HP High Performance Technical Computing family of products

Scale up, scale out, scale simply

High performance technical computing

HP Integrity servers

Scale out and scale simply with the 2-way HP Integrity Server rx2600 and the 4-way Integrity Server rx5670.

Scale up and scale simply with the HP Integrity Superdome.

rx2600

rx5670

Integrity Superdome

Engineers, scientists, and researchers in the high performance technical computing (HPTC) marketplace are continually seeking systems with higher levels of performance, manageability, and reliability. To maximize performance and scalability within challenging budget constraints, it is essential to choose servers that offer the best return on investment—outstanding price/performance with upgrade paths that will continue to meet your computing needs even as applications become more complex and time-to-solution demands intensify.

HP scalable servers are ideal for all HPTC industries: computer-aided engineering (CAE), life sciences, electronic design automation (EDA), and scientific research and signal processing. No matter what your needs—compute- or data-intensive, high throughput or fast time to solution—HP scalable systems are designed for maximum performance.

HP offers the most complete range of systems available in the technical computing marketplace.

- **Scale up** with performance-leading HP high-end servers
- **Scale out** with cost-effective and powerful HP clusters
- **Scale simply** with HP single-system-image solutions

Whatever the need or size of your organization, HP can provide a scalable solution to achieve your performance goals and increase your return on investment.

A new chapter in the Intel® Itanium® architecture era has begun with the introduction of HP Integrity servers. Based on the Intel Itanium 2 processor 6M, these systems are more than twice as fast as their PA-RISC-based predecessors and 1.5 times the speed of the original Itanium 2-based HP systems.

Jump-start your scientific and engineering simulations with two speeds of performance-leading Intel Itanium 2 processors: 1.5 GHz with 6 MB of L3 cache or 1.3 GHz with 3 MB of L3 cache.

- **HP Integrity Server rx2600:** 2-way (12 GFLOPS) with up to 24 GB of memory
- **HP Integrity Server rx5670:** 4-way (24 GFLOPS) with up to 96 GB of memory
- **HP Integrity Superdome server:** 16-/32-/64-way (up to 384 GFLOPS) with up to 512 GB of memory

Additional HP Integrity systems will be introduced in the second half of 2003, including:

- Integrity 8-way and 16-way servers
- Integrity xc6000 cluster for Linux with large configurations of up to 512-way (3 TFLOPS) and 12 terabytes of memory at product introduction

HP servers—scale up, scale out, and scale simply for breakthrough performance

Extensive experience with Itanium-based systems and co-developer insights result in unmatched HP system performance gains. Invented by HP, the HP Scalable Processor Chipset zx1 and sx1000 Chipset fully unleash the power of Intel Itanium 2 processors by lowering memory latencies and increasing memory and I/O subsystem scalability. With high clock rates and more sustained performance per clock than any other microprocessor architecture, the Integrity systems enable greater in-depth analysis and higher quality images on more complex models.

To achieve even greater performance, HP is working with leading independent software vendors (ISVs) in both the technical and commercial markets to optimize their applications to the Intel Itanium 2 microarchitecture, thereby exploiting the full potential of HP Integrity systems. For example, every tier-one CAE application is fully tuned and ready to run on HP Integrity servers.

HP customers are reporting compelling application performance improvements, with standard benchmark results faster than with any other microprocessors[1] and the fastest performance on major industrial ISV codes[2]. This leading performance is delivered with excellent industrial ISV support on HP-UX and Linux.

Scale up, scale out, and scale simply with open, industry-standard technology

The transition from proprietary technology to open, industry-standard technology will result in lower costs and sustainable technology growth. HP supports this transition with open, industry-standard products. The Integrity family is based on the Intel Itanium 2 processor, and the HP ProLiant product family is based on the Xeon processor.

To ensure an easy transition from proprietary to industry-standard processor technology, HP will continue to deliver processor upgrades through 2004 on the PA-RISC–based HP 9000 and AlphaServer product lines. Thus, you can choose fresh and new HP technical computing servers from four processor families, all with technology refreshes through 2004. You can also be secure knowing that HP will continue full support for AlphaServer and HP 9000 systems into the next decade.

[1] Examples: SPECrate_2000, LINPACK 1000x100

[2] Examples: MSC.NASTRAN, ANSYS, ABAQUS, LS-DYNA NCAC, STAR-CD, PAM-FLOW, AVL FIRE, etc.

HP Integrity family

- Based on 64-bit, industry-standard Intel Itanium 2 processors
- SMP/ccNUMA scaling from 2 to 64 processors
- Running HP-UX, Linux, or Windows® operating systems
- In-box upgrades to faster Itanium 2 processors

HP 9000 family

- Based on 64-bit HP PA-RISC 8700+ processors
- SMP scaling from 2 to 64 processors
- Running the HP-UX operating system
- In-box upgrades to Intel Itanium 2 and PA-RISC 8800 processors

HP ProLiant family

- Based on 32-bit, industry-standard Intel Xeon processors
- Scaling primarily with two- or four-processor Linux servers clustered in HPTC distributed scalable configurations
- Running Linux or Windows operating systems

HP AlphaServer family

- Based on 64-bit HP EV68 and EV7 Alpha processors
- SMP/ccNUMA scaling from 2 to 32 processors; up to 64 processors in second half 2003
- Running HP Tru64 UNIX® or Linux operating systems

Ensuring a smooth transition to Itanium-based systems
If the thought of migration challenges is holding you back from achieving top computing performance, wait no longer. HP has you covered—every step of the way. With the most comprehensive transition services available, you can deploy Itanium-based systems quickly, easily, and painlessly. HP transition services include planning, porting and migration, implementation, support, and education.

And unlike some breakthrough technologies, you don't need to change everything at once when you move to Itanium 2-based systems. The co-developer expertise of HP ensures a seamless migration with 32- and 64-bit application binary compatibility; a comprehensive suite of native development tools; a choice of operating systems— HP-UX, Linux, or Windows; and consistent tools and infrastructure to ensure the highest levels of availability and manageability.

Industry-standard processor benefits
Industry standard processors allow HP customers to reap numerous performance and cost benefits:

- Higher performance than any other microprocessors on most standard benchmark technical applications
- Lower total cost of ownership (TCO) with lifecycle longevity, including in-box processor upgrades across the entire Integrity product line and in-box upgrades from PA-RISC to Intel Itanium processors
- Highest performance growth rates of any processor technologies
- Binary compatible scalability from desktop workstations through small and large servers (with 2 to 64 processors) to extra-large distributed supercomputers with hundreds and thousands of processors that deliver TFLOPS of performance
- Unique HP support for HP-UX (UNIX), Linux, and Windows—all on a single, flexible hardware platform

Multiple operating system support: HP-UX, Linux, and Windows

Because Integrity systems offer you the flexibility to choose between HP-UX, Linux, and Windows operating systems, you are guaranteed even greater investment protection. Itanium 2-based HP systems allow you to choose the operating system that best meets your needs now and also offer you the flexibility to change operating systems as your technical needs change. This flexibility is important because some applications are only available—or are more economical—on a particular operating system. Whether you need the industrial ISV support and production-level security of HP-UX, the leading-edge applications and features of Linux, or the desktop compatibility of Windows, HP Integrity systems have you covered.

HP-UX

HP is the only vendor to offer a proven, mission-critical, enterprise-quality UNIX operating system for Itanium-based systems. HP-UX 11i offers unsurpassed scalability, reliability, manageability, availability, and security. HP-UX 11i for Itanium-based systems even has the ability to execute PA-RISC applications using built-in HP dynamic code translation technology.

In addition, HP-UX offers Linux affinity for binary compatibility with applications compiled using standard techniques on Itanium 2-based Linux systems. Thus, Integrity HP-UX servers are the most scalable and most flexible microprocessor-based systems in the industry.

Linux

Linux has been broadly accepted within the technical community as a key platform for development and deployment of scientific applications, and it's rapidly moving into commercial-sector use in research and engineering. The Linux open-source kernel, combined with an extensive collection of open-source middleware and tools, has put users in the driver's seat, allowing them to design and assemble unique software environments and to collaborate across the open-source community on infrastructure and applications. And with a choice of industry-standard platforms, Linux is driving price/performance for technical computing. HP has been at the forefront of this evolution, as the number-one source for the base platforms and by playing a major role in critical open-source projects.

To support the growth of Linux within the technical market, HP works closely with its partners in application development software and collaborates across application segments with leading software application providers to assist in bringing these solutions to the Linux platform.

Windows

Integrity servers are OS-flexible and will be ready when and if you need the 64-bit version of the Microsoft® Windows Server 2003 operating system[3]. You can take advantage of the OS flexibility of the Integrity servers to run a mix of HP-UX, Linux, and Windows simultaneously on partitionable systems. Thus, if you initially deploy HP-UX or Linux, this OS flexibility provides you with investment protection for the future.

Microsoft Windows Server 2003 for 64-bit Itanium 2-based systems, scales to new heights, especially when running on 64-processor, 512 GB Integrity Superdome servers. With the introduction of this new Windows capability, the Integrity Superdome server running SQL Server 2000 (64-bit) takes the lead for commercial database transactions, with the fastest and most cost-effective TPC-C result to date: over 700,000 transactions per second at under $10 tpmC price/performance[4]!

This new Windows scalability opens the door to run CAE, life sciences, and other HPTC applications on scalable, large-memory, Windows-based servers with hundreds of GFLOPS of performance. Running Windows on 32-bit ProLiant servers and 64-bit Integrity servers allows you to scale applications while maintaining binary compatibility with 32-bit and 64-bit HP desktops and HP workstations, where Windows is a popular choice.

[3] Windows OS release dates vary across the HP Integrity platforms.

[4] See complete results at www.tpc.org.

HP clustered solutions—scale out and scale simply from GFLOPS to TFLOPS

HP has years of experience in building the fastest clustered supercomputers in the world. Its AlphaServer SC45 systems, which have scaled to 8,192 processors (20 TFLOPS), pushed high scalability to new heights with outstanding sustained performance, scalable file systems, and ease of use.

As these scalable technologies evolve, HP is evolving with them. HP is transforming its scalable systems to leverage the speed, flexibility, longevity, and fast growth path of industry-standard processors while enhancing scalability, throughput, and ease of use. The flexibility of the Integrity platforms allows HP to offer scalability for both HP-UX (UNIX) and Linux solutions on a single hardware platform. Whether your application mix demands UNIX or Linux, 32-bit or 64-bit processors, dual-processor or 64-processor nodes, dozens of processors (GFLOPS), or thousands of processors (TFLOPS), HP has you covered with flexible, industry-standard cluster solutions.

HP clusters for HP-UX—taming the beast with hptc/ClusterPack

Although server clusters improve price/performance and consolidate resources, one of the biggest concerns for both IT administrators and end users is the manageability of the cluster environment. HP has solved the problems associated with managing clusters with the hptc/ClusterPack advanced cluster management software. The hptc/ClusterPack software provides a single point of access for cluster system administration, cluster system resource control and monitoring, and distributed workload management, all through the family of cost-effective HP-UX Integrity nodes.

This clustering software and its high-speed interconnects allow you to select or mix 2-processor to 64-processor Integrity servers to achieve the best performance and best consolidation results. You may select the optimum price/performance of dual-processor Integrity rx2600 nodes, or you may require the immense memory and I/O capacity offered by Integrity Superdome nodes. The hptc/ClusterPack provides a single point of system administration and job submission, thereby reducing IT costs, increasing reliability, and improving your users' productivity. And since hptc/ClusterPack is based on the HP-UX operating system, it comes with a long list of supported and highly tuned ISV application codes, which are required for most industrial and academic usage.

HP clusters for Linux

A major area of focus for HP is Linux clusters for HPTC—scale-out solutions that deliver Linux price/performance into the realm of supercomputing. HP offers a full range of high-performance clusters for Linux—from a preconfigured set of solutions with leading cluster software to a customized collection of the latest open-source tools assembled and supported by the HP Services consulting and integration team.

HP Integrity and ProLiant XC clusters for Linux
Scale simply with XC Cluster Systems for Linux. These innovative HP clusters combine single-system-image simplicity with high-performance scalability to deliver unprecedented levels of ease of use and productivity. XC clusters, to be announced in the second half of 2003, leverage industry-leading technology from HP and its partners to deliver higher throughput and faster times to solution while excelling at ease of use and manageability. At the core of the program's platform are blazingly fast 64-bit Integrity and 32-bit ProLiant servers and a range of interconnects—including the fastest message-passing interconnects from Quadrics and Myricom, Inc. The initial offering scales from 32-processor (192 GFLOPS) to 512- processor (3 TFLOPS) configurations, with even larger configurations available by request.

HP ProLiant LC Clusters
HP, the largest seller of Linux servers in the industry, makes it easy to purchase and support most major Linux clustering packages. With a choice of interconnects and Linux software and cluster management tools, the LC Clusters are easy-to-buy, flexible cluster packages featuring the rack-optimized ProLiant DL360 and DL380 servers. The LC Clusters are available in configurations of 16, 32, 64, and 128 nodes; integrated with Ethernet or Myrinet high-speed interconnect; and supported by HP Service. Several cluster management software products are certified options for the LC Clusters, including Scali's Manage and MPI Connect products and Scyld Beowulf Clustering Software. The LC Clusters also support open-source options, such as NPACI Rocks. This broad base of support for multiple cluster suites allows customers to deploy their preferred solution.

Scale out, scale simply.

Packaged configurations featuring HP Integrity servers complement the LC Clusters and are available supporting the Scali cluster suite as well as NPACI Rocks.

HP has also established partnerships around the globe to expand its product coverage and delivery capabilities for Linux clusters, including an alliance with MSC.Software.

HP build-to-suit clusters
Within the high-performance technical marketplace, some customers need custom-developed solutions. HP combines its supercomputing expertise with the flexibility of Linux to deliver unique, leading-edge cluster solutions that can easily be built to meet the demanding needs of HPTC customers. End-to-end HPTC services provide a single point of accountability, ensuring successful implementation.

The HP team of experts has extensive experience with Linux clusters, having delivered and supported some of the most powerful Linux clusters to date in both the public and private sectors. A prime example is the 9 TFLOPS HP Integrity Linux cluster at Pacific Northwest National Laboratory (PNNL), with 700+ HP Integrity rx2600 nodes connected with a high-speed Quadrics interconnect and running a cluster software system developed by HP engineers to PNNL's specifications.

HP Workstations

Itanium 2-based desktop systems
HP's Itanium 2–based systems deliver binary compatibility over a complete line of high-performance choices that span from deskside workstations to room-sized super-computers. HP Workstations zx2000 and zx6000 deliver breakthrough performance and advanced visualization. As with the Integrity servers, the Itanium-based work-stations run HP-UX, Linux, and Windows operating systems. Likewise, the HP workstations based on Xeon processors run Windows and Linux operating systems and are binary compatible with the HP ProLiant servers.

The HP family of technical servers—harnessing the power of highly scalable solutions

The new Integrity servers are but one example of why HP customers enjoy better price/performance and faster time to solution for a broad range of high-performance technical applications. HP is unique in its ability to deliver industry-standard 64-bit and 32-bit solutions with the breadth of operating systems, scaling techniques, ISV application portfolios, engineering expertise, and product support demanded by leading industrial, academic, and government technical computing centers. No matter what your performance challenge is—to scale up or to scale out—you can scale simply with HP.

To learn more, visit www.hp.com/go/hptc

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