FIND THE RIGHT SERVERS FOR YOUR BUSINESS

Intel® Xeon® Processor-Based Server Selection Guide

Intel® processors power a wide range of server options, from entry-level small business servers, to big data analytic clusters, to scalable, mission-critical enterprise servers designed to support today's most demanding business intelligence and transactional applications. Intel processors also include a variety of advanced technologies that can help you solve specific business challenges in today's virtualized data centers and clouds. Choosing the right server configurations to match your specific requirements is essential to ensure the performance, reliability, and security you need, while simultaneously minimizing your total cost of ownership. This guide provides an overview of Intel® server processors to help you make informed decisions based on your workloads, your data center deployment models, and your budget.

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intel inside™ XEON®

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Choose the Right Server for the Job

Based on Your Applications and Workloads:

SERVER REQUIREMENT	PAGE	APPLICATIONS AND WORKLOADS			INTEL® PROCESSOR FAMILY
Mission Critical		• Real-time big-data analytics • Large-scale database (in-memory and back-end) • Data warehousing	• RISC to IA conversions • Large-scale ERP	• Real-time transactional systems	• Intel® Xeon® processor E7 v2[1] family
Data Demanding		• Business Intelligence (BI) • Large-scale virtualization and consolidation • Enterprise databases	• ERP • SCM • Decision support	• CRM • Transaction-intensive, such as e-Commerce	• Intel Xeon processor E7 v2[1] family
Standard Infrastructure		• Infrastructure virtualization • Big data analytics • Mail and web • Networking	• File/print • Office and departmental databases • Line-of-business • Rendering farms	• Application servers • Technical computing • Financial service and Java* applications	• Intel® Xeon® processor E5 v3[1] family
Cloud		• All business applications, from standard infrastructure to mission-critical			• Intel Xeon processor E5 v3[1] family • Intel Xeon processor E7 v2[1] family
		• Ultra-low-end web serving • Static content delivery • Basic dedicated hosting	Some: • Media • VDI	Some: • Gaming • Object caching/Memcached	• Intel® Xeon® processor E3 v3[1] family
Small Business and Departmental		• Server consolidation/virtualization • All business applications			• Intel Xeon processor E3 v3[1] family
High Performance and Technical Computing		• Digital manufacturing • Energy	• Financial services • Healthcare and life sciences • Scale-up HPC	• Physical sciences • Weather/climate research	• Intel Xeon processor E5 v3 family • Intel® Xeon Phi™ coprocessor • Intel Xeon processor E7 v2[1] family • Intel Xeon processor E3 v3 family

Based on Your Data Center Requirements:

IT REQUIREMENT	1- TO 4-PROCESSOR SERVERS: INTEL® XEON® PROCESSOR E5[1] FAMILY	2- TO 256-PROCESSOR SERVERS: INTEL® XEON® PROCESSOR E7[1] FAMILY (WINDOWS,* LINUX* WITH SUPPORT FOR ORACLE SOLARIS*)
Reliability, Data Security	Good	Best
Performance, Memory, and I/O Scalability	1-4 sockets 1.5 TB memory (2 sockets)	2-256 sockets (up to 8 sockets natively without 3rd party node controllers) 6 TB memory (4 sockets); 12 TB memory (8 sockets)
Targeted Deployment Models	**Scale OUT:** Rapid, incremental addition of servers to meet business growth demands. **Pedestal, Rack, Blade**	**Scale UP:** Fewer, more powerful servers with headroom for demanding applications, heavier peak periods, and business growth. **Rack and Blade** platforms that scale with the help of third-party node controllers

Specialized Requirements:

Extreme Density (Microservers)	1-Processor Servers: Intel® Xeon® processor E3 v3 family
Extreme Parallelism (HPC)	Intel® Xeon Phi™ product family
Media Servers	Intel Xeon processor E3 v3 product family

Solve Your Toughest Data Center Challenges

The Intel Advantage

The latest Intel® Xeon® processors take performance, energy-efficiency, and compute density to new heights, while delivering best-in-class support for virtualization, cloud computing, in-memory computing, big-data analytics, and technical computing. Servers based on these processors provide the foundation for a standardized, efficient, and agile data center that can help you drive down space, power, cooling, and management costs, while providing exceptional performance and reliability across the full range of workloads.

Energy-Efficient Performance

Intel Xeon processors offer leadership performance and energy efficiency across multiple industry benchmarks[2] in servers that range in size from 1 to 256 sockets.

- **Ongoing Performance Gains.** The latest Intel processors increase performance by up to 100 percent versus the prior generation[3,4] and Intel is committed to boosting performance in every new generation across all server types and deployment models.
- **Intelligent Workload Optimization.** Processor frequencies adapt dynamically to workloads to optimize performance per watt at all operating points. Frequencies can be increased beyond rated values for compute-constrained workloads and power consumption is virtually eliminated for inactive portions of the chip.

Advanced Functionality

Advanced features are built into Intel Xeon processors to help you keep pace with escalating business requirements.

- **Hardware-Enhanced Security.** Hardware-assisted encryption and advanced launch-time and runtime protections help you protect systems, applications, and data more effectively, at lower cost, and with less impact on application performance.
- **Superior Reliability.** All Intel® Xeon® processor-based servers are designed, tested, and validated for superior reliability. The Intel® Xeon® processor E7 v2 family extends this advantage, providing advanced reliability, availability, and serviceability (RAS) capability through Intel® Run Sure Technology[5] to support mission-critical applications.

Higher Value Throughout Your Business

Better for Virtualization – and the Cloud

The broad range of cloud-optimized Intel Xeon processor-based servers provides a flexible and efficient foundation for virtualizing all enterprise applications and for moving confidently toward next-generation private, public, and hybrid cloud solutions.

- **Near-native performance.** With extensive hardware assists for virtualization, even large databases and transactional workloads can be virtualized with confidence. Ongoing improvements in performance and virtualization efficiency in the latest Intel® Xeon® processors—plus the flexible bandwidth provided by 10/40 Gigabit Intel® Ethernet Converged Network Adapters—can help IT organizations sustain high performance across all workloads in demanding cloud environments, while reducing total cost of ownership (TCO) through greater workload consolidation.
- **Seamless workload mobility.** Virtual machines can be migrated without downtime across multiple server generations, so you can establish a single pool of virtualized resources to maximize flexibility and efficiency in your cloud.
- **Secure multitenancy.** Hardware-enhanced security (see page 5) enables sensitive data and workloads to be deployed with greater confidence on shared infrastructure.
- **Intelligent, scale-out storage solutions.** Intel Xeon processors combine high performance and scalability with advanced data protection features for scaling out storage cost-effectively as data volumes grow. Intel® Solid-State Drives and Intel® Cache Acceleration Software add to these advantages by delivering higher performance and greater efficiency through transparent storage tiering.

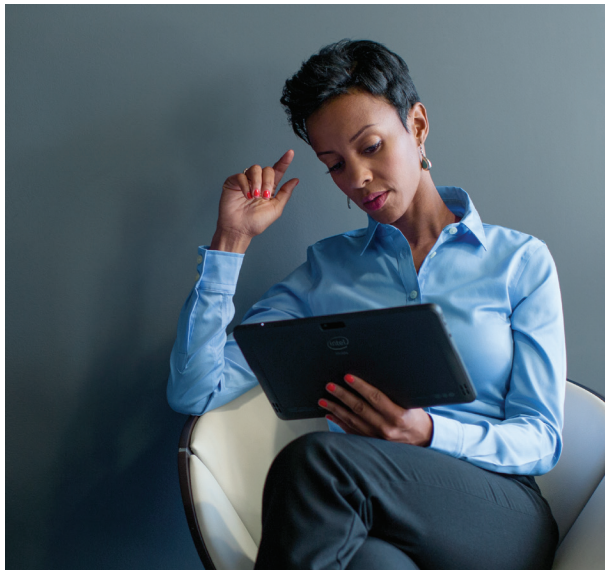
Performance and Security for Real-Time, Big Data Analytics

High-performing and secure clusters are essential for cost-effectively storing and analyzing today's fast-growing, poly-structured data sets. Powerful, large-memory systems are equally important for delivering real-time insights through scalable, in-memory analytics. Intel offers exceptional performance and value for both of these usage models.

- The combination of the Intel® Xeon® processor E5 family, 10/40 Gigabit Intel® Ethernet Converged Network Adapters, Intel SSDs, and the Intel® Distribution for Apache Hadoop* software provides enterprise-class support for security and manageability, and has been shown to deliver up to 30 times higher performance[4,6] compared with a less optimized solution stack.
- The Intel Xeon processor E7 v2 product family provides up to 120 cores, 240 threads and 12 TB of memory capacity per 8-socket server, providing outstanding performance and scalability for real-time, in-memory analytics.

A Compelling Alternative to High-End RISC

According to IDC, over 85 percent of higher end workloads are now running on industry-standard servers, including business intelligence, data warehousing, database, and enterprise resource planning applications.[7] Servers based on the Intel Xeon processor E7 v2 family offer robust mission-critical capability with significant system price and price/performance advantages versus IBM POWER7.*[4,8] Businesses are migrating onto these new servers to reduce costs for their most critical applications, and to provide a more flexible foundation for growth and innovation.



High Performance Technical Computing – at Every Scale

From entry-level workstations to massive high performance computing (HPC) clusters, technical computing systems based on Intel Xeon processors provide leadership performance and energy-efficiency to help engineers and scientists push the boundaries of knowledge and innovation. That's why more than 85 percent of the world's 500 largest supercomputers—and 111 out of the last 114 to join the TOP500 list—run on Intel® architecture.[9]

Intel provides the same high value across the full range of technical computing needs, with a comprehensive array of processors, coprocessors, storage solutions, networking devices, and software tools that are optimized for technical computing. Whether you are a small design shop or a global research center, you can tailor your workstations and clusters to address your specific needs at the lowest cost. And you can take advantage of high-performance Intel innovations, such as Intel® Solid-State Drives, Intel® True Scale fabric, and a highly scalable Intel® Lustre* file system.

Advanced Intel Server Technologies

TECHNOLOGY	DESCRIPTION	BENEFIT
Scalable, Energy-Efficient Performance		
Intel® Turbo Boost Technology[10] 2.0	Increases processor frequencies beyond rated values to take advantage of power and thermal headroom.	Delivers peak performance for compute-constrained workloads without increasing power consumption for other workloads.
Intel® Advanced Vector Extensions[11] (Intel® AVX)	Accelerates vector and floating point computations, including 16/32-bit data conversions.	Delivers up to 2x higher performance for vector and floating point operations[4,12]
Intel® Advanced Vector Extensions 2[11] (Intel® AVX2)	Improves compute-intensive performance through Fused Multiply Add (FMA) operations.	Delivers up to 1.9x higher performance for the integer vector operations used in a broad range of enterprise workloads.[4,13]
Intel® Integrated I/O	Integrates I/O onto the processor die to support faster data movement in today's dense, I/O-intensive environments.	Reduces I/O latency by up to 32 percent[4,14] and support for the PCIe 3.0 specification increases I/O bandwidth by as much as 2x.[4,15]
Intel® Data Direct I/O Technology (Intel® DDIO)	Enables direct data transfers from storage to cache.	Increases I/O performance by up to 2.3 times[4,16] and reduces the need for performance-sapping memory accesses.
Intel® Intelligent Power Technology[17]	Dynamically conserves power and enables advanced power management.	Helps to reduce operating costs and improve system reliability through power optimization and management.
Intel® Hyper-Threading Technology[18] (Intel® HT Technology)	Doubles the number of execution threads that can be supported by each processor core.	Increases processing efficiency for multi-threaded applications and for multiple simultaneous tasks.
Intel Resource Director Technology	Allows the hypervisor to monitor Last Level Cache usage at the application and VM levels.	Helps to improve performance and efficiency by providing better information for scheduling, load balancing, and workload migration.
Intel® Node Manager 3.0 (Intel® NM) with power/thermal-aware scheduling (PTAS)	Enables dynamic monitoring and limiting of server power consumption and provides visibility into thermal profiles across node, rack, and data center.	Allows IT organizations to run more and heavier workloads per server while guarding against server overheating.
Advanced Reliability, Availability, and Serviceability (RAS)		
Intel® Run Sure Technology[5] • Resilient System Technologies • Resilient Memory Technologies • More than 20 additional RAS features	Enhances reliability and uptime for your most business-critical workloads. Helps reduce the frequency and cost of planned/unplanned downtime while also protecting data integrity.	Supports data integrity and uptime equivalent to or better than best-in-class RISC-based platforms, with greater flexibility and better cost models.
Hardware-Enhanced Security		
Intel Data Protection Technology: • Intel® Advanced Encryption Standard New Instructions[19] (Intel® AES-NI) • Intel® Secure Key[20]	• Intel AES-NI provides seven new instructions to accelerate and strengthen encryption and decryption. • Intel Secure Key provides high quality security keys using an integrated random number generator.	Improves encryption security and performance and reduces overhead to enable the pervasive use of encryption for strong data security—without compromising application performance.
Intel Platform Protection Technology: • Trusted Execution Technology[21] (Intel® TXT) • OS Guard	• Intel TXT ensures that physical servers and virtual machines boot only into cryptographically verified "known good states." • OS Guard provides enhanced protection against escalation-of-privilege attacks.	Allows IT to establish trusted pools of virtual resources and to protect systems, applications, and data more effectively from launch-time through runtime.
Hardware-Enhanced Virtualization		
Intel® Virtualization Technology[22] (Intel® VT)	Provides hardware-assists for virtualization in Intel processors, chipsets, and network adapters.	Enables near-native application performance in virtual environments, with improved reliability and enhanced workload isolation.
Intel® VM Control Structure (VCMS) Shadowing	Enables a hypervisor to run efficiently within a virtual machine (VM) managed by a second hypervisor—by eliminating most nesting-induced VM exits/entries.	Provides ultra-high isolation for financial applications and other critical workloads.

Optimized Processors for Your Server Requirements

Affordable Servers for Small Businesses and More

Intel® Xeon® Processor E3-1200 v3 Product Family

1-processor servers ideal for:

- Most small business workloads
- Some departmental workloads for larger companies
- Certain lightweight or graphics-intensive data center workloads

Servers based on the Intel Xeon processor E3-1200 v3 product family are designed to meet the needs of small businesses, providing responsive performance and hardware-assisted reliability and security—all at affordable prices. In addition to the Intel server technologies listed below, these servers include Intel® Rapid Storage Technology enterprise[23] (Intel® RSTe), which protects against hard drive failures, and ECC memory, which automatically corrects memory errors. They also include two security technologies—Intel® Data Protection Technology with AES-NI and Secure Key,[19,20] and Intel® Platform Protection Technology[24] with OS Guard, BIOS Guard, and Trusted Execution Technology (TXT)—to support stronger safeguards against today's increasingly sophisticated malware attacks.

Although designed primarily for small businesses, the outstanding energy-efficiency, density, and graphics performance of these servers make them ideal for certain data center workloads, such as media serving, virtual desktop hosting, and static web serving.

KEY INTEL SERVER TECHNOLOGIES:

Intel Turbo Boost Technology 2.0 | Intel HT Technology | Intel AVX 2 | Intel Platform Protection Technology | Intel Data Protection Technology | Intel VT

Flexible and Efficient Servers for Standard Infrastructure

Intel® Xeon® Processor E5-2600 v3 Product Family

2-processor servers ideal for most workloads, including:

- Standard infrastructure
- Virtualization, cloud, and big data
- Technical computing

The Intel Xeon processor E5 v3 family provides the versatility you need at the heart of your data center, so you can improve agility, efficiency, and performance, while establishing a better foundation for security across all your deployments—native, virtualized, and cloud. Based on Intel's industry-leading 22nm, 3-D transistor technology, these processors provide 50 percent more cores and cache than the previous generation. They also provide improved virtualization efficiency and support industry-leading DDR4 memory, which enables faster data access with reduced power consumption. Compared with typical four-year old servers based on the Intel Xeon processor 5600 series, you can expect to see up to 6x higher performance across a range of benchmarks.[4,25]

KEY INTEL SERVER TECHNOLOGIES:

Intel Turbo Boost Technology 2.0 | Intel Resource Director Technology | Intel AVX2 | Intel NM 3.0 with PTAS | Intel Intelligent Power Technology | Intel HT Technology | Intel Integrated I/O | Intel DDIO | OS Guard | Secure Key | AES-NI | TXT | Intel VT

Scalable Servers for Business Intelligence and Other Mission-Critical Workloads

Intel® Xeon® Processor E7-8800/4800/2800 v2 Product Families

2-256 processor servers ideal for:

- Real-time business intelligence/business analytics
- RISC replacement
- Mission-critical enterprise computing
- Large in-memory or back-end databases
- Heavy workloads in native, virtual, and private cloud deployments
- Large-scale virtualization and consolidation
- Scale-up high performance computing (HPC)

Servers based on the Intel Xeon processor E7-8800/4800/2800 v2 product families deliver leadership performance for real-time business intelligence and other demanding, mission-critical applications. They have more processors, memory, I/O, cache, and RAS capability than standard 2-socket or 4-socket EP systems. The top-of-the-line Intel Xeon processor E7 v2 product family provides up to twice the performance of the previous generation Intel® Xeon® processor E7 product family,[3,4] with 50 percent more cores and threads, 25 percent more cache, three times the memory capacity,[26] four times the system bandwidth,[27] and additional reliability and security features. Each socket provides up to 30 threads, 37.5 MB of on-die cache, and supports up to 24 64 GB LR-DIMMS. As businesses race to deploy real-time analytic solutions, the exceptional performance, large memory capacity, and world-class reliability provided by these servers offer essential new capabilities.

KEY INTEL SERVER TECHNOLOGIES:

Intel Turbo Boost Technology 2.0 | Intel Intelligent Power Technology | Intel HT Technology | Technology | Intel Integrated I/O | Intel DDIO | Intel AVX | OS Guard | Secure Key | Intel AES-NI | Intel TXT | Intel VT | Intel Run Sure Technology

Microservers for Lightweight, Highly-Parallel Workloads

Intel® Xeon® Processor E3 v3

Most data center workloads run best on two-socket or larger Intel Xeon processor-based servers. However, some lightweight, web-scale workloads such as entry-level dedicated hosting, simple content delivery and static web serving run more efficiently on large numbers of smaller server cores. To improve TCO for these workloads, Intel has worked with server manufacturers to deliver a new low-power, high-density server form factor—microservers.

Microservers based on the Intel Xeon processor E3-1200 v3 product family provide up to 5.8x greater performance per SSI rack compared to a rack of 1U servers,[4,28] and support thermal design points (TDPs) as low as 13W per node. These servers are built for the data center, with support for 64-bit software, Intel Virtualization Technology and error-correcting code (ECC) memory. They offer valuable TCO advantages for sufficiently lightweight workloads in large-scale Internet and service-provider data centers.

High-Performance Servers and Workstations for Technical Computing

From entry-level workstations to massive super-computers, Intel Xeon processors support the full range of technical computing requirements to help businesses and research centers achieve desired results faster and at lower cost.

Intel Xeon Processor E5-2600 v3 Family. These processors are the ideal choice for powerful, dual-processor workstations and for high-performance server nodes in HPC clusters. They provide greater bandwidth and stronger per core performance than the previous generation, along with deeper buffers and twice the floating point capacity. You can expect real-world performance gains of up to 1.9x versus prior-generation processors[4,13] and up to 6.3x versus typical four year old processors.[4,29] Compelling features include up to 18 cores, 36 threads, 45 MB last-level cache, support for large memory configurations (up to 1.5 TB per 2S server), fast memory options (up to 2133 MHz with DDR4 memory), 4 memory channels, and up to 40 lanes of PCIe* 3.0 per socket for low node-to-node latency. These are the processors of choice for most technical applications.

Intel® Xeon Phi™ Product Family. Use these powerful coprocessors to accelerate workstation and cluster performance for highly-parallel and vector-oriented applications. Intel Xeon Phi coprocessors provide up to 61 cores and 244 threads, are IP addressable, can run their own Linux* OS, and deliver up to 1.2 teraflops of double-precision performance.[4,30] They support a variety of execution modes (dependent, independent, and symmetrical), and come in multiple configurations and form factors (including standard PCIe x16 cards with or without cooling). They are fully compatible with software written for Intel Xeon processors.

Intel® Xeon® processor E5-1600 v3 Product Family. This is Intel's most powerful processor for single-processor workstations. It offers more cores, cache, memory and I/O bandwidth than the Intel Xeon processor E3-1200 v3 product family (see below), so engineers and researchers get faster results when running complex applications and interacting with large data sets.

Intel® Xeon® Processor E3-1200 v3 Product Family. These processors are ideal for entry-level workstations, which provide a major leap in performance and capacity versus standard business desktops. Server-class features deliver higher performance and scalability, enhanced reliability, and superior data integrity. Intel® HD P4600 graphics are built-in, providing professional-grade data visualization without the cost or complexity of an add-in graphics card.

Intel Xeon Processor E7 v2 Family. These expandable two-to-eight-socket servers deliver scalable performance for data-demanding, transaction-intensive, technical computing workloads requiring large individual systems or clustered supernodes. With up to 15 cores and 37.5 MB of shared on-die cache per processor, up to 6 TB of memory in a four-socket system, Intel AVX for CPU-bound workloads, and unique data traffic optimization features, the Intel Xeon processor E7 v2 family is ideal for accelerating performance on complex, time-critical calculations, and for design analysis, fluid dynamics, life sciences, and more.

TO LEARN MORE

To learn more about Intel® Xeon® processor-based servers, go to www.intel.com/xeon or speak to your local Intel reseller.

[1] 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.

[2] For the latest Intel processor-based server performance benchmarks, including test descriptions, results, and disclaimers, visit the Intel web site at: http://www.intel.com/performance/server/.

[3] Intel internal measurements as of November 2013

Configuration Details

- OLTP brokerage workload results using Microsoft SQL Server* (transactions per second) – Intel Technical Report (TR) #1371.
- Baseline configuration: 4-Socket Intel® 7500 Chipset-based Server with four Intel® Xeon® processors E7-4870 (30M Cache, 2.40 GHz, 10 Cores) using 64x 8 GB DDR3-1066 memory (512 GB) scoring 3008 with SQL Server* 2012.
- New Intel configuration: 4-Socket Intel® C602J Chipset-based Server with four Intel® Xeon® processors E7-4890 v2 (37.5M Cache, 2.80 GHz, 15 Cores) using 64x 16 GB DDR3-1333 (running at 2666MHz) memory (1 TB) scoring 5216 with SQL Server* 2012 (+1.73x).
- OLTP warehouse workload results using Oracle* 11g R2 (transactions per minute) – Intel Technical Report (TR) #1346.
- Baseline configuration: 4-Socket Intel® 7500 Chipset-based Server with four Intel® Xeon® processors E7-4870 (30M Cache, 2.40 GHz, 10 Cores) using 64x 8 GB DDR3-1066 memory (512 GB) scoring 2740K.
- New Intel configuration: 4-Socket Intel® C602J Chipset-based Server with four Intel® Xeon® processors E7-4890 v2 (37.5M Cache, 2.80 GHz, 15 Cores) using 64x 16 GB DDR3-1333 (running at 2666MHz) memory (1 TB) scoring 4789K (+1.75x).
- Commercial General Purpose Throughput (Integer Compute) using SPECint*_rate_base2006 benchmark results compiled with Intel Compiler Parallel Studio XE 2014.1 – Intel Technical Report (TR) #1339.
- Baseline configuration: 4-Socket Intel® 7500 Chipset-based Server with four Intel® Xeon® processors E7-4870 (30M Cache, 2.40 GHz, 10 Cores) using 64x 8 GB DDR3-1066 memory (512 GB) scoring estimated 1100 baseline.
- New Intel configuration: 4-Socket Intel® C602J Chipset-based Server with four Intel® Xeon® processors E7-4890 v2 (37.5M Cache, 2.80 GHz, 15 Cores) using 64x 8 GB DDR3-1333 (running at 2666MHz) memory (1TB) scoring estimated 2288 baseline (+2.08x).
- HPC Application Throughput (Floating-Point Compute) using SPECfp*_rate_base2006 benchmark results compiled with Intel Compiler Parallel Studio XE 2014.1 – Intel Technical Report (TR) #1339.
- Baseline configuration: 4-Socket Intel® 7500 Chipset-based Server with four Intel® Xeon® processors E7-4870 (30M Cache, 2.40 GHz, 10 Cores) using 64x 8 GB DDR3-1066 memory (512 GB) with Intel Compiler Fortran 13.1 scoring estimated 741 baseline.
- New Intel configuration: 4-Socket Intel® C602J Chipset-based Server with four Intel® Xeon® processors E7-4890 v2 (37.5M Cache, 2.80 GHz, 15 Cores) using 64x 8 GB DDR3-1333 (running at 2666MHz) memory (1TB) Intel Compiler Fortran 14.0 scoring estimated 1675 baseline (+2.26x).
- Memory bandwidth using STREAM_OMP TRIAD benchmark results – Intel Technical Report (TR) #1344.
- Baseline configuration: 4-Socket Intel® 7500 Chipset-based Server with four Intel® Xeon® processors E7-4870 (30M Cache, 2.40 GHz, 10 Cores) using 32x 8 GB DDR3-1066 memory (256 GB) scoring 101 GB/s.
- New Intel configuration: 4-Socket Intel® C602J Chipset-based Server with four Intel® Xeon® processors E7-4890 v2 (37.5M Cache, 2.80 GHz, 15 Cores) using 64x 8 GB DDR3-1333 (running at 2666MHz) memory (512 GB) scoring 243 GB/s (+2.41x).
- Matrix multiplication using LINPACK_MP benchmark results based on Intel Math Kernel Library (MKL) (GFLOPs) – Intel Technical Report (TR) #1157b and 1372.
- Baseline configuration: 4-Socket Intel® 7500 Chipset-based Server with four Intel® Xeon® processors E7-4870 (30M Cache, 2.40 GHz, 10 Cores) using 64x 4 GB DDR3-1066 memory (512 GB), Intel MKL 10.3.0 scoring 353.6 GFLOPs.
- New Intel configuration: 4-Socket Intel® C602J Chipset-based Server with four Intel® Xeon® processors E7-4890 v2 (37.5M Cache, 2.80 GHz, 15 Cores) using 64x 8 GB DDR3-1333 (running at 2666MHz) memory (1TB) scoring 1235 GFLOPs (+3.50x).

[4] Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products. For more information go to http://www.intel.com/performance.

[5] No computer system can provide absolute reliability, availability or serviceability. Requires an Intel® Run Sure Technology-enabled system, including an enabled Intel processor and enabled technology(ies). Built-in reliability features available on select Intel® processors may require additional software, hardware, services and/or an Internet connection. Results may vary depending upon configuration. Consult your system manufacturer for more details.

[6] Source: Intel internal measurements. Benchmark run is Terasort with 1 TB of data on Intel® Xeon® E5-2600 product family. Results have been simulated and are provided for information purposes only. Results were derived using simulations run on an architecture simulator or model. Any difference in system hardware or software design or configuration may affect actual performance. Intel product plans in this document do not constitute Intel plan of record product roadmaps. Please consult your Intel representative to obtain Intel's current plan of record product roadmaps. For more information, go to http://intel.com/performace

[7] Source: IDC's Server Workloads 2008, June 2008.

[8] Configurations: Up to 2x performance at 19 percent the price/performance based on comparing a 4-socket server based on an Intel Xeon processor E7-8837 to a 4-socket server based on an Oracle SPARC T4-4 processor using the TPC-H@1,000 GB QphH price and price/performance benchmark metrics as of June 7, 2011.Performance: 4-socket (4S) Intel Xeon processor E7-8837-based platform details: Dell PowerEdge R910 4P server platform with four (4 P/32C/32 T) Intel Xeon processors E7-8837 (2.67 GHz/24MB/6.GT/s Intel QPI), 1,024 GB memory, Vectorwise 1.6 database. Referenced as published score of 436,789 QphH@1,000 GB; USD 0.88/QphH@1,000 GB available June 30, 2011. Source: tpc.org/tpch/results/tpch_result_detail.asp?id=111050402. 4S Oracle SPARC T4-4-based platform details: Oracle T4-4 with four (4 P/32 C/256 T) SPARC T4 3.0 GHz processors, 512 GB, Oracle Database 11g Release 2 Enterprise Edition with Partitioning. Referenced as published score of 201,487 QphH@1,000 GB; USD 4.60/QphH@1,000 GB available October 30, 2011. Source: tpc.org/tpch/results/tpch_result_detail.asp?id=111092601. Up to 1.12x performance at 19 percent system cost based on comparing a 4-socket server based on an Intel Xeon processor E7-4870 to a 4-socket IBM Power 750 Express server based on a POWER7* processor using the SPECjbb2005 bops score benchmark metric and Internet pricing as of June 7, 2012. The IBM Power 750 Express is the majority of IBM's 4-socket shipments and the system we typically compete against with the Intel Xeon processor E7 family in a 4-socket server configuration. Performance: 4S Intel Xeon processor E7-4870-based platform details: NEC Express* 5800/A1080a-S, 4x E7-4870 (30 M cache, 2.40 GHz, 6.40 GT/s Intel QPI), 524 GB memory, Oracle Java* HotSpot 64-Bit Server VM on Windows, version 1.6.0_26, SPECjbb2005 bops = 2,783,744; SPECjbb2005 bops/Java Virtual Machine (JVM) = 139,187. Source: spec.org/osg/jbb2005/results/res2011q2/jbb2005-20110614-00993.html. 4S IBM POWER7–based platform details: IBM Power 750 Express (3.55 GHz, 32 core), 4x POWER7 processors (Intelligent Energy Optimization up to 3.86 GHz), 256 GB memory, IBM Technology for Java 1.6 (32-bit JVM) [build pap3260sr7-20091215_02(SR7)], SPECjbb2005 bops = 2,478,929; SPECjbb2005 bops/JVM = 77,467. Source: spec.org/jbb2005/results/res2010q1/jbb2005-20100205-00800.html. Pricing details: Intel Xeon processor E7-4870: HP DL580 system price of USD 35,201 with 4x Intel Xeon processor E7-4870, 128 GB memory, and 2 hard disk drives (HDDs) as of June 7, 2012, on HP.com. Source: http://h71016.www7.hp.com/dstore/MiddleFrame.asp?page=config&ProductLineId=431&FamilyId=317 7&BaseId=36036&oi=E9CED&BEID=19701&SBLID. IBM Power 750 Express pricing: 4 x 3.55 GHz Power7 processors. Source: IBM Alinean Server Consolidation TCO Calculator for Power (UNIX). List pricing represents typical and average configuration including memory, storage, network interface cables, and chassis. Excludes cost of rack and hardware management console (HMC). Price: USD 186,347 as of June 7, 2012. Source: https://roianalyst.alinean.com/ibm_stg/AutoLogin. do?d=811844259353233331.

[9] Source: TOP500 Supercomputer web site as of August 20, 2014. Data was extracted from the June 2014 list of the Top500 supercomputers using the List Statistics generator at http://www.top500.org/statistics/list/ and the Microsoft Excel version of the list, available at http://www.top500.org/lists/2014/06/.

[10] Requires a system with Intel® Turbo Boost Technology. Intel Turbo Boost Technology and Intel Turbo Boost Technology 2.0 are only available on select Intel® processors. Consult your PC manufacturer. Performance varies depending on hardware, software, and system configuration. For more information, visit http://www.intel.com/go/turbo.

[11] AVX/AVX2 is designed to achieve higher throughput to certain integer and floating point operations. Depending on processor power and thermal characteristics and system power and thermal conditions, AVX/AVX2 floating point instructions may run at lower frequency to maintain reliable operations at all times.

[12] Up to 2x performance boost for floating point operations (FLOPS): The Intel® Xeon® processor E5 product family supports Intel® Advanced Vector Extensions (Intel® AVX), which increases maximum vector size from 128 to 256 bits. Compared to the Intel® Xeon® processor 5600 series, Intel AVX enables up to twice the work to be accomplished per clock cycle during floating point and vector operations. Intel Optimized SMP LINPACK 10.3.5 on Linux x86_64 Intel® Xeon® processor X5690 platform Intel® Xeon® 5600 platform with two Intel® Xeon® processors X5690 (6-Core, 3.46 GHz, 12 MB L3 cache, 6.4GT/s, B1-stepping), EIST Enabled, Turbo Boost enabled, Hyper-Threading Disabled, 48 GB memory (12x 4 GB DDR3-1333 REG ECC), 160 GB SATA 7200RPM HDD, Red Hat* Enterprise Linux Server 6.1 with kernel 2.6.32-131.0.15.el6.x86_64. Source: Intel internal testing as of Nov 2011. Score: 159.36 Gflops. (TR#1236) Intel® Xeon® processor E5-2690 platform Intel® Xeon® E5-2600 Qual platform with two Intel® Xeon® processors E5-2690 (8-core 2.9 GHz, 20M L3 cache, 8.0 GT/s, 135W, C1-stepping), EIST Enabled, Turbo Boost enabled, Hyper-Threading Disabled, 64 GB memory (8x8 GB DDR3-1600 REG ECC), 160 GB SATA 7200RPM HDD, Red Hat* Enterprise Linux Server 6.1 with kernel 2.6.32-131.0.15.el6.x86_64. Source: Intel internal testing as of Nov 2011. Score: 347.69 Gflops. (TR#1236). AVX/AVX2 is designed to achieve higher throughput to certain integer and floating point operations. Depending on processor power and thermal characteristics and system power and thermal conditions, AVX/AVX2 floating point instructions may run at lower frequency to maintain reliable operations at all times.

[13] Source as of August 2014 TR#3034 on Linpack*. Baseline configuration: Intel® Server Board S2600CP with two Intel® Xeon® Processor E5-2697 v2, Intel® HT Technology disabled, Intel® Turbo Boost Technology enabled, 8x8GB DDR3-1866, RHEL* 6.3, Intel® MKL 11.0.5, score: 528 GFlops. New configuration: Intel® Server System R2208WTTYS with two Intel® Xeon® Processor E5-2699 v3, Intel® HT Technology disabled, Intel® Turbo Boost Technology enabled, 8x16GB DDR4-2133, RHEL* 6.4, Intel® MKL 11.1.1, score: 1,012 GFlops.

[14] Source: The claim of up to 32% reduction in I/O latency is based on Intel internal measurements of the average time for an I/O device read to local system memory under idle conditions for the Intel® Xeon® processor E5-2600 product family versus the Intel® Xeon® processor 5600 series.

[15] 8 GT/s and 128b/130b encoding in PCIe 3.0 specification enable double the interconnect bandwidth over the PCIe 2.0 specification. Source: http:www.pcisig.com/news_room/November_18_2010_Press_Release/.

[16] Source: The claim of up to 2.3x I/O performance is based on Intel internal measurements comparing 1-socket SNB data for an L2 forwarding test using 8x10 GbE ports for the Intel® Xeon® processor E5 product family versus the Intel® Xeon® processor 5600 series.

[17] Intel® Intelligent Power Technology requires a computer system with an enabled Intel® processor, chipset, BIOS and for some features, an operating system enabled for it. Functionality or other benefits may vary depending on hardware implementation and may require a BIOS and/or operating system update. Please check with your system vendor for details.

[18] Hyper-Threading Technology requires a computer system with an Intel® 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 http://www.intel.com/info/hyperthreading/ for more information including details on which processors support HT Technology.

[19] Intel® AES-NI requires a computer system with an AES-NI enabled processor, as well as non-Intel software to execute the instructions in the correct sequence. AES-NI is available on select Intel® processors. For availability, consult your reseller or system manufacturer. For more information, see Intel® Advanced Encryption Standard Instructions (AES-NI) http://software.intel.com/en-us/articles/intel-advanced-encryption-standard-instructions-aes-ni/. NOTE: Intel® Advanced Encryption Standard Instructions (AES-NI) should hyperlink to http://software.intel.com/en-us/articles/intel-advanced-encryption-standard-instructions-aes-ni/ for online versions.

[20] No computer system can provide absolute security. Requires an enabled Intel® processor and software optimized for use of the technology. Consult your system manufacturer and/or software vendor for more information.

[21] No computer system can provide absolute security under all conditions. Intel® Trusted Execution Technology is a security technology under development by Intel and requires for operation a computer system with Intel® Virtualization Technology, an Intel Trusted Execution Technology-enabled processor, chipset, BIOS, Authenticated Code Modules, and an Intel or other compatible measured virtual machine monitor. In addition, Intel Trusted Execution Technology requires the system to contain a TPMv.2 as defined by the Trusted Computing Group and specific software for some uses. See http://www.intel.com/technology/security/ for more information.

[22] 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 d pending 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.

[23] For more information on Intel® Rapid Storage Technology, visit http://www.intel.com/p/en_US/support/highlights/chpsts/imsm.

[24] No computer system can provide absolute security. Requires an enabled Intel® processor, enabled chipset, firmware, software, may require a subscription with a capable service provider (may not be available in all countries). Intel assumes no liability for lost or stolen data and/or systems or any other damages resulting thereof. Consult your Service Provider for availability and functionality. For more information, visit http://www.intel.com/go/anti-theft. Consult your system manufacturer and/or software vendor for more information.

[25] Source as of August 2014. Baseline configuration: Supermicro* X8DTN+ with two Intel® Xeon® Processor X5690, Java* Standard Edition 7 Update 11, source. Score: 21,709 SPECjbb*2013-MultiJVM max-jOPs, 3,587 SPECjbb*2013-MultiJVM critical-jOPS. New configuration: Intel® Server Board S2600WTT with two Intel® Xeon® Processor E5-2699 v3, Java* Standard Edition 8 Update 5, source. Score: 139,511 SPECjbb*2013-MultiJVM max-jOPS, 43,107 SPECjbb*2013-MultiJVM critical-jOPs.

[26] On a 4-socket natively-connected platform: Intel® Xeon® processor E7 family supports 64DIMMS, max memory per DIMM of 32GB RDIMM; Intel® Xeon® processor E7 v2 family supports 96DIMMs, max memory per DIMM of 64GB RDIMM. This enables a 3x increase in memory.

[27] Up to 4x I/O bandwidth claim based on Intel internal estimates of the Intel Xeon processor E7-4890 v2 performance normalized against the improvements over dual- IOH Intel Xeon processor E7-4870 based on internal bandwidth tool running the 1R1W test.

[28] Baseline Rack configuration: Intel® Xeon® processor E3-1220L v2. Maximum number of nodes, 42U rack: 41 1U server + 1x 1U 48 port GbE Ethernet switch. Performance per node/rack: Best published SPECint*_rate_base2006 score of 87.3 as of April 15, 2013.http://www.spec.org/cpu2006/results/res2012q2/cpu2006-20120522-22320.html Total performance 41 servers = 3579.3; Power per node: Max power consumption of one Intel® Xeon® Processor E3-1220L v2 on a Intel® C206 based platform using SPECpower_ssj2008, EIST Enabled, Turbo Boost Enabled, 8GB memory (2x 4GB DDR3-1600 UDIMM), 64G 3Gb/s SATA SSD , Windows 2008 R2 SP1. Java SE Runtime Environment (build 1.6.0_30-b12), Java HotSpot 64-Bit Server VM (build 20.5-b03, mixed mode). Source: TR1276, Intel internal testing as of Mar 2012. Score: ssj_ops@100%: 195,006, Power@100%: 51.3W, Active idle power: 26.4; Power per rack: 2.3kW total. 1U switch = 240W, 41 1U server nodes = 2103W New Microserver Configuration: Intel® Xeon® processor E3-1230L v3; Maximum number of nodes: SSI rack= 12 3U chassis with 144 nodes + 3x 1U 48 port GbE switches Performance per node/rack: Intel® C226 chipset based platform with one Intel® Xeon® Processor E3-1230L v3 (8M Cache, 1.8 GHz, C0 stepping), EIST Enabled, Turbo Boost enabled, Hyper-Threading Enabled, 16GB memory (2x 8GB DDR3-1600 ECC UDIMM), 160GB SATA 7200RPM HDD, Red Hat* Enterprise Linux Server 6.3. Compiler version: 13.0 of Intel C++ Studio XE and Intel Fortran. Source: Intel internal testing as of April 2013. Score: SPECint_rate_base2006 of 143, 144 nodes = 20592 Power per node: Based on Intel estimates of 39.3W per node with one Intel® Xeon® Processor E3-1220L v3 node, EIST Enabled, Turbo Boost Enabled, 8GB memory (2x 4GB DDR3-1600 UDIMM), 1x SSD, assuming shared cooling resources and shared power supplies; Power per rack: 6.4kW total. 3x 1U switches at 240W per switch = 720W, 144 nodes at 39.3W per node = 6372W.

[29] Source as of August 2014 on Linpack*. Supermicro* X8DTN+ with two Intel® Xeon® processor X5690, RHEL* 6.1, 12x4GB DDR3-1333, Intel® HT Technology disabled, Intel® Turbo Boost Technology enabled, SMP Linpack 10.3.5. Intel internal measurements TR#1236. Score: 159.36 GFlops. New configuration: Intel® Server System R2208WTTYS with two Intel® Xeon® Processor E5-2699 v3, Intel® HT Technology disabled, Intel® Turbo Boost Technology enabled, 8x16GB DDR4-2133, RHEL* 6.4, Intel® MKL 11.1.1. Intel internal measurements TR#3034. Score: 1,012 GFlops.

[30] Claim based on calculated theoretical peak double precision performance capability for a single coprocessor. 16 DP FLOPS/clock/core * 61 cores * 1.238GHz = 1.208 TeraFlop/s.