Executive summary

Across a broad spectrum of industries, organizations deploy application servers for a range of operations. These processes may include dynamically generating web pages; automating services management; implementing clustering, failover, and load balancing services; and other operations. Application servers also deploy and manage business applications, provide administrative and management tools for efficient control and security, and enhance developer productivity through standards and programming models.

Intel and IBM provide the foundation for high-performance applications with the advanced Intel® Xeon® processor family and IBM® WebSphere® Application Server 8.5.5 software. This energy-efficient hardware powered by the Intel Xeon processor family and the WebSphere Application Server software tuned by both Intel and IBM offers cost-effective enhanced performance and scalability to meet the demands of today’s operation-intensive applications.

Optimizing application server operations

To remain competitive in today’s business arena, IT organizations often seek improvements that can optimize application server performance. Application server deployments such as IBM WebSphere Application Server software offer a dynamic, flexible Java application server environment that is well suited for either single-server environments or web-tier clusters of multiple application server instances.

Intel and IBM have teamed up to optimize WebSphere Application Server performance on systems powered by the Intel Xeon processor E5 v2 family and equipped with Intel® Ethernet Converged Network Adapters and Intel® Solid-State Drives (Intel® SSDs).

Utilizing the open source DayTrader® benchmark application, which models an online stock trading system, Intel and IBM engineers conducted testing at labs at Intel. The application simulates end users logging in, looking up stock quotes, and buying or selling stock shares. Testing resulted in 62,233 operations per second, a benchmark that is more than two times the performance of the previous-generation Intel Xeon processor E5 family (see Figure 1).1
Using the open source Apache JMeter* load driver, the real-world workload provided by DayTrader can be used to measure and compare performance results for Java applications running on application servers, and the Intel-IBM engineering team used it to benchmark WebSphere Application Server Version 8.5.5 on a dual-socket, Intel Xeon processor E5 v2 family–based platform with an IBM DB2® Version 9 back-end database system (see Figure 2).2

**Advancing performance enhancement**
The benchmark result represents a 215 percent increase from benchmarking previous generations of Intel processors, network adapters, and storage running WebSphere Application Server. Intel and IBM engineers not only compared results for the Intel Xeon processor E5 v2 family and Intel Xeon processor E5 family, but also for Gigabit Ethernet (GbE) networking compared to 10 Gigabit Ethernet (10GbE) networking. The combination of the Intel Xeon processor E5 v2 family and 10GbE networking achieved results reflecting significant increases in operations/second.1

Many organizations worldwide deploy WebSphere Application Server to help deliver Java applications for important business functions, services, and employee productivity. But as these applications become increasingly complex and the data they rely on continues to grow, organizations need to up the ante on application operation performance within their infrastructure. Poorly performing applications can lead to diminished productivity, inefficient results, and lost revenue.

**Deploying next-generation components**
The Intel Xeon processor E5 v2 family is designed to rapidly process vast amounts of data. Advances engineered into these Intel Xeon processors enabled the successful DayTrader benchmark performance. Processor features such as Intel® Advanced Vector Extensions (Intel® AVX)3 and improved Intel® Turbo Boost Technology 2.04 also contribute to significant performance gains. In addition, Intel® Integrated I/O incorporates Intel® Data Direct I/O (Intel® DDIO), which helps reduce latency while expanding capacity and bandwidth by allowing the processor cache to serve as the destination for I/O data.

The high benchmark results were obtained through combined Intel Ethernet Converged Network Adapters and 10GbE switches for high-speed network connectivity. The converged adapters help unify networking and provide a simple path to cost-effective performance of next-generation storage networks. Intel adapters include support for technologies such as Intel® QuickData Technology, the Message Signaled Interrupts (MSI-X) standard, and low-latency interrupts in a multi-core platform that help accelerate data across the platform and improve application response times.

The Intel® SSD 710 Series provides high-I/O, solid-state drive storage to help deliver fast and consistent performance for the DayTrader benchmarking. SSDs offer a high-performance alternative to traditional disk drives that help...
reduce power consumption. IBM storage solutions that utilize Intel SSDs combine high read/write performance with strong data protection and Flash technology.

**Capitalizing on rock-solid collaboration**

Combined Intel and IBM engineering continues to enhance the overall performance of WebSphere Application Server running on servers powered by Intel processors and equipped with Intel networking connectivity and Intel SSD storage. Intel® technologies are designed to deliver enhanced performance out of the box, and joint Intel and IBM performance tuning can result in further improvements. Intel network adapters can be tuned based on the traffic pattern of the application workload, using parameters such as queue sizes, number of queues, interrupt throttling, and other parameters.

The engineering collaboration between Intel and IBM that achieved this benchmark paves the way for organizations to realize significant, cost-effective performance improvements in their WebSphere Application Server deployments on platforms powered by the Intel Xeon processor E5 v2 family.

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1. Performance comparison based on IBM® WebSphere® Application Server 8.5.5 running on dual-socket servers equipped with current and prior-generation Intel® Xeon® processors. Using the DayTrader performance benchmark application, the server equipped with the prior-generation Intel® Xeon® processor E5-2680 processor with a Gigabit Ethernet adapter scored 28,933 operations per second. The same server equipped with an Intel® Ethernet 10 Gigabit Server Adapter scored 42,382 operations per second.

2. 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, go to: http://www-01.ibm.com/software/webservers/appserv/was/performance.html.

3. AVX/AVX2 is designed to achieve high 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 reduced frequency to maintain reliable operations at all times.

4. Intel® Turbo Boost Technology 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 system manufacturer. Performance varies depending on hardware, software, and system configuration. For more information, visit http://www.intel.com/go/turbo.

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