Data Center and Private Cloud Solutions

Intel® Xeon® Processor E5 Family

The Heart of a Flexible and Efficient Data Center

Learn why the Intel® Xeon® processor E5 family provides the best combination of performance, cost-effectiveness and built-in capabilities for your data center, your private cloud and your business.

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. The speed and functionality 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. 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.

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 a vast array of future devices will be collecting and aggregating oceans of data that you'll need to integrate, store, manage, and mine to improve business outcomes.

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 private cloud 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.

- **Explosive Data Growth.** With more users, connecting with more devices, demanding richer on-line experiences, your storage solutions will have to become more cost-effective, flexible, and efficient, and they'll need to scale to support massive volumes of structured and unstructured data.

- **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 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 and 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 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 private clouds that are flexible, efficient, cost-effective, and built to scale.

Addressing the Storage Challenge as Data Volumes Explode

Intel Xeon processors are powering a new generation of cost-effective storage solutions that are designed specifically for dynamic cloud environments. 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, data is automatically tiered to optimize performance based on specific usage models, and data management is greatly enhanced with sophisticated capabilities such as data deduplication.

Eliminating I/O Bottlenecks to Optimize Density and Performance

Intel has integrated next-generation I/O into the processor to deliver major increases in performance and bandwidth. Data flows faster and more reliably to support data-hungry applications. You can increase VM densities to improve utilization and reduce costs, while maintaining responsive applications.

Strengthening Security so You can Move Forward with Confidence

The Intel Xeon processor E5 family supports stronger security in two fundamental ways.

- **Better Data Protection through Pervasive Encryption.** Integrated hardware support for encryption reduces the "performance tax" that so often prevents businesses from encrypting business-critical data. This integrated hardware assistance is compatible with functionality provided in many of today's most widely used operating systems, databases, and security applications. With this support, you can implement encryption pervasively and without costly accelerators to protect your data both at rest and in transit.

- **Trusted Pools of Virtual Resources.** Traditional approaches to security force you into a game of catch-up in which safeguards must be constantly updated to thwart new attacks. The Intel Xeon processor E5 family takes a different and complementary approach, helping to ensure that operating systems and hypervisors can only boot into cryptographically verified "known good states." This allows you to establish a hardware "root of trust" to ensure your systems and software have not been tampered with during or prior to launch, so you can be sure no unapproved code of any kind has been inserted.

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 family deliver with up to 80 percent higher performance than previous generation servers to enable higher consolidation ratios and improved application responsiveness.[1] These processors support a broad range of system offerings, so you have unmatched choice of vendors and server configurations. They also support live migration among multiple processor generations, so you can maintain a single pool of virtualized resources as you add new servers.

Getting Better Value from Every Watt

Data center power and cooling costs continue to rise and, for some companies, now exceed the cost of acquiring new servers.[2] The Intel Xeon processor E5 family helps you get more out of every watt by optimizing performance versus energy consumption, not only for individual servers, but also for racks, rows, and entire data centers. Intelligence is built into all key Intel server components to adapt power usage based on workloads. Intel also offers tools that plug into existing management frameworks to provide unprecedented insight and control over power, cooling, and performance throughout your facility.

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.[3] Even more importantly, 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. 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, like the Intel Xeon processor E5 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

IT@Intel

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 9 million and reduced the time required to deliver new capacity from three months to just three hours. As implementation and optimization continue, Intel IT expects to save an additional USD 6 million per year over the next three years, while reducing provisioning times to just minutes.

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

Learn More Today
Intel Xeon processor: **http://www.intel.com/xeon**
Intel Resources for Your Journey to the Cloud: **http://www.intel.com/cloud**

1. Performance comparison using geometric mean of SPECint*_rate_base2006, SPECfp*_rate_base2006, STREAM*_MP Triad, and Linpack* benchmark results. Baseline geometric mean score of 166.75 on prior generation 2S Intel® Xeon® Processor X5690 platform based on best published SPECrate* scores to www.spec.org and best Intel internal measurements on STREAM*_MP Triad and Linpack as of 5 December 2011. New geometric mean score of 306.74 based on Intel internal measured estimates using an Intel® Rose City platform with two Intel® Xeon® processor E5-2690, Turbo and EIST Enabled, with Hyper-Threading, 128 GB RAM, Red Hat* Enterprise Linux Server 6.1 beta for x86_6, Intel® Compiler 12.1, THP disabled for SPECfp_rate_base2006 and enabled for SPECint*_rate_base2006.

2. "Power Surge: The heat is rising–and costs, too–as tightly packed servers consume gobs of electricity," Darrell Dunn, InformationWeek, February 27, 2006. http://informationweek.com/news/180207724

3. Source: "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.cisco.com/en/US/solutions/collateral/ns340/ns517/ns224/U_of_Colorado_casestudy_final.pdf