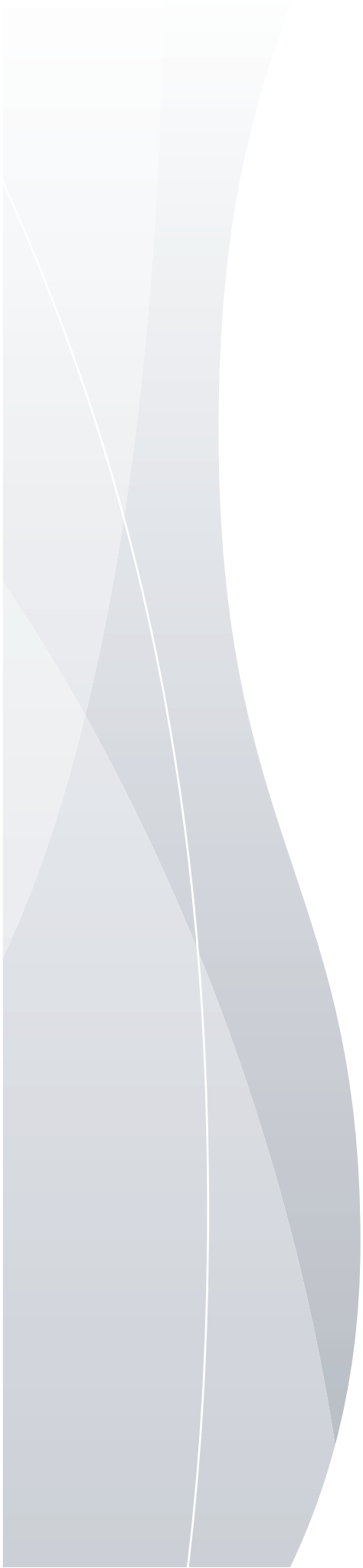

JAVA™ TECHNOLOGIES AND WEB SERVICES PLATFORMS

White Paper
August 2005

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Chapter 1

Overview

Perhaps one of the most successful technological concepts to emerge from the Internet age is Web services. Representing the logical evolution of system design, Web services are part of an ongoing trend towards decoupling and distributing system components, enabling each element to operate and evolve independently. Web services help optimize information technology (IT) investment, reduce the cost of creating new applications, and shorten development time, and can result in reduced time to market of new services while reducing total cost of ownership (TCO).

Web services are comprised of a set of technologies:

- The Simple Object Access Protocol (SOAP) provides a simple and lightweight mechanism for exchanging structured and typed information in the eXtensible Markup Language (XML) format.
- The Web Services Description Language (WSDL) is an XML format that describes the Web service and how to use it.
- Universal Description, Discovery, and Integration (UDDI) is a specification for distributed, Web-based information registries of Web services — a telephone book for Web services.

These standards enable interoperable, application-to-application communication over the Internet using standardized application programming interfaces (APIs). XML, which makes data portable, is a key technology in addressing this need. Enterprises have discovered the benefits of using XML for the integration of data — both internally for sharing legacy data among departments, and externally for sharing data with other enterprises.

Service-oriented architectures (SOAs) describe an architectural style or strategy. When built using Web services technology, SOAs are well-defined, loosely coupled, business-centric, reusable, shared services. A service can be accessed by any application or service with a SOAP interface. However, services are typically accessed by Business Process Execution Language (BPEL) engines, portals, or applications. Many companies are using the principles of an SOA to securely expose their business-to-business (B2B) services. This approach, which wraps a standard interface around legacy applications, enables businesses to quickly integrate essential data and information, such as accounting (for example, accounts payable and receivable), manufacturing (including traffic, scheduling, inventory, and finished goods) and so on.

The objective of this paper is to review Sun’s commitment to Web services and the relationship between Web services and Sun’s technology. This paper also reviews Sun’s product portfolio and strategic initiatives.

Chapter 2

Java™ Technology and Web Services

Sun has long been a proponent of open standards — Java™ technology is perhaps the leading example of this. Java technology is an open platform with extensive capabilities and a robust, global ecosystem of developers, vendors, and users. It has enabled businesses to develop portable business logic — Write Once, Run Anywhere™ — that frees enterprise applications and services from proprietary lock-in. It is an ideal complement to Web services.

Just as Java technology has decoupled the operating system from the application logic, Web services and SOAs decouple B2B integration from proprietary interfaces. Using these technologies, enterprises now can create open, standards-based applications and interfaces which are portable and interoperable — run and interoperate anywhere. The result greatly facilitates IT agility while leveraging existing infrastructure.

Java technology has embraced Web services. The Java platform provides the XML APIs and tools needed to quickly design, develop, test, and deploy Web services and clients that fully interoperate with other Web services. A community-driven standard, the Java Community Process (JCP℠) has established a number of Java standards in support of Web services.

Today's enterprises see Web services as a major driving force behind the next wave of application integration and business-to-business transactions. Sun is delivering solutions that make it possible to implement reliable Web services architectures more quickly by reducing complexity, resulting in significant cost savings.

Chapter 3

Sun Leadership in the Standards Community

While Sun is clearly influential in the standards community, there are four areas where Sun has had significant impact over the past year and will continue investment:

- Driving the evolution of Java 2 Platform, Enterprise Edition (J2EE™) technology
- Java Business Integration (JBI) — JSR 208
- Web services and Java for telecommunication and service providers
- Java and .Net interoperability for enterprise integration

Driving the Evolution of J2EE Technology

Since its successful introduction in 1999, the J2EE platform has become an integrated standard for implementing and deploying portable and distributed enterprise applications. One significant factor contributing to this success is that the J2EE platform has been designed through an open process, the Java Community Process (JCP). This open process has engaged a range of enterprise computing vendors to ensure that the platform meets the widest possible spectrum of enterprise application requirements. As a result, the J2EE platform addresses the core issues that impede organizations' efforts to maintain a competitive pace in the information economy. Organizations have recognized this and quickly adopted the J2EE platform standard.

With the introduction of the J2EE 1.4 specification, the platform has evolved further to accommodate the growing popularity and use of Web services. The platform has added support for Web service specific components and technologies including the Java API for XML Processing (JAXP), Java API for XML-based RPC (JAX-RPC), and other Web services and Java XML technologies. The Web services standards ensure interoperability across platforms and programming languages. Portability — the ability to migrate applications from one platform to another — is just as important. Significantly, the J2EE platform adds portability to Web services. By combining portability and interoperability, the J2EE platform is a compelling platform for developing distributed systems. This Web-service evolution of the J2EE platform has been achieved with the same open process as before, involving leading enterprise computing vendors. It has ensured that the J2EE platform is the platform of choice for developing and deploying portable and interoperable Web services and enterprise applications.

The J2EE platform has added its Web services features to a platform that has already standardized development and deployment of portable enterprise applications. With these new features, the J2EE platform offers enterprises these benefits:

- Enables existing enterprise applications to be extended as Web services in a manner that is standard, easy, portable, and interoperable
- Helps extend the reach of existing and new enterprise applications to a new set of clients beyond the already wide variety of clients supported by the earlier J2EE platforms
- Enables using commercially proven, robust technologies — such as Enterprise JavaBeans™ (EJB™), servlets, and so forth — as the backbone for developing new services
- Helps Enterprise Information Systems (EISs) to be available to end users in a portable way

Further work in the J2EE 5.0 specification will make the development of J2EE applications and Web services significantly easier, and the support for standards such as the Message Transmission Optimization Mechanism (MTOM) and SOAP 1.2 will provide better interoperability with Microsoft .Net.

As the J2EE 5.0 specification nears completion, work is starting on the reframing of J2EE technology to address emerging market requirements, to ensure that J2EE technology continues to be the Java Web services platform of choice.

Java Business Integration — JSR 208

Sun is driving the final Java Business Integration (JSR 208) specification, an initiative that Sun has chaired and led from inception. The standard was approved by the JCP on June 20, 2005 and Sun has already released a JBI developer preview.

JBI provides a standards-based architecture for integration solutions through a pluggable system for integration of services engines and component bindings. This enables the exchange and routing of XML business workflow and messages in a service-oriented, open standards, and extensible model. JBI will provide the foundation for implementing an SOA architecture. Sun plans to deliver its first JBI offering with the Sun Java Enterprise System 5.0, in the spring of 2006.

JBI also delivers the foundation for integration and SOA solutions. Specifically, it provides:

- A Composite Service Descriptor: A standard definition for an SOA application. JBI defines a standard document that describes in one place all the artifacts and services that make up an application in this environment.
- An extensible and adaptable platform for building integration and SOA solutions based on open industry standards
- A mechanism that enables collaboration between integration technology and services. This is done by a standard message router and message exchange patterns.

Sun is also creating an ecosystem around JBI and announced partner support for JBI at the JavaOne℠ Conference in 2005. (Please see www.sun.com/smi/Press/sunflash/2005-06/sunflash.20050627.2.html.)

Web Services and Java Technology for Telecommunication and Service Providers

Sun is involved in a number of initiatives with telco customers and partners to leverage J2EE and Java technology, Web services, and SOAs to solve complex infrastructure problems in an open and standard way. The complexity of the telecommunication industry makes it an ideal paving ground for the benefits of Web services and Java technology, because it offers security, scalability, and flexibility.

The first of those initiatives is the Open Source Software (OSS) through Java Initiative (OSS/J). The goals for Web services and OSS/J are very well aligned — the flexible interworking of heterogeneous, telecommunication business systems. Web services will enable service providers to make OSS services available to customers and business partners without major investments in client software and custom communication software. OSS/J will foster a component-based approach to development of OSS and element management systems (EMSs) using Java and Web services technology.

Sun has driven the adoption of J2EE technology as the underlying platform for OSS/J — this helps to ensure that risk and investment are shared with other industries, and drives the availability of a large pool of developers. Sun's application server is the default container for the OSS/J reference API, and Sun has invested in validating the APIs against each new version of the application server and new versions of the J2EE specification.

Sun is also applying a similar philosophy — leveraging mainstream enterprise technology, supported by commoditized middleware — to other areas of the OSS. For example, the Java System Portal Server and StarOffice™ suite have OSS/J plug-ins, so customers can quickly build presentation and reporting layers. The Java System Directory Server can be used for persistent storage of inventory management, while the Java System Identity Server can help with the security and personalization needed by next-generation network architectures.

The second area is IP Multimedia Subsystem (IMS). Sun is working with customers, partners, and other community stake holders through our involvement in the Open Mobile Alliance (OMA) to drive adoption of existing Java and Web services standards, augmented with additional open standards to address this emerging market.

Finally, Sun has been driving Web services into mobile platforms via the Java 2 Platform, Micro Edition (J2ME™) Web Services APIs (WSA) and provides a developer ecosystem through the J2ME Wireless Toolkit and NetBeans™ 4.1 Mobility Pack, which allow development and deployment of Web services clients to a broad range of mobile client devices.

Java and .Net Interoperability for Addressing Enterprise Integration

We recognize that most enterprises have heterogeneous platforms, which can cause integration challenges. Through Sun's strategic relationship with Microsoft, both companies are making a strong outreach to customers to identify key areas for points of interoperability between the Sun™ and .Net platforms.

Web Single Sign-On (SSO)

Sun and Microsoft have jointly developed and published two draft specifications: the Web Single Sign-On Metadata Exchange (SSP MEX) Protocol, and the Web Single Sign-On (SSO) Interoperability Profile. These new specifications enable browser-based Web SSO between security domains that use the Liberty Identity Federation Framework (ID-FF) and the Web Services Federation Language (WS-Federation). Products that support the Web SSO MEX Protocol and the Web SSO Interoperability Profile will enable companies to provide users with an improved Web SSO experience from their Web browsers.

WS-Management Specification

Sun and Microsoft are collaborating on systems management to enable deep interoperability between their operating systems and management products. As part of this effort, the companies are developing the WS-Management Web services specification, which is co-authored by Sun, Microsoft, Intel, and other vendors. It defines a single protocol to meet management requirements spanning hardware devices, operating systems, and applications. Sun will implement WS-Management in the Solaris™ 10 Operating System, management service processors in its x64-based Sun Fire™ servers, and the Sun N1™ management software tools to provide full systems management interoperability across Solaris and Microsoft Windows environments. In addition, Sun has created an implementation of WS-Management in the Java programming language that it plans to release to the open source community at www.java.net. In addition, WS-Management is a key component of the Microsoft Dynamic Systems Initiative, and is expected to ship as a standard part of Windows Server 2003, starting with R2.

Chapter 4

Advancing the Community and Ecosystem

Sun's Web services developer community is the Java developer. Sun continues to host some of the most popular Java, XML, and Web services properties on the Web.

As the industry steward for Java technology, and the company responsible for the vast majority of the engineering work (and expense) in developing and enhancing the Java platform, Sun has been very focused on empowering the Java developer for Web services. Over the past three years, Sun has built significant Web services capabilities into the J2EE and Java 2 Platform, Standard Edition (J2SE™) platforms, providing a host of new APIs that support XML and Web services. This work has been implemented in a way that ensures Java developers maintain the core value proposition of the Java platform related to portability and interoperability.

In addition, Sun was the first company to offer a J2EE-compliant application server as a free download for development, deployment, and redistribution, and is a leading contributor of technology and intellectual property to the Java open source community.

Over the past six months, Sun made the development of the Java and J2EE platforms more transparent (Peabody and GlassFish projects) with the goal of further enhancing our grassroots support and developer affinity. Peabody and GlassFish allow developers to easily access and build the source, and contribute fixes under a simple, flexible, non-tainting license, yet still be assured of compatibility.

For a comprehensive list of community collaboration initiatives that are driven by Sun, see Appendix 3.

Complementing its efforts to lower the bar for developers through open source options, Sun also provides a broad set of Web services developer content and programs to nearly a million developers through our paid Sun Developer Network subscription service including design patterns, interactive chat, early access software, and tutorials.

In addition to the Sun Developer Network services, Sun also offers a wide range of formal classroom training for Web services developers, ranging from entry level to advanced courses.

Chapter 5

A Complete Services Platform

Sun's fully integrated and standards compliant Web services platform includes these component products:

Web and Application Services

- Java System Application Server
- Java System Message Queue
- Java System Web Server
- Java System Web Proxy Server

Portal Services

- Java System Portal Server
- Java System Portal Mobile Access
- Java System Portal Secure Remote Access

Development Tools

- Java Studio Enterprise
- Java Studio Creator
- NetBeans

Identity Management Services

- Java System Access Manager
- Java System Directory Server Enterprise Edition
- Java System Identity Manager

Sun offers a number of pricing models for software:

- Standalone product: Perpetual pricing (such as $X per CPU)
- Suite subscription: $50 per employee per year, including support
- Java Enterprise System: $140 per employee per year, including support, maintenance, consulting, training, and education services

NOTE: Additional product and suite information is included in Appendix 1.

Web and Application Services

Java System Application Server

The Java System Application Server provides a complete platform for Web services: Java API for XML Processing (JAXP), Java API for XML Registries (JAXR), Java API for XML-based RPC (JAX-RPC), and support for the Web Services Interoperability (WS-I) Basic Profile 1.0 to ensure interoperability with other Web services platforms. The core Web services and XML technologies are provided through integration with Sun's Java Web Services Developer Pack (WSDP).

- Fully J2EE 1.4 compatible, the Java System Application Server is targeted as a container for complex Web services — such as those requiring sophisticated database, or enterprise information system access — that are implemented as servlets or EJB.
- Tight integration with NetBeans, Java Studio Creator, and Java Studio Enterprise (as well as support for Eclipse and Borland JBuilder) make the Java System Application Server a highly productive and flexible development platform. The robust and highly scalable HTTP engine makes it an extremely cost-effective deployment platform.

Java System Web Server

The Java WSDP is a common component of the Java Enterprise System and is fully supported in the Java System Web Server. The Java System Web Server is also suitable as a runtime container for Web-tier deployment of Web services — though typically aimed at services that require simpler database interactions via Plain Old Java Objects (POJOs) exposed via J2EE servlet-based end points.

The Java System Web Server is also a powerful and highly secure container for non Java Web services deployments — for example, using Hypertext Preprocessor (PHP5) Web services.

Portal Services

The presentation of Sun's Web services platform is delivered through the Java System Portal Server. It provides all the key services required to build compelling portals, including aggregation, presentation, security, personalization, search, integration, and centralized identity services for managing user policy and security. Sun believes the following standards are critical to making the portal an integrated component to the Web services platform.

- JSR 168: The Java standard for "portable" portlets, it enables reuse of portlets across different portal vendors. Sun was co-lead and specification author, and developed the Technology Compatibility Kit (TCK).
- Web Services for Remote Portlets (WSRP): OASIS Web services standard to enable portlets to be used as remote services. As the co-lead of JSR 168 and participant of WSRP, Sun was instrumental in driving the alignment of JSR 168 and WSRP 1.0 to facilitate faster adoption of the standards and ease ISV integration through better portability. Sun is also contributing to WSRP 2.0 (expected to be approved later this year) and is excited about the new coordination mechanism (such as inter-portlet eventing) being introduced. This specification will allow coordination of aggregated, remote WSRP services and the assembly of the composite applications at the visual layer. Sun is one of only a few vendors that provide a complete implementation of WSRP 1.0.

- The Java System Portal Server also provides built-in support, via a specialized Provider, for consuming data-oriented Web services by automatically generating user interfaces that allow the end user to interact with those services. This allows the consumption of Web services that are not inherently visual in nature (such as WSRP services). Another approach to consuming data Web services is to create Web service clients as portlets, using Sun's tools and deploying them onto the Java System Portal Server — taking advantage of the underlying, industry-leading Java Web services stack.
- Liberty: Java System Portal Server has supported Liberty ID-FF for more than two years. Sun plans to incorporate support for the Liberty Identity Web Services Framework (ID-WSF) to the WSRP implementation in a future release. This will enable Sun to achieve the true notion of federated portals involving both content and identity federation.

Sun authored the Publish/Find/Bind Technical Note for Electronic Business Extensible Markup Language (ebXML) Registries published by the WSRP Technical Committee (TC). Based on the tech note, Sun will be providing capability to integrate with ebXML registries in the next Java System Portal Server release, expected in the fall of 2005.

Highlights

- Early to market with a production-quality application server supporting WS-I Basic Profile
- Fastest Web services (PushToTest, Network Computing — 2002, 2003, 2004)
- Early to market with product-ready JSR 168 (Portlet Specification) support (Fall 2003)
- Early to market with complete WSRP consumer and producer support (Summer 2004)
- Early to market with support for Liberty ID-FF
- Early to market with WS-Security implementation (Fall 2004)
- Java System Portal Server (Leader's Quadrant in Gartner Horizontal Portal Products Magic Quadrant, 2005. Authors: Gene Phifer, Ray Valdes, David Gootzit, Kim S. Underwood, Laurie F. Wurster)
- Future integration of WSRP and Registries

Developer Tools

For product details, see Appendix 1.

- NetBeans 4.1 is the first complete J2EE 1.4 development platform with full support for Web services, and also includes the NetBeans Mobility Pack for deploying Web services clients to a large array of mobile devices via the J2ME Web services API (JSR 172).
- Web services support for service providers, enabling developers to build secure, reliable, interoperable services and publish those services to a UDDI or ebXML registry. Provides full Java API for XML functionality and support for SOAP, WSDL, and UDDI.
- J2EE 1.4 SDK includes the J2EE 1.4 runtime (Java System Application Server Platform Edition 8.1), documentation, samples, and blueprint applications aimed at developers who need to get up to speed quickly developing J2EE applications and Web services.
- Java Application Verification Kit (AVK) for the enterprise is available to help developers test applications for correct use of J2EE 1.4 APIs, and maintain portability across J2EE compatible application servers. The AVK includes more than 400 assertions, of which 50 are specific to enterprise Web services (JSR 109).
- Java WSDP provides a complete development and deployment environment for Web services, with the current version providing added support for WSS, XML encryption, and Digital Signature initiative (DSIG).

- Rich Web services tooling available in the Java Studio Enterprise and Creator enables developers to build their own clients to interact with Web services, and plug them into the Java System Portal Server. Creator will be previewing a new release of the JSR 168-based Portlet Builder in the JavaOne 2005 timeframe.
- Java Web Services Tutorial provides a comprehensive guide to developing Web services applications with the Java language.
- Java Blueprints Solutions Catalog is a comprehensive online catalog of guidelines, patterns, and code for building real-world applications and services with the J2EE 1.4 platform. Includes more than 50 solutions for Web services, SOAs, and Asynchronous JavaScript™ + XML (AJAX).
- Java Business Integration (JSR 208) Tech Preview (released May 2005) provides developers with early access to the technology implementation of the JBI specification to better understand how they can benefit from this new Java specification within SOA projects.

Highlights

- Java WSDP rated #1 Web services toolkit for Java Developers (Evans Data, March 2004)
- Java WSDP awarded Web Services Tool of the Year (developer.com, 2005)
- Java Studio Creator named Java Tool of the Year (developer.com, 2005)
- Java Studio Enterprise wins eWeek Excellence Award (April 2005)
- Nearly three million downloads of Java System Application Server 8.1 Platform Edition, including the J2EE 1.4 SDK
- Java Business Integration (JSR 208) Tech Preview, released May 2005

Identity Management Services

Sun's Identity Services Platform provides a coordinated, integrated set of services driven specifically by identity. All of Sun's identity management products work together, using integrated components and open standards, to create a common definition of identity and regularizing the application of identity throughout a company's environment.

- First, the platform provides a centralized way of creating unique identities and managing those identities throughout their life cycle. This includes synchronizing identities between existing data stores, creating new identities, and identifying unique keys that help map distributed identities to one another, and subsequently to policies and roles.
- Second, the platform provides policy services — how to create new user accounts, authenticate users, and authorize access — that map to the company's existing business processes. Policies are organic, like organizational structures, and therefore have many sources, some of which may not be digital. The platform's policy services incorporate and repurpose existing policies for general use.
- Third, the platform provides auditing services to create a centralized, coordinated tracking system (such as what people are using your applications, and how) that verifies compliance to internal auditors and regulators.
- Finally, the platform provides federated identity services, which create a standards-based, reusable mechanism for sharing identities, policies, and management capabilities with partners or other service providers outside the network boundaries.

Sun's Identity Services Platform delivers identity as a service to all applications in an environment, regardless of platform, data store, or application capabilities. Identity is provided in a consistent, reusable way for all applications to use in order to make important decisions about what functions users can perform, when users can perform them, and how to track those activities in a coordinated and meaningful way.

Highlights

- Support for message-level security: encryption, digital signing, secure messaging — WSS, Extensible Markup Language Digital Signature (XMLDsig), XML Encryption, SSL, and HTTP Secure (HTTPS)
- Support for service-level security: single sign-on, identity management, user management, authentication, authorization, federated Identity — Security Assertions Markup Language (SAML), Services Provisioning Markup Language (SPML), Lightweight Directory Access Protocol (LDAP), and Kerberos
- Support for Liberty-enabled Web services — ID-WSF, ID-FF, and Identity Service Interface Specifications (ID-SIS)

Chapter 6

Conclusion

Web services and SOAs are defined as a means of enabling applications to communicate data without intimate knowledge of each other's IT systems through Web servers or other Web-connected programs. They can be the heart of your enterprise's profitability and competitiveness — they not only deliver value and productivity today, but also prepare your IT infrastructure for tomorrow. Web services can help you quickly and efficiently develop new business processes, while driving the creation of new economic models.

Chapter 7
Appendix

Appendix 1 — Additional Information

Web and Application Services

Java System Application Server: sun.com/software/products/appsrvr

Java System Web Server: sun.com/software/products/web_srvr

“Fast Web Services” article: java.sun.com/developer/technicalArticles/WebServices/fastWS/

Portal Services

Java System Portal Server: sun.com/software/products/portal_srvr

Developer Tools

NetBeans: netbeans.org

Java Studio Creator: sun.com/software/products/jscreator/index.xml

Java Studio Enterprise: developers.sun.com/prodtech/javatools/jsenterprise/index.html

Java Web Services Developer Pack: java.sun.com/webservices/jwsdp/index.jsp

Java Technology and Web Services: java.sun.com/webservices/jwsdp

J2EE 1.4 SDK: java.sun.com/j2ee/1.4/download.html#sdk/

J2EE 1.4 Application Verification Kit: java.sun.com/j2ee/avk/

Java Blueprints Solution Catalogue: bpcatalog.dev.java.net/nonav/solutions.html

Sun Java Studio Enterprise 7: sun.com/software/products/jsenterprise/index.xml

Identity Management Services

Java System Identity Manager: sun.com/software/products/identity_mgr/index.xml

Java System Access Manager: sun.com/software/products/access_mgr

Java System Directory Server: sun.com/software/products/directory_srvr/home_directory.xml

Java System Identity Management Suite: sun.com/software/javaenterprisesystem/compare.xml

Telecommunication Initiatives

"OSS Through Java Web Services Integration Profile (WSIP)" white paper: www.ossj.org/learning/docs/wp_ossj_wsip.pdf

J2ME Web Services APIs: java.sun.com/products/wsa/

Service-Oriented Architectures

"Assessing Your SOA Readiness" white paper: www.sun.com/software/whitepapers/webservices/soa_ready.pdf

Java BluePrints for Service Oriented Architecture: java.sun.com/developer/community/chat/JavaLive/2004/jl0914.html

Appendix 2 — Leadership in Standards

Executive Standards Participation

Member of the OASIS Board of Directors for seven years

WS-I board of directors

W3C Advisory Member

Web Service Standards Participation

Standard	Involvement	Organization
Business Process Execution Language (BPEL)	Specification co-submitter	OASIS
ebXML Collaborative Profile Protocol & Agreement (CPPA	Contributor	OASIS
ebXML Message Service (ebMS)	Past Editor	OASIS
ebXML Business Process (ebBP)	TC chair	OASIS
ebXML Registry/Repository (ebRR) Specification	Editor, past TC chair	OASIS
UBL	TC chair	OASIS
Open Office XML Format	TC chair, co-submitter	OASIS
Relax	TC member	OASIS
SAML	Original TC chair, co-submitter	OASIS
Services Provisioning Markup Language	Co-chair	OASIS
Universal Business Language (UBL)	TC chair, co-submitter	OASIS
WA Composite Application Framework (WS-CAF)	Co-submitter	OASIS

Standard	Involvement	Organization
WS Distributed Management (WSDM)	Co-submitter	OASIS
WS Reliable Messaging (WSRM)	Co-submitter, secretary	OASIS
WS for Remote Portlets (WSRP)	Contributor	OASIS
WS Security (WSS)	Specification editor, voting member	OASIS
WS Addressing	Contributor	W3C
WS Choreography	Contributor	W3C
WS Description Language (WSDL)	Principal contributor	W3C
XML	Chair, founder of the XML WG	W3C
XML Digital Signature	Contributor	W3C
XML Encryption	Contributor	W3C
XML Schema	Contributor	W3C
XML Core	WG chair	W3C
XML Protocol (messaging)	Spec editor	W3C
XML Forms	Contributor	W3C
XML Key Management (XKMS)	WG chair	W3C
ID-WSF Specification	Contributor	Liberty
ID-FF Specification	Contributor	Liberty
HL7	Organizational member	HL7
OMA Mobile Web Services	Vice chair	OMA

Appendix 3 — Advancing the Community

Through the java.net communities, Apache, and SourceForge, Sun has contributed the following Web services technologies to the community:

Project	Description	Further Reading
Peabody	Provides weekly snapshots of the Java SE 5.0 and 6.0 source code. Buildable source, easy to use, non-tainting license. Community contribution.	http://community.java.net/jdk
Glassfish	Provides weekly snapshots of the Java EE 5.0 source code. Buildable source, easy to use, non-tainting license. Community contribution.	http://glassfish.dev.java.net
NetBeans	Free, open-source Java IDE and platform and thriving community with more than five million downloads of the NetBeans IDE to date, and over 100,000 participating developers	netbeans.org
Fast Infoset (FI	An open source (ASL 2.0) production-quality implementation of the open ISO/ITU-T Fast Infoset standard for binary encoding of XML. Used by Sun products and others, including the Web3D consortium.	http://fi.dev.java.net
Java WSDP	Integrated community-developed projects providing production-quality implementations for all the key Web services and XML APIs in the Java Platform. Licensed under ASL 2.0, JRL, and JDL.	http://jwsdp.dev.java.net
XACML	An open source implementation of the OASIS Extensible Access Control Markup Language	http://sunxacml.sourceforge.net
ebXML Registry	freebXML Registry — Sun-led open source project to deliver a functionally complete reference implementation of the OASIS ebXML Registry specifications.	http://ebxmlrr.sourceforge.net/
Apache JAXP	Contribution of JAXP 1.3 implementation to Xerces and Xalan projects	http://apache.org
Apache XML Security	Participation in the Java XML Security implementation	http://apache.org

Appendix 4—Sun Web Services Platform Successes

Customers who are successfully using Web services and the Java Enterprise System can be found at:
sun.com/software/javaenterprisesystem/case_studies.xml
sun.com/software/products/portal_srvr/sabreholdings_emergo_portal.pdf

Sun Microsystems, Inc. 4150 Network Circle, Santa Clara, CA 95054 USA **Phone** 1-650-960-1300 or 1-800-555-9SUN **Web** sun.com