



IBM Software Group

## SOA and z/OS The Perfect Match

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## Agenda

### What is SOA?

### SOA Solutions on z/OS

- Transaction environments
- SOA Foundation products
- SOA Integration solutions
- Development and full SOA cycle solutions
- System Management Tools for z/OS Applications

### Conclusion

*Service Oriented Architecture (SOA) helps customers increase the flexibility of their business processes, strengthen their underlying IT infrastructure and retain and reuse their existing assets. z/OS is THE platform of choice where the main enterprise assets reside. This session will define the basics of SOA and will highlight the solution available under z/OS.*

## Some definitions ...

### ... a service?

A **repeatable business task** – e.g.,  
check customer credit;  
open new account

### ... service orientation?

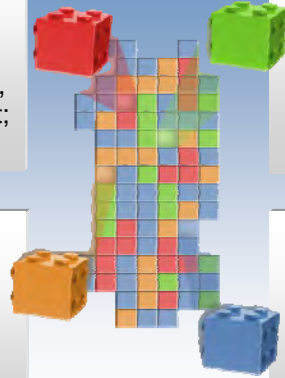
A way of integrating your  
**business as linked services**  
and the outcomes that  
they bring

### ... service oriented architecture (SOA)?

An IT **architectural style** that supports  
service orientation

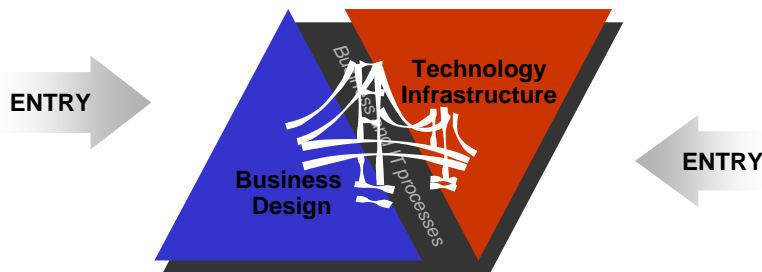
### ... a composite application?

A set of **related & integrated** services that  
support a business  
process built on an SOA



## Becoming an On Demand Business

An On Demand Business is an enterprise whose **business processes** —  
**integrated end-to-end** across the company and with key partners,  
suppliers and customers — **can respond with speed** to any customer demand,  
market opportunity or external threat.



**SOA bridges the gap!**



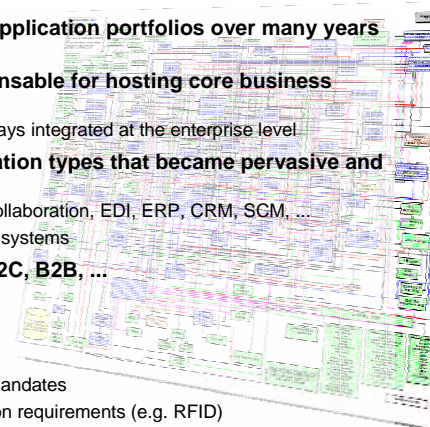
## Web Service, an example of a Service

- A set of open standards for accessing component-based applications
- Core Web Services standards include WSDL, SOAP, XML, and UDDI
  
- Advanced Web Services standards support security, transactionality, reliability, business process execution, and management
  
- SOA does not require Web Services!  
But a collection of Web Services may form an instance of an SOA
- Web Services do not require HTTP!



## Is this your enterprise IT application architecture?

- Most enterprises have built / acquired wide application portfolios over many years on a number of platforms
- Centralized mainframes first became indispensable for hosting core business systems
  - These systems remain critical today, but are not always integrated at the enterprise level
- Distributed platforms introduced new application types that became pervasive and important
  - Departmental / workgroup productivity, e-mail and collaboration, EDI, ERP, CRM, SCM, ...
  - Requiring new application integration links with core systems
- e-business added Web sites, Web serving, B2C, B2B, ...
  - Requiring more new application integration links
- Current IT drivers include
  - On Demand Business transformation
  - Regulatory compliance and corporate governance mandates
  - New technologies driving different forms of integration requirements (e.g. RFID)
  - Requiring even more new application integration links

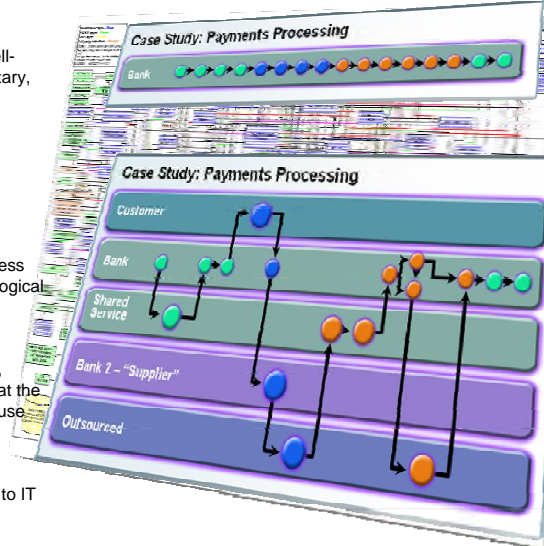


**These portfolios are large (400-1000 systems in top 500 global enterprises) and many new integration points are still needed between them – and to numerous external ecosystems**

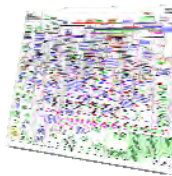
Reference: Software Strategies, Enterprise Integration Challenge: Vendor Middleware-based Integration Solutions Offer Major Advantages Over Custom In-house Solutions, 2<sup>nd</sup> Edition, April 2005

## So what is different today?

- **Standards**
  - Broadly adopted Web services ensure well-defined interfaces (as opposed to proprietary, ad-hoc "standards")
- **Connections**
  - SOA services are loosely-bound and are dynamically linked (as opposed to fragile, tightly-coupled point-to-point connectivity)
- **Level of Abstraction**
  - SOA services define larger-grained business tasks (as opposed to fine-grained technological sub-processes)
- **Level of Reuse**
  - SOA services can be extensively re-used, encouraging planned asset re-purposing at the enterprise level (as opposed to ad-hoc reuse within a vertical organization)
- **Organizational Commitment**
  - SOA unites business and IT (as opposed to IT alone defining the design)



## SOA: the next step on the evolution of enterprise integration



Point-to-Point connection between applications



Applications via a centralized hub



Integration and choreography of services through an Enterprise Service Bus

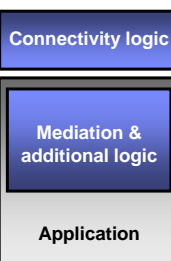


### Direct Connectivity



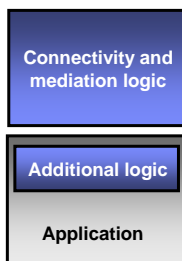
All connectivity, mediation & additional logic buried in the application

### Message Queuing



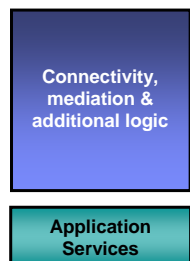
Abstracts the connectivity logic from the application

### Message Brokering



Abstracts the connectivity & mediation logic from the application

### Service Orientation

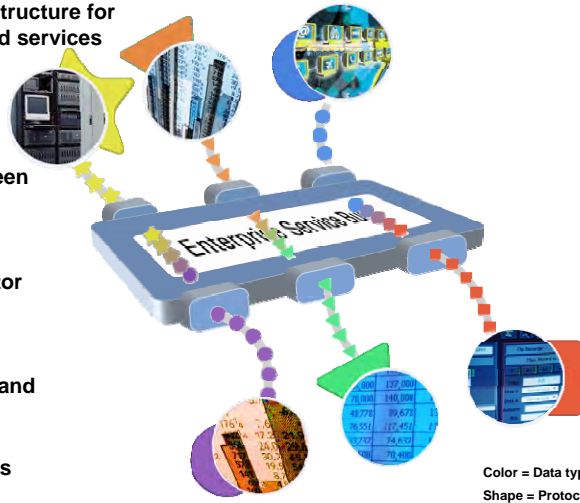


Reduces application to its core business functions

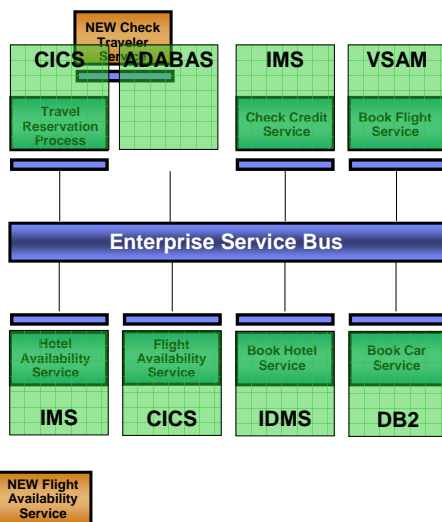
## Enterprise Service Bus – the centerpiece of a SOA

Flexible connectivity infrastructure for integrating applications and services to power your SOA

- ▶ ROUTING messages between services
- ▶ CONVERTING transport protocols between requestor and service
- ▶ TRANSFORMING message format between requestor and service
- ▶ HANDLING business events from disparate sources

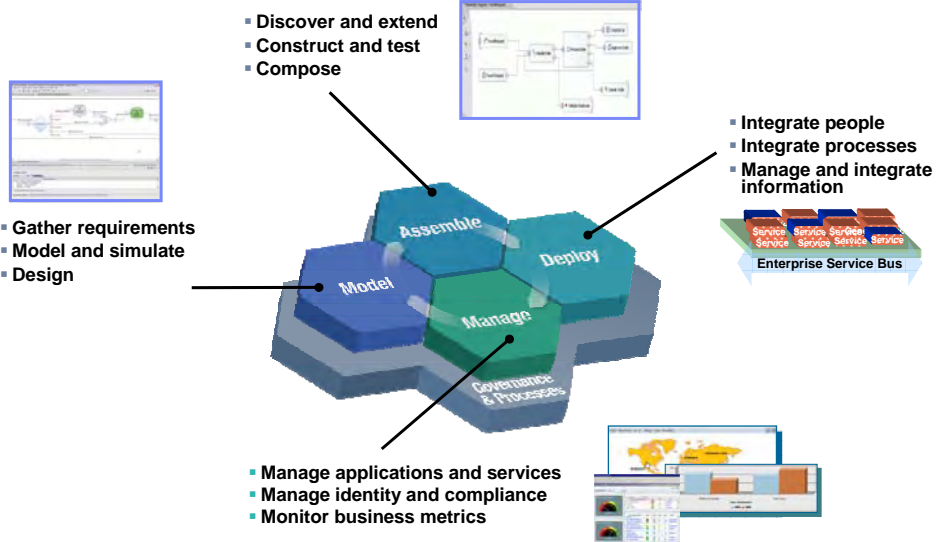


## SOA lets you focus on core business, not IT

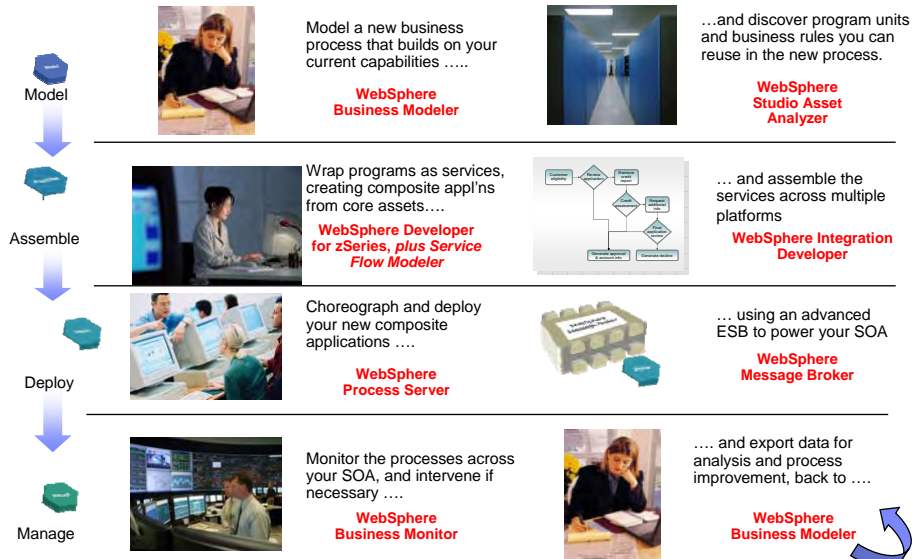


- ▶ Add new services faster
- ▶ Change services with minimal impact to existing services
- ▶ **REUSE** core z/OS resources in composite SOA service implementations!

## The SOA Foundation and SOA life cycle

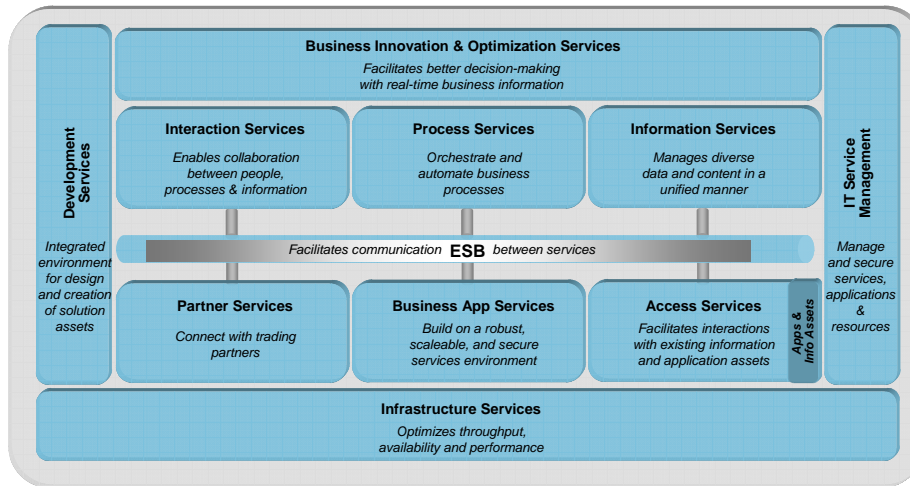


## Creating SOA composite applications with existing assets





## The SOA Reference Architecture



Leverage z/Middleware for maximum business flexibility.



## Agenda

- Key concepts of SOA

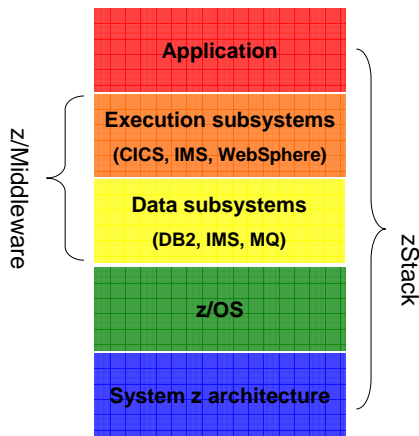
- SOA Solutions on z/OS

- Transaction environments
- SOA Foundation products
- SOA Integration solutions
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- Conclusion



## zStack Technologies Value



- Not just a collection of technologies
- A \$100 billion dollar investment in an integrated stack ...
- Software and hardware *designed and optimized to work together* to achieve business objectives in demanding customer environments
- Deliver
  - Rock-solid transaction processing
  - Never goes down
  - Unbreakable security
  - Ready to go
  - Operates at high levels of utilization
  - First class virtualization
  - Ready to run multiple workloads
  - Easy to scale up
  - Modern application development tools
  - Low Total Cost of Operation



## Some Questions?

- Do you have your data in a DB2 repository on z/OS?
- Do you need to **handle critical complex transactions**, such as those that interact with multiple data sources and have significant levels of importance/clearance?
- Do you have mission critical applications that require the ability to effectively monitor end-to-end transactions?
- Do your transactions require rollback/compensate support, such as those often associated with the financial industry?
- Do you have stringent **security/isolation** requirements for data?
- Would it be valuable to move to a 2 tier configuration to eliminate the network dependency of a 3 tier configuration?
- Is your critical application portfolio homogenous, or are there **highly-variable workloads**?
- How important is it to have clearly-identified workload priorities?
- Does your business require best-in-class support?
- Do you need to be able to **integrate your mainframe core business assets**, such as CICS, IMS, DB2?

[http://www.ibm.com/software/webservers/appserv/zos\\_os390/faq.html](http://www.ibm.com/software/webservers/appserv/zos_os390/faq.html)





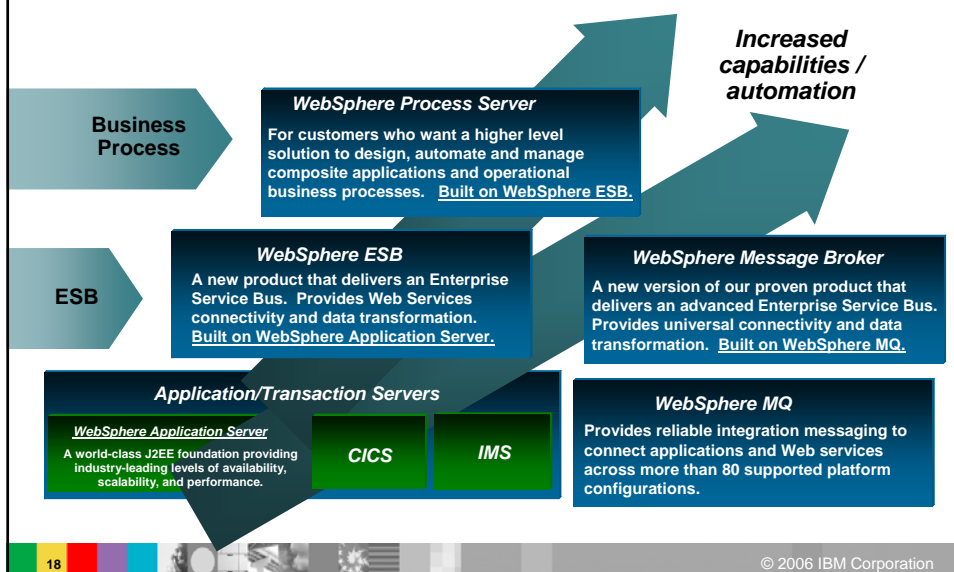
## Services and mainframe transactions

- “The irony is that **host applications are probably better suited for exposure as part of an SOA than many applications based on more modern 4GL object-oriented languages**, said Phil Murphy, a principal analyst with consultancy Forrester Research, in an interview last year. “When folks wrote screen-based transactions many months ago, they wrote it at a business function viewpoint: I add a customer, I add an order for that customer, I check backlogs for that customer, etc. So in many respects, those CICS screens of 15 years ago are better suited to service orientation than a lot of the newer, distributed code that’s been written over the last several years, because of their affinity with a business function,” he argued, adding: “What did the object-oriented guys do? They took those screens and they broke them down into a thousand different objects.”

From Enterprise Systems Journal, 7/26/2005  
<http://esj.com/enterprise/article.aspx?EditorialsID=1457>



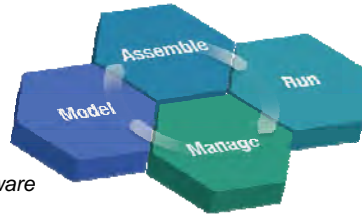
## SOA on z/OS – a complete solution from existing systems to the full SOA Lifecycle





## Why SOA on “z” ?

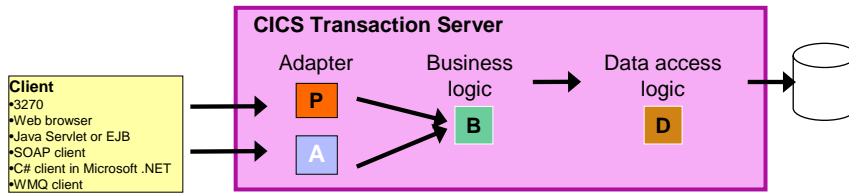
- **High availability for critical components**
  - Application Server
    - Used as server for new Java applications*
    - Used as underlying component for other middleware*
  - Enterprise Services Bus
  - Process Server
- **Highest security capabilities for critical components**
- **Centralized management**
- **Easier integration of core business assets**
  - Applications
  - Data



## z/OS Transaction Processing

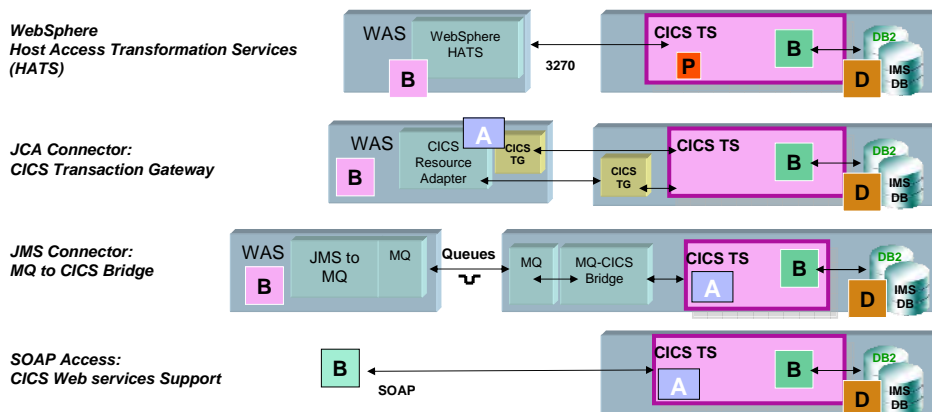
- **CICS, IMS and WebSphere Application Server (WAS) provide state-of-the-art transaction processing**
  - Ability to put business data online...
  - While guaranteeing that the data will never be lost, corrupted, or stuck in a inconsistent state
  - Business can move at the speed of computers
- **CICS works with relational (DB2), hierarchical (IMS DB) data or sequential (VSAM) data**
- **IMS works with relational (DB2) or hierarchical (IMS DB) data**
- **WAS works natively with relational (DB2) data and hierarchical (IMS DB) data using the JDBC standard**
- **All are optimized and exploit zArchitecture for**
  - Speed
  - Scale
  - Reliability
  - Easy management
- **All provide modern container capabilities**

## What assets in CICS can be transformed?

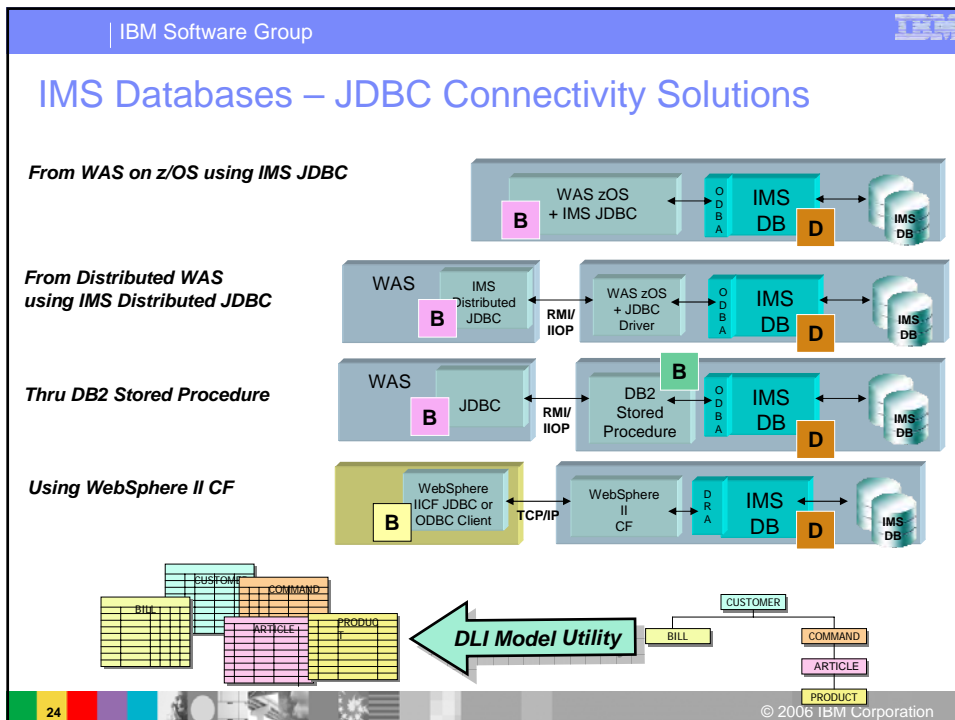
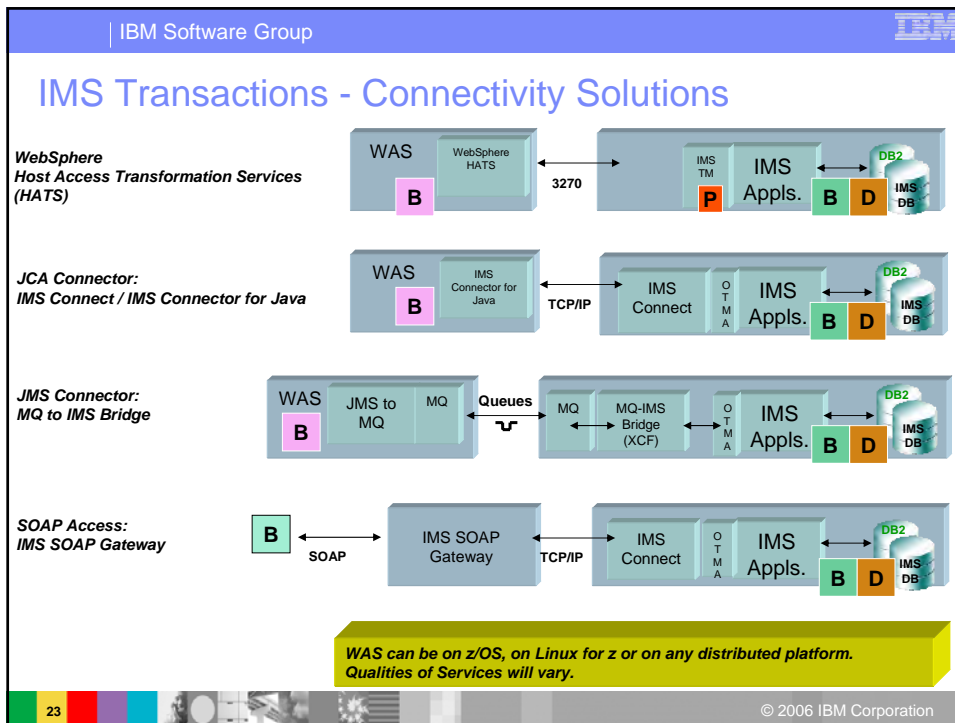


- **Best practice in CICS application design is to separate key elements of the application, in particular:**
  - Client adapter or Presentation logic
  - Business logic
  - Data access logic
  
- **Adapter/connector can be**
  - External (e.g JavaBean using JCA to connect to CICS)
  - Internal (e.g CICS SOAP-aware program)
  - Written or generated by tools

## CICS Transactions - Connectivity Solutions



WAS can be on z/OS, on Linux for z or on any distributed platform. Qualities of Services will vary.





## WebSphere Application Server for z/OS V6

### ■ A Compliant J2EE Server

- Extend existing Java assets with support for Web Services standards and standards-based messaging

*Certified J2EE 1.4*

*Web Services standard support (WSI, WSS 1.0, WS-Transaction, UDDI v3)*

- Help ensure 24x7 availability of business-critical applications with clustering and high availability
- J2EE applications on different J2EE server can be ported to WAS z/OS

### ■ A Compatible WAS on the z/OS operating system

- Functionally equivalent to WAS Network Deployment (distributed)
- Same WAS V6 common code

### ■ Development Tools

- Common development tools (eg. RAD v6), but enhanced version available for z (WDz) to unify Java, COBOL, PL/I development environment



## WAS for z/OS – Why is it different?

### ■ Workload Management

- WLM and Parallel Sysplex exploitation

### ■ High-availability

- Based on System z availability
- Server clustering

### ■ Security

- Based on z/OS Security Server / RACF (SAF)
- Security context passed between WAS applications and other z/OS applications

### ■ Transactional support

- Based on z/OS Resource Recovery Services (RRS)

### ■ Performance improvement

- Parallel sysplex scalability
- Use of Java specialized processors (zAAP) to improve TCO

## WAS for z/OS – featuring High-Availability

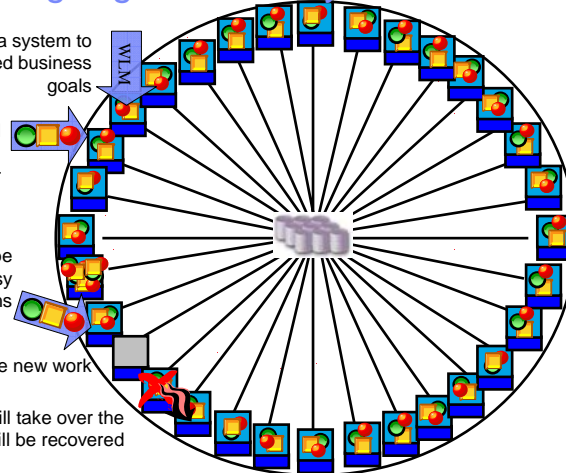
Work is automatically balanced within a system to complete high priority work according to stated business goals

New WebSphere servers will be started automatically to accommodate spikes; they will automatically be quiesced when no longer needed

If a given system is overloaded it will be temporarily bypassed in favor of less busy systems

If a system is unavailable it will not receive new work

If a system fails other systems will take over the work and the system will be recovered

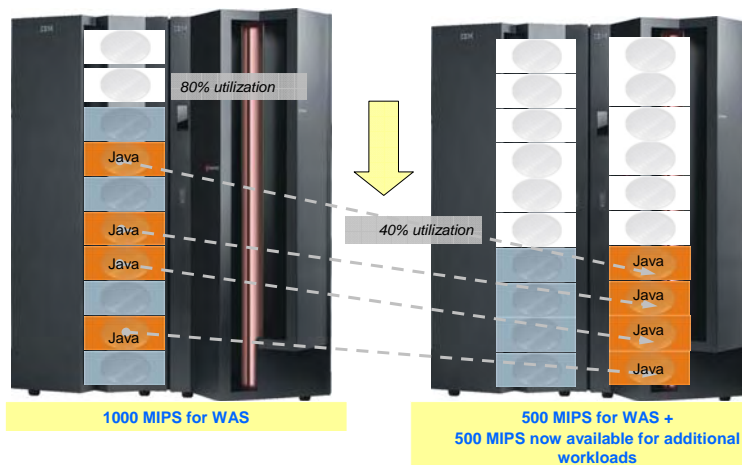


If the Sysplex is running at capacity, resources will be adjusted to favor the more important workloads

*The Sysplex is designed to run heterogeneous workloads ... it can run WebSphere and traditional OLTP/DB applications simultaneously, at 100% utilization.*

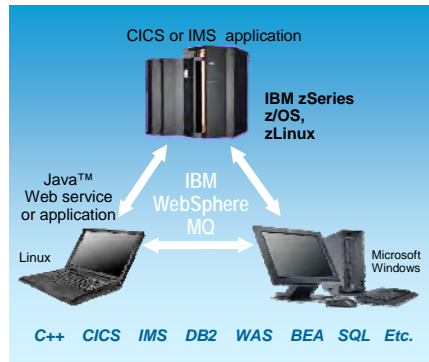
## WAS for z/OS – featuring zAAP Processors

- Running Java code under zAAP processors control



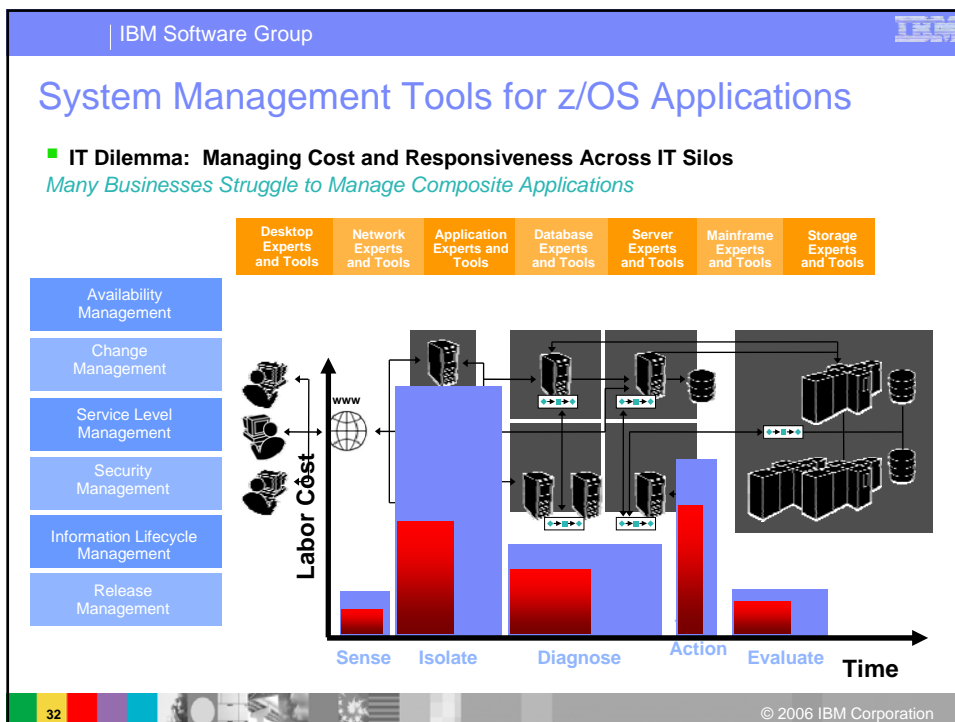
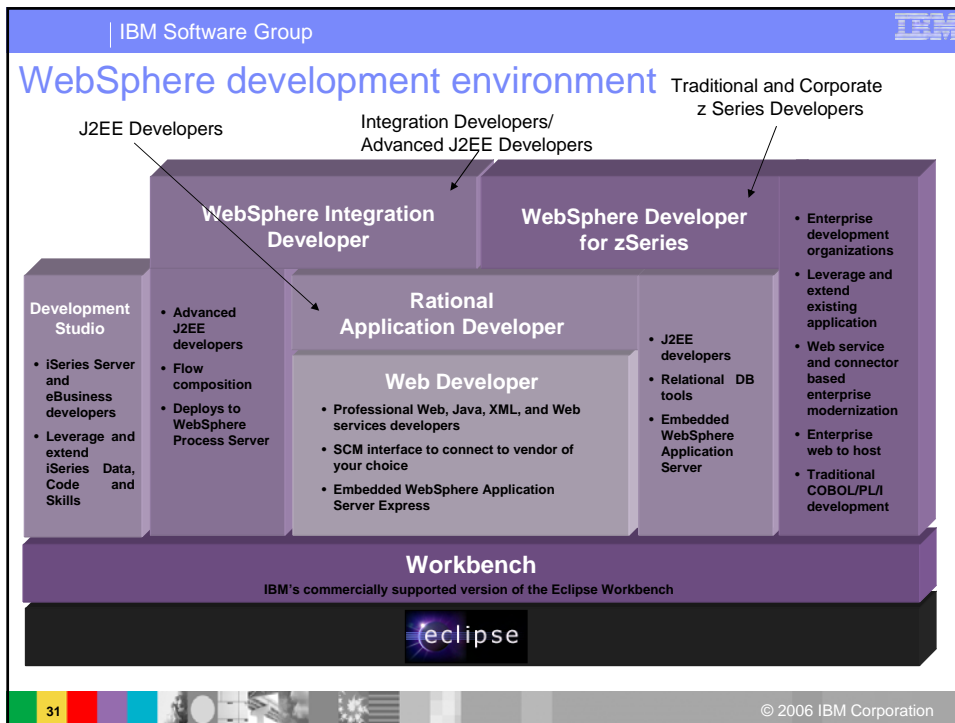
## WebSphere MQ for z/OS

- A simple, efficient **API** for sending/receiving data **messages**
- Enables fast, reliable **asynchronous messaging** from application to application
- The industry standard for Message-Oriented-Middlewares (MOM) with over 75% of the market.
- Can be used on over **45 different platforms** (Windows, Linux, AIX, Solaris, HP-UX, iSeries-AS/400, etc, etc., and of course..... z !)
- Can be used from **all major programming languages** (C, C++, COBOL, Fortran, BAL, PL/I, Java/JMS, VB, RPG, etc.)
- Built from the ground up on System z
  - Engineered natively to exploit z/OS RAS features such as RACF, ARM, WLM, Parallel Sysplex
  - Specialised bridge included for CICS and IMS transactions
  - Provides callable access from
    - ✓ CICS, IMS, WebSphere Application Server
    - ✓ DB2 Stored Procedures
    - ✓ Batch and TSO application execution environments
  - Provides full participation in transactions coordinated by CICS, IMS and RRS
  - Capable of supporting 1000s of messages per second
  - Many supporting vendor tools, developers and consultants available worldwide



## AD Transformation Tools for z/OS Applications

- **WebSphere Developer for zSeries**
  - Traditional and composite application development (COBOL, PL/I, J2EE, Web services)
- **WebSphere Business Modeler**
  - Designed for the business analyst as an easy to use tool for process modeling and analysis
- **WebSphere Studio Asset Analyzer**
  - Enterprise-wide application discovery and insight through web browser
  - Identify dependencies in and across applications and lines of business
- **Asset Transformation Workbench**
  - Deep application analysis
  - Business rules discovery and componentization
  - Project-level workbench

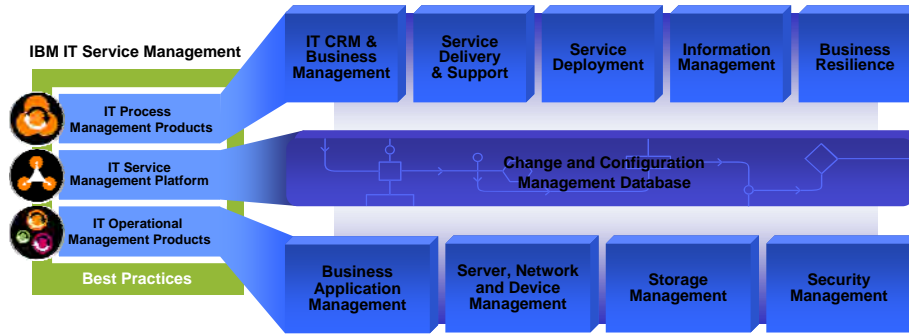






## System Management Tools for z/OS Applications

### IBM IT Service Management, A Differentiated, Flexible Approach



## System Management Tools for z/OS Applications

### Tivoli portfolio extract

#### Business Service Management

##### INFRASTRUCTURE MANAGEMENT

- Tivoli Web Access for Information Management
- Tivoli Business Systems Manager for z/OS

- Tivoli Usage & Accounting Manager
- Tivoli Service Level Advisor

#### Availability

##### PERFORMANCE MANAGEMENT

- Tivoli OMEGAMON DE on z/OS
- Tivoli OMEGAMON XE for
  - z/OS
  - CICS
  - IMS
  - DB2 PE
  - DB2 PM
  - Mainframe Networks
  - Storage
  - WebSphere Business Integration
- Tivoli OMEGAMON Management Console
- Tivoli Monitoring Services z/OS
- Tivoli OMEGAMON for z/VM

#### Availability

##### OPERATIONS MANAGEMENT

- Tivoli NetView for z/OS
- Tivoli Automated Tape Allocation Manager for z/OS
- Tivoli Decision Support for z/OS
- Tivoli Performance Modeler
- Tivoli Information Management for z/OS
- Tivoli System Automation for
  - z/OS
  - E2E
  - Multiplatforms
- Tivoli AF/OPERATOR on z/OS
- Tivoli AF/REMOTE

#### Security

- Vanguard suite
  - Administrator
  - Advisor
  - Analyzer
  - Enforcer
  - Security Center
- Tivoli Access Manager for BI host edition
- Tivoli Identity Manager for z/OS (client only)

#### Storage

- Tivoli Storage Manager for z/OS
- Tivoli Storage Manager for mail for z/OS
- Tivoli Storage Manager for data retention for z/OS

#### Optimization

##### PRODUCTION CONTROL

- Tivoli Workload Scheduler E2E
- Tivoli Workload Scheduler for z/OS
- Tivoli Workload Scheduler
- Tivoli Output Manager
- Tivoli Licence Compliance Manager
- Tivoli Allocation Optimizer for z/OS
- Tivoli Storage Optimizer for z/OS
- Diversified Software Systems (DSSI)
  - Job/SCAN
  - Docu/TEXT



## IBM Investment to simplify management of the mainframe, October 2006

The cross-company effort is to make System z easier to use for a greater number of computer professionals by 2011. The goal of this five-year effort, which will include an investment of approximately \$100 million, is to enable technology administrators and computer programmers to more easily program, manage and administer a mainframe system -- as well as to increasingly automate the development and deployment of applications for the mainframe environment. The initiative, involving a team of hardware and software experts, leverages IBM's expertise in automation and systems management.

### The major areas of IBM's mainframe simplification strategy include:

- Automated configuration checking -- to make it easier for information technology administrators and computer programmers to predict and avoid technical problems.
- Modernizing the mainframe user interface -- including network configuration, systems management, and data center hardware configuration designed with both existing IT staff and the new generation of IT workers in mind.
- Improving software asset management technologies -- to make it easier for users to control software costs and, as well, simplify and automate the acquisition of software services.
- Modernizing the mainframe's development environment with visual tools that enable novices to quickly learn how to program for the mainframe



## Agenda

- **Key concepts of SOA**
- **SOA Solutions on z/OS**
  - Transaction environments
  - SOA Foundation products
  - SOA Integration solutions
  - Development and full SOA cycle solutions
  - System Management Tools for z/OS Applications

### Conclusion



## Why SOA now?

- **To keep pace with competition**
  - "We are taking apart each task and sending it to whomever can do it best, ... and then we are reassembling all the pieces"
    - from Thomas Friedman's 'The World is Flat'
  - "By 2008, SOA will provide the basis for 80 percent of new development projects." -- Gartner
- **The standards and technology are finally in place, with broad industry support**
- **Availability of best practices for effective governance**
- **The necessary software to get started is available today**



## Why SOA on z/OS?

- **Because the zStack offers the most solid foundation for integration**
  - z/Architecture, Virtualization, Sysplex, GDPS, WLM/IRD, zAAP, zIIP
- **Because the zStack is where your corporate assets are found**
  - Put SOA infrastructure close to your data ... avoid network overhead and security issues
- **Because z/OS manages workload performance against business objectives**
  - WLM & IRD, eWLM, z/OS Security Server, Sysplex Distributor
  - Tivoli OMEGAMON, Application Monitor, WS Workload Simulator
- **Because zStack has all the tools to transform, modernize & extend existing applications, processes and data**
  - WAS, SOA & Web Services & ESB, HATS, CICS TG, DB2 Connect, IMS Connect, WMQ, ...
- **Because the System z is the platform where you can most easily integrate applications, processes and data, new and old**
  - z/OS, PR/SM, zAAP, Hipersockets, RRS, Thread Identity support, ...
- **Because the System z reduces architecture complexity!**

***System z offers an advanced SOA integration platform for the on demand world!***

## You really need to think about z/OS when

- **You don't always need z/OS, but look closely at it when you require....**

- Highest reliability, application availability, and/or integrity
- Highest integration with backend systems and systems operations
- Most robust transaction management at two phase commit level
- Tightest security and privacy protection
- Continuous support for mixed workloads



***IBM System z – The premier platform to serve as the enterprise hub for integration and SOA***

## Further reading

- **REDP4190 Role of IBM System Z in a Service Oriented Architecture**
- **SG24-6365 WebSphere Application Server z/OS Connectivity Architectural Choices**
- **SG24-7064 WebSphere Application Server for z/OS Connectivity Handbook**
- **GC34-6582-00 WebSphere MQ for zOS Concepts and Planning Guide V6.0**
- **SG24-7137 WebSphere Message Broker Basics**
- **SG24-7212 Getting Started with WebSphere Enterprise Server Bus v6 (draft)**

IBM RedBooks (SG24... or REDP...) are available for download at <http://www.redbooks.ibm.com/>

Other IBM manuals are available at <http://www.ibm.com/support/publications/us/>



## Dealing with objections – business needs are driving a renaissance in mainframe interest and use

<p><b>The mainframe is obsolete</b></p>	<p>Enterprises are rediscovering mainframe values. IBM is seeing a resurgence of interest and use of the mainframe. The ability to efficiently deliver core services - without interruption – is critical to becoming an On Demand enterprise.</p> <p>IBM has invested \$bb of dollars to rejuvenate the platform. You will find most of the latest hardware &amp; software technologies on the mainframe.</p> <p>The platform protects and enhances 40 years of investment in application assets. Our customers tell us they want this indefinitely.</p> <p>Competitors now wish their servers were more like the IBM mainframe.</p>
<p><b>The mainframe is too expensive</b></p>	<p>The mainframe delivers higher utilization, lower overheads and the lowest total cost-per-user of any platform.</p> <p>Mainframe delivers huge value through its leading security, availability and recoverability capabilities.</p> <p>You may be surprised at the affordability of new mainframe application projects</p>
<p><b>I can't get the skills</b></p>	<p>There is a resurgence of interest in the mainframe amongst younger IT professionals, driven by a recognition of career opportunities.</p> <p>IBM is sponsoring major initiatives in universities and colleges to facilitate the development of mainframe skills.</p>