Performance Brief

**Intel® Xeon® Processor 5500 Series**

# Virtualization Performance of SAP ERP* on the Intel® Xeon® Processor 5500 Series with VMware

Using the Intel Xeon processor 5500 series-based platforms, the latest version of SAP ERP achieves a 1.71x[1] performance improvement in a virtualized environment over the Intel Xeon processor 5400 series.

## Overview

The SAP ERP* applications help companies address the ups and downs of markets, business cycles, and compliances by providing software solutions that include operations, financials, corporate services, and human capital management. With greater enterprise productivity and insight from SAP ERP, companies have the power needed to adapt quickly and cost effectively to changing business, market, and industry requirements. By running SAP ERP in a virtualized environment, IT can add to these benefits by lowering IT costs and increasing data center and business agility.

The Intel® Xeon® processor 5500[Δ] series with a new generation of Intel® Microarchitecture, codenamed Nehalem, helps achieve near-native performance for SAP ERP in a virtualized environment, so IT can lower costs without compromising performance. With automated energy-efficiency features, the Intel Xeon processor 5500 series also scales energy usage to the workload to achieve optimal performance/watt and reduce operating costs.

## How Intel Benefits SAP ERP

For more than 10 years, Intel and SAP have worked together to help ensure leading performance for SAP software solutions on Intel® processor-based platforms. By running SAP ERP on servers with Intel Xeon processors, enterprises can tap the power of that collaboration and access outstanding application performance and easy scalability to help achieve their business goals.

Servers based on the Intel Xeon processor 5500 series boost performance while saving on power and cooling requirements, delivering as much as 2.25x more performance in a similar power envelope[2] and dramatically reducing idle power.[3]

In addition, the Intel Xeon processor 5500 series with Intel Microarchitecture Nehalem, combined with VMware, expands the benefits of virtualization of SAP ERP with innovations that boost performance, increase consolidation ratios, and enable servers of different generations to be combined in the same virtualized server pool, improving virtual machine failover, load balancing, and disaster recovery capabilities.

Next-generation Intel® Virtualization Technology◊ (Intel® VT), combined with VMware, enhances the virtualization performance of SAP ERP by up to 1.71x[1] with new hardware-assist capabilities:

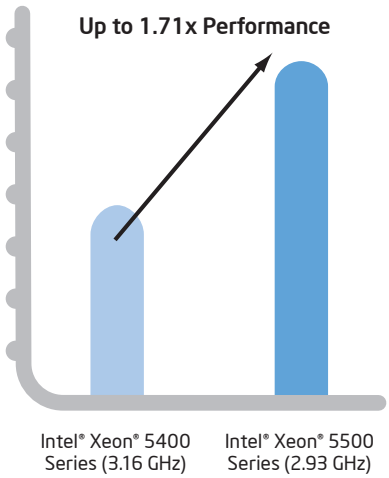
- **Intel® Virtualization Technology** (Intel® VT-x) with Intel® VT FlexMigration and Intel® VT FlexPriority, and VMware Enhanced VMotion* offers more flexible workload migration and performance optimization across the full range of 32-bit and 64-bit operating environments.
- **Intel® Virtualization Technology for Directed I/O** (Intel® VT-d) speeds data movement and eliminates much of the performance overhead by giving designated VMs their own dedicated I/O devices.
- **Intel® Virtualization Technology for Connectivity** (Intel® VT-c) further enhances server I/O solutions by integrating extensive hardware assists into the I/O devices that are used to connect servers to the data center network, storage infrastructure, and other external devices. Intel VT-c provides up to 2x the throughput of non-hardware-assisted devices.[4]

## Performance Results

Using the Intel Xeon processor 5500 series-based platforms, the latest version of SAP ERP achieved a performance improvement of up to 1.71x[1] over the previous-generation Intel Xeon processor 5400 series. The results were measured using the SAP ERP application running a typical ERP workload.

To create the server virtualization, VMware ESX* Server (Build #140815 of a version still under development, www.vmware.com/products/vi/esx/) has been optimized to take advantage of Intel Micro-architecture Nehalem features, including Extended Page Tables (EPT), Intel® Turbo Boost Technology,§ and Intel® QuickPath Technology.

### Virtualization Performance of SAP ERP



## Hardware Configuration

| Platform | Intel® Software Development Platform | |
|---|---|---|
| Processor | 2P Intel® Xeon® Processor X5570 | 2P Intel® Xeon® Processor X5460 |
| Processor Details | Nehalem 2.93 GHz/ 6.4 GT/sec Intel® QPI | Harpertown 3.16 GHz/ 1333 MT/s |
| Cores per Processor | 4 | 4 |
| Hyper-Threading | No | N/A |
| Turbo Boost | Yes | N/A |
| NUMA | Yes | N/A |
| Memory | 12 x 4 GB | 16 x 2 GB |
| Memory Details | DDR3 1066 PC3-10600R | Fully-Buffered DDR2 667 PC2-5300 |
| SAN HDD | EMC CLARiiON* CX3-80 | EMC CLARiiON* CX3-80 |
| Storage Configuration | RAID 0 | RAID 0 |

## Software Configuration

| SAP Version: SAP ECC6.0* | | |
|---|---|---|
| Hypervisor: VMware ESX* Server (Build #140815) | | |
| Guest OS | SLES10-SP2 64-bit | |
| vCPU per VM | 4 | |
| Number of VMs | 2 | |
| Memory per VM | Intel® Xeon® Processor X5570: 24 GB | Intel® Xeon® Processor X5460: 16 GB |

"The Intel® Xeon® processor 5500 series with Intel Microarchitecture Nehalem helps achieve near-native performance for SAP ERP in a virtualized environment, so IT can lower costs without compromising performance."

## Multiplying the Benefits of Virtualization for SAP ERP

Database performance is a critical part of a successful ERP implementation, and it is critical that cost-saving virtualization does not compromise that performance. By running SAP ERP in a virtualized environment built on Intel Xeon processor 5500 series-based platforms, companies can achieve outstanding ERP performance and scalability while lowering IT costs.

## Learn More

For more information on SAP ERP software, visit www.sap.com/solutions/business-suite/erp/index.epx.

For more information on VMware ESX Server, visit www.vmware.com/products/vi/esx/.

For more information on the Intel Xeon processor 5500 series, visit www.intel.com/xeon.

For more information about Intel Microarchitecture Nehalem, visit www.intel.com/technology/architecture-silicon/next-gen.

[Δ] 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.

[◊] 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.

[§] 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.

[1] Source: Intel internal measurement, February 2009.

[2] Compared to 5400 series claim supported by multiple performance results including an OLTP database benchmark and a bandwidth intensive scientific computing benchmark (SPECfp_rate_base2006). Intel internal measurement (Feb 2009).

[3] 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.

[4] Intel internal measurement. (April 2008) Ixia IxChariot* 6.4 benchmark. VMware ESX* v3.5U1. Intel® Xeon® processor E5355, 2.66 GHz, 8MB L2 cache, 1333MHz system bus, 8GB memory (8x1GB FB DIMM 667MHz).



*Other names and brands may be claimed as the property of others.

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