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Product Marketing Guide: Compaq ProLiant 7000

Abstract: *The Compaq ProLiant 7000 is the ultimate standards-based server delivering the most scalable performance and highest levels of availability and expansion for 7 x 24 environments. The ProLiant 7000 is the ideal server for large business-critical databases, OLTP, ERP, messaging, and web applications.*

Executive Summary

Key Features

- 4-way Pentium® II Xeon™ processing now with **450MHz** for superior power and performance and **NEW 2MB L2 cache**.
- 8 GB ECC-protected EDO memory for the highest performance in memory-intensive applications
- Next-generation cable-free 3-channel Wide-Ultra SCSI RAID Controller (Smart Array 3100ES) with enhanced features, offering high performance and contiguous RAID across all 3 internal hot plug drive cages, plus **NEW optional redundant Smart Array 3100ES**.
- New Fast Ethernet 64PCI, Dual Based 10/100 Controller for higher bandwidth requirements.
- Industry-first, easy-to-use push button PCI Hot Plug technology includes intelligent software shut-off during transitions, eliminating the need for software utility shutdown at a keyboard or console.
- Investment protection to future industry-standard 8-way processing.
- Standard Integrated Remote Console and Optional PCI Remote Insight Board for faster remote access.
- Compaq Insight Manager with web-enabled agents for the broadest management and systems software integration and the best pre-failure alerting.
- Rack-ready for ease of expansion, upgrade, and service, with 3 servers fitting in an industry-standard 19" x 42U (7-ft.) rack.
- Compaq Care provides a wide range of service offerings including a three-year limited warranty, Pre-Failure Warranty, and Compaq Service and Support Programs available on a worldwide basis.



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Product Marketing Guide: Compaq ProLiant 7000
Competitive Analysis prepared by Industry Standard Server Division

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Power and Reliability for 7 x 24 Environments

ProLiant 7000 with Pentium® II Xeon™ 450MHz/2MB L2 Cache Processors

Compaq combines cutting-edge performance and reliability with the benefits of industry standards to deliver the highest quality and lowest cost of ownership.

Evolving enterprises need a server that takes change in stride, and the Compaq ProLiant 7000 is designed to evolve with you. The ProLiant 7000 offers the highest levels of scalability to meet changing IT needs and protect your investment over time. The ProLiant 7000 was engineered with technology foresight, delivering an innovative design that allows customers to easily take advantage of future eight-way computing.

The ProLiant 7000 is ideal for large business-critical databases, messaging and web databases, high-availability OLTP, and ERP. You can trust Compaq ProLiant 7000 to run your business.

Businesses Everywhere Trust Compaq

- Compaq is the global and U.S. leader in industry-standard servers, holding a 32.2% market share.¹
- 55% of Windows NT customers running SAP/R3 entrust their business-critical applications to Compaq servers.²
- Compaq is #1 in NT, SAP, and Novell.²

¹ IDC Quarterly PC Market Tracker, 11/98.

² Compaq and respective partner data.



“Best Network Server” Award, Annual Best Buy Awards presented at Comdex, *Computer Shopper Magazine* (11/19/98)

“CRN Recommended,” CRN Test Center at Fall Comdex, *Computer Reseller Magazine* (11/98)

Enterprise PC Server Product of the Year Award, *Network Magazine* (3/98)



Product Overview

The Compaq ProLiant 7000 is the ultimate standards-based server delivering the most scalable performance and highest levels of availability and expansion for 7 x 24 environments. Compaq continues to set new standards for server power and customer confidence.

Highest Performance and Scalability – The ProLiant 7000 delivers next-generation technology:

- Up to 4 400MHz to 450MHz Pentium® II Xeon™ processors, with 500MHz expected to be available in March 1999.
- 100MHz system bus and now **2MB L2 cache**.
- 3-channel Wide-Ultra SCSI RAID Controller.
- 8GB ECC-protected EDO memory.
- 10 I/O expansion slots, with room for large amounts of integrated disk storage with the flexibility to choose 18x1” or 12x1.6” disks.
- Clustering supported in a variety of cluster configurations and operating systems.
- Upgradability to future 8-way Pentium® II Xeon™ processor technology maximizes investment protection.

Critical Availability for 7 x 24 Environments – The Compaq ProLiant 7000 offered the first industry-standard **push button PCI Hot Plug** platform in July 1998, and offers the following additional availability features:

- **NEW optional redundant RAID controller**,
- redundant hot plug power supplies,
- redundant hot plug fans,
- redundant processor power modules,
- redundant hot plug NICs,
- cluster support,
- RAID-protected hot plug drives,
- OSCRO (Online Storage Controller Recovery Option), an automatic failover option that allows controllers to back each other up.

Tight Integration with Leading Applications and Solutions – Compaq and its partners work together through every stage, from product development and engineering to product delivery and support – delivering systems that have been tested and optimized with the leading business-critical applications.

- Compaq has established 11 SAP Competence centers worldwide dedicated to testing and optimizing SAP R/3 solutions exclusively on Microsoft Windows NT.
- Compaq is the sole development and deployment platform for Baan’s Windows NT clustering.
- Compaq is the number one platform for the leading standards-based solutions, including Microsoft Windows NT, Novell NetWare, SCO Unix, as well as Oracle, SAP R/3, Lotus, Citrix, Siebel, PeopleSoft, and Baan on Windows NT.

Leading Manageability for Reduced TCO – Everything about the ProLiant 7000 is engineered for ease of management and decreased resource utilization.

- With SmartStart, Compaq Insight Manager, Integrated Remote Console, Integrated Management Display, Remote Insight Board (now PCI-based), new push button PCI Hot Plug, and easy access, customers recognize a 20-41% reduction of time spent on management tasks.³
- Compaq provides an unbeaten 3-Year Pre-Failure Warranty for servers using Compaq Insight Manager, covering memory, drives, and processors.

Highest Performance and Scalability

The ProLiant 7000 delivers balanced system performance to meet the demands of today's business-critical applications.

Compaq's balanced system architecture maximizes performance of processor, scalable memory, and Compaq's I/O subsystem, minimizing bottlenecks.

Next-Generation Processor Performance⁴

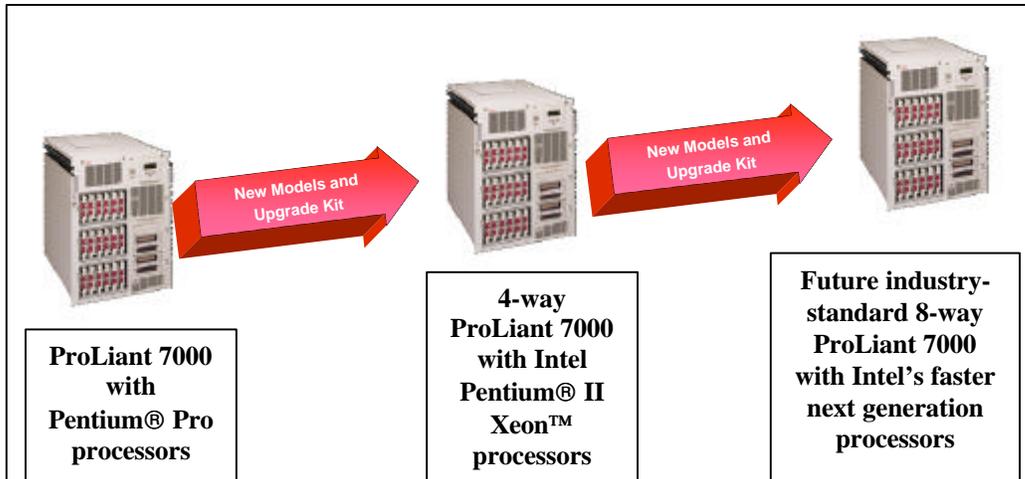
The ProLiant 7000 with 4-way Pentium® II Xeon™ processors raises performance to the next level for applications requiring 4-way scalability and beyond. **Processor mixing is now supported.** Customers can now populate the server with processors of different speeds and cache sizes (maximum of 2 different configurations), allowing them to take advantage of faster processor speeds and larger cache sizes.



Enhancements	Pentium® II Xeon™ vs. Pentium® Pro Processors
Faster processing speeds	Up to 500MHz vs. 200MHz
Larger L2 cache size	2MB vs. 1MB
Larger L1 cache size	16KB vs. 8KB
Faster bus speeds	100MHz vs. 66MHz
Higher peak memory transfer rate	1.6GB/s vs. 1.07GB/s
Higher peak PCI transfer rate	399MB/s vs. 266MB/s
Concurrent CPU to Memory and PCI to Memory transfers	

³ *The Business Case for Investing in Manageable Systems*, IDC White Paper, 1997.

⁴ For Performance Data (TPC-C, TPC-D, SPECWeb 96, and SAP R/3 SD) see the following site: <http://www.compaq.com/products/servers/benchmarks/index.html>.



Ultimate Industry-Standard Scalability

Uncompromising investment protection is provided by 8-way in-chassis upgradability.

Enhanced Memory Architecture

The ProLiant 7000 has ECC protected EDO memory, up to 8 GB RAM using industry-standard EDO DIMMs.

The memory architecture provides parallel memory access for increased performance support. The ProLiant 7000 has two memory boards, each with its own memory controller. This allows for overlapping memory accesses providing longer sustained peak transfer rates.

Advanced I/O Scalability with Higher Bandwidth

- Three PCI buses for faster I/O throughput.
- 64-bit PCI for double the bandwidth to storage, networks, and peripherals.
- Ten total I/O expansion slots: 5 x 64-bit PCI, 4 x 32-bit PCI, all nine hot-pluggable, plus one ISA modem slot, to meet growing I/O requirements for the most demanding environments.
- Hot-pluggable, cable-free internal 3-channel RAID controller continues to provide a major new concept in internal drive expandability.
 - A single controller supports all three internal hot plug drive cages. All internal hot plug disk drives can be configured as one 218.4GB array (12 x 18.2GB) for optimum application performance or as three 72.8GB arrays. The ProLiant 7000 offers the flexibility of up to 18 x 1" or 12 x 1.6" hot plug disk drives, mixing allowed.
 - Compaq-unique, cable-free design allows the disk drive cages to be connected directly to the I/O board via an extended SCSI connector. Installation is a snap, and there are no complex cable configurations. The cable-free bus greatly enhances PCI Hot Plug operation and serviceability.
 - Compaq's advanced array technology allows these **NEW features**: 1) **logical drive capacity expansion** allowing the user to extend the size of existing logical drives offline independent of the operating system used, 2) **online migration to new RAID level without disrupting system operation or causing data loss**; and 3) **online drive stripe**





sizing to enhance application performance. Compaq Insight Manager monitors key parameters and provides information for proactive system planning.

- The large 64MB (ECC-protected and battery-backed removable read/write) cache maximizes I/O performance without sacrificing data integrity.
- **NEW optional redundant Smart Array 3100ES for failover support.** The Smart Array software upgrade is available as an option kit with the Smart Array 3100ES, separate software purchase, or can be downloaded from the Web.

Up to Six SCSI Channels

- Two integrated Wide-Ultra SCSI-3 controllers are used for internal media or internal storage, and one integrated Wide-Ultra SCSI-3 is used for external storage.
- A three-channel RAID controller is standard, allowing flexible expansion.

Support for the Industry's Highest Performing Storage Devices

- 10,000-RPM Hot Plug Drives provide 26% higher performance than 7200 RPM drives.
- 35/70 DLT tape drives give faster performing, efficient backup for massive storage, optimally configured with individual SCSI channels to reduce load on the network.
- **32X CD-ROM** gives faster access to programs.



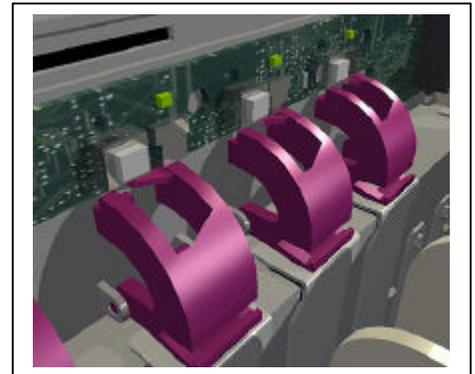
Fast Ethernet 64 PCI Dual Based 10/100 NIC

- The dual port Fast Ethernet NIC satisfies customers' higher bandwidth requirements.
- Dual Port 10/100 Upgrade Module and 64-bit Gigabit Ethernet Upgrade Module available.

Highest Availability for 7 x 24 Environments

Push Button PCI Hot Plug

Compaq industry-first push button design provides full PCI Hot Plug capabilities for all 9 PCI Hot Plug slots. A single button at each slot enables rapid replacement, upgrade, and addition of PCI cards. LED notification provides easy-to-read PCI Hot Plug status. The push button capability includes the feature of intelligent software shut-off during transitions, eliminating the need for software utility shutdown at a keyboard or console.



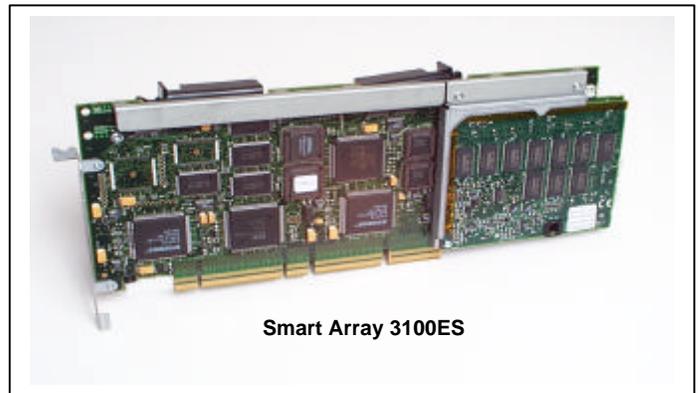
Redundant and Hot Plug Components

- Hot-Pluggable Redundant Power Supplies provide maximum system availability.
 - Load sharing between the 2-3 power supplies saves critical time in the event of redundant takeover, auto sensing for 750-watt/220 volt or 500-watt/110 volt.
 - Independent power cords eliminate single points of failure and provide more power to the system.
 - Security bar with user-supplied key lock further ensures availability and security of components.

- Power Supply Fans provide internal cooling of each power supply, and continue to cool the system even in the event of a power supply failure.
- Hot-Pluggable Redundant System Fans continue to provide cooling in the event of a failure, as long as power is available. Intelligent system fans sense the ambient temperature in the server and automatically increase fan speed as needed. Hot-pluggable system fans are easy to replace without system downtime.
- Redundant NIC support eliminates the network connection as a single point of system failure. One NIC is operational while another is ready as a hot standby.
- Redundant Processor Power Modules go beyond regulating power to the processors. The Compaq design monitors power currents to proactively detect and prevent potential problems.
- Online Storage Controller Recovery Option allows controllers to automatically back each other up for increased redundancy.

Next-Generation 3-Channel Internal Smart Array Controller

The same RAID engine can operate all 3 drive cages. Cable-free design provides easier PCI Hot Plug usage. 64MB cache (ECC-protected and removable battery-backed read/write cache) provides superior performance. On-board battery backup of cached memory (for up to four days) protects data in the event of a power failure. Support for RAID 0, 1, 4, and 5 provides flexibility. Optional redundant RAID controller eliminates single point of failure.



Clustering for Even Higher Levels of Availability

The Compaq ProLiant 7000 has been tested by Compaq to support both Compaq's Recovery Server Option (RSO) clustering solution and industry-standard Microsoft Cluster Server (MSCS). The Compaq Recovery Server Option runs with Microsoft Windows NT, Novell Netware, and SCO UnixWare. **The ProLiant 7000 is certified by Microsoft for MSCS clustering.** Using the ProLiant 7000, MSCS can be configured in matched-pair or mixed-pair configurations (e.g. ProLiant 7000 – ProLiant 6000), which provides industry-leading protection of existing server investments. Also, using Compaq ProLiant F100 or S100 cluster kits, the ProLiant 7000 can be configured with either Compaq Fibre Channel Storage Systems or ProLiant SCSI Storage Systems, providing configuration flexibility and a choice of storage technologies to users. Compaq has been working closely with Novell to certify the Compaq ProLiant 7000 for Novell's High Availability Server Product, the first Orion phase of Novell's plan to bring industry leading clustering solutions to NetWare. Additionally, Compaq is working closely with SCO to certify the Compaq ProLiant 7000 for SCO UnixWare NonStop Clusters.

Engineered Fault-Tolerant Features

- ECC memory, Automatic Server Recovery-2, and Smart Array 3100 ES controllers with RAID and optional redundancy work together to prevent errors, correct faults, and bring the server back online quickly.

- Remote Management Capabilities with Integrated Remote Console and the host-independent features of the optional Compaq Remote Insight Board let businesses stay in touch with their servers wherever they are, even if the server or network is down.
- Industry-Leading Three-Year Limited Pre-Failure Warranty for servers using Compaq Insight Manager. Pre-Failure Alerts and Warranties proactively detect and provide free, fast replacement of critical components, which may prevent costly unexpected downtime.⁵
- The Compaq ProLiant 7000 undergoes thousands of hours of quality assurance, integration, optimization, and testing for maximum reliability.

Expansion-Optimized Chassis



Specifically designed to meet growing demands without compromising investment – provides future support of industry-standard 8-way computing.

The ProLiant 7000 was designed with technology foresight, providing an in-chassis upgrade from Pentium® Pro to Pentium® II Xeon™ processors, and beyond, with next-generation industry-standard 8-way processing. When customers are ready to upgrade to next-generation 8-way technology, the ProLiant 7000 allows an upgrade utilizing the original server chassis and serial number, therefore reducing needs for software re-licensing while providing significant tax benefits.

Within-Chassis Upgrade

- The ProLiant 7000 can be upgraded from 4-way Pentium® II Xeon™ capability to industry-standard 8-way capability at a future date.
 - **Compaq Corollary/Joint Development Partners** –The combination of Compaq's I/O design with Corollary's Profusion 8-way crossbar switch technology and Intel's

⁵ Certain restrictions and exclusions apply. Contact the Compaq Product Information Center at 1-800-345-1518 for details.

Pentium® II Xeon™ processor achieves a balanced, highly scalable system architecture for the future.

- Delivering on the promise to upgrade your 4-way Pentium® Pro™ server to next-generation 4-way Pentium® II™ Xeon processing, Compaq continues to offer an upgrade for current Pentium Pro owners to the ProLiant 7000 with Pentium® II Xeon™ processors.

Nine PCI Hot Plug Slots with 64-bit PCI Technology



Ten total I/O slots include nine PCI Hot Plug slots and one ISO modem slot.

- Compaq was the first to introduce industry-standard PCI Hot Plug, and brings the customer high levels of performance with 64-bit PCI slots providing double the bandwidth of 32-bit PCI.
- Ten total slots provide plenty of headroom for growing I/O requirements.

18x1" or 12x1.6" Hot Plug Disk Drives in Flexible Configuration

- Up to 218.4GB internal storage is achieved with twelve 1.6" 18.2GB hard drives.
- **NEW: Up to 14.4TB RAID** combined internal/external storage using Fibre Channel controllers and storage.
- **NEW: Over 14.2TB SCSI external storage** using external Fibre Channel controllers and storage.

Six Removable Media Bays

Four 5.25" media bays are available in addition to the standard 1.44MB floppy and 32X IDE CD-ROM. The four removable media bays are ideal for DLTs, additional CD-ROM drives, or other removable media devices.

Standard Rack Model

- The Compaq fully integrated rack solution includes a rack-mounted server, a rack enclosure, switch box, rack-mounted storage, keyboard and monitor shelving, and cable management. These components work physically and electrically together for seamless setup and operation. For incredible ease of upgrade and service, the serviceable design provides quick access to critical components like expansion cards, processors, memory, and media devices, drastically reducing the time needed for upgrades or maintenance.
- Vast amounts of storage can stack on a 5.6 square-foot footprint with 3 servers fitting in a 42U (7-ft.) industry-standard 19" rack. Customers can use an optional kit to convert the ProLiant 7000 to a 19" tower now and redeploy as a rack in the future.

Open Industry Standards

Compaq ProLiant platforms integrate with a broad range of options, solutions, and service. The ProLiant 7000 has all the power of RISC systems with all the advantages of industry standards.

- For easy enhancement and upgrade, the ProLiant 7000 integrates with a comprehensive family of compatible storage, options, and networking products.
- The broadest range of software choices is possible with Compaq, for increased accommodation of layered applications.
- Compaq brings the benefit of standards-based solutions for enterprise computing: Internet/Intranet, clustering, E-Commerce, and management.
- Compaq drives new technologies and solutions to open standards, allowing the customer to take advantage of rapid industry development for a more sustainable business advantage over time.

The power of the entire industry is harnessed through a broad array of packaged applications and solutions.

The best minds in the industry work with Compaq to drive the best solutions. Compaq partners with powerful industry leaders to give customers the flexibility to select optimal solutions for specific needs. Customers are saved the inconvenience of expensive, single-vendor solutions, and can select optimal solutions for their changing needs.

Tight Integration with Leading Applications and Solutions

Partnerships: Compaq and its partners work together through every stage, from product development and engineering to product delivery and support delivering systems that are powerfully optimized and tested with leading business-critical applications.

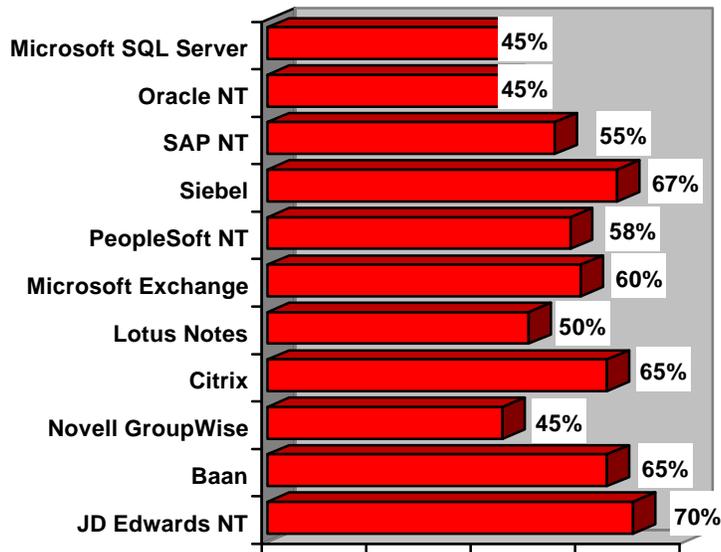
- Leading software has been optimized, tested for, and often developed on Compaq servers for the highest levels of performance and reliability.
 - Compaq is the platform of choice for development on Microsoft Windows NT.
 - Compaq servers are the development and deployment platform for Baan products on Microsoft Windows NT and the sole development platform for Baan's Windows NT clustering.
 - Compaq onsite engineers at PeopleSoft labs are dedicated to testing and optimizing PeopleSoft solutions on Compaq servers.

Certified partner solutions reduce complexity and overall risk.

- Compaq has established worldwide SAP Competence Centers in Houston, Munich, Waldorf, and Tokyo, all dedicated to testing and optimizing SAP R/3 solutions exclusively on Windows NT.

- This unique and powerful integration delivers fully integrated, optimized enterprise tools and solutions to increase speed and reduce risk in the planning and deployment process. SAP on Compaq is the fastest time to success with Compaq customers implementing SAP in as few as 15 months versus 36 months on average for RISC/Unix solutions.
- More than 2000 customers trust Compaq to run their SAP R/3 solutions.

Compaq is the #1 platform for the leading standards-based solutions, holding the following market share worldwide⁶:



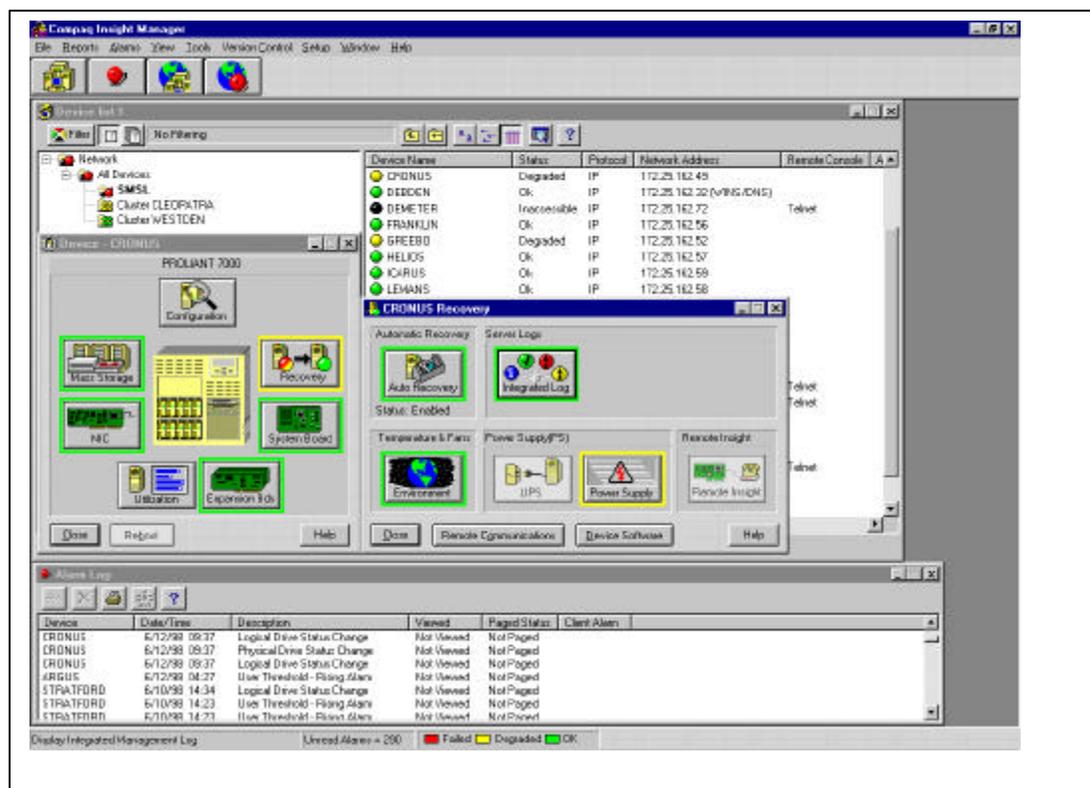
⁶ Compaq and respective partner data.

Enterprise Solution Center Enhances Customer Productivity

Customers interested in the ProLiant 7000 can preview how a proposed system of desktops, networking equipment, servers, and software will perform under real-life operating conditions. Compaq opened its Enterprise Solution Center (ESC) in Houston, designed to provide full-scale, proof-of-concept testing resources to North America and global customers. As Compaq's primary solution center, the new and improved facility is the largest of a group of labs located around the country. Satellite facilities are located in New York City and San Francisco, with additional centers scheduled to open in Atlanta and Chicago.⁷

Most Manageable Server

From hardware to software, everything about the ProLiant 7000 is engineered for ease of management and decreased resource utilization.



Compaq Insight Manager: One of the Industry's Broadest Management Applications

⁷ For customer success stories see <http://www.compaq.com/newsroom/pr/pr171297a.html>.

Best Managed Systems in the World

The unrivalled suite of Compaq management tools simplifies deployment, maintenance and updating – saving resources and time.

- SmartStart Integration tool allows customers to roll out new systems reliably optimized for the job and replicated to other new systems with confidence.
- Compaq Integration Server allows update of multiple servers more consistently and accurately, while saving time and resources.
- Compaq Insight Manager monitors and controls critical hardware components with unique features like pre-failure alerts with detailed diagnosis and help files to reduce costly downtime.
- Web-Based Compaq Insight Manager allows flexible enterprise management of Compaq systems, networking devices, and third party systems, from all points, not just a centralized single console.
- Compaq Insight Manager for OpenView and TME 10 NetView for heterogeneous NT/UNIX environments makes it easy to manage Compaq hardware from UNIX-based management platforms.
- Compaq Info Messenger, a proactive Internet information tool, delivers product information customized to a customer's specific computing environment, such as software and firmware updates, to help prevent and quickly resolve problems.
- Power Down Manager, available under NT OS, allows configuration of the power button to provide: graceful power down (closes all open applications), power down countdown (allows a specific amount of time to stop power down), or disabling the power button completely.
- Power Supply Viewer, available under NT OS, informs user of the current redundancy of the server's power supplies, whether or not they are in a redundant configuration, allows "what if" scenarios, and gives information on the cause of a power supply failure.
- Remote Management capabilities, with Integrated Remote Console and host-independent features of Compaq PCI Remote Insight Board let businesses keep their fingers on the heartbeat of the server, even if the server or network is down.

PCI Remote Insight Board



Innovative Design Speeds and Simplifies Access and Maintenance

- New, easy-to-use individual push button PCI Hot Plug technology at each PCI Slot communicates directly with the server and operates independently of PCI Hot Plug software utilities, allowing slot power control directly at the server.
- Integrated Management Display gives quick at-a-glance LCD alert monitoring right on the server.
- Highly serviceable chassis enables easy servicing in a rack or as a tower.
 - Easy access panels and board release levers for quick access to modular, removable, hot plug components.
 - Internal cabling for improved reliability and manageability.
 - Key-locking chassis and power supply security bar to enhance serviceability and security.

Compaq and System Partners Offer the High Level Systems Service Critical for Global Support of 7 x 24 Systems and Applications

Compaq and its service partners work together to ensure access to applications and data anytime, everywhere. A full suite of services allows customized global service and support solutions. With 29,000 employees, in 550 locations in 114 countries, and an additional 30,000 partner service resources, Compaq can provide business-critical support for uninterrupted business operations, 24 hours a day, 365 days a year.

- Planning and Design Services provide IT architectural planning and network design.
- Integration Services provide migration services, project management, and interoperability testing.
- Life Cycle System Support Services provide 7x24 hardware and software support, remote monitoring, asset management, and business recovery services.
- The System Service Provider program (SSP) was co-developed with recognized service partners to provide best-in-class services for enterprise class customers.

Testing, Integration, and Manufacturing

Compaq servers, including the ProLiant 7000, run the gauntlet of the most rigorous real-world testing procedures, from design to design validation and certification to manufacturing.

Design

The ProLiant 7000 was specifically designed for high reliability. To achieve this goal, Compaq designed the spacing between processor slots to optimize trace lengths, signal quality, and power supply regulation. The processor heat sink, using heat pipe technology, uses a critical element in optimizing the system reliability while providing room necessary for an upgrade to 8-way architectures.

Design Validation

The ProLiant 7000, like all Compaq ProLiant servers, is tested in stand-alone and connected environments to verify the design. Compaq designed and used unique systems for testing the ProLiant 7000 to ensure rigorous and thorough test environments for producing a mission-critical

server. As mockups are built, they are subjected to different phases of testing. If at any point in the process a problem is detected, the design is reworked and again subjected to the same testing.

- Compaq test fixtures are designed to stress systems far beyond normal usage. The ProLiant 7000 was tested with numerous hardware and software test tools, including stress testing, testing with third party devices and Compaq options, and real-world environment testing to achieve the highest possible reliability in the ProLiant 7000.
 - DOS-based tests analyze specific sub-systems as soon as they are created.
 - The entire systems are stress tested under multiple operating systems at 100% capacity for months. New technologies, such as 64-bit PCI, are tested with Compaq test cards and software test suites designed to exercise the limits of the specifications.
 - Compaq tests all widely used business software applications and third party hardware devices to ensure compatibility. Also, Compaq optional enhancement products are tested on past and future models of the ProLiant 7000 to ensure all upgrades bring the same high quality to any solution.
 - The ProLiant 7000, like all other Compaq products, is designed and tested to be Year 2000 compliant. Compaq is proud to be the first in the industry to offer customers a tool to measure Year 2000 product compliance, free of charge.
 - Finally, the ProLiant 7000 undergoes Enterprise System Verification (ESV), which represents harsh real-world tests of applications on multiple operating system environments.
 - Compaq and Intel were validation partners for the Pentium® II Xeon™ processor.
- Compaq also puts new product designs such as the ProLiant 7000 with Pentium® II™ Xeon processors through demanding design verification, reliability, and functionality tests. Some of these tests include:
 - Mechanical “wear-out” testing to simulate long-term wear and tear.
 - Thermal extremes testing.
 - Video characterization.
 - AC power interruption and variation stress testing.
 - Keyboard force displacement characterization.
 - Shock and vibration testing.
 - Acoustical characterization.
 - All required safety agency (UL, CSA) and FCC tests on all new products.

Integration

Compaq believes that understanding the customer's total environment and ensuring that all the required components work well together is a key responsibility of any systems vendor. The Compaq commitment to integration is evident in the thorough testing undertaken to ensure the tightest integration with a spectrum of software and hardware.

- Interoperability tests are performed with local area networks, communications connectivity, operating systems, applications, and third-party hardware. These tests ensure that the

customer can deploy the ProLiant 7000 confidently, reducing set-up time as well as downtime due to system incompatibilities.

- Each ProLiant 7000 is validated and measured for performance in configuration. Compaq validates its servers as compliant with industry standards and with leading third party devices, including drive array controllers, network interface cards, video controllers, and more. Servers are tested for proper operation under the leading network topologies: 10baseT, 100baseT, Token Ring (4Mbps and 16Mbps), FDDI, CDDI, and ATM. Secondary storage solutions are incorporated into many of the customer platform test stations to ensure superior customer satisfaction.
- Compaq's extensive integration labs that provide the foundation for extensive certification testing with leading operating systems, network operating systems, and applications. Compaq's experience led to the development of Compaq's SAP Competence Centers in both Waldorf, Germany, and Houston. These centers deliver superior integration value to our SAP customers.
- Integration Management, which stems from Compaq partnerships with leading developers of operating systems and applications, ensures that customers can easily deploy Compaq systems from the time of installation through optimization. Compaq SmartStart offers customers easier integration, better performance, and lower support costs. SmartStart lowers initial set-up costs by providing one-stop integrated installation for drivers, operating systems and applications: all optimized for Compaq hardware. SmartStart also allows the deployment of an Integration Server. Using these tools, MIS managers achieve consistency and uniformity in how servers are set up and maintained. With the Integration Server, a single, definitive repository can be established on the network and used to set up other servers in an enterprise.

Manufacturing

The ProLiant 7000, like all Compaq products, is run through a series of tests during the manufacturing process itself. Compaq designs and uses its own hardware and software testing tools to make sure products meet the highest standards. Various product- and process-level audits are performed at different stages of assembly to ensure quality. Tightly knit manufacturing teams work together to ensure every ProLiant 7000 is built to exacting specifications.

Compaq has received numerous awards for its manufacturing process: •1998 Singapore National Productivity Award; • China Manufacturing: 1998 Shenzhen Regional Technical Supervision Bureau Quality Award; • Singapore Manufacturing: 1997 Singapore National Quality Circle Organization Award; • Energy Star 1997; • PC Partner of the Year Award (second year in a row); •World Environment Center Gold Medal Award; • 1997 Texas Quality Award; and • Large Manufacturing Category of the 1996 Houston Award for Quality.

Compaq does what it takes to test the ProLiant 7000 rigorously, from conception to production, to ensure delivery of the most reliable mission-critical server.

Benefits of Compaq ProLiant 7000

Versus Other Servers with Pentium® II Xeon™ Processors

Upgradability – The ProLiant 7000 is the only server in the industry offering an in-chassis upgrade of Pentium® Pro™ processors to 4-way Pentium®II Xeon™ and Intel's faster next-generation 8-way processors.

- In-chassis upgrades reduce total costs of ownership. Because many enterprise operating systems, application software installations, and warranties are linked to hardware serial numbers, the continuation of the serial number provides significant cost savings. Also, the in-chassis upgrade allows extended amortization of the server.
- Rather than a “forklift” transition, Compaq replaces key parts while migrating other major components. Components migrated in the upgrade include:
 - Chassis (and serial number)
 - EDO Memory (4-way upgrade only)
 - Power Supplies
 - Hard Drives
 - Media Devices
 - Hot Plug Redundant Fans
 - Integrated Management Display
 - CD-ROM and Floppy Drives (4-way only)
 - PCI Cards

PCI Hot Plug – First Introduced by Compaq

- Enhanced usability with push button design – offering the benefit of a single button at each PCI Hot Plug slot to enable rapid replacement, upgrade, and addition of PCI cards without powering down the server.
- 32- and 64-bit PCI slots – the five 64-bit slots provide double the bandwidth to storage, networks, and peripherals.
- Fully Microsoft Server 98 Compliant.

3-channel Smart Array 3100ES Controller

- Supports contiguous array across 18 internal drives for up to 218.4GB storage.
- Provides 64MB of cache for high-performance RAID.
- Convenient cable-free design allows connection of cages to the system I/O board itself and not the array controller card. *New redundant and enhanced features are now available.*
- The Most Expandable Server
- Nine PCI Hot Plug slots provide plenty of headroom for growing needs.
- 18 x 1” hot plug hard drive bays allow excellent expandability, with the flexibility to choose 12 x 1.6” if desired, or a combination of 1” and 1.6” in a single drive cage.

- Six removable media bays – 6 total, one 1.44MB floppy, one 32X IDE CD-ROM, 4 available: ideal for DLTs, additional CD-RMS, or other removable media devices.

Versus RISC Platforms

The ProLiant 7000 offers better scalability than competitors' RISC systems with all the advantages of industry-standard platforms. The ProLiant 7000 with Pentium® II Xeon™ processors provides superior performance per processor at a lower price point, as demonstrated in the chart below.

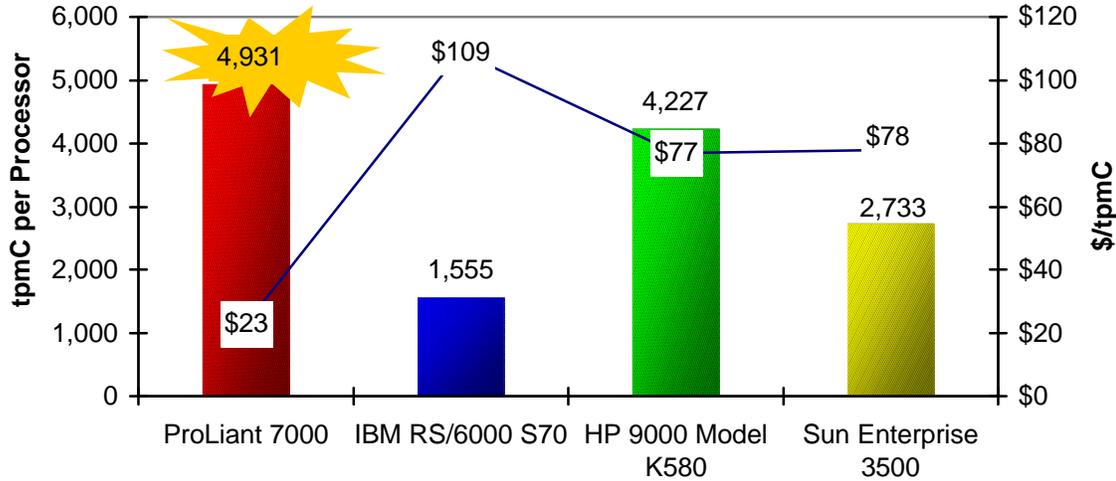


Table 1. ProLiant 7000 TPC-C Results Compared to RISC Servers from IBM, HP and Sun

System	# of proc.	tpmC	\$ per tpmC	Operating System and Database	Total System Cost	System Availability
Compaq ProLiant 7000	4	19,725	\$23	Microsoft Windows NT 4.0 Enterprise Edition and SQL Server 7.0 Enterprise Edition	\$443,951	6/10/99
IBM RS/6000 S70	12	18,666	\$109	IBM AIX 4.3 and Oracle8	\$2,027,566	9/2/98
HP 9000 Model K580	6	25,363	\$77	HP HP-UX 11.0 and Sybase Adaptive Server Enterprise 11.5	\$1,943,661	8/13/98
Sun Enterprise 3500	8	21,871	\$78	Sun Solaris 2.5 and Sybase Adaptive Server Enterprise 11.5	\$1,693,697	9/30/98

Based on Published TPC-C Results as of 11/25/98.

<i>Continued</i>	Compaq ProLiant 7000	IBM Netfinity 7000 M10	Hewlett-Packard LXR 8000
Redundant NIC	Optional	Optional	Optional
Redundant Power Supply	Standard Hot Pluggable	Optional Hot Pluggable	Standard
Redundant VRMs	Standard	No	No
Server Health Logs	Standard	Standard	Standard
CLUSTER SUPPORT	MSCS	IBM NetFinity Clusters	Forthcoming
MANAGEMENT & SOFTWARE SUPPORT			
Management	Compaq Insight Manager, Integrated Remote Console	IBM Netfinity Manager	HP Top Tools for Servers
Remote Management	Opt. PCI Remote Insight Bd.	Integ. Syst. Management Processor	Std. Remote Control Card in slot
Intelligent Software Integration	SmartStart	ServerGuide	HP NetServer Navigator
OS Supported	All Major OSs	Windows NT, Novell, OS/2	All Major OSs
WARRANTY	3-year, 2 nd BD, on-site	3-year, NBD, on-site	3-year, NBD, on-site
Pre-Failure Warranty⁸	Standard	SMART drives only, optional	Disk only

⁸ Certain restrictions and exclusions apply. Requires that servers use Compaq Insight Manager in order to implement Pre-Failure Alerting. Call the Compaq Product Information Center at 1-800-345-1518 for details.

Product Specifications

FEATURES	Compaq ProLiant 7000
Processor	Support for up to 4 Pentium® II Xeon™ 450MHz processors or future 500MHz processors ⁹ with integrated 1024 and 2048KB Level-2 cache, upgradable to industry-standard 8-way. One redundant processor power module standard per processor.
Memory	256MB/512MB ECC memory expandable to 8GB using industry-standard ECC protected EDO DIMMs.
Cache Memory	1024KB and 2048KB Level-2 Cache.
Form Factor	19" Rack-Ready (14U); Rack-to-Tower option kit.
Network Controller	Fast Ethernet 64PCI, Dual Based 10/100 Controller
Drive Controller	Smart Array 3100ES controller in PCI slot (three-channel for internal RAID configurations only) and two integrated Wide-Ultra SCSI-3 controllers (internal) plus one Wide-Ultra SCSI-3 (external).
I/O Expansion Slots	10 Total Slots: Five 64-bit PCI Hot Plug, four 32-bit PCI Hot Plug, one ISA modem slot. All 9 PCI Hot Plug slots support Compaq PCI Hot Plug push button feature.
Hot-Pluggable Drive Bays	Three internal drive cages; each drive cage holds 6 x 1.0" or 4 x 1.6" or combinations; 18 x 1.0" or 12 x 1.6" drive bays total.
Maximum Storage	Maximum internal capacity: 218.4GB (12 x 18.2GB) or 163.8GB (18 x 9.1GB). Maximum external capacity: 14.2TB. Six total bays: four available 5.25" removable media, one 1.44MB floppy drive, one 32X MAX IDE CD-ROM.
Power Supplies	Two Hot Plug Redundant 750/500 watt N+1 Power Supplies standard, with support for up to three Power Supplies per system. Power Supplies are Load sharing. Server uses 1 to 3 supplies based on system configuration. Optimized for 220 (high-line) volts. Runs either on 110 (low-line) or 220 (high-line) volts.
Interfaces	Two network RJ-45, External Wide-Ultra SCSI, two serial, parallel, keyboard, and pointing device (mouse).
Graphics	Integrated 1024 x 768 x 256 color with 2MB memory.
Full-Spectrum Fault Management	
Fault Prevention	Compaq Insight Manager, Pre-Failure Warranty, Integrated Management Display, Integrated Remote Console, Remote Insight Board PCI (optional)
Fault Tolerance	On-Line Spare, UPS (optional), Redundant Power Supplies, Redundant Processor Power Modules, ECC memory, Compaq Smart Array controllers, Redundant Network Adapter Software.
Fault Recovery	On-Line Recovery Server (optional), Standby Recovery Server (optional), Online Storage Controller Recovery Option (optional), Automatic Server Recovery (ASR-2), Server Health Logging, Revision History Table, Automatic Revision Tracking, Drive Parameter Tracking and Dynamic Sector Repairing (with SMART Array 3100ES controller), Off-Line Processor, I/O Bus Utilization Monitor, Power-Down Utility, Integrated Management Log Viewer, Power Down Manager, Power Supply Viewer.
Software	Compaq SmartStart, Compaq Insight Manager standard.
Operating Systems	Windows NT, SCO UnixWare, Novell NetWare, OS/2 Warp.
Warranty	Limited three-year Pre-Failure Warranty on drives, processors, and memory, for servers using Compaq Insight Manager. Certain restrictions and exclusions apply.
Service and Support	Compaq Care provides a wide range of service offerings including a three-year limited warranty, Pre-Failure Warranty, and Compaq Service and Support Programs available on a worldwide basis.

⁹ Expected availability in March 1999.