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IBM WebSphere AS V4 Web Services Deployment Environment

WebSphere Application Server V4 Provides Highly Scalable and Manageable Production Web Services

By Susan E. Aldrich

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NETTING IT OUT

Customers are demanding, and suppliers are encouraging, companies to make business processes more flexible. Web Services is the newest technology on the scene to ease the shift to adaptive business processes.

IBM is the leader in encouraging, enabling, and employing Web Services. IBM WebSphere Application Server (AS) V4, the leading J2EE application server in the mid- to high-end server market, is IBM's primary Web Services deployment environment. WebSphere AS also provides Web Services Infrastructure Services and business process choreography support for Adaptive Business Process Environments. WebSphere V4 is the currently shipping version. We will evaluate the features of the next release, V5, in a separate report.

The strengths of WebSphere AS are its reliability, manageability, scalability, and performance; its leading market share (34 percent); IBM's leadership in Web Services technology and architecture definition; the commitment of partners; and the availability of IBM Global Services. On the downside, IBM has not been able to simplify this feature-rich product, nor does it seem plausible that it will. WebSphere AS is complicated to install, which puts the cost of WebSphere AS Web Services out of range for small companies. Also, despite the unity of the brand, the WebSphere product family is not yet integrated into a seamless collection.

But we're betting IBM dominates the mid-range to high-end Web Services deployment arena for the next year. Why? IBM is into Web Services early and highly effectively. WebSphere's market position is very strong. The result will be that partners and customers will continue to place their chips on the IBM pile at an accelerating rate.

CONNECTING RELATIONSHIPS

Linking Stovepipes with Web Services

Web Services architectures and standards present an opportunity to resolve intractable and persistent problems that hamper business relationships. These problems actually arise from great success: enterprises have achieved highly-efficient and automated processes.

Unfortunately, these processes aren't very adaptable. Companies need to respond quickly and reliably to special requests from customers and to special offers from suppliers. Business processes need customized tweaks for various situations, customers, suppliers, and changes in the market place. Business processes need to interact automatically across organization and enterprise boundaries. The technology challenge lies in creating adaptive business processes from stove-piped, incompatible, and isolated systems.

Much of the Web Services attention to date has been focused on development environments. We don't believe that development tools will, in the long run, be the battle ground for Web Services leader-

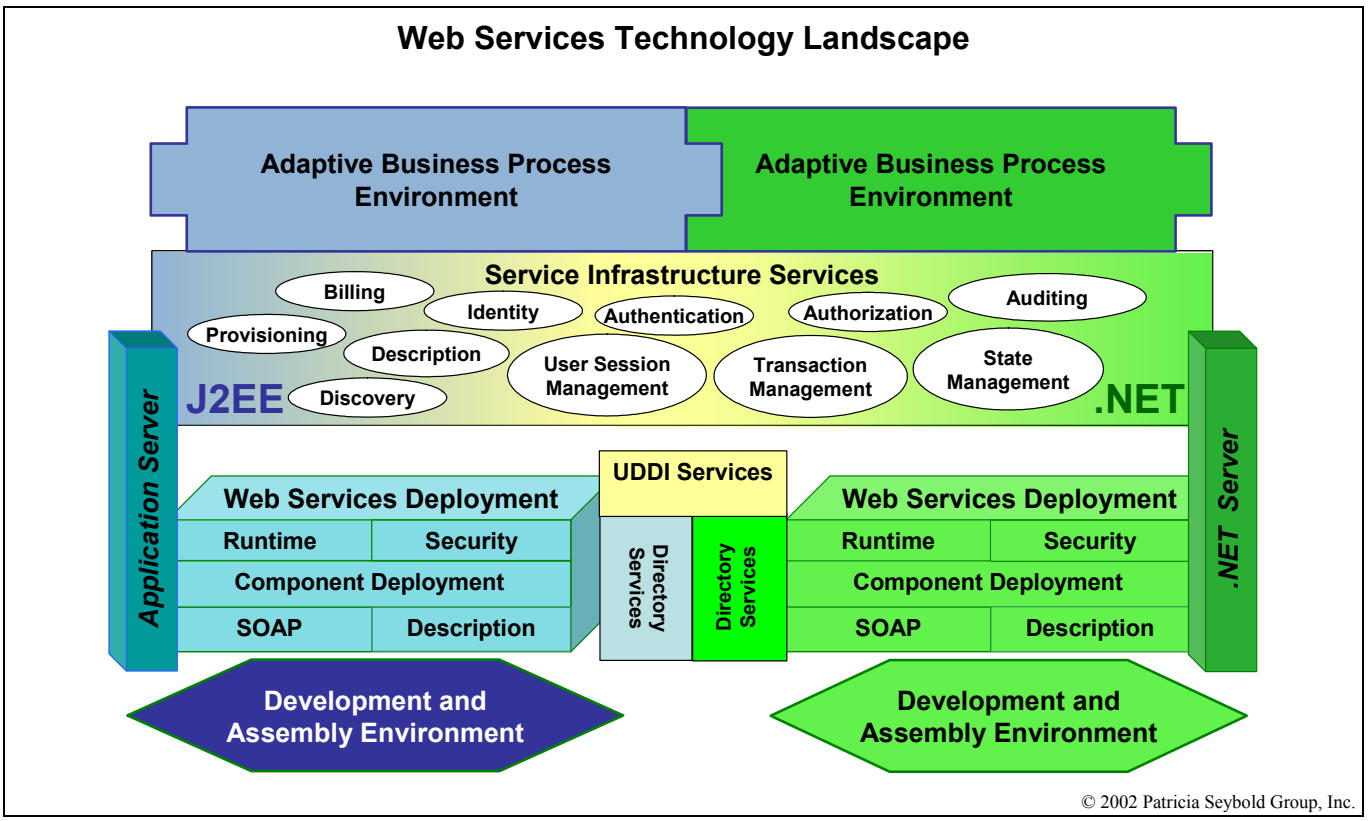

Illustration 1. The landscape for Web Services includes a range of technologies, spanning both the service requestor's environment and the service provider's environment. In this diagram, the requestor application runs in a .NET environment, and the provider's application runs in a Java environment.

ship. Leading development tools will expand to incorporate Web Services, and Web Services capabilities alone are unlikely to drive the IDE decision. Ultimately, Web Services budgets will flow to the vendors with the best deployment environment. The best deployment environments will offer and support the most valuable Web Services infrastructure services and the best tools for creating and managing adaptive business processes.

For this reason, we are currently focusing our attention on Web Services deployment environments and the Web Services Infrastructure Services embedded in them.

WEB SERVICES DEPLOYMENT ENVIRONMENTS

Web-Services Technology Categories

Generally speaking, the Web-services technologies you'll be considering include development and assembly environments, deployment environments, directories, Web Service Infrastructure Services, and adaptive business process environments. Service Infrastructure Services are common services that support secure and reliable Web Services and may be provided as separate products, separate Services, embedded in application servers, embedded in platforms, or provided by adaptive business process solutions.

Our landscape of the Web-Services space is presented in Illustration 1.

These aren't exactly product categories yet, but more of a continuum. In other words, the Web-Services market has not yet agreed upon what should be expected from a deployment environment product, orchestration product, or business process management product.

What Is a Web-Services Deployment Environment?

In our view, a Web-Services deployment environment has the following responsibilities:

- **Component Deployment.** Provide tools that will expose existing application parts (components, programs, and objects) as Web Services. This includes creating WSDL, the wrapper, and the SOAP interface for each Web Service as well as listing the Service on a UDDI registry or other directory.
- **WSDL and XML Schema Support.** Provide descriptions of all deployed Web Services for potential clients and support the XML data typing system.
- **SOAP Support.** Provide, or integrate with, a SOAP service that manages the sending, routing, and receiving of SOAP messages; XML-to-language type mapping; application invocation; and propagation of error messages.
- **Runtime.** Provide an application runtime environment for Web Services with configuration and life-cycle management, provide fault tolerance and recovery, log, trace, and enable performance tuning of active environment.
- **Security.** Provide runtime services for providers and requestors to verify authentication, proof of origin, message integrity, and message privacy.

IBM AND WEB SERVICES

IBM

IBM, founded in 1911, is the largest IT supplier in the world with 2001 revenues of $85.9 billion. Of that total, services comprised $35 billion, hardware $33 billion, and software $13 billion. First quarter IBM 2002 revenues were $18.1 billion, a decrease of 9 percent from same period 2001, satisfactory results in a painful year for high tech.

IBM WebSphere and Web Services

IBM WebSphere Application Server (AS), the leading J2EE application server, is IBM's primary Web Services deployment environment. WebSphere AS provides Web Services runtime, security, SOAP server, and client services; UDDI, WSDL, and XML support; and enables component deployment. WebSphere AS also provides Web Services Infrastructure Services and choreography support for Adaptive Business Process Environments. See Illustration 2.

While it's true that WebSphere AS runs on Windows platforms, and provides interoperability services for CORBA and COM, the Web Services and applications that WebSphere AS supports are Java-based. WebSphere AS does not provide COM and .NET runtime environments. For that reason, we depict WebSphere as supporting only the Java side of our Web Services Landscape.

Goals for Web Services

IBM aims to provide enterprise-quality Web Services through its WebSphere family of products. IBM expects Web Services to be a key contributor to IBM's current and future software technology leadership. Web Services already permeate IBM's four software brands: WebSphere, Lotus, Tivoli, and DB2.

Opportunities in Web Services

Web Services also round out IBM's portfolio of integration technology offerings, which cover messaging and publish/subscribe middleware as well as EAI. Even more importantly, they provide an open, standardized, mechanism IBM can employ to evolve its software collection into an open, standardized, integrated platform. Moreover, being an unfamiliar, hot, and valuable new technology, Web Services are likely to drive considerable demand for IBM Global Services.

Customers see Web Services as providing simpler and more flexible access to the capabilities of these IBM products as well as to corporate and trading partner application portfolios.

What's not to love about Web Services?

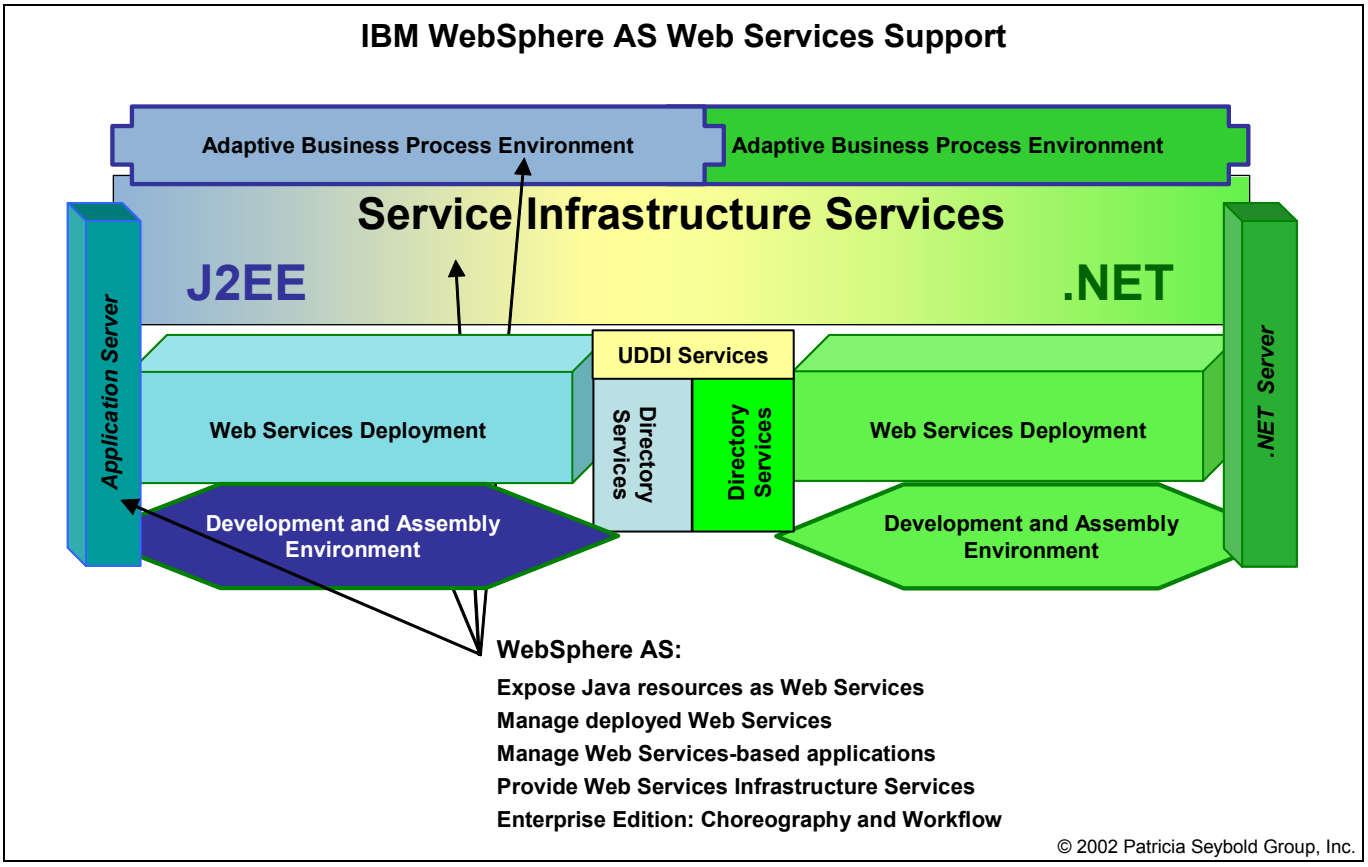

Illustration 2. WebSphere AS provides Web Services runtime, security, SOAP server, and client services; UDDI, WSDL, and XML support; and enables component deployment. WebSphere AS also provides Web Services Infrastructure Services and choreography support for Adaptive Business Process Environments.

Scope of Web Services Contributions

IBM seized upon Web Services early and exuberantly, getting in on the ground floor for this new technology wave. IBM learned how to achieve commercial success with both Java and Linux by participating in development of standards, open systems, and shareware. Currently, 3,800 IBM employees participate in 200 standards organizations. IBM has been a significant contributor to Java, including J2EE, the connector architecture (JCA), RMI-IIOP, the EJB Specification, Java Foundation Classes, JDBC, JMS, JMX, and JavaBeans Component Assembly Specification.

In the Web Services arena, IBM has been a significant contributor to the specification and reference implementations of the Web Services technologies—even setting aside historic OS/2-engendered rancor to work closely with Microsoft.

IBM's investments in and contributions to Web Services development include:

- Chair of XML Protocol working group in W3C
- Chair of the Web Services Coordination Group in W3C
- Co-author of SOAP and WSDL specifications
- Co-author of WS-Security and a Web Services security roadmap
- Contributed SOAP4J to Apache open source project, now known as the Axis project
- Contributed reference implementations of UDDI, WSDL, and SOAP to Apache
- Leader in creating UDDI project

- Hosts UDDI Business Registry beta
- Founded Web Services Interoperability Organization (WS-I.org), an open industry organization chartered to promote Web Services interoperability across platforms, operating systems, and programming languages

WEBSPHERE APPLICATION SERVER

WebSphere AS was first released in 1999, and has so far clocked 12 consecutive quarters of revenue growth. Currently, the WebSphere product family has 50,000 customers. IBM has certified more than 6,000 partner personnel for selling and implementing WebSphere products. WebSphere AS has integration hooks to key IBM products including DB2, Tivoli, and WebSphere MQ, as well as hundreds of ISV solutions.

WebSphere Product Family

Customers want a single, integrated, highly reliable platform for modern applications that will connect solidly with key infrastructure elements, delivered via open standards. WebSphere is IBM's response to these customers, and the cornerstone of IBM's bid for long term software market leadership.

Partly because of the success of the WebSphere brand, there are over six dozen products in the WebSphere family. This causes customers to complain about the confusing number of products sporting the WebSphere brand, and wondering how the newest WebSphere product relates to an old favorite from pre-WebSphere days. IBM's strategic goals for the WebSphere product family are to achieve leadership in business integration; establish WebSphere as the heart of world class open services infrastructure; and support deployment of secure, manageable Web Services that reuse existing applications and data. WebSphere AS is the center of the WebSphere family. See Illustration 3.

In 2001, IBM committed US$1 billion worldwide in WebSphere, its integrated electronic commerce (e-commerce) software, and associated development, marketing, and partners.

WebSphere Editions

WebSphere AS V4, the current release and the 2nd to support Web Services, achieves production-level support for Web Services deployments. All WebSphere Application Server V4 editions support Web Services. WebSphere AS V4, currently available, is offered in four editions:

- WebSphere AS Advanced Edition Single Server Option. Simplified implementation where application server and administrative server share a single JVM.
- WebSphere AS Advanced Edition. Targeted for highly scalable environments; supports multiple and distributed servers, clustering and cloning, and DB2 for repository. Use this for volumes in the range of hundreds to thousands of transactions per second.
- WebSphere AS Enterprise Edition. Targeted for large- and very-large- scale environments; provides distribution application interoperability; provides work-area support for CORBA and COM interoperability and business process choreography; use this for volumes in the range of thousands to tens of thousands of transactions per second.
- WebSphere AS for z/OS. Targeted for enterprise customers using zSeries hardware and z/OS software.

WebSphere Edge Server is a separate product in V4, but merges into the standard edition in V5. WebSphere Studio is a development environment with tools for Web Services development, assembly, and publishing. We will be analyzing WebSphere Studio in a separate Report on Development and Assembly environments.

There are 73 WebSphere products listed on IBM's Web site, not counting editions and versions. Key WebSphere product *groups* include WebSphere Business Integrator, WebSphere Personalization, WebSphere Portal Family, WebSphere Commerce Server and WebSphere MQ. WebSphere Commerce Server shares the WebSphere AS code base.

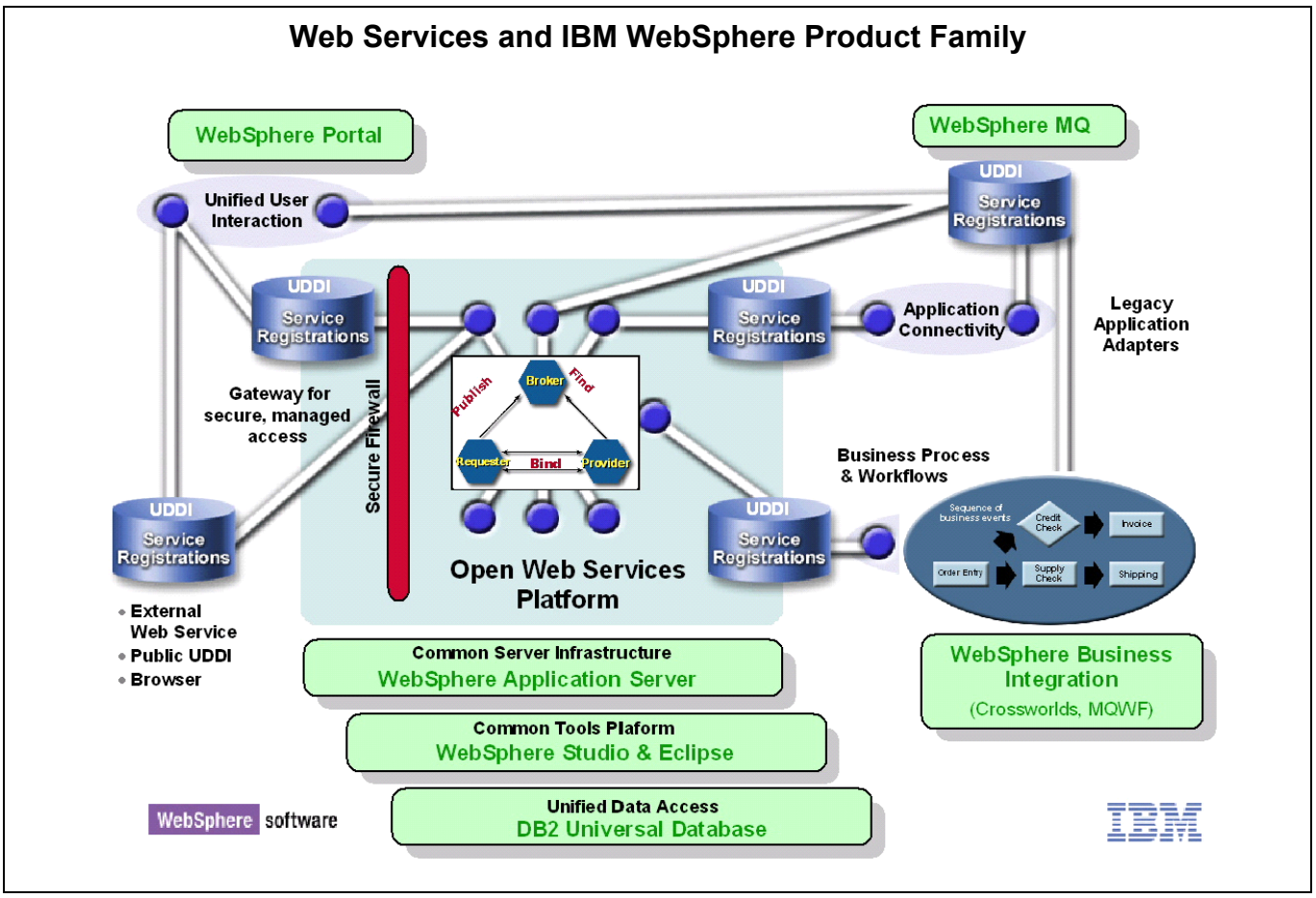

Illustration 3. IBM places WebSphere AS at the center of the IBM Web Services story.

WEBSPHERE APPLICATION SERVER FEATURES AND FUNCTIONS

The focus of this report on the WebSphere Web Services deployment environment is WebSphere AS Advanced Edition V4, the current version. V5 was announced May 8 for delivery in 3Q 2002, and will be the focus of a later report.

IBM WebSphere will be the top J2EE-based Web Services deployment environment for at least the next year. It will take at least that long for other vendors to catch up with IBM's lead, if they can. The differentiating features of IBM's WebSphere Web Services deployment environment are as follows:

- WebSphere's reliability, manageability, scalability, and performance
- WebSphere's increasing integration with IBM infrastructure and platform solutions
- IBM's leadership in Web Services technology and architecture definition
- Commitment of partners
- IBM Global Services

A summary of WebSphere AS V4 Web Services deployment features is presented in Table A.

Key Web Services Deployment Features in WebSphere V4

Web Services Deployment Environment Function	V4 Differentiators
Development Tools	• WebSphere Studio • Eclipse • Developerworks and alphaworks Web sites and communities
Component Deployment	• Deploy DB2 stored procedures as Web Services • Expose Web Services through portal
Description	• Does not automatically generate WSDL—use toolkit or WebSphere Studio or other IDE • UDDI for Java client library and tools
SOAP	• Apache Soap V2.2
Runtime Engine	• Reliability, manageability, scalability of WebSphere • Administrative Domains • Server groups, cloning, and virtual hosts • Performance Management Interface • Programmatic access to configuration data • Integration with MQ messaging infrastructure
Security	• Basic SOAP security • Authentication policies and services • Authorization policies and services • Delegation and trust policies • Single sign-on • Encrypted password storage
Performance	• Leading industry benchmark, both in scale and price.
Environment/Configuration	• Clustering for performance, scalability, and failover • Heterogeneous platform support
Packaging	• WebSphere Application Server Advanced Single Server Edition • WebSphere Application Server Advanced • WebSphere Application Server Enterprise Edition • WebSphere Application Server for z/OS, WebSphere • Edge Server

Table A. This table summarizes key WebSphere AS features in each of the requirements areas.

Component Deployment

With WebSphere AS, any resource can be exposed as a Web Service. This includes DB2 stored procedures, which creates a very straightforward way to link these newer applications with data-level integrations you've already built.

WebSphere AS V4 does not include tools for generating WSDL or automatically generating the client proxy for consuming a Web Service. These services are available in WebSphere Studio. They are also provided in Web Services Tool Kit (WSKT), available as a free download. Other J2EE deployment environments embed these capabilities, but the tools are readily available, so we don't see this as a deficiency.

SOAP, WSDL, XML, and UDDI

Support for Web Services standards isn't the requirements arena that invites differentiation; happily, IBM sticks to the standards. IBM leverages its Apache contributions by incorporating Apache technologies for SOAP and XML. IBM has also invested in improving XML parser performance and in providing tools for connecting Java to XML and UDDI. Standards support is summarized in Table B.

Standards and Extensibility

Protocol Stack	V4 Support	API/Plug-In
Web Services Transport	HTTP, HTTPS, JMS, SMTP, IMAP, POP3, IBM WebSphere MQ messaging	Yes
XML Messaging	SOAP 1.1 compliant stack XML Schema 1999/2000/2001	Yes
Web Services Description	WSDL 1.1	No
Web Services Discovery	UDDI 1.0	No

Table B. WebSphere AS supports Web Services standards.

SOAP. WebSphere AS incorporates Apache Soap V2.2, a Java-based implementation of the SOAP 1.1 specification, including support for attachments. No other versions of SOAP are supported.

XML. WebSphere AS includes Apache XML4J, a JAXP-compatible name-space-aware parser for Version 3.1 XML, which is required for Apache SOAP. WebSphere AS also incorporates XML-based transformation tools.

WSDL. WebSphere AS supports WSDL Version 1.1.

UDDI. WebSphere supports UDDI Version 1.0. WebSphere AS provides UDDI4J, a Java API for the UDDI registry. WebSphere AS V4.0 does not include a private UDDI registry. This is available as a free download from the WebSphere Developer Domain.

Runtime Engine

A Web Services runtime engine is a Web Service container responsible for processing SOAP messages and converting them into application invocations and vice versa. In the process, the runtime engine maps language types to XML types and XML types to language types, it dispatches requests, it processes and propagates exceptions, and it manages the applications under its control.

RELIABILITY, MANAGEABILITY, SCALABILITY. IBM WebSphere AS runtime strengths are its reliability, scalability, and manageability. IBM's decades of experience in building highly-reliable and manageable operating systems have clearly been applied in WebSphere AS.

MANAGEMENT FOR SCALE. Practically speaking, scalability requires a special set of management functions, designed to operate on collections of resources and to make reproducing a set of configuration attributes foolproof.

WebSphere AS has several features that make it possible to manage collections of servers, control the number of configuration variations the operations staff has to deal with, and make it easier to deploy or redeploy servers.

Structurally, WebSphere AS uses a construct called virtual host. This is a configuration that allows a single machine to support independently configured and administered applications. The server group construct provides a template for creating clones that carry identical structure and attributes. Finally, WebSphere configuration data in the administrative repository can be accessed and updated programmatically, so error prone manual configuration tasks can be eliminated.

WebSphere AS provides management interfaces via an Administrative Domain comprised of a server, Web and Java GUI consoles, a repository, and command processing for managing XML configuration and WebSphere control programs.

WebSphere AS incorporates a framework for thorough gathering, delivering, processing, and displaying of performance data, called Performance Monitoring Infrastructure (PMI).

Finally, WebSphere AS provides a distributed debugger and trace facility that extend the otherwise limited capabilities built into SOAP.

MESSAGING FEATURES. Another WebSphere AS Web Services runtime differentiator is integration with the WebSphere MQ messaging infrastructure, enabling WebSphere deployed applications to send, transform, and route messages via the highly reliable MQ messaging.

Security

Security is provided at several levels in the technology stack before WebSphere and Web Services security come into play. WebSphere AS rests on a stack of security standards and services, including operating system, Java, and J2EE.

In the Web Services arena, WebSphere AS provides basic SOAP security support, which includes authentication, asymmetric secure sockets layers, SOAP digital signature, and symmetric HTTPS. These features have the effect of protecting message integrity and enabling Web Service clients and servers to exchange credentials.

In addition to basic SOAP security support, WebSphere AS provides security features, including authentication policies and services, authorization policies and services, delegation policies, trust policies single sign-on support, and password encoding in configuration files.

WebSphere AS V4 provides authorization control at the application or Web Services levels for methods within a Web Service. This high degree of granularity makes it more feasible to use existing resources as Web Services because you control which methods are exposed.

WebSphere AS does not support GSS-API, a standard for end-to-end authentication and authorization services.

ARCHITECTURE

Organization

The key components of WebSphere AS include the Administrative Domain, an embedded HTTP server, Application Server JVM, and Web and EJB containers. See Illustration 4.

Structure

With V4, WebSphere AS shifted to a single J2EE-compatible code base supporting all editions. The V4 architecture is not modular: modularity is introduced in V5. Features themselves are constructed, as much as possible, as Services within WebSphere.

Performance

WebSphere is built to support large- and very-large volume processing. Visa, a WebSphere customer, processes tens of thousands of transactions per second on WebSphere platforms. Those are not Web Services transactions, but they are an indicator of WebSphere's scalability.

We've already discussed the critical contribution WebSphere management capabilities make to scalability. Another dimension of WebSphere scalability is provided by features such as workload balancing through a single-system image across clusters. Another key contributor to scalability is a tunable and performance-balanced environment. Industry benchmarks serve as a measure of not only raw power, but the extensibility of the deployment environment.

IBM has scored the latest coup in the benchmark wars, doubling the ECPerf benchmark throughput in April, 2002. ECPerf is an EJB-based benchmark developed by a consortium that includes ATG, Ascential, BEA, HP, IBM, Iona, iPlanet, Macromedia, Oracle, Pramati, Sun, and Sybase. Benchmark measurements can be performed by any organization, but, before being published, the results must be submitted to and reviewed by the ECPerf Review Committee. Should you have a workload similar to ECPerf (as unlikely as your having exactly the world's average height, weight, age, and family size), you will get the best J2EE application server throughput and cost per transaction on IBM WebSphere. A standard Web Services-based benchmark has not yet been developed, and IBM currently offers no benchmark numbers for WebSphere's Web Services performance.

Nevertheless, the ECPerf benchmark is a valid indicator that WebSphere will provide great price/performance for Web Services-based applications.

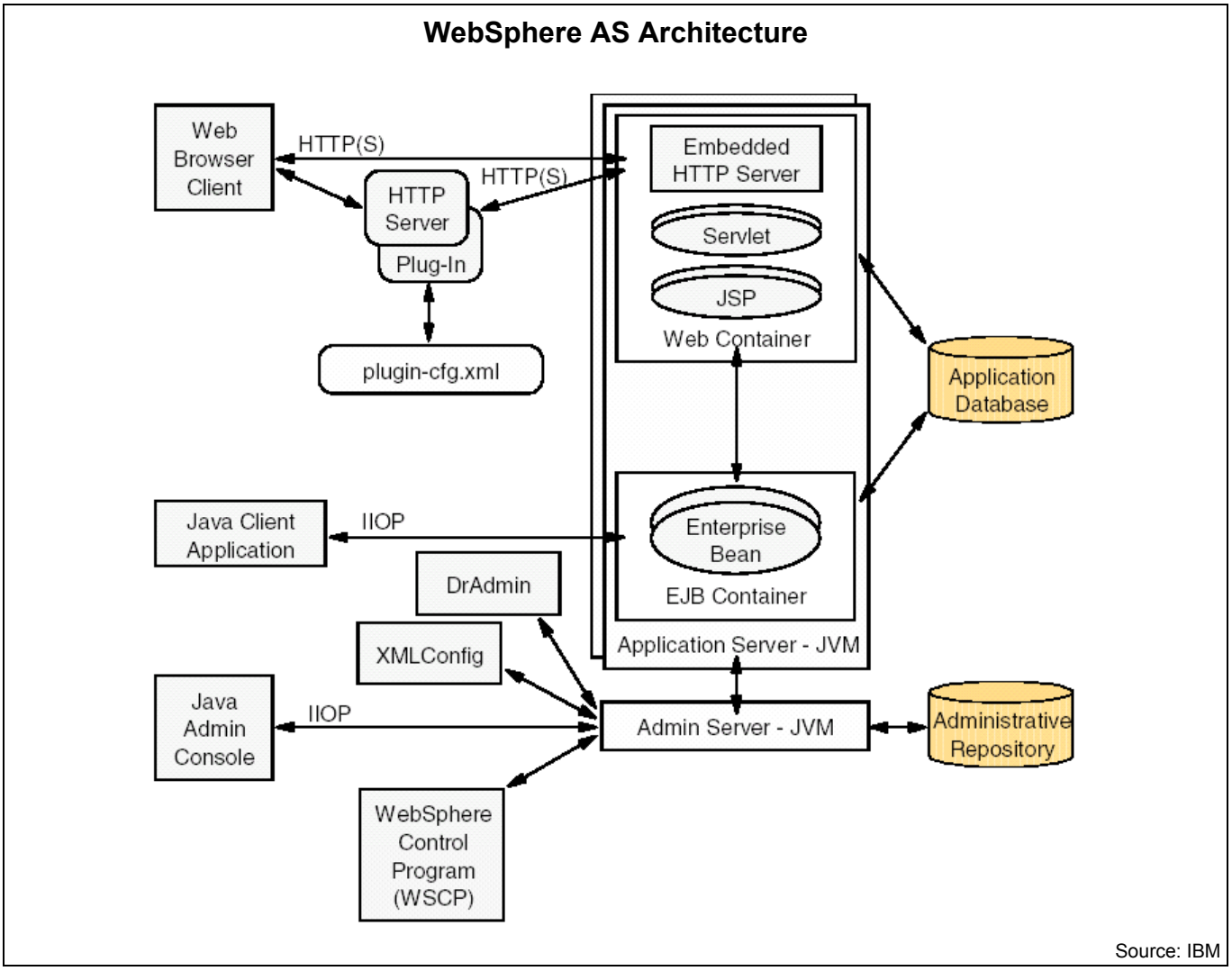

Illustration 4. This diagram depicts the major components of WebSphere AS V4.0 Advanced Edition.

The ECPerf results show WebSphere AS AE 4.03 running on 9 IBM dual CPU boxes, achieving 32581.47 billion business operations per minute (BBops/minute) at $11 per BBops/minute.

BEA WebLogic 7 running on two HP Intel quad CPUs with the database on one quad CPU rated 16, 696 BBops/min at $18/BBops/min. IBM WebSphere running on two quad CPUs with the database on one dual CPU rated 16, 634 BBops/minute at $13/BBop/minunte.

Comparing these two very similar IBM and BEA high-end configurations, IBM comes in at almost the same throughput rate and much better price performance. Yet another round of benchmarking by BEA would likely produce higher BEA performance numbers, but BEA's price per BBops/min is unlikely to drop to match IBM's.

Environment (Configuration)

WebSphere AS supports distributed, cross-platform topologies that incorporate Unix, Linux, OS/400, Windows, and S/390. As we've mentioned, clustering, failover, and management features are provided to support complex and reliable WebSphere configurations.

Standard deployment is optimized for simpler administration and provides dynamic caching, browser-based administration, and database support.

MARKET

Positioning

Early involvement in Web Services specifications development gives IBM a head start in applying Web Services technologies to its product lines. Given IBM's careful development process, getting a head start is very valuable to IBM. Specifications represent a problem statement, allude to solution architecture, and effectively create both the boundaries and foundations for future extensibility, reliability, and capability. Having a say in these specifications, and getting a lead on designing them into IBM's own solutions, puts IBM in a stronger competitive position with Web Services.

IBM's early involvement is also a very good thing for Web Services because the world's technology community gets the benefit of IBM's experience in developing highly reliable, scalable, extensible platforms. This expertise has been gained—and demonstrated—through four decades of operating system development, proved by the current undiminished vitality of the systems first developed in the 1960s and 70s.

IBM's early involvement is also a very good thing for Web Services because the world's technology community gets the benefit of IBM's experience in developing highly reliable, scalable, extensible platforms.

The success of WebSphere AS demonstrates customer enthusiasm for IBM's application of its systems experience to the Application Server arena. At this point in history, several surveys show WebSphere AS reaching for the lead market share for J2EE application servers. A March 2002 Giga survey places IBM WebSphere's J2EE application server market revenue share at 34 percent, level with BEA and ahead of all other J2EE application servers. A Morgan Stanley study shows that customers standardizing their J2EE platforms are currently choosing WebSphere 47 percent of the time, roughly 2:1 over BEA. A similar survey from Salomon Smith Barney shows the preference at 5:1. So, going forward, IBM's application server market share is certainly strong and very likely to be growing.

WebSphere may succeed in reproducing this J2EE market lead in the realm of Web Services, where IBM is currently the winner in the mind-share battle: a Giga perception-based customer survey of most important Web Services platforms pinpoints WebSphere as the most important Web Services environment, at 33 percent. Microsoft .NET gets 22 percent of the votes. Oracle, BEA, and Sun are in the single digits. As with the battle of the benchmarks, no doubt further survey skirmishes will identify a different leader, but there is no doubt that IBM and WebSphere are strong in Web Services and in the J2EE Application Server world.

Target Customers and Industries

IBM sells WebSphere into every industry. The WebSphere decision is generally made at an executive level, typically a director involved in e-business, a director or VP within IT, or the CIO. The decision is heavily influenced by assessments and requirements from IT architecture, development, and operations.

Pricing and Platforms

WebSphere is available on 35 platforms, including Microsoft Windows NT, Windows 2000, Linux, HP-UX, Sun Solaris, IBM AIX, Red Hat Linux, TurboLinux, SuSE Linux, Novell Netware, IBM OS/400, IBM z/OS, and Linux for IBM e-server zSeries.

WebSphere AS V4 pricing is as follows: Standard Edition V3.5 is $795 per CPU; Advanced Single Server is $8,000 per CPU; Advanced Edition with clustering is $12,000 per CPU; Enterprise Edition is $35,000 per CPU. WebSphere AS V5 pricing has not yet been finalized; IBM states that the pricing will be consistent with V4 pricing.

Company and Product Viability

IBM and WebSphere are strong brands. Have no fears that either will be disappearing from the scene.

Vendor's Technical Support

There are two support programs to consider: support for IBM customers and support for IBM business partners.

IBM's customer support provides on line self-support, online training, classroom training, downloadable patches for all severity 1 and most severity 2 problems that have been reported, and phone support for a customer's technical support team.

IBM business partners have access to the same support services through IBM PartnerWorld for Developers In addition, IBM has established development centers called Solution Partnership Centers and WebSphere Innovation Centers where partners can learn WebSphere while working on their WebSphere-related products.

There are over 6000 partner consultants certified for WebSphere AS. IBM Global Services has 1000 consultants trained for Web Services implementation work.

There are four reasons that IBM has such a strong Web Services position: WebSphere's market leadership, IBM's early investments and early leadership in Web Services; IBM's partners, and IBM's integration technology and services portfolio.

Competition

IBM's WebSphere family has evolved to a highly reliable, scalable, and manageable integrated platform. BEA and Oracle should be feeling pretty uncomfortable right now, as IBM steadily gains market share.

Another reason for their discomfort, and for IBM's as well, is the pressure from Sun and Microsoft to eliminate the Application Server as a separate product. Both Sun and Microsoft have strategies to undercut the importance and value of an application server by combining the application server functions in the base operating system.

Sun's application server share has been dismal, but Sun is currently taking Unix market share away from IBM. Including an Application Server in that base platform makes the WebSphere and BEA price tags harder to justify.

There are other Web Services and J2EE Application Servers out there that are, in terms of price and, especially, of cost, way out of IBM's league. Macromedia's JRun, for example, is likely to satisfy customer requirements for all but the highest end, and its price tag is 10 percent of WebSphere's. And you can install it yourself, sparing you the cost of IBM or partner professional services. The low end belongs to Tomcat and its ilk; JRun and others are likely to dominate the low end of the mid-range and give IBM a tough sell for the mid- to upper mid-range.

CONCLUSION

Weaknesses

It's hard to create something as bullet proof and feature rich as WebSphere AS and still keep it simple. And, let's face it, simple has never been IBM's forte. Installing and configuring WebSphere AS is complicated. Customers remark that it is well nigh impossible to install WebSphere with out professional services. Exacerbating the problem is IBM's standards for documentation, which results in a pallet of books of facts, but few recipes and cookbooks for standard tasks. The comprehensive network of training and certified specialists serves to fill in the how-to gaps.

As a result of the complexity, and the concomitant need for professional services, IBM doesn't have an affordable entry-level offering of WebSphere AS Web Services for small companies. It's hard to picture how IBM will achieve that.

Another downside is the current level of integration of WebSphere family, which shares a brand but is not yet a seamless collection. Still, IBM is improving the integration story with each WebSphere family product release.

Lastly, some customers view WebSphere's strong portfolio of Web Services Infrastructure Services as an enticement to forgo architectural standardization and application portability. One might say, "Well, don't use them!," but it is difficult for developers to remember which capabilities to avoid.

Strengths

IBM has emerged as the Web Services leader. There are four reasons that IBM has such a strong Web Services position: WebSphere's market leadership, IBM's early investments and early leadership

in Web Services, IBM's partners, and IBM's integration technology and services portfolio.

WebSphere AS is a rock-solid J2EE deployment environment and the leading J2EE application server. There is little doubt that WebSphere will hold the same position in the Web Services arena.

IBM's early contributions to Web Services standards and specifications have given IBM development a head start, with Web Services technologies now incorporated in Lotus, Tivoli, and DB2 families as well. The early involvement has also served to capture Web Services mind share.

IBM has a strong development tools story in WebSphere Studio AD and the open source Eclipse environment, plus a developer community and Web site that rivals Microsoft's. IBM's partner programs have been honed over decades of experience, and IBM is coordinating all partner Web Services support through the Web Services on WebSphere (WoW) program. Although it doesn't use our terminology, IBM is slipping very valuable Service Infrastructure Services into WebSphere V5 scheduled for delivery 3Q02. These Web Service infrastructure services reflect IBM's embrace-and-extend strategy. The services are extremely valuable for programmer productivity, as well as reliability and manageability. Of course, using those services leaves you addicted to WebSphere.

Bottom line

We're betting IBM dominates the J2EE-based Web Services arena for the next year. Why? IBM is into Web Services early and highly effectively. WebSphere's market position is very strong. The result will be that partners and customers will continue to place their chips on the IBM pile at an accelerating rate.

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