



## **IBM Netfinity 7000 M10 Server**

*Raising the bar for performance*

### **Executive Summary**

The IBM Netfinity® 7000 M10 server is an advanced, high-throughput, four-way SMP-capable network server solution using the 400MHz<sup>1</sup> and later Intel® Pentium® II Xeon™ processors. With new 100MHz F-16 bus architecture, the Netfinity 7000 M10 server delivers excellent scalability for adding memory and processors.

The Netfinity 7000 M10 server provides exceptionally high levels of performance and data throughput to speed applications and support more clients than previously possible with Intel processor-based servers.

IBM's Web Server Accelerator technology can make the Netfinity 7000 M10 server respond twice as fast to Web requests. And you can download Web Server Accelerator software from the Netfinity Web site at no additional charge and add the application to your Netfinity 7000 M10 server running Microsoft® Windows NT®. For ISPs, the Web Server Accelerator for Windows NT helps ISPs deliver economical, fast and reliable Web service. The combination of Web Server Accelerator software and the Netfinity 7000 M10 server give you advantages you can't readily get from other Intel processor-based platforms.

Through advances in migration and integration technologies, reliability, scalability, availability, manageability, security and serviceability, IBM Netfinity X-architecture provides maximum performance for the Netfinity 7000 M10 while maintaining compatibility with your existing systems. Based on IBM's vast enterprise experience and server technology, Netfinity X-architecture sets the standard for affordable enterprise servers through unmatched testing, systems integration and compatibility.

The Netfinity 7000 M10 server provides exceptional fault-tolerant and high-availability functions integrated within the server as standard features. These standard features include Hot-Plug PCI/add/upgrade and redundant hot-plug drives. Additional hard drives, memory and power supplies are optional. IBM Predictive Failure Analysis® (PFA) for fans, power supplies, disk drives, memory and processors help your business avoid downtime.

Advanced manageability and serviceability features can help you control the Netfinity 7000 M10 server and diagnose problems quickly from remote locations, even if your system is down without power. An integrated IBM Netfinity Advanced System Management PCI Adapter, in a dedicated PCI slot, combined with IBM Netfinity Manager™ software, supports remote power on self test (POST), in addition to setup and diagnostics via a LAN, a modem or the Web.

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<sup>1</sup> MHz only measures internal clock speed, not application performance. Many factors affect application performance.

## *Performance leader, 4-way Pentium II Xeon processor server*

If critical system thresholds are approached, Netfinity Manager can generate alerts to local and remote monitoring locations, and even notify you by pager or telephone. Built-in light-path diagnostics and LEDs alert you to possible failing components and help you locate specific problems quickly and efficiently. The design of the Netfinity 7000 M10 server allows access to critical components so you can service and upgrade your Netfinity server quickly and easily and maintain high availability, with little or no downtime.

IBM's Remote Connect support is a major enhancement to its service and support for Netfinity servers. If your Netfinity 7000 M10 server experiences a problem, it can dial IBM and contact the right level of support to keep your system up and running. And, you can select options to have IBM contact you or your approved warranty service provider.

High availability and advanced manageability features are engineered for the Netfinity 7000 M10 server to provide a solid foundation to run high-speed, business-critical applications with confidence.



## **Performance**

The IBM Netfinity 7000 M10 server solution with the Intel Pentium II Xeon processor set performance benchmarks for Intel processor-based servers. With record-setting performance on the J.D. Edwards' OneWorld™, TPC-C, TPC-D, SAP and SPECweb benchmarks, the Netfinity 7000 M10 server claims its place as the best platform for enterprise applications. Its balanced system design integrates the memory and I/O required to deliver a powerful application. The Netfinity 7000 M10 server solution integrates this power with the scalability, control and service characteristics needed for business-critical applications at all times.

*Performance leader, 4-way Pentium II Xeon processor server*

Since June 1998, the Netfinity 7000 M10 server has set the following leading benchmarks.

<b>Benchmark</b>	<b>Date</b>
J.D. Edwards OneWorld	October 13, 1998
SAP Central (Oracle)	June 22 and August 17, 1998
SPECweb96	June 29 and July 14, 1998
TPC-C (SQL Server 7.0)	September 14, 1998
TPC-D (DB2)	June 29, 1998

***J.D. Edwards' OneWorld Performance Results***

As of October 13, 1998 the Netfinity 7000 M10 server outperformed all other Intel-processor based servers currently tested for J.D. Edwards' network-centric, ERP application, OneWorld running Windows NT. The Netfinity 7000 M10 achieved response times of approximately one third of a second for 1000 users.

The performance tests were conducted as part of J.D. Edwards' 'Workload Scaling Performance Test Series One' program, under which the same physical environment, simulated workloads, database environment and test procedures are used for each hardware platform tested.

The Netfinity 7000 M10 achieved faster response times running Oracle RDBMS for both 1000 and 1500 user groups than any other Intel server currently benchmarked for J.D. Edwards OneWorld.

***SAP R/3 Centralized SD Benchmark Results***

In August of 1998, the IBM Netfinity 7000 M10 server solution achieved 240 SD Benchmark users with 1.95 seconds average response time and a throughput of 24,000 fully processed order line items per hour.

With its extensive functionality and high level of integration, the SAP R/3 System meets the full range of business requirements, including financial accounting and controlling, sales and distribution, materials management, production planning and human resources management. The certification achieved with these results ensures that the new Netfinity 7000 M10 supports the SAP R/3 System client/server business applications—meeting the requirements of customers whose business operations depend on these applications.

The following are the published results for the SAP R/3 Centralized SD Benchmark.

<b>Centralized SD Users</b>	<b>Response Time</b>	<b>Certification Number</b>	<b>Software Platform</b>
240	1.95	N/A	NT 4.0 / Oracle 8.0.4 SAP R/3 3.1H

### **SPECweb96 Benchmark Results**

The record-breaking SPECweb96 results (as of July, 1998) demonstrate the robust capability of the Netfinity 7000 M10 server for handling Web page delivery and e-commerce at heavily trafficked Web sites. The Netfinity 7000 M10 server, configured with four 400MHz Pentium II Xeon processors and 2GB<sup>2</sup> of memory, running Windows NT 4.0 Server, Apache HTTP Web Server Version 1.3.3 and IBM's Web Server Accelerator technology, achieved peak results of 5,277 Web page requests per second, with an average response time of 8.3 msec per request. As of that date, this is the highest SPECweb96 performance result recorded for a four-way, Windows NT based Web server.

The following are the published results for the SPECweb96 benchmark.

<b>Date</b>	<b>Number and Type of Processors</b>	<b>Ops/Second</b>	<b>Msec/Op</b>
July, 1998	4 x Pentium II Xeon	5,227	8.3

SPECweb96, with its standardized workload and implementation, measures a system's ability to perform as a World Wide Web server for static pages. The workload simulates the accesses to a Web service provider, where the server supports multiple pages for a number of different organizations. This benchmark is useful in evaluating systems that handle millions of hits per day and multiple hits per second. SPECweb96 provides the most objective, most representative benchmarks for measuring Web server performance.

### **TPC-C Benchmark Results**

The Netfinity 7000 M10 server running Microsoft SQL Server 7.0 Enterprise Edition posted the highest throughput (18,893.43 tpmC) recorded on a four-processor Intel, Windows NT-based server at the price/performance ratio (\$29.09/tpmC), as of September 14, 1998.

The following are the published results for the TPC-C benchmark.

<b>Total System Cost</b>	<b>TPC-C Throughput</b>	<b>Price/ Performance</b>	<b>Total Solution Availability Date</b>
549,551	18,893.43 tpmC	\$29.09/tpmC	December 29, 1998

### **TPC-D Benchmark Results**

The Netfinity 7000 M10 server running IBM's DB2<sup>®</sup> Universal Database posted the highest power (1,871.1 QppD@100GB) and the highest throughput (661.3 QthD@100GB) recorded on a four-processor Intel, Windows NT-based server at the lowest price/performance ratio (\$243/QphD@100GB) in the industry, as of June 29, 1998.

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<sup>2</sup> When referring to hard drive capacity, a gigabyte (GB) equals one billion bytes. Total user-accessible capacity may vary depending on operating environments.

## Performance leader, 4-way Pentium II Xeon processor server

The following are the published results for the TPC-D benchmark.

QppD @ 100GB	QthD @ 100GB	\$/QphD @ 100GB	Total Solution Availability Date
1,871.1	66.3	243	October 31, 1998

The performance breakthroughs, verified by Transaction Processing Performance Council (TPC) auditors on June 19, 1998, ranked the Netfinity 7000 M10 and DB2 Universal Database as the performance leader among all hardware and database vendors for 100GB TPC-D results on a four-processor, Intel Pentium II Xeon-based system, and the price/performance leader overall.

The TPC-D benchmark simulates data modeling and trend analysis of information contained within a large database such as a data mart or data warehouse. Customers can use TPC-D results to better understand the relative performance of business intelligence systems from different vendors.

For the latest information on Netfinity 7000 M10 server and performance benchmarks, see the Netfinity Web site at <http://www.ibm.com/netfinity>.

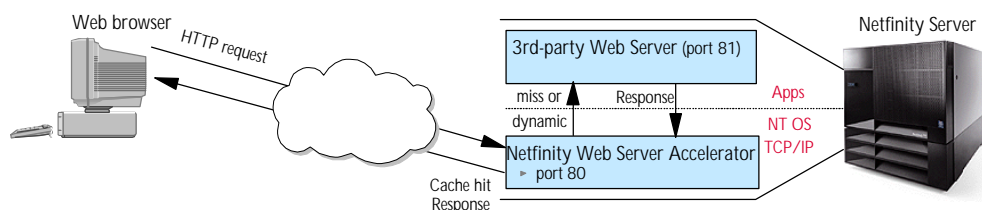
### Netfinity Technology Performance Advantages

The standard Netfinity 7000 M10 server contains a powerful 400MHz Pentium II Xeon processor. The Netfinity 7000 M10 server solution is designed to support all Intel Pentium II Xeon CPU speeds and cache sizes. The Pentium II Xeon processor is about twice as fast as the Pentium Pro processor. External operations to memory and the I/O buses are supported at 100MHz. The Netfinity 7000 M10 server currently supports 512KB and 1MB integrated ECC L2 cache sizes, with ECC on both the frontside buses. The ECC L2 cache size can increase to 2MB and greater as processor speeds increase. The Netfinity 7000 M10 server is architected for expansion.

### IBM Netfinity Web Server Accelerator Advantages

Performance isn't about just handling the greatest number of requests ("hits"); it's also about the most efficient use of hardware. The Netfinity 7000 M10 server with IBM Web Server Accelerator technology can cut server response time in half, as demonstrated by the SPECweb96 results reported in this paper, while substantially lowering the time your server's processor spends responding to requests for static Web page content. This is performance value.

Netfinity servers using this new technology can simply do more with less. As of the date listed in this paper, in similar processor-memory configurations (same number of processors, same amount of memory), no other server matches 1-, 2- and 4-processor SPECweb96 performance of the Netfinity 7000 M10 server solution.



### **Netfinity X-architecture Performance Advantages**

Through advances in migration and integration technologies, reliability, scalability, availability, manageability, security and serviceability, IBM Netfinity X-architecture provides maximum performance for the Netfinity 7000 M10 server solution while maintaining compatibility with your existing systems. Based on IBM's vast enterprise experience and server technology, Netfinity X-architecture sets the standard for affordable enterprise quality through unmatched testing, systems integration and compatibility.

To optimize IBM Netfinity X-architecture for your current and expanding business needs, IBM designed this architecture to:

- w Leverage IBM's vast technology portfolio and server expertise into industry-standard computing
- w Bring down the cost of enterprise-class technologies
- w Set the standard for enterprise quality through unmatched testing, systems integration and compatibility

Key elements of the Netfinity X-architecture in the Netfinity 7000 M10 server include powerful processors, reliable and available memory systems, scalable I/O, advanced caching software and world-class silicon and module technology. Netfinity X-architecture also includes clustered systems featuring technology from IBM's industry-leading S/390® and RS/6000® SP™ product lines, as well as interoperability with existing large and midrange systems.

### **IBM Netfinity ESCON Adapter**

The IBM Netfinity ESCON® Adapter from Options by IBM opens a high-capacity, bi-directional and reliable data highway between Netfinity servers (including the Netfinity 7000 M10 server) and mainframe-resident data and applications. The Netfinity ESCON Adapter implements the multipath channel (MPC) protocol, an IBM technology that significantly improves the efficiency of communications across the ESCON channel. The MPC protocol and the Netfinity ESCON adapter can yield up to 40% performance improvement and 60% reduction in IBM System/390 CPU cycles.

As an example of performance, the Netfinity ESCON Adapter delivers transfer rates of 200MBps and 64KB per block. In comparison, an Ethernet adapter yields only 100/10MBps and 1,500 bytes per block.

With the Netfinity ESCON adapter, the Netfinity 7000 M10 server can act as a data warehousing and data mining coprocessor for business intelligence applications. The combination of the Netfinity 7000 M10 server and the Netfinity ESCON Adapter is excellent for running enterprise resource planning applications, such as those from Baan, J.D. Edwards, PeopleSoft and SAP.

The superior speed of the Netfinity ESCON Adapter, combined with its nondisruptive fail-safe recovery and near-zero error rates across the channel lets you confidently run business-critical applications on the Netfinity 7000 M10 server while interacting with mainframe computers.

By supporting the ESCON Multiple Image Facility, the Netfinity ESCON Adapter enables multiple Netfinity users to access multiple mainframes quickly and efficiently. You can also consolidate multiple, distributed LAN-to-mainframe gateways into a single, centralized, channel-attached Netfinity 7000 M10 server. This greatly simplifies network administration, network management and change control for now and the future.

## **Netfinity Enterprise Storage Options**

The Netfinity 7000 M10 server enterprise storage options from Options by IBM provide the following benefits:

- w Maximum control and reliability derived from extensive testing for compatibility of hardware and software to industry-leading local and remote system management tools.
- w Flexible scalability provided by a wide array of rack, RAID, tape and IBM Netfinity Fibre Channel storage solutions that allow your network to grow with your business. For example, because Netfinity Fibre Channel storage solutions can support transfers over distances up to 10 km (6.2 miles), companies can more easily configure off-site server and storage systems to keep critical data available around the clock—even in the event of a catastrophe. Netfinity Fibre Channel hot-pluggable and redundant RAID controllers support the uninterrupted flow of your business.
- w Peak performance delivered by high-capacity hard disk drives and high-speed tape drives. For example, IBM's hot-pluggable hard-disk drives provide storage capacity of up to 18.2GB at speeds up to 10,000 rpm.

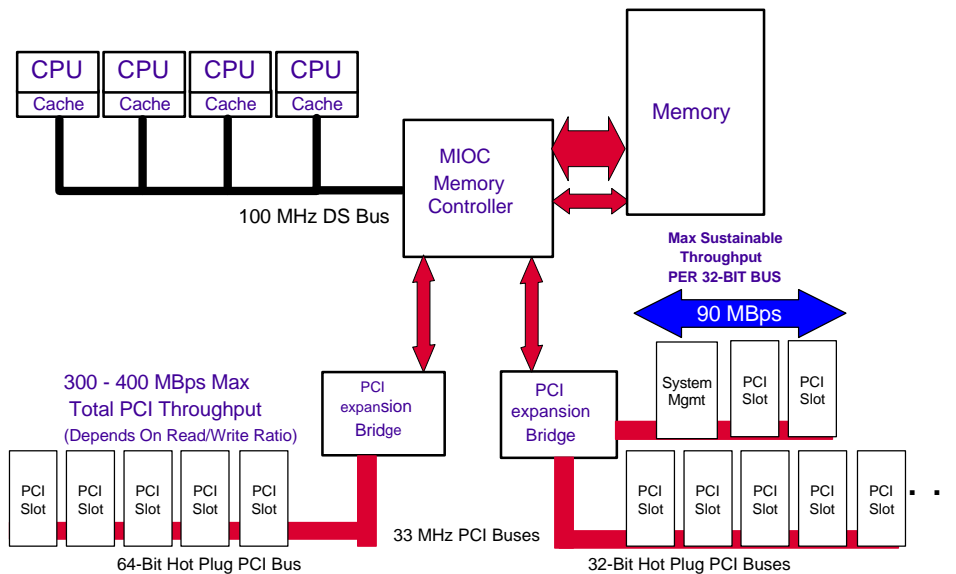
## **100MHz F-16 Bus to PCI Bus Architecture**

This bus architecture consists of a 64-bit, 100MHz CPU backplane that supports four Intel Pentium II Xeon processors and two 16-bit, 100MHz F-16 buses. The 100MHz F-16 bus is double pumped, meaning that transfers occur on both clock edges. The Netfinity 7000 M10 server has one memory controller.

The two F-16 buses support three PCI buses. One PCI bus contains five 64-bit slots. The other two PCI buses contain seven 32-bit slots, for a total of 12 available full-length, Hot-Plug PCI slots. This architecture, using the Intel 450NX chipset, is designed to optimize memory and bus performance with the new Pentium II Xeon processors.

This new optimized bus design improves the sustainable throughput of the PCI bus. On Pentium Pro-equipped servers, the sustainable throughput is about 35MBps. With the new F-16 bus architecture of the Netfinity 7000 M10 server, the sustainable 32-bit PCI bus throughput improves to about 90 to 100MBps, which is an improvement of more than 250% per PCI bus. When configured with 32-bit PCI adapters, combined throughput of the three PCI buses is up to 300MBps. Using newer 64-bit adapters, the 7000 M10 server can achieve a total sustained throughput of up to 300 to 400MBps.

## Intel 450NX Chipset Architecture Used in the Netfinity 7000 M10 server



## ECC Extended Data Out (EDO) 50ns Server Memory

The Netfinity 7000 M10 server memory subsystem is designed to support up to 8GB of memory, the maximum currently supported by the 450NX chipset.

The 8GB memory resides on two fully populated memory boards using 256MB DIMMs. The Netfinity 7000 M10 server provides a total of eight banks (four banks per board) in a 4:1 interleaved configuration (four DIMM sockets per bank) for a total of 32 DIMM sockets. This allows 32 bytes of data to be accessed per memory request. The four DIMMs per bank must be the same size, type and speed. When multiple banks of memory are populated, Address Bit Permutating (ABP) and Card to Card (C2C) are enabled automatically.

The Netfinity 7000 M10 server memory subsystem is designed for maximum performance. By overlapping memory accesses to different banks on the memory board using ABP and overlapping accesses to different banks on separate memory boards using C2C interleaving, the data transfer rate on consecutive memory access is maximized. When multiple banks of memory are populated, ABP and C2C are enabled automatically.

The Netfinity 7000 M10 server memory board includes the following features:

- Support for 32MB, 64MB, 128MB and 256MB DIMMs
- 50ns DIMMs for maximum performance
- Peak data transfer rate of 1.06GB
- Single error correct/Double error detect (SEC/DED) error-correct code (ECC) enabled
- Single errors are corrected and written back to memory by Scrub on Error
- Single-bit memory errors are isolated to a single DIMM



- w Double-bit memory errors are isolated to a pair of DIMMs when ECC is enabled, and a single DIMM when memory diagnostics are invoked in POST
- w If a DIMM is failing, light-path diagnostics activate an LED on the memory board. Each DIMM socket has a corresponding LED

## **High Availability**

### **Overview**

The Netfinity 7000 M10 server offers high availability to keep your network running at peak performance. You can control the server locally and remotely and even service and upgrade the Netfinity 7000 M10 server while keeping the server up and running. Not only that, the Netfinity 7000 M10 server and its Netfinity Manager software allows you to control other servers.

Netfinity servers bring high-availability features to the Intel processor-based server market with Hot-Plug PCI technology. Netfinity Hot-Plug PCI solutions give you the ability to add, remove and replace PCI I/O adapters, and communications adapters (including Ethernet and Token Ring adapters) while the server is running. These solutions include the Hot-Plug Controller, Hot-Plug Server Driver and Hot-Plug Service. Your Netfinity 7000 M10 server remains available while you modify the I/O configuration.

**Chip-kill Memory.** As an option on the Netfinity 7000 M10 server, IBM offers a new family of error-correcting semiconductor memory modules that provide system memory reliability up to 100 times greater than standard memory modules. This capability is similar to reliability features that IBM developed for NASA's Mars Pathfinder mission. For the first time, this level of reliability is available to enhance an Intel processor-based server.

The optional failure-protection DIMMs for the Netfinity 7000 M10 server are among the first to provide the self-contained capability to correct real-time, multi-bit DRAM errors, including complete DRAM failures. IBM Netfinity technology provides enhanced multi-bit error detection and correction that is transparent to the system. IBM's failure-protection modules also allow the Netfinity 7000 M10 server to be upgraded to support enterprise-class, multi-bit failure correction.

In the networked computing environment, the need for server reliability is essential. Memory faults, including complete chip failures, have the potential to cause significant system down time and data loss. IBM's new error-correcting products offer a level of "off-the-shelf," onboard memory fault protection previously available only in the mainframe environment.

Advanced failure-protection modules become especially important as memory sizes in server systems increase to 1GB and beyond. The standard single error correct (SEC) error-correction code (ECC) found on most of today's Intel processor-based servers may not be enough to overcome fatal memory faults. Servers with large amounts of memory and standard error-correction are projected to have the same non-correctable error rate as previous parity-only systems. Therefore, as memory needs increase, so does the potential for errors.

These failure-protection DIMMs are among the first to provide the self-contained capability of correcting real-time, multi-bit DRAM errors, such as complete DRAM failures. By the use of a high-performance IBM custom chip, enhanced multi-bit error detection and correction are incorporated into the module and made transparent to the system. IBM's failure-protection modules also allow the Netfinity 7000 M10 server to be upgraded to support mainframe-class, multi-bit failure correction.

The Netfinity 7000 M10 server solution's error-correcting memory modules exemplifies IBM's leadership in the area of "on-the-fly" error correction code capabilities. This new family of products complements the Netfinity 7000 M10 server and offers you the ultimate in availability.

## **Hot-Plug PCI Features**

**Hot-Plug Controller.** The Hot-Plug Controller hardware controls power and signals to the PCI adapter slot. This controller sequences the power-on and power-off cycles for each adapter slot. When power is applied to the slot, the controller monitors the power to see that the voltages are correct. When the voltages are at the required levels and the PCI bus is idle, the controller switches the adapter onto the host system bus. The Hot-Plug Controller monitors each hot-plug slot for a power fault and signals the host system if such an event occurs. The controller also monitors a latch with integrated optical sensors which, if opened or closed, signals a user's intent to remove or add a PCI adapter in the corresponding expansion slot.

Note: Even though the switch is in place, it is not appropriate to open the switch when an active adapter is installed and the slot is powered. All hot-plug operations are initiated at the system console for orderly operating system interaction with the hot-plug slots.

**Hot-Plug System Driver.** The Hot-Plug System Driver provides the interface to the Hot-Plug Controller and the Hot-Plug Service. This driver works much like a traditional device driver. It accepts requests from a higher level software component, the Hot-Plug Service, and sends instructions to the Hot-Plug Controller. In addition, it maintains the system configuration and is responsible for configuring the hot-plug adapters.

After each adapter is powered on and ready to receive information from the host, the adapter is configured. The adapter must be programmed to describe where it resides in the system (its address) and how to signal the host to service the adapter (its interrupt setting). Turning the adapter on and off and configuring the adapter is managed by the Hot-Plug System Driver. To allocate addresses and interrupts to the adapters, the Hot-Plug System Driver ensures that no two adapters have conflicting resources assigned.

The Hot-Plug System Driver also ensures that the operating system does not try to communicate with the adapter until the adapter is configured correctly. The Hot-Plug System Driver receives commands from the Hot-Plug Service and issues appropriate instructions to the Hot-Plug Controller.

**Relation of Hot-Plug to Device Drivers.** An adapter's device driver is very important in the hot-plug scenario. One of the Hot-Plug PCI specification requirements is that the device driver quiesce. *Quiesce* means that the adapter driver does not send any requests to the adapter and the adapter does not generate any interrupts or bus activity.

This is necessary prior to removing the adapter from the server. The device driver must be written to support quiescence. Operating system vendors who support Hot-Plug PCI are required to design this function into their device-driver specifications. System vendors who provide hot-plug support prior to operating-system support must include this function in device drivers. IBM provides this for Windows NT 4.0.

**Hot-Plug Service.** The Hot-Plug Service is an operating system module that ties together several key aspects of a Hot-Plug PCI solution. The Hot-Plug Service provides a user interface and a program interface for monitoring and controlling Hot-Plug PCI adapter slots. It can also identify the device drivers that are loaded and identify the adapters located in a hot-plug expansion slot.

Operating system vendors providing the Hot-Plug Service define the software and the interface in their documentation. The program interface, if implemented by the operating system vendor, allows for system management applications to interact with the Hot-Plug PCI solution.

The Hot-Plug System Driver receives instructions from the Hot-Plug Service software, which is a higher-level software component. When you issue a command through the interface to perform a task, such as switching on a slot, the Hot-Plug Service instructs the Hot-Plug System Driver to power on, reset and configure the adapter. Then the Hot-Plug Service helps install and initialize the new adapter's device driver.

*Performance leader, 4-way Pentium II Xeon processor server*

The following table summarizes the hardware and software functions of the Hot-Plug PCI infrastructure.

Hardware/software	Subsystems	Functions
Hardware	Hot-Plug Controller	Controls power
		Connects the adapter to the system
		Monitors for power fault
Software	Hot-Plug System Driver	Maintains the configuration
		Presents a single view of the hardware to Hot-Plug Service
	Hot-Plug Service	Enables user control
		Cooperates with other operating system servers
		Optionally presents a management interface

**Power Isolation.** One of the major benefits of the Hot-Plug PCI feature in the Netfinity 7000 M10 server is that you can add adapters to a server without switching it off. The Netfinity 7000 M10 server solution provides hardware and software features designed to prevent an adapter and the server from damage during hot plug. To allow other adapters to continue operation without interruption, the power and all other signals to the adapter you're adding are isolated.

After power is applied to a newly-added adapter, the Netfinity 7000 M10 server pauses for less than a microsecond while the new adapter is connected to the system. Even though the solution is commonly referred to as *Hot-Plug PCI*, the expansion slots are not actually "hot" (powered up and connected to the bus) when adapters are being added or removed.

When an adapter has been inserted into the expansion slot and all connections and cables are in place, the power is switched on with a user command. The power applied to the adapter is brought up slowly rather than instantaneously. A power control module works with the Hot-Plug Controller and the power transistor to smoothly apply power to the adapter. This eliminates power surges, which could potentially upset operation of the system.

**Fault Detection.** The Netfinity hot-plug solution detects power faults on the hot-plug expansion slots. In the event of a power fault on an adapter, power is removed from the slot almost instantaneously.

Inserting, replacing and removing Hot-Plug PCI adapters in a running system can save time and ensure system availability. When you want to add, remove or replace an adapter, power is shut off to the adapter slot. The system gives positive confirmation of this action by turning off the power light of the adapter slot.

Before an adapter can be inserted, a physical switch must be opened. Opening the switch physically turns the power off to the corresponding slot. Between each of the Hot-Plug slots, there are plastic dividers that prevent the adapter being inserted or removed from touching the adapters in adjoining slots that are still active. Finally, there is a plastic shield designed to protect the PCI board from incidental contact. With these important availability and system management features, the Netfinity 7000 M10 server is ready to reliably deliver the latest availability functions.

### ***Component Isolation***

If a component failure threatens to cause a system crash—for example, a CPU or memory module failure—the Netfinity 7000 M10 server disables and isolates the failed component and automatically restarts the system. The failure is logged in the error log and the system can notify the system administrator of the failed component and the server restart.

### ***Redundant Network Adapters***

The Netfinity 7000 M10 server supports the use of redundant network adapters. If two similar fault-tolerant adapters are installed, one is designated as the primary network adapter and the other is designated the standby adapter. If the primary adapter fails, network traffic is automatically rerouted to the standby adapter. When used in the Hot-Plug PCI slots, the failed primary adapter can be replaced and traffic can be rerouted without having to reboot the server or restart the operating system.

### ***Hot-Plug Redundant Fans***

The Netfinity 7000 M10 server supports hot-pluggable fans that can be replaced while the server operates, eliminating downtime for fan replacement. If a fan needs replacement and the temperature within the server rises, Netfinity Manager software instructs the other fans to speed up to maintain optimum operating temperature in the server. Netfinity Manager even provides this feature while each fan is removed or replaced. Because each of the fans in the Netfinity 7000 M10 server can be replaced individually, you don't have to leave your system without important cooling fans while you perform a fan replacement.

### ***Hot-Plug Power Supplies***

Netfinity 7000 M10 servers use N+1 redundant, intelligent, hot-plug power supplies to increase server availability. The standard offering includes one or two power supplies, depending on the model you choose. Unlike some competitors, each Netfinity 7000 M10 server's power supply provides full performance at both low-range and high-range ac inputs. The advantage to this provides is that the Netfinity 7000 M10 server offers redundancy in a full configuration without requiring expensive changes to your electrical system. The supplies are fully autoranging and have active power factor correction to reduce input ac current, thus minimizing stress on your facilities. A total of three power supply positions support future expansion.

Each power supply has internal microcontrollers with I<sup>2</sup>C system management interfaces, which perform continuous internal health checking and status reporting. Each power supply has forced current sharing to within 10% to eliminate concentrated electrical and thermal stresses possible in other designs. This load balancing also allows the optional additional power supplies to quickly pick up the load in the event of a failure.

Furthermore, each power supply can monitor and report status on its sharing performance. This design feature of the Netfinity 7000 M10 server provides a high level of confidence that network operations will continue uninterrupted in event of a power supply failure.

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The Netfinity 7000 series offers power cord management, which is an industry first. The base unit comes with a single line cord, to minimize cable management headaches in crowded racks and reduce power outlet requirements. For those customers who require the extra security of multiple line cords, an optional Automatic Bus Transfer switch automatically switches from your primary ac source to a backup while the Netfinity 7000 M10 server is running.

### **Hot-Plug Hard Drives**

Four hot-plug hard drive bays provide uninterrupted service for hard drive replacement.

### **Clustering**

If you are concerned about applications that cannot afford even a temporary lapse in availability, the Netfinity 7000 M10 server is supported in the following methods:

- w In two-node, shared disk clusters in a Microsoft Windows NT environment using Microsoft Cluster Server (MSCS)
- w In a Novell NetWare environment using Netfinity Cluster Pack
- w With multiple-node clusters running Oracle Parallel Server

In this environment, external disk subsystems are needed to meet the large capacities and the clustered high-availability requirements. The Netfinity 7000 M10 server has the flexibility to be configured with technology leadership products such as, high-speed ServeRAID™, SSA RAID or Netfinity Fibre Channel RAID adapters to access data with blazing speed and from distances up to 10 Km (6 miles) from the production servers.

## **Management**

IBM Netfinity Manager software and the integrated Netfinity Advanced System Management PCI Adapter, both included at no additional charge, simplify network and server management and offer proactive, local and remote control of networked business systems. Netfinity Manager can integrate with key workgroup and enterprise management platforms, complementing these products with hardware systems management. You can connect via LAN or modem to your Netfinity 7000 M10 server from virtually anywhere for extensive remote management.

For example, if an error occurs in the Netfinity 7000 M10 server, the system records the error. The system logs all events in one Event Log stored on the Advanced System Management PCI Adapter in a nonvolatile storage location. The Event Log can be read from the local system through the Netfinity Manager running locally or remotely, or it can be viewed remotely from an ASCII terminal connection or via a Web connection.

The Event Log in the Advanced System Management PCI Adapter logs the following information:

- w Nonrecoverable error information
- w Recoverable error information
- w PFA information
- w Power on/off information
- w Remote connection information
- w POST/BIOS information

w Application events

w Alerting information

The system displays critical error messages on the front panel and allows the user to use the <ENTER> and <NEXT> buttons to record the error, put the system in REMIND mode or clear the error from the display list. This allows the system administrator to see critical errors without having to go to the Event Log at a remote console and take action at the system itself.

By looking at the three LEDs on the Netfinity 7000 M10 server, the system administrator can determine if the server has any errors and has power attached, in addition to hard drive activities. The display that indicates the error state of the server can also indicate a reminder that something needs to be fixed, as well as indicate an error not yet apparent to the system administrator. An LED on the system board next to the failing component can identify failing components.

The LEDs are another means that allows early detection of problems with components or the server, and notification when a process has stopped or a critical file has been changed.

IBM's revolutionary light-path diagnostics on the Netfinity 7000 M10 server contribute to advanced manageability. Netfinity servers are designed with fast problem isolation as a goal, and the light-path service panel in conjunction with the component LEDs meet that goal. The Netfinity 7000 M10 server not only has LED indicators on the front panel, but within the server. For example, four LEDs on each memory board can help you quickly and easily locate an individual memory processors, if one fails. System administrators and service personnel can quickly and easily identify failing components, potentially without even running diagnostics.

If configured to do so, the Netfinity Manager can alert the system administrator remotely by contacting a numeric or alphanumeric pager. The system can also alert a Netfinity Manager Console running remotely of any errors that have been caused in the system. The system administrator can gather all of this information and the information stored in the event log remotely and make a determination as to the source of the problem and required actions for solutions without having to be at the system site.

## ***Predictive Failure Analysis (PFA) Alerts***

PFA for Netfinity servers helps you run your business with less unscheduled downtime. PFA allows the Netfinity 7000 M10 server to monitor the status of critical subsystems and to notify the system administrator when components appear to be failing.

In most cases, replacements of failing parts can be performed as part of planned maintenance activity. As a result, unscheduled outages can be prevented. Your system stays up and running for your users.

Netfinity PFA uses a dedicated IBM Advanced System Management PCI Adapter that runs independently of the system processor and provides the intelligence for remote management, system monitoring, alert notification, error logging and environmental monitoring.

PFA features on the Netfinity 7000 M10 server include the following:

**System Memory.** Semiconductor memory is subject to both hard and soft errors. Erroneous data bits in memory due to a soft error can be corrected by rewriting the corrected bit to that location.

Erroneous data due bits to a hard error cannot be corrected by rewriting the bad bit. If another data bit error occurs in the same Quad Word, it results in a double-bit, uncorrectable error. Because ECC corrects single-bit failures in the data prior to use, your system will continue to run without error, even when a single data bit is permanently bad.

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Netfinity memory PFA monitors the number of single-bit errors. A sophisticated algorithm determines when single-bit errors could present a concern to system performance. When a threshold is exceeded, the Advanced System Management PCI Adapter generates an alert.

**System Fans.** For system cooling, the Netfinity 7000 M10 server has extensive fan cooling. One fan is standard in the power supply, but a total of eight fans can be configured throughout the server. Some other vendors have fans that run at two speeds, slow and fast. This means that at higher room temperatures, the fans go to full speed, cool the system, then return to slow speed as needed. In other words, they *thermal cycle* the electronics, which can reduce reliability.

PFA in the Netfinity 7000 M10 server solution uses tachometers to measure fan speed, so that Netfinity Manager can monitor fan performance and if necessary, generate alerts. The Netfinity 7000 M10 server design increases fan speed gradually with temperature, powering all of the fans (not just the primary ones), resulting in a cooler, quieter and more reliable system.

**Thermal.** Netfinity Manager software monitors temperature and PFA warnings are issued before graceful system shutdown so corrective action can be taken if the server, due to a thermal problem, ever needs a restart.

**Processors.** Some processor problems, such as L2 cache and frontside bus error corrections, can be monitored by the system. If these errors become too frequent, the likelihood of a disruptive failure increases. The processor PFA feature monitors corrected errors reported by the processors. If the frequency of these errors exceeds the preset threshold, the Netfinity Advanced System Management PCI Adapter generates an alert. Processor replacement can then be scheduled as part of normal maintenance.

**Power subsystems and voltage regulator modules (VRMs).** Netfinity PFA for the power supply subsystem provides an additional measure of protection. The Netfinity Advanced System Management PCI Adapter monitors the power supply voltages (+5v, +12v, -12v and 3.3v). Additionally, each processor on the Netfinity 7000 M10 server is powered by VRMs. The Advanced System Management PCI Adapter also monitors the voltage of each VRM.

Each voltage has an upper and lower threshold for which a PFA alert is issued. If any voltage is out of tolerance, the system-management processor sends an alert to Netfinity Manager and the error is logged to the system-management error log.

For extreme deviations of power supply voltage from the specification, the Advanced System Management PCI Adapter issues shutdown commands to prevent hardware damage and protect customer data from unstable circuitry that can result from fluctuating voltage levels.

**Self-Monitoring, Analysis and Reporting Technology (S.M.A.R.T.).** PFA in the S.M.A.R.T. specification provides early warning of some hard-disk drive failures. This allows critical data to be protected. S.M.A.R.T. is the industry-standard reliability prediction indicator for hard disk drives. IBM paved the way for S.M.A.R.T. by marketing the industry's first failure-prediction capability for SCSI hard disk drives. Regular backups, combined with S.M.A.R.T.-capable hard disk drives, help safeguard against loss of data.

There are two kinds of hard-disk drive failures: unpredictable and predictable. As you might expect, unpredictable failures happen quickly, without advance warning. These failures can be caused by static electricity, handling damage or thermal-related solder problems. Predictable failures, on the other hand, are the types of failures that S.M.A.R.T. attempts to detect. These failures result from the gradual degradation of the drive's performance. In fact, 60% of drive failures are mechanical—and that's just the kind of failure S.M.A.R.T. is designed to predict. S.M.A.R.T.-capable drives use a variety of techniques to monitor data availability. These techniques vary from one manufacturer to another. For example, a S.M.A.R.T. drive might monitor the fly height of the head above the magnetic media. If the head starts to fly too high or too low, there's a good chance the drive could fail. Other drives might monitor different conditions, such as ECC circuitry on the hard-drive card or soft-error rates. Depending on the circumstances, some drives might monitor all or none of these conditions.

Internal hard drives also support the SCSI Accessed Fault Tolerant Enclosure (SAF-TE) standard to protect hard drive data if failures occur.

If one of IBM's S.M.A.R.T.-capable drives predicts it is going to fail while it's still under warranty, IBM will repair or replace it at no additional cost to you.

## ***Easy Accessibility***

The Netfinity 7000 M10 server chassis is designed for no-tools access. All the components are easily accessible to the user. CPUs, PCI adapters, fans, memory, power supplies, VRMs and hard drives are all available with out the use of any tools. This allows for quick and easy upgrades and repairs and reduces the amount of downtime needed.

## ***IBM Netfinity Advanced System Management PCI Adapter***

The Advanced Systems Management PCI Adapter provides remote control via LAN, modem and the Web. Through a remote connection directly to the Advanced System Management PCI Adapter, a system administrator can do the following from a remote location:

- w Control power on and off to the system
- w Get error indications from the system
- w Monitor the system
- w Run remote applications on the system

Netfinity Manager software and the integrated Netfinity Advanced System Management PCI Adapter, both included at no additional charge, simplify network and server management and offer proactive, local and remote control of networked business systems.

From a remote location, you can connect to your Netfinity 7000 M10 server by the following means:

- w The Advanced System Management PCI Adapter Ethernet Port is a feature unique to IBM servers. When attached to a LAN, the Advanced System Management PCI Adapter Ethernet Port accepts a connection from a remote Netfinity Manager Console. The Token Ring option is not available yet.
- w When attached to an external modem, the Advanced System Management PCI Adapter accepts a dial-in request from either a remote Netfinity Manager Console or from a remote ASCII terminal.



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- w When attached to a modem connected to the Web, the Advanced System Management PCI Adapter can let you control your Netfinity 7000 M10 server from virtually anywhere for extensive remote management.

Password protection can prevent unauthorized access. The password setup and user ID are stored in the Advanced System Management PCI Adapter. If the user cannot provide the correct identification or password after three times, to prevent "hacking" the system does not answer the phone for an amount of time specified by the system administrator. In addition, if access is denied, an event log entry is recorded in the log indicating that someone tried to gain access to the system.

If the remote user is able to provide the correct password and ID information, that person gains access to the system. The event log records remote access. The level of authorization also varies per user and is selectable by the system administrator.

The Advanced System Management PCI Adapter supports remote access across the modem from an ASCII terminal. This removes the requirement to have Netfinity Manager running remotely in order to access the system Advanced System Management PCI Adapter. The Advanced System Management PCI Adapter determines that the remote connection is for an ASCII terminal and builds the appropriate menus for the terminal in order for the system administrator to control the Netfinity 7000 M10 server.

In conjunction with the paging mechanisms of the Advanced System Management PCI Adapter, the system administrator can be paged whenever a problem occurs. Then the system administrator can remotely connect to the adapter through an ASCII terminal, power the server on or off, monitor the server, perform problem determination and control the Netfinity 7000 M10 server.

This allows the system administrator to remotely reboot systems or take them offline without having to be on site. In addition, if requested by the system administrator, attempts are made to protect the system by requesting the operating system to shut down.

The Netfinity 7000 M10 server can be programmed to turn itself off or on at specified times. This allows the system administrator to schedule service for the system.

The Advanced System Management PCI Adapter allows for management of other Advanced System Management PCI Adapters in other servers. This connection allows a remote system administrator to have a central point of control of the entire environment.

This function works by having a remote connection into one particular Advanced System Management PCI Adapter and then having the ability to control and monitor any of the Advanced System Management PCI Adapters attached via the optional RS485 connection. (The RS485 option is not available yet.) This removes the requirement that each Advanced System Management PCI Adapter has to be connected to a modem or a LAN port. Each secondary Advanced System Management PCI Adapter can display its own menu at the primary Advanced System Management PCI Adapter. The system administrator can assign the appropriate level of access to each Advanced System Management PCI Adapter to each user.

## **IBM Netfinity Manager Software**

To complement the IBM Netfinity Advanced System Management PCI Adapter and the IBM Netfinity 7000 M10 server, Netfinity Manager software is included at no additional charge. Netfinity Manager complements the hardware instrumentation by collecting, analyzing, storing and forwarding information from the system management features.

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Netfinity Manager software offers a graphical user interface for easy local and remote access, control over these features and the processor, as well as seamless integration into higher levels of workgroup or enterprise management tools such as Microsoft System Management Server (SMS), Intel LANDesk® and Tivoli™ Management Software.

Netfinity Manager is a powerful suite of tools and utilities designed to manage servers in the environment you currently have, including Microsoft Windows NT, IBM OS/2®, Novell NetWare, Citrix WinFrame and NCD WinCenterPro operating on both IBM and non-IBM systems. And it supports industry standards, such as the Desktop Management Interface (DMI), Simple Network Management Protocol (SNMP) and the Multi-Platform Management (MPM) API.

Netfinity Manager software can help you manage your server with ease and efficiency. And, most importantly, it can help you control many of the hidden costs of operation.

Concentrating on administration and hardware management, Netfinity Manager performs four main functions:

- w **Asset and capacity management.** With Netfinity Manager, you can obtain comprehensive and detailed information about your system hardware and software and export this information to a variety of popular databases. In addition, the Capacity Management service collects server performance data and displays this data graphically to help system administrators easily determine how every server on their network is performing. For example, instead of physically traveling to each LAN-connected system to perform asset management, noting serial numbers and configuration information, the Netfinity Manager auto-discovery feature lets you collect this data remotely, right from your Netfinity Manager system. You can perform capacity planning proactively, knowing in advance which systems will require additional resources, such as more memory, larger disk capacity or faster processors.
- w **Problem detection and notification.** Netfinity Manager has an extensive range of monitoring functions that in conjunction with the Advanced System Management PCI Adapter provide advanced warning of potential and critical failures. A sophisticated and powerful Alert Manager function can notify the system administrator through a variety of methods, or automatically take action in response to events.
- w **Remote console control.** Netfinity Manager allows network administrators to take complete control of a target system and have full graphics control. The target and managing system can be any one of the Netfinity Manager supported platforms—they do not have to be the same platform.
- w **Server management tools.** Netfinity Manager allows network administrators to perform many routine tasks and mass configuration over a network connection or over a serial dial-in connection. Many tasks such as system backup, file updates, inventory and system reboots can be automated and scheduled outside normal working hours. Netfinity Manager also integrates valuable tools to give you remote support for some server-unique functions such as RAID and cluster management.

## ***Business-critical Support and Service***

IBM offers the best server support in the industry. For decades, IBM has been a leader in large and midrange system service and support, bar none. Now with that same expertise and focus on Netfinity products, IBM offers you an integrated system that provides you with high-availability service and support, designed and optimized to meet your business needs.

IBM is uniquely qualified to deliver a caliber of service and support that allows businesses to concentrate on doing their business. The statistics are impressive:

- w 110,000 people worldwide deliver IBM service and support in 164 countries.

## *Performance leader, 4-way Pentium II Xeon processor server*

- w 2500 IBM support specialists handle customer and Business Partner calls in 17 languages from our 10 HelpCenter® facilities around the world.
- w Maintenance parts are available from IBM's 144 parts-stocking locations in the U.S. and 479 locations worldwide.
- w More than 4000 IBM and Business Partner specialists have been rigorously trained in the TechConnect® certification program for IBM Netfinity servers.

As you can see, IBM offers the most widespread global support and highly trained personnel available. This kind of coverage can make your life easier, as well as reduce potential risks for your business.

IBM continues to improve service and support for Netfinity servers. IBM's focus includes increasing availability of maintenance parts; providing support specialists at the local, regional and area levels; and assigning customer service representatives and technical support managers to your business.

### ***Kirkland Programming Center***

The 50,000 square foot, state-of-the-art Kirkland Programming Center, which opened in 1993, is an integral part of IBM's Personal Systems Group (PSG). At the IBM Kirkland Programming Center, there are over 120 software engineers, test and quality specialists, and enterprise solutions support staff whose sole mission is to ensure the interoperability of Microsoft's products with IBM products.

IBM has made a major investment in the Kirkland Programming Center and has deployed the resources needed to work hand in hand with Microsoft. Their goal is to ensure that IBM Netfinity servers and other IBM hardware systems are clearly the superior platform for Windows NT and other Microsoft products.

The IBM Enterprise Solutions team provides pre-sales and post-sales non-defect support to IBM marketing teams and enterprise customers. The team analyzes and documents evolving Microsoft software technology opportunities delivered on IBM hardware. They also conduct briefings, manage IBM PSG demonstration systems running Microsoft technology at industry trade shows, and assist customers in the initial design and architecture of current and future Microsoft technology solutions on IBM hardware. This group is made up of Microsoft Certified Systems Engineers, Trainers and Solution Developers.

IBM service and support offerings cover all your needs from pre-sales to installation to post-sales, and include remote, electronic and on-site support. IBM's goal is to offer you the best possible solution to meet your business requirements.

### ***Remote Connect Support***

IBM's Remote Connect is a major enhancement to service and support for Netfinity servers. Using the latest technology advances delivered by select models of the Netfinity product line, IBM offers a "Call Home" remote support feature in an Intel processor-based server. If your server experiences a problem, it will dial IBM and set in motion the right level of support to keep your system up and running. And, you can select options to have IBM contact you or your approved warranty service provider.

## *Performance leader, 4-way Pentium II Xeon processor server*

Using the multiple technologies in IBM's newest Netfinity servers, Netfinity Manager software and the Advanced System Management PCI Adapter, our support capability allows us to remotely deliver hardware problem determination, launch on-site resources if needed and invoke any level of support, including product engineering, within minutes. Included in this offering is a comprehensive problem-management system that provides tracking, management, escalation and transfer of problem ownership to the appropriate skills required to resolve an issue. For more information visit [www.pc.ibm.com/techinfo/6342](http://www.pc.ibm.com/techinfo/6342).

Note: Remote Connect availability is limited to certain mainstream and high-end Netfinity servers (U.S. only) and supports selected network operating systems. Remote Connect is offered exclusively through IBM Global Services.

### ***Update Connector Provides Web Access to Latest BIOS and Driver Code***

IBM's electronic-support Web site provides an automated service for updating your Netfinity and PC Server BIOS and driver files called Update Connector. Update Connector is a quick and convenient way to access the latest available BIOS and driver code. Connecting and executing through the Web, Update Connector searches your system's configuration, determines the levels of BIOS and drivers currently installed and notifies you of the latest levels. At your discretion, Update Connector can send you the latest versions for your system and prepare them for installation at your convenience.

### ***MoST Connect Provides a Direct Communication Link to the Experts***

Leveraging the latest technology advancements in Netfinity and PC Server systems and Netfinity Manager, IBM increases its on-site support by enhancing the Mobile Solution Terminal (MoST), carried by our server field-service representatives. MoST Connect, provides a direct communication link between the IBM field service specialist at your location and the experts at the IBM HelpCenter. Continuing to improve on-site support, IBM delivers remote-console capability with both voice and data communications through a Netfinity or PC Server system's serial port.

MoST Connect allows the HelpCenter support specialist to perform remote problem determination and launch additional resources, including product engineering if required, to solve a server problem. MoST Connect enables the HelpCenter to assemble a pool of skills and be *virtually* on-site to address the most complex problems without delay.

Note: MoST Connect is not yet available in all countries. MoST Connect is offered exclusively through IBM Global Services.

### ***3-year Limited Warranty, Including Predictive-Failure Coverage***

You never know where or when business-critical problems will occur. IBM stands behind its server products with a 3-year, limited, on-site warranty. This leading-edge warranty includes hardware problem determination performed on-site, as well as remotely, with IBM's latest technology and tools. Labor and IBM parts are covered for the full duration of the warranty period, including parts identified during PFA and the installation of required engineering changes. This warranty offers more than the typical industry-standard warranty. For example, when you add Options by IBM to a Netfinity server, they assume the warranty term of the server on which they are installed.

As an IBM customer you are entitled to 7-days-a-week, 24-hours-a-day, 365-days-a-year access<sup>2</sup> to the IBM HelpCenter for remote phone support of your IBM server hardware products.

Note: Warranties may vary by country.

## **ServerProven Technology**

The IBM Netfinity ServerProven™ program takes the complexity out of configuring, installing and setting up options, network operating systems and applications. IBM has carefully tested hundreds of products from Options by IBM and other leading industry vendors for compatibility with IBM Netfinity products, so you can add new capabilities with confidence. The results are published in a comprehensive list and updated frequently on the IBM Web site. The products listed as ServerProven operate in the tested environments.

And IBM has expanded its ServerProven program to incorporate ServerProven solutions, a commitment by IBM to work with independent software vendors and industry-leading hardware manufacturers to provide you with fully integrated solutions that meet your business needs. Comprehensive testing of both the software applications and hardware products during the development cycle of IBM servers will provide you with improved performance, simplified installation and guidelines for the correct configuration to meet your business requirements.

You can find a complete list of ServerProven Solutions and ServerProven options at [www.us.pc.ibm.com/compat](http://www.us.pc.ibm.com/compat).

Note: The compatibility information provided by IBM should be used as a guide only, since hardware and software levels and releases may vary, and numerous hardware and software combinations are possible. IBM makes no representation or guarantee regarding the compatibility of specific hardware or software products. Unless otherwise specified, warranty, service, and support for non-IBM products are provided directly to you by the product manufacturer, supplier or publisher of the product. IBM makes no representations or warranties regarding the non-IBM products.

## **Conclusion**

The IBM Netfinity 7000 M10 server solution provides exceptionally high levels of power, availability, scalability and serviceability to support your business-critical needs, at greater performance levels and supporting more clients than previously possible with Intel processor-based servers.

The advanced, high-throughput, four-way SMP-capable Netfinity 7000 M10 server solution not only includes the latest Intel Pentium II Xeon processors, it adds the bonus of IBM features that deliver superior performance. With new 100MHz F-16 bus architecture, the Netfinity 7000 M10 server delivers excellent scalability for adding memory and processors.

The Netfinity 7000 M10 server and IBM's Web Server Accelerator technology can cut response time in half. The Web Server Accelerator for Windows NT running on the Netfinity 7000 M10 server helps ISPs deliver economical, fast and reliable Web service. The combination of IBM's Web Server Accelerator software and the Netfinity 7000 M10 server give you advantages you can't readily get from other Intel processor-based platforms.

IBM Netfinity X-architecture sets the standard for affordable enterprise quality through unmatched testing, systems integration and compatibility. Through advances in migration and integration technologies, reliability, scalability, availability, manageability, security and serviceability, Netfinity X-architecture, based on IBM's decades of experience in enterprise and server technology, provides maximum performance for the Netfinity 7000 M10 server while maintaining compatibility with your existing systems.

The Netfinity 7000 M10 server provides exceptional fault-tolerant and high-availability functions integrated within the server as standard features. These standard features include Hot-Plug PCI/add/upgrade and redundant hot-plug drives. Additional hard drives, memory and power supplies are optional, or can be installed later without little or no downtime. PFA for major components helps your business avoid downtime.

## *Performance leader, 4-way Pentium II Xeon processor server*

Advanced manageability and serviceability features can help you control the Netfinity 7000 M10 server and diagnose problems quickly from remote locations, even if your system is down without power. An integrated Netfinity Advanced System Management PCI Adapter, in a dedicated PCI slot, combined with Netfinity Manager software, supports remote POST, in addition to setup and diagnostics via a LAN, a modem or the Web. Built-in light-path diagnostics and LEDs alert you to possible failing components and help you locate and fix specific problems quickly and efficiently, with little or no downtime.

IBM's Remote Connect support is a major enhancement to its service and support for Netfinity servers. If your Netfinity 7000 M10 server experiences a problem, it can dial IBM and contact the right level of support to keep your system up and running. And, you can select options to have IBM contact you or your approved warranty service provider.

High-availability and advanced manageability features of the Netfinity 7000 M10 server provide a solid foundation to run your high-speed, business-critical applications with confidence.

### ***Additional Information***

For more information on IBM Netfinity direction, products and services, refer to the following white papers, available from our Web site at [www.ibm.com/netfinity](http://www.ibm.com/netfinity).<sup>3</sup>

*Lotus Domino® Clusters Overview*

*Lotus Domino Clusters Installation Primer*

*Integrating IBM Netfinity Manager with Microsoft System Management Server*

*Integrating IBM Netfinity Manager with Intel LANDesk Server Manager*

*IBM Netfinity System Management Processor*

*IBM Netfinity PCI Hot-Plug Solutions*

*IBM Netfinity Storage Management Using Tape Subsystems*

*IBM Netfinity X-architecture*

*IBM Netfinity Servers and Intel Architecture*

*IBM Netfinity 8-Way SMP Directions*

*IBM Netfinity Cluster Directions*

*IBM Netfinity Fibre Channel Directions*

*IBM Netfinity Server Ultra2 SCSI Directions*

*IBM Netfinity System Management for Servers*

*IBM Netfinity Server Quality*

*IBM Netfinity Predictive Failure Analysis*

*At Your Service...Differentiation beyond technology*

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<sup>3</sup> Are you Year 2000 Ready? Visit [www.ibm.com/pc/year2000](http://www.ibm.com/pc/year2000) or call 1 800 426-3395 (and request document 10020 from our faxback database) for the latest information.

*Performance leader, 4-way Pentium II Xeon processor server*



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