Optimizing your application development environment.

Strategy you can use from IBM

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Introduction

Driven by ever-increasing business demands, today's enterprise needs to become more agile and more efficient. To achieve these goals, enterprises increasingly rely on information technology (IT) to gain a competitive edge. In turn, IT organizations within an enterprise often face a variety of challenges that range from transforming and leveraging value in existing legacy systems to creating completely new Web applications, to integrating new and existing systems. At the core of an IT organization is the application development (AD) team. The success of the AD team depends on its ability to leverage existing skills and quickly adopt new ones, to efficiently deliver the requirements of business and to consistently produce high-quality applications that the business can depend upon.

In the past, the success of AD teams has been hampered by the lack of appropriate IT skills, fragmentation of the AD environment, the difficulty of integrating existing legacy systems, platform heterogeneity, lack of support for the application lifecycle and the high cost of AD tools. The launch of the Eclipse Platform and IBM WebSphere® Studio development environment heralds a new era for enterprise application development tools. WebSphere Studio development environment can help customers optimize their application development by increasing return on investment (ROI), enhancing developer productivity, leveraging existing skills and assets, facilitating integration of new and existing systems and delivering a solution where best-of-breed tools are seamlessly integrated.

This white paper provides an overview of the IBM application development strategy and the WebSphere Studio application development environment and shows how AD organizations can meet today's IT challenges.

The challenges of application development

It is important to understand the challenges IT organizations face to support the global business objectives of an enterprise. Many strategies related to application development can enable an enterprise to succeed. You can:

- *Expand through mergers, acquisitions and rapid trading alliances.*
- *Collaborate with suppliers, trading partners and customers through application integration that utilizes portal-, mobile- and voice-based capabilities.*
- *Lower cost through increased efficiency and agility.*
- *Reduce time to market for new products and services.*
- *Innovate new business models to outmaneuver competitive threats.*

In contrast, obstacles to efficient AD can impede the attainment of global business objectives for many companies. The WebSphere software development environment directly addresses these barriers and can help companies overcome many of them. Common obstacles include:

- *Business operations that adapt to the evolving marketplace too slowly*
- *Legacy systems that are brittle, difficult and expensive to change*
- *Difficulty in leveraging important information contained in enterprise resource planning (ERP), supply chain management (SCM) and customer relationship management (CRM) systems*
- *Web and e-business initiatives that do not progress as efficiently or as fast as they should*
- *Web applications that don't always scale easily with increased usage to demand*
- *Length of time to adopt new Web and e-business technologies*
- *Manual intervention required by many transactions that could be completed over the Web*
- *Heterogeneous computing environments that incur a high cost to update and extend* The computing infrastructure of an enterprise often comprises a variety of environments with different technologies and multiple generations of each technology. These environments can be difficult to update and extend because they often require specialized support skills and can result in large expenses when replacing functional legacy components.

- *Inadequate support for the complete lifecycle of the product*
  Because of a lack of fully integrated and managed support for the lifecycle of the applications being developed, development teams need to support products from inception through development and finally to deployment and maintenance.
- *Outdated standards that make application integration difficult*
  Environments may not yet support the Internet and the Java™ technology-based standards required by the Web or for integration of new Web applications with existing business applications
- *High cost and complexity of user-experience options*
  Implementation and customization of portal, mobile and voice solutions, key elements of new business strategies, are complex, expensive and resource-intensive.
- *Complexity of application and business integration*
  Rising customer and trading partner expectations of automated and Web-enabled systems drive a critical need for faster and more reliable ways to integrate transaction streams between e-business and legacy applications
- *AD tool fragmentation*
  Developing new e-business solutions require a multitude of specialized tools: specialized, best-of-breed development tools that are not always well integrated; the need to export programming artifacts across different tools to link components of a Web-legacy application; complexity that often lengthens development time and increases training requirements across multiple tool environments.
- *Lack of appropriate IT skills*
  Technical skills needed to implement new e-business strategies and cross-organizational skills that are not standardized or flexible enough to satisfy changing business needs are in short supply.
- *Inadequate cost-to-benefit ratio*
  IT costs continue to grow, in addition to the complexity and pervasiveness of systems; increased spending does not necessarily deliver expected benefits.

Previous AD solutions have not addressed customer needs

Most businesses have a set of common desires when it comes to creating an application development environment. They want a highly productive environment with open-standards-based, best-of-breed tools that can be seamlessly integrated with the environment and deliver high-quality applications. Further, most businesses demand that these tools support a broad set of middleware and deployment platforms — planned or currently in use — and be extensible and configurable to rapidly match changing needs and internal processes.

In the past, when selecting an AD environment, an enterprise had to compromise between two choices:

- *Multiple best-of-breed tools from a variety of vendors*
  The advantage with this choice is that each stage of the development lifecycle is optimized. The disadvantage is that the overall development lifecycle becomes severely inadequate from lack of integration between one stage and another. The development team is faced with the daunting task of integrating all these tools and then maintaining the home-built environment.

- *An integrated environment from one vendor*
  In this approach, the optimization is focused on the overall lifecycle, which means that tools supporting individual lifecycle stages may not be best of breed. In addition, such single-vendor solutions tend to be proprietary, requiring the adoption of vendor-specific methodologies. These methodologies don't allow easy expansion or customization beyond the vendor's solution or for the seamless replacement of tools in the suite.

Clearly, none of these choices is the ideal solution for a forward-thinking development team. Choosing a compromise at this level only compounds the problems of application development and leads to further fragmentation of the AD environment in the overall enterprise.

IBM WebSphere application development strategy

The IBM application development strategy is intended to deliver an open, comprehensive development environment for e-business, supporting a broad set of middleware and operating platforms based on industry standards. The central principle of the strategy is openness, flexibility and multivendor participation. In addition to IBM tools, the development environment leverages the core strengths and delivers best-of-breed tools for selected stages of the application development lifecycle, relying on various market leaders to provide complementary components.

The end result is a no-compromise, comprehensive application development solution helping organizations achieve unprecedented levels of productivity and quality by implementing a multivendor, best-of-breed environment integrated out of the box that covers the entire lifecycle of an application. Figure 1 shows how the IBM application development environment offers a comprehensive solution with no compromises.
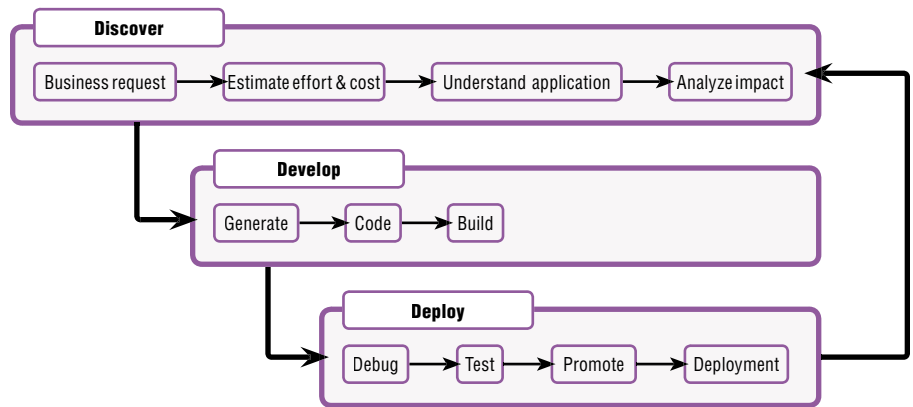

Figure 1. The IBM application development process

A single development environment for the entire team

When analyzing the factors that undermine developer productivity, two main factors emerge:

- *Lack of integration*
  - Across the lifecycle
  - Between development tools, runtime and test environment
- *Development process inefficiencies*
  - Developers frequently switching between tools
  - Poor communication within the development team

The challenge of integrating a variety of tools could be solved by an integration framework – and there have been previous industry attempts to do this. The more difficult problem of creating a mixed vendor environment with a common user interface and a common integrated development environment (IDE) that addresses process inefficiencies has not been solved until now with the introduction of WebSphere Studio.

The IBM strategy is to provide all developers, regardless of skill level or role in the development process, with only one IDE per desktop. All the tools that IBM delivers, along with those of its trading partners and other vendors, run seamlessly within the one portal-like IDE. A developer no longer needs to switch between multiple environments with different usage paradigms. This common IDE simplifies the development environment and enhances a developer's productivity. In addition, an organization will be able to leverage, transition and enable existing traditional skills to deliver new e-business applications.

WebSphere Studio is the single, comprehensive development environment from IBM. Built on the Eclipse Platform – an open, industry-supported application development integration platform – WebSphere Studio is available in several configurations for varied uses.

- *Homepage Builder: to develop Web pages and simple Web sites*
- *Device Developer: to develop embedded, Java 2 Platform, Micro Edition (J2ME) applications*

- *Site Developer: to develop Web applications*
- *Application Developer: to develop end-to-end Java 2 Platform, Enterprise Edition (J2EE) applications*
- *Enterprise Developer: to develop end-to-end enterprise applications*
- *Asset Analyzer: for application understanding of enterprise applications*

Figure 2 shows an outline of the WebSphere Studio development environment, together with complementary IBM and trading partner extensions.

IBM server and middleware tools	Trading partner tools and middleware
WebSphere Studio	
Eclipse Platform	

Figure 2. WebSphere Studio development environment

The Eclipse Platform and WebSphere Studio Workbench

The Eclipse Platform is a new open-source environment for creating, integrating and deploying application development tools for use across a broad range of computing technology. It provides a common set of services and establishes the framework, infrastructure and interactive workbench used by project developers to build application software and related elements.

Through the Eclipse Platform, smooth integration of tools from several different vendors will be possible on Microsoft® Windows®, Linux® and QNX developer workstations. Figure 3 shows how the Eclipse Platform helps bring together best-of-breed tools on a common platform.
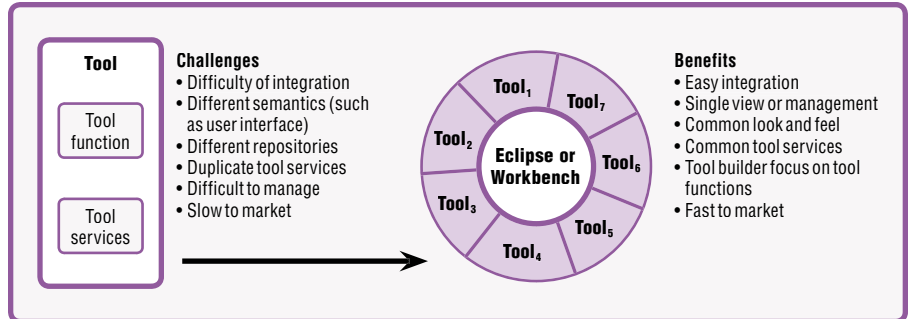
Figure 3. A fundamental change in building application development tools

The Eclipse Platform provides user-interface perspectives specific to different developer roles. A perspective is a predefined, yet user-configurable, set of views of tools and data that is added to the environment. The end result is an environment that offers an unprecedented level of flexibility in supporting each development role on the team. The Eclipse Platform is designed to:

- *Build IDEs.*
- *Support multiple tool providers.*
  Including independent software vendors (ISVs), by providing specifications about how a tool may plug into the environment and share services and workspaces
- *Support tools used to create and manipulate any development artifacts.*
  Including, but not limited to, those inherent in the J2EE programming model, such as HTML, Java technology-based, JavaServer Pages (JSP) component-based, Enterprise JavaBeans (EJB) component-based, XML and Graphics Interchange Format (GIF) artifacts
- *Support integration of multiple Java runtime environments.*
  To enable development of projects that target various levels of Java technology-based environments
- *Support integration of multiple test and deployment environments.*
  Such as IBM WebSphere Application Server and the Apache Tomcat server
- *Facilitate integration of tools and provide access to cross-platform services.*
  Such as source code management and team development
- *Run on Microsoft Windows and Linux operating systems.*
  With support for additional platforms under consideration by the Eclipse Project

The Eclipse Platform can enable two fundamental improvements for both application developers and tool vendors during the application development process:

- *Developers can use any plug-in tool.*
  In the same environment you can have a consistent user interface, code management and testing experience. And because of this innovation, developers are not unnecessarily burdened with having to export an artifact, open a different tool, import the artifact, convert it, work with it and then compile, test, save and export the artifacts using yet additional tools. All development tasks can instead be performed in the same environment.
- *Tool vendors can focus on domain-specific tool function.*
  Rather than having to maintain and support all services needed to use a tool, such as user interface and object storage, this makes it easier to develop a new tool and have it instantly integrated on an established platform.
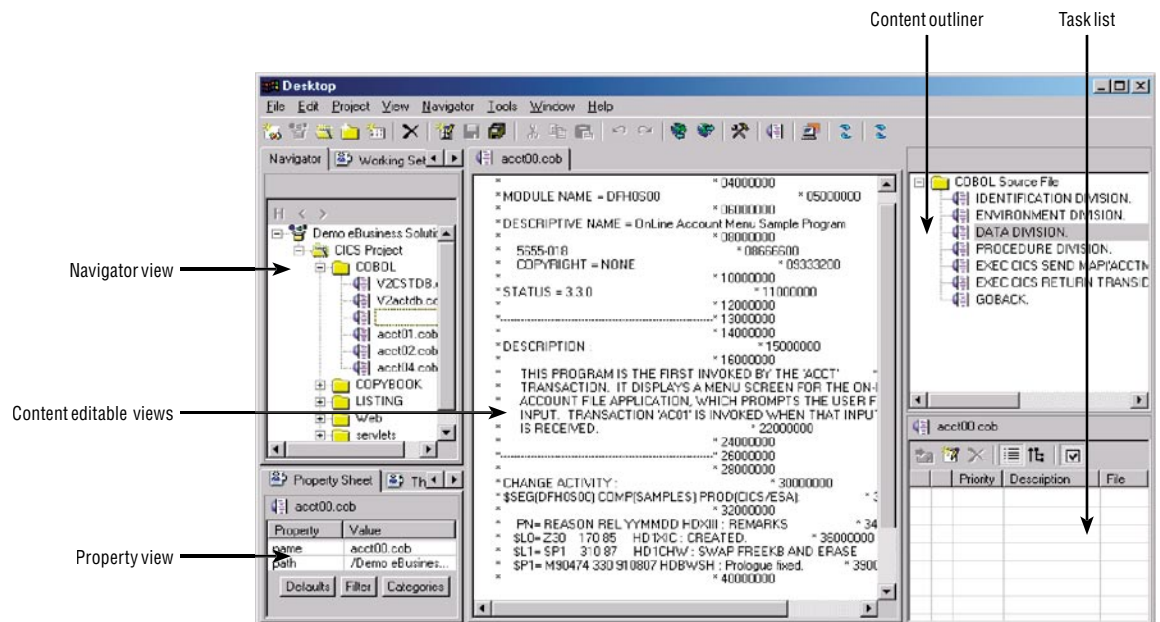

Figure 4. WebSphere Studio Workbench

IBM WebSphere Studio Workbench is the IBM-branded version of the Eclipse Platform. WebSphere Studio Workbench is the foundation for all WebSphere Studio tools and is available at no charge to IBM Business Partners who want to ensure they are up to date with the version of the Eclipse Platform currently used in WebSphere Studio. The IBM strategy is to base all new application development tool offerings on WebSphere Studio Workbench. IBM intends to update WebSphere Studio Workbench as new levels of the Eclipse Platform are delivered, much in the same way WebSphere software supports the evolution of Apache, J2EE technology and other industry standards. Figure 4 shows a screen shot for a WebSphere Studio software-based development tool. For more information, visit **ibm.com**/software/ ad/workbench.

WebSphere Studio

WebSphere Studio leverages the Eclipse Platform and third-party vendor support in several important ways:

- *All software and Web artifacts created using a WebSphere tool are available for use by third-party tools.*
- *The third-party tools integrated with WebSphere Studio have the ability to leverage the advanced functions in WebSphere Application Server for integrated unit testing.*
- *Configurations of WebSphere Studio can seamlessly add new tools to those of other configurations. (For example, IBM WebSphere Studio Application Developer includes all the features of IBM WebSphere Studio Site Developer. And IBM intends that future releases of IBM WebSphere Enterprise Developer include all features of WebSphere Studio Application Developer.)*
- *End users can extend and customize a WebSphere Studio development environment to fit their particular needs.*

Platforms, middleware and IBM Business Partner support

The IBM application development strategy is to enable the development of e-business applications targeted at multiple platforms and supporting a wide range of middleware. The WebSphere Studio development environment is available on the most popular development platforms, including Microsoft Windows NT®, Windows 2000, Windows XP, Red Hat Linux and SuSE Linux.

Supported deployment platforms include all IBM @server platforms and all platforms, editions and extensions supported by WebSphere Application Server. For more information on IBM @server platforms, visit **ibm.com**/e-server. For more information about WebSphere Application Server, visit **ibm.com**/websphere/appserver.

WebSphere Studio is complemented and extended by IBM Business Partner tools and by IBM @server software and middleware toolkits. Some trading partners currently providing or planning to provide tools that are integrated with WebSphere Studio include Rational Software, Versata Inc., Serena, Instantiations and Macromedia. For more details on the "Ready for WebSphere Studio" program, visit www.developer.**ibm.com**/websphere/ready.html.

Examples of IBM middleware with tools that do or plan to extend WebSphere Studio include IBM DB2® Data Management, IBM Lotus® Domino™ collaboration server, IBM Tivoli® systems management and the WebSphere software platform, which includes foundation (WebSphere Application Server); reach and user experience (IBM WebSphere Portal Server, IBM WebSphere Voice Server, IBM WebSphere Commerce and IBM WebSphere Everyplace™); and business integration (IBM CrossWorlds™ software and IBM WebSphere MQ Integrator and IBM WebSphere MQ Workflow, formerly IBM WebSphere MQSeries™).

The configuration of WebSphere Studio Enterprise Developer includes tools for developing applications that integrate WebSphere software and software not based on the WebSphere software platform, such as COBOL-based IBM CICS® transactions or PL/1 language-based native IBM @server zSeries™ applications. In addition, WebSphere Studio is incorporated and extended in the WebSphere Development Studio for IBM @server iSeries™, which includes tools for developing iSeries applications that integrate native iSeries and WebSphere software-based applications.

Developer community

Because availability and ongoing support of well-trained skills are critical requirements, nurturing and growing the WebSphere software application developer community is an important goal of the IBM application development strategy. WebSphere Developer Domain, with over 600,000 registered developers, is the focal point for directly serving WebSphere software developer needs online. WebSphere Developer Domain offers support ranging from quick advice to in-depth technical articles, online forums and Webcasts. For more information, visit **ibm.com**/websphere/developer.

IBM *developerWorks Live!* is an annual meeting where all WebSphere application developers are invited to interact with each other and with developers of the WebSphere software platform. In addition, many local WebSphere user groups meet regularly throughout the world. For more information about these and other WebSphere user groups, visit **ibm.com**/events/ibmdeveloperworkslive. (Please note that although IBM supports these groups with speakers and trading partner contacts, they are self-organized and independent.)

Open standards

Open industry standards provide a way to predict a certain level of functionality and interoperability from vendors. The Internet has demonstrated that open standards can create huge benefits for everyone by simplifying connectivity and integration at many levels. Open standards for Web applications are constantly developing and expanding to provide increasing business value.

IBM is a major force driving the development of open standards, including:

- *Web services standards*
  That enable business integration, such as Extensible Markup Language (XML), Simple Object Access Protocol (SOAP), Web Services Description Language (WSDL) and Universal Description, Discovery and Integration (UDDI), regardless of the target deployment platforms and implementation technologies
- *Component standards*
  That enable the efficient reuse and redeployment of enterprise assets (Enterprise JavaBeans, for example)

- *Connectivity standards*

  That enable asynchronous transactions between e-business and enterprise systems, using Java Connectivity Architecture (JCA) and Java Database Connectivity (JDBC)

- *Messaging standards*

  That enable reliable messaging and management of asynchronous transactions using message-driven beans, such as Java Message Service (JMS) and Message Queuing (MQ)

IBM is also a major supporter of the Linux operating system. With more than 1,500 Linux developers on staff, IBM offers the Linux platform as an operating system option on hardware servers. Moreover, IBM is releasing development and software applications that either run on or target Linux platforms. WebSphere Application Server and WebSphere Studio, for example, are available for several distributions of the Linux platform.

Customer advantages

The IBM application development strategy is designed to give customers significant advantages when adopting and standardizing the WebSphere Studio open development environment. These advantages include:

- *Maximum developer productivity*

  The WebSphere Studio development environment does not lock users into a proprietary, single-vendor solution. Instead, it leverages the industry's best-of-breed tools by offering seamless integration within a single development environment.

- *Reduced time to market*

  Enhancing the developer's productivity is only part of the equation in reducing time to market. WebSphere Studio environment allows an organization to optimize across all phases of an application lifecycle — from requirement definition to analysis and design, to development, testing, deployment and maintenance. This results in a well-structured development process that improves the overall efficiency of the development team.

- *Increased quality*

  The integration of the development environment, development team and entire development process — coupled with best-of-breed tools and an integrated unit test environment — means fewer defects late in the development cycle and a higher quality of application.

- *Increased responsiveness to business requirements*

  Today's winning organizations must not only respond quickly, but lead as well. To have a flexible development team that is capable of quickly adopting a new technology or can quickly reassign resources to respond to a new business opportunity, the development organization needs flexible, reusable skills. With WebSphere Studio, the development team learns reusable skills, allowing team members to more quickly move to new technologies and quickly integrate with newly formed or reorganized teams.

- *Leverage existing skills*

  The Enterprise Developer configuration of WebSphere Studio is designed to be used by all members of your development team, allowing each developer to contribute to building the next generation of e-business applications. Enterprise Developer has a complete set of tools that covers all aspects of development: Web page and site creation, Web services, J2EE technology-based development and integration with back-end systems, COBOL and PL/I development and maintenance and component generation using Enterprise Generation Language (EGL).

- *Leverage existing assets*

  WebSphere Studio Enterprise Developer and IBM WebSphere Studio Asset Analyzer help enterprises discover, componentize and integrate existing IT assets in current e-business applications, which can increase ROI and decrease time to market — all while increasing the reliability of mission-critical, e-business applications.

Role-based application development

WebSphere software application development tools are designed for a specific development role or a range of roles. For example, WebSphere Studio Site Developer is intended for Web developers who develop and manage complete Web sites. WebSphere Studio Application Developer includes all the functions of WebSphere Studio Site Developer and adds support for programmers working on business logic (including EJBs).

Within each WebSphere Studio solution, task-oriented perspectives filter out complexity and present only those functions that are relevant to the task at hand. Users switch perspectives depending on what they are developing or analyzing at the moment, or depending on their roles in projects. Because different developers work in different ways, these perspectives can be customized. But because they are built using the WebSphere Studio Workbench technology, all tools and perspectives share a common look and feel, which reduces learning curves and maximizes user productivity. And since development resources for a project are stored in a single repository, you can achieve maximum shareability and consistent team support for that project.

Web site development

A Web site experience is shaped when a Web presentation server generates Web pages and displays them on a visitor's Web browser. The Web pages may combine static and dynamic text, graphic content, HTML, JSP tags, XML or Java applets. The server can accept Web visitor input and respond directly to the Web browser or relay the input to Web applications or enterprise applications for processing.

The WebSphere development environment for building Web sites includes support for:

- *Easily creating Web sites with labor-saving templates and visual Web page design tools*
- *Integrated testing of Web page appearance and behavior at the Web browser*
- *Creating Web client/server applications based on Java scripts, servlets and JavaBeans technology to parse user input and user responses and take appropriate action at the server*
- *Deploying business-to-business (B2B) and business-to-consumer (B2C) online services and business models as Web services based on UDDI, WSDL and SOAP standards; WebSphere Studio provides support for creating, publishing, discovering and testing Web services, discussed in the Web services section of this paper*
- *Creating flexible, self-defining data transmission and exchange applications* based on XML and Extensible Stylesheet Language (XSL)

WebSphere Studio provides convenient ways to create and manage portals, personalization, pervasive and mobile computing devices and tracking of user actions. It even specifies how to use the necessary specialized data tags and conversion of content between HTML, XML and other standards. Building a Web site can be a large and complex project, but WebSphere Studio includes provisions for team development, such as project sharing, assigning tasks and support for end-to-end local or remote unit testing.

Web application development

Web applications encompass all the content and functionality in a Web site, and they apply business logic to Web interactions. They can either manage a complete transaction or orchestrate a series of interactions with business logic on other Web applications, databases or legacy servers. Web applications can serve as a bridge for Web and mobile access modes with e-business applications like personalization and commerce. They can also provide a bridge to existing applications on legacy infrastructure (such as inventory, logistics, finance and human resources) or to packaged solutions (like ERP, CRM or SCM).

The WebSphere development environment for building Web applications accommodates a wide range of processing. This environment:

- *Supports Java applets, servlets, JSP tags, HTML, XML, GIFs and JPEGs on Web clients and Web sites*
- *Uses both procedural and nonprocedural programming techniques, including automated generation of complementary client and server business logic modules to create Web client/server Java technology-based applications*
- *Employs Java technology-based standards to invoke transactions and application processing on other servers — Web application or legacy — or builds J2EE technology-based applications using EJB component models*
- *Uses development toolkits to add features to existing Web applications or create new ones that can leverage e-business server applications, such as portals, personalization, mobile access and e-commerce*
- *Customizes and configures e-business server applications offered by IBM — IBM WebSphere Portal server, IBM WebSphere Personalization, IBM WebSphere Everyplace, WebSphere Commerce and more — or from any of thousands of WebSphere ISVs*

- *Allows access of enterprise resources by using JCA*
- *Includes provisions for team development, such as project sharing, assigning tasks and supporting end-to-end local or remote unit testing*

Web services

Web services are self-describing, self-contained, modular applications based on open standards that are designed for deployment on the Internet or a private intranet. Web services provide companies with the flexibility to mix and match functions from different sources, bringing innovative processes, services and value chains to market quickly and efficiently. A global industrial shipping company, for example, can make its shipment routing, pricing and scheduling applications available as a Web service on the Internet, enabling customer ERP and logistics systems to evaluate shipment options and place orders.

Support for Web services standards has been built into WebSphere Application Server and WebSphere Studio development tools. IBM has recently announced availability of a UDDI registry as a download at no charge on the IBM Web site. WSDL and SOAP standards have been built into WebSphere Application Server. Sample classes are included with WebSphere Studio so that developers can create and customize Web services more quickly.

WebSphere Studio provides tools for constructing applications by visually composing components as services. These application services can be accessed through the Web or implemented as local Java-based technology services (such as JavaBeans or EJB modules) or legacy assets accessed with JCA or JMS connections. By working with all components as services, a higher level of reuse and productivity is achievable.

Enterprise application development and integration

Enterprise application development encompasses Web application development in addition to the design, integration and management of end-to-end e-business applications across and between systems and enterprises. Enterprise application development can involve information or transaction messaging between internal business applications or transactions conducted with trading partners through established Electronic Data Interchange (EDI) standards or emerging B2B standards, such as RosettaNet.

Enterprise application development leverages a wide range of technologies, including existing ones to the newest, from the use of COBOL or PL/1 to creating new business logic in Java technology-based platforms to leveraging the latest Web services technologies with XML, WSDL, SOAP and UDDI. Another major focus of enterprise application development is including and enabling the largest numbers of developers possible in the application development process. From business-oriented developers using high-level or fourth-generation languages (4GL) and visual development environments to Web and Java developers, to IBM z/OS™ platform-based COBOL and PL/I developers.

The WebSphere development environment for building and integrating enterprise applications:

- *Enables development and streamlines maintenance by providing end-to-end application asset identification, application understanding and component creation, encompassing both distributed (Web) and traditional applications*
- *Supports Web site and Web application development*
- *Allows developers to model and optimize task steps and application flow*
- *Supports the development, assembly and deployment of reusable application services, including services accessed through JCA connections*
- *Enables the development and maintenance of Web and legacy programs using EGL (business oriented), COBOL, PL/1 and other languages*
- *Provides tools to record and analyze abends and program execution faults; corrects problems with files and data*

WebSphere Studio Device Developer

Handheld computing devices, personal digital assistants (PDAs) and mobile phones are increasingly being used for e-business transactions. The challenge is to deliver end-user usefulness in a device that may or may not be connected 100 percent of the time, has small-screen real estate and is powered by a battery.

IBM WebSphere Studio Device Developer is a complete development solution for creating signature applications for small resource-constrained devices, such as personal information management (PIM), sales force automation, data synchronization, messaging and connectivity with the WebSphere software platform.

Using device-side technologies, such as J2ME technology-powered configura-
tions (CLDC, or Connected Limited Device Configuration; CDC, or Connected
Device Configuration) and profiles (MIDP, or Mobile Information Device Profile),
SmartLinker optimization (JIT, or just in time; AOT, or ahead of time) and remote
on-target debug and analysis tooling, developers can create applications that take
advantage of the convenience of small devices and connect them to applications
running on WebSphere Application Server. WebSphere Studio Device Developer
is the next generation of tools for small devices and the follow-on product to IBM
VisualAge®, Micro Edition. For a complete description and a download of the beta,
visit **ibm.com**/embedded.

Middleware support and extensions

The standard configurations of WebSphere Studio (WebSphere Studio Site Devel-
oper, WebSphere Studio Application Developer, WebSphere Studio Enterprise
Developer) offer the core support needed to develop J2EE technology-based appli-
cations. To further extend the support for other WebSphere middleware functions,
IBM offers a variety of toolkits and extensions for application development.

WebSphere Voice Toolkit

As part of the IBM WebSphere Voice family of products, IBM WebSphere Voice
Toolkit provides the necessary components to write voice applications quickly and
easily. The Voice Toolkit is based on the VoiceXML 1.0 industry standard for voice
application development and is built on WebSphere Studio Workbench.

The Voice Toolkit provides the key components needed to expedite the devel-
opment of voice applications, including VoiceXML and grammar editors,
pronunciation builder to create and update how words will be heard through the
text-to-speech engine and reusable dialog components that are building blocks of
working code that can be copied and reused throughout a voice application.

The Voice Toolkit helps to alleviate some of the complexity of speech technology
so that developers with VoiceXML, XML, HTML, Java or general IT programming
experience can get a jump-start in creating voice applications. For more informa-
tion, visit **ibm.com**/software/speech/enterprise/vtoolkit.html.

WebSphere Portal Toolkit

Portals provide a mechanism for aggregating information and access to enterprise services into a single consolidated view for the Web. A portlet is similar to a servlet and provides access to a specific application or function being made available to the user through the portal. The integrated portal and portlet development environment can provide the capabilities to customize and manage the enterprise portal and create, test, debug and deploy individual portlets and Web content. Templates enable developers to quickly and easily create their own portlets. Debugging and deployment tools shorten the development cycle. Sample portlet code that demonstrates best programming practices is also provided. The IBM Portal Toolkit is available and is packaged with WebSphere Portal, Version 4.1.

WebSphere Everyplace Toolkit

IBM WebSphere Everyplace Toolkit allows developers to extend enterprise applications to mobile computing devices. Mobile computing extends e-business to a new breed of devices (such as PDAs, mobile telephones and various other types of computing devices). These devices have a wide range of functionality and various modes of operation. They can extend enterprise computing, allowing the mobile user to reap the benefits of location independence. Mobile tools from IBM support the development of mobile applications for connected and disconnected modes. Content adaptation tools, such as markup and annotation editors, allow the user to create new content and adapt existing content to multiple markup languages supported by different devices. Synchronization tools allow developers to create forms-based applications to access, update and create data on the client for devices that are not continuously connected. These mobile development tools will also provide samples and templates for some of the most popular mobile applications.

Because portlets can be used in connected or disconnected browser-based applications, the IBM mobile programming model promotes portals as a mechanism for aggregating information and access to enterprise services regardless of the device. Consequently, WebSphere Everyplace Toolkit includes portal and portlet tools to allow portlet rendering on mobile computing devices. With the integrated portal

and portlet development environment, IBM provides the capabilities to customize and manage the enterprise portal and create, test, debug and deploy individual mobile portlets and Web content.

Templates enable developers to quickly and easily create their own portlets. Debugging and deployment tools shorten the development cycle. Sample portlet code that demonstrates best programming practices is also provided. IBM Everyplace Toolkit is packaged with IBM WebSphere Everyplace Access, Version 4.1.

Software configuration management

An essential part of any application development environment is support for team-based development. WebSphere Studio is enabled for team-based development through tight integration with major software configuration management (SCM) vendors. The IBM strategy is to provide default integration to any Web Distributed Authoring and Versioning (WebDAV) technology-enabled repository. WebSphere Studio comes preconfigured to integrate with Concurrent Versioning System (CVS). In addition, certain configurations of WebSphere Studio (including WebSphere Studio Site Developer Advanced and WebSphere Studio Application Developer configurations) are currently preconfigured for and include Rational ClearCase LT. Integration adapters for many other SCM vendors (such as IBM SCLM, Serena, Merant, Computer Associates and MKS) are already available or planned. An up-to-date list of vendors who have supplied adapters for WebSphere Studio can be found at **ibm.com**/software/ad/studioappdev/partners/scm.html.

Summary

WebSphere software and WebSphere Studio are one of the fastest growing e-business platforms. WebSphere Studio customers have achieved high gains in productivity, quality and time to market. The next section provides WebSphere Studio customer testimonials.

For more information

For more information about how the WebSphere Studio portfolio of products can enhance your e-business, visit **ibm.com**/software/ad.

Customer testimonials

eBay, Inc.

"When eBay moved recently to the WebSphere platform, we were confident its open, robust computing infrastructure was a smart choice for our next phase of e-business implementation. The new WebSphere Studio Application Developer only makes our choice of WebSphere [software] look even more promising. The ability to integrate a wide set of tools easily will make it faster and simpler to test, tune and add new functionality to our Web environment. In fact, we anticipate we'll see about two- to three-fold productivity improvement on the development side. We think that's a significant advantage when it comes to providing our members with exciting new services."
– Maynard Webb, president, eBay , Inc.

About eBay

Founded in September of 1995, eBay is a leading online marketplace for the sale of goods and services by a diverse community of individuals and businesses. Today, the eBay community includes 29.7 million registered users and is the most popular shopping site on the Internet when measured by total user minutes according to Media Metrix. For more information, visit www.ebay.com.

Blue Cross Blue Shield of North Carolina

"With WebSphere Studio Application Developer, IBM has delivered a well-integrated and unified development environment that will support a wide range of BCBSNC projects. It delivers everything a developer would look for: stability, robustness, ease of deployment and ease of use. Our developers can now tailor their workbench to match their preferences from a great selection of tools. We anticipate major productivity gains coming out of this environment."
– Selva Mohan, IS Business Applications, Blue Cross Blue Shield of North Carolina

About Blue Cross Blue Shield of North Carolina

Blue Cross Blue Shield of North Carolina is a leader in delivering innovative health-care products, services and information to 2.5 million members. For 68 years, the company has served its customers by offering access to quality health care at an

affordable price and has served the people of North Carolina through support of community organizations, programs and events that promote good health. BCBSNC's HMO and POS products have earned Excellent Accreditation from the National Committee for Quality Assurance (NCQA), an independent, not-for-profit organization dedicated to measuring the quality of America's health care. Blue Cross Blue Shield of North Carolina is an independent licensee of the Blue Cross Blue Shield Association. For more information, visit www.bcbsnc.com.

The Bekins Company

"The response to [Tonnage Broadcast Exchange] TBE has been overwhelmingly enthusiastic…Our business partners are delighted with the ease of integration and the amount of personalization it offers. It's revolutionizing our business, opening up a major area of opportunity to improve our operating margins and continue to provide outstanding customer service…TBE represents a truly groundbreaking piece of work for Bekins and for our industry. We are first to market with a robust, secure, scalable and fully integrated brokerage solution incorporating a completely new Web Services architecture and a new development paradigm."

– Randy Mowen, director, Data Management and e-Business Architecture

About Bekins

Based in Hillside, Illinois, Bekins has been providing high-quality transportation and distribution services across North America for more than a century. Today, through specialized divisions, Bekins moves household goods, provides trade show services, warehousing, inventory management, distribution, delivery, set-up and light installation for computer companies, telecommunications and office imaging equipment suppliers. Bekins also provides logistics and fulfillment for online retailers as well as traditional brick-and-mortar retailers that offer direct-to-home delivery for their customers. For more information, visit www.bekins.com.

KPMG

"We've got a team of developers using WebSphere Studio Application Developer at one of our client engagements. An IBM [employee] brought it by (along with VisualAge for Java), installed it for us and showed us just a little bit about the tool. It is so easy to use, that with no real training, we've put out a whole complex front end, using JSPs, beans and servlets in less than 60 days into production. As a team, we have had experience in the past with VisualAge for Java. But the new WebSphere Studio Application Developer tool is great, all of the developers love it."
– Jay Cappy, senior manager, KPMG

About KPMG
KPMG is a leading provider of multidisciplinary business services in the Internet Age. We have forged business relationships with some of the world's leading technology and telecommunications providers to serve our global clients. Our investments in new technologies, in information sharing and in human resources help companies to move faster than their competition, to serve their clients and to build value for stakeholders. For more information, visit www.kpmg.com.

Honeywell Aircraft Landing Systems

"At Honeywell, we've always seen the value in trying to dovetail and integrate our entire development environment. We're very encouraged by the release of WebSphere Studio tools, which supports the further integration of a number of major application development tools on a common foundation. As a Rational Rose user, for example, we anticipate a real boost to developer productivity through its tighter integration now with the WebSphere tools and complementary tools from other vendors. It's great to see IBM working with its [trading] partners to build a truly open, integrated and vendor-independent development environment."
– Dave Kulakowski, development and technology manager, Honeywell Aircraft Landing Systems

About Honeywell Aircraft Landing Systems

Aircraft Landing Systems is part of Honeywell Aerospace, which is one of the world's largest suppliers of aircraft engines, equipment, systems and services for commercial transport, regional, general aviation and military aircraft. Headquartered in Phoenix, Arizona, Honeywell Aerospace manufactures auxiliary power units; turbofan, turboprop and turboshaft propulsion engines; marine propulsion and ground power systems; engine systems and accessories; commercial avionics, including enhanced ground proximity warning systems (EGPWS); flight control systems; environmental control systems; aircraft landing systems; power management and generation systems; and interior and exterior aircraft lighting. For more information, visit www.honeywellaircraftlandingsystems.com.

Evolving Technologies Corporation

"IBM has made a bold and gutsy move. They consolidated their whole range of middleware and application development products into a single underlying technology. Better yet, they open sourced the development environment and made its APIs open and available so that everyone, including their competitors, is encouraged to incorporate their own tools and facilities. Rather than taking the one-off approach… WebSphere Studio Workbench makes it possible for the first time to sensibly blend end-to-end integration with scalability for whatever platforms would be needed. Developers and their employers are in for a pleasant treat. The introduction of the new WebSphere Studio Application Developer tool and other AD tools built on this Workbench, bring into the mix, a potent and highly productive development environment. Along with it, watch the cost of development and life cycle maintenance plummet. This is exactly what companies need to be competitive in a dynamically evolving global economy."

– Loren Abdulezer, CEO, Evolving Technologies Corporation

For more information, visit www.evolvingtech.com.

IBM developer programs

IBM offers several programs for WebSphere developers.

IBM PartnerWorld for Developers

IBM offers a developer program called IBM PartnerWorld® for Developers. For more information about this program, visit www.developer.**ibm.com**.

Ready for WebSphere Studio

IBM has recently announced the Ready for WebSphere Studio program, which is a program for its Business Partners who have created tools integrated with WebSphere Studio Workbench. For more information about this program, visit www.developer.**ibm.com**/websphere/ready.html.

IBM Business Partners that develop WebSphere applications and solutions can receive additional education and support through WebSphere Innovation Connection. For more information about this program, visit **ibm.com**/websphere/partners.

Rational

IBM and Rational have been cooperating to develop an integrated and documented full lifecycle development and deployment solution that supports the IBM WebSphere software platform. For customers who are currently using IBM VisualAge for Java WebSphere, Version 3.5 solution or IBM WebSphere Studio Application Developer, Version 4.0 solution, Rational Suite and ClearCase complement the IBM application development solution by providing an integrated, full lifecycle solution with requirements management, modeling, functional testing, defect tracking, change management, performance testing, documentation automation and configuration management in addition to the Rational Unified Process for WebSphere.

Rational XDE for Java is an extended development environment that empowers developers to code and design directly within the IBM WebSphere Studio Application Developer offering. Rational XDE extends the IBM application developer, providing a powerful and customizable patterns engine, instant unified modeling language (UML) and code template support. Together, WebSphere Studio Application Developer and Rational XDE help ensure that developers never need to start with a blank slate and they have the most advanced productivity tools at their disposal.

Versata

Versata Logic Suite for WebSphere software, provided as a companion to WebSphere Studio, enables you to use a declarative approach to deliver business logic for your enterprise-scale WebSphere application. This declarative approach enables developers to collaborate with business managers, placing functionality ahead of technology in the development cycle to deliver n-fold improvements in time to market and maintenance, dramatically reduce the complexity and risk of large projects and allow development resources new to J2EE-based technology to become productive members of your WebSphere software team.

The Versata Logic Server complements your strategic investments in WebSphere software, J2EE, DB2 and WebSphere Studio by deploying the function defined by declarative business logic as EJB modules that can be seamlessly integrated with your architectural framework. The declarative business logic can be extended using conventional techniques, such as Java event handlers, inheritance and delegation. IBM and Versata are currently working to develop new releases of the Versata Logic Suite that will provide the most current functionality for the WebSphere software platform and allow full integration with the WebSphere Studio development environment for J2EE technology-based applications.

Instantiations, Inc.

Instantiations and Rational have created an offering — CodePro Migrator for Rational ClearCase — to migrate existing VisualAge for Java customers to WebSphere Studio and ClearCase LT. By providing seamless migration support, this new tool assists project leaders who want to take advantage of the new developer productivity tools and team collaboration capabilities that support IBM WebSphere Studio. Rational collaborated with Instantiations, Inc. to develop the new tool, which supports full migration from IBM VisualAge for Java/Envy to Rational ClearCase LT, a comprehensive version-control solution for small, co-located teams and to Rational ClearCase.

WebSphere Studio Workbench trading partners

Many other WebSphere Studio Workbench users and trading partners currently support the WebSphere software platform. To read the most current list of trading partner statements of support, visit **ibm.com**/websphere/developer/downloads/plugin.

Appendix A. WebSphere Studio configurations

Name	Description	For more information
Homepage Builder	While not currently implemented on the Eclipse Platform, provides easy-to-use, yet powerful tools for individual Web site developers	**ibm.com**/software/webservers/hpbuilder/
Device Developer	An integrated development environment for the creation and testing of applications that will be deployed on handheld and other small devices	www.embedded.oti.com/wdd
Site Developer	Product that provides a comprehensive integrated suite of tools for creating, managing and maintaining dynamic Web applications and supports the latest Web standards including Java-based technology, JSP components, HTML, DHTML, XML and Web services	**ibm.com**/software/ad/studiositedevok
Application Developer	An end-to-end award-winning J2EE development environment with integrated support for Java-based technology, Web, XML, Web services and EJB components	**ibm.com**/software/ad/studioappdev
Application Developer, Integrator Edition	Application Developer plus powerful graphical tools to build custom application adapters, visual flow-based tools that visually define the sequence and flow of information between application artifacts such as adapters, EJB components, Web services or other flows. Wizards that build and deploy complex Web services from adapters, EJB components, flows and other Web services	**ibm.com**/software/ad/studiointegration
Enterprise Developer	Complete set of tools, covering all aspects of development from Web page creation to Web services, to J2EE development to enterprise connectors to COBOL and PL/I development and maintenance, and to component generation using Enterprise Generation Language	See VisualAge, Enterprise Suite, Version 4.0, which now includes WebSphere Studio Application Developer, Integration Edition to help you get started today.

Appendix B. WebSphere Studio Extensions

Name	Description	For more information
Voice Toolkit	Based on VoiceXML, Version 1.0, provides the key components needed to expedite the development of voice applications	**ibm.com**/software/speech/enterprise/vtoolkit.html
Portal Toolkit	Provides the capabilities to customize and manage the enterprise portal and create, test, debug and deploy individual portlets and Web content	**ibm.com**/websphere/portal
Everyplace Toolkit	Allows developers to create new enterprise applications, adapt existing ones for mobile devices while enabling portlet rendering on these devices	**ibm.com**/pvc

Appendix C. Complementary products

Name	Description	For more information
WebSphere Development Studio for iSeries	A comprehensive solution for iSeries development	**ibm.com**/software/speech/enterprise/vtoolkit.html
Fault Analyzer/File Manager	Tools for zSeries file and fault management	www.boulder.**ibm.com**/epdd
WebSphere Studio Asset Analyzer	A tool that provides rapid inventory, understanding and impact analysis to simplify the integration of existing applications into an e-business environment	**ibm.com**/software/ad/wsaa

Appendix D. IBM application development product transition

Tool name	Description	Making the transition to	For more information
WebSphere Studio, Professional	Entry-level Web application development	Site developer	**ibm.com**/software/webservers/studio
WebSphere Studio, Advanced	Enterprise-level Web application development	Site developer, advanced	**ibm.com**/software/webservers/studio
VisualAge for Java, Professional	An entry-level development tool focused on Java and client-side application development	Site developer	**ibm.com**/software/ad/vajava
VisualAge for Java 2 Platform, Enterprise Edition	An award-winning team development environment for J2EE applications	Application developer	**ibm.com**/software/ad/vajava
VisualAge Enterprise Suite	Suite of application development software products packaged together to meet the end-to-end needs of e-business application developers and traditional mainframe developers	Enterprise developer	**ibm.com**/software/ad/vaes
VisualAge for COBOL	Offering to help increase development productivity, simplify the maintenance of your legacy code and provide seamless portability from host to workstation	Enterprise developer	**ibm.com**/software/ad/cobol/va
VisualAge for PL/I	Complete offering of compatible, cross-platform, cross-product compilers	Enterprise developer	**ibm.com**/software/ad/pli
VisualAge Generator	High-end rapid application development environment for building and deploying e-business, multitiered and standalone applications	Enterprise developer	**ibm.com**/software/ad/vagen

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