

A Quantum Leap in Enterprise Computing

Unprecedented Reliability and Scalability
in a Multi-Processor Server

Product Brief

Intel® Xeon® Processor
7500 Series



Whether you've got data-demanding applications, are deploying a private cloud, or are using virtualization to consolidate your data center or develop a robust data recovery plan, the Intel® Xeon® processor 7500 series, built with Next-Generation Intel® Microarchitecture (Nehalem), pushes the limits of scalable performance, giving you up to 3.7x better performance in a virtualized environment than previous generations.¹ Intel Xeon processor 7500 series-based servers combine intelligent, expandable performance that automatically adapts to the diverse needs of your environment with advanced reliability and world-record-breaking scalability.

Highly Intelligent, Massively Scalable for Your Most Data-Intensive Applications

With enhanced 45nm technology, Next-Generation Intel Microarchitecture (Nehalem) and Intel® Virtualization Technology (Intel® VT); the Intel Xeon processor 7500 series-based servers help drive your data-demanding enterprise applications faster. Delivering a quantum leap in enterprise computing performance, the Intel Xeon processor 7500 series features up to eight cores supporting 16 processing threads and 24 MB of cache per processor, and four advanced, high-bandwidth interconnect links that allow multiple processors to be directly connected to each other.

All of that scalable performance will allow you to take server consolidation to the next level. Systems powered by the Intel Xeon processor 7500 series deliver up to 20x² the performance of older 4-socket single-core servers, enabling up to 20:1 server consolidation,³ up to 90 percent lower operating costs,³ and an estimated return on investment in as little as one year.³ Now you can get more done with fewer servers, reduced power consumption, and less IT overhead.

With 4x the 4-socket memory capacity and up to 8x the memory bandwidth of the prior generation,⁴ the Intel Xeon processor 7500 series is uniquely architected for data-demanding applications,

such as business intelligence and ERP, letting you deploy increasingly powerful business tools to track your marketplace and identify previously hidden opportunities.

The 24 MB of on-die, L3 cache means that you can spend more time processing data and less time looking for it. Applications can store data and instruction sets closer to the processor, which makes for overall better system performance. All this can help improve productivity and increase the speed of business decisions so that your company is able to take advantage of opportunities and respond to competitive threats as quickly as possible.

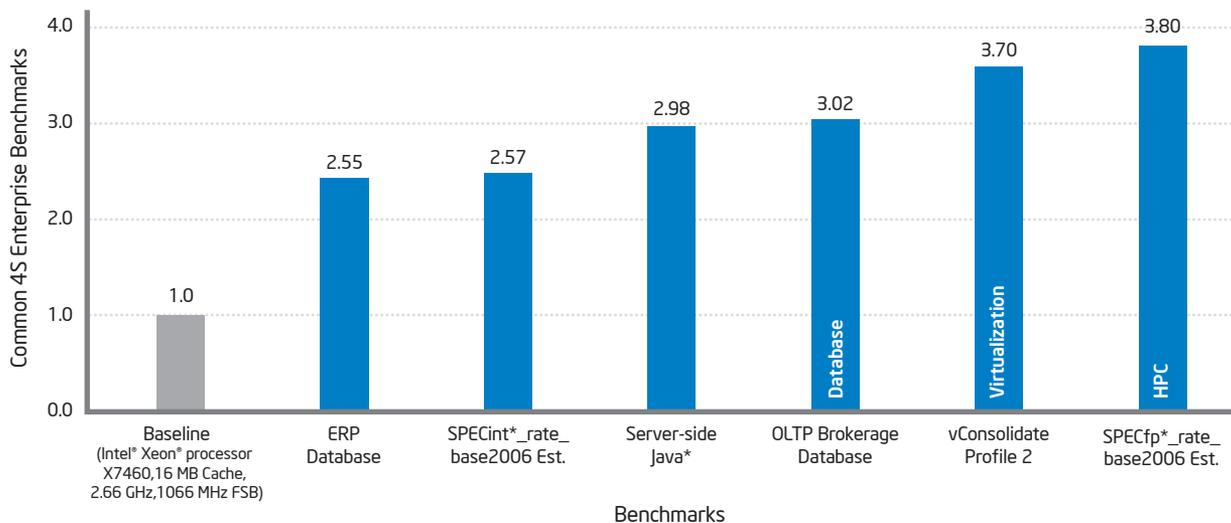
Additional scalable performance includes:

- **Up to 3.7x better performance** in a virtualized environment than previous generations¹
- **Up to 3x the database performance** of prior generations⁵

Maximize Performance with Intel® Xeon® Processor 7500 Series

(Higher is better, relative results shown.)

Up to 3x database, 3.7x virtualized server, and 3.8x HPC throughput performance increases over 7400 series



Always-on Business Advantage for your Mission-critical Applications

The Intel Xeon processor 7500 series is built specifically for virtualization and helps you keep up by optimizing server productivity and efficiency, and supports more virtual machines per server. On an 8-socket platform processing up to 128 threads simultaneously, you can use virtualization to help maximize the resources of your data center and keep your data center flexible and able to respond to changing business priorities. Servers powered by the Intel Xeon processor 7500 series provide the industry's highest virtualization performance to run the most demanding applications while still maintaining the peak load responsiveness needed for the unpredictability of virtualized applications. And with the reliability and scalability of the Intel Xeon processor 7500 series, you can use virtualized machines to ensure business continuity and disaster-recovery objectives are met with ease.

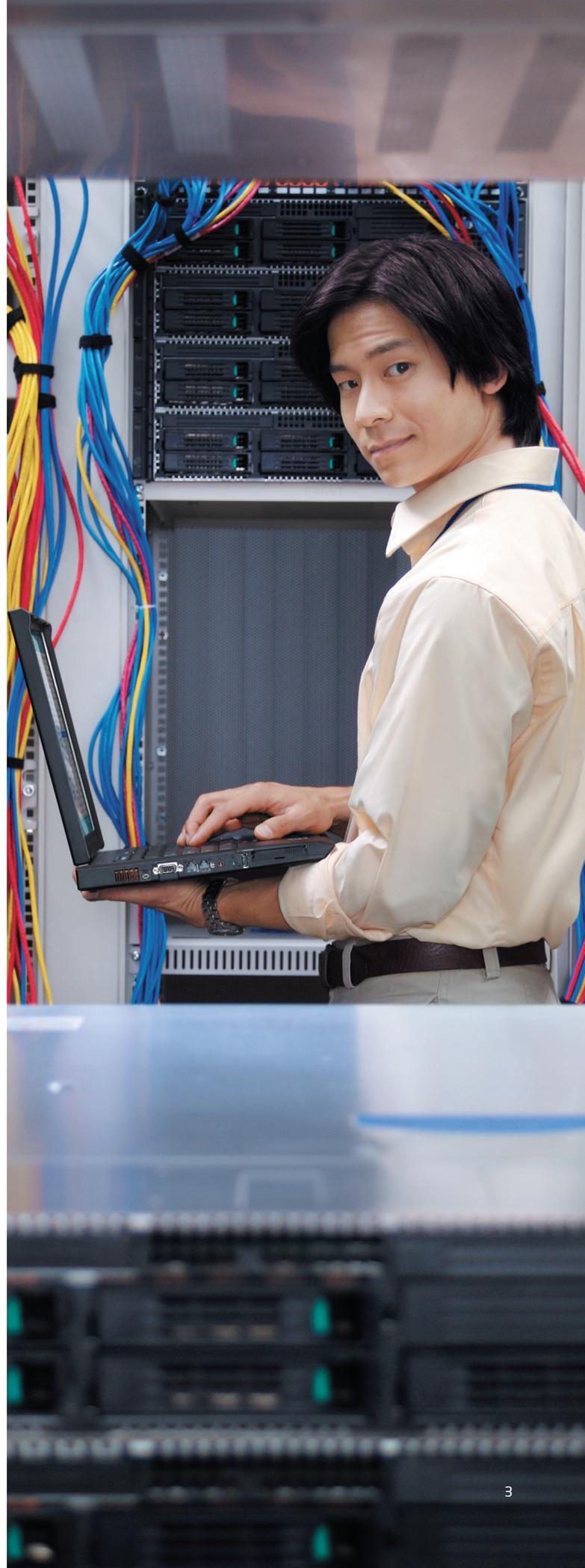
The Intel Xeon processor 7500 series has integrated virtualization hardware support with Intel VT. Intel VT works by hardware assisting your virtualization environment and, in combination with powerful, reliable processor features, boost asset utilization and IT flexibility while reducing overall operating costs.

You can now build one compatible group of platforms offering maximum flexibility for live migration across all Next-Generation Intel® Core™ Microarchitecture (Nehalem)-based servers including 1-socket Intel® Xeon® processor 3000 sequence-, 2-socket Intel® Xeon® processor 5000 sequence-, and the scalable 4-socket Intel® Xeon® processor 7000 sequence-based servers.

Maximizing System Uptime and Minimizing Administrative Costs

With new reliability, availability and serviceability (RAS) capabilities for high-end enterprises, the Intel Xeon processor 7500 series meets your most demanding mission-critical processing requirements, while offering significantly lower overall total cost of ownership, higher performance per dollar, lower electricity bills and the ability to standardize on a flexible IT environment.

Servers built on the Intel Xeon processor 7500 series feature Intel® Machine Check Architecture Recovery which provides automatic detection and recovery from many types of otherwise uncorrectable errors. The Intel Xeon processor 7500 series also provides many new reliability features including SMI lane failover and QPI self healing which enable the platform to identify problems and fail over or modify itself to keep running. In essence, it delivers everything you need to maintain data integrity, minimize downtime, and maximize productivity. Built to handle your most processor-intensive, mission-critical applications, the Intel Xeon processor 7500 series provides a cost-effective alternative to expensive, proprietary RISC-processor-based systems.



Intel Xeon Processor 7500 Series Overview

The Intel Xeon processor 7500 series helps you keep up by optimizing server productivity and efficiency and letting you deploy more virtual machines per server. With powerful multi-core processors, you'll experience better productivity with fewer servers.

Features

Benefits

8-Core Processing	<ul style="list-style-type: none">Up to 8 cores and 16 threads per socket with Intel® Hyper-Threading Technology,® the Intel® Xeon® processor 7500 series offers increased performance with 45nm manufacturing technology and increased headroom for multi-threaded applications and data-demanding applications.Enables improved compute performance, increasing system utilization.
Intel® Core™ Microarchitecture (Nehalem)	<ul style="list-style-type: none">Boosts performance on multiple applications/user environments and data-demanding workloads, while enabling denser data center deployments through improved performance-per-watt.45nm Hi-k process technology enables larger on-die cache for better performance, and reduced transistor gate leakage for greater energy efficiency.
24 MB of L3 Cache	<ul style="list-style-type: none">Increases efficiency of cache-to-core data transfers, maximizing main memory-to-processor bandwidth.Reduces latency by storing larger data sets closer to the processor, reducing the number of trips to main memory.
Intel® QuickPath Interconnect	<ul style="list-style-type: none">High-speed (up to 25.6 GB/s), point-to-point connections between processors, and between processors and the I/O hub.Tightly integrated interconnect reliability, availability, and serviceability (RAS) features with design-scalable configurations for optimal balance of price, performance, and energy efficiency.Enables scaling of processors from 2- to 8-sockets, and higher with use of third-party node controllers.
Quad Channel Integrated Memory Controller	<ul style="list-style-type: none">Up to 1 Terabyte of memory with 16 GB DIMMs in a 4-socket system (up to 2 terabytes in an 8-socket system).Intel® Scalable Memory Interconnect results in up to 8x the memory bandwidth of prior generations.⁴Intel Scalable Memory Buffers are used to achieve the highest memory capacity per socket for an X86 architecture.Up to 16 memory DIMM slots per processor socket.Support for up to 16 GB DDR3 DIMMs.
Advanced Reliability Features	<ul style="list-style-type: none">Intel® Machine Check Architecture Recovery lets the operating system continue running even after otherwise uncorrectable errors are detected.SMI lane failover and QPI self-healing boost availability through automatic interconnect error detection and recovery.SMI lane failover and QPI self-healing which enable the platform to identify problems and fail over or modify itself to keep running.
Intel® Virtualization Technology®	<ul style="list-style-type: none">A suite of processor hardware enhancements that assists virtualization software to deliver more efficient virtualization solutions and greater capabilities including 64-bit guest OS support.Intel® VT FlexPriority optimizes virtualization software efficiency by improving interrupt handling.Intel® VT FlexMigration enables Intel Xeon processor 7500 series-based systems to be added to the existing virtualization pool with single, two, 4-socket, or 4+ socket Intel-based servers.
Intel® 64 Architecture [†]	<ul style="list-style-type: none">Flexibility for 64-bit and 32-bit applications and operating systems.

What is the 7000 Sequence?

At Intel, our Intel Xeon processor series numbers are designed to help clarify processor features, capabilities, and intended usages. Intel offers three Xeon processor number sequences for server applications:

- **Intel® Xeon® processor 3000 sequence**

One-processor servers for small business, entry, or first server based on the Intel Xeon processor.

- **Intel® Xeon® processor 5000 sequence**

Two-processor general-purpose, standard high-volume servers, HPC systems, and workstations based on Intel Xeon processors.

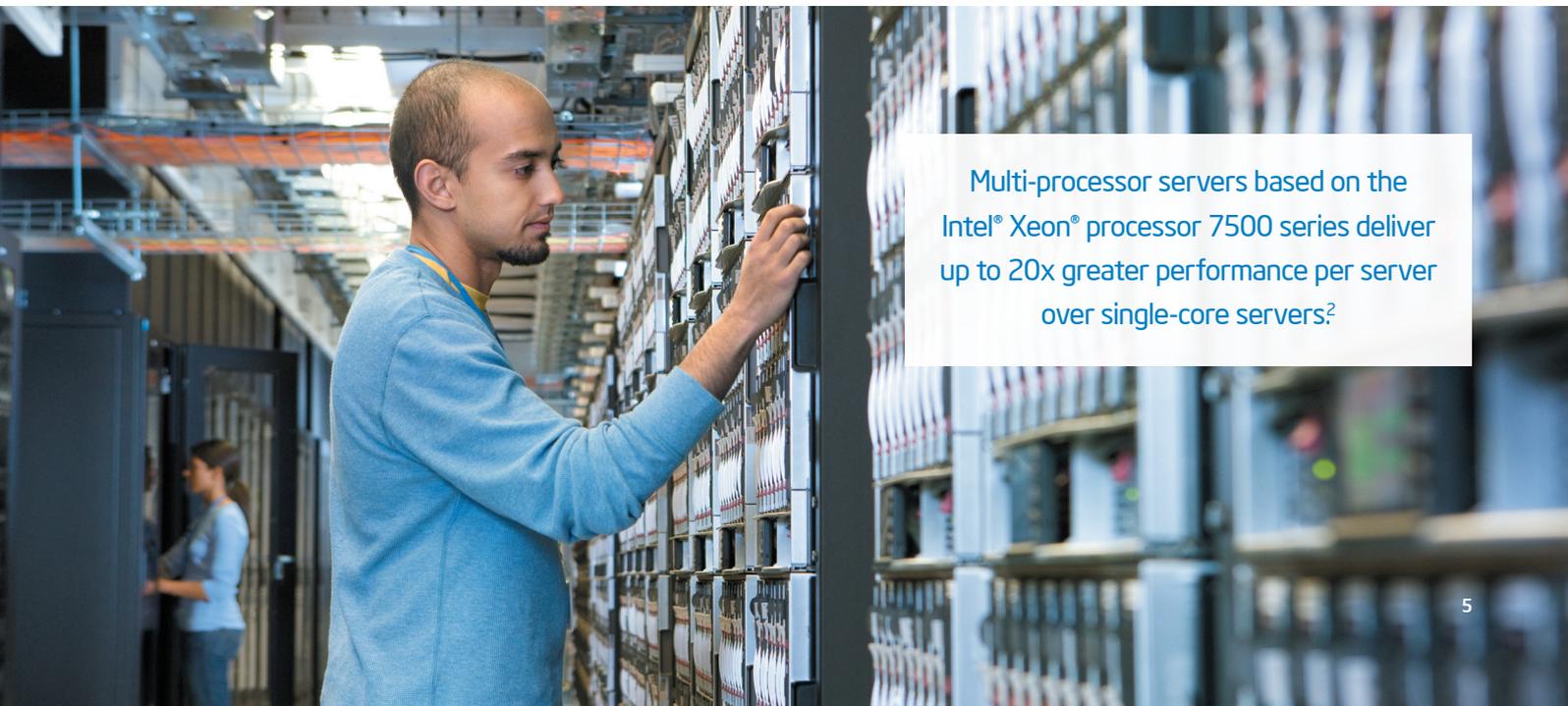
- **Intel® Xeon® processor 7000 sequence**

Greater performance and scalability with 2- to 256-processor enterprise servers. These processors are designed for mission-critical workloads including large-scale virtualization and data-demanding enterprise applications. And their large memory capacity, high memory bandwidth, and scalability also make them an excellent choice for large-node High Performance Computing.

SKU list

The Intel Xeon processor 7500 series is available in a range of features to match different computing demands. Advanced reliability features, Intel® Virtualization Technology including Intel® Flex-Migration Assist and Intel® 64 Architecture[†] are standard on all SKUs.

Processor Number [‡]	Power	Cores Per Processor	Speed	L3 Cache	Hyper-Threading
Intel® Xeon® Processor X7560	130 W	8	2.26 GHz	24 MB	Yes
Intel® Xeon® Processor X7550	130 W	8	2 GHz	18 MB	Yes
Intel® Xeon® Processor X7542	130 W	6	2.66 GHz	18 MB	No
Intel® Xeon® Processor L7555	95 W	8	1.86 GHz	24 MB	Yes
Intel® Xeon® Processor L7545	95 W	6	1.86 GHz	18 MB	Yes
Intel® Xeon® Processor E7540	105 W	6	2 GHz	18 MB	Yes
Intel® Xeon® Processor E7530	105 W	6	1.86 GHz	12 MB	Yes
Intel® Xeon® Processor E7520	95 W	4	1.86 GHz	18 MB	Yes



Multi-processor servers based on the Intel® Xeon® processor 7500 series deliver up to 20x greater performance per server over single-core servers.²

Server Platform Designed for Your Needs

Intel® 7500 Chipset

The Intel® 7500 Chipset supports the Intel Xeon processor 7500 series at 6.4 GT/s, 5.86 GT/s and 4.8 GT/s speeds via the Intel® QuickPath Interconnect. Additionally, this chipset delivers support for 72 lanes of PCI Express* 2.0 I/O, Intel® VT for Connectivity and Intel® VT for Directed I/O enhancements for virtualization OS, Intel® Dynamic Power Node Manager system management, and support for Intel® ICH10, ICH10R and Intel 6700PXH 64-bit PCI Hub.

Intel® Ethernet Server Adapters

Designed for Intel Xeon processors with features that distribute I/O processing across multiple CPU cores. Intel® Ethernet Server Adapters are optimized for virtualization and include technologies such as Virtual Machine Device Queues (VMDq), which off-load some hypervisor functions to the network silicon, freeing processor cycles and improving overall system performance.

Features Enabled by the Intel® 7500 Chipset Include:

Intel® QuickPath Interconnect	▪ Intel's latest system interconnect design increases bandwidth and lowers latency.
PCI Express* Gen 2.0 I/O	▪ Serial I/O technology provides a direct connection between the chipset and PCI Express component/adapters with bandwidth up to 48 GB/s on each PCI Express Gen 2.0 x8 interface. PCI Express offers higher bandwidth, lower latency, and fewer I/O bottlenecks than PCI-X.
Intel® Matrix Storage Technology	▪ With additional hard drives added, provides quicker access to files with RAID 0, 5, and 10, and greater data protection against a hard disk drive failure with RAID 1, 5, and 10. Support for external SATA (eSATA) enables the full SATA interface speed outside the chassis, up to 3 GB/s.
Enhanced Intel® Virtualization Technology® (Intel® VT)	▪ Further speeds up virtual machine transition (entry/exit) times. Supports hardware assist for I/O virtualization using Intel Virtualization Technology for Directed I/O (Intel® VT-d). ▪ Supports Intel® VT for Connectivity; (Intel® VT-c) which reduces I/O latency.



Reliable Uptime

The Intel Xeon processor 7500 series also builds in enhanced reliability to support continuous server availability and help prevent unplanned downtime.

Reliability Feature

Benefit

Intel® Machine Check Architecture Recovery

- Detects and recovers from otherwise uncorrectable single-bit errors.
- Logging with OS predictive failure analysis allows you to predict failures before they happen.

Intel® QuickPath Interconnect

- Packet re-try and lane failover help heal failing data connections and help ensure your data is available.

Dynamic processor socket and memory migration

- Migrate workloads from components at risk, maintaining server availability and uptime.

Memory Thermal Throttling

- Prevents circuit-level memory errors so that data integrity is preserved.

Memory ECC, parity checking, and patrol scrubbing

- Detect and correct single-bit data errors.

Corrected Machine Check Interrupt

- Identifies components with recurring errors for preemptive replacement, increasing reliability and improving uptime.



Learn More

For more information on the Intel Xeon processor, visit www.intel.com/xeon.

Intel offers a complete line of industry-leading single- and multi-port Gigabit and Fast Ethernet controllers. For more information go to www.intel.com/network.

For I/O virtualization solutions go to, www.intel.com/go/vtc.

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

^B Intel® Virtualization Technology requires a computer system with an enabled Intel® processor, BIOS, virtual machine monitor (VMM) and, for some uses, certain platform software enabled for it. Functionality, performance or other benefits will vary depending on hardware and software configurations and may require a BIOS update. Software applications may not be compatible with all operating systems. Please check with your application vendor.

^C Hyper-Threading Technology requires a computer system with a processor supporting Hyper-Threading Technology and an HT Technology enabled chipset, BIOS and operating system. Performance will vary depending on the specific hardware and software you use. See www.intel.com/info/hyperthreading/ for more information including details on which processors support HT Technology.

^D 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. Processors will not operate (including 32-bit operation) without an Intel 64 architecture-enabled BIOS. Performance will vary depending on your hardware and software configurations. Consult with your system vendor for more information.

^E Intel comparison replacing one Intel Xeon processor X7460-based server with one new Intel Xeon processor X7560-based server up to 3.7x better virtualized environment claim: Virtualization Performance on internal tiled consolidation profile 2 benchmark Comparison based on Intel internally measured results (TR#1096) as of 12 February 2010. 4S Intel® Xeon® processor X7460-based platform details Intel 7300 Chipset-based server system with four Intel Xeon processors X7460 (16M cache, 2.66 GHz, 1066 MHz FSB, 6C), 128 GB (32x4 GB PC2-5300 667 MHz Registered ECC DDR2 DIMMs, VMware ESX* 3.5.0 U3 GA. 4S Intel® Xeon® processor X7560-based platform details Intel® 7500 Chipset-based reference server platform with four Intel® Xeon® Processor X7560 (24M cache, 2.26GHz, 6.40GT/s Intel QPI), Intel® EIST enabled, Turbo Boost enabled, Hyper-Threading enabled, NUMA enabled, Prefetchers enabled, 512 GB (64x8 GB DDR3-1066) memory, VMware ESX 4.0 Update 1 development build, 2x Intel® 10 Gb CX4 Dual-Port Server Adapter, FC SAN 2x QLogic QLA2462, 16x32 GB SSD disk storage system.

^F Intel performance comparison using SPECint_rate_base2006* performance results between 5-year-old single-core Intel® Xeon® processor 3.33 GHz based servers and one new Intel Xeon processor X7560-based server. 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, visit www.intel.com/performance/server.

^G Claim based on comparison between 4S Intel® Xeon® MP CPU 3.3 GHz (Single core w/ HT, 1 MB L2, 8 MB L3, Potomac) and 4S Intel® Xeon® X7560 (8 core, 2.26 GHz) processor-based servers. Calculation includes analysis based on performance, power, cooling, electricity rates, operating system annual license costs and estimated server costs. This assumes 42U racks, \$0.10 per kWh, cooling costs are 2x the server power consumption costs, operating system license cost of \$900/year per server, per server cost of \$36,000 based on estimated list prices, and estimated server utilization rates. All dollar figures are approximate. SPECint_rate_base2006* performance and power results are measured for X7560 and Xeon 3.3GHz processor-based servers. Platform power was measured during the steady state window of the benchmark run and at idle. Performance gain compared to baseline was 20x. Costs and return on investment payback have been estimated based on internal Intel analysis and are provided for informational purposes only.

^H 8.2x memory bandwidth claim based on Feb'10 Intel internal measurement using Intel internal memory bandwidth workload on comparable 4S Intel Xeon processor X7560 and 4S Intel Xeon processor X7460 servers.

^I Based on Feb '10 internal measurement using OLTP workload. 4-socket Intel® Xeon® processor 7560-based platform vs 4-socket Intel Xeon processor X7460-based platform. 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 Intel Performance Benchmark Limitations.

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