

The Solaris™ Operating System and Linux Software from Sun

Offering Choice With Best-of-Breed, Open Systems Software
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Chapter 1

Managing Cost and Complexity

During the economic boom of the late 1990s, companies expanded their infrastructures to meet the demands of increased network users and devices. Today, times have changed. Businesses must rethink how they create, manage, extend, and ultimately deliver information technology (IT) services with greater functionality and reduced cost.

Pressure to deliver results to the bottom line is forcing IT managers to find new ways to drive costs out of their operations. It's easy to focus on total cost of acquisition — but that's not enough. Total cost of operations and other business requirements must also be considered. Availability is essential. Computing infrastructures that scale both horizontally and vertically are a must. Security that protects businesses and identities during times of heightened global tensions is in the forefront of people's minds. Complex IT infrastructures consisting of thousands of heterogeneous servers spread across the globe must be maintained. Handling all this while reducing complexity, cost, and easing management is the challenge.

Managing data center complexity from a services perspective lets businesses focus on choosing the right solution for the job at hand, rather than managing individual systems. Matching the right platform — from entry-level, low-cost servers to high-end, 64-bit mission-critical systems, each with differing degrees of availability, scalability, security, and manageability — to the right task helps companies reap the benefits of trade-offs that often must be made between cost and business requirements.

Optimizing the Boundaryless Data Center With Sun

With an unwavering long-term vision — The Network Is The Computer™ — Sun continues to lead the industry toward simpler, faster, open, more cost-effective ways of using network computing for business benefit. Sun is advancing that vision with N1, a Java™ technology-based architecture that builds computers out of the network so that interactions focus on networked-based services rather than individual systems and storage. Achieving this vision requires making the pieces under the service layer ubiquitous. But how is this done?

Sun makes it work by unifying hardware and operating systems at the Java technology and Sun™ Open Net Environment (Sun ONE) layer. The foundation for this is Sun's Project Orion, a vision for integrating and delivering Sun's software portfolio with its operating system platforms — as a single package — for every system. The result is a scalable family of UltraSPARC® processors and x86-based systems, a choice of operating systems in the Solaris™ Operating System (SPARC® and x86 Platform Editions) and Linux from Sun, and a cohesive set of software products with the Sun ONE family that run on every platform. And tying it all together is Java technology and N1. For organizations large and small, and administrators alike, the benefit is clear: Less visible complexity with an open standards vision.

Chapter 2

Operating Systems and Platforms for Today and Tomorrow

Sun continues to focus on providing solutions to a complex problem — and giving customers the flexibility to make the trade-offs necessary for their business. Sun offers the full range of IT infrastructure assets: A scalable family of UltraSPARC and x86-based computing systems, a choice of operating systems, and integrated software products. This strategy helps simplify platform choice by delivering optimized systems that span the spectrum of functionality and cost.

Two Hardware Platforms

Optimizing the data center requires matching systems to application needs at the right price. Being effective also means using scalable systems. To address this issue, Sun is offering two hardware platforms — UltraSPARC and x86-based systems.

Sun's comprehensive line of UltraSPARC desktop and server systems scale from 1 to hundreds of processors, and more than half a terabyte of main memory. Sun remains committed to this broad, binary-compatible product line and continues to invest in lower cost, next-generation UltraSPARC IV and UltraSPARC V processors and systems as well as breakthrough chip multithreading microprocessor designs. This provides customers with the flexibility to choose leading-edge UltraSPARC servers that offer the scalability and availability they have come to expect from Sun.

Sun is broadening its x86 product line. The new family of x86-based systems will include an array of general purpose servers, blade servers, and desktops — delivering enterprise-class computing to the commodity server market. All Sun x86-based systems are designed to run either the Solaris x86 or Linux from Sun operating systems, as well as open source and Linux Standards Based (LSB) compliant applications.

The combination of Sun's respected UltraSPARC and x86-based systems give customers one-stop shopping — highly scalable, available, manageable systems from low-cost appliances to mission-critical servers.

Best-of-Breed Operating Systems

An application's characteristics determine where and how it is deployed. Mission-critical applications demand highly available platforms, while others can tolerate reduced uptime. Some applications require a high degree of vertical scalability, while others need only moderate horizontal scalability. Some applications require minimal security, and others demand stringent access control rules be followed at all times.

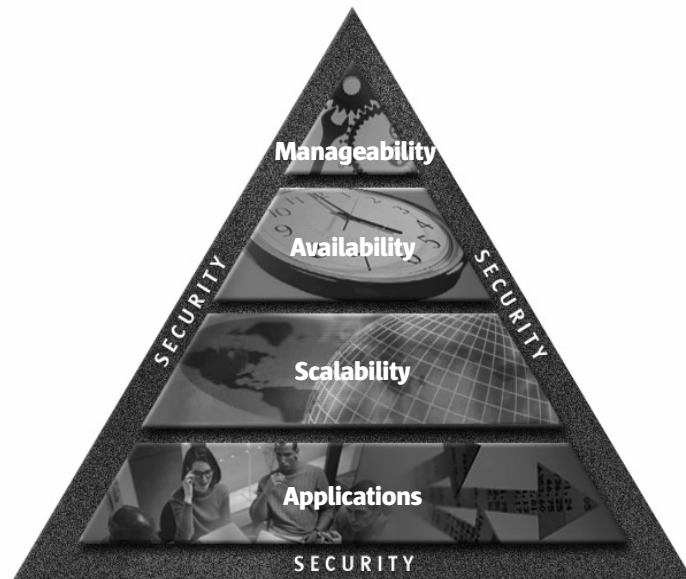
Evaluating requirements and making the right decisions that result in the best pairing of platform to problem is essential to success. Making that goal a reality means having the flexibility to optimize the environment. Sun offers businesses the flexibility to build optimized systems by delivering two operating system platforms — Solaris and Linux from Sun — with multiplatform options based on open systems.

Solaris Operating System

For more than ten years, the Solaris Operating System (OS) has delivered the power, flexibility, availability, and compatibility companies need to support enterprise-wide computing. It combines key computing elements — operating system, networking, security, and user environment — into a stable, high-quality foundation companies can depend on to develop, deliver, and manage both business-critical and mission-critical services. The Solaris OS is the leading UNIX® environment and the choice for powering enterprise networks that need to deliver information to networked users any time, any place, to any platform.

What makes the Solaris OS so great? Its massive scalability, lock tight security, mainframe-class functionality, and a whole lot more.

Figure 2-1: The Solaris solution.



Manageability

- Integration of key infrastructure software products into the Solaris OS radically simplifies the acquisition, deployment, and management of enterprise infrastructure software. All enterprise infrastructure software is delivered as one modular, integrated, and open software stack where everything is designed to work together. The Sun ONE Application Server, Sun ONE Directory Server, Solaris 9 Resource Manager, and Sun ONE Message Queue are all integrated today, and many more applications are planned to be integrated soon.
- Solaris 9 Resource Manager allows resources to be allocated among individual tasks and users in a structured, policy-driven fashion. System resources — CPU time, processes, virtual memory, connect time, and logins — can be proactively allocated, controlled, and monitored on a fine-grained basis, resulting in more predictable service levels.
- Solaris Volume Manager offers a storage management solution that helps companies address their storage management, administration, availability, and performance needs.
- Solaris Live Upgrade enables the operating system to continue to run while upgrades, patch installations, or routine maintenance operations are being performed.

Availability

- Superior reliability and availability provides maximum data and application accessibility, with features such as online patch installations without the need for system downtime.

Scalability

- Enhanced scalability, with a complete 32- and 64-bit computing environment, enables the delivery of applications and services to large numbers of users. The 64-bit functionality allows access to more system resources and the ability to consolidate applications onto a single server.
- Performance breakthroughs in multithreading, efficient memory usage, disk I/O improvements, and symmetric multiprocessing (SMP) deliver increased performance.

Security

- Unrivaled security provides additional protection for organizations. The base level security in the Solaris OS delivers one of the highest levels of security found in any platform. Extended security features are also available, including authentication, data integrity, data privacy, and single sign-on capabilities, so that tampering, snooping, and eavesdropping do not compromise data or associated transactions.
- Trusted Solaris™ software provides customers needing even higher levels of security with a hardened version of the Solaris OS that helps solve the increasing problems associated with securing information from both internal and external threats. Key features of Trusted Solaris software include privilege and authorization mechanisms, label-based access control, mandatory/discretionary access control, profile mechanisms, role-based administration, trusted networking, scalable security, and much more.
- SunScreen™ 3.2 firewall provides a built-in firewall with every version of the Solaris Operating System.
- Secure LDAP client allows the naming of objects and secure access to naming services. Passwords are no longer exchanged in the open — complete password management support is handled in a directory server.

Compatibility

- Platform compatibility with Linux means that the Solaris OS is designed to enable existing Linux applications to run on it without modification or recompilation.
- Binary compatibility provides application scalability that spans entry-level servers to powerful multiprocessor systems.

The Solaris x86 OS

Sun remains committed to the Solaris OS on UltraSPARC platforms, and is bringing the benefits of the leading UNIX platform to x86-based machines with the Solaris Operating System (x86 Platform Edition). Providing the same functionality with source code compatibility, both the Solaris and Solaris x86 environments deliver stability and open source innovation on UltraSPARC and x86-based systems. The Solaris OS delivers full 32- and 64-bit computing, mainframe-class reliability, availability, serviceability, and true binary compatibility — Solaris applications run on the entire Sun product family, and Linux applications run on the Solaris OS unmodified. Additionally, Sun is dramatically increasing its investments in Solaris software, including technical advancements, performance improvements, market development, marketing programs, and new channels. Investments such as these further illustrate Sun's commitment to cost-effective computing based on innovation, value, and choice.

Future Developments

For Solaris software, major developments are underway and will be available in the near future, including increased support for virtualized operating system environments for improved isolation and utilization, a new fault management architecture for improved observability, increased network performance, dynamic instrumentation that fosters rapid restore, and more. In addition, Trusted Solaris software is being integrated into the Solaris OS, raising the base-level security of the next major release of the Solaris OS to today's Trusted Solaris security level. Trusted Solaris software is planned to continue to evolve to have even more flexible and granular security levels. Stay tuned for how we're going to bring security to a whole new level.

Linux from Sun

In the tradition of numerous technologies made openly available to the development community, Linux has gained a great deal of momentum. The Linux server market is growing at double-digit rates. Core infrastructure and edge applications — including Web, application, file/print, proxy, cache, security, firewall, and VPN servers — are the most widely deployed, and database and other business application deployments are beginning to emerge.

Sun is changing its Linux strategy to better capitalize on the strength and market penetration of existing platforms and leverage community efforts. Gone is a custom Linux. Instead, Sun is delivering Linux from Sun — standard distributions of Linux tightly integrated with its Sun ONE product family and Java valued-added software to complement the Solaris OS product line and extend the reach of our end-to-end infrastructure. Sun expects to offer several Linux options, giving companies the freedom to choose the right platform for their business needs. By using standard Linux distributions, Sun's customers will have immediate access to the applications written to them. Additionally, standard Linux distributions support a broad hardware base and provide customers with the flexibility to choose the hardware platform.

Sun is committed to Linux, and supports the Linux platform as part of Sun's software vision. We intend to continue our active participation in community organizations and projects, driving momentum and leveraging innovation. We know the active support and promotion of the Linux Standards Base (LSB) as the industry-standard API for application certification is essential. And just like all other Sun products, Linux from Sun solutions will be backed by a full portfolio of support and services. Specifically, Sun plans to:

- Continue to build out the x86 product line (single and SMP rackmount, blade, and desktop systems)
- Expand support for standard Linux distributions
- Foster high levels of Linux and Solaris compatibility
- Expand support and services for Linux and x86 systems
- Offer seven Sun ONE software components on Linux today, and deliver more in the coming months

The leader in enterprise services for UNIX, Sun brings decades of expertise to Linux environments. And we'll deliver. We'll compete on integration. We'll add the value of Sun's entire software portfolio (via Project Orion), Sun's worldwide services, N1, and Java technology. We'll provide a superior global, single-vendor experience. With Sun, companies can rest assured they'll get the best system value money can buy — more products, great service, at a competitive price.

Knowing When to Choose

Being successful requires picking the right deployment platform for a given solution. Sun's operating systems offer companies the freedom to choose the right platform for the right job.

- The Solaris OS (x86 Platform Edition) is best-suited for companies invested in native Solaris applications and system administrator training who need additional security, want a predictable release and update process with an application compatibility guarantee, and want Solaris source code access — all while still leveraging standard x86-based system hardware.
- Linux from Sun is best-suited for companies looking for the broadest x86 platform support and who have standardized on Linux or native Linux applications. Linux from Sun is also available for customers who want to draw on the resources of the open source community or who desire free access to source code.
- The Solaris OS (SPARC Platform Edition) is best-suited for companies who want to run 32- and 64-bit applications, demand scalability from a few to hundreds of CPUs, require the highest

security or system availability, and require key features such as dynamic system domains, dynamic reconfiguration, and advanced memory management.

Table 2-2 outlines Sun's Solaris, Solaris x86 and Linux from Sun platforms, and provides suggestions on matching them to specific business requirements.

	Solaris OS	Solaris x86 OS	Linux from Sun
24x7 Support	✓	✓	✓
32-Bit Applications	✓	✓	✓
64-Bit Applications	✓	o	o
Binary Compatibility Guarantee	✓	✓	o
System and Resource Management	Built-in	Built-in	Third Party
Need to Preserve Significant Investments in Solaris	✓	✓	o
Need to Preserve Significant Investments in Linux	o	✓	✓
Commercial Application Availability	6600+	1000+	Hundreds
Vertical Scalability	100+ CPUs	1-4 CPUs	1-4 CPUs
Horizontal Scalability	✓	✓	✓
Community x86 Applications	Source	Source/Binary	Source/Binary
EAL4 CAPP (C2) Security	✓	✓	o
EAL4 LSPP (B1) Security	✓ ¹	✓ ¹	o
System Availability	Highest	High	High
Extended Release Support	9+ Years	9+ Years	3 Years
Commodity Hardware Support	o	Many	Most

1. With Trusted Solaris (SPARC Platform Edition) and Trusted Solaris (x86 Platform Edition).

Table 2-2: Knowing when to choose.

✓ = standard
o = not available

Project Orion — A New Level of Integration

The complexity and lifecycle management of today's disjointed software infrastructure is a serious impediment to many businesses. Driving down these expensive integration costs is paramount. Many computing companies focus on simple system integration. Others focus on providing global services to solve integration headaches. The right approach — the one that adds the most value to businesses — is providing access to key software across the computing spectrum. Sun is leading the industry in making software delivery more predictable.

Project Orion is Sun's vision and program to deliver the next-generation software system, methodology, and business strategy to radically simplify the business and information technology process. Such a strategy enables companies to focus on how best to allocate services — not how to integrate them.

Using systems that provide the same functionality — even if those systems are based on disparate computing technologies — helps manage cost and complexity. To help reduce integration costs, Sun's Project Orion is giving companies the tools they need — directly integrated into its platforms. This methodology identifies and transfers integration from the customer production environment to Sun's front-end development process, reducing deployment risk and driving down total software ownership costs.

With Project Orion, the Sun ONE product family, clustering software, storage software, and other applications will ship integrated into Sun's operating systems. The result is the same software on all platforms — with common integration facilities, management, and frameworks — integrated, tested, and designed to work together right out of the box. Companies simply choose the components they need, turn them on, and pay only for software used. Companies can enjoy the benefits of a standards based, interoperable software stack running either Solaris OS (SPARC or x86 Platform Edition) or Linux from Sun. With Sun, companies can mix, match, and manage software and hardware cost-effectively.

The first release of Project Orion is expected to include:

- *Interoperability features*, including Web single sign-on authentication, common technology and product components, the same release of the Java virtual machine, and a common directory schema
- *Experience features*, including common install and uninstall facilities, internationalization and localization, and accessibility mechanisms
- *Documentation and Best Practices guides*, including a deployment guide, performance and tuning guide, and a reference architecture

Consistent Delivery of Innovation and Stability

Sun has been developing and refining the Solaris Operating System code base since the late 1980s, and believes that developing key software as a continuum provides a high level of stability and compatibility. Today, Sun is bringing the power of the Solaris release process to Project Orion. The plan is for Project Orion and Solaris to release as part of the Solaris regular release cycle — with no out of cycle announcements — leveraging the existing and ready-made channel so that businesses can immediately deploy the value of the software system.

Sun's software release process uses a release *train*, where all new features are integrated and rigorously tested for performance and compatibility. This process enables Sun to preserve compatibility and add new functionality quickly while continuing to increase software quality at every turn.

By building on over a decade of quality and stability, each new release of Sun software reaches customer ship quality from its first build. Sun puts this to test every day by running production servers on the most current train build. For example, Solaris software engineering, marketing, and executive management was hosted on servers running the Solaris 9 OS years before its release — and are now running on the Solaris 10 OS. Sun works every day to ensure customers get only the best.

The Promise of N1

Companies know their infrastructures are made up of individual pieces. UltraSPARC and x86-based systems. The Solaris Operating System and Linux from Sun. Storage systems and appliances. Applications and services. Tying all those pieces together with Java technology makes the environment work. But challenges still remain. Vast networks of servers and software components. Escalating management costs. Pressure to reduce IT infrastructure costs and better manage service levels. Balancing these needs and finding ways to locate resources to run services is paramount.

Maximizing utilization requires N1 — an approach that allows data centers to be visualized and managed as a fabric of interconnected computing resources, rather than as a room filled with individual systems. N1 is Sun's vision, architecture, and products for the next-generation data center. It addresses the many problems that have to date hampered organizations in delivering true just-in-time computing. N1 virtualization and provisioning technology offers a new and innovative method for simplifying the deployment and management of complex computing resources. With N1, the focus is not on the individual servers and storage systems — it's on managing an IT infrastructure as a smoothly integrated whole. It's about making the data center behave as a single, unified system.

N1 is designed to reduce management complexity and cost, increase data center resource utilization, improve infrastructure responsiveness and agility, and ensure investment protection. Sun's two operating systems — Solaris and Linux from Sun — give businesses multiple delivery mechanisms into the N1 environment. The operating systems become a part of the resource pool, and form a solid foundation for building an N1 infrastructure. Combined with a scalable hardware line and Project Orion software, the result is the right amount of resources, in the right place, at the right time to meet the demands of a dynamic business.

Chapter 3

Summary

Sun and Network Computing

Success depends on building a flexible infrastructure. Sun delivers more value by integrating all critical features — availability, manageability, security, and network and Web services — into every system. Providing the most scalable product line packed with features, tighter integration, more complete testing, and the highest security levels for general purpose servers, Sun gives companies the freedom to choose the systems and software that best meet their business needs.

One Vision, One Strategy

At Sun, we are recommitting to what made us an industry pioneer — delivering the best network computing systems. Sun innovation has led the way in highly scalable 64-bit computing, symmetric multiprocessing, carrier-grade functionality, Java technology, directory services, identity management, portal services, and much more. But Sun's best asset is its ability to work with partners to deliver integrated solutions based on innovation, value, and choice.

Today, Sun continues this trend with support for Linux and the x86 market. By embracing Linux as an open standard, incorporating and innovating new technology, and taking it to the next level, Sun illustrates its commitment to providing the solutions customers demand. By offering the Solaris OS for both UltraSPARC and x86-based systems as well as Linux for x86-based systems, adding the Sun ONE family of software products to them, providing worldwide support and services, and creating the most scalable platforms for network computing with freedom of choice built in, Sun is reinforcing its dedication to open systems and customers alike.

At Sun, our vision and strategy is the same as it's always been — connect everything through network computing. We're proud of our ability to leverage open standards and technologies, innovate on top of them, and create the kinds of systems our customers demand. Remember, the network is *still* the computer — and Sun provides the infrastructure for network computing.

For More Information

The following Web sites provide additional sources of information related to Sun products and services. Organizations can also contact a local Sun sales representative to learn how Sun can help build competitive advantage with a network computing infrastructure that meets the needs of today and tomorrow.

Solaris Operating Environment

- sun.com/solaris

N1: Revolutionary IT Architecture for Business

- sun.com/n1

Linux from Sun

- sun.com/linux

Sun Open Net Environment (Sun ONE)

- sun.com/sunone

Sun Cluster and Other Availability Solutions

- sun.com/clusters

Sun Security Solutions

- sun.com/security

Network Storage Solutions

- sun.com/storage

Sun Hardware Servers

- sun.com/servers

Sun's iForceSM Initiative

- sun.com/iforce

Sun Service Offerings

- sun.com/service

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