Choosing SOA and application life-cycle solutions designed to help you achieve your business objectives.

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Executive overview

Organizations that run the IBM System z™ platform have unique business requirements. Their commitment to the server platform in the IBM portfolio with the highest availability demonstrates their need for an environment that can support high-volume transaction processing with demanding batch windows and large, critical application portfolios. Organizations with System z environments typically have large numbers of developers with broad skill sets in varying areas of business and technology, as well as a diverse set of applications, processes and standards. They also have the highest expectations for the quality of service and value they want their systems to deliver internally, as well as externally to their customers.

This white paper examines the needs of organizations that run System z machines and their On Demand Business requirements. It reviews IBM software solutions that support On Demand Business in the context of service oriented architecture (SOA), transaction processing and application life cycles. Finally, this white paper aligns the IT requirements of System z users with their business goals, with an emphasis on return on investment (ROI).

On Demand Business and SOA

Making the shift to On Demand Business requires that companies no longer look at their Web-based application architectures and the underlying IT infrastructures as additions or extensions of their core IT environments. Rather, they view these elements as the center of gravity of their enterprises' demand-based computing capabilities.

You can make this same strategic shift by deploying a robust application foundation that can:

- *Open processing to new classes of users.*
- *Deliver processing faster – and integrate IT and business processes smoothly.*
- *Manage complex processing with high performance and throughput.*
- *Easily adapt to growing workloads without affecting system responsiveness and user quality of service.*
- *Promote security-rich access to heterogeneous enterprise computing resources.*
- *Offer virtually around-the-clock availability.*

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The SOA life cycle

SOA provides the flexibility to treat business-process elements and the underlying IT infrastructure as security-rich, standardized components—typically, Web services—that you can reuse and combine to address changing business priorities. You can use an SOA to address key challenges and pursue significant opportunities more quickly and efficiently. SOA can also help your business by:

- Making it easier to link existing systems to new applications. *Each successive wave of technology—from batch processing to green-screen and client-server technologies, enterprise resource planning (ERP) systems, Web applications, Java™ technology-based applications and now services—has contributed to a mosaic of applications that most enterprises are likely to rely on for years to come. And SOA helps simplify the integration of new and existing applications.*
- Helping to improve internal business processes. *Analyzing, improving, automating or creating new business processes is fundamental to cost-cutting, enhancing customer satisfaction and advancing virtually every business initiative. The ability to rapidly assemble or reassemble solutions using SOA streamlines these efforts.*
- Enhancing shared business processes. *SOA is based on open standards and is platform-independent, making it easier for businesses to automate common business-to-business (B2B) processes and improve the efficiency of supply chains.*

SOA enables you to improve flexibility within IT and better align IT with business objectives. Of course, building SOA solutions is only part of the story. IBM provides the IBM SOA Foundation to support the entire SOA life cycle, including modeling, assembling, deploying and managing SOA solutions, as shown in Figure 1. IBM also offers education, consulting services and years of SOA expertise to help you build your SOA-based solution.

IBM SOA Foundation focuses on aligning IT with business priorities and enabling business flexibility. You can model business processes, design and construct services, and assemble them into composite applications, which you can then deploy, manage and adapt as needed to satisfy changing business requirements.

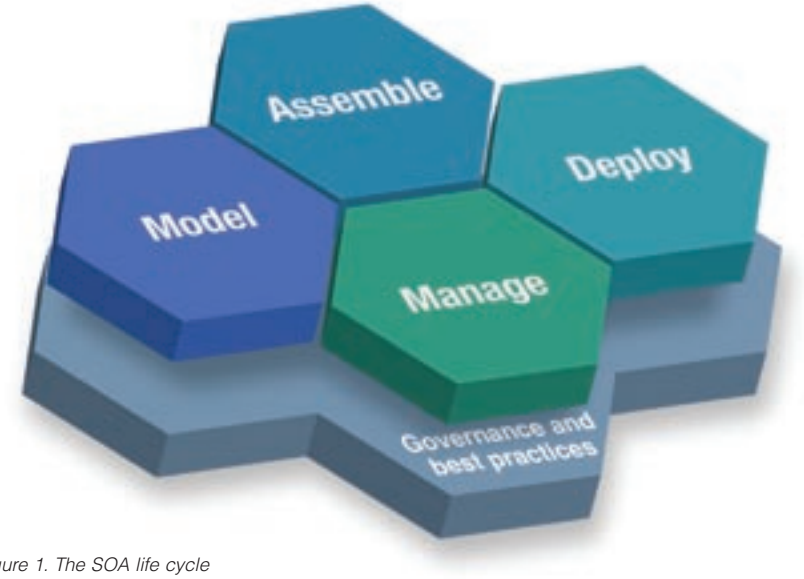

Figure 1. The SOA life cycle

SOA: A blueprint for change

The need to respond to changing business demands with flexible IT solutions has led many businesses to consider the benefits of an SOA approach. SOA combines individual business functions and processes, called *services*, to implement more-sophisticated composite business applications and processes. This approach to IT considers business processes as reusable components or services that are independent of applications and the computing platforms on which they run. With SOA, you can design solutions as assemblies of services in which the assembly description is a managed, first-class aspect of the solution, and hence, amenable to analysis, change and evolution. You can then view a solution as a choreographed set of service interactions. The ultimate goal of taking an SOA approach is to help maximize flexibility for the business and within IT.

A simplified model for describing the overall service wiring and assembly aspects of an SOA solution is critical to creating it. IBM has introduced new technologies, including Business Process Execution Language (BPEL), business-state machines, business rules, Web services and direct support in

IBM software like IBM WebSphere® Application Server, IBM CICS® Transaction Server, IBM IMS™ and IBM DB2® Universal Database™ for z/OS (DB2 for z/OS) to process inbound and outbound service requests. These capabilities help simplify and accelerate service design, development, assembly and deployment.

The IBM SOA programming model separates development and deployment activities into separate phases that can occur at different times and that different individuals with different skills can perform. This approach yields a true separation of concerns, enabling you to reuse software components. Key elements of the IBM SOA programming model include:

- *Service Data Objects (SDOs) and Service Component Architectures (SCAs) (now in the standardization path at Java Community Process), which provide a simplified programming model for various resources and data access – and complement core Web services standards, such as XML, Web Services Definition Language (WSDL) and SOAP*
- *BPEL for Web services, a service-orchestration and component-scripting standard that supports workflow and business-process integration*
- *JavaServer Faces (JSF), a Java framework that speeds Web application development for developers who are not expert Java 2 Platform, Enterprise Edition (J2EE) developers*
- *Transactional and language support through WebSphere Application Server, CICS Transaction Server, IMS, DB2 for z/OS, Java, COBOL and PL/I*

Industry leaders worldwide consider open-standards-based Web technology to be 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 Web 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 Web services connectivity to enterprise information systems (EISs), has played an instrumental role in developing mature Web services standards, and has incorporated comprehensive support for connectivity and Web services throughout operating environments such as WebSphere, CICS, IMS and DB2 for z/OS. Bridging capabilities are defined between existing critical WebSphere, CICS, IMS and DB2 applications, prepackaged applications and enterprise data stores (including hierarchical, relational, XML and text).

The ROI that you can potentially achieve through SOA can be significant. After your underlying infrastructure helps you meet your reliability, quality, performance, time-to-market, productivity and flexibility requirements, it can help reduce the time required to take advantage of new market opportunities, or to respond to shifts in your existing markets.

A change in application architecture: from monolithic to composite applications

Traditional enterprise applications were large, monolithic solutions targeted at addressing a specific business function. Design techniques, tools and processes were optimized around developing these kinds of systems. However, today's business systems increasingly involve composite applications, which are sets of related and integrated services that support a business process. To pull all this together, a composite application generates multiple transactions and subtransactions across various runtime platforms and systems.

Supporting SOA within your IT organization and across the application life cycle

Embracing the principles of On Demand Business means finding ways to enhance business processes so that they can support new and rapidly changing business environments. Who delivers this new technology and support? Your organization's IT systems—and perhaps more important, the people who manage them. Part of the purpose of this white paper is to describe how you can use IBM software to help move existing IT resources, staffing and processes to an On Demand Business environment. And to understand how On Demand Business offers a comprehensive solution that has the potential to help improve your organization's overall productivity and business success.

Key attributes of an On Demand Business strategy address the need to enhance current investments and participate in computing that is based on the composite application model. The ability to support a composite-application model throughout the entire application life cycle is critical to a successful SOA approach. Important capabilities of composite applications include:

- *New enterprise transaction processing and integration support, based on open standards—including Web services, Java and Web technologies—promoting reuse of business processes spanning traditional and new composite applications*
- *The ability to help developers find, manage, transform and integrate their enterprise assets, take advantage of business skills, and meet the technological demands of today's business models*
- *Robust development support to generate an SOA-based application infrastructure, build unique business processing and test applications that can be deployed in SOA and composite-based application environments*
- *High quality of service and throughput for key transactions*

Several important technologies and standards have been defined to support an SOA approach, most notably when the services are distributed across multiple machines and connected over the Internet or an intranet. SOAs that incorporate Web services rely on communication protocols, such as SOAP; express the Web service interfaces in WSDL; register, search for and reuse services and related assets in Reusable Asset Specification (RAS) repositories, directories, and Universal Description, Discovery, and Integration (UDDI) repositories; and share information in documents defined in XML.

Even though you can take an SOA approach that does not use Web services technology and you can use Web services technology in a way that would not be considered service oriented, today, Web services are the most common way to implement an SOA.

The application life cycle: It begins and ends here

Software that runs a business—either directly or through partners—can include a broad array of traditional or green-screen, Web, desktop, SOA and batch applications. 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.

Often, a single member of the team fills multiple roles. For example, a COBOL developer can also write Java code or a senior developer can also do the work of an application or business analyst. The development team needs tools that can enable it to handle the full scope of what needs to be accomplished across the application life cycle, which can 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 help ensure the highest-possible quality, efficiency and reuse*
- *Managing the operations and support of the solution*

IBM software development solutions include products from across the IBM Rational® and WebSphere software portfolios that integrate smoothly with CICS, IMS and DB2 for z/OS, as well as products from the IBM Tivoli® software portfolio and IBM Business Partner toolkits. These solutions can help provide the support that your software-development team needs throughout the discovery-development-deployment life cycle to help drive business success.

Successful development teams collaborate throughout the application life cycle—from the *model* phase, where goals and requirements are learned and captured; to the *assemble* phase, where these requirements are implemented; to the *deployment* phase, where the final testing, maintenance

and monitoring occur, to the *manage* phase where applications can be optimized for performance and reliability with effective security for upmost integrity and efficiency. Throughout this cycle, all members of the team share responsibilities for maintaining best practices and for the specific experience each contributes to the team (see Figure 2).

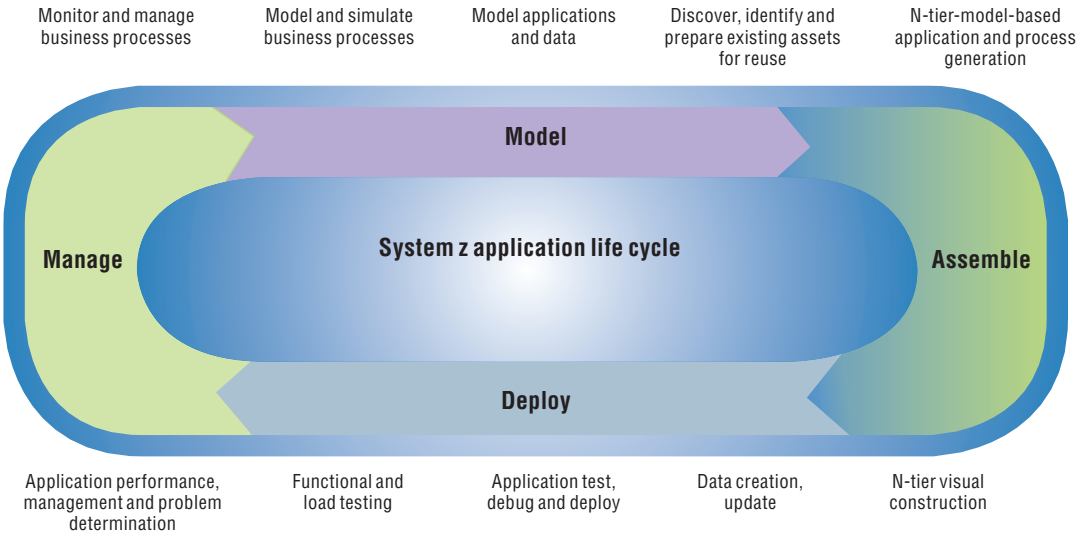

Figure 2: The application life cycle

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

- *Understand existing business processes, and model and simulate future business processes.*
- *Take advantage of to-be processing as application models.*
- *Generate core application objects and implementable processes from the application models.*
- *Write and test WebSphere, CICS, IMS, DB2 for z/OS, Java batch, COBOL and PL/I applications and services.*
- *Test, debug and profile performance and validate coverage.*
- *Create and run test cases and automatically verify functionality.*
- *Append test results to problem reports and help eliminate the need to re-create user errors.*
- *Identify faults and performance problems with production.*
- *Monitor business processes across the enterprise.*
- *Assess the integrity of application architectures early in the project life cycle – before coding begins.*

Modeling solutions for System z and composite applications

IBM uses the term *model* to refer to the process of discovering, analyzing and understanding existing applications, typically so that you can change them. These changes can be simple maintenance enhancements or more-significant transformations that evolve an application so that it can fulfill changing business requirements or that integrate business processes in new SOA application models.

Maintaining complex systems involving millions of lines of code can be very time-consuming. This manual effort consumes time and staff who could otherwise be deployed on new, strategic projects. But creating entirely new code can be significantly more costly than reusing existing code. Much of this cost is in post-programming activities, such as verifying compliance to specifications, testing, deploying, and verifying scalability and functionality, and tuning performance. When you can reuse existing code that has provided business value for years, the potential savings can be dramatic, because this code is already tuned and deployed—and already meeting service-level agreements (SLAs). Modeling solutions are those that inventory a system, aid in understanding the structure and dependencies in and among applications and their data, identify and manage business rules, and identify candidates for reuse. These solutions can:

- *Help reduce the time and cost of the analysis phase of a project.*
- *Show dependencies within and among applications, helping to reduce the risk of making changes (and thereby helping to improve application quality and availability).*
- *Enable analysts and developers on a project to become productive more quickly.*
- *Provide a means to move from today's monolithic applications to architectures that make composite applications possible.*

WebSphere Studio Asset Analyzer

IBM WebSphere Studio Asset Analyzer assists IT personnel across the enterprise with maintaining, extending and transforming existing assets through impact analysis and application understanding. IT personnel, developers, analysts and operations staff can quickly understand enterprise applications and determine the impact of proposed changes within and across applications in the enterprise—including composite applications made up of traditional and J2EE components that span z/OS, Windows and IBM AIX® systems. WebSphere Studio Asset Analyzer operates by providing an enterprise-scale repository of asset insight integrated with both mainframe and distributed source change management (SCM) environments. Its Web-browser-based interface provides visualizations of application dependencies, logic and data flow, and the related source code itself.

Asset Transformation Workbench

IBM Asset Transformation Workbench, and its optional components, provide software architects, project leaders and business analysts with a workstation-based tool that includes an enterprise-application knowledge base. The product also integrates with the IBM WebSphere Studio Asset Analyzer repository. Project teams using Asset Transformation Workbench can tap into the WebSphere Studio Asset Analyzer repository to find all the application artifacts related to a particular application. Detailed reports, metrics, documentation and visualization of the applications are readily accessible from Asset Transformation Workbench.

Asset Transformation Workbench accelerates the move to Web services through its business rules-management and componentization functions. Business analysts can identify candidate processes within code using the business-rules identification features. The componentization technology of Asset Transformation Workbench can then extract the logic into a self-contained component that provides the business-level service appropriate in a Web service.

CICS Interdependency Analyzer

IBM CICS Interdependency Analyzer helps CICS programmers understand the runtime-system resource relationships within CICS applications to improve their ability to maintain and change these applications. Documentation and source code might not be available, and manual investigation of these relationships might not be an option due to project schedule constraints. CICS Interdependency Analyzer eliminates the burden of conducting manual investigations by automating the detection of runtime relationships within a CICS system, recording them in a DB2 database, and providing a graphical interface for analyzing the collected information. This information can help you make more efficient use of your CICS resources, as well as help improve the speed and reduce the costs of application maintenance. It can also be critical to your ability to maintain and change these applications, including making changes to support SOA implementations.

Assembling solutions for System z and composite 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 *assemble* new On Demand 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 On Demand 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 composite deliveries. IBM development tools can help you:

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

WebSphere Developer for zSeries

IBM WebSphere Developer for zSeries® includes capabilities that can help make traditional mainframe development, Web development and integrated composite development fast and efficient. COBOL and PL/I, Java, and Enterprise Generation Language (EGL) developer communities can also be more productive when they take advantage of these functions.

When you implement an SOA approach to your IT infrastructure, you must assemble a team of people with varying levels of technology backgrounds and areas of expertise. These teams include specialists, each with expertise in a different area, such as modern, browser-based, user-interface (UI) development in Java technology, connectivity development with Web services, and business development with languages such as COBOL and PL/I. You want to extend these professional skills across your organization, and use both existing and new Web and Web services technologies—along with proven transactional technologies such as CICS, IMS and DB2 for z/OS—to speed your entire development and deployment processes.

As IBM's premier enterprise application-development environment, WebSphere Developer for zSeries brings traditional development capabilities, the power of J2EE and rapid application-development support to diverse enterprise application-development teams. With comprehensive development tools to help create, deploy and maintain traditional enterprise and composite applications, developers from different technical backgrounds can easily participate in On Demand Business and SOA projects together. As traditional programmers collaborate in the process of creating modern applications, their familiarity with new technologies widens—as they continue to use their existing skills.

WebSphere Developer for zSeries includes tools for building the underlying business process and infrastructure for Web, SOA or composite, and traditional application processes. These tools support the popular, open-source JSF and Struts run times. They also include a visual construction environment that allows a developer to quickly link views implemented as HTML and JavaServer Pages (JSP) with business logic implemented with a number of different technologies, such as Web services and CICS service flows, JCA adapters, COBOL and PL/I, and EGL. This capability enables individuals with a variety of skill sets to contribute to the construction of sophisticated Web, traditional and composite applications.

Enterprise COBOL and Enterprise PL/I

IBM Enterprise COBOL and IBM Enterprise PL/I support XML parsing of messages to facilitate open, high-performance access to z/OS system-based components. With 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 interoperability, used by object-oriented COBOL and code generators built into WebSphere Developer for zSeries, enables you to share business objects across supported z/OS and WebSphere environments.

WebSphere Integration Developer

IBM WebSphere Integration Developer is a fully integrated development environment based on the Eclipse, Version 3 platform. It is designed to enable you to rapidly assemble business solutions based on a composite application-development framework—using minimal programming skills. With WebSphere Integration Developer, you can author SOA-based services and choreograph them into business processes that you can deploy on IBM WebSphere Process Server. WebSphere Integration Developer offers a role-based development experience that specifically targets the integration developer on a single, integrated Eclipse platform. Because WebSphere Integration Developer is based on open standards, such as WSDL, XML Schema Definition Language (XSD) and BPEL, you can model, implement and deploy complex composite applications without extensive knowledge of the underlying implementation.

The graphically rich WebSphere Integration Developer interface enables you to create composite business applications by wiring service components without requiring you to have extensive skills and knowledge of underlying programming and architectural implementations. Its fully integrated testing, debug and deployment environment allows you to easily deploy new applications to WebSphere Process Server. After you've deployed those applications, you can dynamically change them and adapt to evolving business needs with rich features like business rules, selectors and business-state machines.

WebSphere Integration Developer complements IBM WebSphere Business Modeler, and can be used in conjunction with IBM Rational Software Architect, and Rational Application Developer. When combined into a single integrated development environment (IDE), these products provide a comprehensive suite of tools to model and assemble SOA applications.

WebSphere Host Access Transformation Services

IBM WebSphere Host Access Transformation Services (HATS) provides tools to quickly and easily extend existing terminal applications to your business partners, customers and employees. It offers two basic transformation scenarios for expanding the use of terminal applications:

- *The ability to transform the user experience of existing applications without modifying those applications. Using the rules-based transformation technology in HATS, application screens can be rendered in the browser on the fly with intuitive user interfaces. The appearance, usability and flow of existing applications can also be enhanced by creating screen customizations and macros.*
- *The ability to transform and expand the connectivity of existing terminal applications by extending the business logic as Web services. HATS helps simplify the creation of standard Web services interfaces to provide access to host applications. Web services protocols such as SOAP and WSDL provide an efficient and reusable means to standardize access to your host systems, helping you lower the cost to maintain and deploy connectors to these systems.*

HATS, fully integrated with IBM WebSphere Portal, helps enable you to quickly and easily extend existing content and services as new portal content. WebSphere Portal solutions help you make the most of your vast inventory of existing application content through a personalized, single point of access with greater control and ease.

Deploying solutions for System z and composite applications

Whether you are developing new Web applications or integrating existing applications, SOA is a primary concern. The collection of services that make up an SOA communicate with each other to provide some form of sharable processing to applications. 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.

Both traditional applications and modern Web applications can participate in SOA. Older transaction-oriented applications, such as those that work through basic mapping support (BMS) maps and transfer control information through CICS communication areas (COMMAREAs), might 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. Today, standards-based interfaces are often provided through Web user interface (WUI)-oriented JSF interfaces, Enterprise JavaBeans (EJB) or directly as Web services. The SOA interface can be used by any number of business-integration tools and made part of a larger business flow or application.

Middleware and transaction processing deployment

In today's complex IT infrastructures, middleware software is the glue that keeps business transactions running and systems talking to each other. Examples include message-oriented middleware, application servers, enterprise application integration solutions and transaction-processing systems. WebSphere, CICS, IMS and DB2 for z/OS middleware platforms provide the runtime environment to deliver performance, scalability, security-rich capability and integrity. These platforms also offer a deployment environment for business transactions and multiple users that requires access and processing against multiple data types. Because transactions of some sort are integral to a variety of modern-day business activities, virtually everyone uses transaction processors.

Modern application architectures—including those that might be called enterprise applications—can be categorized according to their function. You can decompose functions into common components, including model, view and controller, that make up an application. To enable users to take advantage of modern interfaces and Web access, visual processing with JSF is a well-respected option to implement the view component. The controller component ties visual processing and the business process to the technical implementation, or model. The model component includes business-process logic that controls the order in which various application computations and data operations are implemented. Keep in mind that today, business processing is implemented on various platforms and languages based on the processing requirement of the function.

Studies of the modification history of applications demonstrate that the view and controller components of the application source are more likely to change than any other part of the application. This observation, along with the initial Web-interface requirements, lead to a suggestion that the interface, or view, and business-process logic be implemented in J2EE. Overall controller logic should also be implemented in a closed environment that is easily invoked from the view. Then, to meet very high performance, computation and throughput requirements, including transaction logic, data access and runtime-specific controller logic as appropriate, the best option might be to implement business processing in CICS, IMS and DB2 for z/OS environments using compiled languages like COBOL and PL/I.

As a consumer, you would be dissatisfied with your service provider if you did not get a standard level of service on a consistent basis. For example, back-end systems that are invisible to the banking customer enable banks to process hundreds of thousands of simultaneous transactions. If transaction processing stops, a banking organization loses business. For this reason, most major banks rely on CICS, IMS or DB2 for z/OS systems as the backbone for running their day-to-day operations—with WebSphere software providing access, integration and session-management capabilities. The constancy of a transaction-processing system is the lifeblood of a high-volume transaction organization, such as a financial institution.

CICS Transaction Server for z/OS

Today, businesses must handle a range of challenges, including:

- *Supporting large numbers of active users, with high performance on volatile data*
- *Using multiple sources of data, with robust security and transactional integrity*
- *Running applications across the network with access to data on the host*
- *Growing the systems to cope with increasing demand while taking advantage of existing investments*

These are exactly the qualities that CICS Transaction Server brings to your business. And because CICS Transaction Server is an advanced solution, based on the transaction, which is the fundamental unit of business, it easily adapts to the way that your business works. Many of the world's most prominent companies use CICS Transaction Server. Chances are, your business is one of them.

CICS Transaction Server has a proven track record of successfully delivering new technology and allowing you to profit from it at a pace that makes sense for your business by taking advantage of the investments you have made in CICS technology over the years while minimizing the risks inherent in adopting new technologies.

IBM intended IBM CICS Transaction Server for z/OS, Version 3.1 to align fully with SOA principles, so that it enables business flexibility through IT simplification. Together with its portfolio of tools, CICS Transaction Server features and capabilities fall into the following categories:

- *CICS integration, which enables reuse of CICS applications, within a flexible IT infrastructure, using standard application programming interfaces (APIs) and protocols*
- *Application transformation, which enables enhancement of existing applications and construction of new applications, using contemporary programming languages, constructs and tools*
- *Enterprise management, which enables effective management of large runtime configurations using modern user interfaces, so that you can meet demanding service-level objectives*

WebSphere Application Server for z/OS

Based on J2EE and Web services standards, IBM WebSphere Application Server for z/OS is a business engine for the mainframe—and provides the foundational building blocks for SOA. To take an SOA approach, you must be able to use existing investments and make administrative resources more productive, thereby extending the reach of your core business in a cost-effective, efficient manner. WebSphere Application Server for z/OS provides the environment required to handle high-volume, Web-based transaction processing, and makes the most of the unique qualities of service provided by System z hardware and the IBM z/OS® operating system, including:

- *System z hardware cryptographic engines and z/OS support for Secure Sockets Layer (SSL) transactions to provide high-performance security processing*
- *IBM Intelligent Resource Director to shift capacity and resources from lower- to higher-priority partitions*
- *Integration with z/OS Workload Manager to classify and prioritize WebSphere workloads within the bounds of other System z workloads*
- *On demand capacity upgrade to support nondisruptive capacity increases*
- *Capacity backup to support rapid, temporary, nondisruptive capacity additions*
- *Extended systems-management facility recording*

WebSphere Application Server for z/OS shares a common programming model with IBM WebSphere Application Server Network Deployment—combining an integrated, open-standards-based J2EE environment with the reliability and availability of the z/OS operating system. This advanced design enables WebSphere Application Server for z/OS to provide an efficient environment to help maximize staff and system resources by optimizing existing capacities.

Two-phase commit with Resource Recovery Services (RRS)—the native z/OS transaction manager—facilitates deep integration with CICS, IMS and DB2 for z/OS systems to provide optimal performance, higher availability and faster recovery in rollback situations.

IMS transaction and database server

IMS software provides leading-edge availability and speed for database and transaction processing. With the demands of the evolving On Demand Business environment and a marketplace that works in real time, IMS continues to deliver the integrity, capability and performance that customers have come to expect from IBM.

IBM is focused on strengthening IMS leadership so that you can have the On Demand Business enablement, growth, availability and systems-management capabilities that newer environments and cost measures require. Enhancements to IBM IMS Database Manager and IBM IMS Transaction Manager can help you:

- *Transform the way you do business by helping to enable information integration.*
- *Build On Demand Business applications that can tolerate the rigors of conducting business on the Internet.*
- *Run a scalable, available, highly secure and easily managed environment.*

IMS, Version 9 helps to address your On Demand Business needs by providing integration through SOA with other products and platforms within the industry, supporting IBM's commitment to open standards that benefit you and developing supporting tools for application development and connectivity. The product offers manageability with autonomic computing to ease use, help eliminate or reduce outages, and minimize the education curve for users. And IMS, Version 9 enhances scalability to help ensure flexibility for growth and expansion.

Maximize ROI with Web services and other connectivity standards

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 for z/OS supports key Web services open standards, including SOAP, UDDI and WSDL. You can deploy Web services with a variety of communication mechanisms, including SOAP and HTTP, Java Message Service (JMS) or Remote Method Invocation over Internet InterORB 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 Web-based applications in a security-rich, private environment.

CICS Transaction Server recently introduced CICS Web services to enable rapid connection of Web services-based infrastructures into and out of CICS Transaction Server environments.

IBM also recently introduced IBM IMS SOAP Gateway, enabling rapid connection of Web services-based infrastructures to IMS applications. This capability adds to 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 through WebSphere Application Server for z/OS.

CICS and IMS processing as SOAs

IBM CICS Transaction Gateway and IBM IMS Connectivity 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

To help support an end-to-end On Demand Business environment, IBM CICS Transaction Gateway is a production-proven, high-performing, security-rich and scalable J2EE connector that requires minimal changes to CICS systems and usually no changes to existing CICS applications. It allows you to rapidly service-enable your CICS applications by connecting them to new environments – such as the enterprise service bus (ESB) that is at the heart of your SOA. The latest version of CICS Transaction Gateway implements the J2EE Connector Architecture (JCA), a component of the J2EE specification. The JCA delivers managed qualities of service for connections, transactions and security, and is widely supported in education materials and software tools from IBM and non-IBM vendors. You can use CICS Transaction Gateway to quickly develop better applications. Also, when deployed on System z machines, CICS Transaction Gateway can now support two-phase-commit transactions.

A two-phase-commit transaction helps ensure that data integrity is maintained when updating multiple resource managers in a distributed transaction. This capability helps ensure that the entire transaction can commit successfully, or if some error condition occurs, be entirely returned to the pretransaction state. With global two-phase commit, you can physically distribute a composite transaction across heterogeneous servers and operating environments – giving you maximum flexibility without compromising on data integrity. Two-phase-commit transactions enable maximum transactional integrity by requiring a PREPARE command to be confirmed by each resource manager, before a COMMIT command makes all transaction changes permanent.

IMS Connectivity options

IMS Connectivity options enable you to efficiently integrate applications running on WebSphere Application Server for z/OS, with existing, critical core business systems running on IMS servers. The IBM IMS, Version 9 Integrated Connect function—like its predecessor, the IBM IMS Connect tool—provides a robust, flexible, high-performance, scalable and strategic solution for efficient access to existing and new IMS applications and operations. This support enables efficient transactional integration of WebSphere Application Server for z/OS JCA application EJBs with IMS applications. You can take advantage of distributed two-phase-commit capabilities and publish IMS applications as Web services with connections through SOAP and EJB bindings.

IMS also provides Java Database Connectivity (JDBC) access to IMS data. This support enables efficient data integration of WebSphere Application Server EJBs running on z/OS with IMS data. IMS, Version 9 Java Remote Database Services (RDS) extends this support to distributed WebSphere Application Server EJBs through WebSphere Application Server for z/OS without requiring application changes. Again, you can take advantage of distributed two-phase-commit capabilities and publish IMS data as Web services with connections through SOAP and EJB bindings.

DB2 for z/OS

DB2 for z/OS remains the dominant relational data server on the System z platform. The IBM focus on DB2 continues to meet the scalability, very high availability, reliability and performance requirements of both transactional and analytic workloads. In addition, IBM makes the most of the maturity of its relational database services to support new and expanding data types like XML.

DB2 for z/OS can help to ease your entrance into the complexities of Web services integration. Critical DB2 for z/OS applications can easily be made available in an SOA, as both a provider and a consumer. In addition, applications can be integrated with Web services.

Web Services Object Runtime Framework (WORF) support provides a runtime framework for wrapping Structured Query Language (SQL) functionality within Web services. This framework is easily generated using IBM WebSphere Application Developer and Rational Application Developer tools. SQL operations that exist within a Web service are defined in a WORF-specific XML file (file type Document Access Definition Extension [DADX]) that contains mapping between the service name and the SQL statement implemented by the service. The DB2 JDBC connection information for the target database is provided through the group properties file. The WORF runtime component is hosted on a Java application server (for example, WebSphere Application Server). Support for DB2 is available for both distributed and local z/OS systems. In a local z/OS configuration, the WORF runtime consists of a Web services proxy servlet that receives SOAP requests, loads the DADX file, builds the JDBC call to the database based on the SOAP request and the DADX operation definition, connects to DB2 and invokes SQL statements or calls. The result is then formatted into XML and returned to the requester.

Process servers, and business and service modeling

Today's organizations are merging, consolidating and streamlining operations to streamline business processes to help reduce costs and increase business productivity. Business process management (BPM) can help speed the rate of business change and increase your IT effectiveness. The key to effective BPM solutions, however, is robust tools that enable you to model, assemble, deploy and manage processes. IBM offers a comprehensive suite of process-integration solutions to help you meet these challenges.

WebSphere Process Server

WebSphere Process Server is designed to enable the transformation of business processes based on an SOA model. This comprehensive process-automation server uses open-standards-based technology to integrate business processes with a unified programming model that spans people, workflows, applications, systems, platforms and architectures.

WebSphere Process Server offers robust process automation, advanced human workflow, business rules, application-to-application (A2A) and B2B capabilities—all on a common, integrated SOA platform with native JMS support. Built on WebSphere Application Server and including IBM WebSphere Enterprise Service Bus (WebSphere ESB), WebSphere Process Server provides a premier J2EE and Web services technology-based application platform for deploying enterprise Web services solutions for dynamic On Demand Business.

Together with WebSphere Integration Developer, WebSphere Business Modeler and IBM WebSphere Business Monitor, WebSphere Process Server delivers a comprehensive SOA offering that completes the life cycle of business processes by:

- *Enabling the life cycle of business processes by integrating with WebSphere Business Modeler to seamlessly transform business models into IT flows and, with WebSphere Business Monitor, to provide real-time visibility into your business processes*
- *Interoperating with products across the IBM WebSphere software portfolio, enabling you to take advantage of capabilities for people, information and application integration*
- *Delivering a broad reach across a range of integration solutions through its use of ESB technologies and support for IBM WebSphere Adapters, providing easy connectivity to business applications*

WebSphere Process Server also provides a Web client with plain-text display capabilities to enable on-the-fly changes to business rules to be deployed using an intuitive user interface. By separating the business-rules component from the individual business-process flows, WebSphere Process Server enables a rule to be managed by the domain expert for that particular business rule. Also, by encapsulating rules as a service component, WebSphere Process Server enables a rule to be used across multiple processes for maximum business flexibility.

WebSphere ESB

In an SOA, an ESB is the connectivity layer that connects and mediates information between service requesters and service providers. These service requesters and providers can include new Web services and existing investments, such as core business applications virtualized as Web services. WebSphere ESB is a flexible connectivity infrastructure for integrating applications and services, designed to enable the development of an SOA.

WebSphere ESB is at the heart of an SOA, powering it by helping to reduce the number and complexity of interfaces. As a result, you and your applications can focus on your core business needs, rather than your IT implementation. Your SOA is only as effective as the assets connected together, regardless of what application, system or service is at either end. WebSphere MQ provides a flexible messaging backbone to connect all your assets in a reliable, highly secure, high-speed way.

WebSphere ESB delivers a standards-based integration platform for facilitating connectivity between services. With Web services connectivity, JMS messaging, and service-oriented integration, you have the ability to improve flexibility and minimize disruption by using an ESB to handle integration logic, and enable intelligent interactions between business events and end points.

WebSphere ESB is easy to use from both a tools and a runtime perspective. IBM WebSphere Integration Developer, the WebSphere ESB tool that can be purchased separately, delivers an integrated, interactive and visual development experience that requires minimal programming skills.

You can get up and running quickly with a compelling experience that is supported by easy-to-understand samples and comprehensive documentation. The ability to simplify the task of declaring services and defining interconnections and visually composing mediation functions with first-class tool support for intelligent message routing, enrichment and transformation helps makes development easier. New role-based administration support makes it easy to manage WebSphere ESB deployments through a simplified user experience for solution administrators.

You can also reduce the time required to see a return on your investment. As a cost-effective solution for services integration, WebSphere ESB allows you to use your SOA investments by providing a flexible integration infrastructure to unlock the value of existing investments. WebSphere ESB facilitates the dynamic reconfiguration of service interactions to meet changing business needs. Also, extensive WebSphere Adapter support enables you to connect to hundreds of ISV solutions, together with prebuilt mediation function that can help save time and development costs.

WebSphere MQ

Your SOA is only as widespread and effective as the assets connected together, regardless of what application, system or service is at either end. WebSphere MQ provides a flexible messaging backbone to connect all your assets in a reliable, highly secure, high-speed way.

With WebSphere MQ, you can reliably and consistently integrate your applications so that you can take full advantage of your existing software and hardware assets. It offers scalable, enterprise-class connectivity designed to grow with your integration challenges and needs. Resilient application integration is achieved by passing messages between applications and Web services. Queuing and transactional facilities work to preserve the integrity of messages across the network, helping to reduce the risk of information loss and the need to reconcile communicating IT systems. WebSphere MQ also eliminates the need to write complex communications code and offers a choice of simple APIs (Message Queue Interface [MQI] and XML Message Server [XMS], as well as Microsoft® .NET and Web services) that are consistent across a wide range of supported operating environments.

WebSphere MQ also helps ensure that data sent between applications is not duplicated in transmission and updates are completed as a single unit of work or transaction. This assured delivery means that WebSphere MQ forms the proven messaging backbone of many critical communication systems and is entrusted with delivering critical and high-value data. Information can be delivered either synchronously or asynchronously depending on the needs of the applications and Web services. You can also configure the quality of service provided by WebSphere MQ for increased performance on less-critical data.

WebSphere Message Broker

IBM's advanced ESB, IBM WebSphere Message Broker, integrates any type of asset across your enterprise, delivering high performance and high throughput, while connecting and integrating heterogeneous assets that could be both Web services or non-Web services, nonstandards-based assets. Its robustness, flexibility and wide-ranging capability make WebSphere Message Broker a leading-edge advanced ESB, transforming between multiple protocols and different data formats, handling practically any type of business event, and securely connecting all assets. It mediates between services or end points by examining, routing, transforming and enriching in-flight information between systems to help reduce complexities at the end points. Whether it is a tag-delimited SWIFT or EDIFACT message, a custom-record format closely mapping a C or COBOL data structure or XML, you can manage this diversity in a consistent, format-independent way using WebSphere Message Broker.

Additionally, WebSphere Message Broker includes rich complex-event-processing capabilities that enable you to analyze clouds of events at the application, enterprise or worldwide level, and perform validation, enrichment, transformation and intelligent routing based on a set of business rules as the events themselves occur.

Version 6 of IBM WebSphere Message Broker for z/OS provides a complete and consistent range of brokering capabilities compared to the broker on other platforms. These capabilities are particularly robust because they enable developers to create and test solutions on their platform of choice, and move their packaged solutions to the z/OS production environment when ready—confident that functional behavior can be preserved.

Moreover, the z/OS broker also has characteristics and capabilities that are specific and advantageous to the z/OS platform. Message flows deployed to brokers on z/OS can benefit from using resource managers such as WebSphere MQ and DB2 for z/OS which use an IBM Parallel Sysplex® environment. And now you can use a Java Virtual Machine (JVM) to generate machine instructions that can be offloaded to dedicated processors called System z Application Assist Processsors (zAAPs). Because a zAAP costs significantly less than a regular central processor and the zAAP capacity is not included in MSU capacity, you have the ability to offload Java applications without increasing software costs. WebSphere Message Broker for z/OS also provides enhanced integration to CICS and VSAM environments, enabling those crucial assets to be fully connected into the ESB.

WebSphere Transformation Extender

IBM WebSphere Transformation Extender is the universal transformation engine for products across the WebSphere software portfolio. Along with everyday transformation capabilities, it can also handle transformation of very large, semistructured, hierarchical, nested data sets and files and supports a wide variety of industry formats using WebSphere Transformation Extender Industry PACKs. These packs import data structures from other sources and validate the structure of that data, helping to ensure compliance with industry standards and regulations.

Because WebSphere Transformation Extender runs natively on the System z platform, it can be an excellent companion to WebSphere Message Broker for handling more-complex data integration. It can even run as a component of WebSphere Message Broker as WebSphere Transformation Extender for Message Broker, taking advantage of the robust environment and flexible distribution provided by WebSphere Message Broker. It is *universal* in that it is possible for it to run as the transformation engine in other products within the WebSphere portfolio. It does not replace existing transformation technologies, but can be a valuable addition to the existing capabilities of other WebSphere products.

Along with WebSphere Transformation Extender running on System z, a number of other associated offerings are available, including IBM WebSphere Transformation Extender IMS Execution Option for z/OS, IBM WebSphere Transformation Extender CICS Execution Option, and IBM WebSphere Transformation Extender Extended Edition for z/OS.

Using the IBM WebSphere Transformation Extender Design Studio (in a Microsoft Windows® environment), a business analyst or designer can build integration objects across the applications, databases and systems being integrated. And because WebSphere Transformation Extender is an integration solution, it never generates code that then needs to be managed. All of the extensive integration functionality is managed from an easy-to-use and robust drag-and-drop design interface. Also, WebSphere Transformation Extender delivers complex, hierarchical transformation capabilities that enables you to use one common methodology for all your ESB transformation needs.

WebSphere Transformation Extender performs transformation and routing of data from source systems to target systems in batch and real-time environments. The sources can include files, relational databases, (message-oriented middleware [MOMs]), packaged applications or other external sources.

After retrieving the data from its sources, WebSphere Transformation Extender transfers and routes it to any number of targets where it is needed. This capability offers the appropriate content and format for each target system.

WebSphere Transformation Extender Extended Edition for z/OS delivers the following capabilities:

- *Connectivity to a wide range of mainframe, existing and enterprise applications, databases, messaging systems and external information sources*
- *A comprehensive library of more than 120 prebuilt functions to help reduce development time and simplify specification of rules for validation, transformation and routing*
- *Multiple implementation options to support right-time, right-style transformation, whether it is batch, real-time or embedded*

Manage solutions for System z and composite applications

Business processes rely heavily on IT infrastructure for availability and performance, especially in a Web-based, composite environment. However, the IT infrastructure environment becomes extremely complex when dealing with composite 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 to manage your environment. If an enterprise ignores performance management, serious business and IT problems – and ultimately lost business – can result.

WebSphere performance management

As the growth of Web applications shows no signs of slowing down, composite-application management has become a critical need. By providing granular application structure and behavior information, IBM Tivoli Composite Application Manager complements IBM Tivoli systems-management or infrastructure-monitoring products. WebSphere Studio Application Monitor is intended to be used by application developers and application support analysts, whereas 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 can consume and how to analyze historical data to fine-tune the applications and assess the needs for future growth*

Tivoli Composite Application Manager

To handle loosely coupled composite applications, an effective monitoring solution must be able to follow transactions as they traverse from the user all the way through the heterogeneous infrastructure. IBM Tivoli Composite Application Manager software is designed to help you:

- *Monitor services and response times to detect potential slowdowns or performance bottlenecks before the user is affected.*
- *Mediate services and enforce policies.*
- *Trace transactions and accurately diagnose problems by quickly drilling down to the root cause.*
- *Monitor and adjust resources to help ensure that they are used efficiently.*

The products in the Tivoli Composite Application Manager suite include IBM Tivoli Composite Application Manager for Response Time Tracking, IBM Tivoli Composite Application Manager for SOA, IBM Tivoli Composite Application Manager for WebSphere and IBM Tivoli OMEGAMON® XE for WebSphere Business Integration. The Tivoli Composite Application Manager solution addresses all three dimensions of effective application management:

- Services and transactions, *through service-level response times and problem isolation. Tivoli Composite Application Manager for Response Time Tracking quickly identifies and isolates bottlenecks. Tivoli Composite Application Manager for SOA manages and controls Web services.*
- Applications, *through deep-dive diagnostics and correlation across subsystems. Tivoli Composite Application Manager for WebSphere provides drill-down diagnostics for J2EE, CICS and IMS application-performance problems.*
- Resource monitoring, *through application-server monitoring and resource consumption.*

Tivoli OMEGAMON XE for WebSphere Business Integration provides resource analysis for WebSphere messaging software.

CICS performance and availability management

IBM offers a comprehensive solution for CICS performance management, which is designed to meet the requirements of everyone involved in CICS performance measurement, monitoring, analysis and planning. IBM Tivoli OMEGAMON XE for CICS and IBM CICS Performance Analyzer for z/OS complement each other and the IBM CICSPlex® System Manager capability in CICS Transaction Server. This compatibility helps you plan capacity to reduce millions of instructions per second (MIPS) cost, proactively analyze performance trends to help reduce downtime and increase customer satisfaction, and help reduce outage costs, the risk of missing the service-level commitments, and the time and cost of managing system performance and availability.

CICS Configuration Manager

IBM CICS Configuration Manager for z/OS provides definitional support, reporting and change-management facilities in a central storage device (CSD) or CICSPlex System Manager environment from a single point of control. It helps handle the complexities and potential problems in the administration and maintenance of resource definitions for CICS Transaction Server, across multiple CICS regions, by offering comprehensive control and audit capabilities. Along with the ability to create, edit, compare, copy, move and remove definitions, individually or in groups, CICS Configuration Manager enables you to migrate multiple definitions while automatically transforming them to match the target environment. An audit trail provided by the product generates reports and backs out changes to any previous version of resource definitions.

Tivoli OMEGAMON XE for CICS

Tivoli OMEGAMON XE for CICS on z/OS is a real-time, performance management and monitoring tool. It helps you proactively manage complex CICS system—including those in a Parallel Sysplex environment—to achieve high performance and help avoid costly downtime. You can monitor and manage CICS transactions at both high and granular levels, as well as interaction with other applications, within a single interface. Tivoli OMEGAMON XE for CICS on z/OS is designed to enable you to detect problems quickly and take action in real time to speed problem resolution.

IBM CICS Performance Analyzer for z/OS

IBM CICS Performance Analyzer for z/OS is a robust offline reporting tool that analyzes the System Management Facility (SMF) records created by the CICS monitoring facility, CICS statistics, CICS server statistics, DB2 and IBM WebSphere MQ accounting records and IBM MVS™ system-logger data. It uses this information to produce comprehensive reports on all aspects of CICS systems, and includes historical database capabilities for trend analysis and capacity planning—all to help you tune and manage your CICS systems. You can easily tailor CICS Performance Analyzer reports to your specific analysis requirements.

IMS performance management

IBM Tivoli OMEGAMON XE for IMS on z/OS, IBM IMS Performance Analyzer and IBM IMS Problem Investigator, together with the traditionally strong performance-management technologies in IMS, help you reduce the 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*

Tivoli OMEGAMON XE for IMS on z/OS

For IMS systems, Tivoli OMEGAMON XE for IMS optimizes the performance and availability of vital IMS systems. From a single point of control, you can view comprehensive information and analysis across multiple IMS subsystem—or across an IBM IMSPlex environment. You can use Tivoli OMEGAMON XE for IMS to:

- *Track and optimize both resource usage and transaction processing.*
- *View coupling-facility statistics to identify factors affecting the performance of Parallel Sysplex environments.*
- *Monitor workload balancing using shared-queue support and data sharing to minimize the impact of locks on shared databases.*

IMS Performance Analyzer

For IBM IMS Transaction Manager and IBM IMS Database Manager, IMS Performance Analyzer provides comprehensive performance analysis and tuning assistance. It processes the IBM IMS Log, IBM IMS Monitor, and IMS Connect event data to provide comprehensive reports that enable IMS specialists to tune IMS systems and IMS managers to verify service levels and predict trends. IMS Performance Analyzer:

- *Complements IBM IMS Problem Investigator for z/OS in the investigation of IMS performance-related problems.*
- *Delivers IBM IMS Fast Path monitor and log reports.*
- *Processes logs from a single IMS system or from multiple IMS subsystems running in a shared queue sysplex.*

IMS Problem Investigator

For IMS Transaction Manager and IMS Database Manager, IMS Problem Investigator provides an enhanced level of problem-determination services. These services include navigation aids and investigative procedures, as well as robust automated features that help reduce the time required to identify and analyze defects or other events of interest in the IMS log. With IMS Problem Investigator, you can:

- *Conduct IMS Log analysis more quickly and easily than ever before.*
- *Have access to functionality that is similar to the IMS File Select and Formatting Print utility (DFSERA10) but with more-advanced features.*
- *Improve tuning through a variety of statistical reports.*

DB2 performance management

IBM offers a rich set of tools that help your database and system administrators optimize resource usage and streamline performance management, thereby freeing time to focus on other important activities. These tools help:

- *Monitor, analyze and tune DB2 systems.*
- *Provide a view of system status and quickly identify performance bottlenecks in key areas.*
- *Save performance data for subsequent offline reporting and detailed analysis.*
- *Analyze buffer pool usage.*

Tivoli OMEGAMON XE for DB2 Performance Expert on z/OS
IBM Tivoli OMEGAMON XE for DB2 Performance Expert on z/OS provides a single, comprehensive tool that automates the analysis of your database performance in real time. It helps assess the efficiency of your DB2 for z/OS environment while optimizing performance.

The software combines the sophisticated reporting, monitoring and buffer-pool analysis features of the IBM Tivoli OMEGAMON XE for DB2 Performance Monitor on z/OS and IBM DB2 Buffer Pool Analyzer products. It also adds expert database analysis functions to help you maximize performance and enhance productivity.

Along with the capability of quickly and easily identifying performance bottlenecks using predefined rules, Tivoli OMEGAMON XE for DB2 Performance Expert on z/OS also provides substantial breadth and depth for monitoring DB2 environments by combining batch-reporting capabilities with real-time monitoring and historical-tracking functions.

DB2 Query Monitor
IBM DB2 Query Monitor provides current and historical views of query activity throughout your DB2 subsystems. Using DB2 Query Monitor, you can pinpoint query activity that is important to your business, enabling you to spot potential problems and take steps to resolve these problems quickly. DB2 Query Monitor provides extensive choices in determining what data is gathered during monitoring, when it is gathered, and about whom. It enables you to set thresholds for specific query-related events, such as long-running queries.

DB2 SQL Performance Analyzer
IBM DB2 SQL Performance Analyzer provides you with an extensive analysis of SQL queries without implementing them. This analysis aids you in tuning your queries to achieve maximum performance. DB2 SQL Performance Analyzer helps make it easier to reduce the escalating costs of database queries by estimating their cost prior to implementation and giving you advice for more-efficient SQL.

DB2 Path Checker

IBM DB2 Path Checker helps you increase the stability of your DB2 environments and avoid painful and costly disruptions. It can help you discover and correct unwanted and unexpected access path changes before you are notified about them. These changes can occur as a result of binding when installing a new release of DB2, applying service, or migrating an application from one system to another. DB2 Path Checker can efficiently scan hundreds or thousands of SQL statements and identify just the statement or statements that have experienced or are likely to experience an access path change.

DB2 Automation Tool

IBM DB2 Automation Tool enables you to focus on system optimization by automating object recovery and other common tasks, helping to reduce the need for manual procedures. It provides statistical history reports for trend analysis and forecasting. DB2 Automation Tool advances the goal of enterprise autonomic computing and offers many enhancements to ERP environments.

By continuously and automatically coordinating the implementation of DB2 tools and utilities, DB2 Automation Tool enables you to realize the full potential of your DB2 for z/OS system.

Enterprise Generation Language

IBM Enterprise Generation Language (EGL) is a high-level programming language that enables developers working in COBOL, RPG, PL/I and other fourth-generation languages to write fully functional applications based on Java and SOA without having to become an expert in Java, J2EE or Web services technologies. With EGL, developers write their business logic in EGL source code, then the EGL tool generates Java or COBOL code and the corresponding runtime artifacts required to deploy the application.

EGL hides the details of the Java platform and associated middleware programming mechanisms, which means developers who have little or no experience with Java and Web technologies can use EGL to easily create SOA-based applications. EGL provides a full-featured business language that abstracts the details of a target technology. All the code that is written in EGL is both scalable and reusable across multiple applications and platforms. Services written in EGL can be called from anywhere internally or externally, and Web services developed in EGL can be accessed in both Microsoft .NET and Java environments.

Completing the integration story

Adapters extend the reach of your the ESB right up to the business applications and technologies running on System z. WebSphere Adapters are now available on Linux® on Systems z. A broad range of prebuilt, ready-to-go adapters can help accelerate your time to value by accurately discovering and generating an adapter that can control inbound and outbound events as well as flows of data to and from your application assets and your infrastructure. And if there isn't a prebuilt adapter to suit your needs, use the WebSphere Adapter toolkit to create one—taking advantage of the same tools used by WebSphere Application Server, WebSphere ESB and WebSphere Process Server.

ESB—flexible connectivity infrastructure

The connectivity and integration of disparate information means that every piece of data in your enterprise can be used by business processes requiring access to that information. The ESB represents information within applications and data sources as a series of flexible, reusable services. WebSphere Process Server orchestrates all of these services, enabling the business person to rapidly design, simulate and deploy them as part of new processes. In essence, the ESB offerings provide the "food" for the process.

Integration with the Tivoli portfolio

Many System z tools integrate with Tivoli products to provide a suite of integrated performance-management tools that enable you to better monitor the health of your System z systems and applications. In many cases, integration with IBM Tivoli Business System Manager supplies extended support across the enterprise. Tivoli Business System Manager uses the CICSPlex System Manager API to gather CICS region information for display through its GUI and to 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 Performance Analyzer, IBM Debug Tool and IBM Debug Tool Utilities and Advanced Functions, 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-development life cycle, and can assist in transforming applications into On Demand Business assets by supporting composite environments.

Application Performance Analyzer

Application Performance Analyzer can be used with Debug Tool, Fault Analyzer and File Manager to help increase developer productivity. With Application Performance Analyzer, developers can analyze the performance of CICS, IMS, DB2 and WebSphere MQ applications written in COBOL, PL/1 or Assembler during the application-development 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 implementation of programs written in C/C++, COBOL, PL/I or Java (each compiled with appropriate IBM compilers) on an IBM OS/390®, MVS or VM system. Debug Tool supports debugging of applications in various subsystems, including CICS, IMS and DB2. Debug Tool Utilities and Advanced Functions adds capabilities to the already robust features of Debug Tool, including load-module analyzer, a COBOL conversion utility and a code-coverage utility, that can help you get your CICS applications ready for CICS Transaction Server, Version 3.1 or DB2 Universal Database, Version 8. Either WebSphere Developer for zSeries or WebSphere Developer Debugger for zSeries (a subset of the WebSphere Developer for Debugger for zSeries function), gives developers a robust GUI to Debug Tool and helps increase productivity in their transformation efforts.

Fault Analyzer

Fault Analyzer helps you find the cause of abnormal ends (abends) in application programs across a broad range of environments (such as Time Sharing Option [TSO], CICS, IMS and WebSphere environments) and languages (including COBOL, PL/I and C/C++). You can use this product to identify problems during the development phase and the testing phase, or during implementation in production.

File Manager

File Manager provides valuable functions like data browsing, editing, copying and comparing. Application developers, system support personnel, system administrators or system operators can use these functions, for example, to quickly identify and resolve data problems after an application abnormally ends. As an application programmer, you can use File Manager to quickly build data files for application development or quality-assurance testing, or both.

Workload Simulator

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

Software-quality tools

Software-quality tools address practically every dimension of software quality including functionality, reliability and performance and are critical to successful deployment and management.

Rational TestManager

IBM Rational TestManager is 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, implement tests and analyze the results of the tests. The product 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.

Rational Functional Tester and IBM Rational Functional Tester for Terminal-based Applications

This advanced, automated functional-testing and regression-testing tool is for testers and GUI developers who need superior control for testing Java, Microsoft Visual Studio .NET, Web-based applications and 3270 terminal applications. It provides novice testers with automated capabilities for activities such as data-driven testing. Rational Functional Tester also offers advanced testers a choice of scripting language and an industrial-strength editor—Java in Eclipse or Microsoft Visual Basic .NET in Visual Studio .NET—for test authoring and customization.

Rational Performance Tester for z/OS
IBM Rational Performance Tester for z/OS is the only load-testing and performance-testing solution that enables the use of System z hardware as a load-generation platform. Rational Performance Tester for z/OS combines multiple ease-of-use features with powerful testing capabilities to help simplify the test-creation, load-generation and analysis processes that help teams ensure their applications accommodate required user loads.

Change and configuration management
Whether you are creating new applications or modifying existing applications on any of your enterprise platforms, the need to manage how new components are integrated with traditional z/OS program objects is a critical element in building and deploying your modern enterprise applications. IBM software-configuration solutions help simplify and manage change, including version control, software asset management and defect tracking, and are used throughout the development life cycle across your enterprise platforms. IBM provides a variety of solutions that can either be deployed independently or in concert with each other to provide enterprise software configuration management:

SCLM Advanced Edition for z/OS
IBM SCLM Advanced Edition for z/OS enables you to take advantage of the significant investment that your organization has made in z/OS applications while using an Eclipse technology-based IDE interface. SCLM Advanced Edition features a software configuration and library manager (SCLM), a feature of Interactive System Productivity Facility (ISPF), which is included with the z/OS operating system. SCLM Advanced Edition provides a functionally rich software change- and configuration-management solution for administering the development of distributed and z/OS artifacts. Source code management and highly secure production turnover are provided on either an easy-to-use ISPF interface or a workstation-based GUI that uses standard graphical metaphors that are intuitive and easy to follow.

Rational ClearCase

IBM Rational ClearCase® provides enterprisewide life-cycle management and control of software-development assets. With integrated version control, automated workspace management, parallel development support, baseline management, and build-and-release management, Rational ClearCase provides the capabilities you need to create, update, build, deliver, reuse and maintain critical assets on both distributed and z/OS environments..

Rational ClearQuest

IBM Rational ClearQuest® software enables better insight, predictability and control of the software-development process. Through flexible workflow management, and defect and change tracking across the application life cycle, Rational ClearQuest helps to automate and enforce development processes, manage issues through the project life cycle and facilitate communication between all stake holders across the enterprise. Integrated with Rational ClearCase and SCLM Advanced Edition for z/OS, Rational ClearQuest provides a single point of control for enterprise change management.

Assessing return on investment

In today's economic environment, companies are looking for ROI with strategic potential, 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- 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, which 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.*
- *Using existing assets. Reusing existing business rules and programs helps preserve previous investments, as well as enabling you to deliver new systems more quickly.*

These challenges require support from IT. And 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*

Three types of benefits can be realized by modernizing existing applications. The *first* 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 (helping to increase customer and user satisfaction, and lower training costs), closer business relationships with trusted trading partners and even improving staff morale. The *third* type of benefit is in the potential to reduce cost related to reuse compared to writing new processing. And the more application components you reuse, the more you have the potential to reduce costs.

Conclusion

Organizational productivity could 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 there is today. WebSphere, CICS, IMS and DB2 for z/OS 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.

You can use the information in this white paper to provide a starting point to build the case for implementing an enterprise-transformation solution. 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.

For more information

To learn more about service oriented architecture, contact your IBM representative or IBM Business Partner, or visit:

ibm.com/soa

To learn more about IBM development tools, contact your IBM representative or IBM Business Partner, or visit:

ibm.com/developerworks

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