



Quad-Core and Dual-Core
Intel® Xeon® Processor 5000
Sequence-based Platforms

Energy-Efficient Performance
to Boost Business Benefits



Ready to Handle Your Toughest IT Challenges

Your IT and business challenges are relentless. So is our drive to deliver the right technology solutions to you. Whether your focus is on reliability, cost reduction, or a more responsive, flexible infrastructure, Intel has solutions that can meet your needs – from the accelerated performance of the industry's first quad-core processor for standard, high-volume servers to high-performance, low-power dual-core processors for ultra-dense, blade-based deployments.

Intel builds in more capabilities so you can do much more. We combine industry-leading design, world-renown manufacturing, effective technologies, broad software services, and industry alliances, so you can optimize your data center to deliver the right business services more efficiently and at low cost. With nearly 40 million Intel® Xeon® processor-based servers shipped since 1996, and a 20-year track record of delivering enterprise-class performance, you know you can count on Intel to deliver superior quality and reliability.

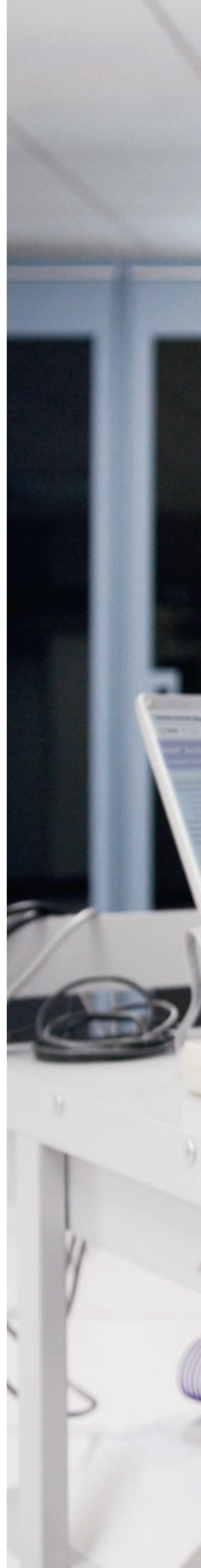
Innovation that helps you move, and stay, ahead

Intel® two-processor (2P) general-purpose server platforms based on the new Quad-Core Intel® Xeon® processor 5300¹ series and Dual-Core Intel® Xeon® processors 5100¹ and 5000 series put more processing power in your infrastructure to help keep your data center more available and more responsive to changing business needs.

The new Quad-Core Intel Xeon processor 5300 series, based on the Intel® Core™ microarchitecture with 64-bit computing, and integrating a very large 8 MB L2 cache (one 4 MB L2 shared cache per core pair), enables the highest performance density and performance/watt in any of our 2P servers. Innovative quad-core servers, along with Dual-Core Intel Xeon processor 5100 and 5000 series-based servers, enable greater compute density with fewer cooling challenges

by boosting system performance while lowering processor power consumption. These servers are ideal for deploying virtualization solutions to enable improved compute density, higher utilization, and lower maintenance costs.

In addition to delivering the the most powerful 64-bit, dual- and quad-core 2P server platforms in the industry, our leading technology innovation goes beyond the processor to touch nearly every part of the server. Embedded capabilities, such as enhanced I/O, advanced memory, and new security features, combine to accelerate data processing and improve IT service continuity, providing a stable platform for long-range data center standardization and optimization.



Quad-Core and Dual-Core Intel® Xeon® processor-based 2P platforms maximize performance and optimize flexibility to help IT adapt and respond faster to ever-changing business requirements.



Rely on Incredible Stability, Performance, and Service Uptime

Four generations of multi-core Intel® processors in a single platform give you incredible stability for long server life and investment protection, allowing you to confidently standardize on a consistent and leading infrastructure solution. New Quad-Core and Dual-Core Intel Xeon processor-based 2P platforms give you the right technologies to meet your IT and business challenges head-on, with energy-efficient performance and powerful data-intensive computing. They allow you to expand new services, manage more systems efficiently, and secure your data and infrastructure more effectively.

Maximize performance density, reduce cooling challenges

2P platforms based on the new Quad-Core Intel Xeon processor 5300 series give you the most choices and capabilities to maximize performance density and performance/watt in demanding applications. With the highest performance and efficiency of the Intel® Xeon® processor 5000 sequence, Quad-Core Intel Xeon processor 5300 series-based platforms are at the core of powerful, energy-efficient 2P rack-mount and ultra-dense blade-based servers.

Boost utilization

With the added performance and headroom of 64-bit, multi-core computing, virtualization hardware assistance with Intel® Virtualization Technology,² and enhanced reliability features, Quad-Core and Dual-Core Intel Xeon processor-based servers are the best platforms for virtualization. A growing number of independent software vendors (ISVs) offer business solutions validated for virtualization under the Intel and VMware* Virtualize ASAP program. These validated solutions help IT departments quickly deploy virtual environments in their companies. Combined

with support from industry-leading virtualization software developers and these ISVs, you have more choices to confidently pool hardware resources and build out critically needed business services.

Optimize data center density

Our energy-efficient platforms take a comprehensive approach to power and thermal challenges, helping to reduce the cooling challenges you face while increasing performance density in your data center. These platforms allow you to improve space and asset utilization and safely increase density, so you can deliver more services in the same amount of space, or even less.

Improve business continuity and compliance

Our new server platforms build in rock-solid reliability and enhanced security to help improve the integrity of business data and services. Processor chipset enhancements, plus Fully Buffered DIMM (FBDIMM) and PCI Express* (PCIe*) reliability features, help create a server you can rely on to build stable, available virtual and traditional environments. You'd expect nothing less given Intel's proven track record for delivering reliable systems.



Increase Flexibility and Performance with Innovative Platform Technologies

Flexible platforms for an agile business

Quad-Core and Dual-Core Intel Xeon processor-based 2P platforms enable flexibility and adaptability, helping your infrastructure scale with changing business needs. More processing resources, coupled with hardware-assisted virtualization, Intel embedded technologies, and Intel software optimization tools, help you optimize your data center to improve business services and user productivity.

- Multi-core, 64-bit computing for intensive workloads and large datasets.
- Dedicated, dual independent front-side buses (FSB) with up to 21 GB/s throughput enhances performance on both Quad-Core and Dual-Core Intel Xeon processor-based 2P platforms.
- Broad choice of processors to meet any demand, from accelerated performance, quad-core processors, to sub-100 watt dual-core and quad-core performance-optimized versions, and low-voltage quad-core and dual-core processors for ultra-dense deployments.
- Large, on-die cache (4 MB on dual-core, 8 MB on quad-core) enhances system memory efficiency and throughput.
- FBDIMM technology, with up to 21 GB/s throughput, provides greater system throughput and reliability.
- Up to 64 GB of memory capacity enables processing of larger data sets, keeps more critical data closer to the processing cores, and enables enhanced memory-based reliability and availability capabilities.

Move ahead with the performance and capacity of FBDIMM technology

FBDIMM technology is widely recognized as the next leap in memory technology, with broad support by industry memory manufacturers and original equipment manufacturers (OEMs). FBDIMM boosts memory throughput, bandwidth, capacity, and reliability, offering new potential and flexibility to IT. FBDIMM technology delivers 4 times the memory capacity (up to 64 GB) and 3 times peak bandwidth (up to 21 GB/sec with 1333 MHz system bus) of previous-generation Intel® E7520 chipset platforms with DDR2-400 memory. FBDIMM removes the memory access bottlenecks with higher data rates and lower latency, and breaks the memory limitation barrier typically found in today's servers.

Quad-Core and Dual-Core Intel Xeon processor-based 2P platforms with FBDIMMs boost system responsiveness for data-intensive applications and business-critical services. Coupled with the new Intel® I/O Acceleration Technology,³ (Intel® I/OAT) overall system performance and response is further improved, creating a balanced, high-performance platform for even the most demanding IT services and business-critical applications.

Breakthrough Performance with New Intel® Core™ Microarchitecture⁹

Combining high-performance design with power-efficient technologies, the Intel® Core™ microarchitecture is a foundation for new energy-efficient platforms. Intel Core microarchitecture technologies deliver higher performance/watt compared to previous Intel microarchitectures, enabling new capabilities for IT.⁴

Intel® Wide Dynamic Execution. Executes more instructions per clock with as much as a 33 percent wider execution path for each processor core.

Intel® Intelligent Power Capability. Manages power consumption of all execution units in the core to optimize energy usage.

Intel® Advanced Smart Cache. A large on-die cache that reduces latency to data, improving performance and power efficiency.

Intel® Advanced Digital Media Boost. Executes complete 128-bit instructions in one clock cycle instead of two cycles, as in previous microarchitectures, for double the performance of streaming instructions (SSE/SSE2/SSE3).

Take advantage of energy-efficient performance to support growing business requirements with fewer cooling challenges

Today's businesses demand more computing capacity and performance, but data centers are limited by their existing physical infrastructures and IT departments by their budgets. Energy-efficient Dual-Core Intel Xeon processor-based server platforms increase your computing capacity, with fewer cooling challenges. Quad-Core Intel Xeon processor 5300 series-based servers help you maximize performance density, when performance and performance/watt are your key requirements. Servers based on Quad-Core and Dual-Core Intel Xeon processors let you put more compute power into your existing power and cooling envelopes to expand services and reduce pressure to enlarge or build new facilities.

Quad-Core Intel® Xeon® processor 5300 series		Dual-Core Intel® Xeon® processor 5100 series	
Accelerated Performance	120W	Accelerated Performance	80W
Mainstream Performance	80W	Mainstream Performance	65W
Ultra-dense	50W	Ultra-dense	40W

Servers based on Quad-Core and Dual-Core Intel Xeon processors let you put more compute power into your existing power and cooling envelopes to expand services and reduce pressure to enlarge or build new facilities. You can easily match your computing needs with your facility's power and cooling capacities, from platforms based on ultra-low-power processors for high-density blade servers to accelerated-performance processors for your most intense computing demands.

Combining enhanced server virtualization with Intel Virtualization Technology, Intel® Software tools, and new energy-efficient Dual-Core Intel Xeon processor-based server platforms enables you to truly optimize your data center for computing capacity, performance, and power and cooling demands.

Embedded technologies improve performance, manageability, reliability, and security

Enhance virtual environments with Intel® Virtualization Technology

Intel has worked with the leading operating system and virtualization software companies, such as VMware, Microsoft, and XenSource, to enhance software-based virtual environments with hardware-assistance from Intel Virtualization Technology built into the processor. You can achieve greater flexibility by simultaneously hosting 64-bit and 32-bit operating systems and applications, and Linux* on Windows* and Windows on Xen*. Virtualization and Intel Virtualization Technology help data centers be more responsive with a more scalable, flexible IT infrastructure.

Enhance performance for data-intensive applications with PCI Express*

PCI Express (PCIe), supported on Intel platforms since 2004, has become the mainstream I/O technology for balanced platforms, with greater bandwidth and lower latency for faster I/O throughput that supports today's multi-core computing.

Boost overall system performance with Intel® I/O Acceleration Technology

Intel I/O Acceleration Technology improves network responsiveness through more efficient network data movement and reduced system overhead. Compared to standard Gigabit Ethernet on 64-bit Intel Xeon processor-based servers using the Intel 7520 chipset, Intel I/OAT can deliver up to 2x the data movement and reduce CPU overhead by up to 40 percent for faster application response.

For more information on Quad-Core and Dual-Core Intel® Xeon® processor-based 2P server platforms, please go to www.intel.com/products/processor/xeon

Intel I/O Acceleration Technology is a platform innovation enabled by

- Processor acceleration: protocol stacks optimized for Intel® architecture improves data access.
- Intel® 5000 Series chipsets enhancements: data copying offloaded from the CPU to the chipset moves data faster.
- Intel® 82563EB Dual Port adapter and Intel® 82564EB Single Port adapter: parallel processing of data and commands supports better data flow to and from the network.
- Software: BIOS and operating systems³ unlock the capabilities of Intel I/O Acceleration Technology.

Intel multiport network adapters with Intel I/OAT support high-performance I/O for server consolidation and virtualization. Stateless network acceleration seamlessly scales across multiple ports and virtual machines. With tight integration into popular operating systems and virtualization software, Intel I/OAT helps you avoid the support risks of third-party network stacks and preserves existing network requirements such as teaming and failover.

For more information, please visit www.intel.com/go/ioat.



Quad-Core and Dual-Core Intel® Xeon® Processor-based Platforms Overview

Platform Feature	User Benefit
Quad-Core Intel® Xeon® processor 5300 ¹ series	<ul style="list-style-type: none"> Based on Intel® Core™ microarchitecture 64-bit, quad-core computing with large 8 MB on-die cache Up to 4 times the performance versus previous-generation single-core processors Better performance/watt than Dual-Core Intel Xeon processor 5100 series-based platforms
Dual-Core Intel® Xeon® processor 5100 ¹ series	<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/watt⁴ Wide range of 65 watt SKUs for performance-optimized deployments, plus 40 watt SKUs for ultra-dense deployments
Dual-Core Intel® Xeon® processor 5000 ¹ series	<ul style="list-style-type: none"> 64-bit, dual-core computing Up to twice the performance versus previous-generation single-core processors Lower cost dual-core processor for great dual-core performance in cost-constrained environments Performance-optimized, sub-100 watt SKUs
Intel® Core™ microarchitecture ³	<ul style="list-style-type: none"> Better performance on multiple application types and user environments, while reducing cooling challenges, enabling more capable, denser data center deployments
Intel® Virtualization Technology ²	<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
Dedicated, dual independent front-side buses (1066 MHz and 1333 MHz)	<ul style="list-style-type: none"> Up to 17 GB/s with 1066 MHz and up to 21 GB/s with 1333 MHz
Intel® 64 Technology ⁵	<ul style="list-style-type: none"> Enables extended memory addressability for server applications
Fully Buffered DIMM technology	<ul style="list-style-type: none"> Up to 21 GB/s for 3 times the increase in memory bandwidth over previous memory technology Up to 4 times the memory capacity up to 64 GB Enhanced reliability, availability, and serviceability features
Intel® I/O Acceleration Technology ³ (Intel® I/OAT)	<ul style="list-style-type: none"> Delivers up to twice the data movement Cuts CPU overhead by as much as 40 percent
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"> Many memory controller features, together with PCI Express RAS features combine to help improve platform reliability vs. previous-generation platforms New features include Error Correcting Code (ECC) system bus, new memory mirroring and I/O hot-plug The Intel® 5000V/P chipsets include an SMBus port for remote management operation and support for a variety of third-party BMC (base management controller) and BIOS solutions

Improve Service Uptime with Superior Reliability and Availability

Dual-Core Intel Xeon processor-based platforms with FBDIMM technology take reliability and availability to a new level.

Intel® 5000 Series chipsets RAS features

Enhanced reliability is integrated in the Intel 5000 Series chipsets, offering a high degree of memory error detection and correction, data protection, and serviceability.

Memory mirroring. Lets you split and duplicate system memory, protecting against uncorrectable errors or DRAM failure.

Memory sparing. Allows you to reserve spare memory capacity that can be used if current memory fails.

X8 Single Device Data Correction (X8 SDDC). Allows you to remove a single DRAM from the memory map and recover its data into a new device.

Error Correcting Code (ECC). The system detects single-bit and double-bit errors and automatically corrects single-bit errors on internal data paths.

Hot-plug I/O. Add I/O after installation without service interruption.

FBDIMM technology RAS features

Incorporating a new Advanced Memory Buffer between the chipset and memory, FBDIMM technology adds new RAS features that make the platform even more robust, helping companies improve service uptime.

Fault or Function	Action by FBDIMM
Integrity check on data	ECC, SDDC, and CRC
Integrity check on address and control	CRC
Upon an uncorrectable error on a transaction (without FBDIMM, this kind of error shuts down the system)	Retry upon error, then log and continue if no error upon retry; escalate to OS only if hard error
Pass-through for AMB (DIMM) fault tolerance	Same if error on DRAM or AMB core; less if whole AMB chip fails

PCI Express RAS enhances I/O availability

PCIe is rich in RAS capabilities critical to maintaining system uptime, including the following:

- Built-in clocking for Data Integrity Checking.
- Advanced error logging and reporting through IPMI.
- Hot-plug capability simplifies replacement of failed devices and helps reduce system downtime, while allowing mix and match of peripherals and systems or I/O chassis from different vendors.
- A high-performance, cost-effective RAID can be implemented on the server board using the Intel® IOP333 I/O processor, designed to connect directly to the chipset's memory controller via PCI Express.

Quad-Core and Dual-Core Intel® Xeon® Server Platform Processors

A range of processors in the Quad-Core and Dual-Core Intel Xeon processor 5000 sequence enables you to optimize your IT environment with the right server platforms to meet your business needs. From accelerated performance versions at 130W to low-power 40W versions for ultra-dense deployments, you can easily match your computing needs with your facility's power and cooling capacities.

Quad-Core Intel® Xeon® processor 5300 series

Quad-Core Intel Xeon processor 5300 series are based on the Intel Core microarchitecture, integrate an 8 MB L2 cache, Intel Virtualization Technology, and Intel® 64 Technology⁵, and are offered in the LGA771 package.

Processor Number	CPU Frequency	Front Side Bus	Power	Demand-based Switching ¹
Quad-Core Intel® Xeon® processor X5355	2.66 GHz	1333 MHz	120W	Yes
Quad-Core Intel® Xeon® processor E5345	2.33 GHz	1333 MHz	80W	Yes
Quad-Core Intel® Xeon® processor E5320	1.86 GHz	1066 MHz	80W	Yes
Quad-Core Intel® Xeon® processor E5310	1.60 GHz	1066 MHz	80W	No
Quad-Core Intel® Xeon® processor E5335 ⁶	2 GHz	1333 MHz	80W	No

Dual-Core Intel® Xeon® processor 5100 series

Dual-Core Intel Xeon processor 5100 series are based on Intel Core microarchitecture, integrate a 4 MB shared L2 cache, Intel Virtualization Technology, and Intel 64 Technology, and are offered in the LGA771 package.

Processor Number	CPU Frequency	Front Side Bus	Power	Demand-based Switching ¹
Dual-Core Intel® Xeon® processor 5160	3 GHz	1333 MHz	80W	Yes
Dual-Core Intel® Xeon® processor 5150	2.66 GHz	1333 MHz	65W	Yes
Dual-Core Intel® Xeon® processor 5148 ⁷	2.33 GHz	1333 MHz	40W	Yes
Dual-Core Intel® Xeon® processor 5140	2.33 GHz	1333 MHz	65W	Yes
Dual-Core Intel® Xeon® processor 5130	2 GHz	1333 MHz	65W	No
Dual-Core Intel® Xeon® processor 5120	1.86 GHz	1066 MHz	80W	No
Dual-Core Intel® Xeon® processor 5010	1.60 GHz	1066 MHz	80W	No

⁷Available in boxed version only.

Dual-Core Intel® Xeon® processor 5000 series

Dual-Core Intel Xeon processor 5000 series are designed with Hyper-Threading Technology, integrate a 4 MB shared L2 cache, Intel Virtualization Technology, and Intel 64 Technology, and are offered in the LGA771 package.

Processor Number	CPU Frequency	Front Side Bus	Power	Demand-based Switching ¹
Dual-Core Intel® Xeon® processor 5080	3.73 GHz	1066 MHz	130W	Yes
Dual-Core Intel® Xeon® processor 5063	3.20 GHz	1066 MHz	95W	Yes
Dual-Core Intel® Xeon® processor 5060	3.20 GHz	1066 MHz	130W	Yes
Dual-Core Intel® Xeon® processor 5050	3 GHz	667 MHz	95W	Yes
Dual-Core Intel® Xeon® processor 5030	2.67 GHz	667 MHz	95W	No

¹Demand-based Switching helps reduce average system power consumption and potentially improves system acoustics.