Building a Secure Web Infrastructure with Sun

High performance and extreme power, cooling, and space efficiency

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With more users accessing Web and networked-based services than ever before, being able to protect identities and minimize the risk of exposure is essential. True success comes when customers, vendors and employees feel safe in exchanging sensitive data over the Web for legitimate business purposes. Simply securing Web servers is not enough—protecting data as it moves through the environment is key. With Sun's secure Web infrastructure, businesses can take advantage of built-in cryptographic acceleration in Sun servers and strong software and storage security features to create Web scale performance, robust infrastructures with security capabilities at every level.

Highlights

- Secure the entire infrastructure, from the edge of the network to the heart of the datacenter, with the Sun's secure Web infrastructure components
- Take advantage of cryptographic capabilities that are embedded in the UltraSPARC® T2 processor rather than expensive encryption solutions
- Deploy Sun SPARC® Enterprise T5120 and T5220 servers and Sun Blade™ T6320 server modules and build high-performance, secure Web infrastructures with extreme power, heat, and space efficiency
- Run the Solaris™ 10 Operating System and address application isolation and security measures at every layer
- Utilize the Sun Java™ System Web Server or Apache HTTPS Server and easily offload key security operations to fast, built-in cryptographic accelerators in Sun's processors and improve security without impacting performance or increasing costs

The need to secure everything fast

Today, security plays a key role in keeping the infrastructure safe as more business is transacted online and network-based access to corporate resources is made available to more remote users every day. Indeed, rising security threats are pushing organizations to look for ways to deploy a secure Web infrastructure and reduce the risk of losing important data due to inadvertent exposure, as well as protect privacy and meet compliance demands.

Finding ways to secure everything—software, operating systems, and hardware in the foundation of the infrastructure—is the best defense. However, traditional approaches to adding security to Web infrastructures tend to require the purchase of additional expensive or cumbersome security software or hardware devices—and can take computing resources away from application servers. As a result, such solutions increase cost and hamper network communication and business efficiency. With the right solution, the overall speed and security of Web infrastructures can be improved without incurring these problems.

Zero-cost security

Designed with cost, security, performance, and scalability in mind, Sun's secure Web infrastructure approach joins new Sun SPARC® Enterprise T5120 and T5220 servers and Sun Blade™ T6320 server modules running the Solaris™ 10 Operating System (OS) with two of the most popular free Web servers—the Sun Java™ System Web Server and Apache HTTP Web Server. Combined with in-depth consulting and implementation expertise, Sun's secure Web infrastructure provides the right foundation for fast, secure Web services.

The solution builds on cryptographic acceleration embedded directly into the UltraSPARC® T2 processor induded in Sun's new systems to deliver zero cost security—no additional encryption hardware or software required and no appreciable impact on application performance. It also takes advantage of hardware and software features—without additional licensing costs—that enable the secure multi-hosting of applications on a single servers to help further reduce risks from inadvertent or malicious sensitive data breaches. By using Sun secure Web infrastructure, organizations can build and deploy Web services rapidly, with full confidence that data is protected as it travels throughout the infrastructure.

Sun servers—built for speed and security

The latest addition to Sun's innovative server family, the Sun SPARC Enterprise T5120 and T5220 servers and Sun Blade T6320 server modules offer breakthrough performance and energy efficiency to drive Web infrastructures and address other demanding datacenter challenges. At the core of the system architecture is the UltraSPARC T2 processor, Sun's latest chip multithreading processor that also incorporates several new design elements to speed Web infrastructure performance and enhance security. Supporting many threads, large memory, cryptographic acceleration, and integrated on-chip 10 Gigabit Ethernet networking and I/O technology, these servers provide high performance and scalability with extreme power, heat, and space efficiency.

Sun SPARC Enterprise T5120 and T5220 servers

Sun SPARC Enterprise T5120 and T5220 servers provide high throughput within significant power, cooling, and space constraints. Using 1.2 GHz or 1.4 GHz UltraSPARC T2 processors with up to eight cores, the servers deliver up to 64 threads, up to 64 GB of memory, and eight disk drives in space and power efficient rackmount packages. Multiple USB ports, PCI Express and XAUI slots, and support for 10/100/1000/10000 Gigabit Ethernet provide a variety of high-performance connectivity options.

Sun SPARC Enterprise T5220 servers provide throughput and expandability, with extra I/O and internal disk options afforded by a 2U rackmount form factor. With fast computing and I/O performance, the Sun SPARC Enterprise T5120 and T5220 servers are designed to handle demanding Web and application-tier consolidation and virtualization projects.

Sun Blade™ T6320 server modules

Based on the same UltraSPARC T2 processor and designed to fit in the Sun Blade 6000 Modular System, the Sun Blade T6320 server module provides high performance and outstanding density in a compact form factor. Up to 142 Gigabit per second of throughput is delivered through 32 lanes of PCI Express I/O, as well as multiple gigabit Ethernet and SAS links. As a compute node in massively horizontally scaled environments, the Sun Blade T6320 server module can help provide a substantial building block for Web infrastructures.

Figure 2. Sun SPARC_Enterprise T5120 and T5220 servers and Sun Blade T6320 server modules provide built-in cryptography acceleration and other security features to enable the deployment of fast, secure Web infrastructures.

UltraSPARC® T2 processor—built-in wirespeed security

Sun SPARC Enterprise T5120 and T5220 servers and Sun Blade T6320 server modules include the UltraSPARC T2 processor. Providing the industry's first massively threaded system-on-a-chip (SOC) design, UltraSPARC T2 processors are ideal for Web infrastructure environments. Based on a 65 nm manufacturing process, the UltraSPARC T2 processor combines all major server functions on a chip, including a network interface unit for 10 Gigabit Ethernet processing, PCI-Express for low latency data transfer, and a streams processing unit in each processor core for wire speed cryptography.

Figure 1. The Sun secure Web infrastructure brings together Sun servers with UltraSPARC_T2 processors, the Solaris 10 OS, and popular Web server software.

Speeding cryptographic operations
The time needed to encrypt network traffic can impact throughput significantly. An embedded streams processing unit in each UltraSPARC T2 processor core provides fast, efficient network traffic encryption by offloading the execution of key cryptographic operations, such as public key, bulk cipher, and secure hash functions. Integrated cryptographic acceleration lets applications run securely without the extra cost of a separate cryptographic device, and without the steep performance degradation previously associated with secure operation.

All cryptographic accelerators in UltraSPARC T2 processors support 10 encryption algorithms, including:

- Data Encryption Standard (DES)
- Triple DES (3DES)
- Secure Hash Algorithm 1 (SHA1)
- SHA256
- Message Digest algorithm 5 (MD5)
- Advanced Encryption Standard (AES)
- Rivest Cipher 4 (RC4)
- Rivest Shamir Adleman (RSA) to 2048 key
- Elliptic Curve Cryptosystem (ECC) encryption.

Wirespeed network connections
Multithreaded Sun 10 Gigabit Ethernet Technology is ideal for Web infrastructures and other network-intensive applications. Now, fully integrated dual 10 Gigabit Ethernet network interfaces built into UltraSPARC T2 processors eliminate PCI-E latencies and accelerate multithreaded application performance.

The Solaris™ 10 Operating System—the foundation for secure solutions

Providing the bridge that gives applications access to unique security and cryptographic capabilities and virtualization mechanisms inherent in Sun servers, the Solaris 10 OS sets a high standard for operating system security by addressing application isolation and security needs at every layer.

Making cryptography acceleration accessible
Speeding cryptographic functions is critical to overall secure system performance. The Solaris 10 OS includes a cryptographic framework that enables Web servers and applications to gain transparent access to encryption algorithms in UltraSPARC_T2 processors and reduce the likelihood of data interception or misuse.

Delivering built-in security enhancements
The Solaris 10 OS provides extended security features, including Solaris User and Process Rights Management, Solaris Service Manager, and Solaris Containers, which can be applied to obstruct hackers from tampering with Web pages and data or gaining super user access to systems.

- User Rights Management and Process Rights Management work together to eliminate the need for applications or users to have unlimited access to the system in order to perform tasks.
- Solaris Service Manager can put constraints on the execution of Web servers, and limit what network services are running in Web and data containers.
- The Solaris 10 OS is substantially easier to harden and minimize, helping to reduce the risk that a system or application can be compromised. Reduced configurations can be installed—with fewer software packages, no active networking, a minimum number of running services, and enhanced security.

Offering the best virtualization server
Solaris Containers and Sun Logical Domains technology provide virtualization and security isolation mechanisms that let multiple virtual machines run simultaneously on a single system. As a result, several HTTP and HTTPS servers can hosted securely on the same system with isolation between virtual machines. By consolidating onto a single CoolThreads server, enterprises can process more transactions per second than before, and reduce datacenter and carbon footprints.

Solaris IP instance isolates Solaris Containers and logical domains at the IP level to further secure the co-hosting of multiple applications on a single system and to assign the right amount of network bandwidth to applications on virtual machines.

Web servers that take advantage of on-chip cryptography

By ensuring Web servers utilize the Solaris Cryptographic Framework or Sun's OpenSSL libraries, organizations can move SSL processing and the execution of other key security operations from slower software-based solutions to the fast, built-in cryptographic accelerator of the UltraSPARC T2 processor and improve security without impacting performance or increasing costs..

Sun Java™ System Web Server
A secure, reliable, easy-to-use Web server, the Sun Java™ System Web Server provides a single deployment platform for Web services.

- **Data encryption and security**—Cryptography modules can be plugged into PKCS#11 compliant cryptographic providers, like the Solaris Cryptographic Framework, to enable cryptography accelerators in UltraSPARC T2 processors to be used transparently. Other features, like Access Control Lists, built-in LDAP, dynamic CRL updating and more, enable Web services to meet high service security and availability requirements.
- **Protection from common threats**—Built in filters enable familiar syntax to be used to modify requests and responses and protect against common attacks, such as Cross Site Scripting and database injection, and support for request mapping for URIs and IP helps to protect against distributed attacks.
- **Virtual server support**—Many domains can be served from one Web server. Each virtual server can have its own IP address, port, log files and more. Extensive virtualization enables the secure, mass hosting of many applications on a single server.

Apache HTTPS Web Server

Perhaps the most popular Web server in use today, the Apache HTTP Web Server powers many sites on the Internet. Now, enterprises can utilize an optimized version of the Apache HTTPS Web Server that utilizes Sun's OpenSSL to exploit the built-in encryption functions of the UltraSPARC_T2 processor, and takes advantage of security and performance features available in Sun servers running the Solaris 10 OS.

Proven Web scale performance

With the ability to power 64 virtual systems in a single server and 2,500 virtual systems per rack, the latest Sun servers and blades are designed with virtualization in mind. Indeed, these systems deliver proven Web scale performance to meet the steepest peaks in demand, and offer high density and industry-leading performance per Watt.

Sun tested Sun SPARC Enterprise T5220 servers on SPECweb®2005 benchmarks to gauge the performance impact of the cryptographic accelerators in UltraSPARC T2 processors. A Sun SPARC Enterprise T5220 server with one 1.4 GHz UltraSPARC T2 processor and eight cores running the Solaris 10 OS and Sun Java System Web Server delivered a world record 37,001 SPECweb2005 composite result—with 63,000 Banking, 49,500 e-commerce, and 36,000 Support composite results[1].

Sun also calculated the relative efficiency and performance of rack optimized servers based on the SPECweb2005 results and the corresponding power consumption.

Results show the Sun server provides 2.2x better performance/Watt than a four-socket HP ProLiant DL585 G2 server[2], and 1.6x better performance/Watt than a two-socket HP ProLiant DL380 G5 server[3].

Together, these results demonstrate that the Sun SPARC Enterprise T5220 server can support thousands of concurrent Web server sessions while letting larger and more complex Java applications to be run in-process for better performance and scalability. In fact, these results show that the integrated cryptographic capabilities of the UltraSPARC T2 processor and security features in the Solaris 10 OS virtually eliminate the performance penalty typically associated with secure Web servers. With the Sun solution, organizations can take advantage of a high-performance and efficient Web server environment without spending a fortune on third-party encryption solutions.

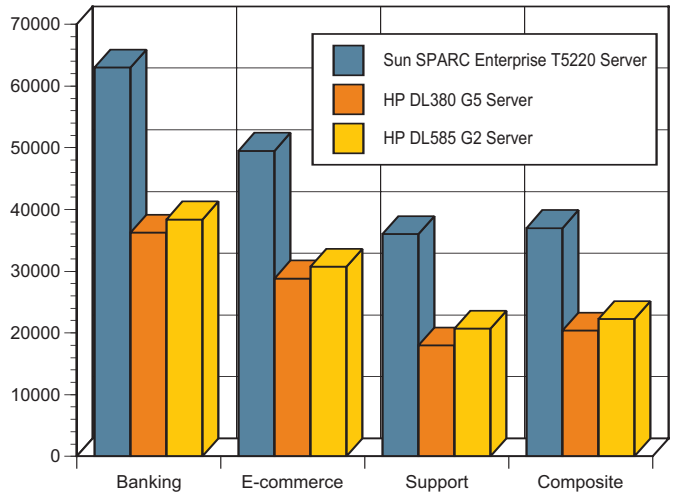

Figure 3. The Sun SPARC Enterprise T5220 server sets world records for Web server performance.

Learn More.
To learn more about the Sun Web Server Encryption Solution go to **sun.com/zerocost**, and for more information on all of Sun's Web infrastructure solutions, go to **sun.com/newheights**

Feel secure with Sun

Sun understands the need to keep businesses secure. With a strong belief in systemic security, Sun continues to provide the platforms and software needed to create robust infrastructures with security capabilities at every level. Now Sun's secure Web infrastructure brings these powerful server, storage, and software products—all with security measures built in—together in a solution designed to make it easy to not only secure the edge of the network, but the entire Web infrastructure.

[1] Results from www.spec.org as of October 23, 2007. Sun SPARC Enterprise T5220 (8 cores, 1 chip) 37,001 SPECweb2005 composite, 63,000 banking, 49,500 e-commerce, 36,000 support. Sun SPARC Enterprise T5220 server power consumption taken from measurements made during the benchmark run.

[2] Results from www.spec.org as of October 23, 2007. HP ProLiant DL585 G2 server (8 cores, 4 chips) 22,254 SPECweb2005 composite, 38,400 banking, 30,720 e-commerce, 20,704 support. HP ProLiant DL585 G2 server power consumption from HP Power Calculator for system configured with 4 x AMD 8222 3.0GHz processors, redundant PSU, 16 x 4GB DIMMs, 2 x HBAs and 2 x 146GB SAS drives, 80% utilization on 6/4/07: http://h30099.www3.hp.com/configurator/powercalcs.asp

[3] Results from www.spec.org as of October 23, 2007. HP ProLiant DL380 G5 server (8 cores, 2 chips) 20,387 SPECweb2005 composite, 36,256 banking, 28,800 e-commerce, 17,984 support. HP DL380G5 power consumption from HP Power Calculator for system configured with 2 x E5355 2.66GHz processors, redundant PSU, 8 x 4GB DIMMs, 2 x HBAs and 2 x 146GB SAS drives, 80 percent utilization on 6/4/07: http://h30099.www3.hp.com/configurator/powercalcs.asp

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