



Solution Brief

Performance and ROI

Intel® Xeon® Processor 7500 Series

Moving from RISC to Intel®-based Servers to Improve Performance and ROI

As financial institutions look for ways to accelerate return on investment (ROI) and reduce risk, the Intel® Xeon® processor 7500 series presents a unique opportunity to leave expensive, proprietary RISC systems behind and transition to a more scalable and efficient solution.



Moving from RISC server architecture to industry-standard Intel Xeon processor 7500 series-based servers can yield ROI in 12 months or less.

The financial crisis of 2008 and the resulting economic climate have radically changed the banking and financial services landscape. Industry pressures to reduce IT costs while meeting an increasing demand for services are driving financial firms to re-evaluate IT operations.

Mission-critical enterprise database applications play an increasingly vital role in the core functions of daily business operations, and the amount of data an organization must process and store doubles every 12 months.¹ New requirements for real-time business analytics—as well as increasing regulatory requirements—are driving the need for improvements in high-performance infrastructure.

These trends demand that business and IT managers continue to explore ways to reduce costs while extending performance and reliability—translating business requirements into systems using the latest technologies and best frameworks. Moving from RISC server architecture to industry-standard Intel® Xeon® processor 7500 series-based servers can yield ROI in 12 months or less.²

The Intel Xeon processor 7500 series represents a significant leap in performance and reliability for mission-critical and data-intensive applications in financial services. Servers based on the Intel Xeon processor 7500 series are delivering world-record performance across a range of benchmarks, while adding more than 20 new advanced reliability features, including Machine Check Architecture Recovery (MCA Recovery), which comes to x86 servers for the first time ever. This level of high-end reliability, availability, and serviceability (RAS) is traditionally associated with proprietary RISC and mainframe systems, and offers exceptional new capability and value for mission-critical deployments and large-scale consolidation.

Advantages of Industry-standard Servers

Financial services organizations process, aggregate, analyze, and distribute enormous volumes of data in real time, including historical data and transactions critical for real-time decision making. Gartner projects a 650 percent increase in IT data growth over the next five years,³ and this comes at a time when IT organizations are under pressure to get more value from every dollar they spend.

To improve service levels and drive down total costs for their most demanding workloads, many IT managers are exploring the benefits of

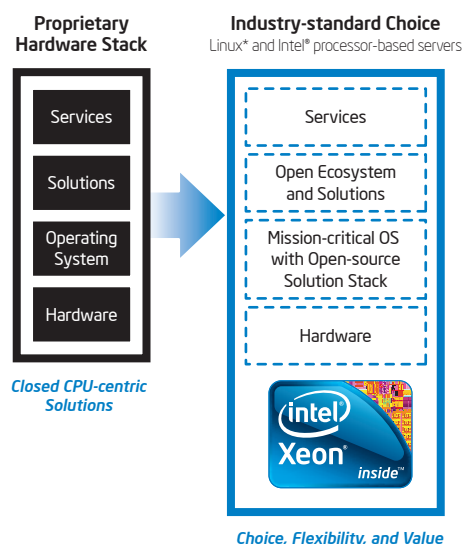
migrating from servers based on RISC architectures to the latest industry-standard servers based on the Intel Xeon processor 7500 series.

Data centers based on aging RISC architectures create an environment that suffers from:

- High operating and support costs
- Inability to meet the challenge of increased power density
- Insufficient physical space
- Systems locked into one proprietary solution
- Limited OS flexibility
- Inflexible hardware-defined systems



Figure 1. Advantages of industry-standard servers. Intel® processor-based servers deliver greater choice, flexibility, and value than proprietary RISC architectures and have matured to support today's most demanding and mission-critical applications.



Financial services companies need more powerful computing systems, but they also need better cost models and a flexible platform for growing mission-critical computing capabilities (see Figure 1). The latest Intel Xeon processor 7500 series-based servers provide an answer to this challenge by delivering improved performance, scalability, and availability, and faster ROI on the world's most flexible and widely supported computing architecture.

Moving to servers based on Intel® architecture provides benefits such as:

- Better ROI through cost reductions from running industry-standard servers
- Consolidation of physical space requirements
- A more open solution capable of running OSs from multiple suppliers
- Improved business agility with a unified environment

Return on Investment

Supporting existing infrastructure accounts for about two-thirds of total costs⁴ for many IT organizations, and rising energy bills are pushing data center costs higher. Difficult economic conditions magnify these concerns as IT budgets shrink despite growing business requirements.

About 95 percent of the servers shipped every year are industry-standard servers; the other five percent, however, make up about 40 percent of worldwide server revenue.⁵ The discrepancy between business requirements and costs is the primary force behind the increasing

adoption of industry-standard servers for data-intensive, mission-critical applications in the financial systems industry.

Replacing RISC systems with Intel Xeon processor 7500 series-based servers typically delivers major cost savings along with greater long-term business value. In many cases, the benefits will far exceed the cost and risk of migration. Moving from RISC server architecture to industry-standard servers based on Intel Xeon processor 7500 series can yield ROI in 12 months or less.⁶

A recent TCO study by Principled Technologies for Dell estimated the total costs for upgrading from end-of-life Sun SPARC® servers to new Sun SPARC Enterprise T5440® servers or to new servers based on Intel Xeon processor 7500 series.

The study found that 10 servers based on Intel Xeon processor 7500 series could do the work of 22 Sun SPARC Enterprise T5440 servers, using SPECjbb2005® performance benchmark results. The Intel®-based servers cost 75 percent less per server and consumed 54 percent less energy per server. The study estimated total costs for both solutions, including those for acquisition (hardware, software, training, planning, and migration) and support (software support, power, cooling, and data center and server administration). Results showed a 76 percent lower TCO over three years for the Intel-based solution, with a total savings of USD 4.4 million.⁷ (See Table 1.)

Table 1. A TCO study by Principled Technologies for Dell showed a 76 percent TCO savings over three years using Intel® Xeon® processor 7500 series-based servers as opposed to Sun SPARC Enterprise T5440® servers.

	Intel® Xeon® Processor 7500 Series-based Servers	Sun SPARC Enterprise T5440® Servers	Savings with the Intel®-based Solution	
Cost per Server Including 3-year support costs	USD 40,890	USD 163,265	USD 122,375 (per server)	75%
Energy Consumption per Server Based on typical workloads ^a	804 Watts	1,766 Watts	962 Watts (per server)	54%
Number of Servers Required Based on SPECjbb2005® results	10	22	12 fewer servers	54%
Total Acquisition Costs Including hardware, software, training, planning, migration, and 3-year support costs	USD 784,617	USD 4,377,258	USD 3,592,641	82%
3-Year Operating Costs Including software support, power, cooling, and data center and server administration costs	USD 586,740	USD 1,399,200	USD 812,460	58%
3-Year Total Cost of Ownership	USD 1,371,357	USD 5,776,458	USD 4,405,101	76%

^a Represents consumption during typical usage, which was determined by averaging consumption when idle with consumption under a full (100 percent) workload.

Performance that Meets Mission-critical Enterprise Demands

Intel® Xeon® processor-based servers are not new to mission-critical computing. According to IDC, more than 85 percent of higher-end workloads are already running on industry-standard servers, including business intelligence, data warehousing, database, and enterprise resource planning applications.⁸ In recent years, Intel Xeon processor-based servers have become a common solution for RISC migrations and are widely used for data center virtualization and consolidation.

The latest Intel Xeon processor 7500 series-based servers deliver dramatically increased capability for mission-critical environments. Benchmarks demonstrate up to 3.5x higher virtualization performance⁹ and 3x higher database performance¹⁰ than previous generations of servers, and world-record performance has been documented across more than 20 enterprise and technical computing benchmarks.¹¹ (See Figures 2 and 3.)

Approximately 5 percent of systems worldwide are powered by RISC or other architectures, and yet the corresponding IT expenditure on those systems is 40 percent. By addressing this costly 5 percent of systems with volume economics, Intel can help customers significantly reduce costs while delivering required performance increases.¹²

Reliability, Availability, and Serviceability

Financial services institutions require the most reliable systems available. The Intel Xeon processor 7500 series includes more than 20 new mainframe-inspired RAS features that help to provide the following benefits:¹³

- **MCA Recovery.** For the first time on x86 architecture, when the system encounters a processor or memory error, it raises a Machine Check Exception and works with the OS to recover and continue normal operation. Corrective action may include retiring a memory page or stopping the relevant virtual machine (VM). See Figure 4.
- **Superior data integrity.** Advanced support for error detection, correction, and containment across all major components and communication pathways.
- **Improved system availability.** Multiple levels of redundancy, plus OS-assisted system recovery from certain uncorrectable

errors that would have brought down previous generation servers.

- **Enhanced serviceability.** Predictive failure analysis enables problematic components to be identified and replaced before they fail. Also supports static hard partitioning with electrical isolation to provide strong workload isolation and enable more efficient maintenance cycles.

Scalability for Increased Business Agility

The Intel architecture performance increase is combined with dramatic improvements in scalability. The new processor series supports server designs with two, four, or eight sockets without the need for customized OEM chipsets and delivers scalable performance across all these configurations. In some cases, OEM node controllers are used to scale up to 256 sockets for breakthrough capabilities that will enable new uses in mission-critical computing. With up to 64 high-performance processor cores, 128 execution threads, and 2 TB of memory,¹⁴ an eight-socket system provides ample resources for heavy workloads and data center consolidation.

Memory capacity per socket is more than 30 percent higher than competing x86 architectures, and some suppliers are delivering innovative designs based on specialized chipsets that support even higher memory capacity.¹⁵ This large capacity helps to eliminate a key roadblock for financial services institutions that must host large, data-intensive applications, such as enterprise databases, data warehouses, and real-time analytics.

Choice in Operating Systems

Software must be as scalable and resilient as hardware in mission-critical environments. Migrating from an environment with servers based on UNIX* or RISC to Intel-based servers provides OS flexibility. Microsoft Windows* and Linux* have matured dramatically in recent years. Both now provide the levels of scalability, availability, and resource management needed for mission-critical business applications, and they do so at much lower cost than traditional UNIX OSs and with far greater application support. Intel Xeon processors also provide native support for Oracle Solaris*. Together, these options provide tremendous flexibility for hosting mission-critical applications without the excessive costs and vendor lock-in of high-end RISC systems.

Figure 2. The Intel® Xeon® processor 7500 series delivers the biggest leap ever in generation-to-generation performance for an Intel® processor. These processors deliver roughly 3x higher performance than previous generation processors and up to 20x higher performance than single-core processors of just five years ago.

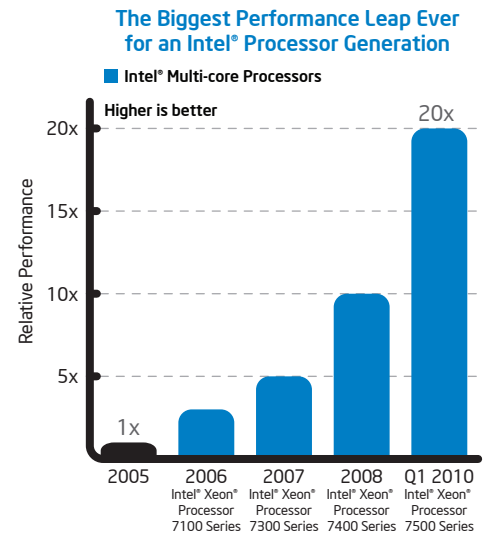


Figure 3. Based on published benchmarks, Intel® Xeon® processor 7500 series-based systems provide up to 2.39x higher performance than UltraSPARC2* processor-based systems. All comparisons based on published/submitted/approved results as of April 2010.

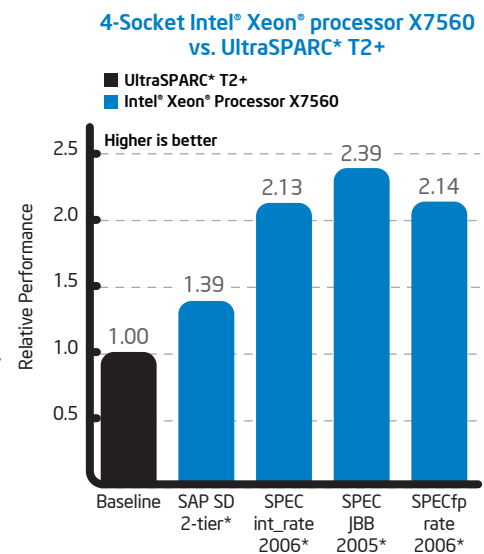
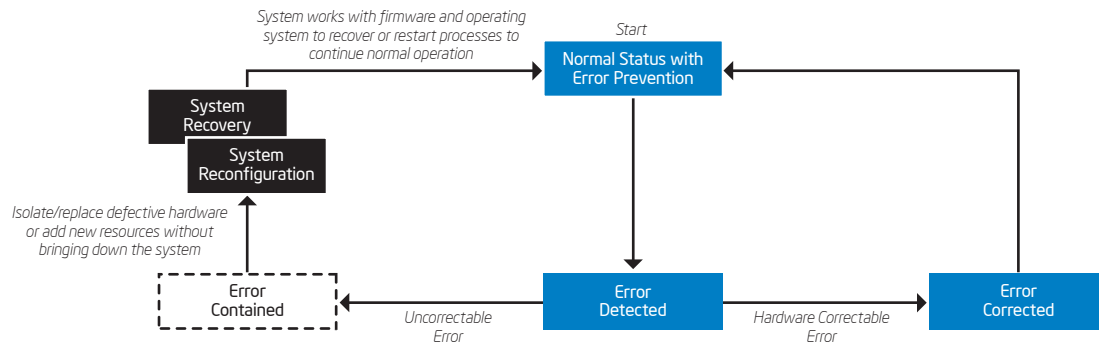


Figure 4. Machine Check Architecture Recovery combines hardware and software mechanisms to correct or recover from machine check errors.



Conclusion and Next Steps

Compared with proprietary RISC architectures, servers based on Intel Xeon processor 7500 series offer comparable or superior performance, more options, and superior cost models across virtually all key IT infrastructure elements, including hardware, software, maintenance, and facilities (space, power, and cooling for example). They are also supported by a much broader pool of suppliers and skilled IT professionals. This processor family rivals high-end RISC systems for scalability and availability, so financial institutions can use these systems with confidence to support even their most demanding applications.

To stay competitive in the new marketplace, now is the time to further reduce acquisition, maintenance, and management costs, and improve performance and ROI. The ROI for moving from RISC to Intel architecture is now less than a year.

- **Plan the migration.** Intel can act as a trusted advisor as you plan your migration.

- **Determine your savings.** Use our RISC Migration TCO Calculator for 4+ socket systems to help determine your savings.
- **Take advantage of Intel expertise.** The Intel Premiere Professional (IPIP) Web site is a new online presence that helps guide you through a migration.
- **Contact your Intel sales representative.**

Additional Resources

- "Driving Higher Value into the Data Center: Migrating from UNIX*/RISC to Microsoft Windows Server® 2008 R2 on Intel® Processor-based Servers" www.intel.com/Assets/en_US/PDF/whitepaper/322995.pdf
- "Migrating from UNIX*/RISC to Red Hat Enterprise Linux® on Intel® processor-based Servers" www.intel.com/Assets/en_US/PDF/whitepaper/322283.pdf
- RISC Migration TCO Calculator: https://roianalyst.alinean.com/intel_migration

Authors



Christian Sommer, Director of Financial Services Marketing, Intel Americas



Garry Thall, District Manager of Financial Services, Intel Corporation

Learn more at: <http://ipip.intel.com/go/fsi>

¹ Wells, Jeff. "Market Data Capacity - 2009 Review, 2010 Outlook." A-Team Group. February 10, 2010. www.a-teamgroup.com/article/market-data-capacity-2009-review-2010-outlook

² Twelve-month ROI claim based on comparison between 4S Intel® Xeon® processor MP (CPU 3.3 Ghz single-core w/ HT, 1MB L2, 8MB L3, Potomac) and 4S Intel® Xeon® processor X7560 (8 core, 2.26 GHz) based servers. Calculation includes analysis based on performance, power, cooling, electricity rates, operating system annual license costs, and estimated server costs. For more information on performance tests and on the performance of Intel® products, reference www.intel.com/performance/resources/benchmark_limitations.htm or call (U.S.) 1-800-628-8686 or 1-916-356-3104.

³ Claunch, Carl. "Hot Trends and Innovations in Data Centers." Gartner, 2009.

⁴ "Migrating from UNIX*/RISC to Red Hat Enterprise Linux on Intel processor-based Servers." Intel Corporation and Red Hat, Inc., July 2009.

⁵ McAllister, Neil. "How x86 Conquered the World." InfoWorld. October 24, 2005.

⁶ See endnote 1.

⁷ "TCO Comparison: 4-Processor Dell and Sun Servers." Principled Technologies, Inc. March 2010. Actual performance will vary with configuration, usage and manufacturing variability. For the full Principled Technologies report, visit www.principledtechnologies.com/clients/reports/Dell/R910_TCO.pdf.

⁸ "Server Workloads 2008." IDC. June 2008.

⁹ Based on the best VMware VMmark® benchmark result for an Intel® Xeon® processor 7500 series-based server (70.78@48 tiles, 4/6/10) versus the best result for an Intel® Xeon® processor 7400 series-based server (20.50@14 tiles, 3/24/09). For details, visit www.vmware.com/products/vmmark/results.html.

¹⁰ Source: Intel internal measurement (March 2010) using the TPC-E® benchmarks.

¹¹ For the latest benchmarks, visit the Intel Web site at www.intel.com/performance/server/index.htm.

¹² Burt, Jeffery. "Intel Xeon 7500 Takes Aim at IBM Power, Oracle SPARC." e-Week.com. April 8, 2010. www.eweek.com/c/a/IT-Infrastructure/Intel-Xeon-7500-Takes-Aim-at-IBM-Power-Oracle-SPARC-817529

¹³ Many new reliability, availability, and serviceability features in the Intel® Xeon® processor 7500 series-based servers require OS or server platform support.

¹⁴ Four-socket systems feature 1 TB of memory.

¹⁵ Eight-socket systems with up to 192 DIMM sockets are available from select vendors.

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