

Intel® Xeon® Processor 7500 Series helps Kingsoft boost performance for its MMOG gaming software



Accelerating online gaming adoption with the help of the Intel® Xeon® Processor 7500 Series

As leading game development software companies transition from small dedicated servers to efficient data centers, they are using virtualized solutions to reduce time to market, increase their competitive advantage, and accelerate innovation. Kingsoft JX Online* III is a new-generation Massively Multiplayer Online Game (MMOG) that can support hundreds or thousands of players simultaneously. In developing and supporting JX Online III, Kingsoft has maintained a strong focus on continually enhancing the user experience to increase loyalty and attract new customers. Kingsoft JX Online III Game Server is developed using C/C++.

Now Kingsoft JX Online III and Intel® Xeon® processor-based servers are bringing the full power, performance, and scale of online gaming to the mainstream, by making the gaming experience more fun, available and affordable than ever.

Product Overview

After three years of development, Kingsoft released its JX Online* Closed Alpha version in 2003. The game was created by the Season Studio based on traditional Chinese Kung Fu culture during the Southern Song Dynasty Period, when China fought against the invaders from Jin. In 2005, Kingsoft released JX Online II. The sequel presented martial arts culture using Dynamic Motion Capture to create life-like body movements. Since April 2006, JX Online II has been operating in Taiwan, Hong Kong, Singapore, Vietnam, Malaysia and other overseas regions. The sequel to the JX Series, JX Online III, will benefit from the processing capabilities of the next generation Intel® Xeon® processor 7500 series.

Key Challenges

As online gaming enters the mainstream, system requirements are moving beyond pure performance. With JX Online III, Kingsoft needed to improve the response time of its game servers, while providing isolation and increasing the number of concurrent users within its virtual gaming world. Today's popular online games often support more than 100,000 concurrent users. Because of extraordinarily high growth rates in its user base, Kingsoft needed robust and high-performing systems that could scale accordingly.

The company also wanted to avoid the perils of server sprawl, contain power and cooling costs, and reduce overall management complexity.

With the advent of next-generation Intel Xeon processor 7500 series-based platforms and Windows Server* 2008 R2 Hyper-V* virtualization software, Kingsoft's online gaming challenges can be resolved.

"The new Intel® Xeon® processor 7500 series is really an important update in server platforms. These new servers improved performance for Kingsoft JX Online* III, the next-generation online game, by 2.51x over the Intel® Xeon® processor 7400 series. The testing result indicates that Intel® Xeon® processor 7500 series is certainly one of the most preferable platforms for our online gaming."

– Chen FeiZhou, Vice President, Kingsoft

Delivering Scalable Performance for Large User Populations

Intel Xeon processor 7500 series-based servers deliver dramatic increases in performance and scalability versus previous-generation servers and include new embedded technologies that give business, creative, and scientific professionals the tools to solve problems faster, process larger data sets, and meet bigger challenges.

With intelligent performance, a new high-bandwidth interconnect architecture, and greater memory capacity, platforms based on the Intel Xeon processor 7500 series are ideal for demanding workloads. A standard four-socket server provides up to 32 processor cores, 64 execution threads and a full terabyte of memory, and eight-socket and larger systems are in development by leading system vendors. The Intel Xeon processor 7500 series also includes more than 20 new reliability, availability and serviceability (RAS) features that help to improve data integrity and uptime. One of the most important is Intel® Machine Check Architecture Recovery, which allows the operating system to take corrective action and continue running when uncorrected errors are detected. Since these highly scalable servers can be used to support enormous user populations, the enhanced RAS support offers significant value for online gaming.

Server platforms based on the Intel Xeon processor 7500 series deliver a number of additional features that help to improve performance, scalability and energy-efficiency.

- **Next-generation Intel® Virtualization Technology¹ (Intel® VT)** provides extensive hardware assists in processors, chipsets and I/O devices to enable fast application performance in virtual machines, including near-native I/O performance. Intel VT also supports live virtual machine migration among current and future Intel Xeon processor-based servers, so businesses maintain a common pool of virtualized resources as they add new servers.
- **Intel® QuickPath Interconnect Technology** is a scalable new shared-memory architecture that integrates two memory controllers into each microprocessor and connects processors and other components with a high-speed interconnect. It provides the bandwidth needed to keep each core running at capacity.
- **Intel® Turbo Boost Technology²** boosts performance when it's needed most by dynamically increasing core frequencies beyond rated values for peak workloads.

“Our benchmarks show that running our online gaming system in a Hyper-V* virtualization environment on Intel® Xeon® processor 7500 series-based servers more than doubles performance. With their higher performance, consolidation headroom, and energy efficiency, these new Intel® Xeon® processors and Hyper-V will help us reduce our carbon footprint, save on power costs, and let us grow our business a lot further with our existing data centers.”

– Chen FeiZhou, Vice President, Kingsoft

- **Intel® Intelligent Power Technology** adjusts core frequencies to conserve power when demand is lower.
- **Intel® Hyper-Threading Technology³** improves throughput and reduces latency for multithreaded applications and for multiple workloads running concurrently in virtualized environments.

How Intel Benefited Kingsoft

Intel engineers worked closely with Kingsoft engineers to optimize the JX Online III software stack to take advantage of the new features in the Intel Xeon processor 7500 series. Using the Intel® VTune™ Performance Analyzer, the team identified and optimized key code segments so the application can support more concurrent users within the response time window of less than 12 milliseconds.

As the results of the performance tests show, the new Intel Xeon processor 7500 series-based servers deliver major performance and performance per watt improvements for Kingsoft JX Online III versus the previous-generation Intel Xeon processor 7400 series-based server platform, including:

- Up to 2.51x better performance⁴
- Up to 2.79x better performance per watt⁴

With these gains, servers based on the Intel Xeon processor 7500 series are helping Kingsoft substantially improve data center density and reduce energy costs, while providing a superior online game experience for its customers.

Performance Test Configurations

| Hardware | | |
|------------------------------------|---|------------------------------------|
| Processor | Intel® Xeon® Processor 7500 series | Intel® Xeon® Processor 7400 series |
| Frequency | 2.27 GHz | 2.67 GHz |
| Cores per Processor | 8 | 6 |
| System Bandwidth | Intel QuickPath Interconnect: 6.4 GT/s | Front Side Bus: 1066 MHz |
| Memory | 64 GB, 16x4 GB DDR3-1066 | 64 GB, 32x2 GB DDR2-667 FB |
| Software | | |
| Operating System | Microsoft Windows* Server 2008 R2 Datacenter with Hyper-V* (6.1.7600.16385) | |
| Guest Operating System | Microsoft Windows* Server 2003 SP2 32-bits | |
| Maximum Number of Virtual Machines | 16 | 6 |
| Virtual Machine Configurations | 4 vCPU, 2 GB memory | |

Summary

Windows Hyper-V and the Intel Xeon processor 7500 series delivered exceptional virtualization efficiency and flexibility, enabling Kingsoft to maximize the benefits of its virtualized architecture. Kingsoft also benefitted from the engagement in many additional ways, as it provided them with the information they needed to:

- Configure and size Kingsoft JX Online III Game Server in a virtualized environment
- Compare different platforms to optimize the value of their server investments
- Conduct proof-of-concept testing across multiple scenarios
- Establish a foundation for gauging and measuring future performance levels as new platforms, servers and other innovations become available

The virtualization solution fully met the goals of consolidating the server environment and providing business continuity during unexpected spikes in customer demand. Since the virtualization solution delivers performance that is comparable with that of a dedicated physical server, it is also helping Kingsoft achieve better responsiveness and lower TCO (through higher consolidation ratios and increased energy efficiency), while establishing a flexible foundation for meeting all their virtualization goals.

JX Online III Game Server Performance

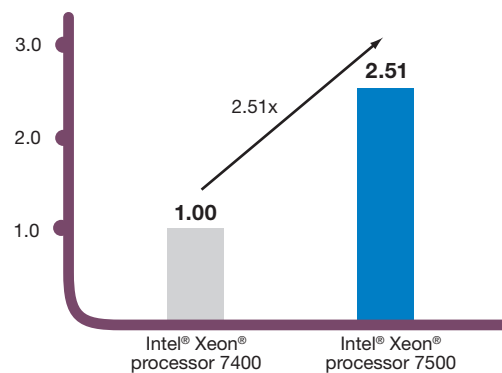


Figure 1. Intel® Xeon® processor 7500 series-based servers improved performance for Kingsoft JX Online® III by 2.51x versus previous-generation Intel® Xeon® processor 7400 series-based servers.

Spotlight:

- Kingsoft is a leading online game and applications software developer and distributor in China.
- Kingsoft offers a portfolio of online games; information security software, including anti-virus, anti-spyware and firewall applications; utility products, including dictionary, translation and other consumer software; and office software, including word processing, spreadsheet and presentation applications.
- Kingsoft leverages its comprehensive software development platform to offer a wide range of innovative entertainment and application software.
- Kingsoft also utilizes the Internet as an efficient and relatively secure channel to market and distribute our existing and new software products.

| | |
|--|--|
| Intel® Xeon® Processor 7500 Series | |
| Scalable Performance | <ul style="list-style-type: none"> • Up to eight cores and Intel® Hyper-Threading Technology increase throughput and responsiveness for multi-threaded applications and multiple concurrent workloads • Intel® Turbo Boost Technology lets processors operate above the rated frequency for peak workloads • Intel® QuickPath Interconnect Technology, integrated memory controllers and the Intel® Scalable Memory Interconnect deliver dramatic increases in system and memory bandwidth • Up to 78 lanes configurable PCIe* (72 lanes PCIe gen 2) • Up to 1 TB memory per four-socket server |
| Enhanced Virtualization with Intel® Virtualization Technology (including Extended Page Tables, Intel® VT-d and Intel® VT FlexMigration) | Expanded hardware assists across processors, chipsets and I/O devices enable near-native application performance in virtual machines and support live migration among current and future Intel® Xeon® processor generations. |
| Advanced Reliability, Availability and Serviceability (RAS) | More than 20 new RAS features, including Intel® Machine Check Architecture Recovery, help to improve data integrity and system reliability for mission-critical workloads |

To read more about virtualization solutions from Intel and Microsoft, visit www.intelalliance.com/microsoft/servervirtualization.aspx

To learn more about the Intel® Xeon® processor 7500 series, visit www.intel.com/p/en_US/products/server/processor

To find out more about Microsoft Hyper-V, visit www.microsoft.com/hyper-v

For more information about Intel® Microarchitecture Nehalem, visit www.intel.com/technology/architecture-silicon/next-gen



¹Intel processor numbers are not a measure of performance. Processor numbers differentiate features within each processor family, not across different processor families. See www.intel.com/products/processor_number for details.

¹Intel® Virtualization Technology requires a computer system with an enabled Intel® processor, BIOS, virtual machine monitor (VMM) and, for some uses, certain platform software enabled for it. Functionality, performance or other benefits will vary depending on hardware and software configurations and may require a BIOS update. Software applications may not be compatible with all operating systems. Please check with your application vendor.

²Intel® Turbo Boost Technology requires a Platform with a processor with Intel Turbo Boost Technology capability. Intel Turbo Boost Technology performance varies depending on hardware, software and overall system configuration. Check with your platform manufacturer on whether your system delivers Intel Turbo Boost Technology. For more information, see <http://www.intel.com/technology/turboboost>.

³Intel® Hyper-Threading Technology requires a computer system with a processor supporting HT Technology and an HT Technology-enabled chipset, BIOS and operating system. Performance will vary depending on the specific hardware and software you use. For more information including details on which processors support HT Technology, see <http://www.intel.com/info/hyperthreading>.

⁴Source: Intel and Kingsoft measurements, February 2010. Intel® Xeon® processor X7500, 2.27GHz; 64GB (16x4 GB DDR3-1066) versus Intel® Xeon® processor x7400, 2.67 GHz; 64 GB (32x2 GB DDR2-667 FB).

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