

# Solaris™ Business Services: Vision and Enabling Technology

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*Forward-Looking Solutions for  
Commercial and ISP Organizations*



THE NETWORK IS THE COMPUTER™

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## Executive Summary

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Corporate Information Technology (IT) departments and Internet Service Providers (ISPs) are under constant pressure to increase revenue while simultaneously saving money. ISPs must find ways to free up staff to create new services while still managing day-to-day operations; Enterprise Service Providers (ESPs) must support the business objectives of multiple lines of business while keeping within tight budget constraints.

Sun's Solaris™ business services provide solid solutions. Sun is delivering a set of Internet and Internet-enabled services that offer high performance, scalability, reliability, interoperability, and low total cost of ownership — with increasing integration over time. This core set of services helps ISPs and ESPs to run their business more efficiently, and at lower cost.

Sun is also providing a Java™ development environment that will allow ISPs and ESPs to rapidly develop new services, enabling them to be more responsive to customer demands. Examples include anytime/anywhere/any client Web access; integrated voice and text mailboxes; business outsourcing; personalized Web services; and more.

In addition, Sun is building strong alliances with application vendors for additional new services, such as business application hosting and Universal Inbox/unified messaging services.

Solaris business services have a clearly defined strategy for enabling secure, anytime/anywhere client access, and fits cleanly with the overall Sun direction. Leveraging HTML, Java technology, and third-party security applications, Sun is putting a complete architecture in place for universal access.

This paper presents an overview of the possibilities that Solaris business services enables, and describes the products and services that are currently in place to help ISPs and ESPs take their first steps toward this vision.

## Recent Trends: New Challenges, New Opportunities

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The explosive growth of the Internet. The increase in mobile computing. The new generation of information appliances. The accelerating pace of global business. These and other recent trends in business and technology create both possibilities and problems for IT departments and ISPs.

### *Corporate IT Challenges*

Corporations are eager to take full advantage of the power of Internet, intranet, and extranet services to increase employee productivity and enter new markets. But to do so they must:

- Implement an information backbone that is reliable, available, interoperable, and secure
- Find a way to provide anytime/anywhere data and file access to mobile and remote users
- Achieve economies of scale by appropriately consolidating hardware resources
- Align IT goals with line-of-business (LoB) goals within the organization
- Leverage outside service providers

### *ISP Challenges*

ISPs are faced with the challenges of meeting the demands of astronomic growth: retaining customers, controlling expenses, creating competitive advantages, and finding and retaining skilled technical staff. To maintain profitability in this environment, they need to:

- Find innovative ways to offer differentiated products and services
- Cut costs through new ways of doing business
- Deliver new service offerings to market more quickly and cost-effectively than the competition
- Find new ways to unburden talented staff so that they can focus on creating value-added services rather than supporting engineering

## A Look Ahead: Emerging Opportunities

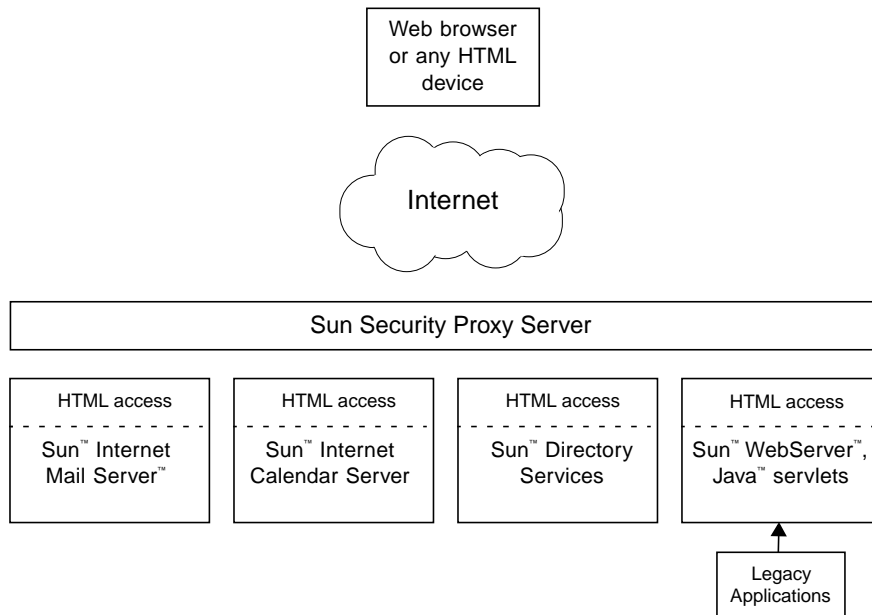
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### *The Virtual Office*

The Virtual Office is a common interface that integrates all of a user's typical business services — e-mail, calendar, scheduling, Internet and Web access, and news and information services. Through cross-platform technologies such as Java and HTML, this common interface can be made available to users from virtually any device. Users have a consistent look and feel regardless of which device they're using.

For example, a user could access their Virtual Office console from a laptop on an airplane and review incoming faxes, read the newspaper, or submit a revised travel itinerary to their manager. If no laptop is available, the user could call in from a public phone and have access to their calendar, e-mail, voice mail messages, and so on. Kiosks featuring the standard Virtual Office console could even be installed at airports to enable members to access their office information without even carrying a network device.

Sun is currently developing Virtual Office technology in a two-stage process: first, by providing ubiquitous HTML access to intranet data; and second, by developing the security infrastructure to extend this functionality to public networks such as the Internet. The diagram below illustrates Sun's approach.



**FIGURE 1** The Virtual Office

This implementation leverages the cross-platform capabilities of HTML to provide Web access to e-mail, calendar, directory, and other applications and services. Security services such as authentication, encryption, and access control as well as performance tuning are provided by the security proxy server. The entire architecture is open so that multivendor technologies will be pluggable, and multiple implementations will be accommodated. Java technology will serve as the extension mechanism for this architecture.

**Opportunity for IT:** By implementing the Virtual Office, IT departments can provide an extremely high-value service to users while also reducing the total amount of manpower required to support and administer multiplatform business services (since the Virtual Office will be based on inherently cross-platform technology such as HTML and Java software). IT will also have the option of outsourcing the entire Virtual Office implementation to ISPs, which would mean IT would no longer have to support and maintain these business services. This option actually enables the IT department to provide other higher-value-add services more effectively.

**Opportunity for ISPs:** ISPs can provide integrated Virtual Office services as an outsourced packaged offering to corporations in addition to providing businesses quality connectivity. ISPs that implement scalable business services, such as Sun™ Internet Mail Server™ or Sun™ Internet Calendar Server software, will be able to deliver a greater economy-of-scale advantage compared to corporate IT departments because the per-user cost declines rapidly as the number of users increases. This economy of scale makes outsourcing a win/win situation for the corporation and the ISP.

### *The Universal Inbox*

It is possible to provide users with a single electronic “inbox” that securely receives and stores voice, data, and multimedia messages from virtually any device. Users can access the inbox via the network or over public phones lines; voice-to-text and text-to-voice capabilities will enable e-mail messages to be read aloud over the phone and phone messages to be seen on a computer monitor. One major benefit for users is the ability to randomly access voice-mail messages rather than serially, allowing users to get to messages left by specific individuals, or those requiring urgent attention more quickly.

It is also possible to create “follow-me” functionality — integrating voice and data capabilities at high performance so that services can effectively follow the user anywhere and perform multiple functions. For example, a sales representative could use a cellular phone to call in to the office, check appointments, cancel meetings, and send either voice or data messages to clients.

**Opportunity for IT:** This is another example of a value-added service that IT could implement to make mobile and remote users more productive.

**Opportunity for ISPs:** By developing and offering this type of service to customers, ISPs create a significant new source of revenue and enable corporate IT departments to cost-effectively off-load a significant percentage of their workload and focus on new value-added service for their constituents. This type of service can also help ISPs avoid the “flat rate” trap that would otherwise limit future profitability.

### *Business Application Hosting*

There is an opportunity for business application vendors to reach wider markets for their products by outsourcing the applications to ISPs, who in turn could offer the services to corporate customers.

For example, Enterprise Resource Planning (ERP), sales force automation, and customer service applications are typically extremely large and complex and are not easily condensed or simplified for customers who do not require the full functionality of the application. Vendors of these applications could outsource the full-featured application to ISPs, who could offer functionality as needed to their customers.

**Opportunity for IT:** Small and mid-sized corporations could finally have access to the functionality of important business applications that otherwise may have been too expensive or complex to utilize.

**Opportunity for ISPs:** Clearly, the ability to offer affordable access to business applications creates a competitive advantage and a significant source of new revenue for ISPs.

### *Personalized Web Sites*

With the advent of active agent-based technology, it is now possible to create personalized Web sites that proactively find information requested by the user. For example, a user could instruct the Web site to track stock quotes and provide pager notification when specified thresholds are exceeded, or find magazine and newspaper articles on a particular subject.

**Opportunity for IT:** In addition to providing a high-value and productivity-enhancing service to users, automated services such as personalized Web sites can reduce the number of requests made by users for assistance in locating information.

**Opportunity for ISPs:** This is another example of a differentiated service that can help ISPs attract new customers, retain existing customers, and provide additional outsourcing services.

## Technological Requirements

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To deliver on the promise of the new generation of services, the corporate IT department or ISP organization must satisfy a wide spectrum of demands, both from a technological and a business perspective. The core requirements are summarized below.

**Scalability:** Successful organizations respond to change rapidly, and the scalability of IT systems can determine how responsive an enterprise can be. However, many computing platforms do not scale in a cost-effective manner. In addition, the difficulty in forecasting demand for new services creates a dilemma: design a solution for peak loads and risk underutilized resources; or design a solution for a lower capacity and risk customer dissatisfaction in the event of high demand. A truly scalable solution must scale on demand without wasting resources.

**Availability:** Internet/intranet services are becoming increasingly mission-critical. Downtime is expensive for customers in terms of reduced productivity or lost business opportunities; yet delivering high availability can be extremely expensive. The goal for most IT managers is to make network services as available and reliable as the telephone dial tone. For ISPs, availability is of paramount importance; people expect 24-hour availability with no downtime.

**High Performance:** Every year, users become more and more demanding with respect to their expectations for performance. High performance for services (low latency) must be maintained even as the use of the service grows. This is true in both the public Internet and private intranets.

**Low Total Cost of Ownership (TCO):** The initial purchase price of new technology accounts for only a small percentage of its long-term cost. TCO comprises four areas: development/acquisition, training, support, and maintenance (some models also try to account for downtime and lost productivity). The rate of technological change in both hardware and software must also be considered; upgrades are often required before resources are fully amortized.

**Security:** Information security was a more manageable concept when everyone worked within corporate buildings and data resided on a single mainframe. Now, as corporate data and information are made available and distributed to employees, security is a much more complex matter. Access control, information compartmentalization, and logging events are fundamental components. Information privacy — encryption — is key when sending out sensitive information across public networks such as the Internet. And while users understand the need for security, they don't accept disruption to their jobs caused by security technology. For ISPs, this is particularly tricky because they need to trade off providing access — their core business — with providing security.

**Accessibility:** Users want their information where and when it is most productive to them. Users who require the information from places other than their corporate desktop complicate matters with low-bandwidth requirements and security issues.

**Migration Tools:** IT organizations require tools and professional services that can assist them in transitioning from one application to another. Often the value of moving to newer platforms or applications is seriously undercut by the cost, trapping users in existing legacy environments.

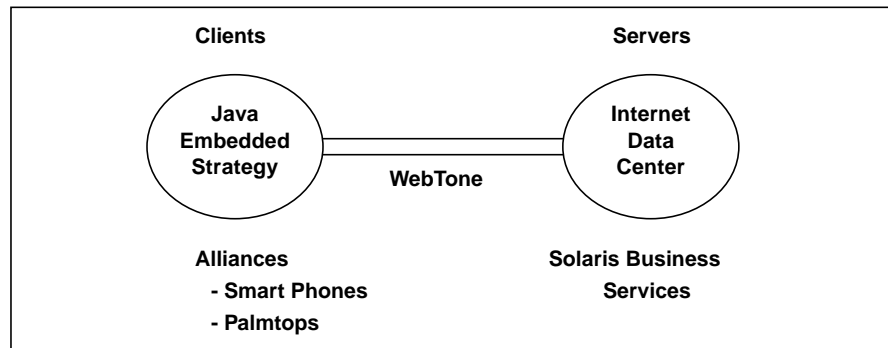
**Tools for Monitoring the Customer Experience:** IT departments and ISPs must have a way to objectively measure the customer experience and gauge whether service-level commitments are being met — before the phone rings with a user complaint.

**Centralized Administration and Easy Deployment:** There must be a way to easily manage and deploy new systems to keep pace with rapid growth.

**Line of Business Alignment:** Service requirements vary by line of business (LoB). This can require multiple systems and technologies to deliver the same information to different users. Meeting the needs and requirements of each business unit can maximize corporate productivity, but must be weighed against the management and support costs of multiple application sets.

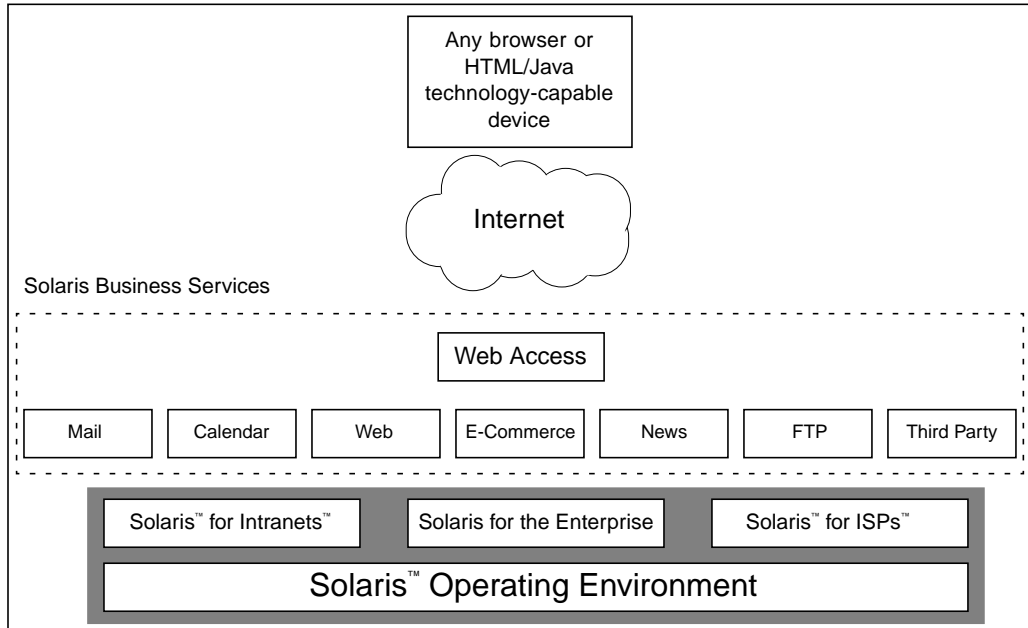
## Delivering on the Demands: Solaris Business Services

Sun's vision of integrated services and seamless information flow requires a wide spectrum of capabilities, working in concert, to deliver services reliably, securely, and at high performance to end users. Sun calls this convergence of capabilities Solaris business services.



**FIGURE 1** Solaris business services complement and add value to Sun's overarching strategy for delivering universal client access to server-based resources by delivering server-side services.

The basic components of Solaris business services are shown in Figure 2.



**FIGURE 2** Solaris business services are a collection of services delivered by products. These services run on the Solaris™ for ISPs™ environment (a tailored version of Sun's Solaris™ operating environment), and provide Web access to any browser or device supporting HTML or the Java language.

## Products that Implement Solaris Business Services

In June 1998, Sun introduced an integrated product suite for commercial enterprises and ISP customers. This product suite delivers information services built on Internet standards, at a low total cost of ownership (TCO), with a high service-reliability level. Combining these products to meet specific customer requirements is the first step towards implementing Solaris business services today.

The key components are the Solaris™ operating environment (or the Solaris™ for ISPs™ 1.0 service platform); Sun Internet Mail Server 3.5 software; and Sun Internet Calendar Server 1.0 software.

### *Solaris Operating Environment*

The Solaris operating environment forms the foundation of Solaris business services. Solaris delivers unmatched flexibility because it is:

- **Scalable** – Solaris powers everything from laptops, host-based systems, PCs, workstations, and servers to supercomputers.

- **Reliable** – Solaris is the most mature and tested UNIX® operating environment on the market today. It is also the most widely deployed UNIX platform and is frequently used in mission-critical environments where Windows NT falls short.
- **Secure** – Solaris supports the full range of security solutions, from authentication and encryption to firewalls and privacy solutions for secure business transactions.
- **Internet-ready** – Solaris is built on a TCP/IP network design and architecture, the standard for public and private networks.

These are a few of the reasons that many of the world's largest e-mail systems, including Microsoft's HotMail, run on the Solaris operating environment.

### *Solaris for ISPs 1.0*

Solaris for ISPs 1.0 software is a customized extension to the Solaris operating environment designed specifically for ISPs. It includes a variety of ISP platform services that simplify administration and provide customer service monitoring. It also includes core service-delivery products such as Sun™ Internet FTP Server™, Sun™ Internet News Server™, and Sun™ WebServer™ software. During installation, it automatically secures Solaris to improve security.

The product is organized into two collections of software: ISP Solaris platform extensions and ISP services. ISP Solaris platform extensions include:

- **Sun™ Internet Administrator™**: A unified system management console that provides simplified management of distributed ISP services.
- **Sun™ Internet Services Monitor™**: A core services performance monitor that enables automatic monitoring of a customer's service experience by collecting information and providing notice of declining service levels.
- **Sun™ Directory Services**: A Lightweight Directory Access Protocol (LDAP) implementation that offers a shared repository for both user (administrator) and service configuration information.

Solaris for ISPs basic server license offers a choice of one of three ISP services. The additional two services may be chosen as options. The three key ISP services are:

- **Sun™ Internet News Server™**: A high-performance, highly scalable news server that includes full-featured news-feed handling and high-performance as well as client-connection scalability.
- **Sun™ WebServer™**: A highly reliable, secure, standards-based HTTP Web server for accessing, managing, and distributing information over the Internet, intranet, or extranets; includes support for HTTP 1.1, enhanced scalability, and Java servlet support.
- **Sun™ Internet FTP Server™**: A scalable, high-performance, fully compliant FTP server that supports multiple domains on a single host and offers configurable user authentication and scriptable management.

The Solaris for ISPs 1.0 suite also works with two complementary options, which will be increasingly integrated over time:

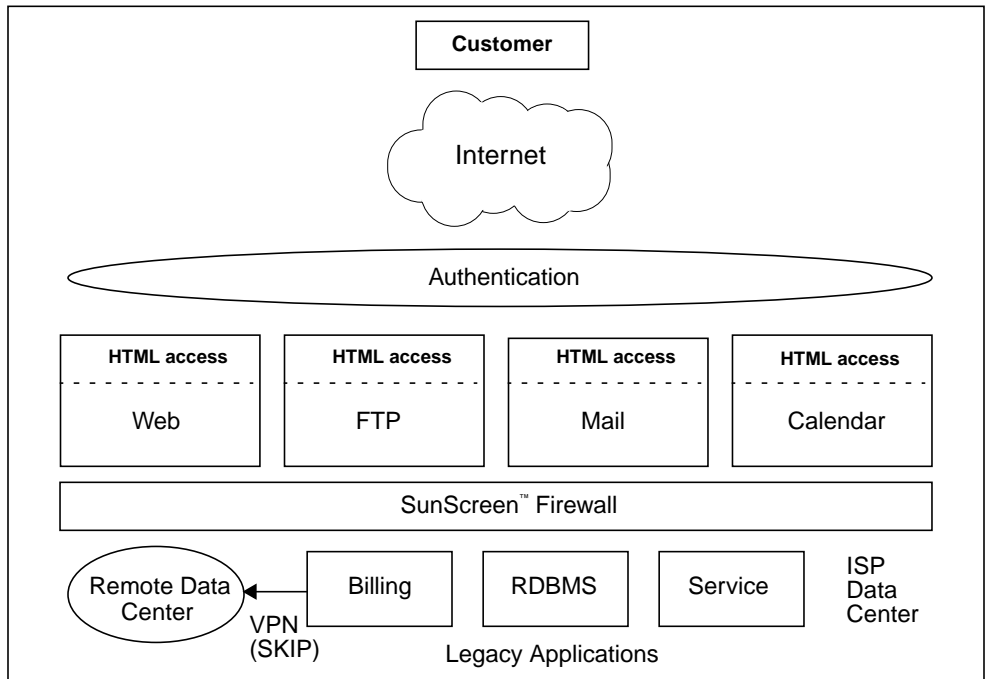
- **Sun™ Internet Mail Server™ 3.5:** A leading e-mail server with the performance, scalability, reliability, and low total cost of ownership required by ISPs.
- **Sun™ Internet Calendar Server 1.0:** A powerful calendaring and scheduling package (scheduled to begin shipping in the latter half of 1998).

**TABLE 1** Benefits Delivered by Solaris for ISPs Components

Feature/Product	Benefits
<b>Sun Internet Services Monitor</b>	<ul style="list-style-type: none"> <li>• Increases customer/user satisfaction by monitoring service-level performance from a customer perspective</li> </ul>
<b>Sun Internet Administrator</b>	<ul style="list-style-type: none"> <li>• Saves time managing and configuring multiple services</li> <li>• Reduces internal security risks by allowing the system administrator to define user access levels; supports secure communications</li> <li>• Helps maintain system uptime</li> </ul>
<b>Platform and Security Hardening</b>	<ul style="list-style-type: none"> <li>• Reduces time and experience needed to protect systems from hackers</li> <li>• Ensures consistency and reduces time required to configure similar servers</li> </ul>
<b>Scaling and Performance Improvements</b>	<ul style="list-style-type: none"> <li>• Allows economies of scale to reduce system and operations cost</li> </ul>
<b>Sun WebServer</b>	<ul style="list-style-type: none"> <li>• Provides secure, scalable, extensible, integrated, high-performance Web server functionality</li> <li>• Supports revenue generating Web-hosting business</li> </ul>
<b>Sun Directory Services</b>	<ul style="list-style-type: none"> <li>• Reduces configuration time by providing a common database for accessing services</li> <li>• Reduces errors and administration costs</li> </ul>
<b>Sun Internet News Server</b>	<ul style="list-style-type: none"> <li>• Provides integrated, tested, scalable news server capabilities</li> </ul>
<b>Sun Internet FTP Server</b>	<ul style="list-style-type: none"> <li>• Provides an integrated, tested, scalable FTP server to support heavy user demands</li> </ul>

# Security Platform

ISP and ESP services must be secure from internal and external intruders. Security is integral to the Solaris business services concept. All components of the Solaris operating environment and Solaris for ISPs software were designed to deliver secure server-to-server and client-to-server communication.



**FIGURE 3** Solaris business services leverage cross-platform HTML and a secure proxy server for Web access to e-mail, calendar, directory, and other applications and services. Services such as authentication, encryption, and access control – as well as performance tuning – are provided by a security proxy server. The data center is firewalled, and Sun’s SKIP technology provides secure access to remote data centers via virtual private networks (VPNs).

There are several underlying security components in the Solaris business services environment:

- Sun Directory Services stores login, password, and access-control information for administrators and users; all interaction with Solaris for ISPs services and applications refers to this information.

- Web-based installation tools and applications allow ISPs and ESPs to quickly install, configure, and maintain the desired components of Solaris for ISPs on local or remote servers. These browser-based administrative and application consoles use either Secure Sockets Layer (SSL) or IPSec Simple Key-management for Internet Protocol (SKIP) to authenticate and encrypt all login information and communications traffic between clients and servers.
- The three-tier architecture of Sun Internet Administrator facilitates secure connections for the client, and secure administrative sessions through SSL support. This support enables all communication between the clients and the servers to take place inside an encrypted session. Secure server-to-server communication is provided using IPSec SKIP.
- Tightening Standard Solaris Security: Sun™ Host Configuration “hardens” the underlying Solaris operating environment version 2.6 foundation by changing file owners and modes, and enabling security and logging mechanisms as appropriate for each service.
- Logging and System Status: All administrator actions are logged, and Host Configuration software includes a daemon that detects intrusion attempts by watching a specially configured syslog. Sun Internet Services Monitor provides 24-hour performance feedback from a customer perspective, and can alert administrators when a service degrades or fails.
- Advanced Encryption and Authentication: Solaris allows for out-of-the-box server-to-server IP layer encryption using Sun's IPSec product, SunScreen™ SKIP. This enables users to secure any IP transmission between servers without any additional software.
- Secure Sun WebServer: To provide maximum protection, Sun WebServer 2.0 supports SSL and certificate-based security. Additional security features offer several levels of access control while supporting security rules for data and network protection.

Additional security features are available through a wide range of Sun and third-party products. For example, Sun has a strong relationship with Entrust, a leading provider of authentication and other e-commerce security solutions.

## Java Technology

The Java software platform is a key component of Solaris business services. As the creator and guardian of Java technology, Sun plays a pivotal role in the development of this platform.

On the programming front, development tools such as Java™ WorkShop™ and Java™ Studio™ software enable even novice programmers to get new services to market faster with re-usable object-based technologies such as JavaBeans™ and Enterprise JavaBeans™ components. The use of object-based development tools also makes it easier to plug in third-party applications, further speeding time to market for new services.

Many of Sun's software products now ship with Web-based Java administration and install consoles. Solaris, Sun Internet Mail Server, and SunScreen SecureNet software all use Java administration and/or install. Other products, including Sun WebServer and Solstice™ Enterprise Manager™ software, allow Java applications to interact with the distributed management services.

In addition, networked information appliances such as cellular phones, PDAs, Web phones, and smart cards can run JavaOS™ software — a small, flexible, and economical embedded operating system.

## Rapid Service Deployment: Java Servlets and Sun WebServer

In addition to a full spectrum of powerful software development tools, Sun offers technology that facilitates rapid service deployment for faster time to market. The key enabling technologies are Java servlets and Sun WebServer software.

On the server side, Java servlets provide a real and complete Java programming development environment — including Java development tools and reusable object technology — for fast, flexible application development and service delivery.

Sun WebServer technology simplifies the process of deploying Java servlets onto the Web, intranet, or extranet. Sun WebServer is easy to use, extensible, easy to administer, and secure.

## Thin-Client Hardware and Software

HTML is fast becoming the common language of network services, and soon most file and data access will be Web-based. Recent research studies estimate that there will be over 200 million thin clients in use by the year 2000. And if devices such as pagers, printers, smart watches, digital cameras, and smart cards are included, there will be more than 2 billion client devices shipping by the year 2000. These are the devices that will need to be supported in years ahead, and that is why Sun is pioneering the development of Java technology-enabled thin-client devices today.

Sun is building the foundation for anytime/anywhere thin-client data accessibility through the Java software platform, the JavaStation™ product line, the JavaChip™ processor platform, powerful tools for embedded software development, and information appliance “recipes” that provide reference hardware and software for fast development of targeted devices.

## Service and Support

Sun has developed customized service and support offerings tailored to the needs of both enterprise IT departments and ISPs.

- In the professional services arena, Sun’s Internet consulting practice offers expert assistance in virtually every aspect of designing, deploying, and managing network services. We also offer specialized consulting services for Sun Internet Mail Server and SunScreen SecureNet products. These services assist with the planning, migration, and deployment of the products to ensure the fastest possible time to value.
- Sun has developed a Certification Program for Solaris administration, as well as a Certification Program for third-party applications targeted at ISPs. These programs help reduce the amount of time talented staff spends integrating and testing third-party software; increase confidence in the reliability of Sun solutions; and give customers exposure to solutions Sun believes will add significant value.
- Sun also provides extensive 24 hours a day, 7 days a week (24x7) mission-critical systems support and software support, education and training services, and developer support for ISPs on a global scale.

## The Next Steps

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The service-driven network is the goal that future Sun product enhancements will be aimed at achieving. Sun will continue to improve the overall reliability and scalability of Solaris business services. Our next steps toward the goal include:

### *Manageability and Administration*

Unified management and common administration across all applications will help to keep TCO costs low by reducing staffing and training requirements. Improved diagnostic applications and agents will improve reliability and uptime. Capacity tuning and planning tools will help IT organizations pro-actively expand system capacity, enabling greater reliability and performance. User management, including remote administration and adoption of a distributed, hierarchical framework will reduce administrative overhead. Designated administration (sub-administration) will allow central management controls while distributing tasks to remote offices and users. Improved interoperability with third-party management tools will offer IT managers a choice and flexibility in delivering applications to LoBs.

### *Directory Services*

Increased interoperability and migration capabilities with other directory services will improve flexibility and adapt the overall system to more comprehensive set of requirements. Improved replication capabilities will enhance response times and lower staff administrative overhead.

### *Additional Services*

Expanding high availability (HA) capabilities to more functional servers will increase reliability, and incorporation of the full range of Java technology, including Java servlets, applets, and JavaBeans components for rapid service and application deployment will provide greater productivity and functionality.

## Conclusion

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Sun has the vision, the technology, and the proven expertise to deliver end-to-end solutions to the core challenges now facing corporate IT departments and ISP organizations. Sun's solutions for the service-driven network, Solaris business services, will enable customers to:

- Deploy new services more quickly and at a lower cost
- Make more efficient use of talented staff to grow the business rather than run the business
- Change services on demand to meet new user requirements
- Take advantage of new technologies as they emerge
- Deliver the WebTone to end-user customers

By drawing on Sun's solutions for enterprise computing, IT and ISP organizations can solve the pressing problems that strain their resources today while positioning themselves to take full advantage of future enhancements in technology.



THE NETWORK IS THE COMPUTER™

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