



Sun Gains Edge with Sun Fire Extensions

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Management Summary

Over the years, innovation has proven to be a boon for the consumer, increasing the value of each dollar invested in manufactured goods. Innovation leads to improvement in functionality, performance, quality, reliability, and even comfort, as enterprises try to gain an edge over the competition. When a car company introduces a new feature, such as leather seats or a navigational system, or a TV maker improves resolution in a hi-definition set, competitors will have to respond in kind or risk losing ground in market share. Therefore, when Toyota introduces a hybrid engine to improve fuel economy, Honda must respond or risk losing its competitive edge on the highway. The consumer gains from improved fuel economy or not having to stop to ask for directions. When Sony introduces an improved image generation system for its 46" television, you know that every other TV manufacturer must do likewise or watch their factories go silent. The interesting result in this continuing technological advance is that prices often stay the same or go down as companies try to gain an edge. In any case, the consumer realizes a significantly better value for every dollar spent when looked at from a total cost of ownership (TCO) standpoint.

Innovation and competition also lead to improvements in functionality and performance in the data center. Improvements in disk technology, for example, result in increased capacity, while the size and price of these devices continue to plummet. The same story is true for tape, with capacity of a single cartridge approaching 1 TB and throughput exceeding 100 MB/sec. Nowhere is this innovation more evident, however, than in the CPU which is at the heart of every PC and server in the data center. Innovations in the area of energy consumption, performance, and virtualization have led to major improvements in the utilization of server resources. Following the lead of chip technology innovators such as IBM and Sun Microsystems, AMD introduced the first dual-core x86 processor in 2005, *Opteron*. In order to maintain their lead in the microprocessor industry, Intel followed with the introduction of a dual-core *Xeon*. Advances in dual-core technology continue, but the processor is only one component in a complete server solution. That requires the integration of CPUs with the latest memory and I/O architecture.

Sun has been a leader in the development of integrated server solutions based on *Opteron*. Complementing their *Sun Fire SPARC* servers, Sun has been delivering *Opteron*-based Sun Fire since 2005. With their latest announcement, Sun has applied *SPARC* innovation into the commodity x64 space, integrating multi-socket architecture into an open *Solaris* platform that also runs *Linux*, *Windows*, and *VMware*. To see how these innovations can lower your TCO, please read on.

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Enterprise Data Center Evolution

The key issues facing the data center in every Fortune 500 company (and smaller ones as well) revolve around **growth, server utilization, continued use of legacy applications, and consolidation of disparate resources.** Every data center needs to reduce its total cost of operation (TCO), from the capital expenditures of acquisition to operating costs, such as administration and energy. Existing infrastructures consist of a preponderance of special-purpose, mono- and dual-processor systems proliferating the environment. Unfortunately, these servers are running at less than 20% efficiency, wasting critical natural resources and leaving significant unused processing time. Data centers are straining against the walls in terms of physical space, and they are up against the wall in terms of available power to the facilities. The staff needs to increase the density and utilization of server and storage resources in order to reduce the power requirements, and to simplify the application environment to facilitate growth.

Many enterprises now are moving toward scalable, general purpose, industry-standard servers in order to consolidate and improve the utilization of server infrastructure. CIOs are looking to stay within an x86 framework to take advantage of lower acquisition costs and available, trained personnel. Access to *Windows* and *Linux* helps the enterprise to avoid the perils of facing an end of life situation similar to what befell enterprises with *HP-UX* applications running on the *HP-PA* architecture. In fact, many data centers are still dependent on applications running in legacy operating environments and need to continue using them to facilitate the growth they expect. Virtualization techniques enable the enterprise to run multiple *Windows* and *Linux* environments at the same time. Enterprises with existing *HP-UX* applications have also been able to virtualize *HP-UX* within HP's *Integrity* platform. Similarly, enterprises with an extensive data center investment in Sun SPARC servers are now able to share processor time with Solaris applications within a virtualized partition on their *Opteron*-based *Sun Fire* platform. In fact, existing customers, and some new ones, have installed five million new Solaris 10 licenses this year alone, stimulating even more application availability from an active ISV base.

In order to minimize the costs of training, maintenance, and integration, many enterprises are looking to standardize on a single platform architecture to achieve the economies of scale desired, much the same way that a company such as Southwest Airlines has standardized on a single airplane model, the *Boeing 737*. This standard server model must enable the enterprise to implement a scalable processing environment along with scalable I/O to take advantage of future architectural advances. PCI-Express is one example of an I/O architecture that has been designed to handle tomorrow's workloads. Any new platform must also be able to protect the investment in storage solutions already installed, be it DAS, SAN, or NAS. The new servers need to have access to the latest in low-cost, high capacity disk architecture. Disk devices such as SAS and SATA II enable the data center to maximize the utilization of business-critical data for applications that take advantage of D2D storage techniques, such as backup/recovery and archiving. Standardizing on a single platform architecture also enables the enterprise to simplify network manageability, reducing administrative overhead.

Reducing energy requirements for running and cooling the data center efficiently is of paramount importance. With the cost of energy rising to previously unheard of limits, increasing the performance per watt becomes a necessity for every data center in order to reduce the recurring costs of data center operation. With one eye on the bottom line and the other on the horizon, the CIO must ensure that the enterprise's investment is being protected with a scalable platform, capable of adding, and upgrading, processors and memory without the aid of a forklift. With the announced roadmaps from both Intel and AMD, this will guarantee a long life to any new open system solution.

Sun and AMD

x86-based systems are known to as "open systems" or "commodity platforms" because they are based on the widely-available Intel and AMD microprocessor set. While the processor "inside" may be commodity, the architecture surrounding the CPU is often unique. Server vendors attempt to differentiate their platform with some significant feature set. For some, that may be an extensive application set. Other

vendors may tout exceptional performance based upon a unique I/O architecture or supporting chip set. For others, the differentiator may simply be price. The bottom line is - **to have a superior solution requires a commitment to innovation.** You need outstanding performance, an extensive application catalog, committed partners, as well as a low price.

Sun has collaborated with AMD for over two years in bringing innovation to the x86 server community¹. AMD has been the recent trailblazer in x86 innovation; first with a common 32/64 bit architecture and then with the first commodity dual-core engine. Sun was the first of the Tier 1 suppliers to recognize the opportunity that Opteron provided, and why not. As a leader in multi-core architecture with SPARC, Sun knew how to blend this high-performance engine into a total server solution. They used this knowledge to lead the way to x64 dual-core Sun Fire platforms in the fall of 2005². Now Sun is leading the way again, with x64 servers scalable to 8 sockets and 16 cores.

Combined with proven success in server integration, with an extensive offering in software, storage and services, Sun is using innovation to not only lower the TCO of today's data center, but also to simplify provisioning and improve server utilization. Sun is doing this through automated tools for infrastructure management of multi-OS systems, throughout the enterprise, not just in the data center.

New Sun Fire Solutions

First, let us be clear: one of Sun's biggest differentiators is the availability of Solaris 10 to run on all Sun Fire platforms, both SPARC and Opteron. In the case of the Opteron servers, Solaris can share processing time and resources with Windows and Linux, using *VMware* to virtualize the environment for a vast catalog of commodity applications. Sun also has a variety of storage solutions to complement the server set, from their legacy catalog as well as disk

and tape products from the acquisition of StorageTek. Sun also can coexist with storage products from EMC and IBM, qualified on the Sun Fire platform. Sun Fire also supports a dedicated on-board system processor, ILOM³, to monitor system and component status.

For this announcement, Sun has put together three distinct solutions to address different application needs.

- *The Sun Fire X4500* – World's first Data Server;
- *The Sun Fire X4600* – for high-performance scalability in a general purpose server; and
- *The Sun Blade 8000 Modular System* – for multi-socket blade scalability.

Sun Fire X4500 Server

With the Sun Fire X4500, Sun has configured an outstanding integrated application and data server using the newest in server and storage technologies. Using a pair of AMD dual-core Opteron processors running at 2.6 GHz, integrated with up to (48) 250 or 500GB SATA II 7200 RPM drives, Sun delivers remarkable throughput performance in an energy efficient 4U platform with enterprise-level reliability featuring redundant and hot-swappable components. Sun has integrated a first-class I/O package with approximately 1GBps throughput from disk to network and 2GBps sustained throughput from disk to memory.

With up to 24TB of disk and 16 GB of ECC memory with chipkill technology, there is little need for SAN attachment to achieve database processing flexibility. Integrated RAID functionality, enabled by Solaris ZFS⁴, provides data security through RAID 0, 1, 0+1, and 5 to ensure the enterprise against data loss. A Sun Fire X4500 has a starting price of \$32,995; however, purchased in quantity of ten, it is priced at less than \$2/GB. A fully configured X4500 consumes only 1120 Watts. Known internally as "Thumper", the Sun Fire X4500 is poised to make a lot of noise in the data warehousing, web analytics, media streaming, and HPC markets, as there is no competitive product in this class.

¹ See **The Clipper Group Navigator** dated March 4, 2004, entitled *Sun Expands Data Center Product Set with Multi-Technology Offering*, available at <http://www.clipper.com/research/TCG2004018.pdf>.

² See **The Clipper Group Navigator** dated October 14, 2005, entitled *Sun Boosts Server Performance with Opteron – Adds More RAS for Commodity Sun Fire*, available at <http://www.clipper.com/research/TCG20054065.pdf>

³ Integrated Lights Out Management

⁴ The *Zettabyte File System* simplifies file system management into a single structure providing a reliable and flexible file system solution.

Sun Fire X4600 Server

The Sun Fire X4600 is the first and only 16-way x86 server in a 4U chassis. It enables high-end cluster computing in a scalable commodity package, establishing new performance levels for others to shoot at. Using 13 X4600s, the data center can generate one Teraflop of performance. It may well be the last server you will need for years to come, and it starts at only \$25,995 configured with four dual-core Opteron processors.

With twice the performance and twice the scalability of a Xeon platform, the X4600 support up to eight single- or dual-core AMD Opteron processors and up to 128GB of memory with 4GB DIMMs. It is an ideal consolidation solution with power to spare and a virtualization capability to enable a single platform to host a multitude of applications. The X4600 has up to four 2.5" SAS drives and six PCI-Express slots, along with two standard PCI-X slots. It is capable of up to 20GB/s of bi-directional I/O. The X4600 is designed for reliability with efficient power and cooling, with a maximum power requirement of 1,700 Watts.

Sun Blade 8000 Modular System

After an initial false start in the blade arena, Sun has risen again – *in a big way* – with the 19U Sun Blade 8000 Modular System, capable of running up to ten Sun Blade X8400 server modules in each chassis. The Sun Blade 8000 is an ideal way to cut the TCO of your data center, reducing your server and services costs by more than half, with a similar savings in power and cooling expense. Any enterprise can now run the most demanding database and technical computing applications in a modular form factor. Further, the Sun Blade has been designed to handle power, cooling, and I/O needs for the next five years, protecting the investment that you make today.

Each server module supports four dual-core Opteron CPUs and six PCI-Express interfaces, with up to 64GB of memory per module. A single rack can support up to 20 X8400 modules with a total of 80 sockets and 160 processors – twice the power of conventional rack-mount options. The Sun Blade 8000 with a single x8400 module costs less than \$20K.

Conclusion

You cannot compete as an open systems

vendor as a “me too” player. You must have differentiators to warrant the spotlight. Sun Microsystems has stepped out of the shadows and is glowing again with innovative features that are not currently available anywhere else in the x64 arena. While the Sun Fire/Sun Blade design may enable a non-disruptive upgrade path to future processor technologies, Sun’s competitors will find Sun Fire to be highly disruptive.

Innovative features such as eight sockets in the X4600 and four sockets in the x8400 enables the data center to double the processing density in the same floor space, providing years of scalability and lowering maintenance costs, all contributing to a lower TCO. The availability of Solaris 10, along with Windows and Linux, will also contribute to Sun regaining their former stature.

After several years off target, and significant changes in organization, it appears that Sun has returned. If you are looking to reduce your operational costs and eliminate the constant fretting over server swap-out to meet today’s requirements, take a look at the new Sun Fire. It may help you sleep better tonight.



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