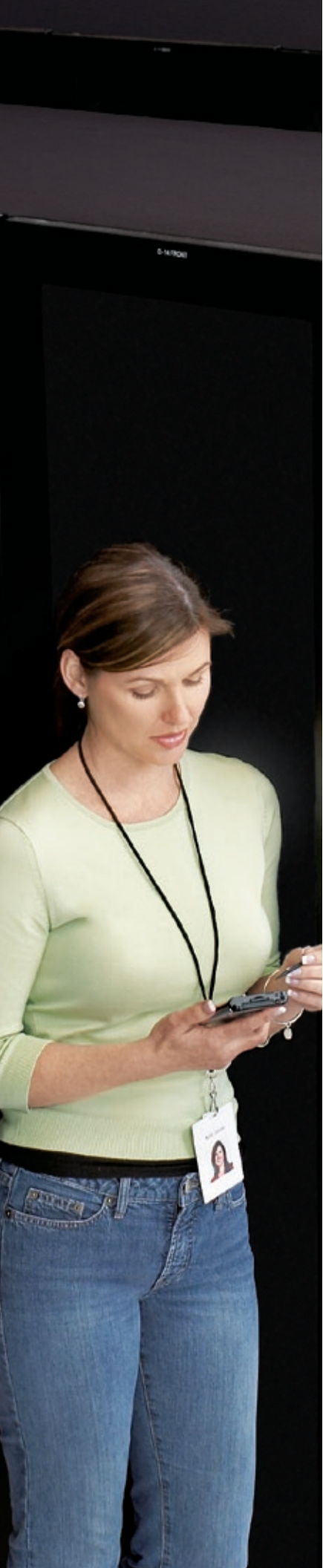




Quad-Core Intel® Xeon® Processor-based 3200/3210 Chipset Server Platforms

Entry-level server platforms with
outstanding dependability,
performance, and value





Trust your company to Intel's proven server technology

With nearly 40 million Intel® processor-based servers shipped since 1996 and a 21-year track record of proven performance worldwide, you know you can count on Intel to deliver superior quality and reliability. Today, that tradition of excellence continues with the introduction of server platforms based on the Intel® Xeon® processor 3000¹ sequence and Intel® 3200/3210 chipsets.

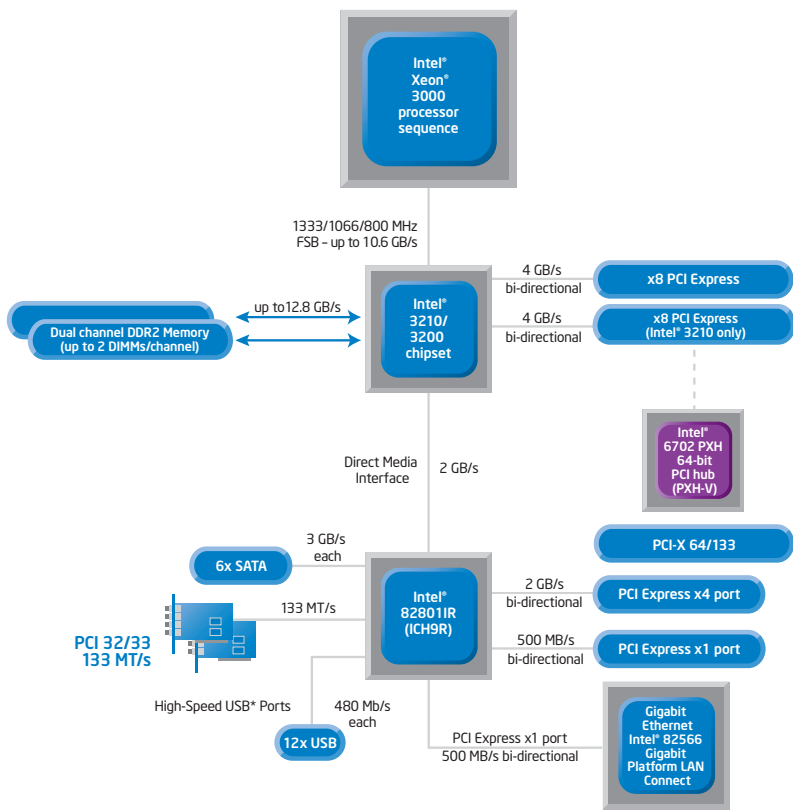


Designed with utility and versatility in mind, Intel® technology-based entry-level servers give you the key features needed to support and grow your business. Entry-level servers are ideal for running server applications such as file and print sharing, low-volume e-mail, web serving, and business automation applications. For value-conscious business users, these entry-level servers deliver impressive computing performance with compromising speed, affordability or system reliability – a substantial improvement over desktop PCs.

Entry-level server platforms based on the Intel Xeon processor 3000 sequence and the Intel 3200/3210 chipsets offer cost-effective features and are ideally suited for small businesses looking for their first server. These platforms are engineered to handle your computing workloads while providing reliable and trouble-free operation, ensuring that your operational needs are met at every stage of your business growth.

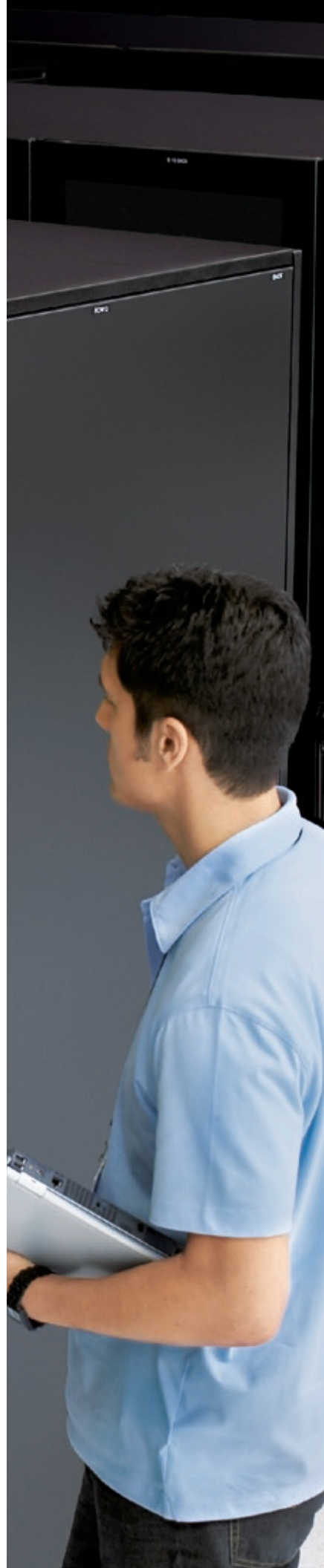
Server Platform Architecture

Intel® Xeon® processor 3000 sequence and Intel® 3200/3210 chipsets



Platform Technologies

- Intel® Virtualization Technology for Directed I/O
- Intel® Matrix Storage Technology
- Enhanced Intel SpeedStep® Technology
- Intel® 64 Architecture



Cost-effective solutions to grow your business

Whether your business is starting up or expanding, entry-level server platforms based on Intel® Xeon® processors and Intel 3200/3210 chipsets can help you do more for your business than ever before. These platforms boost productivity by providing greater reliability and connectivity with your customers, supplier, and employees. With the ability to choose from dual- or quad-core Intel processors, you can get the performance you need at an affordable price.

Cost-effective, personal supercomputing

Entry-level, dual-core Intel server platforms are ideal for building small, cost-effective HPC clusters that create high performance, personal supercomputing solutions and workgroup clusters. Dual-core, 64-bit computing, up to 8 GB of high-speed DDR2 memory, and gigabit Ethernet LAN connectivity enable rapid resolution the large, complex problems found in technical computing.

These new platforms provide energy-efficient performance, so you get high-end performance for thin or teach nodes at low power levels, keeping the costs of running your personal cluster low.

Dual- and Quad-Core Intel Xeon processor 3000 sequence-based servers give you Intel server technologies for reliability, data protection, and easy management. You can solve tough problems for less cost than traditional cluster technologies with the dependability and integrity of Intel's 20-year track record of delivering reliable, high-performance solutions.

Platforms based on the Intel 3200/3210 chipsets support the Dual- and Quad-Core Intel Xeon processor 3000 sequence. Intel Xeon processor 3000 sequence are based on Intel Core micro-architecture, with Intel® 64 architecture² and up to a 1333 MHz front-side bus for dual-core processors. These platforms deliver outstanding performance for today's business applications, with capabilities to run a broad range of 32-bit and 64-bit applications, with plenty of headroom for growth for tomorrow.

Save on power costs with Enhanced Intel SpeedStep® Technology

Enhanced Intel SpeedStep® technology, a feature of Intel Xeon processor 3000 sequence, allows the server to dynamically adjust processor voltage and core frequency while maintaining application performance, which can result in decreased average power consumption and decreased average heat production.

Improve security and reduce virus-related downtime and repairs

Today, most business are appropriately concerned about the decirity of their business information. Security issues come in many forms: viruses, worms, and Trojan horses. These risks increase your IT resource demands and, in some cases, could destroy data.

One type of invasion is called a "buffer overflow" attack. In a typical attack, a malicious worm creates a flood of code that overwhelms the processor, allowing to worm to propagate itself to the network and other computers. Intel® Execute Disable Bit functionality, a feature of Intel Xeon processor 3000 sequence, can prevent many types of buffer overflow attacks by limiting application code execution to only specific areas of memory. This, when combined with a supporting operating system, helps stop the worm in its track and minimizes data loss and large-scale system infection.

Capitalize on power-efficient performance

Power-efficient performance designed into the platform to reduce operating costs while delivering higher performance than previous-generation Intel® Pentium® processor-based server platforms. Lower power consumption can also result in slower fans and quieter servers.

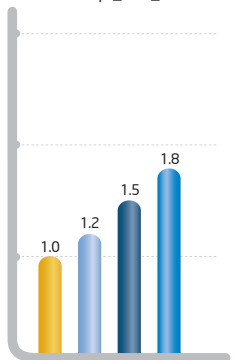
For more information on performance, please visit:

www.intel.com/performance



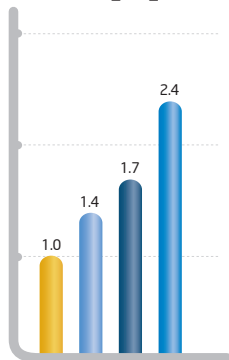
Compute-Intensive Throughput

Technical Computing
Est. SPECfp*_rate_base2006



■ Intel® Pentium® D Processor 945
■ Intel® Xeon® Processor 3070
■ Intel® Xeon® Processor 3085
■ Intel® Xeon® Processor X3230

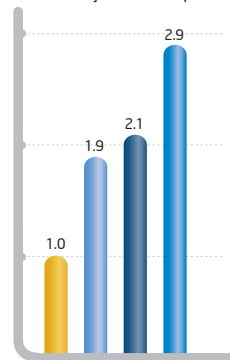
General Purpose
Est. SPECint*_rate_base2006



■ Intel® Pentium® D Processor 945
■ Intel® Xeon® Processor 3070
■ Intel® Xeon® Processor 3085
■ Intel® Xeon® Processor X3230

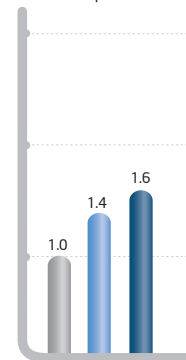
General-Purpose Server

Java® Application Server
SPECjbb* 2005 bops



■ Intel® Pentium® D Processor 950
■ Intel® Xeon® Processor 3070
■ Intel® Xeon® Processor 3085
■ Intel® Xeon® Processor X3230

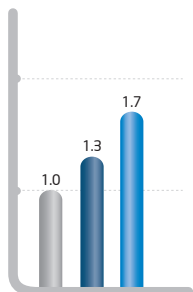
Energy Efficiency
Dual-Core performance/watt



■ AMD Opteron® Processor 1220SE
■ Intel® Xeon® Processor 3070
■ Intel® Xeon® Processor 3085

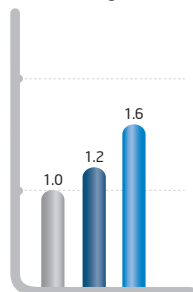
High-Performance Computing (HPC) Server

Fluent® 6.3.33
8/9 workloads



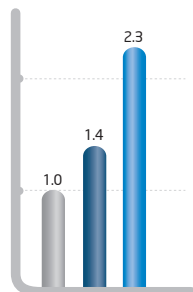
■ AMD Opteron® Processor 1220SE
■ Intel® Xeon® Processor 3085
■ Intel® Xeon® Processor X3230

LS-Dyna® mpp971
3 cars @ 30ms



■ AMD Opteron® Processor 1220SE
■ Intel® Xeon® Processor 3085
■ Intel® Xeon® Processor X3230

Amber® 9
8 workloads



■ AMD Opteron® Processor 1220SE
■ Intel® Xeon® Processor 3085
■ Intel® Xeon® Processor X3230

For more information on performance, please visit www.intel.com/performance

The ideal entry-level server

Our entry-level server platforms with quad-core and dual-core processors and the Intel 3200/3210 chipsets are ideal for value-conscious organizations looking for their first server or small HPC cluster with a close eye on the budget. These platforms offer industry-leading performance coupled with Intel reliability to help drive your big ideas non-stop, while providing low-cost, dependable and efficient performance. Our entry-level server platforms integrate the most advanced technologies:

Intel® Virtualization Technology for Directed I/O

Intel® Virtualization Technology³ provides hardware assist to virtualization software, enabling your servers to support both 32-bit and 64-bit operating systems and applications on the same server. Implementing virtualization enables businesses to get most out of server investment by running more applications on each server.

Intel® Matrix Storage Technology

Intel® Matrix Storage Technology with integrated RAID 0, 1, 5 or 10 accelerates data access to support high user productivity, and protects business operations by allowing recovery of data in the event of a hard drive failure. Intel Matrix Storage Technology is built into the Intel® 82801 IR I/O controller hub (ICH9R). The ICH9R also supports Serial ATA (SATA) at 3 GB/s, with Native Command Queuing for high-speed disk access in a high-performance, low-cost server platform.

DDR2 memory

Intel 3200/3210 chipsets feature higher speed DDR2 memory (up to 800 MHz) than previous-generation platforms to maximize system bandwidth and performance. Up to 8 GB of memory capacity helps eliminate slowdowns from memory bottlenecks.

PCI Express*

PCI Express* today's mainstream I/O technology, helps enable fast I/O transactions to assist peripherals to keep up with our high-performance processors and chipsets today with built-in scalability for the future. The Intel 3210 chipset offers an additional PCI Express port for even more expansion possibilities.

Data Protection

Platforms based on the Intel 3200/3210 chipsets support Error Correction Code memory for a high level of data integrity, reliability, and system uptime. ECC can detect multiple-bit memory errors and locate and correct single bit errors to keep business applications running smoothly and prevent stealth data corruption.

Intel® 64 Architecture

All of the processors supported with the Intel 3200/3210 chipsets also support Intel 64 architecture. It allows servers to handle larger data sets, more complex applications, and larger amounts of memory. In addition, Intel 64 architecture allows you to run both 32- and 64-bit applications, helping to ensure the smooth migration of your business to 64-bit computing.

Platform Feature	User Benefit
Quad-Core Intel® Xeon® 3000 ¹ processor-based 3200/3210 chipsets	<ul style="list-style-type: none"> ▪ Based on Intel Core microarchitecture ▪ 64-bit, quad-core computing with large 8 MB on-die cache ▪ 1066 MHz front-side bus
Dual-Core Intel® Xeon® processor 3000 sequence	<ul style="list-style-type: none"> ▪ Based on Intel Core microarchitecture ▪ Breakthrough performance at up to 3 times the performance versus previous-generation single-core processors ▪ Enhanced power-efficient technologies for over 3 times performance/watt⁵ ▪ New 1333 and 1066 MHz front-side bus
Intel® Core™ microarchitecture	<ul style="list-style-type: none"> ▪ Better performance on multiple application types and user environments at a substantially reduced power envelope
Intel® Virtualization Technology ³ for Directed I/O	<ul style="list-style-type: none"> ▪ Enables more operating systems and software to run in today's virtual environments ▪ Developed with virtualization software providers to enable greater functionality and compatibility compared to non-hardware-assisted virtual environments
Intel® Matrix Storage Technology	<ul style="list-style-type: none"> ▪ Accelerates system performance ▪ Protects against hard drive failure and loss of critical business data
Enhanced Intel SpeedStep® Technology	<ul style="list-style-type: none"> ▪ Dynamically adjusts processor voltage and frequency to meet application performance demands while minimizing power consumption and thermal dissipation
Intel® 64 Architecture ²	<ul style="list-style-type: none"> ▪ Enables extended memory addressability for server applications
PCI Express* serial I/O	<ul style="list-style-type: none"> ▪ Industry-standard serial I/O capable of up to 4 GB/s peak bandwidth with x8 link
Enhanced reliability and manageability	<ul style="list-style-type: none"> ▪ Memory Error Correcting Code (ECC) memory that checks and corrects system memory errors ▪ Execute disable bit protects the system from viruses



Server and HPC Performance

• **Benchmark Description for SPECcpu*2006 suite (SPECint*_rate_base2006 & SPECfp*_rate_base2006):** SPEC CPU2006 is the industry-adopted, CPU-intensive benchmark which stresses the system processor(s), memory subsystem, and compiler. Derived from 29 real user applications, CPU2006 provides a comparison across the widest practical range of hardware reporting a geometric mean ratio score on a baseline compiled binary.

• **Best 1-socket server SPECint*_rate_base2006* (score) benchmark results as of 15 Oct 2007:**

- Intel® Pentium® D Processor platform (score 20.6): Fujitsu-Siemens PRIMERGY* RX100S4 using Intel Pentium D processor 945 (3.40 GHz, 2x2 MB L2 cache, 800 MHz bus), 8 GB (4x 2 GB DDR2 PC4200E, 2-rank, CL4, ECC), 64-bit SuSE LINUX* Enterprise Server 10 2.6.16.21-08smp, Intel® C++ Compiler for IA32/EM64T version 9.1. Source: <http://www.spec.org/cpu2006/results/res2007q3/cpu2006-20070619-01287.html>.
- Dual-Core Intel® Xeon® Processor 3070 platform (score 29.3): Fujitsu-Siemens PRIMERGY* RX100S4 using Intel Xeon processor 3070 (2.66 GHz, 4 MB L2 cache, 1066 MHz bus), 8 GB (4x 2 GB DDR2 PC4200E, 2-rank, CL4, ECC), 64-bit SuSE LINUX* Enterprise Server 10 2.6.16.21-08smp, Intel® C++ Compiler for IA32/EM64T version 9.1. Source: <http://www.spec.org/cpu2006/results/res2007q3/cpu2006-20070514-01066.html>.
- Dual-Core Intel® Xeon® Processor 3085 platform (score 35.3): Intel® SR1530HSH using Intel Xeon processor 3085 (3.00 GHz, 4 MB L2 cache, 1333 MHz bus), 8 GB (4x 2GB DDR2-800), SUSE Linux10* SP1 RC5, Intel® C++ Compiler version 10.1. Source: Intel internal measurements TR#824.
- Quad-Core Intel® Xeon® Processor X3230 platform (score 48.5): Intel® SR1530HSH using Intel Xeon processor X3230 (2.66 GHz, 8 MB L2 cache, 1066 MHz bus), 8 GB (4x 2GB DDR2-800), SUSE Linux10* SP1 RC5, Intel® C++ Compiler version 10.1. Source: Intel internal measurements TR#824.

• **Best 1-socket server SPECfp*_rate_base2006* (score) benchmark results as of 15 Oct 2007:**

- Intel® Pentium® D Processor platform (score 19.8): Fujitsu-Siemens PRIMERGY* RX100S4 using Intel Pentium D processor 945 (3.40 GHz, 2x2 MB L2 cache, 800 MHz bus), 8 GB (4x 2 GB DDR2 PC4200E, 2-rank, CL4, ECC), 64-bit SuSE LINUX* Enterprise Server 10 2.6.16.21-08smp, Intel® C++ Compiler for IA32/EM64T version 9.1. Source: <http://www.spec.org/cpu2006/results/res2007q3/cpu2006-20070619-01288.html>.
- Dual-Core Intel® Xeon® Processor 3070 platform (score 25.3): Acer Altos* G330 using Intel Xeon processor 3070 (2.66 GHz, 4 MB L2 cache, 1066 MHz bus), 4 GB (4x 1 GB DDR2-667, CL5, ECC), 64-bit SuSE LINUX* Enterprise Server 10 2.6.16.21-08smp, Intel® C++ Compiler for IA32/EM64T version 9.1. Source: <http://www.spec.org/cpu2006/results/res2007q2/cpu2006-20070429-00964.html>.
- Dual-Core Intel® Xeon® Processor 3085 platform (score 29.7): Intel® SR1530HSH using Intel Xeon processor 3085 (3.00 GHz, 4 MB L2 cache, 1333 MHz bus), 8 GB (4x 2GB DDR2-800), SUSE Linux10 SP1 RC5, Intel® C++ Compiler and Fortran Compiler version 10.1. Source: Intel internal measurements TR#824.
- Quad-Core Intel® Xeon® Processor X3230 platform (score 35.2): Intel® SR1530HSH using Intel Xeon processor X3230 (2.66 GHz, 8 MB L2 cache, 1066 MHz bus), 8 GB (4x 2GB DDR2-800), SUSE Linux10 SP1 RC5, Intel® C++ Compiler and Fortran Compiler 10.1. Source: Intel internal measurements TR#824.

• **Benchmark Description for SPECjbb*2005:** SPEC Java Business Benchmark 2005 (jbb2005). Written in Java, this multi-threaded benchmark emulates an order processing environment in a company with multiple warehouses serving multiple customers. Measures average transaction throughput of a heavily loaded server. Performance reported in Business Operations per Second (BOPS).

• **Best 1-socket server SPECjbb2005* (bops) benchmark results as of 15 Oct 2007:**

- Intel® Pentium® D Processor platform (score 34,111): Fujitsu-Siemens PRIMERGY* TX150S4 using Intel® Pentium® D Processor 950 (3.40 GHz, 800 MHz bus, 2x 2 MB L2 cache), 8192 MB RAM, Microsoft Windows* Server 2003 Enterprise x64-Edition SP1 (64-bit), BEA JRockit* P26.0.0-35-59328-1.5.0_06-20060321-1333-win-x86_64. Source: <http://www.spec.org/osg/jbb2005/results/res2006q2/jbb2005-20060425-00108.html>.
- Intel® Xeon® Processor platform (3070 score 65,656/avg sys watts 132; 3085 score 73,275/avg sys watts 131; X3230 score 97,434/avg sys watts 196): Intel® Garlow* 3210 Chipset-based server platform BIOS 8/31/2007 using Intel® Xeon® Processor 3070 (2.66 GHz, 4 MB cache, 1066 FSB), 3085 (3.00 GHz, 4 MB cache, 1333 FSB), and X3230 (2.66 GHz, 8 MB cache, 1066 FSB), 4x 2 GB DDR2-800 ECC CL5 DIMMs, 120 GB SATA HDD, Microsoft Windows* Server 2003 Enterprise x64-Edition SP1 (64-bit), SPECjbb* V1.07, BEA JRockit* P274.0. Source: Intel internal measurements TR#825.

– AMD Opteron* Processor platform (score 58,189/avg sys watts 162): Hewlett-Packard ML115G1 using AMD Opteron* Processor 1220SE (2.80 GHz), 4x 2 GB DDR2-800 ECC CL5 DIMMs, 120 GB SATA HDD, Microsoft Windows* Server 2003 Enterprise x64-Edition SP1 (64-bit), SPECjbb* V1.07, BEA JRockit* P274.0. Source: Intel internal measurements TR#825.

• **Benchmark Description for Fluent*:** Fluent is a commercial engineering application used to model computational fluid dynamics. The benchmark consists of 9 standard workloads organized into small, medium and large models. These comparisons use all but the largest of the models which does not fit into the 8 GB of memory available on the platforms. The Rating, the default Fluent metric, was used in calculating the ratio of the platforms by taking a geometric mean of the 8 workload ratings measured.

• **Best 1-socket Fluent* version 6.3.33 (8 of the 9 standard, jobs/day) benchmark results as of 15 Oct 2007:**

- Intel® Xeon® Processor platform (3085 score 1611.1/avg sys watts 131; X3230 score 22477/avg sys watts 192): Intel® Garlow* 3210 Chipset-based server platform BIOS 8/31/2007 using Intel® Xeon® Processor 3085 (3.00 GHz, 4 MB cache, 1333 FSB) and X3230 (2.66 GHz, 8 MB cache, 1066 FSB), 4x 2 GB DDR2-667 ECC CL5 DIMMs, 120 GB SATA HDD, Red Hat Enterprise LINUX* 64-bit. Source: Intel internal measurements TR#823.
- AMD Opteron* Processor platform (score 1287.2/avg sys watts 164): Hewlett-Packard ML115G1 using AMD Opteron* Processor 1220SE (2.80 GHz), 4x 2 GB DDR2-667 ECC CL5 DIMMs, 120 GB SATA HDD, Red Hat Enterprise LINUX* 64-bit. Source: Intel internal measurements TR#823.

• **Benchmark Description for LS-Dyna*:** LS-DYNA is a commercial engineering application used in finite element analysis such as a car collision. The workload used in these comparisons is called 3 Vehicle Collision and is publicly available from www.topcrunch.org/. The metric for the benchmark is elapsed time in seconds.

• **Best 1-socket LS-Dyna* version mpp971.7600.2.398 (3 cars@30ms, jobs/day) benchmark results as of 15 Oct 2007:**

- Intel® Xeon® Processor platform (3085 score 6.63/avg sys watts 136; X3230 score 8.96/avg sys watts 194): Intel® Garlow* 3210 Chipset-based server platform BIOS 8/31/2007 using Intel® Xeon® Processor 3085 (3.00 GHz, 4 MB cache, 1333 FSB) and X3230 (2.66 GHz, 8 MB cache, 1066 FSB), 4x 2 GB DDR2-667 ECC CL5 DIMMs, 120 GB SATA HDD, Red Hat Enterprise LINUX* 64-bit. Source: Intel internal measurements TR#823.
- AMD Opteron* Processor platform (score 5.67/avg sys watts 167): Hewlett-Packard ML115G1 using AMD Opteron* Processor 1220SE (2.80 GHz), 4x 2 GB DDR2-667 ECC CL5 DIMMs, 120 GB SATA HDD, Red Hat Enterprise LINUX* 64-bit. Source: Intel internal measurements TR#823.

• **Benchmark Description for Amber*:** a package of molecular simulation programs. The workload measures the number of problems solved per day (PS) using eight standard molecular dynamic simulations. See <http://amber.ch.ic.ac.uk/amber8/bench1.html> for more information.

• **Best 1-socket Amber* version 9 (8 standard, PS/day) benchmark results as of 15 Oct 2007:**

- Intel® Xeon® Processor platform (3085 score 305.5/avg sys watts 134; X3230 score 491.9/avg sys watts 204): Intel® Garlow* 3210 Chipset-based server platform BIOS 8/31/2007 using Intel® Xeon® Processor 3085 (3.00 GHz, 4 MB cache, 1333 FSB) and X3230 (2.66 GHz, 8 MB cache, 1066 FSB), 4x 2 GB DDR2-667 ECC CL5 DIMMs, 120 GB SATA HDD, Red Hat Enterprise LINUX* 64-bit. Source: Intel internal measurements TR#823.
- AMD Opteron* Processor platform (score 212.8/avg sys watts 164): Hewlett-Packard ML115G1 using AMD Opteron* Processor 1220SE (2.80 GHz), 4x 2 GB DDR2-667 ECC CL5 DIMMs, 120 GB SATA HDD, Red Hat Enterprise LINUX* 64-bit. Source: Intel internal measurements TR#823.

SPECint*2006 and SPECfp*2006 benchmark tests reflect the performance of the microprocessor, memory architecture and compiler of a computer system on compute-intensive, 32-bit or 64-bit applications. SPEC benchmark tests results for Intel microprocessors are determined using particular, well-configured systems. These results may or may not reflect the relative performance of Intel microprocessor in systems with different hardware or software designs or configurations (including compilers). Buyers should consult other sources of information, including system benchmarks, to evaluate the performance of systems they are considering purchasing. SPECcpu*2006 suite including SPECint2006 and SPECfp2006 are registered trademarks of the Standard Performance Evaluation Corporation (SPEC).

¹ Intel processor numbers are not a measure of performance. Processor numbers differentiate features within each processor series, not across different processor sequences. See http://www.intel.com/products/processor_number for details.

² 64-bit computing on Intel architecture requires a computer system with a processor, chipset, BIOS, operating system, device drivers and applications enabled for Intel® 64 architecture. Performance will vary depending on your hardware and software configurations. Consult with your system vendor for more information.

³ Intel Virtualization Technology requires a computer system with a processor, chipset, BIOS, virtual machine monitor (VMM) and applications enabled for virtualization technology. Functionality, performance or other virtualization technology benefits will vary depending on hardware and software configurations. Virtualization technology-enabled BIOS and VMM applications are currently in development.

Performance tests and ratings are measured using specific computer systems and/or components and reflect the approximate performance of Intel products as measured by those tests. Any difference in system hardware or software design or configuration may affect actual performance. Buyers should consult other sources of information to evaluate the performance of systems or components they are considering purchasing. For more information on performance tests and on the performance of Intel products, visit <http://www.intel.com/performance/resources/limits.htm> or call (U.S.) 1-800-628-8686 or 1-916-356-3104.

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Relative performance for each benchmark is calculated by taking the actual benchmark result for the first platform tested and assigning it a value of 1.0 as a baseline. Relative performance for the remaining platforms tested was calculated by dividing the actual benchmark result for the baseline platform into each of the specific benchmark results of each of the other platforms and assigning them a relative performance number that correlates with the performance improvements reported.

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