



Quad-Core Intel® Xeon® Processor 3200 Series

Energy-Efficient Quad-Core Processors for 1-way Servers



Intel's newest quad-core Intel® Xeon® processor 3200¹ series for servers delivers new levels of energy-efficient performance. The quad-core Intel Xeon processor 3200 series is based on Intel® Core™ microarchitecture and delivers industry leading performance over previous generations of Intel processors. This state-of-the-art, multi-core optimized microarchitecture delivers a number of new and innovative features that are setting new standards for energy-efficient performance.

The quad-core Intel Xeon processor 3200 series is ideal for small business owners and buyers looking for ways to grow business and manage operations more effectively and efficiently.

The quad-core Intel Xeon processor 3200 series can also be used for building small, cost-effective High Performance Computing (HPC) clusters that create high-performance, personal supercomputing solutions or work-group clusters.

With nearly 40 million Intel® processor-based servers shipped since 1996, and a 20-year track record of delivering proven performance worldwide, you can count on Intel to deliver superior quality and reliability to drive your business forward.





Energy-Efficient Servers Deliver Industry Leading Performance

The new Intel Core microarchitecture is an innovative microarchitecture, enabling you to build industry leading dual-core performance and performance-per-watt server platforms that are both economical and dependable, and well-suited for small business, basic enterprise applications, and low-cost HPC applications. This new microarchitecture delivers a number of new and innovative features:

- **Intel® Wide Dynamic Execution**, enabling delivery of more instructions per clock cycle to improve execution time and energy efficiency.
- **Intel® Intelligent Power Capability**, designed to deliver more energy-efficient performance.
- **Intel® Smart Memory Access**, improving system performance by optimizing the use of the available data bandwidth.
- **Intel® Advanced Smart Cache**, providing a higher-performance, more efficient cache subsystem. Optimized for multi-core processors.
- **Intel® I/O Advanced Digital Media Boost**, accelerating a broad range of applications, including video, speech, image, photo processing, encryption, financial, engineering, and scientific applications.

Find out more about dual- or quad-core Intel® Xeon® processors at www.intel.com/server

Intel® Xeon® Processor 3200 Series Overview

Entry-level servers based on the quad-core Intel® Xeon® processor 3200 series deliver energy-efficient performance, quality, reliability, and versatility, and offer cost-effective features needed to support and grow your business.

Features	Benefits
Quad-core processing	▪ Significant performance headroom, especially for multi-threaded applications, helps boost system utilization through virtualization and application responsiveness.
Intel® Core™ microarchitecture	▪ Delivers better performance on multiple application types and user environments at a substantially reduced power envelope.
105 W TDP**	▪ Significantly lower power (compared to previous generation) helps improve data center density and power/thermal operating costs.
8 MB* shared L2 cache	▪ Increases efficiency of L2 cache-to-processor data transfers, maximizing main memory to processor bandwidth and reducing latency.
1066 MHz system bus	▪ Faster system bus speeds than previous generations for increased throughput.
Intel® Virtualization Technology ²	▪ New processor hardware enhancements that support software-based virtualization, enabling migration of more environments – including 64-bit OSs and applications – to virtual environments.
Intel® 64 Architecture ³	▪ Flexibility for 64-bit and 32-bit applications and operating systems. The Instruction Set Architecture (ISA) is Intel 64 (formerly known as Intel® EM64T), which allows both 32-bit and 64-bit applications to run. Details on Intel's various ISAs can be found at www.intel.com and in the associated programming manuals for Intel® processors.
Enhanced Intel SpeedStep® technology (EIST)	▪ Helps reduce average system power consumption and potentially improves system acoustics.

*Features 4 MB Smart Cache per core pair

**TDP = Thermal Design Power

What is the 3200 Series?

At Intel, our processor series numbers help differentiate processor features beyond front-side bus speed and brand name. New advancements in our processors—other than bus speed—like architecture, cache, power dissipation, and embedded Intel® technologies, contribute significantly to performance, power efficiency, and other end-user benefits. Our processor sequences will help developers decide on the best processor for their platform designs, and help end-users understand all the characteristics that contribute to their overall experience.

Intel offers four processor number sequences for server applications

Processor Sequence ¹	Used For
Intel® Xeon® processor 3000 sequence featuring the Dual-Core Intel® Xeon® processor 3000 series and the Quad-Core Intel® Xeon® processor 3200 series	Economical, dependable, general-purpose 1-way servers well-suited for small business, the basic enterprise server needs, and low-cost HPC
Intel® Xeon® processor 5000 sequence	Volume DP servers/workstations based on the Intel® Xeon® processor
Intel® Xeon® processor 7000 sequence	Greater scalability than DP platforms with MP enterprise servers based on the Intel® Xeon® processor MP
Intel® Itanium® 2 processor 9000 sequence	Maximum performance and scalability for RISC replacement usage

Quad-Core Intel® Xeon® Processor 3200 Series

Processor Number ¹	Speed	Cache Size	Front-Side Bus	Total Dissipated Power	Intel® Virtualization Technology ²	Intel® 64 ³	Intel® EIST	Package
Quad-Core Intel® Xeon® processor X3220	2.40 GHz	8 MB**	1066 MHz ⁵	105 W	Yes	Yes	Yes	LGA 775
Quad-Core Intel® Xeon® processor X3210	2.13 GHz	8 MB**	1066 MHz	105 W	Yes	Yes	Yes	LGA 775

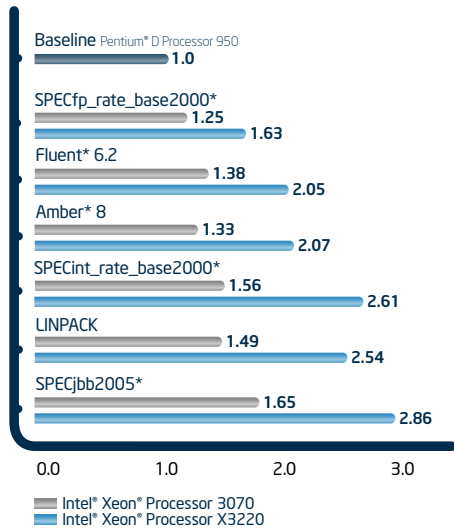
**Features 4 MB Smart Cache per core pair



Superior Performance and Performance-Per-Watt with New Quad-Core Intel® Xeon® Processor 3200 Series

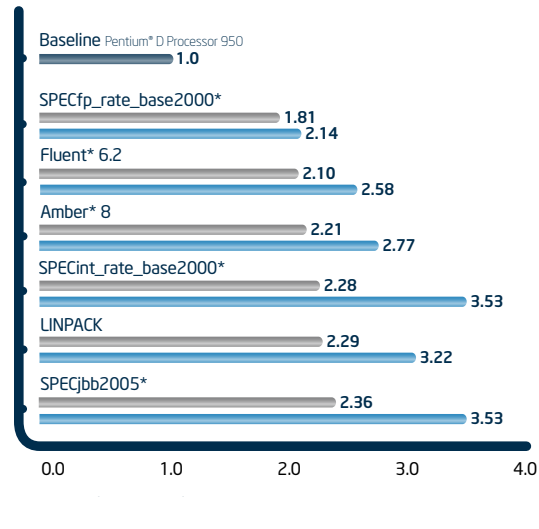
Server and HPC Performance

Quad-Core Intel® Xeon® Processor X3220



Performance-Per-Watt Comparison

Quad-Core Intel® Xeon® Processor X3220



Benchmarks for Server and HPC Performance and Performance-Per-System-Watt Details:

Xeon X3220 ~ Quad-Core Intel® Xeon® processor X3220 (2.40 GHz); Xeon 3070 ~ Dual-Core Intel® Xeon® processor 3070 (2.67 GHz); Pentium D 950 ~ Intel® Pentium® D processor 950 (3.40 GHz)

Performance and performance-per-system-watt comparisons using the typical server benchmark on quad-core Intel® Xeon® processor vs. dual-core vs. Pentium® D processors as of 12 December 2006. Actual performance may vary. For the latest performance, see http://www.intel.com/performance/server/entry_level.

System Configurations:

Benchmark Description for LINPACK: LINPACK is a floating-point benchmark that solves a dense system of linear equations in parallel. The metric produced is GFLOPS or billions of floating point operations per second where higher bars indicate better performance. The benchmark is used to determine the world's fastest computers at the Web site <http://www.top500.org>.

Quad-Core Intel® Xeon® processor X3220-based platform details: Intel preproduction customer reference board "Whitney A1" BIOS EXTWM212 with Intel Xeon processor X3220 (2.40 GHz with 8 M L2 cache, 1066 MHz system bus), 4 GB (4x1 GB) 667 MHz DDR2 MT18HTF12872AY CL5 memory; HW Prefetch Enabled. Red Hat Enterprise AS Linux 4, Update 3, Intel 64, LINPACK version 3.0.3. Source: TR#671.

Intel® Xeon® processor 3070-based platform details: Intel preproduction customer reference board "Whitney A1" BIOS EXTWM212 with Intel® Xeon® processor 3070 (2.66 GHz with 4 M L2 cache, 1066 MHz system bus), 4 GB (4x1 GB) 667 MHz DDR2 MT18HTF12872AY CL5 memory; HW Prefetch Enabled. Red Hat Enterprise AS Linux 4, Update 3, Intel 64, LINPACK version 3.0.3. Source: TR#671.

Intel® Pentium® D processor 950-based platform details: Intel preproduction customer reference board "Whitney A1" BIOS EXTWM211 with Intel Pentium D processor 950 (3.40 GHz with 2x 2 M L2 cache, 800 MHz system bus), 4 GB (4x1 GB) 533 MHz DDR2 M391T2593B0 CL4 memory; Red Hat Enterprise AS Linux 4, Update 3, Intel 64, LINPACK version 3.0.1. Source: TR#625.

Benchmark Description for Fluent®: Fluid flow problem solver based on a numerical technique called computational fluid dynamics (CFD). There are nine standard benchmarks, of which eight are used for the geometric mean rating ("L3" not tested) where higher bars indicate better performance.

Quad-Core Intel Xeon processor X3220-based platform details: Intel preproduction customer reference board "Whitney A1" BIOS EXTWM212 with Intel Xeon processor X3220 (2.40 GHz with 8 M L2 cache, 1066 MHz system bus), 4 GB (4x1 GB) 667 MHz DDR2 MT18HTF12872AY CL5 memory; HW Prefetch Enabled. Red Hat Enterprise AS Linux 4, Update 3, Intel 64, Fluent version 6.2. Source: TR#673.

Intel Xeon processor 3070-based platform details: Intel preproduction customer reference board "Whitney A1" BIOS EXTWM212 with Intel Xeon processor 3070 (2.66 GHz with 4 M L2 cache, 1066 MHz system bus), 4 GB (4x1 GB) 667 MHz DDR2 MT18HTF12872AY CL5 memory; HW Prefetch Enabled. Red Hat Enterprise AS Linux 4, Update 3, Intel 64, Fluent version 6.2. Source: TR#626.

Intel Pentium D processor 950-based platform details: Intel SR1475NH1-E E7230 chipset server with Intel Pentium D processor 950 (3.40 GHz with 2x 2 M L2 cache, 800 MHz system bus), 4 GB (4x1 GB) 533 MHz DDR2 M391T2593B0 CL4 memory; Red Hat Enterprise AS Linux 4, Update 3, Intel 64, Fluent version 6.2. Source: TR#626.

Benchmark Description for Amber®: Amber is a package of molecular modeling/simulation programs. Eight standard workloads measured as a rating where higher bars indicate better performance.

Quad-Core Intel Xeon processor X3220-based platform details: Intel preproduction customer reference board "Whitney A1" BIOS EXTWM212 with Intel Xeon processor X3220 (2.40 GHz with 8 M L2 cache, 1066 MHz system bus), 4 GB (4x1 GB) 667 MHz DDR2 MT18HTF12872AY CL5 memory; HW Prefetch Enabled. Red Hat Enterprise AS Linux 4, Update 3, Intel 64, Amber version 8. Source: TR#673.

Intel Xeon processor 3070-based platform details: Intel preproduction customer reference board "Whitney A1" BIOS EXTWM212 with Intel Xeon processor 3070 (2.66 GHz with 4 M L2 cache, 1066 MHz system bus), 4 GB (4x1 GB) 667 MHz DDR2 MT18HTF12872AY CL5 memory; HW Prefetch Enabled. Red Hat Enterprise AS Linux 4, Update 3, Intel 64, Amber version 8. Source: TR#626.

Intel Pentium D processor 950-based platform details: Intel SR1475NH1-E E7230 chipset server with Intel Pentium D processor 950 (3.40 GHz with 2x 2 M L2 cache, 800 MHz system bus), 4 GB (4x1 GB) 533 MHz DDR2 M391T2593B0 CL4 memory; Red Hat Enterprise AS Linux 4, Update 3, Intel 64, Amber version 8. Source: TR#626.

Benchmark Description for SPECint_rate_base2000* and SPECfp_rate_base2000*: SPECint_rate_base2000 is a compute-intensive benchmark that measures the integer throughput performance of a computer system carrying out a number of parallel tasks typical of productivity-type applications. SPECfp_rate_base2000* is a floating-point, compute-intensive benchmark that measures the throughput performance of a computer system carrying out a number of parallel tasks typically seen in the scientific/technical communities. Higher bars indicate better performance.

Quad-Core Intel Xeon processor X3220-based platform details: Intel preproduction customer reference board "Whitney A1" BIOS EXTWM212 with Intel Xeon processor X3220 (2.40 GHz with 8 M L2 cache, 1066 MHz system bus), 4 GB (4x1 GB) 667 MHz DDR2 MT18HTF12872AY CL5 memory; HW Prefetch Enabled; Microsoft Windows Server® 2003 Enterprise Edition (Win32 X86/IA32) 5.2.3790(Service Pack 1), SPEC® CPU2000 benchmark version 1.3 - 32 bit binaries produced with Intel C/C++ and FORTRAN Compilers version 9.1 using configuration file cpu2000.1.3.ic91.vs2005.win32.p4.sse3.apr122006.cfg. Source: TR#685.

Intel Xeon processor 3070-based platform details: Intel preproduction customer reference board "Whitney A1" BIOS EXTWM212 with Intel Xeon processor 3070 (2.66 GHz with 4 M L2 cache, 1066 MHz system bus), 4 GB (4x1 GB) 667 MHz DDR2 MT18HTF12872AY CL5 memory; HW Prefetch Enabled; Microsoft Windows Server 2003 Enterprise Edition (Win32 X86/IA32) 5.2.3790(Service Pack 1), SPEC CPU2000 benchmark version 1.3 - 32 bit binaries produced with Intel C/C++ and FORTRAN Compilers version 9.1 using configuration file cpu2000.1.3.ic91.vs2005.win32.p4.sse3.apr122006.cfg. Source: TR#685.

Intel Pentium D processor 950-based platform details: Intel preproduction customer reference board "Whitney A1" BIOS EXTWM210 with Intel Pentium D processor 950 (3.40 GHz with 2x 2 M L2 cache, 800 MHz system bus), 8 GB (4x 2 GB) 533 MHz DDR2 KVR533D2E4/G2 CL3 memory; HW Prefetch Enabled; Microsoft® Windows® Server 2003 Enterprise Edition (Win32 X86/IA32) 5.2.3790(Service Pack 1), SPEC® CPU2000 benchmark version 1.3 - 32 bit binaries. Source: Intel® C/C++ and FORTRAN Compiler version 9.0 using configuration file cpu2000.1.3.ic90.win32.p4.sse3.sep232005.cfg on http://www.principledtechnologies.com/clients/reports/intel/UPSPECint_rate0606.pdf and Intel C/C++/Visual Fortran Compiler 9.1 using configuration file cpu2000.ic92.cxp.20060323 on http://www.principledtechnologies.com/clients/reports/intel/UPSPECfp_rate0606.pdf

Benchmark Description for SPECjbb2005*: 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).

Quad-Core Intel Xeon processor X3220-based platform details: Intel preproduction customer reference board "Whitney A1" BIOS EXTWM213 with quad-core Intel Xeon processor X3220 (2.40 GHz with 8 M L2 cache and 1066 MHz system bus), 4 GB (4x1 GB) 667 MHz DDR2 MT18HTF12872AY CL5 memory; Adjacent Sector Prefetch / HW Prefetch Disabled; Microsoft Windows Server 2003 Enterprise Edition x64 SP1, SPECjbb2005 version 1.07; BEA JRockit JDK5.0 Update 6 (P26.4.0-10-win_x86_64). Source: TR#686.

Intel Xeon processor 3070-based platform details: Intel preproduction customer reference board "Whitney A1" BIOS EXTWM213 with Intel Xeon processor 3070 (2.67 GHz with 4 M L2 cache and 1066 MHz system bus), 4 GB (4x1 GB) 667 MHz DDR2 MT18HTF12872AY CL5 memory; Adjacent Sector Prefetch / HW Prefetch Disabled; Microsoft® Windows® Server 2003 Enterprise Edition x64 SP1, SPECjbb2005 version 1.07; BEA JRockit JDK5.0 Update 6 (P26.4.0-10-win_x86_64). Source: TR#686.

Intel Pentium D processor 950-based platform details: Intel preproduction customer reference board "Whitney A1" BIOS EXTWM210 E3010-chipset server with Intel Pentium D processor 950 (3.40 GHz with 2x 2 M L2 cache and 800 MHz system bus), 8 GB (4x 2 GB) 533 MHz DDR2 KVR533D2E4/G2 CL3 memory; Microsoft Windows Server 2003 Enterprise Edition x64 SP1, SPECjbb2005 version 1.04; BEA JRockit JDK5.0 Update 6 (P06-win_x86_64). Source: <http://www.principledtechnologies.com/clients/reports/intel/UPSPECjbb0606.pdf>.

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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 is 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.



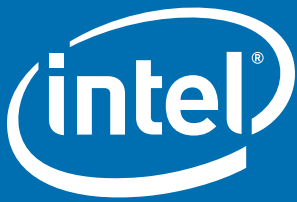
Platform Solutions

Intel® 3000 and 3010 chipsets are optimized for the dual/quad-core Intel Xeon processor 3000 sequence. These platforms offer industry leading performance coupled with Intel reliability to help drive your big ideas non-stop, but are low-cost, dependable, and efficient to set up and manage, providing trouble-free operation and ensuring that your operational needs are met at every stage of your business growth. Our entry-level server platforms integrate the most advanced technologies:

- Dependable server platforms with dual- or quad-core, 64-bit computing based on the Intel Xeon processor 3000 series or the Intel Xeon processor 3200 series .
- Intel® Matrix Storage Technology⁴ quickly stores and retrieves data, while protecting one of your company's most important assets—information—with RAID 0, 1, 5, and 10 technology.
- 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 consumption can also result in slower fans and quieter servers.
- High-speed DDR2 memory with up to 8 GB of memory keeps more data closer to the processor and helps eliminate slow-downs from memory bottlenecks.
- PCI Express* today's mainstream I/O technology, enables fast I/O transactions for peripherals to keep up with our high-performance processors and chipsets today, and builds in scalability for the future. The Intel® 3010 chipset offers an additional PCI Express port for even more expansion possibilities.
- Intel® PRO/1000 PM/PL network connections provide gigabit Ethernet LAN connectivity for high-speed network access.
- Intel® Virtualization Technology provides hardware assistance to virtualization software, enhancing virtual environments.
- Intel® Active Management Technology⁵ enables efficient and effective management, helping to reduce the costs of maintaining your server.



Find out more about Intel® chipsets
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1. Intel processor numbers are not a measure of performance. Processor numbers differentiate features within each processor series, not across different processor sequences. See www.intel.com/products/processor_number for details.
2. 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.
3. 64-bit Intel® Xeon® processors with Intel® 64 require a computer system with a processor, chipset, BIOS, OS, device drivers, and applications enabled for Intel 64. Processor will not operate (including 32-bit operation) without an Intel 64-enabled BIOS. Performance will vary depending on your hardware and software configurations. Intel 64-enabled OS, BIOS, device drivers, and applications may not be available. Check with your vendor for more information.
4. Intel® Matrix Storage Technology requires a motherboard with the Intel® 82801 FR (ICH6R) or Intel® 82801 GR (ICH7R) I/O Controller Hub System. The system must also have the RAID controller in the BIOS enabled and the Intel Matrix Storage Technology software driver installed. Please consult your system vendor for more information.
5. Intel® Active Management Technology requires a system with an Intel® 3000 chipset or Intel® 3010 chipset or Intel® 975X chipset, an Intel® PRO/1000 PM network connection, and appropriate third-party software. The system must be plugged into a power source and connected to a LAN.

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