



Government Organizations Increase Performance and Reduce Costs with Intel and Microsoft Technology



Introduction

Today, public safety and security challenges faced by government organizations are continuously evolving. Natural disasters, providing emergency services, and ensuring safety have led to a greater need for highly reliable technology solutions to help governments better prepare, protect and respond. For government organizations, it is mission critical to ensure public safety and security through technology solutions that enable effective information sharing, real-time data analysis, and precision operational execution.

Over the years, many government agencies have relied on RISC-based or mainframe systems to provide the security, performance and reliability they need to serve their constituents. But as IT has become an increasingly critical part of public service in a time of limited funding and budgets, scalability and cost control are every bit as important as performance. Microsoft- and Intel-based server platforms combine intelligent and expandable performance with advanced reliability and massive scalability to offer a more flexible and cost-effective alternative to RISC or mainframe-based systems.

Migrating mission-critical and core government applications to a new generation of scalable servers powered by the Intel® Xeon® processor 7500 series series with Microsoft Windows Server® 2008 R2 and Microsoft SQL Server® 2008 R2 can help achieve the required levels of performance, scalability, and reliability to support critical government functions. All while reducing complexity, costs, risks and helping government organizations maximize their existing technology investments.

This white paper outlines the benefits of choosing the Microsoft and Intel platform to support the technology needs of government organizations to meet constantly evolving challenges over more expensive RISC-based or mainframe platforms.

Intel® Xeon® processor 7500 series-based servers provide an enterprise-ready alternative to more expensive platforms for mission-critical applications that require high availability and are essential to revenue generation, security and compliance, or management of life-critical services and public safety.

Mission-Critical Needs for Government

Governments require a highly reliable and flexible IT infrastructure that has the processing power to handle mission-critical tasks across a large number of agencies and operations. These organizations need fully integrated and highly available solutions that connect people and systems securely and reliably to deliver information-driven services. The mission-critical nature of ensuring public safety places a burden on an IT infrastructure to reliably run applications that enable:

- **Better situational awareness**

Having accurate and timely information of the exact location and capacity of threats is essential to providing public safety. This enables first responders to make rapid decisions, deploy the right level of support, and determine the most effective response to unfolding events.

- **Enhanced communications**

Improving the speed of communications requires a well coordinated and constantly connected information network. With highly available technology, critical information can be securely shared and accessed by first responders across diverse systems, computer networks, data links, and multiple locations.

- **Support for disaster relief efforts**

When disaster strikes, lives can be saved, health risks contained and normalcy restored far more quickly when aid organizations can rapidly move the required resources in and out of affected areas. Government organizations need to be able to communicate and collaborate securely and immediately across multiple organizations.

- **Enhanced data analysis**

Data management and analysis solutions enable government organizations to better predict needs, deploy resources and plan accurately with up-to-the-minute data analysis of threats, response readiness, resource usage and unfolding events.

- **Rapid deployment of innovative technology**

Technology plays a vital part in the promotion of peace and the protection of citizens. A flexible IT environment empowers government agencies to quickly deploy innovative solutions to help them adapt to the constantly changing demands of their citizens.

Meeting the Needs with the Microsoft and Intel Platform

Historically, government institutions have relied on more expensive, RISC-based or mainframe systems to support mission-critical applications. These systems generally consist of hardware, software, and management tools and services delivered by a single vendor. Although this may simplify the initial deployment process, it also limits software, hardware, and support choices. This reduced flexibility can often mean increased initial capital costs and higher ongoing operating expenses.

Windows Server 2008 R2 with SQL Server 2008 R2 running on Intel Xeon processor 7500 series-based servers provides an alternative to RISC-based or mainframe systems, providing equal or greater performance for much less cost. This platform features dramatic innovations that deliver the performance, scalability, and reliability to run the applications that help ensure public safety and timed delivery of life-critical services.

With this platform, government organizations can:

- Utilize groundbreaking server processing power to handle increased transactions, data volumes, and other essential functions.
- Use advanced reliability, availability, and serviceability (RAS) features to ensure key government mission-critical applications keep running.
- Speed response times by supporting large volumes of customer and operational information across multiple data streams in less than a second.

Groundbreaking Processing Power

The Microsoft and Intel platform delivers a quantum leap in computing performance to help process data-demanding government applications faster than RISC or mainframe-based systems. Windows Server 2008 R2 and SQL Server 2008 R2 powered by the Intel Xeon processor 7500 series combines intelligent and expandable performance with world record-breaking scalability to run the largest and most demanding government workloads.

- Windows Server 2008 R2 and SQL Server 2008 R2 powered by the Intel Xeon processor 7500 series have been benchmarked as the fastest 2,4, and 8-socket machines in the world¹.
- Windows Server 2008 R2 supports up to 256 logical processors per server, which helps government organizations harness the power of multisoocket Xeon 7500 processors to run mission-critical applications.
- Take full advantage of the massive 2TB of memory capacity to keep agency and citizen data highly accessible while running the most demanding applications with ease.

¹ Configuration Details - http://www.intel.com/performance/server/xeon_mp/config/summary_config.htm

Optimizing Mission Critical Computing

Windows Server 2008 R2 and SQL Server 2008 R2 powered by the Intel Xeon processor 7500 series allows government agencies to migrate mission-critical applications with confidence. Designed for maximum performance and reliability, this platform features improvements over previous generations to provide exceptional scalability and processing power for the most data-demanding mission critical applications.

- Enjoy improved price performance over RISC systems while supporting powerful and data-intensive applications with up to **9X** the memory bandwidth.
- Achieve massive throughput while running heavy database workloads with greater than **2.5X** database performance.
- Boost performance and accelerate complex calculations on financial applications with greater than **1.7X** integer throughput.
- Improve compute performance for engineering applications with greater than **2.2X** floating point throughput.

* Comparisons with single core Intel® Xeon® based on pre-production measurements of Intel® Xeon® 7500 compared to 7400 Series

- More information on database performance can be found at: http://www.tpc.org/tpce/results/tpce_perf_results.asp.
- More information on integer throughput can be found at: http://www.intel.com/performance/server/xeon_mp/server.htm?iid=perf_server_lhn+mp_server.
- More information on floating point throughput can be found at: http://www.intel.com/performance/server/xeon_mp/hpc.htm?iid=perf_server_lhn+mp_hpc.

Uncompromising Levels of Availability

Mission-critical applications in government require around-the-clock availability. Windows Server 2008 R2 and SQL Server 2008 R2 takes advantage of Intel Xeon processor 7500 series capabilities to provide support for high availability that is unprecedented in industry-standard hardware.

The Intel Xeon 7500 series processor comes with 20 additional new RAS features to automatically detect errors and then work with Windows Server 2008 R2 to correct them. Features include:

- Intel® Machine Check Architecture Recovery – Detects and recovers from otherwise uncorrectable hardware and software errors
- Intel® QuickPath Interconnect – Heals failing data connections and helps ensure data is available
- Dynamic Processor Socket and Memory Migration – Migrate workloads from at-risk components to maintain server availability
- Memory Thermal Throttling – Prevents circuit level memory errors so data integrity is preserved
- Corrected Machine Check Interrupt – Identifies components with recurring errors for preemptive replacement, increasing reliability and improving uptime

Speed Response Times

To help enhance their effectiveness in managing life-critical services and public safety, government organizations need data management solutions to provide an integrated, real-time, in-depth view of information to support daily operations and drive decisions. A new generation of scalable servers powered by the Intel Xeon processor 7500 and 5600 series with Windows Server 2008 R2 and SQL Server 2008 R2 deliver powerful data management and data mining technologies enabling government organizations to:

- Compile mission-critical information in real-time to make timelier decisions regarding the deployment of first response personnel and resources.
- Organizations charged with public safety can recognize patterns and trends in operations to plan, predict, and deploy resources with greater accuracy and cost-efficiency.
- Manage and share mission-critical information across platforms, applications and devices, making it easier for emergency responders to connect and coordinate personnel and resources in real-time.

Windows Server® 2008 R2 and SQL Server® 2008 R2 powered by the Intel® Xeon® processor 7500 series feature automatic detection and recovery from many types of otherwise uncorrectable errors.

Virtualizing Mission-Critical Applications

Today, more and more government organizations are using Microsoft- and Intel-based solutions to provide a trusted, productive, and intelligent platform for running the most demanding mission-critical applications in a mixed physical and virtual environment. With servers featuring powerful multi-core processors, these organizations experience better productivity and performance with fewer servers. This enables government agencies to recognize significant benefits like increased resource utilization, reduced downtime, and lower up-front and ongoing costs.

- Intel Virtualization Technology FlexMigration enables seamless migrations of workloads among current and future Intel processor-based servers. The result is a more flexible and unified pool of server resources that functions seamlessly across multiple hardware generations.
- Microsoft Hyper-V™ Live Migration to enable you to move running virtual machines between hosts with no perceptible downtime. It also gives government data centers the ability to deliver the level of availability necessary for mission-critical applications and ensuring public safety while minimizing downtime caused by hardware or power failures or natural disasters.
- Intel Xeon processor 7500 series built into eight-socket and larger servers with the large memory capacity needed to provide the processing power to meet the demands of running multiple virtual machines.

Massive Scalability and Performance

Microsoft, working with Intel and Dell, completed a workload test of virtualized Microsoft Dynamics CRM 4.0 on 20 virtual machines on two Dell PowerEdge™ servers equipped with Intel Xeon processors 7500 series-based and solid state drives (SSDs). In this test environment, Microsoft Dynamics CRM 4.0 demonstrated the following performance characteristics:

Concurrent Users	Avg Response Time	Web Requests	Business Transactions
100,000	.29 Seconds	5.1 M/hr.	778,000/hr.

This workload demonstrates that five Microsoft Dynamics CRM 4.0 instances can achieve sub-second response times with 100,000 concurrent users executing a heavy workload in a virtual environment. These results reflect its ability to scale on the Microsoft/Intel platform that is ideal for large-scale application consolidation projects.

More information is available at: <http://blogs.msdn.com/crm/archive/2010/04/13/new-benchmark-100-000-concurrent-users-with-virtualization.aspx>

Cost Benefits of the Intel Xeon Processor 7500 series and the Windows Platform

In this era of tight public budgets and diminishing funding for IT investments, it is critical for government agencies to make the most of their existing investments and find new ways to optimize their IT infrastructure. In evaluating a solution for critical applications, it is important to take into account all the costs associated with each platform. The Windows and Intel platform bring lower hardware acquisition costs, software costs, administrative and technical support costs, and energy costs – resulting in significantly lower TCO and a higher return on investment (ROI).

Lower Hardware Acquisition Costs

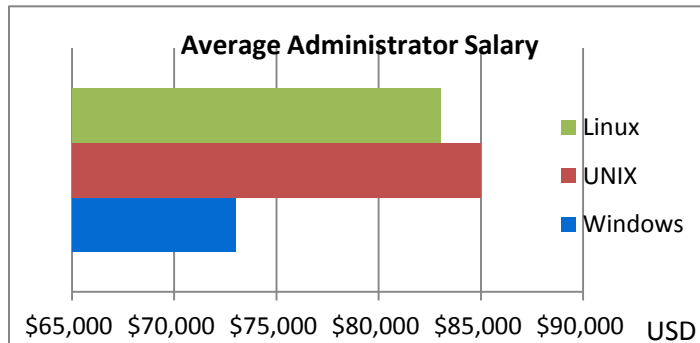
The Microsoft and Intel platform runs on industry-standard servers, which are significantly less costly than mainframes or RISC-based servers. Additionally, using the Hyper-V virtualization technology in Windows Server 2008 R2 can reduce the number of physical machines you need to run your mission- and business-critical applications, giving you better productivity with fewer servers.

Reduced Software Licensing Costs

Government organizations can reduce software licensing and support costs by using the virtualization technologies built into the Intel hardware and the Windows Server 2008 R2 operating system. Because UNIX-based software is typically priced per processor core (instead of per socket), the savings multiply with scale. Using a standardized platform also reduces the amount of testing required before deployment in comparison to RISC-based or mainframe systems, which can impact the cost significantly.

- A study by the analyst firm the Aberdeen Group found Windows Server delivers a 46 percent overall cost advantage when compared to UNIX.ⁱ
- SQL Server 2008 R2 running on Windows Server 2008 R2 can be less costly than Oracle because Microsoft doesn't charge extra for Online Analytical Processing (OLAP), data mining, data compression, partitioning, encryption, and other features.ⁱⁱ

Lower Administrative Support Costs



The cost of hiring qualified personnel to administer Intel Xeon processor-based servers running Windows Server is lower than the cost of hiring RISC and UNIX administrators. Multiple salary surveys have documented those who manage mainframe and other UNIX systems are paid much higher salaries than their Windows counterparts.ⁱⁱⁱ

Source: Indeed.com: Average Salaries of Windows, UNIX, and Linux Administrators

Reduced Energy Costs

Energy costs make up a significant portion of an organization's ongoing expenses for server operations. Reducing energy consumption not only positively impacts the bottom line, it also helps meet goals for "green IT" in keeping with government standards, corporate policies, and societal mandates. The Intel Xeon processor 7500series works with Windows Server 2008 R2 to automatically regulate and reduce power consumption by dynamically increasing consolidation ratios and powering off unused servers during times of lower demand. Additionally, replacing legacy servers with those powered by Intel Xeon processor 7500 series allows for server consolidation through virtualization, providing additional facility and energy cost savings.

Summary

Gain an alternative to expensive and inflexible mainframe systems or RISC-based platforms at significantly lower costs. Microsoft and Intel have worked together for more than 20 years to ensure the highest levels of reliability, availability, and serviceability for mission-critical computing. With scalable servers powered by the Intel Xeon processor 7500 series series running Microsoft Windows Server 2008 R2 and SQL Server 2008 R2, government organizations can run the most demanding mission-critical applications with confidence. All while enjoying significant cost savings without sacrificing reliability, performance, or scalability.

ⁱ The Business Value of Migrating from UNIX to Microsoft Windows Server System <http://download.microsoft.com/download/d/4/9/d490c96f-a070-4878-8779-109d03fffb23/BusValueMigfromUNIX.doc>

ⁱⁱ SQL Server 2008 Ups Pressure on Competitors

<http://www.microsoft.com/presspass/itanalyst/docs/09-22-08SQLServer2008UpsPressureOnCompetitors.PDF>

ⁱⁱⁱ Indeed.com: Average Salaries of Windows, UNIX, and Linux Administrators

<http://www.indeed.com/salary?q1=windows+administrator&l1=&q2=unix+administrator&l2=&q3=Linux+administrator&l3=&tm=1>

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