



WebSphere software

Leveraging the information technology organization, IBM @server zSeries tools and the on demand environment.

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Executive overview

IBM @server® zSeries® customers have unique business requirements. Their commitment to the highest-availability platform in the IBM product family reflects the need for an environment that can support high-volume transaction processing with demanding batch windows and large, mission-critical application portfolios. Organizations with IBM @server zSeries systems typically have large numbers of developers with broad skill sets in varying areas of business and technology, as well as great diversity in applications, processes and standards. In addition, they have the highest expectations as to the quality of service (QoS) and value they deliver to their corporations and to their customers.

This white paper examines the needs of IBM @server zSeries customers and their on demand business requirements. It reviews IBM software solutions that support on demand e-business in the context of service-oriented architectures (SOAs), transaction processing and application life cycles. Finally, this white paper aligns the IT requirements of IBM @server zSeries customers with their business goals, with an emphasis on return on investment (ROI).

Becoming an on demand e-business

Just as organizations did not become e-businesses overnight, the migration to e-business on demand™ will also occur over time. On demand e-businesses share four characteristics:

Responsive. Capable of sensing changes in the environment and responding dynamically, whether to unpredictable fluctuations in supply or demand; emerging customer, partner, supplier and employee needs; or unexpected moves by competition.

Variable. Able to adapt cost structures and business processes flexibly; can reduce risk and drive business performance at higher levels of productivity, cost control, capital efficiency and financial predictability.

Focused. Committed to concentrating on core competencies and differentiating tasks and assets; can leverage tightly integrated strategic partners to manage selected tasks ranging from manufacturing, logistics and fulfillment to HR and financial operations.

Resilient. Able to bounce back in real time from unexpected changes and threats – from computer viruses and earthquakes to sudden spikes in demand.

Virtually every on demand e-business starts with an on demand operating environment. Think of an on demand operating environment as a unified infrastructure that is:

- *Integrated.* With maximum flexibility to support the world of interdependent business processes and transactions – across your extended enterprise and to trading partners, suppliers and customers.
- *Automated.* To reduce management complexity – and to help you make better use of assets, improve availability and resiliency, and lower costs based on your business objectives.
- *Virtualized.* To help ensure peak efficiency – and to maximize the capacities of your servers and storage systems.
- *Based on open industry standards.* So you can readily interface your processes and applications with those of your customers, partners and suppliers.

Making the shift to e-business on demand requires that companies no longer look at their e-business application architectures and the underlying IT infrastructures as additions or extensions of their core IT environments. Rather, they view these elements as the new center of gravity of the enterprise on demand computing capability.

This shift can only be accomplished by deploying a robust application foundation that is capable of:

- *Managing complex transactions with high performance and throughput.*
- *Easily adapting to growing workloads without impacting system responsiveness and end-user service.*
- *Promoting secure access to heterogeneous enterprise computing resources.*
- *Offering virtually around-the-clock availability.*

Industry leaders worldwide look to open, standards-based Java™ 2 Platform, Enterprise Edition (J2EE) technology as the preferred architecture on which to build this solid foundation. IBM WebSphere® software offers an industry-leading, robust implementation that supports this architecture.

An open, standards-based J2EE environment also enables optimal use of your existing IT assets so that both new and existing business processes can be easily integrated with seamless, highly automated solutions. IBM has helped pioneer Java connectivity to enterprise information systems and has played an instrumental role in developing the relative J2EE standards. IBM has also been a driving force in defining standards for Web services, and has incorporated comprehensive support for connectivity and Web services throughout the WebSphere, IBM CICS® and IBM IMS™ transactional platforms.

Support for this environment also requires an enterprise-class application life cycle, with the ability to rapidly understand and deliver application processing. It also requires comprehensive systems management facilities that can monitor production systems, easily identify faults and take corrective action to minimize downtime, and quickly administer changes in the systems – all performed as fast and cost-effectively as possible.

The WebSphere software platform is well integrated with the tools needed to build and test higher-value business applications, and with the additional e-business engines needed to support a wide variety of solutions, including IBM WebSphere Portal, IBM WebSphere Commerce, IBM WebSphere Everyplace® Voice, IBM WebSphere Pervasive and IBM WebSphere Business Integration.

The rewards, or ROI, in becoming an on demand e-business can be significant. After the reliability, quality, performance, time-to-market, productivity and flexibility requirements are met, this underlying infrastructure can help significantly reduce the time required to take advantage of new market opportunities, or to respond to shifts in your existing markets.

IBM zSeries and the on demand environment: The information technology organization

The IBM on demand strategy represents how business processes can be enhanced through IT to support new and rapidly changing business environments. But who delivers this new technology and support? The answer to the question is the IT organization, and, perhaps more important, the people contained within it. This white paper provides examples of how customers can leverage IBM software to help IT organizations move existing resources, staffing and processes to an on demand environment, and how the on demand environment provides a comprehensive solution that can improve overall organizational productivity and business success.

Key attributes of the on demand strategy address the organizational need to enhance current investments and participate in on demand computing. These enable enterprises throughout the entire application life cycle, including:

- *New enterprise transaction processing and integration support, based on open standards – including Web services, Java and J2EE technologies – promoting reuse of business processes spanning traditional and new mixed-workload applications. These include Java, WebSphere, COBOL, PL/I, CICS and IMS.*

- *The ability to help developers discover, transform and communicate their enterprise assets, leverage business skills and meet the technological demands of today's business models.*
- *Robust development support to build and test applications deployable to distributed, traditional and mixed-workload environments.*

The application life cycle: It begins and ends here

Software that runs a business – either directly or through partners – includes a broad array of green-screen or traditional applications, Web applications, desktop applications, and back-end or back-office processing. In any organization, the teams delivering this software are developing new applications, maintaining and extending existing applications, and integrating these with each other and with new or existing packaged applications. The convergence of all these activities is focused on driving value, as measured by the business (and therefore, IT) to enable profitable and sustainable growth throughout the enterprise.

Many and varied roles and responsibilities exist within the complexity of a development team's infrastructure, including:

- *Traditional developers. A primary role is coding traditional COBOL, PL/I, CICS or IMS applications using the green-screen development environment on IBM @server zSeries called Interactive System Productivity Facility (ISPF).*
- *Java or Web developers. The key role is coding of Web and Java applications, using an interactive development environment like IBM WebSphere Studio.*
- *C developers. The main concentration is on traditional distributed or client/server applications, but C developers may be moving to Java and Web-serving environments.*
- *COBOL, PL/I, 4GL or high-level language developers. The primary responsibility is to create traditional-style applications, using higher-level languages like Enterprise Generation Language.*
- *Quality assurance personnel. Primarily performing functional testing and application validation of business performance, quality assurance roles typically involve planning tests and documenting how applications can be executed to validate processing, and may involve turning tests into executable scripts.*

- *Application and business analysts. The major role is to understand the current business environment, analyze future business requirements and evolve business process requirements into application documentation and proposals in the form of documents and application Unified Modeling Language (UML) models.*
- *Architects. A key responsibility is to define scalable and integrable architectures, and migration and infrastructure support strategies that can be integrated.*
- *Production support or operations staff. A primary role is to define, monitor and respond to changes in either the application infrastructure or usage (that is, performance issues in an organization).*

Often, a single member of the team fills multiple roles. For example, a COBOL developer may also write Java code or a senior developer may also do the work of an application or business analyst. The development team needs tools that can allow it to handle the full scope of what needs to be accomplished across the application life cycle, which may include:

- *Documenting and maintaining business requirements.*
- *Modeling and simulating the business process to identify optimal solutions.*
- *Architecting the solution and its components.*
- *Developing with multiple technologies and for multiple platforms.*
- *Integrating new, existing and packaged applications.*
- *Testing throughout the process.*
- *Managing the development process and the software assets to ensure the highest possible quality, efficiency and reuse.*
- *Managing the operations and support of the solution.*

IBM software development solutions – ranging from the IBM Rational® brand and WebSphere software brand, integrated with the CICS and IMS software and the IBM DB2® and IBM Tivoli® brands and IBM Business Partner toolkits – can help provide the support that professional software development teams need throughout the discovery-development-deployment cycle to drive business success.

Successful development teams collaborate throughout the life of an application – from the discovery phase, where goals and requirements are learned and captured – to the development phase, where these requirements are implemented – to the deploy phase, where the final testing, maintenance and monitoring occurs. Through this cycle – from requirement to retirement – all members of the team share responsibilities for maintaining best practices and for the specific expertise each contributes to the team. Figure 1 illustrates how IBM Rational tools automate almost every aspect of the software development cycle, while IBM, WebSphere, Rational, Tivoli and run-time-integrated tools provide much of the essential functionality.

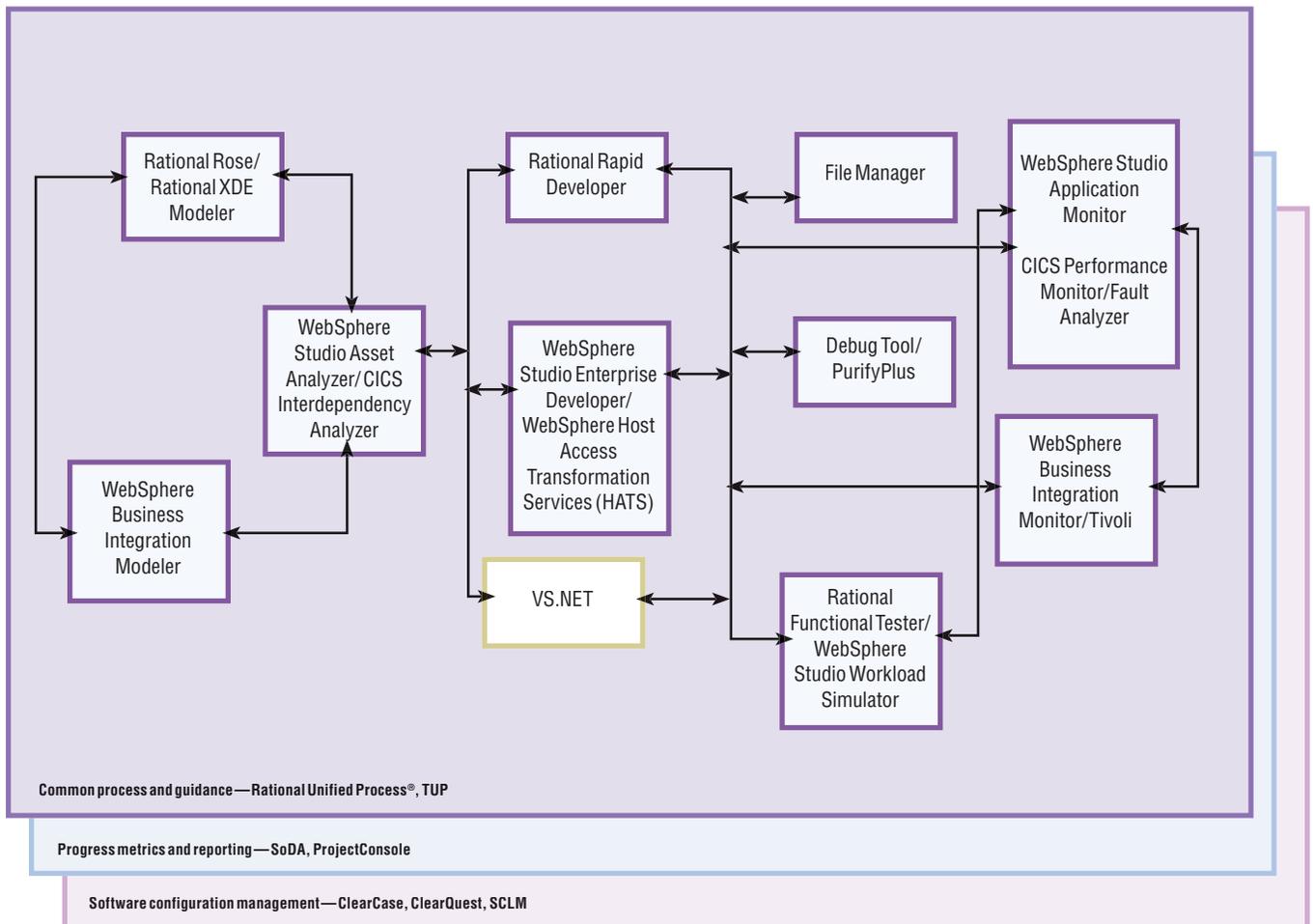


Figure 1. A view of IBM tools from an integration and work-flow perspective

IBM software solutions can support the application life cycle by helping you:

- *Understand as-is business processes and modeling and simulating to-be business processes.*
- *Leverage to-be processing as application models.*
- *Generate core application objects from the application models.*
- *Write and test WebSphere, CICS, IMS, batch Java, COBOL and PL/I applications.*
- *Test, debug and profile (performance) and validate coverage.*
- *Create and execute test cases and automatically verify functionality.*
- *Append test results to problem (bug) reports and help eliminate the need to re-create user errors.*
- *Identify faults and performance problems.*
- *Monitor business processes across the enterprise.*
- *Assess the integrity of application architectures early in the project life cycle—before coding begins.*

The net result is more automation that can save time used to perform tedious administrative tasks, and consequently ease the complexity of software development through simple management of software development cycles. Ultimately, automation can enable quality evaluation earlier in the process, promote heterogeneous skills and lead to manageable infrastructures to support the entire development process.

Service-oriented architectures and IBM transactional environments

Whether you are developing new J2EE applications or integrating existing applications, a topic of primary consideration is a term commonly known as *service-oriented architecture (SOA)*. An SOA is a collection of services that provides some form of sharable processing to applications. These services communicate with each other. The communication can be either simple data passing, or it can involve two or more services coordinating activity. Some means of connecting services to each other is also needed.

Traditional applications can participate in SOAs. Transaction-oriented applications, such as those that work through basic mapping support (BMS) maps and transfer control information through CICS Comm Areas, may have been created, as has been the recent architectural recommendation, with one set of routines handling screen processing and one set handling business processing. The business processing itself is often written in a batch-type application, invoked through a standards-based interface, and provides programmatic access to data and unique logic. This is an SOA and its componentized interface can be used by any number of business integration tools and made part of a larger business flow or application. Today, standards-based interfaces are often provided through Enterprise JavaBeans (EJB) or as a Web service. This interface can also be used by any number of business integration tools and made part of a larger business flow or application.

Middleware and transaction processing

In today's complex IT infrastructures, middleware software is the glue that keeps business transactions executing, and systems talking to each other. Examples include message-oriented middleware, application servers, enterprise application integration solutions and transaction processing systems.

WebSphere, CICS and IMS middleware platforms provide an execution environment for business transactions and multiple end users that require access and processing against multiple data types. WebSphere, CICS and IMS provide transaction processing and manage the operating environment to provide performance, scalability, security-rich capability and integrity.

Virtually everyone uses transaction processors, because transactions are pervasive in modern-day activities:

- *Banks and financial services*
- *Distribution and retail*
- *Government*
- *Health and education*
- *Insurance*
- *Manufacturing*
- *Process and petroleum*
- *Telecommunications and media*
- *Travel and transport*
- *Utilities and energy*

A transaction can be thought of as a routine event, usually a request for service, in running the day-to-day operations of an organization. WebSphere software, CICS and IMS manage these requests. As an example, imagine withdrawing US\$100 from an ATM. To complete this transaction, you want to be able to:

- *Withdraw funds at any time of day or night.*
- *Receive the correct amount you request, provided the funds are available.*
- *Have the dispensed amount deducted from the correct account.*
- *Have the next account statement reflect the transaction.*

As a consumer, you would be dissatisfied with your service provider if you did not get this standard level of service on a consistent basis. What is invisible to the banking customer is the reason why banks have the ability to process hundreds of thousands of simultaneous transactions. If transaction processing stops, a banking organization will lose business. For this reason, many banks rely on CICS or IMS, or both, as the backbone for running their day-to-day operations, with WebSphere software providing the access, integration and session management. The constancy of a transaction-processing system is the lifeblood of a high-volume transaction organization, such as a financial institution.

WebSphere Application Server for z/OS

Building an agile on demand e-business that can increase your market reach and maximize your ROI means more than simply extending host systems to the Web. To participate in the next stage of e-business, it is vital to leverage existing investments and make administrative resources more productive.

IBM WebSphere Application Server for z/OS provides the environment required to handle high-volume, Web-based transaction processing. A comprehensive J2EE technology and Web services-based application server, WebSphere Application Server for z/OS is specifically designed to leverage the unique qualities of service provided by @server zSeries hardware and the IBM z/OS® operating system. Through a rich e-business application deployment environment, you can build and manage e-business applications, integrate existing resources and extend host systems to the Web.

WebSphere Application Server for z/OS combines the integrated, open, standards-based J2EE environment of IBM WebSphere Application Server with the reliability and availability of the z/OS operating system. As a result of this advanced design, WebSphere Application Server for z/OS provides an efficient environment to help maximize staff and system resources by optimizing existing capacities.

WebSphere Application Server for z/OS leverages the robust @server zSeries and z/OS capabilities that your business counts on, including:

- *@server zSeries hardware cryptographic engines and z/OS support for Secure Sockets Layer (SSL) transactions to provide high-performance security processing.*
- *Intelligent resource director (IRD) to shift capacity and resources from lower- to higher-priority partitions.*
- *Capacity upgrade on demand to support nondisruptive capacity increases.*
- *Capacity backup to support rapid, temporary, nondisruptive capacity additions.*
- *Extended systems management facility recording.*
- *Two-phase commit with resource recovery service (RRS) – the native z/OS transaction manager – to facilitate deep integration with CICS, IMS and IBM DB2® Universal Database™ systems to provide optimal performance, higher availability and faster recovery in rollback situations.*

WebSphere Portal software solutions

WebSphere Portal provides a single point of personalized access to applications, content, processes and people, and enables customers to reduce costs, increase revenue and rationalize infrastructure.

IBM WebSphere Portal for z/OS leverages the self-configuring, self-healing, self-optimizing and self-protecting z/OS platform to deliver the highest levels of workload management, QoS and scalability. WebSphere Portal for z/OS enables you to share enterprise data and dynamically allocate resources across multiple servers and heterogeneous workloads.

Maximize ROI with Web services and other standards-based connectivity

Web services can help you reliably and smoothly integrate new Web applications with existing Web and traditional applications. WebSphere Application Server for z/OS provides a comprehensive infrastructure to support the production-ready deployment of Web services-based applications, allowing you to build, publish and manage integration-ready application services that can be used by other internal or external organizations or platforms. WebSphere Application Server supports key Web services open standards, including Simple Object Access Protocol (SOAP); Universal Description, Discovery and Integration (UDDI); and Web Services Description Language (WSDL). You can deploy Web services with a variety of communication mechanisms, including SOAP and HTTP, Java Message Service (JMS) or Remote Method Invocation/Internet Inter-ORB Protocol (RMI/IIOP).

WebSphere Application Server for z/OS provides extended Web services support with a private UDDI registry. The IBM UDDI Registry – which acts as a directory of services to help users find information about Web services – enables developers to publish and test their internal e-business applications in a security-rich, private environment.

IBM CICS Transaction Server recently introduced SOAP for CICS to enable rapid connection of Web service-based infrastructures into and out from CICS Transaction Server environments.

IBM also recently introduced support for publishing existing or new IMS, COBOL, PL/I and C Message Format Service (MFS) applications as Web services with connections through SOAP and EJB bindings.

CICS and IMS processing as SOAs

The IBM CICS Connector for IBM CICS Transaction Server and IBM IMS Connector for Java options enable a Java technology-based program or EJB code-based application to be developed to communicate with an existing or new CICS or IMS application – typically running on another CICS or IMS system.

CICS Transaction Gateway

IBM CICS Transaction Gateway provides a robust, flexible and scalable solution for companies that have existing business-critical processes running on CICS servers. CICS Transaction Gateway allows you to efficiently integrate applications running on IBM WebSphere Application Server with core business systems running on CICS servers. The latest versions of CICS Transaction Gateway implements the J2EE Connector Architecture (J2EE CA), allowing you to use EJB technology to leverage CICS system capabilities.

IMS and IMS Connect

IBM IMS Connect provides a robust, flexible, high-performance, scalable and strategic solution for access to existing and new IMS applications and operations. IMS Connect allows efficient transactional integration of WebSphere Application Server JCA application EJBs with IMS. IMS Connect, Version 2 adds a distributed two-phase commit and publishing of IMS applications as Web services with connections through SOAP and EJB bindings. IMS provides Java Database Connectivity (JDBC) to IMS data for WebSphere Application Server EJBs running on z/OS. IMS, Version 9 Java Remote Database Services extends support to distributed WebSphere EJBs.

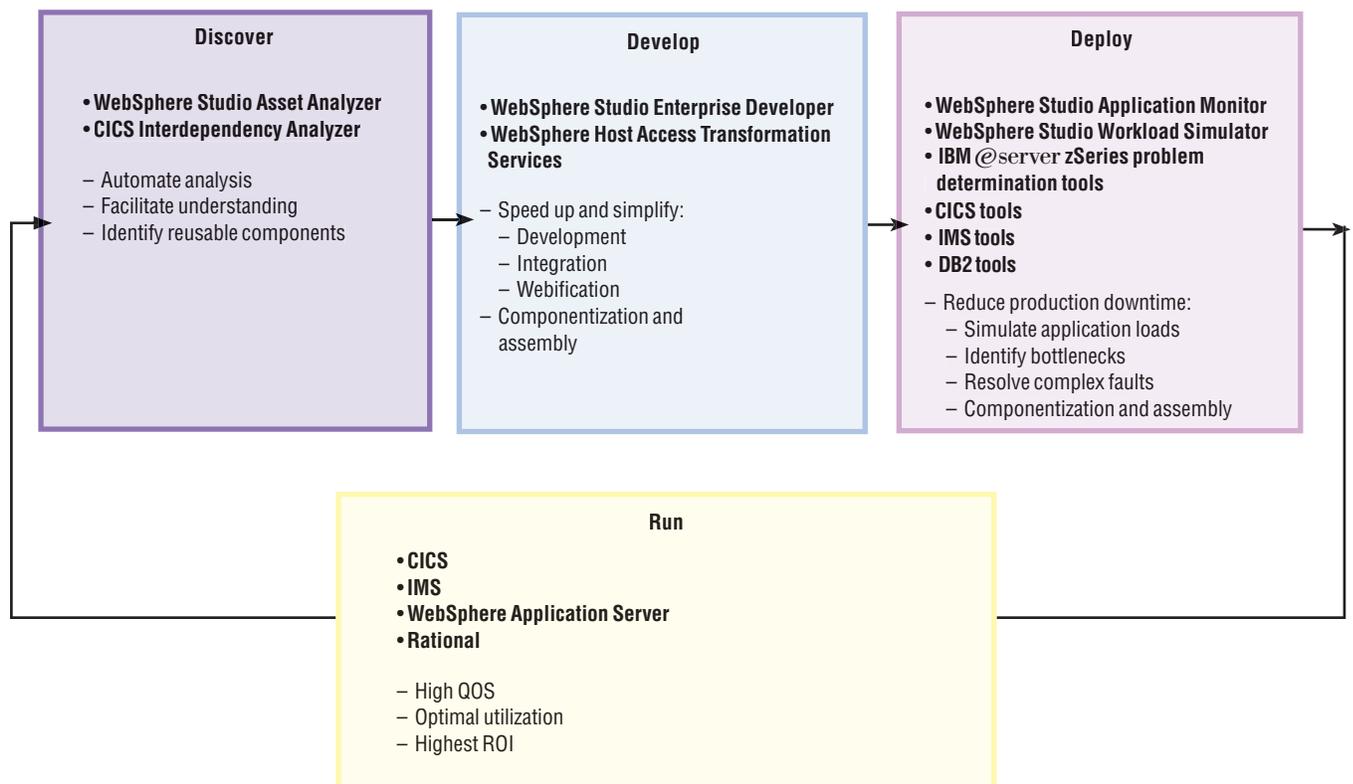


Figure 2. IBM mixed-workload application life-cycle tools

Discovery solutions for @server zSeries and mixed-workload applications

Before a business can be integrated, much needs to be learned about the decades-old systems that are running business functions today. A great deal of time is spent maintaining legacy systems, preventing businesses from using valuable resources to undertake e-business projects. Identifying legacy components for reuse in e-business implementations can speed up the process of reusing valuable business functions. Reusing newly developed components as services can also help meet QoS requirements.

IBM uses the term *discovery solutions* to refer to the process of understanding, preserving, evolving and integrating existing applications with new on demand e-business application models. Studies have shown that creating new code can be significantly more costly than reusing existing code. Much of this cost relates not just to the programming effort, but rather to the costs related to all the other activities, such as verifying compliance to specification (analysis), testing, deploying, verifying the scalability and functionality, and performance tuning. When an organization can reuse existing code that has provided business value for years, and which is tuned and deployed, the savings can be potentially dramatic.

Discovery solutions are those that provide system inventory, application understanding and componentization. These solutions supply relationship mapping of application artifacts, in-depth data and control flow, and code componentization tooling.

IBM WebSphere Studio Asset Analyzer and IBM CICS Interdependency Analyzer are offerings in the discovery solutions category. Working applications can be an IT organization's biggest asset. Reusing application constructs helps accelerate application development through the life cycle, by requiring less new code and reusing previously tested code.

CICS Interdependency Analyzer supports run-time analysis by automating the collection of CICS resource-interdependency data and helping developers understand the object and resource usage in CICS applications. It operates by recording information about the application as it is executing.

WebSphere Studio Asset Analyzer assists IT personnel with the maintenance and extension of existing assets through impact analysis, connector-building assistance and application understanding. It helps enterprise customers modernize their existing enterprise assets and skills for on demand development by providing knowledge about their static environments (finding and reusing application code and the componentry that connects that code), and their dynamic environments (understanding what code is executing in run-time environments). It operates by providing an enterprise-scale repository of asset information integrated with both mainframe and distributed source change management (SCM) environments.

Development solutions for zSeries and mixed-workload applications

As soon as you understand your current business assets and the impacts of changes to these assets, you can use IBM development tools to more effectively develop new e-business applications. These tools offer:

- *Easy-to-use Web application definition, flow and assembly.*
- *Simple and rapid extension of existing applications to the Web.*
- *The ability to combine new and existing applications to develop new e-business solutions.*
- *A development portal that allows both Java and non-Java programmers to use a single tool set.*

Enterprise-scale rapid application development – including simplifying the definition and reuse of existing processing and code in SOAs – is part of the strategy for IBM mixed-workload deliveries.

IBM development tools can help you:

- *Improve the user interface of mission-critical applications to reduce training costs and increase end-user productivity.*
- *Integrate new processes and applications to develop differentiated front-end capabilities with lower risk than more ambitious replacement strategies.*
- *Componentize existing mission-critical applications to enable core processes to be independently modernized and flexibly integrated – on demand.*

WebSphere Studio Enterprise Developer

IBM WebSphere Studio Enterprise Developer helps you get started faster by reducing technological barriers to modern application development and architecture. It gives application architects a single interface to define high-level application processes and architectures and promote best practices, so individual application developers have clearly outlined tasks and can work more intelligently. Application assemblers can quickly connect existing business or screen processes to new application code in a visual environment. WebSphere Studio Enterprise Developer can help improve team-wide efficiency with broader skills sets, including HTML, JavaServer Pages (JSP) and Java technology, Struts visual application assembly, COBOL, PL/I, and 4GL/EGL coding and scripting capabilities.

JCA and Web services connectivity, included with WebSphere Studio Enterprise Developer, gives developers the ability to identify, describe and document Web services. You can then transform specifications into WSDL, create XML schemas and generate connectors to gain access to existing transactional environments.

IBM Enterprise COBOL and PL/I

IBM Enterprise COBOL and IBM Enterprise PL/I support XML parsing of messages to facilitate open, high-performance access to IBM z/OS system-based components. With newly added verbs, such as XML PARSE and XML GENERATE, messages can be easily turned into COBOL data structures for business processing, and then sent back to the requesting application.

Built-in Java technology interoperability, leveraged by OO COBOL and code generators built into WebSphere Studio Enterprise Developer, lets developers share business objects across supported z/OS and WebSphere environments.

IBM WebSphere Host Access Transformation Services

IBM WebSphere Host Access Transformation Services provides a Web services option that allows you to create Web services from programmatic interaction with 3270 applications. Native CICS and IMS terminal-display interfaces can be easily extended as new Web services, or Web pages (using either rules-based or programmatic integration techniques), JavaBeans code or EJB code, to tap into and extend 3270 system information without extensive programming.

Host Access Transformation Services, fully integrated with WebSphere Portal, lets you quickly and easily extend legacy content and services as new portal content. WebSphere Portal solutions help you leverage your vast inventory of legacy application content through a personalized, single point of access with greater control and ease.

Deployment solutions for zSeries and mixed-workload applications

Business processes rely heavily on IT infrastructure for availability and performance, especially in an e-business, mixed-workload environment. However, the IT infrastructure environment becomes extremely complex when dealing with mixed-workload or service-based applications. A large number of different components (for example, client-side presentation, server-side presentation, session management, business logic or database access) can be involved. If an enterprise ignores performance management, serious business and IT problems – and ultimately lost business – can result.

WebSphere performance management

As the growth of J2EE applications shows no signs of slowing down, J2EE application management has become a business-critical need.

By providing granular application structure and behavior information, IBM WebSphere Studio Application Monitor complements systems or infrastructure-monitoring products from Tivoli. WebSphere Studio Application Monitor is intended to be used by application developers and application support analysts, while data center operators use infrastructure-monitoring tools.

The goal of application management is to minimize the risks associated with deploying applications into a production environment. Application management consists of two components:

- *Application problem determination, which addresses the problems that are most likely to occur in the applications and what can be done proactively to avoid them; or if a problem exists, addresses how it can be corrected quickly and with minimal disruption.*
- *Application performance management, which addresses how many resources the applications will consume and how to analyze historical data to fine-tune the applications and assess the needs for future growth.*

WebSphere Studio Application Monitor

WebSphere Studio Application Monitor helps find and correct application problems, and lets you assess and analyze J2EE application performance.

WebSphere Studio Application Monitor enables customers to perform deep drill-down and analysis against J2EE applications, and provides application and business context surrounding the data that it collects. J2EE applications servers, including business flows to CICS, can be like a black box when you try to understand the behavior and flow of applications at any given time. WebSphere Studio Application Monitor can fill that gap through its application-centric problem determination and performance analysis capabilities in a nonintrusive and low-overhead manner.

WebSphere Studio Application Monitor complements other systems management products by providing the missing application detail necessary for a complete, end-to-end solution. WebSphere Studio Application Monitor integrates neatly with IBM Tivoli Event Console framework, allowing you to continue using your existing assets while leveraging new capabilities.

WebSphere Studio Workload Simulator

WebSphere Studio Workload Simulator leverages the highly scalable z/OS environment to conduct load-, stress-, performance-, regression- and capacity-planning tests. It lets customers create *virtual* or *simulated* users, helping reduce the costs associated with manual load and performance testing, verifying application performance and scalability before production or live business processing. WebSphere Studio Workload Simulator:

- *Simulates multiple Internet browsers to test Web servers.*
- *Helps validate a Web-serving environment against production-level loads.*
- *Is integrated with WebSphere Studio Application Monitor.*
- *Enables simplified setup and testing from a single-server environment.*

CICS performance management

IBM CICS Performance Monitor and IBM CICS Performance Analyzer, together with the traditionally strong performance management technologies in CICS Transaction Server, help you reduce the cost of downtime and improve the ability to meet service level agreements by enabling:

- *Continuous monitoring and fast problem determination to control and prevent downtime.*
- *A proactive approach to CICS systems tuning.*
- *Use of proven CICS performance management technologies to improve the availability and integrity of CICS systems.*

CICS Performance Monitor

For CICS Transaction Server, CICS Performance Monitor provides facilities for online threshold management and monitoring, real-time problem determination and correction, and historical task data collection for improved troubleshooting. CICS Performance Monitor:

- *Uses the IBM CICSplex[®] System Management infrastructure for performance data collection.*
- *Offers an easy-to-use comprehensive graphical interface for threshold and history management.*
- *Helps ensure fast problem determination by managing multiple regions from a single point of control.*

CICS Performance Analyzer

For CICS Transaction Server, CICS Performance Analyzer provides facilities for processing performance information recorded in System Management Facility (SMF) to provide ongoing performance analysis, flexible reporting with supplied reports or customizable reports, and historical data processing for trending and capacity planning. CICS Performance Analyzer:

- *Provides an easy-to-use interface to run supplied performance analysis reports, or to easily create customized reports.*
- *Evaluates SMF data recorded not only for CICS, but also for related subsystems, like DB2, IBM WebSphere MQ (formerly IBM MQSeries®), to create a complete picture of a CICS transaction performance across multiple systems.*
- *Selects and records this data in a database for trend analysis.*

IMS performance management

IBM IMS Performance Monitor, IBM IMS Performance Analyzer and IBM IMS Problem Investigator, together with the traditionally strong performance management technologies in IMS, help you reduce the amount of time required to identify, analyze and resolve defects in IMS resources and performance. IMS performance management technologies offer:

- *A proactive approach to IMS system and database problem investigation, identification and resolution.*
- *Use of IMS performance tools technologies to improve the availability and integrity of your IMS transaction and database systems.*
- *Ease-of-use technology and customization for IMS system and database environments.*

Integration with the Tivoli portfolio

Many @server zSeries tools integrate with Tivoli products to provide a suite of integrated performance management tools that enable you to better monitor the health of your @server zSeries systems and applications.

In many cases, integration with Tivoli Business System Manager supplies extended support across the enterprise. Tivoli Business System Manager leverages the CICSplex System Manager application programming interface (API) to gather CICS region information for display via its GUI and drill down to the CICSplex System Manager Web user interface (WUI). With the Tivoli Management Portal availability, CICS Performance Manager provides drill-down capability for the portal.

z/OS application problem determination and management

IBM Application Monitor, IBM Debug Tool, IBM Fault Analyzer, IBM File Manager and IBM Workload Simulator make up the problem determination tool suite from IBM. These tools provide key functions required in the application life cycle, and can assist in transforming applications into on demand applications by supporting mixed-workload environments.

Application Monitor

IBM Application Monitor can be used with Debug Tool, Fault Analyzer and File Manager to provide application developers with a powerful suite of productivity tools. With Application Monitor, application performance can be analyzed during the application build process, as part of preproduction staging or when in production.

Debug Tool and Debug Tool utilities and advanced functions

Debug Tool is a robust, interactive, interlanguage, source-level debugging tool. It helps you examine, monitor and control the execution of programs written in C/C++, COBOL, PL/I or Java (each compiled with appropriate IBM compilers) on an IBM OS/390®, IBM MVS™ or VM system. Debug Tool supports debugging of applications in various subsystems, including CICS, IMS and DB2.

Fault Analyzer

Fault Analyzer helps you find the cause of abends in application programs. It can be used for problem determination during the development phase and the testing phase, or during execution in production. It analyzes the cause of abends in application programs across a broad range of environments (such as TSO, CICS, IMS and WebSphere environments), languages (including COBOL, PL/I and C/C++) and types of abends. Fault Analyzer supports new application development platforms through interactive problem control system (IPCS) exits.

File Manager

File Manager for OS/390 provides powerful functions – like data browsing, editing, copying and comparing – for use by application developers, system support personnel, system administrators or system operators. As an application programmer, you can leverage File Manager to quickly build data files for application development or quality assurance testing, or both.

Workload Simulator

Workload Simulator provides powerful stress and regression functions to help application developers and system support personnel improve quality assurance of deployed applications. A test manager can be used to automate the building and execution of workload scripts.

Assessing return on investment

In today's economic environment, companies are looking for strategic potential ROI, while at the same time evaluating and implementing products delivering tactical or project-scale values. Quite simply, IT organizations need to deliver tactical solutions to build toward a wider-reaching strategic goal. To do this effectively, IT managers must have a thorough understanding of both short-term and long-term benefits of technology acquisition and implementation.

In the previous sections, you read about business challenges that some key technologies are helping to address. Some of these business challenges include:

- *Entering new business initiatives. Finding new ventures enabling the corporation to increase revenues, possibly making up for decreasing revenues in other areas of the business.*
- *Improving customer service. Providing better service and products to current customers. This involves responding to sometimes intense competitive pressures.*
- *Lowering operating costs. Creating more-efficient business models, thereby lowering operating costs. Realizing profits from previously shrinking or stagnant markets. In many ways, this means doing as much or more with less investment and resources.*
- *Managing mergers and acquisitions. Integrating newly acquired business ventures in the most cost-effective way possible.*

These challenges require support from information technology. The technical solutions require IT focus on the following areas:

- *Skills and organizational flexibility*
- *Increased productivity*
- *Greater reuse and sharing of application processes and skills*
- *Shortened time to market*
- *Higher software quality*
- *Improved information about and manageability of the application life cycle or processes*

Two types of benefits can be realized by modernizing existing applications. One type of benefit is the value that is brought to the business by improving the application structure and therefore making programming staff more productive. These are measurable benefits to which ROI can be assigned. The second type of benefit is less quantifiable. These are intrinsic benefits such as improving the user experience (yielding increased customer and user satisfaction, and lowered training costs), closer business relationships with trusted trading partners, and even improving staff morale.

Cost structure of the development life cycle

Writing and maintaining code encompasses a wide variety of tasks.

Requirements, analysis and design are key tasks performed by business and application analysts. Programmers write program code and are also involved in the compiling and debugging of applications. Testing covers a multitude of levels and involves both testers and programming staff.

According to some commonly used industry statistics, IT costs can be broken into the following percentages when mapped against activities in the application development life cycle:

- *Model and discover: may consume up to 30 percent of a project life cycle.*
- *Develop and integrate: may consume up to 30 percent of a project life cycle.*
- *Test, deploy and manage: uses the remaining 40 percent of resources assigned to a project life cycle.*

Value of the portfolio as it exists today

Ultimately, the value of a company's application portfolio exists in the business process contained within. There are many ways to compute the value of this portfolio – some more time-consuming than others. Two popular approaches are listed below:

- *The first method is to attempt to assign value to the applications and the revenue that they drive.*
- *The second approach to calculating the value of the corporate portfolio of applications is to perform a metric analysis of the portfolio. Two of the most common metrics are known as lines of code (LOC) and function points (FPs).*

For many companies, the existing investment in application portfolios is staggering. These companies cannot afford the resources (time, people or money) to re-create the application portfolios to run their businesses.

Value of a component library and component reuse

Perhaps 30 percent of the existing business processing or application code has the potential to be reused as services. This is the portion of the application or code that contains business processing with the potential to be reused as SOAs. The other 70 percent deals with programming infrastructure, such as information validation, error handling and so on.

There can be significant value in having these available services contained in a more flexible architecture and available for reuse in new application portfolios. This value may be realized over a few years, not all at one time. However, the total value added can be significant.

Organizational skills improvement

Real value can be found in skills flexibility when Java technology developers become conversant with application processing in COBOL or PL/I, and when these COBOL or PL/I developers become Java and Web technology literate. As training in today's economic climate is often not a realistic option, this skills transfer and experience often takes the place of formal education.

The result of heterogeneous skill sets is greater organizational flexibility in assigning work, and improved application support as business processes can be understood, supported and moved forward by a broader set of an organization's development community.

Deployment and management

Deployment and management is the customer-facing view of application success. ROI here can be developed by examining the financial impact of application downtime. When an application is not available to its end users, several streams of revenues are directly affected:

- *Loss of customers. If the application is customer-facing and revenue-generating, this particular item is of prime importance. For example, if the shopping cart check-out component of an e-commerce Web site fails, the company loses revenue from this application until the problem is corrected.*
- *Loss of productivity. When a particular application goes down, a number of employees are directly affected and they cannot complete their daily tasks.*

Rational solutions for IBM @server zSeries

IBM Rational products	
IBM Rational XDE® family	<p>A family of UML-based visual design and development tools, which includes:</p> <ul style="list-style-type: none"> • IBM Rational XDE Modeler: helps architects and analysts model their systems using UML • Rational XDE Developer Java Platform Edition: helps Java and J2EE developers design and develop enterprise Java applications without leaving their integrated development environment (IDE).
IBM Rational Rose®	<p>A family of UML-based visual modeling and design tools for all environments not supported by the XDE family. As with the XDE family, the IBM Rational Rose family of products is used to develop a model of software applications that enables work at a higher level of abstraction. And because UML models have semantic meaning, you can use a model to generate code and thus automate the tedious tasks associated with developing an application.</p>
IBM Rational ClearCase®	<p>A software configuration management solution that simplifies the process of artifact change through the use of flexible tools and processes. It supports full parallel development, enabling multiple developers to work on the same artifact concurrently and merge their work with the work of other developers as needed.</p>
IBM Rational ClearQuest®	<p>A defect- and change-tracking tool that captures and tracks all types of change requests (defects, enhancements and so on) for any type of development project. When installed with ClearCase software, the resulting unified change management solution lets team members link the activities used to plan and track project progress with the artifacts that are undergoing change.</p>
IBM Rational RequisitePro®	<p>A requirements management tool that provides project managers with a central location for all requirements to better manage the scope of their projects. It helps analysts effectively document requirements using Microsoft® Word or a database, or both; provides developers with access to requirements from their design tools like IBM Rational Rose and IBM Rational XDE; and gives testers direct access from IBM Rational TestManager to the requirements they need to validate.</p>
IBM Rational TestManager	<p>An open and extensible framework that unites all of the tools, artifacts and data both related to and produced by the testing effort. Testers use it to document a detailed test plan, execute tests and analyze the results of the tests. Rational TestManager contains a full reporting system to track the progress of the application under testing. It provides the entire team with a centralized and integrated set of tools that helps to coordinate the testing effort across team members, iterations and releases.</p>
IBM Rational Functional Tester	<p>A functional and regression testing tool that provides best-in-breed technology for testing Java and Web-based applications. Use it to test applications built with J2SE, J2EE, HTML, DHTML, XML, JavaScript and Java applets. Can be used as a stand-alone product or from within IBM WebSphere Studio and Rational XDE Developer.</p>
IBM Rational PurifyPlus™	<p>A complete set of run-time analysis tools. Run-time analysis is the practice aimed at understanding application behavior using data collected during its execution. Often associated with debugging, run-time analysis can also be used with any variety of testing methods to proactively uncover and diagnose reliability, performance and scalability, and durability problems. PurifyPlus software consists of three tools:</p> <ul style="list-style-type: none"> • IBM Rational Purify®. Memory corruption detection and memory profiling in native C/C++ applications and memory profiling in Java and Microsoft .NET managed code applications. • IBM Rational Quantify®. Performance profiling. • IBM Rational PureCoverage®. Code coverage analysis.

Conclusion

Organizational productivity will be a major driver in the competitiveness of companies in general and IT in particular. Although change and response have always been a part of IT, there has perhaps never been as much technology change in as tight a financial marketplace as we are experiencing today.

IBM WebSphere, CICS, IMS and DB2 run times and the supporting tools can help create an infrastructure to support this change, and enable IT to demonstrate and deliver competitive advantage by leveraging skills, productivity, transactional throughput and SOAs.

The information in this white paper can be used to provide a starting point to build the case for implementing an enterprise transformation solution. Initial investment, initial analysis and project decisions should be evaluated and tracked, over time, for actual compared to theoretical ROI, and used for modification of this information.

Potential returns, as well as actual results, should be monitored and communicated across the organization, perhaps as bulletins, newsletter articles and so on, to further enhance organizational understanding of the value of IT, the promise of new technologies in moving the business forward, and the partnership between business and IT in creating value and increasing profitability.



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