A POWERFUL FOUNDATION FOR VIRTUAL ENVIRONMENTS AND CLOUD COMPUTING INFRASTRUCTURE

VMware vSphere™ 5.0 and the Intel® Xeon® processor E5-2600 product family deliver the availability, performance and flexibility IT organizations need.

BRILLIANTLY VERSATILE FOR BUSINESS

IT organizations are tasked to do more with less: support more users, a wider variety of devices and more data with fewer resources. Intel® Xeon® processor E5-2600 product family-based platforms running VMware vSphere™ 5.0 can provide the availability, performance and flexibility today’s IT organizations need to meet diverse business-critical demands in a cost-effective way.

- **The Intel® Xeon® processor E5-2600 product family** is the heart of a flexible and efficient data center infrastructure. These engineering marvels are designed to deliver the best combination of performance, built-in capabilities, and cost-effectiveness. The Intel Xeon processor E5-2600 product family offers more capabilities for a next-generation data center with more cores, more memory, more integration and more bandwidth. Servers based on these processors deliver high performance across the full range of business applications, including highly demanding workloads, such as design automation and real-time financial transactions.

- **VMware vSphere™ 5.0** is the industry-leading virtualization platform for building cloud infrastructures that enables users to run business-critical applications with confidence and respond faster to their business, maximizing the value of these powerful Intel® servers. This latest version delivers major improvements in live migration speed and flexibility, resource management, health monitoring, and security to provide more agile and reliable support to the business. Exclusively on the ESXi hypervisor, VMware vSphere 5.0 offers industry-leading performance and scalability, and a more complete, robust and powerful solution for virtual environments and cloud computing infrastructure.

The Intel Xeon processor E5-2600 product family and VMware vSphere 5.0 allow you to:

- **Strengthen security** by implementing encryption throughout your business to protect your data and communications more effectively—without slowing your applications or overloading your servers.

- **Reduce IT costs** by consolidating all your applications and workloads onto a small number of Intel Xeon processor E5-2600 product family-based servers. The savings can be dramatic and can increase utilization from 5-15 percent to as much as 60-80 percent.¹
• **Optimize performance and power efficiency** across a broad range of business applications to solve your most complex problems.

• **Ensure always-on IT and cost-effective data protection** with highly reliable servers and simple, fully-automated health monitoring, failover, and disaster recovery. VMware vMotion™ offers live migration so you can eliminate even planned downtime by moving workloads to different servers for hardware maintenance.

• **Improve application quality** by testing new applications, upgrades and patches in pre-production virtual machine “sandbox” staging environments. You can clone your production environment almost instantly to ensure realistic testing so you can avoid software problems that might otherwise cause critical business applications to fail.

**STREAMLINE YOUR DATA CENTER**

Intel Xeon processor E5-2600 product family and VMware vSphere 5.0 allow you to consolidate your infrastructure, simplify operations, and accelerate new deployments, so you can support the business more effectively.

• **Provide better support for your most time-sensitive applications.** Intel® Integrated I/O on the latest Intel Xeon processor E5-2600 product family reduces I/O latency by up to 30 percent2,3 and supports the PCIe 3.0 specification, which can double I/O bandwidth4,5 to help eliminate potential bottlenecks that might otherwise slow virtualized performance as your workload grows. Intel® Data Direct I/O Technology further reduces latency by transferring data directly from storage to cache, eliminating unneeded trips to main system memory. VMware vSphere supports fast data transfers (up to 350,000 I/O operations per second), so these improvements can deliver significant gains in application throughput and response times in your virtualized data center.

• **Increase storage performance** and scalability with non-transparent bridging that gives you the ability to connect multiple systems, each with access to the other’s memory window. Key storage processor features also include accelerated RAID, which simplifies RAID 5 & 6 implementation, so you can protect your data more effectively and at a lower cost. The latest version of VMware vSphere adds to these advantages by providing better reporting for key storage performance statistics and by accelerating virtual machine migrations. This enables IT staff to monitor, control and adapt storage and server infrastructure more quickly and effectively to improve overall performance.

**GAIN POWERFUL PERFORMANCE WITH FLEXIBLE FEATURES**

Intel Xeon processor E5-2600 product family-based servers are the heart of a next-generation data center with a range of technical advancements that address performance to solve your most complex problems. These powerful servers offer:

• **Better application responsiveness**, with up to 80 percent performance gains over a previous generation Intel® Xeon® processor-based server.2,5

• **Even higher gains for many technical and high performance computing (HPC) applications.** Intel® Advanced Vector Extensions (Intel® AVX) double the performance for floating point operations2,6 to significantly reduce compute times and deliver faster results.

• **Computing power when you need it.** The new Intel® Turbo Boost Technology 2.0,7 adapts to spikes in your workload, offering up to two times more performance upside than the previous generation turbo technology.2,8

VMware vSphere 5.0 helps translate these silicon-based technologies into higher performance across your virtual infrastructure. It delivers near-native performance for applications running in virtual machines, with up to four times better scalability than the previous version of VMware vSphere (a single virtual machine can be configured with up to 32 virtual CPUs and 1 TB of memory).

**CREATE A MORE EFFICIENT AND RESILIENT DATA CENTER**

VMware vSphere 5.0 running on Intel Xeon processor E5-2600 product family-based servers provides the scalable capacity required to consolidate large numbers of applications and heavy workloads on each server. This means you can simplify your computing environment and dramatically reduce your capital and operating expenses.

• **Higher consolidation ratios** offer scalable performance to support more virtual machines and heavier workloads per physical server. Up to 16 high-performance cores per two-socket server deliver exceptional performance for multiple virtual machines running simultaneously. Intel® Hyper-Threading Technology2 doubles the number of execution threads per core to further increase parallelism and throughput. Intel® QuickPath Technology, an integrated memory controller, Intel Integrated I/O and 20 MB of last-level cache help to eliminate potential memory and I/O bottlenecks that might otherwise slow virtualized performance as your workloads grow. VMware vSphere 5.0 builds on these features with industry-leading support for dynamic resource allocation, memory compression, and memory over-commit, all of which can help you run more virtual machines per server with consistent and highly reliable performance.

• **Improved utilization and higher availability** deliver increased flexibility and reliability. VMware Enhanced vMotion and Intel® Virtualization Technology FlexMigration provide a proven live migration solution for moving workloads without downtime among current and future Intel Xeon processor-based servers. This capability provides a solid and affordable foundation for a complete array of high-availability and disaster-recovery solutions. With VMware vSphere and Intel Xeon processor E5-2600 product family, you can combine servers from multiple generations into the same virtualized server pool to extend failover, load balancing, and disaster recovery capability across all your applications and workloads.
VMware High Availability monitors and restarts virtual machines on servers that have spare capacity. This cost-effective, automated solution minimizes downtime and IT service disruption, while eliminating the need for dedicated stand-by hardware. VMware Fault Tolerance takes high availability to the next level, by providing fully-mirrored operation with continuous availability to eliminate even the smallest IT service disruption. It provides zero down-time, zero data-loss protection without the cost or complexity of alternative solutions. VMware vCenter™ Site Recovery Manager allows you to automate failover for all your systems and workloads. It is not only far simpler and more cost effective than traditional disaster-recovery solutions, but also more reliable, since it eliminates error-prone manual processes and is easily tested without disrupting your production environment.

The latest version of VMware vSphere improves all of these functions by migrating virtual machines up to five times faster and enabling up to eight simultaneous vMotion events. It also provides deeper diagnostics and health checking, enhanced back-up and restore capabilities, and improved reporting for key storage performance statistics. With this functionality, you can monitor, control and restore your systems and software more quickly and effectively to further improve service levels.

**LOWER YOUR COSTS THROUGH AUTOMATED POWER MANAGEMENT**

Intel and VMware technologies not only improve your application response times, but also help you operate more cost effectively with features that help you maximize energy efficiency throughout your data center.

- **Better power efficiency per server.** Intel® Power Tuning Technology uses on-board sensors to give you greater control over power and thermal levels across the system. Intel® Intelligent Power Technology automatically regulates power consumption to combine industry-leading energy efficiency with intelligent performance that adapts to your workloads. Optimized energy efficiency can be achieved with up to 50 percent more performance per watt than previous generations with servers based on the Intel Xeon processor E5-2600 product family.

- **Decrease your costs even further with intelligent performance.** Virtualizing and consolidating your systems and applications is one of the most effective ways to simplify your computing environment, reduce your hardware costs, and drive down your space, power and management requirements. VMware vSphere takes advantage of Intel Intelligent Power Technology to further reduce power consumption at the system level, by consolidating workloads onto as few cores as possible. For example, when workloads are light, VMware vSphere can automatically increase the frequency of one or more cores by as much as 400 MHz, shift more workloads onto the higher performing cores, and put idle cores into low-power sleep states. VMware® Distributed Power Management (DPM) provides similar control at a higher level by automatically redistributing virtual machines onto a smaller number of servers when workloads are light and shutting down the unneeded systems. You’ll benefit from a greener computing environment and lower utility bills.

**INCREASE SECURITY TO PROTECT YOUR BUSINESS**

VMware vSphere makes it easy to establish and maintain secure configuration standards. It provides automated patch management for physical hosts and virtual machines, and enables businesses to test software patches and upgrades in realistic environments before deploying them to production systems. The Intel Xeon processor E5-2600 product family adds additional security functionality that can help you protect your systems, software and business assets more effectively. Intel® Advanced Encryption Standard-New Instructions (AES-NI) helps businesses to implement encryption pervasively to protect valuable business data and communications more effectively without driving up costs. This new set of instructions accelerates encryption by 10 times to allow you to protect critical data and communications throughout your business without compromising performance.

**AN EVOLUTIONARY PATH TO THE CLOUD**

VMware and Intel are committed to delivering advanced cloud computing functionality to businesses today, while also helping them establish an interoperable foundation for integrating with current and future public clouds.

Intel Xeon processor-based servers provide a high-performing, scalable, energy-efficient hardware platform for public and private cloud servers. The VMware vSphere platform helps to ensure broad software compatibility with diverse cloud solutions, through new storage APIs and the new vCloud™ application-programming interface (API) that enables users to run business-critical applications with confidence and respond faster to their business. VMware vSphere accelerates the shift to cloud computing for existing data centers, while also underpinning compatible public cloud offerings, paving the way for the only hybrid cloud model.

You can take advantage of this industry-leading virtualization platform today to deploy advanced cloud computing functionality for your business. It will help you deliver better and more reliable service, improved productivity and reduced costs. In addition, this platform provides you with an interoperable foundation that keeps your options open as cloud computing models evolve.
Download the recent Cloud Builder Reference Architecture featuring VMware to learn how your company can take advantage of VMware virtualization on Intel Xeon processor E5-2600 product family-based servers to improve energy efficiency and performance, visit www.intel.com/cloudbuilders.


2 Software and workloads used in performance tests may have been optimized for performance only on Intel® microprocessors. Performance tests, such as SYSmark® and MobileMark®, are measured using specific computer systems, components, software, operations, and functions. Any change to any of those factors can cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating the contemplated purchases, including the performance of that product when combined with other products.

3 Intel measurements of average time for an I/O device read to local system memory under idle conditions. Improvement compares Xeon processor E5-2600-product family (230 ni) vs. Xeon processor 5500 series (340 ni). Baseline Configuration: Green City system with two Intel® Xeon processor E5620 (2.4GHz, 4C, 12GB memory @ 1333), C-States Disabled, Turbo-Disabled, SMT Disabled, Rubicon™, PCiE 2.0 x8. New Configuration: Meridian system with two Intel® Xeon processor E5-2660 (C0 stepping, 2.4GHz, 6C, 32GB memory @ 1600MHz, C-States Enabled, Turbo-Enabled. The measurements were taken with a LeCroy® PCie protocol analyzer using Intel internal Rubicon (PCIe 2.0) and FlOm (PCIe 3.0) test cards running under Windows® 2010 R2 x64.

4 If 64b and 128b/15b encoding in PCIe 3.0 specification enables double the interconnection bandwidth over the PCIe 2.0 specification. Source: http://www.pci.org/news_room/November_18_2010_Press_Release.


6 Source: Performance comparison using SPECint® benchmark with turbo enabled and disabled. Baseline scores of 939 (turbo enabled) and 376 (turbo disabled) based on Intel internal measured estimates as of 5 December 2011 using a Supermicro® XBDTN+ system with two Intel® Xeon® processor X5690, Turbo Enabled, EIST Enabled, Hyper-Threading Enabled, 48 GB RAM, Red Hat® Enterprise Linux Server 6.1 beta for x86_6. New scores of 659 (turbo enabled) and 254 (turbo disabled) based on Intel internal measured estimates using an Intel® Rose City platform with two Intel® Xeon® processor E5-2680, Turbo Enabled or Disabled, EIST Enabled, Hyper-Threading Enabled, 64 GB RAM, Red Hat Enterprise Linux Server 6.1 beta for x86_6.

7 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 PC manufacturer. Performance varies depending on hardware, software, and system configuration. For more information, visit http://www.intel.com/go/turbo.

8 Requires an Intel® HT Technology enabled system, check with your PC manufacturer. Performance will vary depending on the specific hardware and software used. Not available on Intel® Core™ i5-750. For more information including details on which processors support HT Technology, visit http://www.intel.com/go/hyperthreading.


11 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 BIOS and/or operating system update. Please check with your system vendor for details.

12 Intel® AES-NI requires a computer system with an AES-NI enabled processor, as well as non-Intel software to execute the instructions in the correct sequence. AES-NI is available on Intel® Core™ i5-600 Desktop Processor Series, Intel® Core™ i7-600 Mobile Processor Series, and Intel® Core™ i5-500 Mobile Processor Series. For availability, consult your retailer or system manufacturer. For more information, see http://software.intel.com/en-us/articles/intel-advanced-encryption-standard-instructions-aes-ni."

13 Source: testing with Oracle Database Enterprise Edition 11.2.0.2 with Transparent Data Encryption (TDE) AES-256 shows as much as a 10x speedup when inserting one million rows 30 times into an empty table on the Intel® Xeon® processor X5680 (3.33 GHz, 36 MB RAM) using Intel® IPP routines, compared to the Intel® Xeon® processor X5560 (2.53 GHz, 36 MB RAM) without Intel® IPP. 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, visit www.intel.com/performance-resources/limits.htm. Copyright © 2012 Intel Corporation. All rights reserved. Intel, the Intel logo, and Xeon are trademarks of Intel Corporation in the U.S. and other countries. Copyright © 2012 VMware, Inc. All rights reserved. VMware, the VMware logo, vSphere, vCenter, vMotion, and vCloud are registered trademarks or trademarks of VMware, Inc. in the United States and/or other jurisdictions. *Other names and brands may be claimed as the property of others.

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