

# Profile

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## IBM's Netfinity Servers: Leveraging Enterprise Technologies for Its New X-Architecture

IBM's "Big Iron" roots are showing new growth in an area where IBM historically hasn't focused its vast resources of services, software and technology: new robust, scalable, high-performance, and manageable Intel-based Windows NT servers. These incorporate technologies and services that offer customers a solution focused on *applications*, instead of just a hardware platform with disparate technologies layered on top.

The key NT-server problem for decision-makers today is to determine the best platform to deploy at a variety of levels, from workgroup to departmental to enterprise-wide. Customers need to choose solutions that address Windows NT's continuing shortcomings in reliability, scalability, manageability, and availability.

Netfinity systems now offer high performance, manageability, reliability and serviceability to support users that seek to deploy Intel-based servers in business-critical production environments as Windows NT matures. In this *Profile*, Aberdeen examines the elements of the IBM Netfinity server line and outlines key products, technologies and services that make Netfinity a compelling choice for executives evaluating the dynamic Intel-based server market.

### **Executive Summary**

Over the last year, IBM has built up its Netfinity Intel-based server line by the addition of mainstream and entry-level servers. Now, IBM is taking a new strategic direction. The new strategy aims to bolster Netfinity by undertaking a number of technology initiatives to further improve these servers' enterprise capabilities.

To do this, IBM is blending technologies from its enterprise-server, midrange-server, microelectronics, storage, software, and Global Services groups into the Netfinity line. This should demonstrate to customers IBM's commitment to bring enterprise-class features into the market ahead of its enterprise-NT competitors and leverage its vast technology portfolio.

IBM also is delivering to Netfinity customers new levels of systems management, performance, interoperability, and system scalability through its new "X-Architecture." A key aim of the X-architecture is to converge the Internet — today's path to competitive advantage — with the realities of the IT infrastructure. IBM's goal is to help IS decision-makers deploying NT-based systems to leverage their existing business-intelligence, large-enterprise, and e-commerce applications as the use of the Internet in the enterprise environment grows.

The new Netfinity solutions offer:

1. New system-architecture advances and technology directions;
2. New clustering features — through both industry-standard high availability clusters and IBM value-added application clustering;
3. Enterprise Interoperability with other IBM server lines;
4. Comprehensive systems management tools to detect and prevent problems and assist in healing servers; and
5. Professional services offerings via IBM Global Services and other Netfinity-specific services through SystemsXtra.

Many of these advances will be critically important to IS managers grappling with NT-server proliferation and seeking to strategically deploy these servers in new application environments such as e-business, data mining, large-enterprise applications, and small-to-medium business environments.

IBM's key Netfinity value is to give IS executives added *flexibility* while continuing to deliver competitive, high-performing Intel servers, technology and services. At the same time, IBM wants to enhance NT's strengths and compensate for NT's weaknesses by offering extensions to NT through its own technologies, applications and systems management tools.

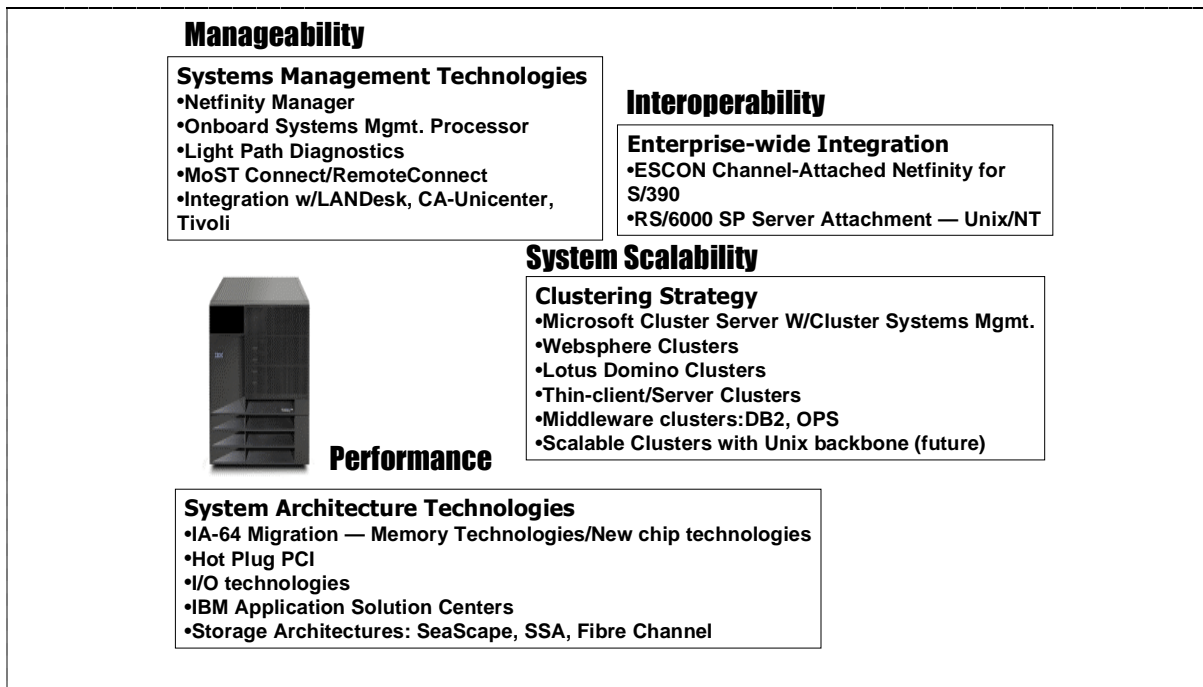
Probably the most significant news for IBM and its installed base in 1998 is the coming of age of its Netfinity server line and the development of the X-Architecture that lays out a technology roadmap for the Netfinity server line. The result is a more aggressive, comprehensive approach to the Intel server market that gives IBM clear differentiation against Hewlett-Packard, the new Compaq, and Dell Computer Corp. — not only industry-standard servers, but also new technologies, industry-leading benchmarks, and clear focus. IS executives should take note of these enhancements as they evaluate NT servers for their enterprises, and carefully consider IBM's Netfinity servers in building their next-generation IT infrastructures.

### **Market Position**

In one of the computer industry's most competitive markets, IBM Netfinity servers haven't traditionally carried IBM's full attention — a strategic mis-step that has

caused Netfinity to cede market share to Hewlett-Packard, Compaq, and Dell. But over the last year, IBM has changed dramatically. IBM now offers one of the industry's most comprehensive NT server lines, including strong technology, services, and solutions, and competitive pricing. As a result, IBM is far better positioned today to attract and hold IS executives' attention than it was even six months ago. And its 1998 solution-delivery success is translating into Netfinity-business growth.

**Figure 1: Netfinity Components for Its X-Architecture**



Source: AberdeenGroup, September 1998

IBM now has a number of key differentiators versus both Dell and HP, including the depth of applications, clustering support, and new interoperability technologies. For example, despite an alliance with Microsoft, HP has not yet demonstrated a strongly-focused, comprehensive NT strategy across software, hardware, services, and interoperability comparable to IBM's. While Dell is increasingly aggressive in pursuing the NT-server market, users do not yet perceive Dell as having IBM's comprehensive systems-management framework, nor IBM's level of professional services, ISV development programs, and enterprise experience.

For IBM's Netfinity servers, Compaq is the largest threat on the competitive horizon, because of Compaq's sheer size after the acquisition of Digital, its technology prowess in enterprise environments, its Digital professional services (including extensive experience with Windows NT), and its past technology leadership in the NT server market. However, Aberdeen research shows that many enterprise users

are still hesitant to associate Digital, even under the Compaq umbrella, with their NT-based business-critical efforts. Thus, IBM's unmatched service reputation plus its new-found ability to play on the same NT-technology field as Compaq should give it an edge in many of the newer NT-across-the-enterprise IS efforts.

### **Netfinity Product Line Overview**

IBM completes its transition from the older PC Server line during September 1998 with the introduction of three new servers: the Netfinity 5000, and the new Netfinity 5500 M10 and 7000 M10 utilizing Pentium II Xeon processors. The Netfinity server line supports a number of different operating systems in addition to Windows NT, including SCO UnixWare, Novell NetWare, and IBM's OS/2.

The resulting server product lineup offers two entry-level servers: the Netfinity 3000 and 3500. The Netfinity 3000 uses a single Pentium II processor at 450MHz, 400MHz, 350MHz or 300MHz clock speeds; the Netfinity 3500 supports dual Pentium II processors at 333MHz. At the midrange, IBM is offering three servers: the *new* Netfinity 5000, the Netfinity 5500 and the Netfinity 5500 M10. The Netfinity 5000 supports dual 450MHz, 400MHz, or 350MHz Pentium II Slot 1 processors. The Netfinity 5500 will now be divided into classes, with the base server supporting dual 450MHz, 400MHz or 350MHz Pentium II slot 1 processors and the M10-class server providing dual Pentium II Xeon performance at 400MHz. IBM's enterprise-class Netfinity 7000 server has been updated to offer the powerful Pentium II Xeon in a four-way Symmetrical Multiprocessing (SMP) platform, now called the Netfinity 7000 M10. All of the mainstream or enterprise servers can be configured in either rack or tower configurations, giving IS buyers increased flexibility in addressing IT-department space issues.

### *Performance/Scalability: A Secret Advantage*

What most customers don't know is that IBM's Netfinity line has been a leader in the industry standard-benchmark race, with record-breaking results in the Transaction Processing Council's (TPC) C- and D-class benchmarks, SpecWeb, Notes-Bench, and SAP R/3. Most recently, Netfinity 7000 M10 scored a record setting 18,893.43 transactions per minute on the TPC-C benchmark. The Netfinity 7000 M10 also earned pace-setting TPC-D rankings this year, scoring 1,871.1 QppD@100GB.

### *Enterprise Storage Systems — Offering Storage to Meet IS Needs*

An increasingly mission-critical component of today's business-critical applications is a storage subsystem that can be expanded rapidly to meet these applications' insatiable appetite for storage. As a storage supplier, IBM has engineered its Netfinity server line with a wide array of storage options. Among these options are:

- Fibre Channel solutions that include adapters, hubs and controllers;
- Serial Storage Architecture (SSA) systems;

- IBM's Seascape family of storage systems; and
- Other enterprise storage systems via the IBM Netfinity ServerProven program.

Fibre Channel, in particular, is a key storage-system technology, and especially for rapid, flexible expansion in NT-server storage to hundreds of terabytes, as well as delivering performance throughput of 100Mbps over distances of up to 10KM.

Fibre Channel technology can serve as the backbone for a storage area network (SAN) and connect the disk drives within a disk storage unit. With a Fibre Channel SAN, an enterprise gains configuration flexibility that translates into easier management of storage hardware. Inside a disk array, FC-connected drives promote higher disk array availability by allowing non-disruptive component replacements.

IBM is offering the Netfinity Fibre Channel RAID Controller unit, a Fibre Channel FailSafe RAID Controller, a Fibre Channel PCI Adapter, and a Fibre Channel Hub. Using Netfinity Fibre Channel systems and the new Netfinity EXP15 storage expansion system, IS administrators can attach up to 36 terabytes (TB) of disk storage to a single PCI slot on the Netfinity 7000.

IBM also offers the ServeRAID-3 Ultra-2 SCSI adapters, and SSA PCI RAID adapters. The ServeRAID-3 family of adapters supports up to 4.3 TB of total external storage when linked to the Netfinity 5500 and 7000, plus the Netfinity EXP15 storage system. IBM can also offer Netfinity customers access to Seascape. Seascape is a storage infrastructure designed for enterprise customers that allows administrators to add storage as their infrastructure demands it. Seascape includes software, enterprise storage management, and a range of disk, tape and optical storage systems.

#### **Advances in Systems Architectures: Building On Intel Platforms**

IBM is working on long-range plans to build new innovation into system architecture designs through a range of microprocessor technologies — leveraging enterprise server capabilities in its Intel Architecture server line. These technologies include IBM's patent-pending work with copper chip wiring, Silicon On Insulator (SOI) chip technology, and new microprocessor packaging. IBM's copper chip wiring technology is expected to streamline the way information is communicated throughout the microprocessor, boosting overall performance by up to 40 %. Silicon On Insulator technology provides better isolation of components on a chip, allowing greater component concentration and thereby boosting performance by up to a further 35 %. Aberdeen anticipates that IBM will include these technologies in various parts of the Netfinity architecture over the next 2-3 years.

Another upcoming Intel-architecture advance in which IBM is taking a leading role is 64-bit processing. Aberdeen research shows that customers are increasingly concerned about how to make the move to 64-bit computing on Intel's IA-64 architecture, slated to arrive after 2000, and how to protect their present invest-

ments in Intel-based applications and systems platforms. IBM has demonstrated experience in 64-bit computing through its work on the PowerPC architecture on its AS/400 and RS/6000 that is already 64-bit enabled. Using this knowledge, IBM is developing technologies to take full advantage of IA-64 in its Netfinity line.

IBM is now developing its own core logic for eight-way IA-64-based systems, as well as enhanced memory systems to take advantage of larger main memory. The Netfinity 7000 M10 now supports up to 8GB of memory, and future Netfinity systems will support up to 64GB of memory. IBM aims to offer customers the flexibility of being able to choose from a wide range of operating environments on IA-64 Netfinity systems that could include IBM's AIX and other varieties of Unix.

Finally, IBM is working to boost the performance and reliability of specific system components: logic cores to boost I/O performance (Intelligent I/O) and designed systems-management processors to boost administration performance. IBM Blue Logic technology is used to build memory and bus controllers (ServeRAID-3) and application-specific integrated circuit (ASIC) designs. IBM is supporting 64-bit PCI buses and faster PCI bus speeds in future Netfinity servers via its leading role in the development of the PCI-X standard (meant to breath new life into the aging PCI Specification by boosting bus speeds up to 133MHz and CPU-peripheral transfers up to 1GB per second). To boost reliability, IBM offers hot-replace and hot-add PCI technology on the Netfinity 5500, 5500 M10 and 7000 M10.

#### **System Scalability: IBM Netfinity Clustering Architecture**

The rapid proliferation of Windows NT Server in enterprises means that customers must now look at new ways of overcoming NT's shortcomings in reliability and downtime. One way to do this is by clustering systems together. NT clustering is just starting to catch the interest of IS buyers, as Microsoft and a host of third-party suppliers move forward with high availability clusters. IBM has extensive experience in clustering through its work on S/390 and RS/6000 clustering technologies. IBM anticipates developing the ability to centrally manage heterogeneous clusters including RS/6000 and Netfinity servers (see below.)

Today, IBM Netfinity offers customers a way to "have their cake and eat it too", by introducing clusters that not only boost availability but also provide scalability by offering solutions tuned for specific application environments. Solutions (including services) soon to be available using the Netfinity server line are:

1. *Websphere Cluster*: providing components such as bandwidth management, caching, file administration and replication, and load balancing via IBM's Web tools Web Traffic Express and Transarc AFS enterprise file system;
2. *Thin-Client/Server clusters*: supporting WinFrame 1.7, Wincenter 3.1 and Citrix MetaFrame in a clustered configuration of Netfinity servers;

3. *DB2 Universal Database Enterprise Extended Edition*: a “shared-nothing” architecture that allows parallel queries on a database with minimal data transfers between Netfinity nodes in a cluster;
4. *Oracle Parallel Server (OPS)*: Oracle's database cluster that scales to six nodes and is certified for Netfinity servers with a Fibre Channel storage sub-system (one of the industry's first); and,
5. *Lotus Domino Cluster*: supporting six Netfinity nodes for messaging.

And Netfinity customers will be reassured by the open nature of these options that they can move forward with scalable clusters in the future as the solutions evolve.

Like other Intel Architecture-based server suppliers, IBM offers Netfinity customers Microsoft's first iteration of high availability clustering, Microsoft Cluster Server (MSCS). However, a key problem that IS buyers have cited as delaying widespread adoption of MSCS is the difficulty of managing the cluster. IBM now offers a solution: its Netfinity Microsoft Cluster Systems Management software that gives administrators improved control over MSCS clusters.

#### **Enterprise Interoperability: Integrating Netfinity Servers**

Increasingly, IS managers face complex issues of deploying and managing new platforms in heterogeneous environments, typically including mainframes, Unix application servers, and NT servers. IBM's ability to engineer its Netfinity servers to interoperate with existing large and midrange systems gives administrators more flexibility in deploying these servers in conjunction with IBM's AS/400, RS/6000, and S/390 systems. Using Enterprise Interoperability, decision-makers can implement cross-platform communication between traditional business-critical applications (such as enterprise resource planning, e-commerce, and data warehousing) and new, powerful NT-based applications.

For example, IBM has developed for the AS/400 an Integrated PC Server (IPCS) that is a “server within a server” on the platform, and that can interoperate with the AS/400 as well as with NT-based Netfinity servers. To integrate RS/6000 and Netfinity servers, IBM has developed new communications links that are slated to be phased in between now and the year 2000. IBM states that during the first half of 1999 it will give customers the ability to manage Netfinity and RS/6000 servers collectively from a single control console through an Ethernet connection, using the peer-to-peer capabilities of the Netfinity systems-management processors. IBM will follow this with inter-NT/Unix clustering by the year 2000, with a Netfinity cluster being able to attach to an RS/6000 SP cluster with an SP switch interconnect. This combination of platforms will be good for three-tiered SAP environments, as well as LAN consolidation server environments.

To integrate S/390 and Netfinity, IBM is providing the ESCON Channel-Attached Application Servers to the S/390. These allow Netfinity servers to be directly chan-

nel-attached to mainframes using a PCI bus-based channel adapter. Netfinity servers will support up to four separate channel connections between an IA-based server and the mainframe. The ESCON Channel adapter can block-transfer up to 64,000 bytes, and has an aggregate throughput rate of 440 Mbps for the channel connections. IBM also offers the Communication Server for Windows NT that allows Netfinity-based applications to communicate with the mainframe through the protocols typical of both, such as SNA and TCP/IP.

### **Systems Management: Netfinity's Multi-Dimensional Approach**

IBM Netfinity server platforms strive to reduce or eliminate management costs in an NT environment that becomes more complex each year. IBM has concentrated on hardware and software architectures that allow Netfinity servers to identify and correct problems before they occur, an onboard systems-management processor that allows remote management, and a tool that lets Netfinity servers call IBM directly for assistance (RemoteConnect). IBM also supports a number of key IBM and third-party instrumentation tools and systems management applications through its own Netfinity Manager software, delivering integration with LANDesk, Microsoft Systems Management Server, Tivoli TME-10, and CA-Unicenter.

IBM is expected to enhance Netfinity Manager as it implements its Universal Management system framework that builds on IBM's key management technologies as well as IBM's work with Intel and Microsoft. This effort includes better integration with management tools at the workgroup and enterprise levels, and offers a standards-based foundation for management of operating system technologies. This initiative builds on the Desktop Management Interface (DMI), as well as other industry standard management tools. Manageability extensions for Netfinity servers include: a capacity manager, remote server management, RAID manager, cluster manager and a number of future management agents.

IBM is moving forward in 1998 with Microsoft on a new initiative called OnForever that provides NT/Netfinity system-level support for hot-plug technologies similar to Hot Plug PCI. This extends Netfinity's ability to detect and monitor components (presently PCI cards) to the memory subsystem, processors, and eventually applications and middleware. OnForever encompasses a number of key technologies that include failure avoidance, failure masking (through redundant features), methods to minimize outages, and tight integration with enterprise management architectures. IBM Netfinity servers already support a number of built-in failure prevention tools, including Error Correction Code (ECC) memory-scrub and Systems Management Interrupt (SMI) that allows specific software to communicate with Error Detection Fault Isolation (EDFI) hardware to detect hardware errors.

Crucial to Netfinity's systems management strategy is its "computer within a computer," an onboard systems-management processor installed on Netfinity 5000, 5500 and 7000 servers. This systems management processor allows remote man-



agement of Netfinity servers even when they are powered off — allowing the running of systems diagnostics for more accurate problem determination. Two systems management tools/services take advantage of this processor: MoST (Mobile Service Terminal) Connect that allows engineers to connect a failing server to the IBM Help Center using the Global Network, and RemoteConnect that enables a Netfinity server to self-diagnose, issue a system alert, call the service organization on its own, and request either a replacement part or a technician.

Lastly, IBM offers in the Netfinity 5000, 5500 and the 7000 M10 a new level of diagnostic support that allows IS administrators to use LCD indicators to determine hardware failures. “Light-path” diagnostics illuminate an indicator on the front panel of the server to alert administrators, and a set of lights points to specific components where the fault is located.

### **IBM Global Services: Yet Another Netfinity Value**

From Aberdeen's perspective, no one matches IBM's overall services in breadth and number of personnel. With 110,000 people located worldwide, IBM Global Services is a leader in the computer services industry (including a Microsoft Practice for design, installation, and management of Microsoft solutions). IBM has approximately 3,800 Global Services engineers responsible for integrating Microsoft and IBM products on NT Server, and approximately 800 personnel to support IBM middleware on NT. Netfinity leverages this Global Services expertise via its “SystemXtra” program. Additional information on NT-specific SystemXtra programs can be found at <http://www.ibm.com/pc/us/systemxtra>.

IBM is making major efforts to customize services for users' Netfinity/NT needs:

- Integrated services for Windows NT and non-Windows-based platforms;
- Remote design/planning assistance for deployment of NT and Microsoft Back Office;
- LAN Client Control Manager — a graphical server-based application that makes it easy to perform systems administration remotely;
- Leasing and Financing options; and,
- Installation Services from IBM's “SmoothStart” for installation and deployment of NT packaged applications.

Other offerings focus on specific aspects of Windows NT:

- Global Services Consulting for Microsoft Technologies, including customized services for enterprise-NT products;
- IBM Cluster Solution Planning Services for planning/deploying NT clusters;
- Recovery Management Services for Windows NT Server, to recover and restore Windows NT environments quickly; and,

- IBM Integration Services for Microsoft BackOffice, remote design/planning of NT/BackOffice servers.

### **Aberdeen Conclusions**

For customers looking for complete offerings, IBM Netfinity servers offer a solid and rapidly expanding foundation of technology, services, and solutions. These should allow enterprises to build a next-generation competitive-advantage infrastructure where NT servers play a larger, more demanding role. For example, IBM has set up a Netfinity technology architecture that addresses a major strategic direction of most forward-looking enterprises: Internet e-business.

It is clear that IBM is focused and committed to the NT server market and that IBM's Netfinity line has come of age. As a result, Netfinity can play a role not only in supplementing IS' efforts to move their NT strategies forward but also in addressing many of NT's shortcomings that are slowing IS down: manageability, scalability, reliability, and availability.

IBM's key challenge will be to balance its multi-platform offerings in such a way that Netfinity servers do not end up competing directly with RS/6000 and AS/400 systems. So far, the key to IBM's cross-server strategy is to offer whatever the customer believes that the customer needs. This is good news for proactive NT users, since it gives them additional investment protection, by allowing them to move to NT-based architectures at their own pace and interoperate with existing systems during the migration. However, IBM will need to do more to clarify where NT systems are especially appropriate for executives less familiar with the benefits of Windows NT environments.

Another IBM challenge will be to execute on the ambitious X-architecture described above. Delivery of real-world solutions based on X-architecture will help IBM overcome many users' impression that IBM isn't focused on the Intel server market and won't spend the time to build high-performance NT systems.

Overall, Aberdeen concludes that customers should take a closer look at what IBM Netfinity servers have to offer. Netfinity is no longer just speeds and feeds. It is a total solution, competitive across the board, that allows IS to do better in addressing their key NT-environment needs.

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