



Platforms for a New Millennium

HP's Transition to Servers Based on Itanium Processors

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EXECUTIVE SUMMARY

Hewlett-Packard (HP) has begun to bring Intel Itanium processor-based servers to market and plans to transition its 64-bit server products to this processor over time. HP's Business Critical Systems group has developed a transition strategy with the goal of allowing customers to decide when they are ready to move to Itanium processor-based servers. The customer impact of HP's strategy varies, depending, in part, on each customer's particular set of investments in 64-bit RISC-based servers. To address these various needs, HP's transition strategy provides significant overlap between the first appearance of new Itanium processor-based servers and the withdrawal of support for RISC-based legacy systems.

HP plans to unify servers currently based on the Alpha processor, the PA-RISC processor, and the MIPS processor. HP's strategy is to transition all 64-bit enterprise server lines to the Intel Itanium processor. HP AlphaServer systems and servers based on the PA-RISC processor will merge into a single line of enterprise server products by 2005, and the MIPS-based NonStop server line will be continued for the foreseeable future, although it will eventually move to the Itanium processor platform. These moves will not affect HP's current line of Intel IA-32-based servers.

Software plays a key role in HP's strategy. HP-UX 11i will continue to be HP's flagship Unix product. In the future, it will incorporate selected features of Tru64 UNIX. OpenVMS will be fully ported to Itanium processor-based HP server systems. Customers will be able to run 64-bit versions of Linux and Microsoft Windows on Itanium processor-based enterprise servers, bringing new levels of system performance to those operating system environments. HP will provide compilers for the Itanium processor and the company will work with independent software vendors (ISVs) to cultivate an ecosystem of software products (applications, middleware, and utilities) that are tuned and tested for the Itanium processor environment.

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With its "Business Systems Evolution" programs, HP will assist customers in each step of the transition process, including free consulting services and the provision of loaner machines to customers, where necessary.

IDC believes that HP has developed a comprehensive and well-structured strategy for melding its enterprise server product lines and addressing the requirements of its customers. HP is developing a solutions strategy for achieving product differentiation for its Itanium processor-based systems. This strategy includes system software, value-added computer architecture features, systems management tools, and service offerings.

HP AND COMPAQ MERGE BOTH COMPANIES AND PRODUCT LINES

... although HP is fielding transition tools and transition programs for customers now, there is no immediate requirement for customers to move to new systems.

Prior to their merger, both HP and Compaq recognized the trend in component standardization and separately made decisions to focus future product engineering on the Intel Itanium processor architecture. The companies developed product strategies based on adding value by identifying evolving technologies, moving to incorporate these technologies into their product lines, and providing comprehensive transition support for their customers. In making these decisions, the companies increased their focus on establishing a "technology ecosystem" of products that meet the evolving needs of enterprise server customers. It is important to note that although HP is fielding transition tools and transition programs for customers now, there is no immediate requirement for customers to move to new systems.

While basing its HP 9000 series of server products on its own PA-RISC processor technology for 15 years, HP studied the industry trends and returns on investment in processor development. In 1994, HP decided that forming an alliance with Intel and participating in the design of a new-generation processor was its best option.

Working closely with Intel, HP has been involved with the design of the Itanium architecture from the outset.

Working closely with Intel, HP has been involved with the design of the Itanium architecture from the outset. HP engineers contributed to the processor's Explicitly Parallel Instruction Computing (EPIC) architecture (see the sidebar, *Thumbnail Sketch of Intel Itanium Processors*). HP-UX was ported to the Itanium platform and optimized, starting in the mid-1990s.

On June 25, 2001, prior to its merger with HP, Compaq announced an agreement with Intel that centered on the Itanium processor family and Compaq's enterprise server strategy. Compaq developed plans to make a transition from the Alpha processor to the Itanium processor beginning in 2004. It planned to sell servers based on the Alpha

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processors through 2006 with support until at least 2011, depending on contractual agreements with customers.

Combined Technology Strategy

Compaq's transition plans for shifting from the Alpha processor to the Itanium processor were incorporated into the larger product road maps for HP with no changes to the premerger road map for the Alpha-based server products. The merger effectively continues the transition for customers of servers using the Alpha processors, and it adds new sets of resources and options for all HP customers.

The merger has made it very clear that, in time, HP intends to converge all enterprise servers on two processor platforms: Intel's 32-bit IA-32 processor and the 64-bit Itanium processor. However, the transition to these two architectures will take several years to achieve.

Customer-Centric Transition Strategy

HP fully recognizes the substantial investment that its customers have made in RISC-based servers. Thus, at the center of HP's Itanium architecture transition strategy is a commitment to allow its customers to control their individual transition plans and processes, supporting their move to servers based on the Itanium processor when it makes business sense to do so.

HP's Business Systems Evolution programs are an important part of the company's transition strategy. These programs focus on the needs of individual customers — evaluating their current computing resources, consulting about the path to server technology based on the Itanium processor, and putting a plan in place to support that customer throughout the transition. The Business Systems Evolution programs embrace the features of Compaq's AlphaServer Customer Assurance Program (ACAP), carrying forward all the guarantees and support programs that were provided for AlphaServer customers.

The plans for processors, server platforms, and operating systems set forth by HP's Business Critical Systems group are summarized in Figure 1. As shown, all servers will use Itanium processors. Four server platforms will converge to two: HP servers and HP NonStop servers. Six operating systems will meld into five; key features of Tru64 UNIX will be implemented in HP-UX, HP MPE/ix will be terminated, and Windows will join the ranks.

HP Server (Hardware) Road Map

The HP and Compaq technology road maps leading to the Itanium processor family were nearly identical; they both detailed a transition to servers based on the Itanium processor beginning in 2004. IDC believes that this agreement on technology direction was one of the driving forces that led to the HP/Compaq merger. HP servers based on the Itanium architecture entered the marketplace in 2002. Two new versions of the PA-RISC and Alpha processors are slated for 2003 and 2004.

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Figure 1: HP's Current and Future Server Products

	Today	Future
Processor technology	PA-RISC Itanium processor family Alpha MIPS	Itanium processor family
Server platform	HP servers HP NonStop servers HP e3000 servers HP AlphaServer systems	HP servers HP NonStop servers
Operating system	HP-UX HP Tru64 UNIX HP MPE/ix Linux HP NonStop Kernel HP OpenVMS	HP-UX (with Tru64 UNIX features) Linux HP NonStop Kernel HP OpenVMS Windows/64

Source: HP, 2002

HP AlphaServer Systems

HP AlphaServer systems will continue to be sold until 2006, and they will be supported by HP until at least 2011. Depending on an individual customer's contract, installed AlphaServer systems may be supported even longer than that. Thus, AlphaServer customers have years to plan their move to servers based on Itanium processors and plenty of time to evaluate which software applications will move to the new platform and at what pace that move will occur.

As Alpha customers consider their long-term plans, they may find that next-generation AlphaServer GS and ES systems can assist them in their server consolidation efforts.

Meanwhile, customers are encouraged to consolidate their AlphaServer workloads onto a smaller number of "frames" so that any eventual move to Itanium processor-based servers can be accomplished more quickly. HP continues to develop AlphaServers and is expected to release new servers based on the EV7 chipset. As Alpha customers consider their long-term plans, they may find that next-generation AlphaServer GS and ES systems can assist them in their server consolidation efforts. Transitioning to these platforms will reduce the number of servers that will need to converge on Itanium processor-based server platforms later.

Thumbnail Sketch of Intel Itanium Processors

Two key innovations in the Intel Itanium processor family are larger memory addressability and the EPIC architecture.

- The 64-bit Itanium architecture allows the processor to address larger amounts of main and virtual memory well beyond the 4GB limit of most 32-bit server systems. Its 64-bit addressing capability also allows the processor to handle larger files of data that can range up to 1TB or more in size. Large address spaces simplify data management and allow for larger in-core solutions. Customers can solve problems more quickly by placing larger collections of data (typically multiple gigabytes) in working memory. It is possible to solve large problems by segmenting them into a sequence of smaller problems, but performance suffers and applications are more complex to write and maintain.
- The Intel Itanium architecture's unique EPIC architecture exploits opportunities for parallelism within the Itanium processor itself. Its ability to execute multiple operations in parallel not only keeps as much of the processor working as possible, but it also allows for the prefetching of data from memory into registers and caches, thus minimizing processor stalls due to unavailable data. The EPIC architecture is designed to allow for close coordination between the processor and the compilers that generate machine instructions. Compilers tuned to the Intel Itanium processor can annotate machine instructions with "hints" about when to prefetch data and how to schedule the parallel execution of instructions.

Dual floating-point processing units are included in the Itanium processor. These units are capable of running with a total combined speed of 6.4GFLOPS. By incorporating floating-point execution units, Intel has provided on-chip support for such tasks as the execution of encryption algorithms or compute-intensive data mining applications. Intel estimates that it will release the next version of the Itanium 2 processor, code-named Madison, in mid-2003 and expects the processor to show an increase in performance by an additional 30–50%.

These key features, combined with Intel's semiconductor manufacturing process expertise and its ability to make significant investments in research and manufacturing capabilities, make the Intel Itanium processor a substantial new competitor in the high-performance processor market. Intel's strong business relationships with workstation and server vendors ensure a ready market for the Itanium processor family.

PA-RISC-based servers will be sold until at least 2005, but customers can begin to move to Itanium processor-based versions of today's PA-RISC servers starting in 2003.

PA-RISC Server Systems

PA-RISC-based servers will be sold until at least 2005, but customers can begin to move to Itanium processor-based versions of today's PA-RISC servers starting in 2003. Further, customers who buy selected PA-RISC servers today (the rp7410, the rp8400, the new "05" series of midrange servers, and the HP Superdome) will be able to install board-level upgrades to the Itanium architecture, protecting their investment and smoothing the transition.

This capability, which HP has planned for many years (since its early work with Intel on the Itanium processor family designs for servers), will preserve customers' existing investments in HP RISC-based server hardware even as it allows field upgrades to Itanium technology. Importantly, this capability will allow customers to upgrade at their own pace.

... the NonStop Himalaya line of highly available servers — which today runs on the MIPS Inc. series of RISC processors — will be redesigned to run on Itanium processors ...

HP's commitment to providing the most robust operating environments for its enterprise systems is evident in its investments in the HP-UX 11i, Tru64 UNIX, OpenVMS, and NSK server operating systems.

It is important to note that this integration will allow Tru64 UNIX customers to reap the benefits of HP-UX 11i and its surrounding software ecosystem.

Tru64 UNIX, which is widely installed in many business-critical and high-performance computing sites, will be sold to customers until at least 2006, with support committed through at least 2011.

HP NonStop Server Systems

As announced in 2001, the NonStop Himalaya line of highly available servers — which today runs on the MIPS Inc. series of RISC processors — will be redesigned to run on Itanium processors, with the first Itanium processor-based versions shipping in 2004. With the merger of HP and Compaq, the NonStop Himalayas are now called HP NonStop server systems.

Several hundred of these HP NonStop servers are shipped each quarter to specific vertical industries for highly demanding workloads. Customers in finance, telecommunications, travel, retail, and healthcare are the target audiences for this high-end fault-tolerant system with more than five-nines (99.999+%) uptime. Perhaps reflecting this community's concerns with making a rapid transition from MIPS-based servers to Itanium processor-based servers and with maintaining current production environments without making any changes for many years, HP plans support for MIPS-based HP NonStop systems through at least 2009.

HP Operating System Road Map

HP's commitment to providing the most robust operating environments for its enterprise systems is evident in its investments in the HP-UX 11i, Tru64 UNIX, OpenVMS, and NonStop Kernel (NSK) server operating systems. HP continues to support Tru64 UNIX for the next generation of AlphaServer systems while incorporating features of Tru64 UNIX in its flagship HP-UX 11i operating system. Beginning in 2003, HP will integrate transition tools and system management features from Tru64 UNIX into HP-UX 11i. Moreover, the company will add functionality from Tru64 UNIX to HP-UX 11i in 2004 and 2005. Specifically, HP-UX will support key features such as TruCluster Server clustering software, which provides traditional cluster capabilities as well as advanced cluster management that allows system administrators to treat the entire cluster as a single computing resource — and the Tru64 UNIX Advanced File System (AdvFS), which provides clustered servers with a global, shared file system that can be accessed by all of the servers within the cluster.

It is important to note that this integration will allow Tru64 UNIX customers to reap the benefits of HP-UX 11i and its surrounding software ecosystem. HP-UX 11i, which has five years of testing and quality assurance history associated with the Itanium architecture, has many industry-leading features, such as support for HP's Utility Data Center (UDC) and workload management (WLM). HP-UX 11i is supported by a broad base of ISVs, which provide several thousand packaged software products for the HP-UX 11i platform. Therefore, HP-UX 11i will allow Tru64 UNIX customers to reach a larger set of applications.

Tru64 UNIX, which is widely installed in many business-critical and high-performance computing sites, will be sold to customers until at least 2006, with support committed through at least 2011. Thus, AlphaServer customers can move to Itanium processor-based platforms at their own pace.

Customers using the OpenVMS operating environment and its layered products will be provided with a full port to the Itanium architecture.

Customers using HP's NonStop line of servers ... will be provided with a full port of the mission-critical NSK server operating system to the Itanium architecture by 2005.

HP intends to support all of its customers throughout their move from today's collection of servers to tomorrow's Itanium processor-based servers.

HP is developing methods and software so that customers can assess and minimize the impact of the transition on business processes ...

Customers using the OpenVMS operating environment and its layered products will be provided with a full port to the Itanium architecture. HP plans an early developer's kit for OpenVMS on the Itanium platform to be available in the first half of 2003, with full support available in 2004. OpenVMS will provide source code compatibility for applications being moved from existing AlphaServers to the new Itanium processor-based systems. HP plans to support mixed architecture clusters; that is, servers running OpenVMS on Alpha processors will work together in a cluster with other servers running OpenVMS on Itanium processors.

Customers using HP's NonStop line of servers (formerly named Compaq Himalaya servers) will be provided with a full port of the mission-critical NSK server operating system to the Itanium architecture by 2005. The NSK server operating system supports full system fault tolerance for such customer environments as support of stock exchanges, online transaction processing (OLTP) for financial institutions, online reservation systems, and similar mission-critical environments that cannot tolerate any interruption in data processing.

SUPPORTING THE TECHNOLOGY TRANSITIONS

HP intends to support all of its customers throughout their move from today's collection of servers to tomorrow's Itanium processor-based servers. This objective has triggered initiatives at HP that are necessary steps toward ensuring successful customer transitions. HP has started to address the implications of the transition to the Itanium architecture in the following areas:

- **System software.** HP has ported HP-UX operating system software and associated software tools and utilities for use with the Itanium processor family. At the same time, the company is working with its ISVs to adapt their current applications for HP-UX, NonStop, and OpenVMS to run on Itanium platforms.
- **Transition tools and benchmarks.** HP is developing methods and software so that customers can assess and minimize the impact of the transition on business processes supported by AlphaServer systems today. The company is also working on application migration tools to help Tru64 UNIX customers and ISVs move their applications to HP-UX. These tools should save customers time and money, especially because they automate certain aspects of evaluating and revising software code for later use on Itanium processor-based server systems.
- **New training programs.** HP is investing in training for its service staff, its sales partners' services organizations, and its customers' IT staffs to make sure that they are ready to make this transition effectively.

Timing Based on Customer Choice

Itanium processor–based servers will be available for all HP's server lines, including entry-level, midrange, and enterprise systems.¹ Only 64-bit operating systems will run on servers using the Itanium processor family, including 64-bit versions of HP-UX, OpenVMS, Windows 2000, and Linux. It is important to note that applications purchased for 32-bit operating systems will also work under the 64-bit operating systems; however, recompilation will be necessary for optimal performance.

Driven by the overall goal of customer satisfaction, HP plans a transition process with wide overlaps between existing and new systems.

Driven by the overall goal of customer satisfaction, HP plans a transition process with wide overlaps between existing and new systems. Wide overlaps will allow users to engage in the transition process when it makes good business sense. Customer choices are therefore maximized.

Customer Assurance Programs

HP has developed several customer programs with the primary goals of reducing customer risk and providing investment protection. Business Systems Evolution is HP's overall program, which includes specific assurance offerings for customers who own different HP products. The offerings under the Business Systems Evolution umbrella include the Alpha RetainTrust, HP e3000/MPE, and HP9000 programs.

The Alpha RetainTrust program focuses on easing the transition from the Alpha platform to Itanium architecture–based HP systems.

The Alpha RetainTrust program focuses on easing the transition from the Alpha platform to Itanium architecture–based HP systems. Key components of this initiative include customer engagement through the Customer Connections program, Architectural Workshops, and free training; products such as the port of OpenVMS to the Itanium architecture, HP-UX 11i enhanced with Tru64 UNIX features, and application transition tools; partner programs, business practices, and services. The AlphaServer Customer Assurance program is now a part of the Alpha RetainTrust program.

Key elements of the AlphaServer Customer Assurance program are:

- A money-back guarantee for investments on the path to the Itanium processor–based platform. Under specified conditions, any customers who are not satisfied with their transition will be reimbursed for their system investments.
- A leasing option that guarantees fixed payments during the transition from AlphaServer systems to Itanium processor–based systems and a software license transfer program launched in conjunction with HP's ISV partners.
- Assistance in expediting the transfer of licenses for operating systems and application software to minimize the cost associated with obtaining new licenses for Itanium processor–based servers.

¹ IDC defines entry-level servers as those priced at less than \$100,000, midrange servers as those priced from \$100,000 to \$999,999, and high-end servers as those priced at \$1 million or more.

HP is expanding its application development environment for both custom applications and packaged software.

HP continues to partner with its ISV community to make sure that applications currently running on HP AlphaServer and PA-RISC systems are ported to Itanium processor-based systems.

IDC believes that HP has developed a comprehensive and well-structured strategy to address the transition of its enterprise servers from Alpha, PA-RISC, and MIPS processors to Intel Itanium processors.

HP's Application and ISV (Software) Strategy

HP is expanding its application development environment for both custom applications and packaged software. Internally, the company is transitioning its system software to the new Itanium processor-based platform. Utilities such as mathematical and statistical subroutine libraries are tested and ready. In cooperation with Intel, HP has developed new compilers optimized for the Itanium processor family.

To more effectively partner with third-party ISVs, HP has exited some product areas, including selected packaged middleware products and selected software development tools. As a result, HP is better positioned to partner with a variety of middleware and application development tools vendors while continuing to offer its own systems software, clustering software, and system management software to customers.

In addition, HP continues to partner with its ISV community to make sure that applications currently running on HP AlphaServer and PA-RISC systems are ported to Itanium processor-based systems. The porting process will involve recompilation of applications and ensure that performance and reliability are high.

Many of these packaged applications will be certified for use on Itanium processor-based systems in testing centers staffed by software engineers from HP and its ISV partners. IDC notes that major software companies, such as Oracle, SAP, SAS, BEA, and PeopleSoft, are participating with HP in this effort. Quality assurance and certification programs will be established to assist ISVs. In addition, HP and Intel have jointly created development reference platforms to support ISVs in porting or developing applications for Itanium processor-based servers.

IDC ANALYSIS

IDC believes that HP has developed a comprehensive and well-structured strategy to address the transition of its enterprise servers from Alpha, PA-RISC, and MIPS processors to Intel Itanium processors. IDC also believes that, going forward, computer vendors such as HP will add significant value to systems in such areas as overall system architecture, peripheral components, and system software that surround the industry-standard processors.

A server is based on many technologies. In addition to processors, memory systems, caches, internal interconnects, and I/O subsystems play important roles in providing applications performance to the end user. Therefore, the way in which the industry-standard components are linked together is becoming a major area in which systems vendors can add value to server products. In addition, vendors can compete through innovations of the software stack (systems software and middleware) and by providing services elements to deliver a total server solution set.

IDC believes that HP can achieve differentiation for its server products, even though HP plans, in time, to move away from custom microprocessors. Thus, HP is working to add value through system elements other than the microprocessor.

The Larger World of Itanium Processor-Based Servers

IDC believes that it is important to set into context the community of AlphaServer, PA-RISC, and MIPS users who transition to Itanium processor-based servers in the future. As system suppliers consolidate on the Itanium processor platform, these users will join the wider community of users who will be deploying Itanium processor-based servers to run the Microsoft Windows 2000 and Linux operating systems. IDC's workloads research shows that most Unix servers are operated by IT organizations that also operate servers running many other operating systems, including Windows 2000 and Linux.

In parallel with the transformation of business-critical servers to industry-standard 64-bit architectures, industry-standard operating systems — including Windows 2000 and Linux — are undergoing an evolution to 64-bit versions that will run on the Intel Itanium processor family. As solutions based on these industry-standard operating systems mature, HP customers will be able to enjoy the added benefit of consolidating on common 64-bit computing infrastructure for all applications. IDC believes that the option to run multiple operating systems on a common platform is consistent with a larger trend toward server consolidation.

Linux

Today, according to HP, most of the Linux applications running on AlphaServer systems are technical applications that, in many cases, are deployed in parallel computing clusters made of multiple small AlphaServer systems. For some of these customers, the transition path for Linux applications that are running on AlphaServer systems will be to move to 64-bit Linux applications running on Itanium processor-based servers.

Other customers may decide to deploy 32-bit Linux applications running on Intel-based IA-32 servers that are sold by the HP Industry Standard Servers (ISS) division, which is the complement to the HP Business Critical Systems (BCS) group. In any case, HP has made clear that its primary focus for Linux shipped on new servers will be Intel processor-based server systems (either IA-32 or Itanium processors) — although HP has said that it will continue to support Linux on HP AlphaServer systems to meet customer requirements for years to come.

Red Hat, HP's supplier of Linux for the Alpha processor, continues to offer new releases that correspond to new versions of the Alpha processors, and HP intends to continue upgrades throughout the transition period. HP expects significant commonality between third-party Linux versions that run on Alpha-based and Itanium processor-based servers. Porting between versions of Linux and using system tools across Linux implementations have been successful strategies that HP intends to continue.

Microsoft Windows

Microsoft is currently supporting Itanium processor–based systems with its Windows 2000 Advanced Server, Limited Edition. In 2003, Microsoft will introduce two 64-bit versions of this operating system: Windows .NET Server 2003 Enterprise Edition and Windows .NET Server 2003 Data Center Edition.

Current versions of 64-bit Windows operating systems support up to eight-processor SMPs. However, customers can run multiple copies of these operating systems on multiple partitions of larger servers. IDC notes that future versions of 64-bit Windows will scale to higher processor counts.

Multiple Operating Systems on Itanium Processor–Based Servers

Computing infrastructure that supports multiple operating systems can be rapidly adapted to meet rapidly changing business needs without disrupting services to end users. HP's vision is to create Itanium processor–based systems that support up to 64 processors. These systems will be partitionable into multiple building blocks to add flexibility to daily IT operations. In addition, users will be able to run multiple operating systems across the same interconnect fabric, thus sharing compute resources and storage networks and reducing system management efforts. As now envisioned, these interconnected server systems will run a variety of 64-bit operating environments, including Microsoft Windows 2000 Advanced Server, Linux, OpenVMS, and HP-UX, across the same interconnect fabric.

If this happens, IDC believes that HP customers will be able to mix and match operating environments to deliver services in a flexible, secure, easily managed, cost-effective configuration. HP will also be able to provide customers with a single point of contact for ongoing support and a single point of responsibility to ensure that these systems meet customer requirements for total solutions and high availability.

HP believes that an "ecosystem" is evolving around the Itanium processor platform. A technology ecosystem is the set of individuals and organizations that are actively working to support and advance a given technology, for computer systems. This ecosystem includes programmers, systems administrators, academic and commercial organizations, systems hardware suppliers, systems and applications software suppliers, and so on.

HP is supporting this ecosystem through:

- Direct support of several server operating systems: HP-UX 11i; HP OpenVMS, and HP NSK. In addition, HP will offer Microsoft Windows 2000 and Linux on its Itanium processor–based and IA-32-based servers.
- Partnerships with all the major ISVs for middleware (server, directory, and security software), database software, and applications software, including software for key vertical markets and Web-enabled ecommerce.

- The AlphaServer RetainTrust program, now a part of HP's Business Systems Evolution program, provides a range of resources, tools, and services — including some that are being provided at no additional cost — to AlphaServer customers who are planning to move custom and packaged applications from AlphaServers to Itanium processor-based servers.

HP's Value Proposition to Customers

Today's HP AlphaServer and PA-RISC system users are members of a diverse community, with applications spanning scientific, engineering and commercial computing environments. Systems that support technical and engineering applications must provide a combination of high floating-point computational performance, large memories, and strong memory and I/O performance. Technical workloads tend to stress all components of a computer system, finding the weakest link in the disk-memory-processor chain. Thus, the ancient cybernetic proverb: "A supercomputer turns a compute-bound problem into an I/O-bound problem."

Server systems that support business applications are expected to be highly available, execute transactions quickly, move information rapidly via highly efficient I/O subsystems, and manage large data stores efficiently. Packaged software is prevalent within the general business community and specific vertical market segments.

In this context, HP's value proposition is straightforward. HP intends to provide continuity to its existing customers, to meet their requirements for more cost-efficient server technology in terms of both hardware and systems software. HP AlphaServer and PA-RISC systems are known for their high performance and high availability, and HP intends to guard that reputation aggressively.

What will the new differentiating factors be? IDC believes that the differentiating factors will be found in the system architecture — in other words, in the way that the various processor, cache, memory, and I/O components are organized and in the technology used to interconnect these components. Successful companies will combine system architecture with the overall integration of hardware, software, and services.

HP will be one of several suppliers of Itanium processor-based systems. This competitive market will encourage broader adoption and wider use of Itanium processor-based technology. Consolidation of component suppliers creates a larger, unsegmented market and provides the opportunity for surviving players to leverage higher volume manufacturing. High volume tends to lead to improved price/performance ratios for customers.

HP's Competitive Challenges

HP is about to engage in the delicate process of balancing support for today's server technology while gearing up to support next-generation server technology. This balancing act is a familiar problem for system suppliers and is always a significant challenge. Retaining customers, building trust in the new environments,

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HP is about to engage in the delicate process of balancing support for today's server technology while gearing up to support next-generation server technology.

integrating product lines, and easing the transition process are not easy tasks. However, HP has successfully faced these tasks in the past.

IDC believes that HP will continue to sell servers based on IA-32 processors at lower price points in the entry-server market (defined by IDC as servers at a price point less than \$100,000) or in the volume-server market (defined by IDC as servers at a price point less than \$25,000). Many 32-bit applications on IA-32 processor-based servers will continue to run side by side with applications running on Itanium processor-based servers that support both 32-bit and 64-bit applications. This is a pragmatic approach to introducing new technology into customer sites that already have widely deployed IA-32 processor-based server systems. However, over time, some of the workloads that are currently running on IA-32 processor-based servers may be consolidated onto Itanium processor-based servers, as needed, based on the type of workload and on that workload's requirements for scalability, performance, and high availability.

The Itanium processor-based servers will be positioned as appropriate for more demanding applications than those that run on IA-32 processor-based servers.

HP's ProLiant line of IA-32 processor-based servers will continue to be sold for years to come, even as 2-way and 4-way Itanium processor-based servers enter the market at price points that are generally 10–15% higher than those of IA-32-based servers. The Itanium processor-based servers will be positioned as appropriate for more demanding applications than those that run on IA-32 processor-based servers.

HP must ensure successful transitions in its early-adopter community. Most IT customers take a wait-and-see attitude toward technology transitions. Lead customers — those who depend most heavily on IT in their businesses — are often the first to move ahead. To maintain their competitive advantage, lead customers need leading-edge technologies. Reports of early-adopter successes will encourage adoption by mainstream IT customers.

HP is meeting the early-adopter challenge head-on by focusing attention on high-performance systems.

HP is meeting this challenge head-on by focusing attention on high-performance systems. In other IT markets, disruptive technologies emerge at the low end of the performance curve (i.e., appliance servers); in this server system market, high-end systems that translate successfully from one type of microprocessor to another are the examples that the majority of HP's customers want to see. Fueled by an industrywide trend to consolidate IT systems onto fewer platforms, high performance and high availability are critical factors on the minds of IT planners.

CONCLUSION

IDC believes that HP's plan to integrate its server technologies with the Intel Itanium processor family represents a viable path for HP's customers ...

IDC believes that HP's plan to integrate its server technologies with the Intel Itanium processor family represents a viable path for HP's customers: Itanium microprocessors will be the engines for high-performance technical, business-critical, and mission-critical data processing. These systems will support OLTP workloads and database workloads, including business intelligence applications such as data warehouses and decision support systems.

In summary, Itanium processor-based servers will have many uses within the enterprise, ranging from support for high-performance computing within engineering workgroups to rack-optimized clustered servers to scalable midrange servers. HP's deep commitment to efforts that will ease the transition process for AlphaServer, PA-RISC server, and HP NonStop server customers is a comprehensive response to the challenges that lie ahead.

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