

SOLUTION BRIEF

Intel® Xeon® Processor
E5-2600 v2
Product Family



Data Center and Private Cloud Solutions

Intel® Xeon® Processor E5-2600 v2 Product Family



The Heart of a Modern Data Center

Not that long ago, IT solutions were largely invisible to customers. They were hidden away in the data center, providing behind-the-scene tools and information. Today, IT is more pervasive and its impact far more visible to customers. Sales, marketing, social networking, and customer support are all happening online. With these changes, the speed, functionality, and reliability of the IT infrastructure directly impacts the customer experience at almost every step and can mean the difference between profit and loss, growth and decline, success and failure.

In short, IT no longer just supports the business. Increasingly, IT is the business. IT organizations are more important than ever and expectations have grown.

The Best Path Forward

In this increasingly IT-centric business world, business leaders want solutions that drive innovation, differentiate the business, generate revenue, scale without limit, and never go down. Chances are you've already begun laying the foundation you need to meet these growing demands. You started by virtualizing and consolidating your data center to cut costs and free up space, power, and cooling resources. Then you began adding automation to increase availability and speed application deployments.

Now you're taking the next step, layering on cloud-like services, such as automated provisioning and end-user chargeback based on usage. With these tools, you're streamlining service delivery and cost models far

more efficiently than in the past, and you're making it easier for your IT staff to roll out new data-driven applications that help drive better business outcomes.

Yet challenges and expectations continue to grow. Over the next few years, another billion users will be connecting to the Internet with more and smarter devices. You may already be integrating sensors into your products and processes to enhance the customer experience. These and many other devices will be collecting and aggregating increasingly vast amounts of diverse, fast-moving data that you'll need to integrate, store, manage, mine, and analyze to maintain your competitive advantage.

How will you scale and adapt fast enough to meet these challenges? The answer lies in continuing the evolution you've already begun. By progressively transforming your data center, you can turn it into a highly-optimized cloud environment that maximizes efficiency, security, and agility, while providing elastic scalability and always-on availability.

Key Challenges in the Virtualized Data Center

To stay on track, IT organizations need to address a number of key challenges that have emerged in today's highly virtualized data centers and clouds.

- **Explosive Data Growth.** With more users connecting with more devices and demanding richer on-line experiences, your storage solutions will have to become more efficient. They will need to scale flexibly and cost-effectively to support massive volumes of structured and unstructured "big" data.
- **Growing Analytics Requirements.** Organizations across many sectors are gaining competitive advantage through their ability to access, store, and analyze petabytes of diverse, fast-moving data in near-real time. Big data analytics is beginning to move into the mainstream and will ultimately become an essential business capability. Successful implementation requires new strategies, new infrastructure, and new IT skillsets.
- **I/O Bottlenecks.** Higher virtual machine densities deliver fundamental cost advantages, but also multiply I/O requirements. This can generate I/O throughput issues that prevent data-hungry virtual machines from obtaining sufficient bandwidth.
- **New Security Threats.** Multi-tenancy, automation, and dynamic workload management are essential to support next-generation IT efficiency, yet they also create new security issues. The consolidation that is typical in a highly virtualized environment adds to these risks, since a compromised hypervisor could potentially endanger all assets residing on a physical server. Fundamental, hardware-based improvements are needed to protect business assets more effectively in virtual data centers and in private, public, and hybrid cloud environments.
- **Isolated Resource Pools.** Non-standard systems and technologies impede resource sharing and add operational complexity, which creates inefficiencies and increases costs. Ongoing convergence of server, storage, and networking assets onto consistent standards is needed to support next-generation cloud models.
- **Rising Energy Costs.** Virtualization and cloud computing improve utilization, which is one of the most effective ways to increase energy efficiency—but that won't be enough going forward. Ongoing improvements in energy-efficiency are needed at every level of the data center, from individual components to entire facilities.

Solving Your Challenges without Breaking Your Budget

The Intel® Xeon® processor E5-2600 v2 product family was designed specifically to address the requirements outlined above. Servers and storage solutions based on these processors deliver an unmatched combination of performance and built-in capabilities to support virtualized data centers and next-generation cloud solutions that are flexible, efficient, cost-effective, and massively scalable.

Scaling Storage and Analytics for the Big Data Era

Intel Xeon processors are powering a new generation of cost-effective storage solutions that improve performance, scalability, and cost models for today's increasingly data-intensive world. By replacing costly proprietary storage processors with Intel Xeon processors, storage vendors have been able to develop intelligent software that delivers transformative levels of efficiency and cost-effectiveness. Capacity can be scaled incrementally and data management is greatly enhanced with sophisticated capabilities such as data deduplication, data consolidation, and thin provisioning.

Intel provides additional resources that can help you solve your most demanding big data challenges.

- **Simple, low-cost storage acceleration.** Intel® Solid State Drives (Intel® SSDs) and Intel® Cache Acceleration Software (Intel® CAS) boost storage performance. Intel CAS monitors data usage and automatically stores "hot" data on ultra-fast Intel SSDs and "cold" data on lower-performing mechanical drives. With this approach, a small number of Intel SSDs can deliver dramatic performance gains at relatively low cost.
- **Big data integration for the enterprise.** Apache Hadoop* has become the de facto standard for ingesting, storing, and preparing big data for analysis. The Intel® Distribution for Apache Hadoop* software provides a comprehensive software stack, with enterprise-class support for security and manageability. This software is highly optimized for Intel Xeon processors, Intel SSDs, and Intel 10 Gigabit Ethernet and has been shown to increase performance by up to 30x versus generic Apache Hadoop software running on a less optimized hardware platform.¹

Eliminating I/O Bottlenecks to Optimize Density and Performance

The Intel Xeon processor E5-2600 v2 product family has the I/O subsystem integrated directly on the processor die and also supports direct storage-to-cache data transfers. Together, these technologies deliver major increases in I/O performance and bandwidth. Data flows faster and more reliably to support data-hungry applications. This higher performance is valuable in all data-intensive environments, and especially in today's virtualized data centers and clouds, where large numbers of virtual machines often vie for the I/O resources of each physical server.

Strengthening Security so You can Move Forward with Confidence

The Intel Xeon processor E5-2600 v2 product family supports stronger security in two fundamental ways.

- **Pervasive protection for data and transactions.** Intel® Data Protection Technology² includes Secure Key, which generates high-quality security keys, and AES-NI, which provides hardware assists to accelerate and improve data encryption. With this support, you can protect online transactions more effectively and implement encryption without costly accelerators. You no longer have to sacrifice application performance to ensure strong security.

- Trusted infrastructure for secure multi-tenancy.** Establish trusted pools of virtual resources, so you can maintain security and compliance more effectively in dynamic, multi-tenant environments. Traditional approaches to security force you into a game of catch-up in which safeguards must be constantly updated to thwart new attacks. Intel® Platform Protection Technology³ includes Trusted Execution Technology (TXT), which takes a different and complementary approach to platform security by helping to ensure that operating systems and hypervisors only boot into cryptographically verified “known good states.” It also includes OS Guard, which helps to protect your operating systems from escalation-of-privilege attacks. With these protections, you can be sure your systems and software have not been tampered with or inadvertently altered during or prior to launch, and that they remain better protected during operation.

Converging Your Networks to Reduce Costs

Platforms that include Intel® Ethernet provide hardware acceleration for consolidating server and storage networks onto a unified, high-bandwidth 10 Gigabit Ethernet network. The result is a simpler and more cost-effective network, with easier connectivity, fewer cables, and lower power consumption. It can help you reduce costs now and lay a simpler and more scalable foundation for growth.

Scaling Performance throughout Your Data Center

One of the key benefits of refreshing older servers is an automatic boost in application performance. Servers based on the Intel Xeon processor E5-2600 v2 product family deliver up to 50 percent higher performance on average than previous generation Intel® Xeon® processor-based servers across a range of workloads⁴ to enable higher consolidation ratios, improved application responsiveness, and better energy efficiency. Each processor provides 50 percent more cores and cache than the prior generation, and supports faster memory. These processors also include a new feature called Advanced Programmable Interrupt Controller virtualization (APICv). APICv eliminates up to 50 percent of virtual machine exits to reduce virtualization overhead down to 4 percent CPU utilization.⁵ It adds to the many hardware assists already provided by Intel® Virtualization Technology (Intel® VT) to further improve virtual machine performance and platform scalability.

Getting Better Value from Every Watt

Data center power and cooling costs continue to rise. The Intel Xeon processor E5-2600 v2 product family helps you get more out of every watt. These processors are built using Intel's industry-leading 22 nm Tri-Gate transistors, which use only half the power of prior-generation transistors operating at the same performance level.⁶ They include built-in intelligence that automatically balances performance versus energy consumption based on IT-determined policies. Intel also offers tools that plug into existing management frameworks to provide insight and control over power, cooling, and performance, from individual servers, racks, and rows to entire facilities.

The Platform of Choice for Flexible, Efficient Data Centers

The performance, built-in capabilities, and cost-effectiveness of Intel Xeon processor-based servers has made them the clear platform of choice for meeting current needs while laying a foundation for growth and innovation. Businesses are doing amazing things with these servers, saving millions of dollars in capital and operating costs, while simplifying their infrastructure and reducing space and power requirements by as much as 90 percent.⁷ Many are in the process of creating flexible, on-demand private clouds that simplify new application deployments and provide elastic scalability to meet current and future demands, both through internal growth and by integrating with public cloud resources. They are creating environments where their IT solutions, and their businesses, can scale and adapt more quickly and efficiently.

The Best Foundation for Your Cloud

Cloud is the future of IT and Intel is at the forefront of cloud development. Intel partners with leading IT organizations around the world to define current challenges and next-generation requirements. Through Intel Cloud Builders (www.intel.com/cloudbuilders), Intel engineers work with leading hardware and software vendors and cloud providers to develop reference architectures and best practices for private, public, and hybrid cloud implementations.

These efforts help to inform Intel's technology roadmap, which ensures that new server products, such as the Intel Xeon processor E5-2600 v2 product family, not only deliver superior performance and energy efficiency, but also include critical technologies that solve problems and smooth your adoption of next-generation cloud solutions. There is no better or more reliable foundation for solving current data center needs, while simultaneously ensuring a flexible and efficient foundation for growth and innovation.

Intel Technology in Action

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Intel's internal IT organization is on track to increase data center utilization from 8 percent to 80 percent* by moving to a private enterprise cloud computing model. A key component of this strategy involves refreshing infrastructure with the latest Intel® Xeon® processor-based server and storage solutions, as well as Intel® 10 GB Ethernet and Intel® Solid-State Drives.

Intel IT's cloud strategy has already helped the company save USD 15 million over the last 2 years. As implementation and optimization continue, Intel IT has also reduced provisioning times to less than 10 minutes and now has the ability to launch a new web application in less than one day.

For more information, see: The New CIO Agenda, Intel® Cloud Computing Insights 2011, www.intel.com/content/www/us/en/cloud-computing/cloud-computing-new-cio-agenda-paper.html

* 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 may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products. For more information go to <http://www.intel.com/performance>

Results have been measured by Intel based on software, benchmark or other data of third parties and are provided for informational purposes only. Any difference in system hardware or software design or configuration may affect actual performance. Intel does not control or audit the design or implementation of third party data referenced in this document. Intel encourages all of its customers to visit the websites of the referenced third parties or other sources to confirm whether the referenced data is accurate and reflects performance of systems available for purchase.

¹ Source: TeraSort Benchmarks conducted by Intel in December 2012. Custom settings: `mapred.reduce.tasks=100` and `mapred.job.reuse.jvm.num.tasks=-1`. Cluster configuration: One head node (name node, job tracker), 10 workers (data nodes, task trackers), Cisco Nexus® 5020 10 Gigabit switch. Performance measured using `lometer*` with Queue Depth 32. Baseline worker node: SuperMicro SYS-1026T-URF 1U servers with two Intel® Xeon® processors X5690 @ 3.47 GHz, 48 GB RAM, 700 GB 7200 RPM SATA hard drives, Intel® Ethernet Server Adapter I350-T2, Apache Hadoop® 1.0.3, Red Hat Enterprise Linux® 6.3, Oracle Java® 1.7.0_05. Baseline storage: 700 GB 7200 RPM SATA hard drives, upgraded storage: Intel® Solid-State Drive 520 Series (the Intel® Solid-State Drive 520 Series is currently not validated for data center usage). Baseline network adapter: Intel® Ethernet Server Adapter I350-T2, upgraded network adapter: Intel® Ethernet Converged Network Adapter X520-DA2. Upgraded software in worker node: Intel® Distribution for Apache Hadoop® software 2.1.1. Note: Solid-state drive performance varies by capacity. More information: <http://hadoop.apache.org/docs/current/api/org/apache/hadoop/examples/terasort/package-summary.html>

² No computer system can provide absolute security. Requires an enabled Intel® processor and software optimized for use of the technology. Consult your system manufacturer and/or software vendor for more information.

³ No computer system can provide absolute security. Requires an enabled Intel® processor, enabled chipset, firmware, software, may require a subscription with a capable service provider (may not be available in all countries). Intel assumes no liability for lost or stolen data and/or systems or any other damages resulting therefrom. Consult your Service Provider for availability and functionality. For more information, visit <http://www.intel.com/go/anti-theft>. Consult your system manufacturer and/or software vendor for more information.

⁴ Baseline Configuration and Score on SPECvirt_sc2013* Benchmark as of Sept. 2013: Platform with two Intel® Xeon® Processor E5-2690. Score: 624.9 @ 37 VMs. New Configuration: IBM System x3650 M4* platform with two Intel® Xeon® Processor E5-2697 v2. Score: 947.0 @ 53 VMs. Source: <http://www.spec.org>. Intel does not control or audit the design or implementation of third party benchmark data or Web sites referenced in this document. Intel encourages all of its customers to visit the referenced Web sites or others where similar performance benchmark data are reported and confirm whether the referenced benchmark data are accurate and reflect performance of systems available for purchase.

⁵ Configuration : Pre-Production 1S Intel® Xeon® Processor E5-2600 (3.0 GHz, 4-core, 10 MB L3 cache, B0-stepping), HyperThreading ON, Turbo OFF, EIST OFF, CPU C-state OFF, Power feature OFF, Virtualization Technology ON, NUMA ON, Prefetch OFF, 64 GB SSD, Xen-unstable C/S23237 w/ APIC-v patch. Hypervisor CPU utilization with no APICv: 5.5%; Hypervisor CPU utilization with APICv: 4%. Source: Intel internal measurements as of December 2011.

⁶ Compared to previous generation 2-D transistors on 32nm planar transistors. Source: Intel internal testing.

⁷ "University Sees Major Savings with Data Center Consolidation," A Cisco customer case study, documenting how the University of Colorado replaced 300 legacy servers with just 10 Intel® Xeon® processor-based servers, reducing its server footprint by 95% and power consumption by 90%. <http://www.intel.la/content/dam/doc/case-study/risc-migration-xeon-cisco-university-of-colorado-study.pdf>

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Relative performance for each benchmark is calculated by taking the actual benchmark result for the first platform tested and assigning it a value of 1.0 as a baseline. Relative performance for the remaining platforms tested was calculated by dividing the actual benchmark result for the baseline platform into each of the specific benchmark results of each of the other platforms and assigning them a relative performance number that correlates with the performance improvements reported.

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