Increase Multi-Processor Performance

with Platforms Based on the Dual-Core Intel® Xeon® Processor 7000 Sequence

Introducing Intel’s first multi-core CPU for the MP platform.

For enterprise computing, nothing less than four-way processor systems will do. And Intel is proud to announce the seventh-generation of MP processors, now featuring dual-core technology. The Dual-Core Intel® Xeon® processor 7000 sequence offers up to 60% projected performance increase over previous-generation single-core processors based on Intel initial preliminary testing, while delivering expandability and outstanding reliability for mid-tier enterprise applications.

With Intel built in, your company has success built in.

To move forward, your business has to be agile – recreating itself daily to better compete in today’s environment. Acting and reacting on the turn of a dime. Taking advantage of innovations at the same time you make the most of your existing technology investment.

That’s just what server platforms based on Intel’s multi-core technology let you do, help give you greater performance and responsiveness than previous-generation single-core server platforms and a foundation based on the industry’s leading business computing architecture.

With millions of Intel® processor-based servers shipped since 1996, and a 10-year track record of delivering enterprise-class performance, you know you can count on Intel to deliver quality and reliability. And currently, with over six million 64-bit processors already shipped, you can depend on Dual-Core Intel Xeon processor-based servers to handle your 32-bit and 64-bit applications.
The chips in the Dual-Core Intel Xeon Processor 7000 sequence are based on Intel’s 90 nm wafer fabrication process. They benefit from Intel’s dual-core technology, which helps increase compute power and throughput by 60% projected performance increase over previous-generation single-core processors based on Intel initial preliminary testing.²

This means they can handle large peak demands and help increase your return on investment. And they deliver outstanding performance for 32-bit software and increased headroom for 64-bit applications — compared to previous-generation, single-core processors — running both simultaneously. The result? An investment that helps lower your Total Cost of Ownership (TCO), while giving you the performance and flexibility you need to grow your business.
Manufacturers in many industries use a product-numbering system to differentiate products within a product line or brand. This helps customers compare specific products that offer a variety of different features. The same is true with processors, especially in today’s world when so many additional features contribute to performance above and beyond clock speed.

By changing how it identifies components on server platforms, Intel is making it easier for customers to take into account all the things that contribute to their overall experience — including features like architecture, cache, front side bus, and other Intel® technologies.

What is the 7000 Sequence?

Intel offers four processor number sequences for server applications.

<table>
<thead>
<tr>
<th>Processor Sequence</th>
<th>Used For</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intel® Pentium® 4/Pentium® D processor</td>
<td>Small business, entry or first server</td>
</tr>
<tr>
<td>Dual-Core Intel® Xeon® processor 50001' sequence</td>
<td>Volume DP servers/workstations based on the Intel Xeon processor</td>
</tr>
<tr>
<td>Dual-Core Intel® Xeon® processor 70001' sequence</td>
<td>Greater scalability than DP platforms with MP enterprise servers based on the Intel Xeon processor MP</td>
</tr>
<tr>
<td>Intel® Itanium® 2 processor 90001' sequence</td>
<td>Maximum performance and scalability for RISC replacement usage</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Processor Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intel® Xeon® processor 7041</td>
<td>3.0 GHz 2x2 MB L2 800 MHz front-side bus</td>
</tr>
<tr>
<td>Intel® Xeon® processor 7040</td>
<td>3.0 GHz 2x2 MB L2 667 MHz front-side bus</td>
</tr>
<tr>
<td>Intel® Xeon® processor 7030</td>
<td>2.8 GHz 2x1 MB L2 800 MHz front-side bus</td>
</tr>
<tr>
<td>Intel® Xeon® processor 7020</td>
<td>2.66 GHz 2x1 MB L2 667 MHz front-side bus</td>
</tr>
</tbody>
</table>
Architected for Intel Dual-Core processors.

MP platforms based on the Dual-Core Intel Xeon processor 7000 sequence are architected specifically for Intel dual-core processors. Multi-core products are designed by including two or more full processor cores within a single processor, enabling simultaneous management of activities. Plus, each core supports Hyper-Threading Technology\(^3\) (HT Technology), which allows a Dual-Core Intel Xeon processor 7000 sequence to process four software threads simultaneously — a total of 16 threads in a 4-way multi-processor platform!

This new generation of Intel Xeon processor offers an 800 MHz dual-independent system bus, which helps businesses get the most productivity from their applications. In addition, the platform supports quad-channel DDR2-400 memory, which offers increased DIMMs per system for enhanced memory scalability compared to previous-generation MP platforms. DDR2-400 is ideal for data-intensive applications, providing increased memory bandwidth over DDR1-333 and decreased power consumption.\(^4\)
The performance, reliability, and flexibility you need.

The Dual-Core Intel Xeon processor 7000 sequence helps deliver enhanced platform performance and dependability through a variety of innovative technologies, including the following:

- Fast response times with two processor cores per CPU running at speeds up to 3.0 GHz, each with their own 2MB integrated L2 cache.

- Up to four times the system bus bandwidth of previous-generation Intel Xeon processors MP with a high-speed, 3-load front-side bus with a frequency of 800 MHz.

- Power savings and system density for server applications by using Demand-Based Switching (DBS) with Enhanced Intel SpeedStep® technology.

- Quad-channel DDR2-400 memory-based subsystem offers large memory capacity and low latency, while consuming less power (vs. DDR1 memory technology).

- Reliability with enhanced RAS features including an Error Correcting Code (ECC) bus, memory RAID, and I/O and memory hot-plug.

- SMBus with PIROM and thermal sensor allows for scheduled service in the event of a system manufacturing defect or cooling device failure.

- Scale bandwidth with PCI Express®, an I/O technology that helps match the performance and capabilities of next-generation serial interconnects.
Dual-Core Intel® Xeon® Processor 7000\textsuperscript{1} Sequence

Server Platform Performance: Dual-core platform versus prior-generation single-core platform

Baseline
Dual-Core Intel® Xeon® processor 7041\textsuperscript{1} vs. Intel® Xeon® Processor MP 3.33 GHz 8MB L3 Cache
1.0

Enterprise Resource Planning
1.35

Database
1.37

SPECint\textsuperscript{*} rate_base2000 (estimate)
1.52

Linpack
1.57

Server Side Java Application
1.64

Dual-Core Intel® Xeon® Processor 7000\textsuperscript{1} Sequence

Scalability: Dual-core 1P to 4P scalability versus prior-generation single-core platform

Dual-Core Intel® Xeon® Processor 7041\textsuperscript{1} 1P to 4P scaling

SPECint\_* rate_base 2000 (estimate)

<table>
<thead>
<tr>
<th>Configuration</th>
<th>SPECint\textsuperscript{*} rate_base2000 (estimate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dual-Core Intel® Xeon® processor 7041 (1P)</td>
<td>1.0</td>
</tr>
<tr>
<td>Dual-Core Intel® Xeon® processor 7041 (2P)</td>
<td>1.93</td>
</tr>
<tr>
<td>Dual-Core Intel® Xeon® processor 7041 (4P)</td>
<td>3.53</td>
</tr>
</tbody>
</table>

Server Side Java Application

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Server Side Java Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dual-Core Intel® Xeon® processor 7041 (1P)</td>
<td>1.0</td>
</tr>
<tr>
<td>Dual-Core Intel® Xeon® processor 7041 (2P)</td>
<td>1.79</td>
</tr>
<tr>
<td>Dual-Core Intel® Xeon® processor 7041 (4P)</td>
<td>3.01</td>
</tr>
</tbody>
</table>

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.
This new generation of Intel Xeon processor offers an 800 MHz dual-independent system bus, helping businesses get the most productivity from their applications.

Benchmark notes:
Dual-Core Intel® Xeon® Processor 7000 Sequence: Server Platform Performance


Linpack: Baseline Platform configuration - Feb 2005: Intel® Harwich (SR6850HW4) Server Platform with four 64-bit Intel® Xeon® Processor MP 3.33 GHz with 8 MB L3 Cache, EBS00 Chipset, 667 MHz FSB; Memory: 16 GB BIOS: SHW4086B8B10.01.00.0031; HT disabled OS - Red Hat Enterprise Linux* AS release 3 (Taroon Update 3) 2.4.21-20EL x86_64 GNU/Linux Workload: 5Kx5K through 44Kx44K matrix sizes used; Workload Type: Scalar. Intel® Linpack 2.1.2

New Platform configuration: Intel® Server System Harwich 800T with four Intel® Xeon® Processors 7041, 3.0 GHz with 2x2MB L2 Cache, EBS01 Chipset, 800 MHz FSB; Memory: 16 GB HT enabled OS - Red Hat Enterprise Linux* AS release 4 2.6.9-5 EL x86_64 GNU/Linux Workload: 5Kx5K through 40Kx40K matrix sizes used; Workload Type: Scalar. Intel® Linpack 2.1.2


Baseline Platform Configuration: Intel® Server System pre-production hardware with four 64-bit Intel® Xeon® Processor MP 3.33 GHz with 8 MB L3 Cache, EBS00 Chipset, 667 MHz FSB; 2 GB memory; Hyper-Threading ON; HwP and ASP enabled; Windows* 2003 Enterprise Edition Application Server software: BEA JRockit* JVM for 32-bit Windows.


Linpack: Baseline Platform configuration - Feb 2005: Intel® Harwich (SR6850HW4) Server Platform with four 64-bit Intel® Xeon® Processor MP 3.33 GHz with 8 MB L3 Cache, EBS00 Chipset, 667 MHz FSB; Memory: 16 GB BIOS: SHW4086B8B10.01.00.0031; HT disabled OS - Red Hat Enterprise Linux* AS release 3 (Taroon Update 3) 2.4.21-20EL x86_64 GNU/Linux Workload: 5Kx5K through 44Kx44K matrix sizes used; Workload Type: Scalar. Intel® Linpack 2.1.2

New Platform configuration: Intel® Server System Harwich 800T with four Intel® Xeon® Processors 7041, 3.0 GHz with 2x2MB L2 Cache, EBS01 Chipset, 800 MHz FSB; Memory: 16 GB HT enabled OS - Red Hat Enterprise Linux* AS release 4 2.6.9-5 EL x86_64 GNU/Linux Workload: 5Kx5K through 40Kx40K matrix sizes used; Workload Type: Scalar. Intel® Linpack 2.1.2

Enterprise Resource Planning. Workload emulates a SAP-based Sales and Distribution application and helps ERP. Measured in number of concurrent users supported. Performance estimates based on Intel internal measurement.

Baseline Platform Configuration: Intel® Server Platform Harwich with four 64-bit Intel Xeon® Processor MP 3.33 GHz with 8 MB L3 Cache, EBS00 Chipset, 667 MHz FSB; Memory: 16 GB BIOS: SHW4086B8B10.01.00.0031; Hyper-Threading Enabled; Hardware Pre-fetch Enabled, Adjacent Sector Pre-fetch Enabled, Memory: 32 GB Operating system: SuSE Linux* Enterprise 9 for x86-64 SP2. Linux kernel 2.6.5-191-smp Application server: SAP R/3 Enterprise v4.7 SR1 for x86-64

New Platform Configuration: Intel Server Platform Harwich 800T with four Intel® Xeon® Processors 7041, 3.0 GHz with 2x2MB L2 Cache, EBS01 Chipset, 800 MHz FSB; Memory: 32 GB Operating system: SuSE Linux* Enterprise 9 for x86-64 SP2. Linux kernel 2.6.5-191-smp Application server: SAP R/3 Enterprise v4.7 SR1 for x86-64

Dual-Core Intel® Xeon® Processor 7000 Sequence: Server Platform Scalability


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

Performance gains based on Intel internal measurements of Java performance. Baseline Intel Server platform contains four 64-bit Intel® Xeon® Processor MP 3.33 GHz/8M L3 Cache, Intel E8500 chipset, Intel Hyper Threading ON. The new Intel Server pre-production platform contains four Intel Xeon Processor 7041 with E8501 Chipset with Intel Hyper Threading ON. Actual results will vary by hardware and software configuration.

Hyper-Threading Technology requires a computer system with an Intel® Xeon® processor supporting HT Technology and a HT Technology enabled chipset, BIOS and operating system. Performance will vary depending on the specific hardware and software you use. See www.intel.com/homepage/land/hyperthreading_more.htm for additional information.

Based on Intel power testing utilizing Intel® Xeon® processor 3.66 GHz with 667 MHz system bus. Dual-Core Intel Xeon Processor 7041 expected to exhibit similar power consumption characteristics. Actual power savings will vary based on system configuration and workloads. 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/homepage/land/hyperthreading_more.htm or call (US) 1-800-628-8686 or 1-916-356-3104.

All dates and products specified are for planning purposes only and are subject to change without notice

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.

SPECint2000* and SPECfp2000* benchmark tests reflect the performance of the microprocessor, memory architecture and compiler of a computer system on compute-intensive, 32-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.

Information in this document is provided in connection with Intel products. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document. Except as provided in Intel’s Terms and Conditions of Sale for such products, Intel assumes no liability whatsoever, and Intel disclaims any express or implied warranty, relating to sale and/or use of Intel products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright or other intellectual property right. Intel products are not intended for use in medical, life saving, or life sustaining applications. Intel may make changes to specifications and product descriptions at any time, without notice.

*Other names and brands may be claimed as the property of others.

Copyright © 2006 Intel Corporation. All rights reserved.

Intel, the Intel logo, Intel. Leap ahead, Intel. Leap ahead. logo, Xeon, Intel SpeedStep, Pentium, and Itanium 2 are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.