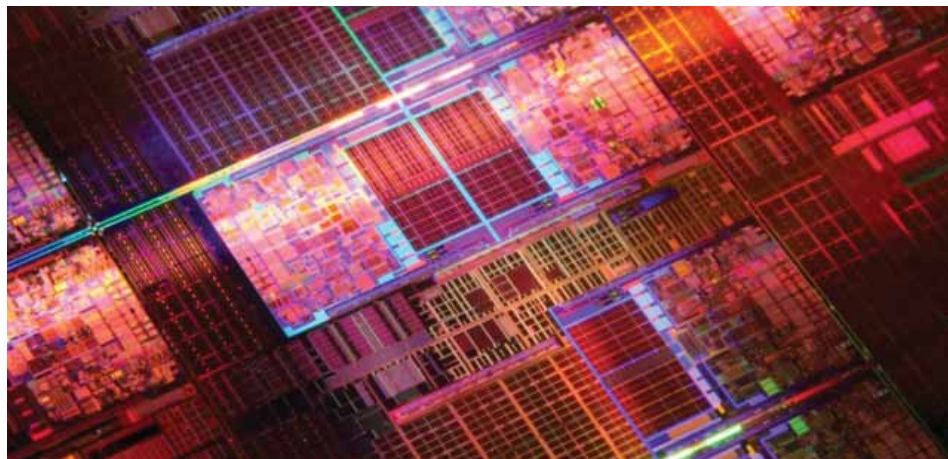


## Virtualization for the Next-Generation Data Center

Intel® Xeon® Processor 7400 Series-based Sun™ Servers Running Sun xVM™ Server and xVM Ops Center Software



### Highlights

- Sun and Intel: unique virtualization capabilities enable new usage models
- Sun xVM Portfolio: virtualize everything, manage everywhere
- Intel Xeon processor 7400 series: highest virtualization performance
- Solaris OS: advanced features for reliable, scalable virtualization
- Sun Fire X4450 servers: ideal platform for data center-class virtualization
- Sun and Intel engineers: working together to optimize the Solaris 10 OS for Intel Xeon processors.
- Integrated, tested virtualization solutions for the next-generation data center
- Comprehensive solutions backed by world-class service and support

The first generation of virtualization technology has delivered on its promise. For those who are ready for more, Sun and Intel now provide a new class of virtualization benefits — and a higher level of virtualization performance. Powered by the Intel Xeon processor 7400 series, Sun™ Fire X4450 servers can get the most out of the new Sun xVM Server and Sun xVM Ops Center products. Now you can virtualize everything and manage anywhere — with Intel-grade performance. Here's how.

### Taking Virtualization to the Next Level

Virtualization has lived up to its hype. By treating your servers as a pool of resources rather than a group of physical systems, virtualization lets you allocate processing power on demand, improve utilization rates, and ensure business continuity. Virtualization is also a great option for server consolidation, which delivers space savings, simplified administration, improved security, and more.

**But with all the benefits of virtualization come new challenges.** Managing a mix of virtual and physical resources can be complicated. Scalability is often limited. Some virtualization products work with only one processor architecture, one

operating system, or one vendor's systems. Migrating from one environment to another is not always possible. And quality of service can be an issue because some virtualization techniques can cause application performance to slow down.

Sun and Intel have a solid answer. Working together, they have combined their next-generation products and technologies to create a new level of virtualization capabilities — including the highest virtualization performance and new virtualization usage models such as high-availability, disaster recovery, and dynamic load balancing.

And what's striking about the new solutions from Sun and Intel is not just how well everything works — but how well it all works together.

Sun's new virtualization solutions run at peak performance on the Intel Xeon processor 7400 series. The processors exploit the unique performance, scalability, and virtualization capabilities of the Solaris™ OS. And it all runs with maximum efficiency on Sun Fire X4450 servers. The result: higher performance, more scalability, and greater energy efficiency on a more stable platform.

### Stronger than the Sum of its Parts

Simply put, Sun and Intel deliver the virtualization platform of choice for dynamic IT.

Here are the key elements; take a closer look at how they play to each other's strengths.

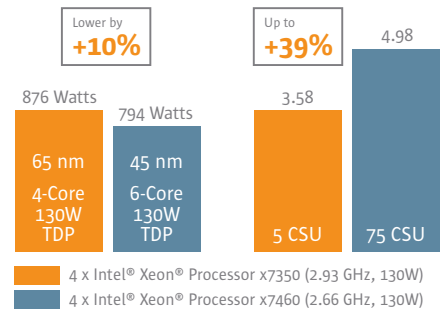
**The Sun xVM Portfolio** provides comprehensive virtualization capabilities, interoperability across heterogeneous environments, and integrated management of both virtual and physical resources. The Sun xVM Portfolio delivers today Internet scale, ease of use and open technologies. It supports:

- **Multiple platforms:** Both Sun and non-Sun Intel processor-based server products from multiple vendors.
- **Multiple operating systems:** Windows\*, Linux\* and Solaris guest operating systems run on Sun xVM Server.
- **Multiple virtualization technologies:** xVM Server natively supports the VMware\* VMDK appliance format, so customers can easily port existing virtual servers to the xVM platform and back.

## 45nm Energy Efficiency Advantages

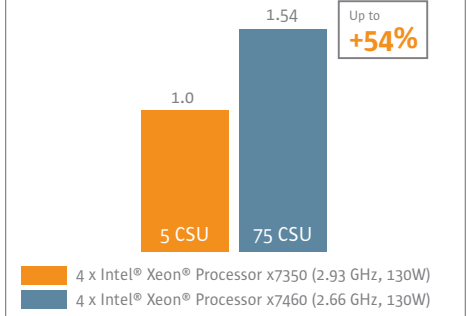
### Lower Virtualization Power

Average Watts @ given CSU during steady state measured at the wall



### Better Virtualization Power Perf/Watt

Absolute Scores divided by Watts. Higher bars indicate better value



1 Processor performance per watt comparison of Intel internally measured vConsolidate/VMware\* ESX Server results on 4-socket populated Intel® Xeon® X7350 (Quad-Core, 8M cache, 2.93GHz, 1066FSB), and Intel® Xeon® X7460 (6-core, 16M cache, 2.66GHz, 1066FSB, 45nm). Actual performance may vary. Source: TR#970 as of 15 Aug 2008.

2 A Sun Fire X4450 server sets the four-socket Java applications middle-ware performance record on SPECjbb\*2005 with a score of 53vvvvvvv,669 bops.

- **Multiple vendors:** Sun's partner ecosystem is actively adding value to the xVM Portfolio in the form of complementary products, services, and technologies.

Two of the cornerstone products of the Sun xVM Portfolio are Sun xVM Server and Sun xVM Ops Center.

**xVM Server** is an optimally pre-configured, easy-to-install, easy-to-use Hypervisor for heterogeneous workload consolidation, with support for Windows, Linux, and Solaris OS guests. It provides live migration and works well with VMware and Microsoft\* virtual machines. That makes it an excellent foundation for larger virtualization solutions, which can then be managed and orchestrated by xVM Ops Center, Sun's virtualization management product.

**xVM Ops Center** provides management of physical and virtual resources. It is designed for internet scale and ease-of-use in heterogeneous datacenters. It simplifies and

accelerates the discovery, provisioning, updating, monitoring, and reporting of both the virtual and physical assets in your data center via one unified browser based interface.

The Sun xVM Portfolio also includes **xVM Virtual Box**, which allows guest operating systems to run on top of an existing OS, making it possible to develop and test cross-platform or multi-tier applications all on a single device.

**The Intel Xeon processor 7400 Series** delivers superior performance built with hardware-assisted virtualization features to boost data center productivity and efficiency. With enhanced 45nm technology and Intel® Virtualization Technology, these six-core processors with 16 MB of L3 cache are breaking world performance records without increasing footprint and power demands<sup>2</sup>.

That level of performance opens the door to new virtualization usage models when used in conjunction with the Sun xVM Portfolio. For example:

- **High availability/disaster recovery:** The high performance of Intel Xeon processor 7400 series, combined with Sun xVM Server and Solaris Containers partitioning capabilities, translates to fast, reliable failover—and the ability to carry on business operations despite failures in individual hardware or software resources.
- **Dynamic load balancing:** Customers who are looking for more flexible resource management options will find that the Intel Xeon processor 7400 series running xVM Server makes it possible to balance real-time computing demands with capacity—and run a wide range of workloads with unprecedented energy efficiency.
- **Live migration:** Sun xVM Server provides a live migration capability, so with Intel Xeon processor 7400 series-based Sun systems it is not only possible to port existing virtual servers to new environments—it is possible to do so quickly and with relative ease.

#### Solaris: Optimized for Intel® Processors

Many of the unique, built-in features of the Solaris OS contribute to the value of xVM Server running on Intel Xeon processor 7400 series-based systems. For example, Solaris incorporates ZFS, the general-purpose file system designed from the ground up to protect data from corruption. ZFS can also support more volumes, files and associated data with a far greater degree of redundancy than competitive offerings.



And through Predictive Self Healing, Solaris can automatically diagnose and recover from many hardware and application faults, so business-critical applications can continue uninterrupted in the event of component failures.

In addition, Solaris offers features that help improve overall IT efficiency. For example, Solaris Containers safely isolate resources, allowing you to maintain the one-application-per-server deployment model. Solaris also includes DTrace, a dynamic tracing facility that makes it easier and faster to identify and address performance bottlenecks.

Intel engineers continue to work closely with Sun to ensure that the Solaris (and by extension OpenSolaris™) operating system rapidly supports new features in Intel Xeon processors and related Intel technology, including power and management and I/O acceleration (see [http://www.sun.com/x64/intel/solaris\\_on\\_xeon.pdf](http://www.sun.com/x64/intel/solaris_on_xeon.pdf))

The Solaris OS for the Intel Xeon processor is now supported by more than 2000 ISVs on hundreds of platforms that deliver the scaling, functionality, and security needed to handle explosive network growth. In addition to Solaris, Intel has also endorsed Java™ and NetBeans™ products and is committed to actively supporting the OpenSolaris and open Java communities from which these technologies will continue to evolve.

In addition, all contributions into OpenSolaris and subsequently into xVM Server will enable the hosting environment to take advantage of advanced Intel technologies and performance. Intel contributions to Xen code also enable xVM Server to take advantage of Intel Virtualization Technology and improve performance of any virtualization solution running on top of the host OS.

#### Sun Fire X4450: Ideal Virtualization Platform

The Sun Fire X4450 server is the most space-efficient and energy-efficient 4-socket, 2U industry standard server among tier one vendors. With Sun's leadership in system design and Intel Xeon processor 7400 series, the Sun Fire X4450 server is optimized for world-class performance, compact footprint, energy efficiency, and simplified manageability. It runs Sun xVM at peak performance, and it runs virtually any operating system, including Solaris, Linux, and Windows.

#### Sun and Intel: Innovation Breeds Excellence

Sun has invested heavily in creating a chassis and component architecture that has enabled customers to get the most out of their Intel processor based server solutions. Since Sun x64 servers hit the market a few years ago, Sun has won countless awards in design that have enabled low cost, low resource consumption, and minimal space impact.

Sun continues to show this same excellence and innovation as they move more aggressively into the virtualization market. Sun not only has OEM relationships with VMWare and Microsoft\*, but also has produced an award-winning virtualization software solution set that is uniquely Sun—built on open source components and delivering new business advantages. Working together, Intel and Sun have truly opened the door to a new era in virtualization.

#### **Bringing it All Together: Service and Support**

Through a broad range of consulting services—including architecture, implementation, and management services from Sun and third-party partners—customers can be sure their virtualization solution will be implemented promptly and correctly, virtually anywhere in the world.

More information about Sun's virtualization services can be found at <http://www.sun.com/service/virtualization/index.jsp>

#### **Learn More**

You can get the details about the Sun xVM Portfolio at [www.sun.com/xvm](http://www.sun.com/xvm). Download the open source version of xVM VirtualBox today.

For more information about Sun's alliance with Intel visit <http://www.sun.com/x64/intel/> and <http://www.intel.com/sunalliance>.

For information about specific products and services of the companies please see [www.sun.com](http://www.sun.com), and [www.intel.com](http://www.intel.com).

