



Itanium® 2-based Solutions: Intel® Volume Economics Extended to the Most Data-Intensive, Business-Critical and Technical Applications



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Introduction



The new Intel® Itanium® 2 processor with 6M L3 cache accelerates the momentum of the Intel Itanium 2 processor family. Platforms based on the Itanium 2 processor family are designed for the most demanding enterprise and technical applications and provide your IT infrastructure with a competitive advantage.

The Itanium 2 processor with 6M L3 cache delivers new levels of compute-parallelism, scalability and reliability for Databases, Enterprise Resource Planning, Supply Chain Management, Business Intelligence and other data intensive applications, such as High Performance Computing (HPC). Available operating systems such as Microsoft Windows* Server 2003, HP-UX* and Linux*, and shipping databases and applications from the likes of BEA, IBM, Microsoft, Oracle, SAP and SAS make now the ideal time to deploy Itanium® 2-based solutions in your enterprise.

Higher Performance, open-standard Itanium 2-based solutions for less than proprietary RISC offerings

Itanium® 2-based Solutions

Enterprise solutions deployed on Itanium® 2-based systems in 2003 focus on maximizing performance, scalability and reliability for Databases, Enterprise Resource Planning, Supply Chain Management, Business Intelligence and Security Transactions. Itanium 2-based systems also enable High Performance Computing, MCAE, EDA and Compute Intensive Custom Applications.

Itanium 2-based solutions, including the compatible Itanium 2 processor with 6M L3 cache offering, run on a broad range of enterprise operating systems including Microsoft Windows* Server 2003, HP-UX*, multiple Linux* distributions, and with future versions of HP OpenVMS* and NonStop Kernel*.

The table below illustrates the key targeted segments for Itanium 2-based systems.

Enterprise Markets	Descriptions	Applications From Companies Like†...
Databases	Relational Database Management Systems	IBM DB2*, Microsoft SQL Server* (64-bit), Oracle9i*
ERP, SCM	Resource Management and Supply Chain	SAP
Business Intelligence	Data Analysis Tools	SAS
MCAE, EDA, Compute Intensive Custom Applications	Simulation of complex products and services	ANSYS, EDS-Unigraphics, Mentor Graphics, MSC.Software, PTC
Application Servers	Enterprise applications and Web services	BEA WebLogic*
Security Transactions	Encryption, Decryption	RSA
High Performance Computing	Supercomputing, Genomics, Particle Research, etc.	Custom applications

† The list of companies is not all-inclusive.

Delivering More Business Value Through PERFORMANCE

Supporting High-End Enterprise and Technical Computing Needs

Uniquely designed for the enterprise, the Intel® Itanium® 2 processor enables industry-leading enterprise performance for a lower cost than proprietary offerings. Currently, Itanium® 2-based systems hold number-one results running a series of enterprise and HPC applications including TPC-C (4-way and overall #1 non-clustered)¹, SPECweb99_SSL² and Linpack HPC³, among others.

Itanium-2 based servers can process twice the number of transactions at half the dollars per transaction than the leading RISC alternative⁴. Moreover, Itanium 2 processor leads in high-performance computing by delivering more GFLOPs at one third the dollars per GFLOP⁵. Companies that are already running applications compiled for the Itanium architecture are expected to experience a +30-50% performance increase when using the Intel Itanium 2 processor 1.50 GHz with 6M L3 cache⁶.

The Itanium 2 processor improves performance on complex business applications, such as large Databases, Enterprise Resource Planning (ERP), Supply Chain Management (SCM), and Business Intelligence (data mining) by delivering increased cache to core throughput (32 GB/s vs. 48 GB/s). These applications demand greater computing power and cache resources because they link together more users, automate complex processes, and work to serve customers more effectively.

See footnotes on page 16.

Delivering More Business Value Through PERFORMANCE

Itanium® 2-based servers are also ideal for database consolidation and demonstrate leading performance with non-clustered database solutions⁷.

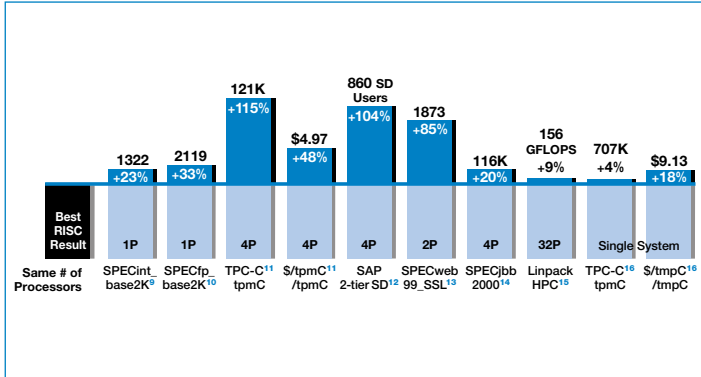
	Features	Functions	Benefits
Intel® Itanium® 2 processor 1.50 GHz with 6M L3 cache	Explicitly Parallel Instruction Computing (EPIC) technology; massive execution resources; 6.4GB/sec system bus bandwidth; 6M integrated L3 cache	Provides superior throughput and compute capability for databases and complex workloads	Enables over 100% higher transaction performance than comparable 4P RISC systems and delivers industry-leading performance in key enterprise applications like Enterprise Resource Planning (ERP) ⁸
Itanium® 2-based platforms[†]	Memory bandwidth balanced with 6.4GB/sec system bus and high-end memory capacity levels to support 64-bit addressability, high-bandwidth I/O and connectivity (for example, multiple PCI-X slots, Gigabit Ethernet, and Ultra 320 SCSI for RAID 5-level support)	Balanced platform bandwidth to support high-end capabilities of Intel® Itanium® architecture with high-end memory, I/O and connectivity solutions	Industry-leading system-level performance for high-end enterprise and technical computing workloads

[†] Platform capabilities shown represent example high-end enterprise server capabilities and can vary based on vendor-specific platform features and target applications.

See footnotes on page 16.

Delivering More Business Value Through PERFORMANCE

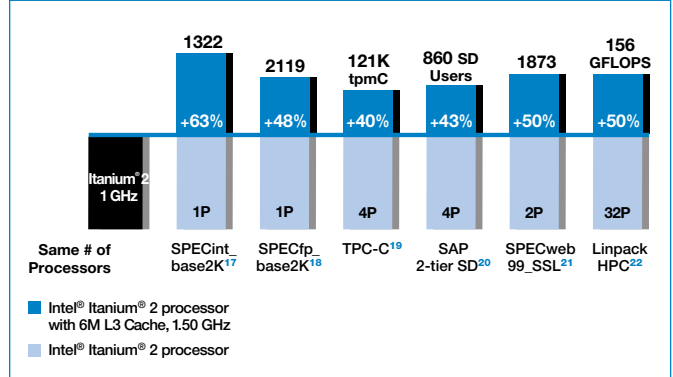
Figure 1: Intel® Itanium® 2 Processor with 6M L3 Cache Performance Advantage vs. Best RISC



† Not published, Intel estimates.

See footnotes on page 17.

Figure 2: Intel® Itanium® 2 Processor with 6M L3 Cache Performance Improvements vs. Itanium 2 Processor



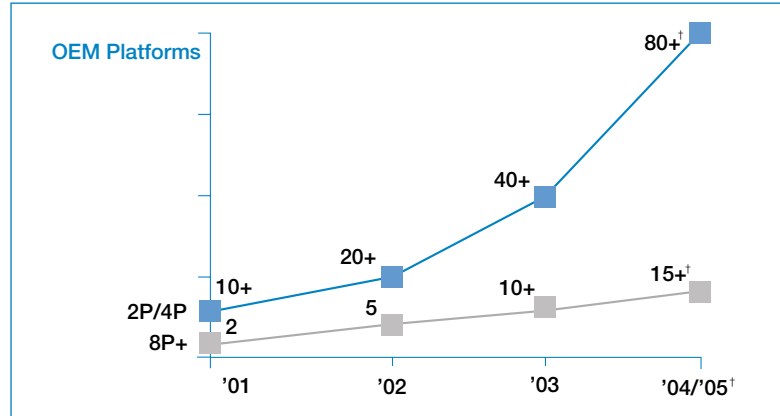
Delivering More Business Value Through SCALABILITY

Platforms based on the Intel® Itanium® 2 processor deliver uncompromising scalability for business-critical computing with headroom for growth. As workloads continue to grow, the need for compute headroom becomes critical as well.

Over 40 OEMs are expected to offer Itanium® 2-based systems with 6M L3 cache in 2003. Broad OEM product offerings are available this year, including more than ten 8 processor (8P)+ systems. OEMs are also committing to deliver 128P Itanium 2-based systems later this year and already have 2P to 64P systems in deployment. This wide range of OEM systems deliver business results for the most demanding enterprise computing tasks.

† Projected. All dates specified are target dates, are provided for planning purposes only, and are subject to change.

Figure 3: Server Platform Configurations Based on the Intel® Itanium® Processor



Delivering More Business Value Through High Server AVAILABILITY

Availability for Business-Critical Applications

Itanium® 2-based systems offer enterprise-class reliability built into the processor and platform in affordable and industry-standard configurations for data-intensive, business-critical computing.

	Features	Functions	Benefits
Intel® Itanium® 2 processor	Innovative Machine Check Architecture: Extensive error detection and correction capabilities	Address and data path error correction; system-wide ECC protection; automatic error detection, logging, and correction	Detect bit-level errors and manage data corruption, thereby providing outstanding reliability for maximum system uptime
Itanium® 2-based platforms†	ECC memory with mirroring, redundancy or Chipkill* capabilities; hot-plug platform components like processor boards, memory, I/O, fans, power supplies, and disks; built-in hardware redundancy; enhanced platform-level manageability	Servers can detect, log, and correct errors and be configured with many levels of redundancy; servers can be serviced while still up and running with hot-plug capabilities; servers can be managed remotely	Servers are highly reliable, manageable and easily serviced providing maximum uptime for business-critical applications

† Platform capabilities shown represent example high-end enterprise server capabilities and can vary based on vendor-specific platform features and target applications.

Delivering More Business Value Through INVESTMENT PROTECTION

Value for Today and Tomorrow

Compatibility with future generations of the Intel® Itanium® processor family ensures platform upgradeability, maximizing ROI of initial investments in Itanium® 2-based servers. Users will be able to scale their applications more quickly and affordably. The performance and compatibility of the Intel® Itanium® 2 processor – along with anticipated performance advances in follow-on processors – support this claim.

IA-32 Application Support: Today, all Itanium 2 processors offer support for IA-32 applications; a new technology called IA-32 Execution Layer will further enhance this capability in 2H '03.

	Features	Functions	Benefits
Hardware	Today's Itanium® 2-based systems can be upgraded with future generations of Intel® Itanium® 2 processors	Those who deploy applications on Itanium 2-based platforms will be able to scale performance by upgrading to future-generation Intel Itanium processors	Future platform compatibility from generation to generation enables upgrades and efficient integration. This ensures longer life cycle for Itanium®-based platforms and protects the investments you make today
Software	Compatible with Itanium® architecture binaries	Systems based on the Intel® Itanium® 2 processor with 6M L3 cache are expected to increase performance from 30-50% over Itanium 2 with 3M L3 cache ⁶	Applications can run and scale on future Itanium-based servers without recompile, minimizing investments in applications and labor

See footnotes on page 16.

Delivering More Business Value Through CHOICE

Open Standards at the High-End of the Enterprise

With commitment and support from major server manufacturers, OS providers, hundreds of application developers and IT solution providers, Itanium® 2-based enterprise solutions maximize flexibility through a broad array (2-, 4-, 8-, 32-, 64- and up to 128-way platforms) of cost-effective solutions for high-end enterprise and technical computing. The Intel® Itanium® processor family offers a broader range of high-end (8-way and greater) platforms and operating systems than any other 64-bit enterprise platform.

Figure 4: Itanium® 2 Processor Ecosystem

Performance	Itanium® 2 processor is setting new records in performance across application segments.
OEMs/Hardware	Platform breadth is growing with a full line-up of Itanium® 2-based OEM offerings available in '03.
Operating Systems	Windows Server 2003*, multiple versions of Linux*, and HP-UX* are in production.
Tools	Robust set of development tools for commercial and custom applications are available now.
Applications	Broad array of applications are in production and availability of new applications is growing quickly.
End Users	Design wins and deployments are progressing across application segments.

Source: Intel Corporation

Planning Deployment of Your Itanium® 2-based Solutions – DATABASE

Powering Reliable and Scalable Database Solutions

The combination of Microsoft Windows* Server 2003 and SQL Server* 2000 (64-bit) is available today, and is designed to take full advantage of the Intel® Itanium® 2 processor with 6M L3 cache. It reduces the time required to scale databases to run on 64-bit platforms, offering high levels of single-system scalability for memory-intensive data applications. These benefits, coupled with up to 1024TB of memory addressability, enable Itanium 2-based systems with up to 6M L3 to offer companies industrial-strength business solutions.

Many corporations run their data stores on IBM DB2* Universal Database. Today, IBM DB2 v.8.1 is available for both Microsoft Windows Server 2003 and Linux.

A large number of corporations also use the Oracle9i* Database to build and run their mission-critical application-based ecosystem. Oracle9i is available today for Itanium® 2-based systems for Windows Server 2003*, HP-UX* and Linux*. Oracle's code is also optimized for parallelism. The Itanium® 2 processor with 6M L3 cache is based on Explicitly Parallel Instruction Computing (EPIC) technology. EPIC technology's advanced compiler and branch architecture facilitates instruction scheduling and parallelism. The Cache Fusion* technology in Oracle9i RAC also takes advantage of the large, integrated L3 cache in the Intel Itanium 2 processor with 6M L3 cache.

Planning Deployment of Your Itanium® 2-based Solutions – DATABASE

Figure 5: Availability of Databases for Itanium® 2 Processors

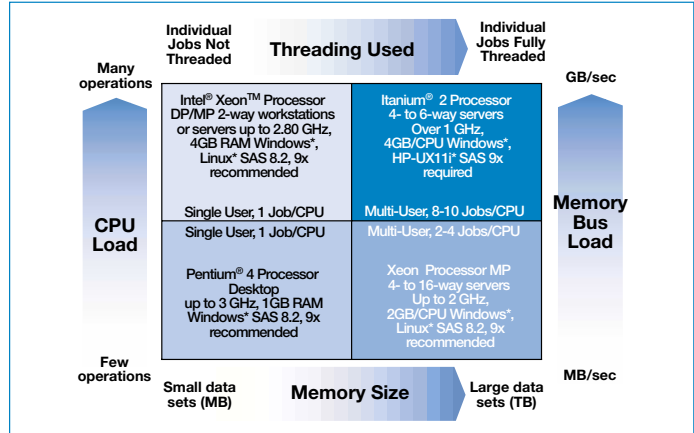
Oracle9i* for HP-UX*	Available now
Oracle9i for Linux*	Available now
Oracle9i for Microsoft Windows* Server 2003	Available now
Microsoft SQL Server 2003* Enterprise Edition (64-bit) for Microsoft Windows Server 2003	Available now
IBM DB2* UDB v.8.1 for Microsoft Windows Server 2003	Available now
IBM DB2 UDB v.8.1 for Linux	Available now

Planning Deployment of Your Itanium® 2-based Solutions – BUSINESS INTELLIGENCE

Deploying Industrial-Strength Business Intelligence Solutions

Running Business Intelligence solutions such as SAS v9.x on an Itanium® 2-based processor, one or several users can take advantage of multiple CPUs and huge memory bandwidth to run enormous amounts of data for analysis. Further, scaling to 4 or more CPUs can provide significantly better performance for threaded procedures. Running analysis with large datasets using SAS v9.x can benefit greatly from the wide-open data paths, high memory addressability, and high memory bandwidth offered by an Itanium 2-based system. At a load of 8 simultaneous jobs per CPU on an Itanium 2-based system, the average processor queue length remains at 1.0 tasks, indicating minimal competition for bandwidth.

Figure 6: SAS on Intel® Architecture System Configuration Matrix



Source: Sizing and Performance Considerations for Intel® Architecture-Based SAS* Solutions, December 2002

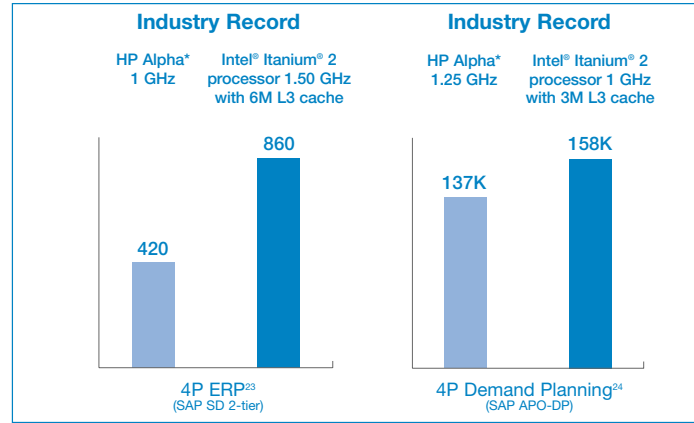
Planning Deployment of Your Itanium® 2-based Solutions – ERP

Enterprise Resource Planning (ERP)

Performance of demanding ERP applications such as the mySAP ERP system heavily depends on large memory support and high system bandwidth, both available with the Itanium® 2 processor with 6M of L3 cache. For example, the SAP Advanced Planner and Optimizer (APO), an extension of mySAP ERP, produces forecasts for parts by reading millions of data records from thousands of customers and hundreds of products, then running multiple batch jobs concurrently to yield the planning reports. The capability of the Intel Itanium 2 processor to address up to 1,024TB of physical memory allows ERP models such as this to scale up with virtually no ceiling, providing rapid data access and smooth analysis, while offering tremendous headroom for growth. World-class performance of SAP running on the Itanium® 2-based platform combined with Intel® volume economics, and solutions based on industry-standard building blocks, result in outstanding business value for ERP applications²³.

See footnotes on page 17.

Figure 7: Outstanding Performance of SAP on the Itanium® 2 Processor



For More Information



High-performance technology for the most data-intensive, business-critical and technical applications.

**For more information contact your Intel-based systems provider, or visit us on the Web at:
<http://www.intel.com/go/itanium2> or,
<http://www.intel.com/eBusiness/products/itanium>**

Footnotes

Pages 4 and 9

- ¹ HP rx5670 server, 121,065 tpmC at \$4.97/tpmC, 96,000 users, with four (4) Intel Itanium 2 processors, each at 1.50 GHz with 6M L3 cache, running Microsoft Windows Server 2003 Enterprise Edition and Microsoft SQL Server 2000 Enterprise Edition 64-bit, with 64GB RAM. TPC-C Availability date: Aug. 1, 2003. HP Superdome Server, 707,102.32 tpmC at \$9.13/tpmC, with sixty-four (64) Intel Itanium 2 processors, each at 1.50 GHz with 6M L3 cache, running Microsoft Windows Server 2003 Datacenter Edition (64-bit) and Microsoft SQL Server 2000 Enterprise Edition 64-bit, with 512GB RAM.
- ² Source: www.spec.org as of 4/21/03: Itanium® 2 processor results on HP Server rx5670 using four (4) Itanium® 2 processors, each at 1.50 GHz with 6M L3 cache, 24GB memory, HP-UX. Power 4+ result of 1988 on pSeries 630 Model 6C4 using four (4) Power 4+ processors, each at 1.45 GHz with 8GB cache (off chip), 32GB memory, AIX.
- ³ Source: Dell Computer for Itanium® 2 processor 6M results on a cluster of sixteen (16) Dell PowerEdge Servers, each with two (2) Itanium® 2 processors, each at 1.50 GHz with 6M L3 cache, 4GB RAM, Red Hat Linux AS 2.1. Source: http://www-1.ibm.com/servers/eserver/pseries/hardware/system_perf.pdf for Best RISC result on IBM eServer p690 with thirty-two (32) Power 4+ processors, each at 1.70 GHz.
- ⁴ 4P Itanium 2 processor 6M HP server rx5670 121K tpmC, \$4.97/Transaction (4/24/03) vs. 4P HP AlphaChip 21264C 1.25 GHz, AlphaServer ES45 Model 68/1250 56.3K tmpC, \$9.44/Transaction (8/5/02) (TPC.org).
- ⁵ IBM pSeries 690 32-way Power 4+ 1.70 GHz running Linpack and measuring 143.4K (<http://www.ibm.com>) 16x2 Dell Itanium 2-based PowerEdge servers running Itanium 2 processors, each at 1.50 GHz with 6M L3 cache (5/15/03).
- ⁶ *4P TPC-C (Database) performance scaling: HP rx5670 server, 121,065 tpmC at \$4.97/tpmC, 96,000 users, with four (4) Intel Itanium 2 processors, each at 1.50 GHz with 6M L3 cache, running Microsoft Windows Server 2003 Enterprise Edition and Microsoft SQL Server 2000 Enterprise Edition 64-bit, with 64GB RAM. TPC-C Availability date: Aug. 1, 2003 vs. HP rx5670 server, 87,741 tpmC at \$5.037/tpmC, 70,000 users, with four (4) Intel Itanium 2 processors, each at 1 GHz with 3M L3 cache, running Microsoft Windows Server.NET Enterprise Server 2003 and Microsoft SQL Server 2000 Enterprise Edition 64-bit, with 48GB RAM. TPC-C Availability date: Feb. 12, 2003. 38% scaling from Itanium 2 processor to Itanium 2 processor 6M.
2P SPECweb99_SSL (secure web serving) performance scaling: HP rx2600 server, 1873 Conforming Simultaneous Connections with two (2) Intel Itanium 2 processors, each at 1.50 GHz with 6M L3 cache, running HP-UX 11i v2, Zeus 4.2r2i, with 4GB of main memory, Test date: April 2003 vs. HP rx2600 server, 1230 Conforming Simultaneous Connections with two (2) Intel Itanium 2 processors, each at 1 GHz with 3M L3 cache, running HP-UX 11i v1.6, Zeus 4.2r2i, with 4GB of main memory, Test date: Feb. 2003. 52% scaling from Itanium 2 processor to Itanium 2 processor 6M.

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- ⁷ HP Superdome Server, 707,102.32 tpmC at \$9.13/tpmC, with sixty-four (64) Intel Itanium 2 processors, each at 1.50 GHz with 6M L3 cache, running Microsoft Windows Server 2003 Datacenter Edition (64-bit) and Microsoft SQL Server 2000 Enterprise Edition 64-bit, with 512GB RAM. TPC-C Availability date: Oct. 23, 2003.
- ⁸ Source: www.tpc.org: as of 5/20/03: HP Superdome Server, 707,102 tpmC, each at \$9.13/tpmC, with sixty-four (64) Intel Itanium 2 processors, each at 1.50 GHz with 6M L3 cache, running Microsoft Windows Server 2003 Datacenter Edition and Microsoft SQL Server 2000 Enterprise Edition 64-bit, with 512GB RAM. TPC-C Availability date: Oct. 23, 2003. Best RISC using HP 9000 Model Superdome Enterprise Server, 423,414 tpmC, \$15.64/tpmC, with sixty-four (64) HP PA-RISC 8700 processors, each at 875 MHz, running HP-UX 11.i 64-bit, Oracle9i Enterprise Database Server 9.2.0.1, 256GB RAM, Available: 8/26/2002.

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- ⁹ Source www.spec.org: Itanium® 2 processor results measured on HP Server rx2600 using Itanium® 2 processor 6M at 1.5 GHz, HP-UX operating system and submitted to SPEC. SPECint* is a trademark of SPEC*. Best RISC result of 1077 on eServer pSeries IBM* 690 using Power4+ 1.7 GHz processor.
- ¹⁰ Source www.spec.org: Itanium® 2 processor results measured on HP Server* rx2600 using Itanium® 2 processor 6M at 1.5 GHz, Red Hat* Linux* AS2.1 operating system and submitted to SPEC. SPECfp* is a trademark of SPEC*. Best RISC result of 1598 on eServer pSeries IBM* 690 using Power4+ 1.7 GHz processor.
- ¹¹ Source www.tpc.org: Itanium® 2 processor results of 121,065 tpmC and \$4.97/tpmC on HP Server* rx5670 using 4 Itanium® 2 processors 1.5 GHz with 6MB L3 cache, 64GB memory, Microsoft* Windows* Server 2003 Enterprise Edition and Microsoft SQL Server 2000 Enterprise Edition 64-bit, availability date 8/1/03. Best published RISC result of 56,375 tpmC and \$9.44/tpmC on HP AlphaServer using 4 ES45 processors 1.25 GHz, 32GB memory, availability 09/27/02.
- ¹² Source: www.sap.com/benchmark. Itanium® 2 processor results measured on HP Server* rx5670 using 4 Itanium® 2 processors 1.5 GHz with integrated 6MB L3 cache, 24GB of memory, HP-UX 11i, SAP rev 4.6 C, Oracle9i*. Best RISC result of 420 from www.sap.com/benchmark on AlphaServer ES45 1000 MHz.
- ¹³ Source: www.spec.org. Itanium® 2 processor result of 1873 on HP Server* rx2600 using 2 Itanium® 2 processors 1.5 GHz with 6MB L3 cache, 12GB memory, HP-UX, Zeus* 4.2r2, published 5/03. Best RISC result on Sun Fire* 280R result of 1008 with 2 UltraSPARC* III Cu processors at 1.2 GHz with 8MB L2 cache (off chip), Solaris* 9, Sun ONE Web Server* 6.0 SP5, 32GB RAM, published 4/03.
- ¹⁴ Source: www.spec.org for Best published RISC result of 96,377 on eServer pSeries IBM* 655 using 4 Power4+ 1.7 GHz processors, 16GB memory, AIX 5L V5.2 APAR IY43549, JVM J2RE 1.4.1 IBM AIX build cadev-20030410. Itanium® 2 processor 6M result of 116,466 measured by HP on HP Server* rx5670 using 4 Itanium® 2 processors 6M at 1.5 GHz with integrated 6MB L3 cache, 4GB of memory, HP-UX 11i v2.0, JVM Hotspot 1.4.2.00 and submitted to www.spec.org. SPECjbb* is a trademark of SPEC at www.spec.org.
- ¹⁵ Source: Dell Computer for Itanium® 2 processor 6M results on a cluster of 16 Dell* PowerEdge* Servers, each with 2 Itanium® 2 processors 6M at 1.5 GHz, 4GB RAM, Red Hat* Linux* AS 2.1. Source:http://www1.ibm.com/servers/eserver/pseries/hardware/system_perf.pdf for Best RISC result of 143.3GFLOPs on IBM eServer* p690 with 32 Power 4+ processors at 1.7 GHz.
- ¹⁶ Source: www.tpc.org: HP Superdome Server*, 707,102 tpmC at \$9.13/tpmC, with 64 Intel® Itanium® 2 processors, each at 1.5 GHz with 6MB of L3 cache, running Microsoft* Windows* Server 2003 Datacenter Edition and Microsoft* SQL Server* 2000 Enterprise Edition 64-bit, with 512 GB RAM. TPC-C Availability date: Oct. 23, 2003. Best single system RISC using IBM eServer* pSeries 690 Turbo 7040-681, 680,613 tpmC, \$11.13/tpmC, with thirty two (32) IBM Power4+* processors at 1.7 GHz, running IBM AIX* 5L V5.2, IBM DB2* UDB 8.1, 512GB RAM, Available: 11/08/2003.
- ¹⁷ Source www.spec.org: Itanium® 2 processor 6M results measured on HP Server* rx2600 using Itanium® 2 processor 6M at 1.5 GHz, HP-UX operating system and submitted to SPEC. SPECint* is a trademark of SPEC*. Itanium® 2 processor result of 810 measured on HP Server rx2600 using Itanium® 2 processor 1 GHz with integrated 3MB L3 cache, HP-UX operating system.
- ¹⁸ Source www.spec.org: Itanium® 2 processor 6M results measured on HP Server* rx2600 using Itanium® 2 processor 6M at 1.5 GHz, Red Hat* Linux* AS2.1 operating system and submitted to SPEC. SPECfp* is a trademark of SPEC*. Itanium® 2 processor result of 1431 on HP Server* rx5670 using Itanium® 2 processor 1 GHz with 3MB L3 cache, Red Hat* Linux* 2.1.
- ¹⁹ Source www.tpc.org. Itanium® 2 processor 6M results of 121,065 tpmC and \$4.97/tpmC on HP Server* rx5670 using 4 Itanium® 2 processors 1.5 GHz with 6MB L3 cache, 64GB memory, Microsoft* Windows* Server 2003 Enterprise Edition and Microsoft* SQL Server* 2000 Enterprise Edition 64-bit, availability date 8/1/03. Itanium® 2 processor results on HP Server rx5670, 87, 741 tpmC at \$5.03/tpmC, with 4 Itanium® 2 processors at 1 GHz with 3MB L3 cache, Microsoft* Windows* .NET Advanced Server, Microsoft SQL Server 2000 Enterprise Edition 64-bit, 48GB memory, availability date 2/12/03.

continued next page

- ²⁰ Source: www.sap.com/benchmark. Itanium® 2 processor 6M result measured on HP Server* rx5670 using 4 Itanium® 2 processors 1.5 GHz with integrated 6MB L3 cache, 24GB of memory, HP-UX 11i, SAP rev 4.6 C, Oracle9i*. Itanium® 2 processor result of 600 SD users on HP Server rx5670 using 4 Itanium® 2 processors 1 GHz with 3MB L3 cache, 16GB memory, Windows* Advanced Server LE 1.2, SAP rev 4.6 C, SQL Server Enterprise Edition 64-bit.
- ²¹ Source: www.spec.org. Itanium® 2 processor 6M result of 1873 on HP Server* rx2600 using 2 Itanium® 2 processors 1.5 GHz with 6MB L3 cache, 12GB memory, HP-UX, Zeus 4.2r2, published 5/03. Itanium® 2 processors result of 1230 on HP Server rx2600 using 2 Itanium® 2 processors 1 GHz with 3MB L3 cache, 8GB memory, HP-UX, availability 9/02.
- ²² Source: Dell Computer for Itanium® 2 processor 6M results on a cluster of 16 Dell* PowerEdge* Servers, each with 2 Itanium® 2 processors 6M at 1.5 GHz, 4GB RAM, Red Hat* Linux* AS 2.1. Itanium® 2 processor measurement of 101.77GFLOPs done on a NEC Server TX7/i9510 using 32 Itanium® 2 processors 1 GHz with integrated 3MB L3 cache, 128GB memory, Linux* OS.

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- ²³ Source: www.sap.com/benchmark. Itanium® 2 processor results measured on HP Server rx5670 using four (4) Itanium® 2 processors, each at 1.50 GHz with integrated 6M L3 cache, 24GB of memory, HP-UX 11i, SAP rev 4.6 C, Oracle 9i Best RISC result of 420 from www.sap.com/benchmark on AlphaServer ES45 1000 MHz.
- ²⁴ Source: www.sap.com. HP server rx5670* result of 157,555 planned characteristic combinations at aggregated level per hour, with four (4) Intel® Itanium® 2 processors, each at 1 GHz with 3M L3 cache, Microsoft Windows* Advanced Server LE v1.2, Microsoft SQL Server* 2000 Enterprise Edition 64 bit, 32GB RAM, published: 9/30/02. HP AlphaServer* ES45 result of 136,982, with four (4) Alphachip* 21264C, each at 1.25 GHz with 16M L2 cache, Tru64* Unix, Oracle9i*, 32GB RAM, published: 5/29/02.

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