Enterprise application tools for IBM @server zSeries servers
White paper

WebSphere® software

Enabling on demand enterprise applications through comprehensive CICS and z/OS Problem Determination Tools.

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Executive summary

In today's competitive business environment, the need to respond to changing customer requirements is driving IT investments to a degree never before seen. Businesses want to maximize IT utilization, integrate existing business processes and applications, and exploit technology to support business strategy. Information technology (IT), for the sake of technology, simply doesn't exist any longer. Instead, IT must provide true business investment value and align with business priorities.

Many businesses are evolving to an On Demand Business model—the ability to respond to marketplace changes in real time. However, the business transformation to on demand business brings new challenges to IT. For example, to conduct effective on demand business, your applications must run 24 hours a day, 365 days a year, scaling thousands of interactive users. And they must process millions—and sometimes billions—of transactions. Mixed workload, or composite applications that are assembled from independent and often conflicting component parts and use standard interfaces like Enterprise JavaBeans (EJB)—as well as nonstandard interfaces of older applications—require tools to efficiently handle these complexities. These tools must be able to help maintain a high level of performance and availability of your core assets, and speed the overall end-to-end development effort for new applications.

This white paper describes how IBM @server® zSeries® enterprise tools can help you meet on demand challenges when developing and deploying composite applications with IBM CICS® software. An integrated suite of zSeries enterprise tools can help you optimize the availability and performance of your critical mixed-workload applications and systems, as well as extend your traditional applications to the on demand business world. Through CICS and IBM z/OS® Problem Determination Tools, you can help improve software economics by reducing IT complexity, improving the development process, improving IT team proficiency and automating the application development and deployment process of source code management, file management, or application performance and fault analysis.

Building an on demand IT environment

The evolution to on demand is business-driven. Transforming the way businesses operate puts pressure on IT to:

- *Align IT resources with business priorities.*
- *Improve resiliency and security.*
- *Increase IT infrastructure flexibility.*
- *Leverage and integrate legacy applications.*
- *Improve developer productivity.*
- *Reduce unnecessary complexity.*
- *Reduce operational costs.*

In the current economic climate, investments are scarce, yet IT must support present business needs and prepare for the future. Businesses have to align IT resources and investments with business priorities, which currently focus on increased efficiency through internal and external integration. Because global business requires 24x7 operation, IT infrastructures must deliver continuous operation. A company's IT staff must define appropriate redundancy so that IT services continue to be available. And they must address security-related threats to IT, a key priority for IT organizations.

As businesses attempt to quickly respond to the marketplace, they rely on IT to meet new requirements. Not only must business applications be flexible, the IT infrastructure (hardware, software and network) must respond quickly to variations in demand cycles. For example, if a business wants to create a new offer in response to one from the competition, not only must the IT environment implement and support the delivery and execution of the offer, it must also be able to deal with the increased load placed on the external Web site and partner connections.

Improved developer productivity continues to be a focus as the need to become more responsive grows. Most enterprises must handle dozens (or hundreds) of packaged and legacy applications in their IT portfolios, which they need to leverage and to integrate as part of the new on demand operating environment. In such environments, complexity is reality; however, with the appropriate tools, you can avoid unnecessary complexity. Application development and deployment tools and processes are critical elements of the IT infrastructure evolution to on demand operating environments.

The evolution from a traditional to an on demand development cycle

Where do you begin creating on demand applications? The answer can be found inside many IT organizations today, starting with the number of lines of enterprise code in use. Even with a decline in the number of COBOL developers, more COBOL code is being used every year. Also, the majority of the world's data still resides behind the enterprise server. New on demand applications consist of multiple application components (traditional and new) that have been integrated.

Traditional development

The traditional application development process starts with a business request, and then involves researching, impact analysis, determining any code reuse, writing, testing and debugging. Finally, the process includes deploying and managing the product. In many IT organizations, these tasks can be manual and labor-intensive.

On demand application enablement

To enable these applications with on demand capabilities, you must address more than just the traditional development life cycle. The key is to address the three Ds (discover-develop-deploy) of the application development life cycle that support traditional and on demand business workloads. The three Ds refer to mixed or composite workloads. You can help drive the benefits of the On Demand Business vision:

- *Speeding application development and deployment.*
- *Modernizing your organization by enhancing applications.*
- *Improving IT operational efficiency to help speed return on investment (ROI).*
- *Accelerating integration across the development life cycle.*

It is critical to have access to solutions that can deliver this vision today by changing the application development and management process based on three imperatives.

The first software development imperative is to develop iteratively, which means that software teams need to:

- *Adopt a flexible, repeatable development process.*
- *Proactively manage requirements.*
- *Continuously verify quality.*

An iterative development process can yield more improved versions of a software system until the software system is ready for deployment. Each iteration includes a mix of analysis, design, construction and testing, which results in a demonstrable form of the software. Development teams start by addressing a limited set of functions pertaining to the high-risk areas of the project. Each iteration verifies the system architecture, the application's ability to satisfy its requirements and the quality of the software.

By adopting an iterative development process, software teams can help:

- *Reduce project risk and increase predictability.*
- *Prioritize and scope projects effectively.*
- *Uncover design flaws and errors earlier in the process.*

The second imperative is to prevent, detect, diagnose and remove defects as they occur in the application life cycle to improve application quality. The third imperative is to reduce application downtime by automating system diagnosis, repair and rebuild capabilities to find and fix post-deployment errors quickly. If a production fault occurs, you need the same degree of automation for both traditional and new on demand business workloads to prevent, identify, isolate and fix the fault.

IBM provides a set of tools to help manage the end-to-end application development and run-time management cycle in a mixed-workload environment.

In the *discover* phase, IBM offers tools with automated analysis capabilities to replace the manual and error-prone process of sifting through old, undocumented code. These automated analysis capabilities facilitate the process of understanding and identifying those portions of traditional systems that can easily become on demand business components.

In the *develop* phase, IBM provides a set of tools that can speed and simplify the overall end-to-end development effort, from Web to Java™ technology, to mainframe programmer productivity. These tools can automate the Web enablement of old systems. The process of creating on demand business solutions means reusing current programs—and adding them to new components and applications that you can quickly assemble to meet evolving business needs.

In the *deploy* phase, IBM provides tools to help improve the ability to simulate run-time start conditions to see how the system behaves. These tools can also help identify possible failures under stress, as well as to easily identify problem areas in general.

And finally, the run-time environment is the critical component to help ensure the highest qualities of service, such as scalability, performance, security and system availability. With this run-time platform, you can fully use the computing power available in the enterprise server.

The portfolio of IBM ^ zSeries tools helps you successfully handle the complexities of the discover-develop-deploy cycle in mixed-workload run-time environments to help speed on demand application enablement.

IBM tools to help improve efficiency

Improved process and end-user efficiency, as well as automation for faster problem resolution, are key capabilities of the zSeries enterprise tool set. These capabilities can help you improve the operational efficiency of your zSeries environment for both traditional and on demand business workloads. With these tools, you can improve quality, enhance availability and help manage run-time performance of your enterprise applications. You can also leverage these tools to speed on demand application enablement by determining which application components are actually being used during the discovery phase, and then integrating them into any new applications during the development phase.

Application and data reuse for efficient implementation of on demand business strategies

Before you can integrate legacy applications into a mixed-workload environment and enable them to participate in on demand processes, you must understand these applications and the impact of any application changes. Documentation might be incomplete, source code missing, and a manual approach might be too costly and time-consuming, if not impossible. Often, you might need to integrate these applications with the new on demand operating environment without changing the application. Or, having made a strategic decision to implement some application changes, you must make the business-critical data that resides in legacy file systems accessible to the new on demand business applications. The zSeries tools portfolio offers cost-effective solutions to enable application and data reuse, for CICS applications and data in particular.

IBM CICS Interdependency Analyzer for z/OS

Many CICS systems and applications evolved over many years, some over as many as 30 years. Some application changes went undocumented, or documentation or source code was lost. Even if the source code and documentation are available, the actual run-time implementation might be different from what was documented and application behavior in run time might differ from the original design. If there is a merger or acquisition, and some or all of the information regarding inherited CICS systems is not available, the time you spend on the discovery process is critical to avoiding business disruption. And if you are targeting your CICS applications for reuse as on demand applications, doing so without fully understanding the makeup of your current applications can be inefficient.

IBM CICS Interdependency Analyzer is a run-time tool that helps you understand CICS run-time application behavior, resource usage in CICS systems and interdependencies among CICS resources. For applications that leverage IBM CICS Transaction Server, as well as IBM DB2®, IBM WebSphere® MQ and IBM IMS™ software, when gathering information about resource interdependencies online, CICS Interdependency Analyzer aggregates the information in IBM DB2® Universal Database™, and then provides a comprehensive interface to query the aggregated data online. The result is that you can gain a better understanding of:

- *Which programs are used by a transaction.*
- *Which data is read or updated by a transaction.*
- *What the sequence of transactions within an application is.*
- *What transactions run in which regions or address spaces.*

This information can help you maintain, enhance and reuse your business applications. You can also take advantage of the workload-balancing capabilities of CICS Transaction Server to facilitate increased availability projects, and build more flexible CICS systems to increase productivity.

If you are developing new on demand business applications and reusing your current CICS assets, using CICS Interdependency Analyzer in conjunction with IBM WebSphere Studio Asset Analyzer can help greatly improve your speed to market (see Figure 1).

WebSphere Studio Asset Analyzer for Multiplatforms

WebSphere Studio Asset Analyzer automates your current application code discovery to complement the discovery of run-time interrelationships in your CICS systems through CICS Interdependency Analyzer.

WebSphere Studio Asset Analyzer provides current information about application components and their relationships, based on source code information. It can also help you create new components and provide impact analysis to help ensure a thorough understanding of any proposed changes.

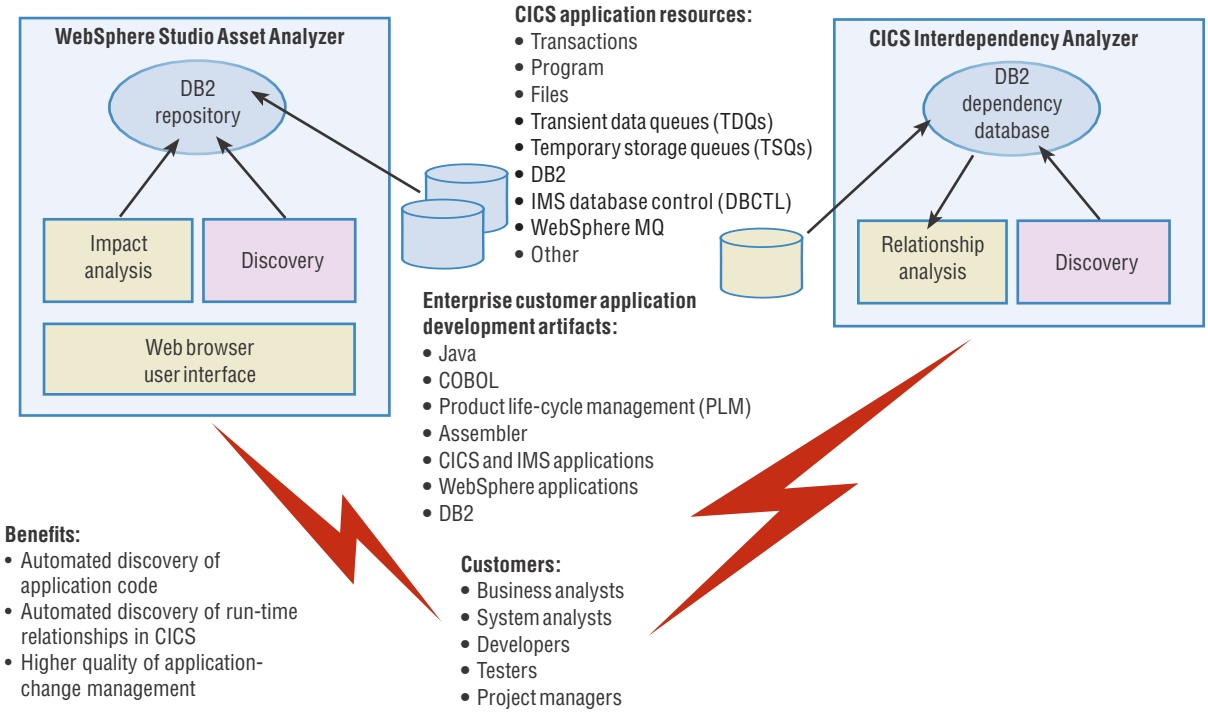

Figure 1. Automated application discovery for mixed-workload environments .

There are a number of ways to drive applications from the Web. Consider COMMAREA as an example. You can use WebSphere Studio Asset Analyzer to identify selected programs you want to include in the application development tools for your new application. When planning for the new application, CICS Interdependency Analyzer can help you understand the makeup of the current application that is being changed: any queues that have been used, types of data accessed or types of business integration this application is involved with (for example, integration with another piece of business logic through IBM WebSphere MQ).

IBM CICS Business Event Publisher for MQSeries

IBM CICS Business Event Publisher offers a new approach to enable legacy applications to participate in business integration environments by allowing rapid integration and extension of mainframe CICS applications and data. IBM CICS Business Event Publisher generates user-defined IBM WebSphere MQ messages based on specific events in existing CICS applications and associated IMS, DB2 and VSAM data. With an easy-to-use Microsoft® Windows® technology-based GUI, you can specify the events that generate messages, as well as the nature and destination of these messages. The message generation is transparent to the application program and data, so no code changes to the existing applications are required.

CICS Business Event Publisher can help you:

- *Reduce implementation time for new applications.*
- *Lower development and testing costs.*
- *Increase the value of legacy applications.*
- *Increase reliability by eliminating changes to code.*

CICS Business Event Publisher enables instant participation of your CICS applications in your WebSphere MQ software-based business integration strategy.

IBM CICS VSAM Transparency for z/OS

Many businesses today are migrating data from VSAM files to DB2, having chosen DB2 as the data platform to support their CICS application modernization and on demand business strategies. However, many companies are deterred from migrating data to DB2 by the prospect of having to rewrite and test CICS applications that have been running untouched for years.

IBM CICS VSAM Transparency for z/OS enables you to migrate data from VSAM to DB2 without changing CICS and DB2 applications. It helps ensure continued access to data in DB2, without modification to CICS or batch VSAM application programs, and with only minor changes to CICS and batch configurations. A single instance of the data is maintained; it is never in two repositories at the same time. With CICS VSAM Transparency, you have the flexibility to migrate specific VSAM files to DB2, file by file, when you want to – but you can leave other files in VSAM.

CICS VSAM Transparency helps preserve investments in long-standing CICS applications, while allowing your core business data to participate in new on demand business applications quickly.

Tools to help improve quality and enhance availability of your enterprise applications
IBM offers a wide range of tools to help improve your enterprise application-deployment efficiency and optimize your run-time system performance.

IBM File Manager for z/OS
IBM File Manager for z/OS provides robust functions for application developers, system support personnel, system administrators or system operators. Application programmers can leverage File Manager to quickly test and debug programs. They can also manage enterprise-based data files required to support test and production systems. And the latest version of the tool enhances support for IBM DB2 Universal Database, Version 8. File Manager can help increase the productivity of application programmers through extensive edit, browse, print, data creation and copy functions.

IBM Debug Tool for z/OS and IBM Debug Tool Utilities and Advanced Functions for z/OS
IBM Debug Tool and IBM Debug Tool for z/OS Utilities and Advanced Functions for z/OS are robust, interactive, interlanguage source-level debugging tools (see Figure 2). They can help you examine, monitor and control the execution of programs written in C/C++, COBOL, PL/I or Java (each compiled with the appropriate IBM compiler) on an IBM z/OS®, IBM S/390® or VM system. You can also use the Debug Tool to debug applications in various subsystems, including CICS, IMS and DB2.

Debug Tool helps developers efficiently and effectively identify the failing of incorrect source programs and enables them to quickly validate the necessary changes to the program. Debug Tool uses a 3270 screen interface that permits you to replay debug sessions, which helps to quickly validate fixes. Depending on the function used, IBM Debug Tool, Version 4.1 Utilities and Advanced Functions provides additional debugging capabilities that help maximize availability of IBM z/OS and IBM OS/390® applications. Together, these capabilities offer an equally robust tool for your traditional and mixed-workload environments.

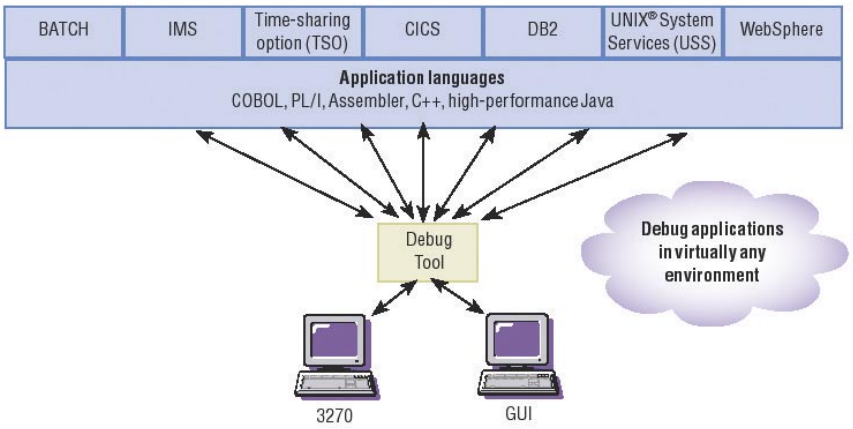

Figure 2. IBM Debug Tool helps developers efficiently and effectively identify incorrect source code.

IBM Fault Analyzer for z/OS

IBM Fault Analyzer for z/OS helps you identify the types and causes of abends in application programs across a broad range of environments (such as IBM TSO/E, CICS and IMS) and languages (including COBOL, PL/I and C/C++) (see Figure 3). You can use it for problem determination while developing or testing application programs, or during application production. Fault Analyzer supports new application development platforms through interactive problem control system (IPCS) exits.

Fault Analyzer is automatically invoked when an application abend occurs, which can help increase programmer productivity, while resolving the cause of the abend in less time.

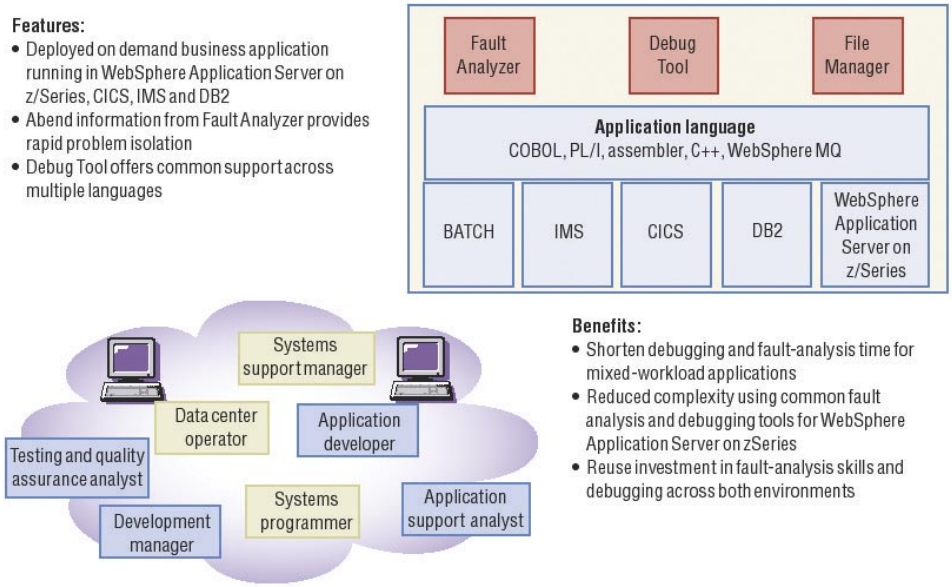

Figure 3. Fault analysis in mixed-workload environments .

These tools provide support for IBM WebSphere Application Server for z/OS, and can help shorten the debugging and fault-analysis cycle for mixed-workload applications. For increased efficiency, File Manager and Fault Analyzer are integrated.

IBM Session Manager for z/OS

Traditional applications, client or vendor, including tools, need to be accessed from a single 3270 terminal, through the deployment process and in run time. IBM Session Manager for z/OS can greatly simplify access to mainframe applications, as it gives IBM VTAM® and TCP/IP users a highly secure and user-friendly way to access multiple z/OS and OS/390 subsystems and applications from a single 3270 terminal. It offers a wide range of facilities, including:

- *A single menu for access to all applications.*
- *Multiple sessions displayed simultaneously on one workstation.*
- *Screen contents displayed at multiple locations.*
- *A common user interface for all TCP/IP and VTAM applications.*

Session Manager helps increase user productivity by providing quick access to a variety of business applications from distributed or workstation programs. It can also help increase security and reduce the cost and effort associated with network administration.

IBM CICS Online Transmission Time Optimizer for z/OS

With a large number of businesses relying on a 3270 data-stream optimization for end-user efficiency, CICS Online Transmission Time Optimizer can help you improve usage of existing network resources and devices and improve end-user response time by examining and dynamically compressing outgoing 3270 data streams.

This tool also provides extensive optimization controls and maintains statistics to show how effectively optimization is being performed. Operation is transparent to users and applications, and CICS Online Transmission Time Optimizer is easy to install, customize and use.

IBM CICS VSAM Recovery

When operating a mixed-workload environment, it is important to ensure the highest level of availability of all data, including VSAM data. A significant amount of business-critical data is stored in VSAM, and, in the event of catastrophic failure, or end-user or application failure throughout your development cycle and in run time, this critical data can be lost or damaged. IBM CICS VSAM Recovery can help reduce the effects of system or application failures and can repair damage quickly. Building on the integrity of your CICS solution, this easy-to-use, yet robust, tool delivers a fully automated solution to recover lost VSAM data. It manages the data recovery process by:

- *Recovering VSAM data from updates made by CICS and by batch applications.*
- *Automatically determining backups and journals to recover lost or damaged data sets.*
- *Making the recovery process faster and easier.*

Application and system availability management in mixed-workload environments

As you implement more complex applications, including mixed-workload applications, the risk of missing service-level commitments increases, and, consequently, the risk of customer dissatisfaction and a damaged reputation rises. You need tools to help you avoid outages, reduce downtime and keep system and application management costs low, while carefully planning for growth to reduce the total millions-of-instructions-per-second (MIPS) cost and meet service-level commitments. You also need the ability to report about systems and application performance to assess the impact of changes, anticipate and solve trends leading to poor performance, and rapidly take action when problems occur to minimize any downtime or performance degradation. IBM offers a range of tools to help improve your ability to develop iteratively and detect problems early (see Figure 4).

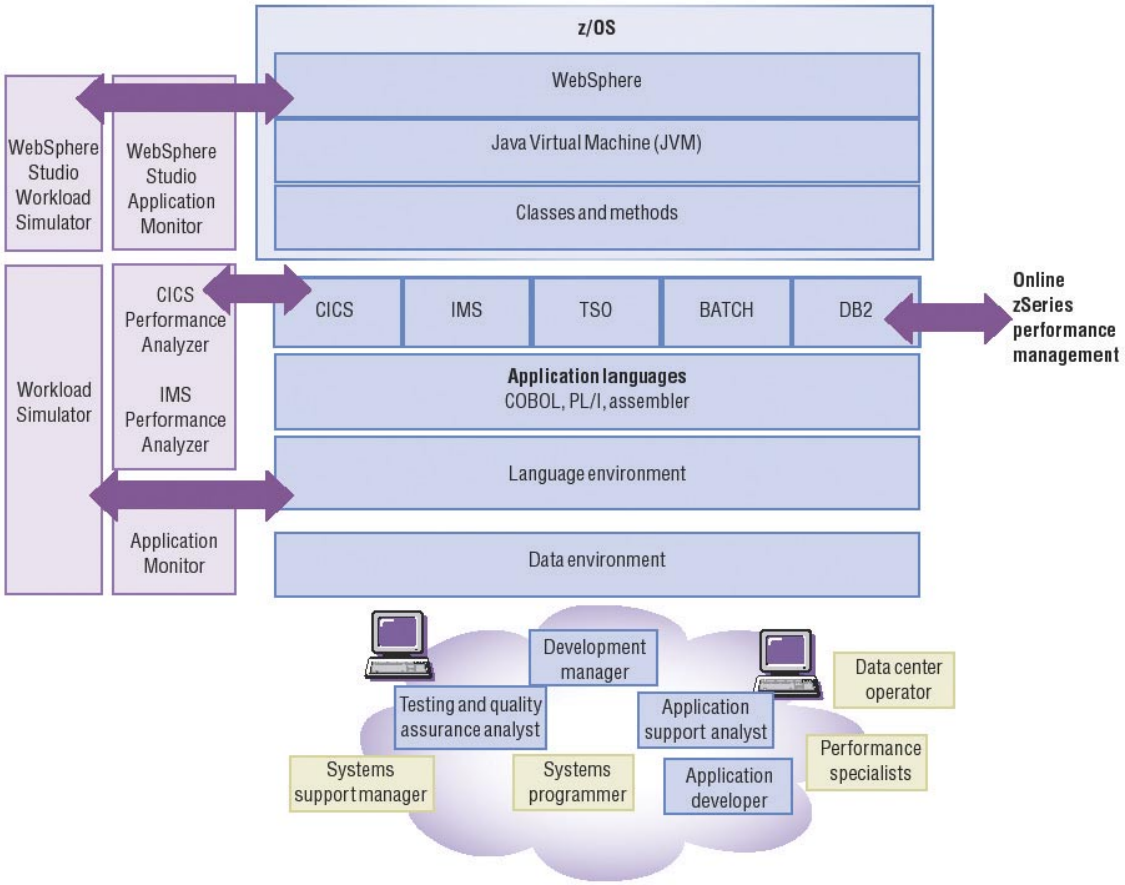

Figure 4. Application and system availability management in mixed-workload environments

IBM WebSphere Studio Workload Simulator

IBM WebSphere Studio Workload Simulator leverages the scalable z/OS environment to conduct tests for load, stress, performance, regression and capacity planning. It can enable you create virtual or simulated users, helping reduce the costs associated with manual load and performance testing, erifying 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-server environment against production-level loads.*
- *Integrates with IBM WebSphere Studio Application Monitor.*
- *Enables simplified setup and testing from a single-server environment.*

IBM Workload Simulator for z/OS and OS/390

IBM Workload Simulator for z/OS and OS/390 provides powerful functions for application developers and system support personnel to stress test and regression-test your traditional enterprise application. A test manger helps automate the building and running of workload scripts. Together, WebSphere Studio Workload Simulator and IBM Workload Simulator offer a complete solution for mixed-workload environments.

IBM WebSphere Studio Application Monitor

As the growth of Java 2 Platform, Enterprise Edition (J2EE) technology-based applications shows no sign of slowing down, J2EE application management has become a business-critical need.

WebSphere Studio Application Monitor is a product determination and performance-management tool for J2EE applications that enables application developers and application support analysts to perform deep, drill-down analysis against J2EE applications in real time, and provides application and business context surrounding the data that it collects. The J2EE application servers act as a black box to help you understand the behavior and flow of applications at any given time. WebSphere Studio Application Monitor fills that gap through its application-centric, problem determination and performance analysis capabilities, in a nonintrusive and low-overhead manner. WebSphere Studio Application Monitor can also monitor, correlate and profile composite transactions (for example, a J2EE transaction branching off into CICS) to give developers visibility into both subsystems.

IBM Application Monitor for z/OS

The goal of application management is to minimize the risks associated with deploying applications to 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, 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.

IBM Application Monitor is a nonintrusive performance analyzer for applications and systems programs. Application Monitor can be used with Debug Tool, Fault Analyzer and File Manager products, to give application developers a robust suite of productivity tools. With Application Monitor, application performance can be analyzed during the application-build process, preproduction staging or during production. It is also complemented by IBM WebSphere Studio Application Monitor for mixed-workload applications.

Application Monitor provides resource utilization information for your applications. This resource information can be the current system data (online analysis) or data collected over a certain time period (historical analysis). Resource information can include these types:

- *Processor utilization*
- *Percentage of address space utilization*
- *Wait time*
- *Wait reasons*
- *Input and output (I/O) utilization*

You can use this resource information to optimize existing hardware resources and improve the performance of applications and subsystems. The collected data appears in either online or printed format.

IBM CICS Performance Analyzer for z/OS

For many customers, CICS is the backbone of the enterprise. Run-time system performance optimization, performance product-determination and capacity planning are critical to meet the peak performance levels to support an on demand business evolution. IBM CICS Performance Analyzer for z/OS is a CICS system performance reporting and analysis solution built to address the needs of those involved in CICS performance analysis, CICS systems tuning and capacity planning. It helps build, manage and deploy complex CICS applications, while maintaining high levels of performance.

CICS Performance Analyzer provides a high level of detail and flexibility to help you easily find new ways to improve CICS system performance, lower maintenance costs and strategically plan IT investments. CICS Performance Analyzer provides a wide range of systems management and measurement reports about all aspects of CICS systems. These reports can be easily tailored to your specific requirements.

The application's robust reporting capabilities and flexible historical database facilities make it an essential tool to help in trend analysis and capacity planning, as well as to help ensure optimal resource utilization within your CICS systems. CICS Performance Analyzer complements online monitoring tools, such as the Omegamon suite of products, because it can help you quickly respond to online performance issues by drilling down into CICS performance data to identify the cause of the problem. CICS Performance Analyzer also complements the enterprise-wide historical performance capabilities of IBM Tivoli® Decision Support for OS/390.

CICS Performance Analyzer can help you:

- *Reduce the cost of tuning and capacity-planning analysis.*
- *Take a proactive approach to CICS systems tuning.*
- *Provide detailed performance bottleneck analysis.*
- *Uncover trends leading to reduced CICS performance or even outages.*
- *Enable capacity planning for optimal performance.*
- *Identify the potential to improve application design and review performance before applications go into production.*

IBM WebSphere Studio Enterprise Developer

IBM WebSphere Studio Enterprise Developer can be used to develop and debug both a COBOL and a Java application (see Figure 5). For traditional languages such as COBOL, WebSphere Studio Enterprise Developer has the ability to remotely edit, compile and debug, which means that the COBOL code remains on the host system and is debugged using Debug Tool. This capability provides two benefits: IBM WebSphere Studio Enterprise Developer can be more productive than character-based interface development, and you can continue compiling and debugging on the host system for the highest degree of deployment assurance. With Java technology, however, you can still use WebSphere Studio Enterprise Developer, but you code and debug on the client before deploying the application to the z/OS environment. WebSphere Studio Enterprise Developer brings both development worlds together using a common dashboard, to provide on demand development for mixed workloads.

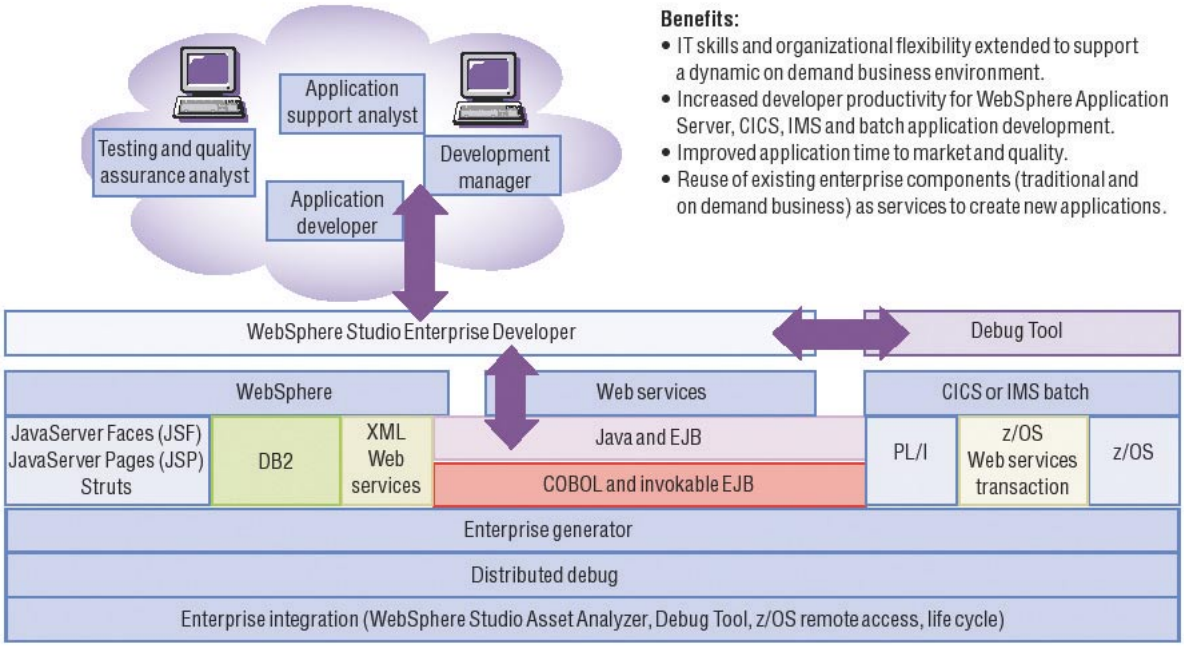

Figure 5.Common development and debugging dashboard

Conclusion

To conduct effective on demand business, your applications must run 24x7, with the ability to process unpredictable and sizable amounts of transactions. IBM offers a range of IBM @server zSeries enterprise tools (see Figure 6) to help you analyze and maximize the functionality and efficiency of your core assets, such as IBM CICS technologies. As part of an integrated suite of zSeries enterprise tools, CICS and z/OS Problem Determination Tools can help you optimize the availability and performance of your critical mixed-workload applications and systems, as well as extend your traditional applications into the on demand world.

Leverage the strength of these tools today to help:

- *Reduce IT complexity.*
- *Improve the development process.*
- *Improve IT team proficiency.*
- *Automate the application development and deployment process from source code management, file management, and application performance and fault analysis.*

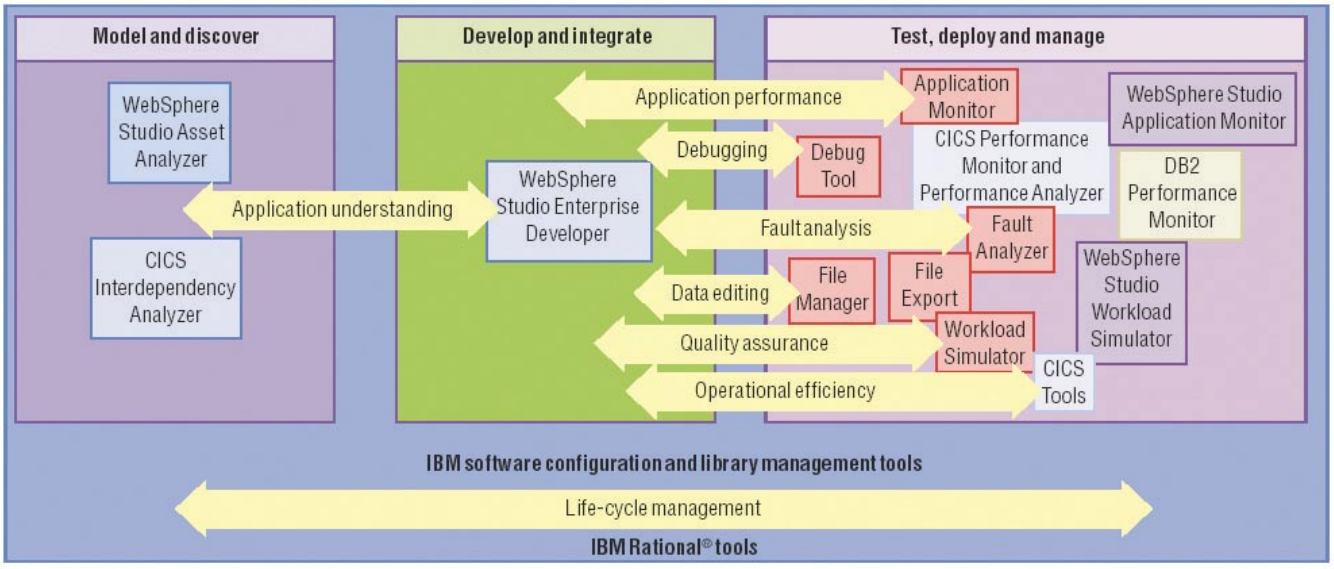

Figure 6. Implementing IBM @server zSeries tools can have a dramatic impact on your software economics.

For more Information

For more information about the complete portfolio of IBM @server zSeries tools, visit:

ibm.com/software/info1/websphere/index.jsp?tab=landings/zadportal

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