

Proven Virtualization Scalability

Consolidate more on the Sun Fire™ X4600 M2 server

Highlights

- As demonstrated by internal test results, a Sun Fire™ X4600 M2 server with eight enhanced Quad-Core AMD Opteron processors offers 2.11 times the scalability of the same system equipped with four Third-Generation Quad-Core AMD Opteron processors.
- The combination of the Sun Fire X4600 M2 server and VMware Virtual Infrastructure 3 software provides a highly-modular virtualization platform that can scale to meet growing consolidation demands by increasing the amount of CPU, memory, and I/O resources without increasing footprint.
- Utilizing the Sun Fire 4600 M2 server as a consolidation platform can help organizations reduce costs and datacenter resource strain.

Consolidation holds great promise for IT organizations worldwide. Moving a number of applications from a pool of under-utilized servers to a single platform can ease datacenter space, power, and cooling pressures as well as reduce maintenance costs. Modern consolidation practices take advantage of high-performance, scalable virtualization platforms that can host multiple guest operating systems and applications on the same server. As a side benefit, the migration to up-to-date hardware can help legacy applications realize performance gains — often without upgrading the operating system or application software.

The need for scalable virtualization

Scalability is one of the most important characteristics of a consolidation platform. To deliver the greatest value to a consolidation project, a system must simultaneously run multiple applications at the desired performance level. As IT organizations begin tackling more complex consolidation projects that include applications with greater resource demands, many find low-end platforms fail to provide the necessary scalability.

Most x86-architecture servers offer no more than four processor sockets since some CPU architectures and many applications cannot scale beyond this point. Sun built the Sun Fire X4600 M2 server for organizations that need more raw compute power than typical four-socket servers can provide. In fact, technologies from Sun, AMD, and VMware work together to make the Sun Fire™ X4600 M2 server one of the most scalable virtualization platforms.

The Sun Fire X4600 M2 server consolidation platform

Adding more hardware resources — such as processors and memory — to a truly scalable server results in a commensurate increase in processing power. Linear scalability describes an ideal situation where every increase in server resources results in the same increase in capacity. Doubling the number of CPUs and memory, for example, results in a doubling of the server's throughput. However, linear scalability is a goal that is rarely reached. In most cases, increasing the workload results in greater operating system overhead and more resource contention between processes. Combined with the scalability offered by VMware Virtual Infrastructure 3 software, the Sun Fire X4600 M2 server demonstrates consistent scalability increases across four-socket, six-socket, and eight-socket configurations on VMware's virtualization benchmark.

In a mere four rack units, the Sun Fire X4600 M2 server can accommodate up to eight CPU sockets and 512 GB of memory (Figure 1). The server can support as many as eight enhanced Quad-Core AMD Opteron™ processors for a total of 32 processor cores. To meet I/O requirements, the Sun Fire X4600 M2 server provides space for up to four hot-pluggable SAS disk drives with on-board RAID 0 and RAID 1. The server also offers the following interfaces:

- Four Gigabit Ethernet ports
- Four low-profile, 8-lane PCI Express slots
- Two low-profile, 4-lane PCI Express slots
- Two low-profile PCI-X slots



Figure 1. The Sun Fire X4600 M2 Server

Scalable server, scalable performance

The Sun Fire X4600 M2 server delivers scalability to consolidation projects in two ways:

- The server supports up to eight CPU/memory modules with one socket per module. Organizations can begin with a minimal configuration of two modules and scale server capacity as consolidation needs dictate. Sun Fire X4600 M2 server configurations can include a maximum of eight modules with as much as 64 GB of memory per module.
- Increasing the CPU and memory capacity of the Sun Fire X4600 M2 server results in a substantial increase in processing power for a virtualization workload.

Objective scalability measures

The VMmark benchmark provides a means to objectively compare the scalability of virtualization platforms. The benchmark is executed by increasing the number of executing *tiles* until the system is saturated. Each tile consists of a set of five active workload components and one standby server, each one executing in its own virtual machine. The benchmark runs a mix of Microsoft Windows and Linux operating systems running the following workloads:

- A mail server workload using Microsoft Exchange Server
- An application server workload running Java™ technology business software

- A Web server workload running the open source Apache Web server
- A database management system workload manipulating a large commercial database
- A simulated file server workload

The Sun Fire x4600 M2 server offers proven scalability for virtualized workloads

Proven scalability

To demonstrate the scalability of the Sun Fire X4600 M2 server, Sun conducted internal testing utilizing the VMmark benchmark and a system with four, six, and eight processors. For further comparison, tests were executed utilizing the following two AMD Opteron processor models.

- **Third-Generation Quad-Core AMD Opteron processor** — Featuring four cores on a single die, this AMD Opteron processor model provides efficient data sharing. An enhanced cache structure and integrated memory controller help to sustain multi-threaded application throughput. The processor also includes hardware-assisted AMD Virtualization (AMD-V) technology to help optimize the performance of virtualized environments.
- **Enhanced Quad-Core AMD Opteron processor** — This AMD Opteron processor model implements a larger Level 3 cache (6 MB as compared to 2 MB) to support greater scalability. In addition, a faster “world switch” time helps maximize virtual machine efficiency, and enhancements to AMD’s Rapid Virtualization Indexing technology can aid in reducing the overhead associated with software virtualization.

Internal test results reveal that the Sun Fire X4600 M2 server offers considerable scalability as processors are added as well as through processor upgrades. As shown in Figure 2, both types of Quad-Core AMD Opteron processors deliver substantial scalability when moving from four, to six, and to eight sockets. In addition, an eight-socket system with enhanced Quad-Core AMD Opteron processors can manage more than twice the number of active virtual machines as a four-socket system with Third-Generation Quad-Core AMD Opteron processors — a total of 114 virtual machines versus 54 virtual machines.

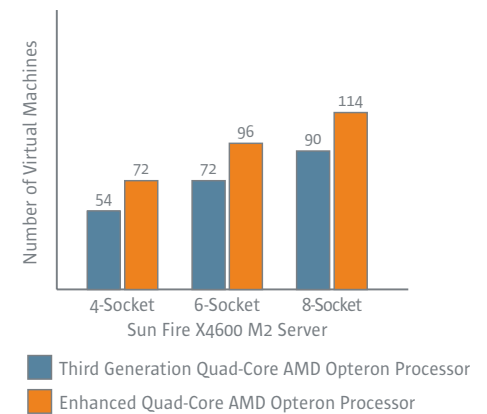


Figure 2. Scalability as measured by the VMmark benchmark

Sun, AMD, and VMware deliver the scalability that today’s IT organizations require for the most resource-intensive consolidation efforts. The scalable Sun Fire X4600 M2 server with AMD Opteron processors supports efficient CPU, memory, and I/O scalability. This scalability is delivered through virtual machines supported by VMware Virtual Infrastructure 3 software. Together, these three leading-edge technology companies deliver one of the most effective consolidation platforms available anywhere.