – Type : `REG_DWORD`
  – String : `512`

▸ The OS/2® and POSIX subsystems present a security risk and can cause performance issues. We recommend you delete the following:

  – HKEY_LOCAL_MACHINE\SYSTEM\Current Control Set\Control\Session Manager\Subsystem
  – POSIX,OS2

▸ NTFS stores the last time a file was accessed, and modifying the following registry disables this:

  – HKEY_LOCAL_MACHINE\SYSTEM\CurrentcontrolSet\Control\FileSystem
  – Value : `NtfsDisableLastAccessUpdate`
  – Type : `REG_DWORD`
  – String : `1`

▸ Remove Dr. Watson:

  – HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\AeDebug
  – Value : `Debugger`
  – Type : `REG_SZ`
  – String : leave the string blank

▸ Disable printer logging:

  – HKEY_LOCAL_MACHINE\SYSTEM\Current ControlSet\Control\Print\Providers
  – Value : `Event Log`
  – Type : `REG_DWORD`
  – String : `0`

- ► Disable printer pop-ups dialog on Citrix Server:

    – HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Printer\Providers
    – Value : `NetPopup`
    – Type : `REG_DWORD`
    – Data : 0

- ► Change the location of the Printer SPOOL directory to the D drive:

    – HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSEt\Control\Print\Printers
    – Value : `DefaultSpoolDirectory`
    – Type : `REG_SZ`
    – String : `D:\spool\printers`

- ► Disable Printer Beep:

    – HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Print:
    – Value : `BeepEnabled`
    – Type : `REG_DWORD`
    – String : `1`

- ► Set the Event logs to 2 GB and to overwrite as required; this stops the event log from filling up. Some sites many not need to do this:

    – HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Event Log\System
    – Value : `Retension`
    – Type : `REG_DWORD`
    – String : `0`
    – Value : `MaxSize`
    – Type : `REG_DWORD`
    – String : `2`
    – HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Event Log\Application
    – Value : `Retension`
    – Type : `REG_DWORD`
    – String : `0`
    – Value : `MaxSize`
    – Type : `REG_DWORD`
    – String : `2`
    – HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Event Log\Security
    – Value : `Retension`
    – Type : `REG_DWORD`
    – String : `0`
    – Value : `MaxSize`
    – Type : `REG_DWORD`
    – String : `2`

- ► Disable paging of the Windows NT Executive:

    – HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Session Manager\Memory Management
    – Value : `DisablePagingExecutive`
    – Type : `DWORD`
    – String : `00000001`

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 189.

- ► *IBM @server BladeCenter Systems Management,* REDP3582
- ► *The Cutting Edge: IBM @server BladeCenter,* REDP3581
- ► *Deploying Lotus Domino on IBM @server BladeCenter,* REDP3584
- ► *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

Referenced Web sites

These Web sites are also relevant as further information sources:

- ► IBM BladeCenter sites

    http://www.pc.ibm.com/us/eserver/xseries/bladecenter_family.html (Main support)
    http://www-1.ibm.com/servers/eserver/bladecenter/
- ► IBM Support

    http://www-306.ibm.com/pc/support/site.wss/document.do?lndocid=MIGR-52686
- ► Citrix

    http://www.citrix.com (Main support)
    - – Advanced Concepts MetaFrame Presentation Server for Windows Version 3.0:

        http://support.citrix.com/kb/entry.jspa?entryID=4462&categoryID=276
    - – Citrix MetaFrame Presentation Server 3.0 Product Documentation

        http://support.citrix.com/docs/productdocs.jspa?product=119&version=80&languages=en&x=88y=9
- ► Deployment and the performance of Citrix MetaFrame:

    http://www-306.ibm.com/pc/support/site.wss/document.do?lndocid=MIGR-52686
- ► IBM Director 4.2

    http://www-307.ibm.com/pc/support/site.wss/document.do?lndocid=MIGR-55606
- ► IBM Remote Deployment Manager

    http://www-1.ibm.com/servers/eserver/xseries/systems_management/sys_migration/rdm.html

- Microsoft

  http://www.microsoft.com (Main support)
  http://www.microsoft.com/windowsserver2003/techinfo/overview/quickstart.mspx

  (Guidelines for Deploying Terminal Server)

- DABCC.COM

  http://www.dabcc.com (Methodology in a Box)

- IBM ServerProven®

  http://www.ibm.com/pc/compat/

- IBM @serverBladeCenter - Power Module Upgrade Guidelines

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

- IBM @serverBladeCenter - Power Module Upgrade Guidelines

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

- IBM TotalStorage FAStT600 Storage Server, please visit the following URL:
  http://www-6.ibm.com/jp/storage/library/products/disk/fastt600.pdf

- FAStT Hands-on Training class

  http://www.ibm.com/services/learning/us

- FAStT Installation Checklist (SA477) and Systems Assurance Product Guide (SA02-014)

  http://w3-1.ibm.com/support/assure/assur30i.nsf/PubAllNum/SA477

- SAPR Guide

  http://w3.ibm.com/support/assure

- IGS offers FAStT Installation services

  http://www.ibm.com/services/its/us/drmjgd17.html

- FAStT Support Line services for ongoing "how to" support

  http://www.ibm.com/services/its/us/mus62d1.html

- IBM FAStT Storage Manager version 8.4 for Microsoft Windows Server 2003 (32bit)
  http://www-1.ibm.com/support/docview.wss?rs=572&uid=psg1MIGR-52940&loc=en_US

- SQL 2000 Service Pack 3a

  http://www.microsoft.com/sql/downloads/2000/sp3.asp

- IBM RDM Update3 (rdm411update3.exe)
  http://www-307.ibm.com/pc/support/site.wss/MIGR-53153.html

- Citrix Support Web site:

  http://support.citrix.com

- Critical Hotfixes and Service Packs for Citrix MetaFrame Presentation Server 3.0 for Windows 2003

  http://support.citrix.com/criticalupdates

- Fibre Channel Expansion Card device driver
  http://www-307.ibm.com/pc/support/site.wss/document.do?lndocid=MIGR-53295

- BladeCenter options

  http://www.ibm.com/pc/compat/

- Technical Update

  http://www-1.ibm.com/support/docview.wss?uid=psg1MIGR-53353
  ftp://ftp.software.ibm.com/pc/pccbbs/pc_servers_pdf/13n0308.pdf

Cisco Systems Intelligent Gigabit Ethernet Switch Module for the IBM @server BladeCenter, REDP3869

http://www.redbooks.ibm.com/abstracts/redp3869.html

► Cisco Systems Intelligent Gigabit Ethernet Switch Module and Nortel Networks Layer 2-7 Gigabit Ethernet Switch Module

http://www-1.ibm.com/servers/eserver/bladecenter/switch/more_info.html

► *IBM @server BladeCenter Layer 2-7 Network Switching*, REDP3755 at
http://www.redbooks.ibm.com/abstracts/redp3755.html

► *The Cutting Edge: IBM @server BladeCenter, REDP3581*
http://www.redbooks.ibm.com/abstracts/redp3581.html

► BladeCenter Alliance

http://www-1.ibm.com/servers/eserver/bladecenter/alliance/members.html

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 Citrix MetaFrame on IBM *e*server BladeCenter with IBM FAStT Storage

Supersizing the IBM *e*server BladeCenter with IBM FAStT600

Implementing suggested configurations for Citrix MetaFrame

Installing and configuring Citrix MetaFrame on IBM *e*server BladeCenter and IBM FAStT600

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 used with the IBM BladeCenter HS20 servers. Attractive cost savings are also possible in situations where a large number of rack installed servers are required. Combined with the latest IBM storage, you have some winning options to consider.

This IBM Redpaper describes the technology, installation, functionality and advantages of Citrix MetaFrame Presentation Server running on HS20 blade servers. In addition, we discuss the use and benefits of the IBM TotalStorage FAStT600 Storage Server.

In Chapter 1, we cover the features and functions of the IBM *e*server BladeCenter.

In Chapter 2, we cover the features and functions of the IBM TotalStorage FAStT600 Storage Server.

Chapter 3 examines the different components required for a Citrix MetaFrame Presentation Server installation on the HS20 with the FAStT600.

Chapter 4 provides a number of scenarios installing the Citrix MetaFrame Presentation Server.

Chapter 5 describes the process we followed to install Citrix MetaFrame Presentation Server on the HS20 blade servers with the IBM TotalStorage FAStT600 Storage Server.

Chapter 6 describes the process we used to publish applications onto a Citrix server.

The remaining chapters discuss the use of the Web Interface and Citrix Conferencing Manager.