



# Highly Productive High Performance Computing

## Windows® HPC Server 2008 and the Intel® Xeon® Processor 5500 Series

### SOLUTION BRIEF

Reduce time to insight,  
increase competitive  
advantage, and  
accelerate innovation.

As high performance computing (HPC) systems evolve from super-computers to dedicated compute clusters based on commodity platforms, more organizations are using HPC applications to reduce time to insight, increase their competitive advantage, and accelerate innovation. Now, Windows® HPC Server 2008 (HPCS) and Intel® Xeon® processor-based servers bring the full power, performance, and scale of HPC to mainstream computing, making the benefits of these applications more available and affordable than ever.

Deploying and operating clusters for HPC has traditionally been a long, complex and costly process, requiring an organization to stitch together and manage multiple pieces of hardware and software. Once deployed, clusters can be difficult to manage and support. Windows HPC Server 2008 on Intel® Xeon® processor 5500 series-based servers offers ground-breaking HPC cluster performance and unprecedented energy efficiency, plus highly efficient deployment, better cluster utilization, and simplified, scalable management, even in mixed HPC environments.



**Microsoft®**



## Windows® HPC Server 2008

As HPC enters the mainstream, IT requirements for it are moving beyond pure performance. Many cluster solutions today require customization and administrative staff with specialized skills. Windows HPC Server 2008 simplifies cluster management with the familiar Windows® platform, compatible out-of-the-box system management tools, and standardized image templates for deployment and provisioning of cluster nodes. Windows HPC Server takes advantage of the overall Microsoft ecosystem to improve the functionality, usability, and manageability of the cluster. Integration with Windows Server 2008 features such as Active Directory®, Windows Deployment Services, and Microsoft System Center System Manager simplify cluster management, and a simple at-a-glance interface makes it easier to manage large clusters, boost utilization, and to identify and resolve problems.

## Windows® HPC Server 2008

Benefit	Features
<b>Efficient Deployment</b>	<ul style="list-style-type: none"> <li>• A Node Template Generation Wizard guides the administrator through creation of templates for compute nodes.</li> <li>• Integrated Administration Console for management and deployment helps simplify deployment for large and small compute clusters.</li> <li>• Integration with Windows Deployment Services also offers scalability due to image multicasting, support for Node Templates, driver integration and updating, and support for non-uniform node deployment.</li> </ul>
<b>Shorter Time to Insight</b>	<ul style="list-style-type: none"> <li>• Allows developers to leverage existing Windows®-based skills and experience.</li> <li>• Visual Studio® 2008 includes support for developing HPC applications with parallel debugger, MPI support and OpenMP capabilities.</li> <li>• Broad base of support from public-domain parallel development tools and leading HPC applications in a range of industry segments.</li> </ul>
<b>Better Utilization</b>	<ul style="list-style-type: none"> <li>• Uses SQL Server® (or SQL Express) for the Job Scheduler, greatly improving the scalability and redundancy of the scheduler.</li> <li>• Integrated MPICH2-compliant MPI layer uses RDMA and Winsock for performance boosts.</li> <li>• MS-MPI is integrated with Event Tracing for Windows, allowing better tuning and providing a time-synchronized log for parallel debugging across clusters.</li> </ul>
<b>Heterogeneous Clusters</b>	<ul style="list-style-type: none"> <li>• Job scheduling interoperability and flexibility enables integration between Windows and Linux*-based HPC platforms.</li> <li>• Node grouping allows administrators to categorize and batch operations on compute nodes.</li> </ul>
<b>Scalable Management</b>	<ul style="list-style-type: none"> <li>• New support for Windows PowerShell™ accelerates automation of system administration tasks.</li> <li>• Active Directory® integration enables easy role-based cluster management with Cluster Administrator and Cluster User roles for security control.</li> <li>• Support for Windows Server 2008 Failover Clustering enhances availability and ensures easy setup of head node and failover node.</li> <li>• Integrated patch management allows updates without interfering with running jobs.</li> </ul>

## Intel® Xeon® Processor 5500 Series

You know that the need for “high performance” gets higher all the time. To meet these demands, the Intel Xeon processor 5500 series, with next-generation Intel® Microarchitecture, codenamed Nehalem, maximizes performance, improves throughput, and adds new embedded technologies that give business, creative, and scientific professionals the tools to solve problems faster, process larger data sets, and meet bigger challenges.

With new intelligent performance features, a new high-bandwidth interconnect architecture, and greater memory capacity, platforms based on the Intel Xeon processor 5500 series will deliver the best possible performance

for HPC Server 2008. Servers based on the Intel Xeon processor 5500 series have up to 8 computation engines, 16 threads per 2-socket platform with Intel® Hyper-Threading Technology,<sup>†</sup> and more bandwidth than previous generations.

Dual-processor technical compute server platforms based on the Intel Xeon processor 5500 series feature Intel® QuickPath Architecture, a new, scalable, shared memory

The need for “high performance”  
gets higher all the time

## Intel® Xeon® Processor 5500 Series

Benefit	Features
<b>Intelligent Performance</b>	<ul style="list-style-type: none"> <li>• New intelligent performance features:               <ul style="list-style-type: none"> <li>- Intel® Turbo Boost Technology delivers performance on demand, letting processors operate above the rated frequency under certain conditions to speed specific workloads.</li> <li>- Greater bandwidth from Intel® QuickPath Architecture and new inclusive L3 cache.</li> <li>- Intel® Hyper-Threading Technology benefits from larger caches and massive memory bandwidth, delivering greater throughput and responsiveness for multi-threaded applications.</li> </ul> </li> <li>• Up to 78 lanes configurable PCIe* (72 lanes PCIe gen 2).</li> <li>• Larger memory support (up to 144 GB).</li> <li>• Performance/Watt - Intel® Intelligent Power Technology delivers the highest system-level performance/watt.<sup>1</sup></li> </ul>
<b>Best-in-Class Reliability</b>	<ul style="list-style-type: none"> <li>• Backed by the proven track record of the world’s most widely deployed servers:               <ul style="list-style-type: none"> <li>- More than 20 years of server experience.</li> <li>- Nearly 40 million servers deployed worldwide.</li> <li>- Billions of hours of real application runtime.</li> </ul> </li> <li>• Proactive data protection and improved security through advanced redundancy and error checking features including enhanced memory ECC, memory mirroring, and available DDR3 DIMM.</li> </ul>
<b>Comprehensive Software Tools</b>	<ul style="list-style-type: none"> <li>• Visual Studio® 2008-ready, Intel® C++ and Intel® Fortran Compilers for Windows® automatically optimize and parallelize software to take advantage of multi-core Intel® processors.</li> <li>• Intel® Threading Building Blocks (Intel® TBB), Intel® Integrated Performance Primitives (Intel® IPP) and Intel® Math Kernel Library (Intel® MKL) create a strong foundation for building robust, high-performance parallel code at significant price savings.</li> <li>• Integrated testing tools help save time and improve the quality of software applications.</li> <li>• Intel® VTune™ Performance Analyzer works with Visual Studio to improve performance by identifying and removing performance bottlenecks. Low intrusion sampling methods provide an accurate representation of software’s actual performance.</li> <li>• Intel® Thread Checker locates hard-to-find bugs in threaded software. Thread Profiler helps tune performance of Open MP-threaded apps.</li> </ul>

architecture that integrates a memory controller into each microprocessor and connects processors and other components with a new high-speed interconnect, providing the data bandwidth to keep each core running at capacity. Intel® Turbo Boost technology<sup>5</sup> boosts performance even further for critical workloads by adapting core frequency to increase execution speed as needed (while Intel® Intelligent Power Technology<sup>6</sup> conserves power on cores where there is less demand). For applications that lend themselves to parallel, multi-threaded execution, Intel Hyper-Threading Technology reduces computational latency, making optimal use of every cycle.

## Summary

At Intel and Microsoft, we recognize that you need more than just HPC that delivers greater performance in the data center. That's why we provide standardized, platform-based solutions that simplify cluster management, optimize performance and efficiency, improve throughput, and give business, creative, and scientific professionals the tools to solve problems faster and at lower cost, process larger data sets, and meet bigger challenges.



### For More Information

For more information about Windows HPC Server 2008, visit [www.microsoft.com/hpc](http://www.microsoft.com/hpc). For information about purchasing Windows HPC 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). For more information about the Intel and Microsoft solutions, visit [www.intelalliance.com/microsoft](http://www.intelalliance.com/microsoft).

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). And for more information about Intel® platforms in high performance computing, go to [www.intel.com/products/server/hpc](http://www.intel.com/products/server/hpc).

<sup>1</sup>Source: Intel internal measurements using SPECjbb2005\* as of Aug 2007. System configurations: 2S, 80W processors, 8 DIMMs, 1 HDD, 1 PSU. Except Irwindale-110W processors; Power measurements using SPECjbb2005. Tylersburg-EP from Intel internal measurements as of Sept 2008 with 2.93GHz 95W processors. This information is preliminary and subject to change before launch.

<sup>4</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>5</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>6</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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