



**Solution Brief**  
Intel® Xeon® Processor 7500 Series

**Siemens\* investigates Virtualized Solution for Soarian Clinicals  
on the Intel® Xeon® Processor 7500 Series with VMware  
vSphere™ 4**

**Executive Summary:**

Siemens Healthcare and Intel continue their strategic collaboration in health information technologies. Recently, efforts have been made to analyze and validate the use of leading technologies from both Intel and VMware®. The goals of this collaboration include leveraging new technologies to enhance availability and manageability of patient care applications. The collaboration has started with a proof of concept that has shown that the Soarian Clinicals suite can be virtualized on VMware vSphere across web, application, and database tiers. Further, the virtualized Soarian Clinicals environment successfully operates on the latest Intel® Xeon® platform 7500 series architecture. Continuing research and collaboration through the strategic partnership is intended to demonstrate how virtualization overhead can be minimized for optimizing total cost of ownership (TCO) and maximizing performance, while simultaneously increasing the flexibility of horizontal scaling and capacity management.

*The Intel® Xeon® processor 7500 series technology offers high potential to advance customers towards improved server management and to apply new server-based features that support improved availability. Applying innovative technology that supports complex, critical applications is vital in meeting the demands for improvements in all aspects of patient care. The Siemens and Intel collaboration continues to bring innovative results for health information technology. We see this in our most recent collaboration, demonstrating the operation and performance of Soarian Clinicals in a VMware virtualized environment. Ultimately, we believe this collaboration has significance across the entire health IT industry.*

*-Roger Vidal, Vice President, Siemens Healthcare*

### **About Siemens Soarian**

Soarian is an enterprise-wide, healthcare information system. The Soarian Clinicals application suite supports healthcare providers in assessing patient condition and driving workflow care processes quickly, efficiently, and with maximum quality. Soarian Clinicals provides the means to electronically display, store, retrieve, transfer, exchange, report, and print patient information across the continuum of care by healthcare providers and integrates the latest technologies in process management and analytics.

### **About the Intel 7500 Series**

Intel Xeon processor 7500 series-based servers deliver dramatic increases in performance and scalability versus previous-generation servers and include new embedded technologies that give businesses like Siemens Health Services division the tools to solve problems faster, process larger data sets, and meet bigger challenges. With intelligent performance, a new high-bandwidth interconnect architecture, and greater memory capacity, platforms based on the Intel Xeon processor 7500 series are ideal for demanding workloads. A standard four-socket server provides up to 32 processor cores, 64 execution threads and a full terabyte of memory. The Intel Xeon processor 7500 series also includes more than 20 new reliability, availability and serviceability (RAS) features that help to improve data integrity and uptime. One of the most important is Intel® Machine Check Architecture Recovery, which allows the operating system to take corrective action and continue running when uncorrected errors are detected. Since these highly scalable servers can be used to support enormous user populations, the enhanced RAS support offers significant value for online workflow and medical processes. Platforms based on the Intel Xeon processor 7500 series deliver a number of additional features that help to improve performance, scalability and energy-efficiency.

- Next-generation Intel® Virtualization Technology<sup>1</sup> (Intel® VT) provides extensive hardware assists in processors, chipsets and I/O devices to enable fast application performance in virtual machines, including near-native I/O performance. Intel® VT also supports live virtual machine migration among current and future Intel Xeon processor-based servers, so businesses maintain a common pool of VMware virtualized resources as they add new servers.

- Intel® QuickPath Interconnect Technology is a scalable new shared-memory architecture that integrates two memory controllers into each microprocessor and connects processors and other components with a high speed interconnect. It provides the bandwidth needed to keep each core running at capacity.
- Intel® Turbo Boost Technology boosts performance when it's needed most by dynamically increasing core frequencies beyond rated values for peak workloads.
- Intel® Intelligent Power Technology adjusts core frequencies to conserve power when demand is lower.
- Intel® Hyper-Threading Technology improves throughput and reduces latency for multithreaded applications and for multiple workloads running concurrently in VMware virtualized environments.

## About VMware vSphere

VMware vSphere complements these capabilities by offering comprehensive support for highly reliable datacenter virtualization, flexible and optimized resource management, and the highest levels of application service, availability and resiliency. VMware vSphere provides a flexible and scalable software foundation for virtualizing high-capacity systems. Virtual machines may be configured with up to eight virtual CPUs and 256GB of memory and the vSphere platform can support up to 40GB/s of network bandwidth and more than 300,000 I/O operations per second. VMware vSphere also provides comprehensive support for Intel® Virtualization Technology (Intel® VT), which enables near-native performance and increased flexibility for all virtualized workloads.

## The Collaboration

Collaboration testing utilized the Siemens Soarian Clinicals solution, simulating a realistic hospital deployment where physicians, nurses and other medical practitioners concurrently used the applications during peak processing times. The peak time workload applied represented 3,000 user sessions, 40,000 clinical result transactions, 5,000 patient care orders placed, the completion of 3,000 nurse assessment sessions resulting in 32,000 documented patient observations, as well as all of the associated administrative and background processing necessary with that level of patient care.

The first VMware virtualized configuration tested involved an un-tuned, direct translation from a standard physical server implementation configuration. It was hosted on an Intel Xeon Processor 7500 Series platform and was used to validate acceptable response times while leaving excess computing resources on the server.

## Details:

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The performance tests were executed by Intel engineers in Intel labs, in close collaboration with Siemens and VMware. All environment configurations and testing results were reviewed by engineers from all three companies.

## Current Deployment Model:

Soarian Clinicals' standard deployment has a minimum of four physical servers including two load balanced servers at the application/web tier and two for active-passive redundancy at the database tier. The Application/Web tier can scale out dynamically for adapting to increasing loads. The configuration is designed for N+1 redundancy. The following diagram illustrates the critical components of a sample deployment model.

	2 x Web/App-1, 2 Load Balanced	2 x DB Server Active-Passive
<b>Hardware Configuration:</b>		
Processor	2P Intel® Xeon® Processor 5530	2P Intel® Xeon® Processor 5530
Processor Details	Nehalem 2.3 GHz/	Nehalem 2.3 GHz/
Cores per Processor	4	4
Hyper-Threading	Disabled	Disabled
Memory	30GB	30GB
<b>Software Configuration</b>		
Operating System	Windows 2003 SP2- 32Bit	Windows 2003 SP2- 32Bit
Software Stack Components	IBM Websphere 6.1	Sql Server 2005 (32Bit)
Application Software	Soarian Clinicals version 2.0C6	Soarian Clinicals version 2.0C6

## Test System Deployment Model:

The test deployment model (for proof of performance purposes) utilized a single Intel® Xeon® processor 7500 series platform, which hosted all tiers of the sample deployment of the Soarian Clinicals configuration on a single 4 socket, 8 core system. The server platform hosted multiple virtual machines of various configurations (i.e., database tier, web/app tier) which remained configurable based on the customer sizing to deliver necessary response times in each tier. The virtual machines were configured to be compositionally homogenous for ease of capacity planning, scaling and management. This allowed for managing the server components as though they were on their own dedicated, physical machines, while still providing the capability to run component copies for either scaling or for provisioning new systems.

Since Web- and application-tier virtual machines require heavier resources, 8 of 32 CPUs were reserved for each of the web/app virtual servers on the physical server. The following is an illustration of the test deployment model used in the first phase validation.

Physical Hardware Configuration	
Processor	4P Intel® Xeon® Processor 7560
Processor Details	Nehalem 2.27 GHz/ 6.4 GT/sec Intel® QPI
Cores per Processor	8
Memory	128GB RAM
Ethernet	8- GB Ethernet Ports

Hyper-Threading	Disabled		
Hypervisor	VMware ESX 4.0 Update 1 (Build #208167)		
	2x Web/App-1 (Virtual Machine)	Utility Server (Virtual Machine)	2 x DB Server (Virtual Machine)
Hardware Configuration			
vCpu for Virtual Machine	8	4	4
Memory	24GB	16GB	16GB
Software Configuration			
Guest Operating System	Windows 2003 SP2- 32Bit	Windows 2003 SP2- 32Bit	Windows 2003 SP2- 32Bit
Software Stack Components	IBM Websphere 6.1		Sql Server 2005 (32Bit)
Application Software	Soarian Clinicals version 2.0c6	Soarian Clinicals version 2.0C6	Soarian Clinicals version 2.0C6

The VMware driver VMXNET2 was considered best for this deployment test scenario as it provided the smoothest network traffic between the virtual machines. VMXNET3 configuration is also available. For more information regarding VMXNET3, consult Siemens and VMware.

### Performance of the VMware Virtualized Model in the Test System:

The Intel® Xeon® processor 7500 series processor offers substantial computing resources beyond what is required to achieve acceptable response times for Soarian Clinicals in this first phase, virtualized configuration. Additional tuning of the configuration is planned as the collaboration project continues, and the team is projecting greater yields in optimization of computing-resource utilization and scaling capability. We believe that virtualization offers benefits for improved software deployment, scalability, and server management while preserving system resiliency.

### Conclusion:

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As part of the ongoing strategic relationship between Intel and Siemens Healthcare, a collaborative project was launched to prove concepts around optimal use of advanced technologies from Intel and VMware when deploying Siemens Soarian Clinicals. The ultimate goal of this continuing collaboration around server virtualization is to bring enhanced value to the Soarian customers and their patients. The results thus far have shown that VMware vSphere can be utilized across the web, application, and database tiers and that Soarian Clinicals attains acceptable performance on the Intel Xeon processor 7500 platform. The results also indicate that additional tuning of the configuration will minimize the

virtualization overhead, while also increasing the flexibility of the capacity management processes. Continuing collaborative development will explore optimizing each of these critical characteristics.

Siemens, Intel, and VMware believe these technologies holds great promise to improve the flexibility, scalability, and availability of healthcare IT systems by providing an agile architecture which is adaptable to the changes that the healthcare industry is sure to encounter.

## Learn More

For more information on Siemens Soarian Clinicals software, visit [www.usa.siemens.com/soarian](http://www.usa.siemens.com/soarian).

For more information on VMware vSphere, visit [www.vmware.com/products/vsphere/](http://www.vmware.com/products/vsphere/).

For more information on the Intel Xeon processor 7500 series, visit [www.intel.com/xeon](http://www.intel.com/xeon).

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

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**Disclaimer:** This collaborative, strategic testing effort represents ongoing research to leverage newer, emerging technologies with Siemens Soarian Clinicals' suite of applications. Configurations may not be readily deployable in the hospital or production environments until additional validation is completed for optimized and hardened configuration models.