

Intel® Workstation Platforms

For intelligent performance, automated energy efficiency, and flexible expandability



How quickly can you change complex data into actionable information?

Workstations based on the new Intel® Microarchitecture, codenamed Nehalem, are designed for intelligent performance, new levels of energy efficiency, and flexible expandability giving workstation users unprecedented time-to-results in quieter, cooler and potentially smaller form-factors.

Result: Users can iterate and innovate faster and compress the time between the idea and a product.

Intel's family of workstation platforms provides you with a range of options to meet your needs. They give you the tools to multi-task more productively, iterate through alternatives faster and innovate more.





Digital Workbench: Intel® Xeon® Processor 5500^A Series with the Intel® 5500 Series Chipsets

- These dual-processor-capable platforms transform workstations into workstation supercomputers that provide breakthrough performance and energy efficiency to visualize larger and more complex data.
- Intelligent performance technology adapts to mega-tasking workloads, allocating more performance to demanding applications when available.
- Smarter caches improve access time to application data, and I/O expansion meets the most demanding workflow and graphics requirements providing the power to solve and visualize large-scale problems in the shortest time.
- Near-supercomputing performance powers more “what ifs” than ever before, enables testing via simulation, and helps developers find design and implementation errors and issues earlier.

Entry Professional: Intel® Xeon® Processor W3500^A Series with the Intel® X58 Express Chipset or the Intel® Core™2 Processor Family with the Intel® X38 Express Chipset

- Designed for single-processor, energy-efficient workstations that demand price-proficient performance and professional-grade graphics solutions to meet the ever-increasing computing and visualization needs of engineers, architects, designers, and video editors.
- Intel® Xeon® processor W3500^A series offers dynamic processor performance to maximize workstation response, up to two professional graphics adapters, and the memory capacity demanded by larger, more complex models.
- Provide users with the capacity to quickly integrate data from disparate business systems across the enterprise and transform it into insights.

Mobile Professional: Intel® Centrino® 2 with vPro™ Technology and Intel® Core™2 Duo Processor

- Designed to deliver single-processor workstation performance and features nearly equal with entry professional workstations, plus advanced power-saving features designed to help extend mobility.
- Provide access to professional-grade graphics and performance for proficiency with complex 2D and 3D designs and models.
- Provide powerful energy-efficient performance and the latest wireless technologies to support convenience and collaboration.

Blade Workstations: Intel® Xeon® Processors

- Deliver features and performance of a digital workbench or entry-level workstation in a bladed form factor.
- Provide dual-processor workstation performance and flexibility with up to two professional-grade graphics adapters and the memory capacity demanded by larger more complex models.
- Improved performance, manageability, and access to workstation resources.
- The flexibility to quickly and easily provision and deploy trusted high-performance workstation capabilities when you need them.

Workstation Processors

Intel Xeon Processors

Intel Xeon processors featuring the new Intel Microarchitecture Nehalem transform workstations and blade workstations into workstation supercomputers that provide breakthrough performance and energy efficiency for the ultimate experience in processing and visualizing large complex data.

Dual-processor Workstations: Digital Workbench

Dual-processor workstation platforms based on the Intel Xeon processor 5500 series deliver the performance and flexibility to help users solve bigger problems, to build business advantage or to rapidly explore, develop, test and predict the success of new ideas. With two intelligent processors, these expert workstations enable users to maximize computing and graphics power to solve and visualize large-scale problems faster. Designed for expert workstation users, these next-generation workstations integrate capabilities for flexibility and productivity, helping users get more done in less time.

With 8 computational cores, up to 192 GB of memory,¹ and over 100GFLOPS of compute performance using cutting-edge Intel® 45nm with Hi-K technology, dual-processor workstations with the Intel Xeon processor 5500 series deliver untouchable workstation performance, up to 2x performance increase² over the previous-generation Intel® Xeon® processor 5400 series, so you can render faster, analyze and display more data with higher fidelity, and speed visual comparisons.

Single-processor Workstations: Entry Professional

Single-processor entry professional workstations based on the Intel Xeon processor W3500 series offer excellent performance for the power office user and for the computing and visualization needs of engineers, architects, animators, and analysts. (The Intel Xeon processor W3500 series delivers up to 2x greater performance³ than entry workstations built with the Intel® Core™2 processor family.) These workstations combine the performance and visualization advantages of the new Intel Microarchitecture Nehalem with RAS features for the reliability you need from a single-processor workstation.

The Ultimate Workbench

The Intel® Xeon® processor W5580^A designed specifically for workstation platforms, delivers the ultimate in workstation performance with the highest available processor speed and data bandwidth. This 3.20 GHz processor delivers bandwidth of up to 25.6 GB/second.

A New Generation of Workstation Performance and Efficiency

At the heart of Intel's leadership performance is a history of unwavering innovation. The Intel® Xeon® processors based on the new Intel Microarchitecture Nehalem take workstation capabilities to a new level with intelligent performance, automated energy efficiency, and flexible expandability.

Features	Benefits
Intelligent Performance	<ul style="list-style-type: none"> Dynamic scalability increases the processors' opportunity to manage cores, threads, caches, interfaces and power to deliver more energy-efficient workstation performance on demand.
Intel® Turbo Boost Technology	<ul style="list-style-type: none"> Dynamically and automatically maximizes workstation application performance by turning off unused resources and increasing processor frequencies, enabling faster execution for specific threads and mega-tasking workloads.
Intel® QuickPath Architecture	<ul style="list-style-type: none"> Scalable shared memory architecture with high-speed, point-to-point connections and larger memory delivers up to 3.5x bandwidth improvement⁴ for dual-processor workstations, enabling them to act as digital workbenches that can concurrently create, simulate, and render.
Intel® Hyper-Threading Technology [†]	<ul style="list-style-type: none"> With support for up to 16 threads on a two-socket workstation, Intel Hyper-Threading Technology enables better multitasking for complex simulation and rendering applications.
Larger memory capacity	<ul style="list-style-type: none"> Up to 192 GB of main memory supports higher performance¹ for larger, more complex models.
Intel® Smart Cache	<ul style="list-style-type: none"> Inclusive shared L3 cache increases application performance by reducing data latency issues.
Intel® I/O Acceleration Technology (Intel® I/OAT), with Intel® QuickData Technology	<ul style="list-style-type: none"> Moves data more efficiently through Intel® Xeon® processor-based workstations for fast, scalable, and reliable network performance.⁵
Expanded SSE4.2 instruction set	<ul style="list-style-type: none"> Includes enhanced branch prediction and loop stream detection to boost performance and cut energy consumption.
Support for up to two PCIe* x16 Gen 2 Adapters	<ul style="list-style-type: none"> Up to 72 lanes, to solve complex and visually-intensive problems. New dual PCI Express* x16 2.0 graphics interfaces deliver as much as 8 GB/s of graphics bandwidth per direction directly into the Intel® 5500X I/O Controller Hub chipset (total bandwidth 16 GB/s), delivering enhanced visualization and twice the bandwidth over previous-generation PCI Express.
Automated Energy Efficiency	<ul style="list-style-type: none"> Intel® Intelligent Power Technology³ enables workstation applications to achieve peak application performance in the smallest energy and thermal footprint available.
Integrated Power Gates	<ul style="list-style-type: none"> Allow idling cores to be reduced to near-zero power independent of other cores, reducing idle power consumption by up to 50 percent versus the previous generation of dual-socket workstation processors.⁶
Automated Low Power States	<ul style="list-style-type: none"> Automatically adjusts power consumption, put processor and memory into the lowest available power states that will meet the current workload. Fifteen power states, with low transition latency, offer fine-grained control over power usage.
Flexible Virtualization	<ul style="list-style-type: none"> Enables disaster recovery, upgrades, and load-balancing as needed without user impact or noticeable performance degradation, and protects end-user workstation investments.
Intel® Virtualization Technology (Intel® VT)	<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. You get performance and headroom to improve the average virtualization performance by as much as 2.1x over previous-generation dual-processor systems.⁷

These technologies can change the way you work by delivering the processing, memory, graphics and I/O capacity to accelerate your innovation and get to a yes answer faster. It enables users to work differently by moving from serial to parallel workflows.

Intel® Core™2 Processor Family

Great performance was never so affordable – designed for single-processor, energy-efficient workstations that demand price-proficient performance and high-end graphics solutions to meet the ever-increasing computing and visualization needs of engineers, architects, designers, and video editors.

Single-processor workstations based on the Intel Core 2 processor family and the Intel® Core™ microarchitecture provide users the capacity to quickly integrate data from disparate business systems across the enterprise and transform it into insights. This processing power coupled with:

- The Intel® Core™2 Extreme processor QX9650^A delivers advanced and powerful processors for entry-level workstations.
- The Intel® X38 Express chipset delivers industry-leading dual PCI Express* 2.0 graphics capability, faster processor bus, and support for higher bandwidth DDR3 memory technology while still maintaining support for DDR2.
- PCI Express x16 2.0 delivers 8 GB/s bandwidth per direction (total bandwidth 16 GB/s), double that of PCI Express 1.0. It provides leading-edge graphics and visualization performance with dual x16 graphic card configuration.
- Intel® Turbo Memory features Intel's innovative NAND cache, designed to improve the responsiveness of applications, application load times, and system boot performance.
- Intel® Fast Memory Access and Intel Turbo Memory deliver increased system performance and application loading times, respectively.
- Intel® Quiet System Technology integrated in Intel® ICH9 can help reduce system noise and heat through more intelligent fan speed control algorithms.
- Intel® Rapid Storage Technology provides a greater level of protection, performance, and expandability for single-processor workstation platforms.

Intel® Centrino® 2 with vPro™ Technology and Intel® Core™2 Duo Mobile Processors

Mobile workstations just hit a new high note. Providing outstanding mobile performance, improved battery life, and enhanced wireless connectivity, Intel® Centrino® 2 with vPro technology enables top mobile performance for basic digital content creation, engineering, and financial workloads, while the Intel® Core™2 Duo processor for entry-level mobile workstations delivers great performance for computer-aided and 2D digital content creation. Both processors deliver the power and visualization where and when you need it in order to transform data into actionable information. This processing power coupled with:

- Intel Centrino 2 with vPro technology provides leading-edge mobile technologies that provide revolutionary levels of performance, extended battery life, and expansive connectivity.
- Intel® Dynamic Power helps manage voltage and power consumption. One core can demand high performance while the other core can independently transition to a low-power state.
- Intel® Advanced Smart Cache enables improved performance, increased responsiveness and power savings.



Imagine the Innovation and Discovery That You Can Achieve with Intel-based Workstations

Engineers will iterate through design options faster. They will be able to use the resources at their desk to rapidly quantify design quality and quickly rule out bad designs and identify good ones.

Impact: Faster time-to-market with more innovative products.

Animators will create and render simultaneously with no loss in workstation responsiveness. They will work interactively with ultra high-resolution imagery, experiment quickly and be more daring and creative.

Impact: Digital storyboarding and animation just got faster, enabling innovation to happen at light speed.

Financial analysts, traders and portfolio managers will monitor complex options positions while concurrently analyzing the effects of changes in market conditions and price over time.

Impact: Better informed, higher quality decisions in less time.

Reservoir engineers can create, test and iterate quickly through more complex reservoir models and achieve more accurate reserves estimates.

Impact: Improved exploitation plans in less time, optimized oil and gas recovery, improved production forecasting and economic modeling.

Power office users will quickly integrate data from across the enterprise, transform it into insights, then communicate and collaborate to impact business and technical decision making. Users will quickly and efficiently develop WEB 2.0 applications, create rich interactive experiences, prepare digital files for printing, and process more business analytics.

Impact: Better decision making, more precise predictions, improved corporate performance.

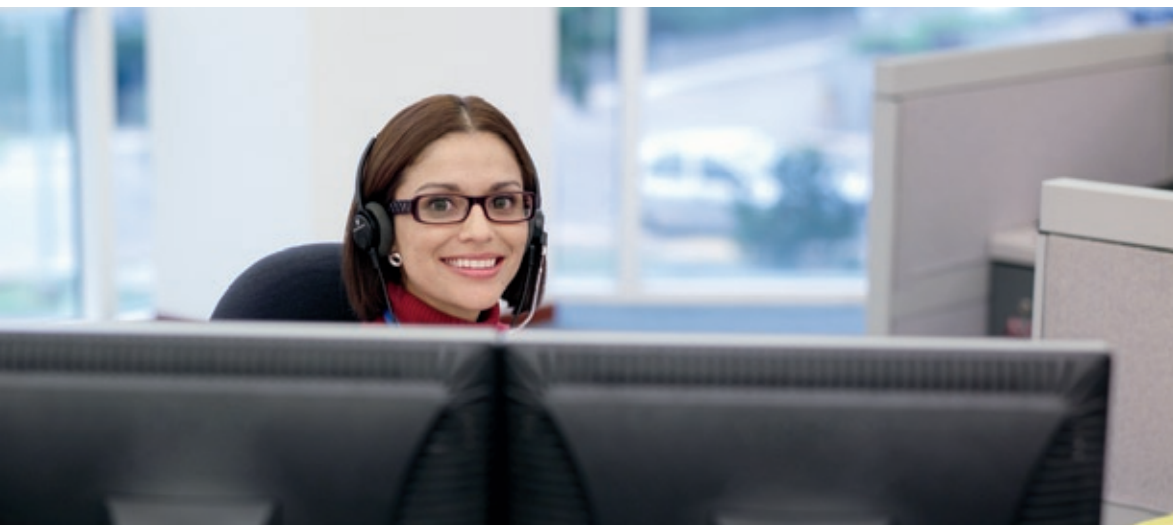
IT personnel will be able to more quickly provision and deploy blade solutions to provide workstation capabilities to diverse user populations, and power saving from these energy-efficient processors will help create quieter, cooler office environments.

Impact: Improved user productivity and satisfaction, and bottom-line savings on power and IT resources.

Intel Workstation Processors at a Glance

	Digital Workbench		Entry Professional		Mobile Workstation
	Intel® Xeon® Processor W5580 ^A	Intel® Xeon® Processor 5500 ^A Series	Intel® Xeon® Processor W3500 ^A Series	Intel® Core™2 Processor Family	Intel® Centrino® 2 with vPro™ Technology and Intel® Core™2 Duo Mobile Processors
Summary	Ultimate workstation performance for the most demanding processing and visualization needs.	Breakthrough performance and energy efficiency for the ultimate experience in processing and visualizing large, complex data.	Excellent performance for professionals. Designed for the power office user and for the computing and visualization needs of engineers, architects, animators, and analysts.	Affordable performance for single-processor, energy-efficient workstations. Designed to meet the ever-increasing computing and visualization needs of engineers, architects, designers, and video editors.	Outstanding mobile performance, improved battery life, and enhanced wireless connectivity. Intel® Centrino® 2 with vPro technology enables top mobile performance for basic digital content creation, engineering, and financial workloads, while the Intel® Core™2 Duo processor delivers great performance for computer-aided and 2D digital content creation. .
Socket Support	Dual	Single or Dual	Single	Single	Single
Cores per processor	4 cores	2 or 4 cores	4 cores	2 or 4 cores	2 or 4 cores
Intel® Hyper-Threading Technology[†]	Up to 16 threads	4-16 threads	Up to 8 threads	N/A	
Intel® Turbo Boost Technology	Yes	Yes [‡]	Yes	N/A	
Processor Power	130W	95W, 80W, 60W	130W	150W, 136W, 130W, 75W, 65W	150W, 136W, 130W, 75W, 65W
Interconnect Speeds	Intel® QuickPath Technology 6.4 GT/s	Intel QuickPath Technology 6.4, 5.86 or 4.8 GT/s	Intel QuickPath Technology 6.4 or 4.8 GT/s	System Bus (FSB) speeds up to 1333 MT/s	System Bus (FSB) speeds up to 1333 MT/s
Memory Support	Up to 192 GB ¹ DDR3 1333	Up to 192 GB ¹ DDR3 800, 1066, or 1333 [‡]	Up to 24 GB DDR3 1066 or 1333 [‡]	Up to 8 GB DDR2 800	Up to 8 GB DDR2 800
Memory Addressability	40 bits (1 TB)	40 bits (1 TB)	38 bits (64 GB)	34 bits (8 GB)	34 bits (8 GB)
On-Die Cache	8 MB Shared L3 Cache	4 or 8 MB Shared L3 Cache	8 MB Shared L3 Cache	Up to 12 MB L2 Cache	Up to 12 MB L2 Cache
I/O Capacity	Up to two PCIe* x16 Gen 2 Adapters (72 lanes)				
RAS Features	ECC, Patrol Scrubbing, Demand Scrubbing, Mirroring, Sparing, Lockstep Mode, x4/x8 SDDC		ECC	Execute Disable Bit	
Other Intel® Workstation Features	<ul style="list-style-type: none"> • Intel® 64 architecture⁵ provides users with improved performance by allowing systems extended memory addressability for workstation applications. • Intel® Fast Memory Access improves system performance by optimizing the use of available memory bandwidth and reducing the latency of the memory accesses. • Intel® Rapid Storage Technology boosts storage performance with RAID 0 while protecting data with RAID 1 on the same disk. RAID 5 and 10 provide both increased data protection and performance. • Integrated Serial (SATA) facilitates high-speed storage and data transfers up to 3 GB/s per SATA drive. • Support for external SATA (eSATA) enables the full SATA interface speed outside the chassis, up to 3 GB/s. • Intel® High Definition Audio supports up to 8 channels at 192 kHz/32-bit sound without requiring a separate audio card. 				

[‡] Depending on SKU



For the latest product performance information,
please visit www.intel.com/performance

For more information on Intel workstation products
please visit www.intel.com/go/workstation

⁴ 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.

¹ 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.

⁶ 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.

⁸ 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.

² 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.

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

¹ 192GB of memory with 16GB DIMMS. Supports up to 96GB with 8GB DIMMS under current design.

² Up to 2x performance compared to Xeon 5400 series claim supported by multiple performance results including a ray tracing benchmark and a bandwidth intensive scientific computing benchmark (SPECfp_rate_base2006). Intel internal measurement. (Feb 2009).

³ Up to 2x performance compared to Intel® Core™2 Quad processors Q9650. Claim supported a bandwidth intensive scientific computing benchmark (SPECfp_rate_base2006). Intel internal measurement. (Feb 2009).

⁴ Up to 3.5x platform memory bandwidth compared to Xeon 5400 series claim supported by Stream-Triad results. Intel internal measurement. (Feb 2009).

⁵ Intel® I/O Acceleration Technology (Intel® I/OAT) requires an operating system that supports Intel I/OAT.

⁶ Intel internal measurements of 221W at idle with Supermicro 2xE5450 (3.0GHz 80W) processors, 8x2GB 667MHz FBDIMMs, 1x700W PSU, 1x320GB SATA hard drive vs. 111W at idle with Supermicro software development platform with 2xE5540 (2.53GHz Nehalem 80W) processors, 6x2GB DDR3-1066 RDIMMs, 1x800W PSU, 1x150GB 10k SATA hard drive. Both systems were running Windows 2008 with USB suspend select enabled and maximum power savings mode for PCIe link state power management. Measurements as of Feb 2009.

⁷ Up to 2.10x Virtualization performance compared to Xeon 5400 series claim supported by performance results on VMmark* benchmark. Xeon X5470 data based on published results. Xeon X5570 Intel internal measurement. (Feb 2009).

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