



# Intelligent Performance Enhances Business Agility and Expands Insight

Microsoft Windows Server® 2008,  
SQL Server® 2008 and the  
Intel® Xeon® Processor 5500 Series

## SOLUTION BRIEF

Deliver breakthrough performance and scalability within the same energy and space footprint as prior-generation processors.

For the past decade, IT has rapidly added low-cost hardware to accommodate business growth. But with data centers reaching capacity, IT infrastructure has begun to constrain business efficiency and growth. To help meet this challenge, Microsoft Windows Server® and SQL Server® 2008, together with intelligent server platforms based on the Intel® Xeon® processor 5500<sup>A</sup> series, deliver breakthrough performance and scalability within the same energy and space footprint as prior-generation processors.

Windows Server 2008 on Intel Xeon processor 5500-based servers will continue Intel and Microsoft performance leadership, harnessing new intelligent performance features of Intel® Microarchitecture, codenamed Nehalem, for greater application responsiveness and throughput. Windows Server 2008 and SQL Server 2008 work with the Intel Xeon processor 5500 series to dynamically adapt performance to workload needs in real time, increasing performance by up to 2.25x the performance<sup>1</sup> of previous-generation two-socket servers, while giving IT administrators unprecedented control over configuration and operation.



**Microsoft®**



## Intelligent Performance Technology from Intel

Application performance is critical for day-to-day business operations, as well as creating new products and reaching new customers and markets. The Intel Xeon processor 5500 series, with Intel Microarchitecture Nehalem, brings intelligent performance to the most trusted server architecture. The Intel Xeon processor 5500 series brings together a number of innovative technologies to enable intelligent performance:

**Intel® Turbo Boost Technology<sup>s</sup>**, together with Intel® Intelligent Power Technology, delivers performance on demand, letting processors operate above the rated frequency under certain conditions to speed specific workloads.

**Intel® Hyper-Threading Technology<sup>t</sup>** benefits from larger caches and up to 144 GB memory capacity, delivering greater throughput and responsiveness for multi-threaded applications.

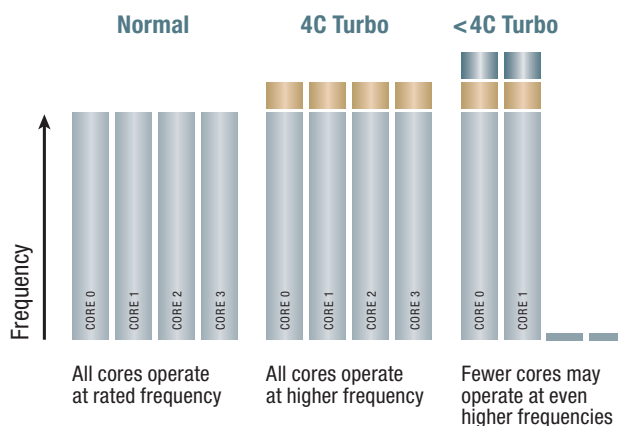
**Intel® QuickPath Technology** and an integrated memory controller speed traffic between processors and I/O controllers for bandwidth-intensive applications.

**Intel® Intelligent Power Technology<sup>q</sup>** also enables policy-based control that allows processors to operate at optimal frequency and power, boosting performance for critical workloads while lowering TCO through overall reduction in power consumption.

## Performance that Adapts to Your Priorities

The Intel Xeon processor 5500 series is the world's most adaptable server platform. Windows Server 2008 works with Intel Microarchitecture Nehalem to adapt performance and power usage in real time to meet the exact requirements of your computing workloads, while allowing manual adjustment for IT control. This powerful combination delivers up to 2.25x the performance<sup>1</sup> in a similar power envelope<sup>2</sup>, so you can deliver greater business agility and insight in the same data center footprint at a lower cost.

Windows Server 2008 and SQL Server 2008 take advantage of Intel Turbo Boost Technology, delivering performance on demand by letting processors operate above the rated frequency to speed specific Windows®-based workloads. Windows Server 2008 automatically and



**Figure 1. Higher Performance on Demand - Intel® Turbo Boost Technology increases performance by increasing processor frequency and enabling faster speeds when conditions allow.**

transparently matches processor power to the needs of the workload, putting inactive cores into appropriate low-power states, and scaling the power of active processors to fit workload performance needs.

Windows Server 2008 also takes advantage of Intel Intelligent Power Technology to provide fine-grained control to adapt performance to changing priorities or to meet service-level agreements (SLAs). IT administrators can set policies that allow processors to operate at optimal frequency and power. Windows can make this determination automatically, or administrators can designate which applications require high-frequency processing and which should be executed at lower frequencies to conserve power.

Deploying Intel Xeon processor 5500 series servers in an environment with Microsoft's System Center software will further extend the ability of IT professionals to proactively manage application performance and energy consumption within both physical and virtual IT environments. With its seamless integration to Microsoft's operating systems and robust support for underlying Intel Xeon processor-based servers, System Center optimizes resources and reduces environmental footprint.

## Higher Performance for Business Advantage

For bandwidth-intensive SQL Server 2008 data warehousing, business intelligence (BI) and other Windows-based applications, Intel QuickPath Technology and an integrated memory controller speed traffic between processors and I/O controllers and reduce latency. The Windows Server 2008 scheduler is also highly optimized for multi-threading, and Intel Hyper-Threading Technology benefits from larger caches and up to 144 GB memory capacity, delivering greater throughput and responsiveness for multi-threaded SQL Server 2008-based applications.

Performance libraries such as the Intel® Math Kernel Library (Intel® MKL) for Windows and Intel® Integrated Performance Primitives (Intel® IPP) for Windows offer highly optimized, extensively threaded routines and tools to help Microsoft Visual Studio® developers efficiently build robust applications that take advantage of the latest Intel® microarchitecture. And Microsoft Visual Studio 10 will have instructions for the Intel Microarchitecture Nehalem built in, to take even greater advantage of the hardware-based performance features.

Intel Xeon processor 5500-based servers will be a key part of the development platform for SQL Server's upcoming business intelligence and data warehousing releases. Strong performance improvements, as well as workload-adaptive responsiveness in real time make the Intel Xeon processor 5500 an ideal platform for building and testing the next generation of SQL Server applications.

### Meeting the Performance Challenge

Industry benchmarks are already proving the advantage of Microsoft-based applications on the new generation of Intel Xeon processor-based servers:

- An Intel Xeon processor 5500 series-based server running Microsoft SQL Server 2008 on Microsoft Windows Server sets a new two-socket record on the TPC-E benchmark, with a score of 800 tpsE at \$343.91/tpsE. This demonstrates a dramatic 2.52x performance gain over the previous-generation processor.<sup>3</sup>
- HP servers based on the Intel Xeon processor 5500 series and running Windows Server and SQL Server demonstrate up to 1.98x performance gain on the SAP SD 2-tier benchmark.<sup>4</sup>
- A web workload simulating load on a web server showed a performance gain of up to 2x on an Intel Xeon processor 5500 series-based server when compared to previous-generation processors.<sup>5</sup>

# Transforming the Economics of the Data Center

Intel and Microsoft are continuously collaborating to optimize the performance and value of Microsoft solutions on the latest Intel® platforms. That's why all nine of today's top nine TPC-E performance results are running Microsoft SQL Server 2008 and Intel-based servers, as are nine of the top ten TPC-E price/performance results.<sup>6</sup>

Windows Server 2008 on Intel Xeon processor 5500-based servers will continue Intel and Microsoft performance leadership. With higher performance from each processor, the combination of Windows Server 2008, SQL Server 2008 and the Intel Xeon processor 5500 series enhances business agility and allows IT to support more applications and users for the same power, and provides scalability to help grow the business without outgrowing the data center.

## For More Information

For more information about Windows Server 2008 and SQL Server 2008, visit [www.microsoft.com/windowsserver2008](http://www.microsoft.com/windowsserver2008) and [www.microsoft.com/sqlserver](http://www.microsoft.com/sqlserver). For information about purchasing Windows Server 2008, e-mail us at [hpcinfo@microsoft.com](mailto:hpcinfo@microsoft.com), or to find Microsoft offices worldwide, visit [www.microsoft.com/worldwide](http://www.microsoft.com/worldwide).

And for more information about Intel® Microarchitecture Nehalem, visit [www.intel.com/technology/architecture-silicon/next-gen](http://www.intel.com/technology/architecture-silicon/next-gen).

Accelerate your transition to a new generation of intelligent platforms from Intel. Talk with your local Intel representative, and visit us on the web at [www.intel.com/xeon](http://www.intel.com/xeon).

<sup>1</sup> Compared to Intel® Xeon® processor 5400 series. Claim supported by multiple performance results including an OLTP database benchmark. Intel preproduction server platforms with two Quad-Core Intel® Xeon® processors X5460, 3.16 GHz, 2x6MB L2 cache, 1333MHz system bus, 64GB memory (16x4GB FB DDR2-667) vs. Intel preproduction server platform with two Quad-Core Intel® Xeon® processors X5570, 2.93 GHz, 8MB L3 cache, 6.4QPI, 72GB memory (18x4GB DDR3-800), Microsoft Windows Server 2008 Enterprise x64 Edition OS. Performance measured in transactions per second. Intel internal measurement. (Feb 2009).

<sup>2</sup> Compared to Intel® Xeon® processor 5400 series. Claim supported by multiple performance results including an OLTP database benchmark. Intel internal measurement. (Feb 2009).

<sup>3</sup> Fujitsu PRIMERGY® RX300 S5 server platform with two Quad-Core Intel Xeon processors X5570 2.93GHz (2 processors/8 cores/16 threads), 8MB L3 cache, 6.4GT/s QPI, 96 GB memory (12x8 GB DDR3-1066), Microsoft SQL Server 2008 x64 Enterprise Edition, Microsoft Windows Server 2008 Enterprise x64. Result submitted to [www.tpc.org](http://www.tpc.org) at 800tpsE and \$343.91/tpsE as of March 30, 2009. Availability date April 1, 2009.

<sup>4</sup> Source: Hewlett Packard, July and December 2008. Intel Xeon Processor X5470, 3.33 GHz, 64 KB L1 cache per core and 6 MB L2 cache per 2 cores vs. Intel Xeon Processor X5570, 2.93 GHz, 64 KB L1 cache and 256 KB L2 cache per core, 8 MB L3 cache per processor. See <http://www.sap.com/solutions/benchmark/sd2tier.epx> for more information.

<sup>5</sup> Source: Intel and Microsoft internal measurements, March 2009. Web workload simulating load on a web server. Windows Server 2008 x64 Enterprise Edition. Intel Xeon processor X5500, 2.93GHz; 24GB (6x4GB) DDR3-1066MHz vs. Intel Xeon processor X5400, 2.83GHz; 16GB (16x2GB) DDR2-667 FB.

<sup>6</sup> Source: [tpc.org](http://tpc.org)

<sup>7</sup> 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](http://www.intel.com/products/processor_number) for details.

<sup>8</sup> 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 <http://www.intel.com/info/hyperthreading/> for more information including details on which processors support HT Technology.

<sup>9</sup> Intel® Turbo Boost Technology requires a Platform with a processor with Intel Turbo Boost Technology capability. Intel Turbo Boost Technology performance varies depending on hardware, software and overall system configuration. Check with your platform manufacturer on whether your system delivers Intel Turbo Boost Technology. For more information, see <http://www.intel.com/technology/turboboost>.

<sup>10</sup> 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.

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