Application Infrastructure Runtime Considerations

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The Right Platform for Any Situation

SOA Enabled Agile Integrated Application Environment

Modernize and transform your environment

IBM WebSphere Application Server for z/OS

Practical reuse of on-line Java assets in Batch

IBM WebSphere Compute Grid for z/OS

IBM CICS Transaction Server

Understanding, Optimization and Control

IBM CICS Tools

IBM Problem Determination Tools for z/OS

Topics for today's discussion

- **WebSphere Application Server for z/OS and Compute Grid**
- **CICS Transaction Server V4.1**
- **CICS Tools and Problem Determination Tools**

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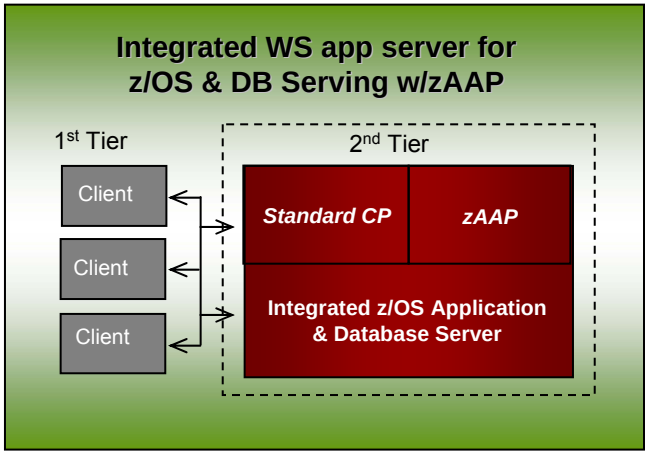
WebSphere Application Server for z/OS V7

- **Reduced cost of ownership and enhanced agility**
  - Common code and industry standards (JEE, Web Services, etc.)
  - zAAP enabled for low cost Java application deployment collocated with mission critical data



- **Innovation that matters**
  - Feature Packs for ongoing functional enhancements

- **The unique value of WAS for z/OS and its active platform optimization and exploitation**
  - Replicated Server cluster architecture leveraging shared data for scale and availability
  - Native OS support: RRS, RACF, zWLM, SMF, ARM, Parallel Sysplex
  - Optimization features designed to provide performance, security and data interaction, including FRCA, thread hang recovery, etc.
  - Collocation advantages when connecting to traditional mainframe subsystems – CICS, IMS, DB2
  - Other “Hidden Gems” documented in White Paper (WP101138) on Techdocs at www.ibm.com/support/techdocs

WebSphere Application Server for z/OS - Synergy with the cross platform WebSphere Application Server Family

An industry-leading open standard application server platform, with powerful business functionality

Manage Cost

- **Common standards and API's across all platforms**
- **Common tooling across all platforms**
- **Many of the same skills across all platforms**
- **zAAP enabled**

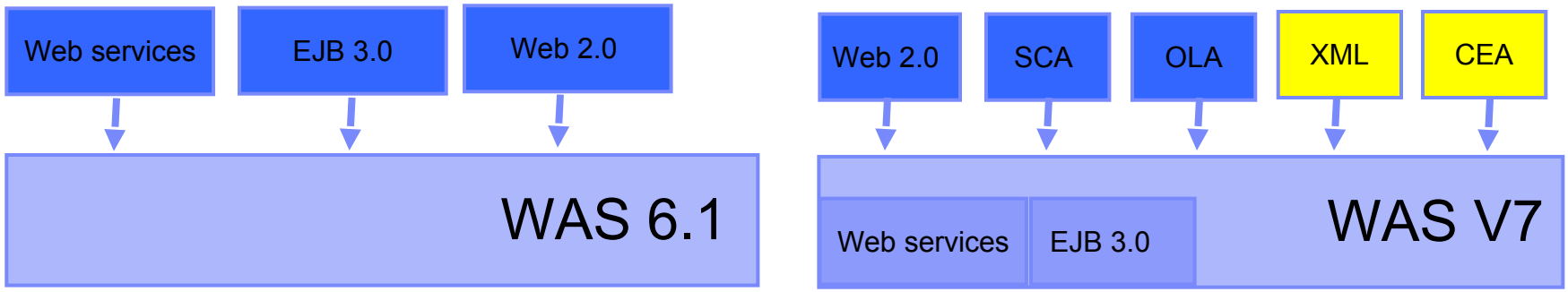
Enhance Agility

- **Rapid development and deployment model**
- **Many dynamic runtime elements**

Common business applications runtime across the enterprise … development, test, production

Innovation that Matters – Feature Packs

Revolutionizing the way customers consume application server technology now and in the future



1. Choose the application server technology you need.
2. Install additional functionality on core WAS 7
3. Build the Application Server you want without waiting for new releases.

As new technology evolves, so does WAS – get the technology you need now without waiting for a new release!

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WebSphere Application Server for z/OS Delivers Superior Customer Value

Business Applications

Value-add Middleware

Open Standard Application Programming Model

CICS
WebSphere Application Server for z/OS

Passive Qualities of Service

Value attributes of the operating system

Value attributes of the hardware

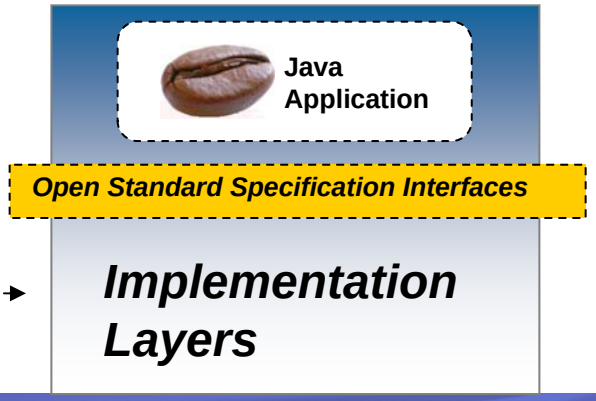
Active Platform Exploitation
- Workload Mgmt
- Security
- Transaction Mgmt
- Thread Management
- Scalability
- Recovery

Read the Whitepaper on Value of WAS on z/OS

ACTIVE Areas of exploitation for WAS on z/OS

1. **Exploitation of SMP/E**
2. **Exploitation of JES and common z/OS facilities**
3. **Exploitation of zAAP specialty engines**
4. **Exploitation of WLM**
5. **Exploitation of RRS**
6. **Exploitation of SAF and Crypto**
7. **Exploitation of SMF**
8. **Exploitation of z/OS exclusive Cross Memory Communications**

These are all z/OS value attributes

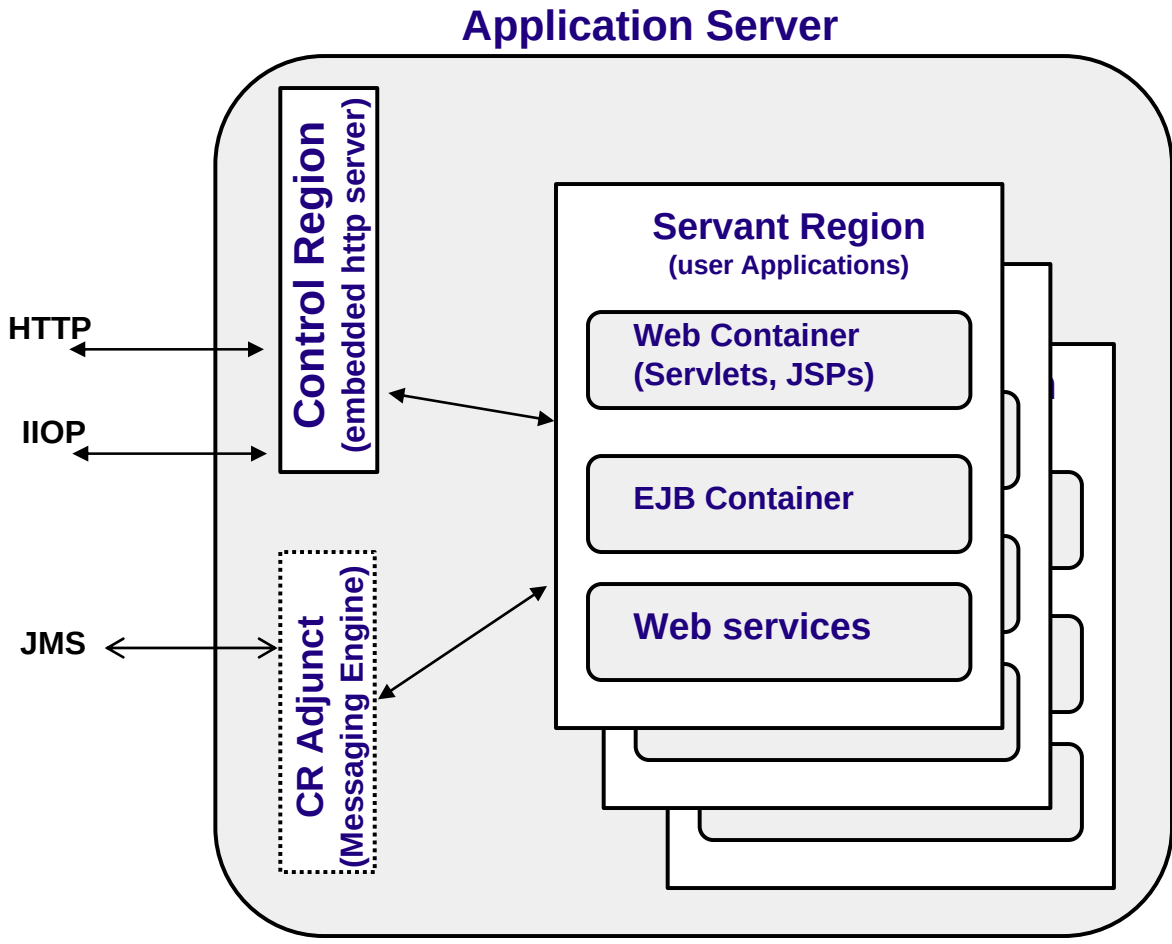


WebSphere is WebSphere up here. It's all based on accepted standards.

Exploitation taking place below the open standard interface line.

WAS z/OS internal architecture – very different!

- **z/OS implementation uses a "master-slave" hierarchy**
  - This architecture is at the heart of CICS and IMS also
- **A WAS "Control Region" distributes the application work to its "Servant Regions"**
- **This is key to understanding the value of WAS on z/OS**
- **This is what brings the business value**



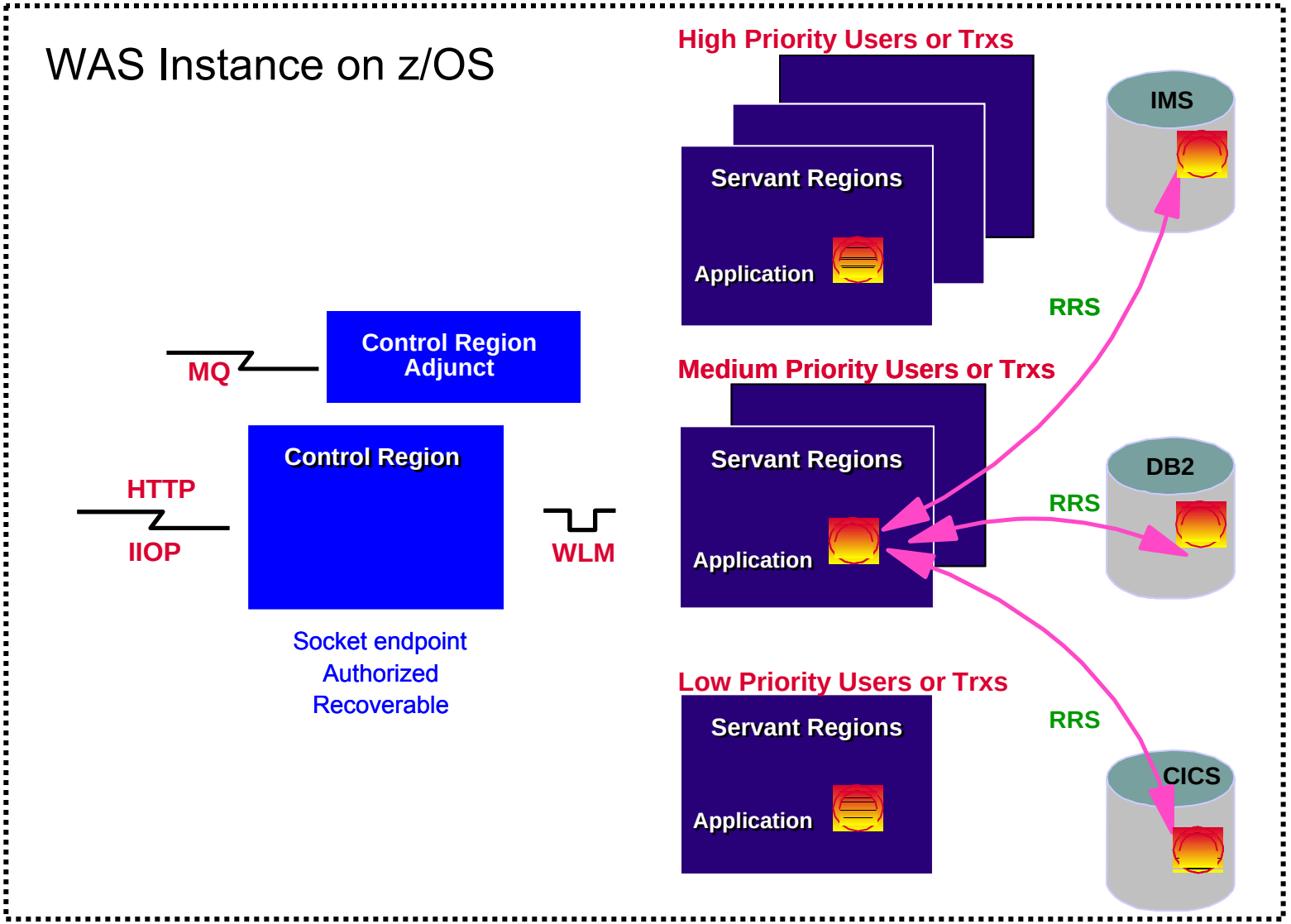
Example **ACTIVE** Exploitation – Workload Management (WLM)

Many view WLM exploitation as the heart of the platform exploitation model for WAS z/OS. There are four main elements of this exploitation …

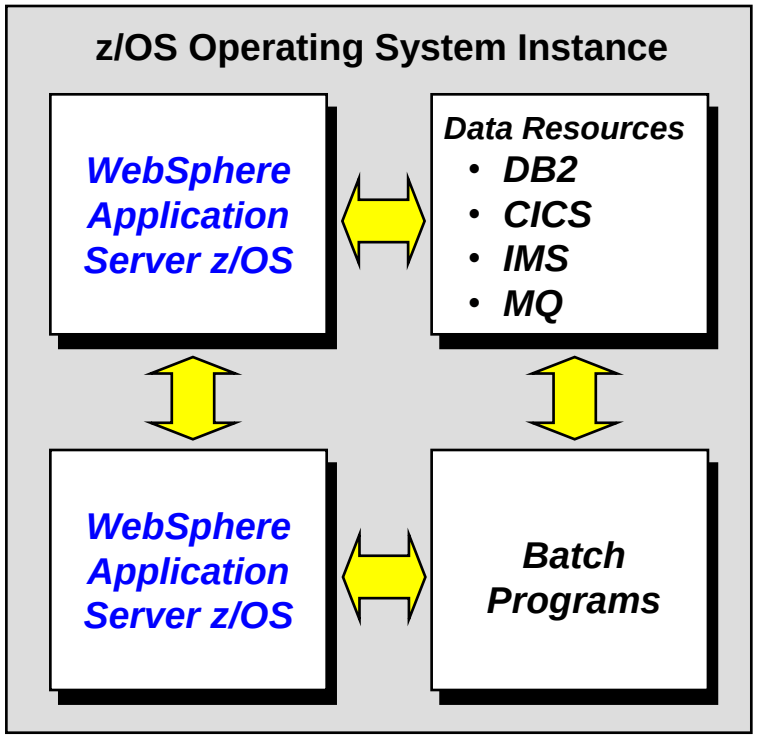
Intelligent Dynamic Capacity Expansion	Intelligent Workload Flow Control	Intelligent Management of Mixed Work in Server	Intelligent Workload Routing Advice
The ability to increase the number of JVM instances based on WLM goals and configuration settings. **This is an advantage of the "Controller / Servant" structure.**	**An element of the Controller/Servant structure. Inbound work is queued and held, waiting for a thread to select it, based on importance and arrival. It's a pull model rather than a push. Applications in JVMs take only what they can handle.**	**Multiple servants allows differently classified work to be placed in different servant regions. This allows WAS/WLM to understand what kind of work is in each and to manage system resources accordingly.**	**WAS z/OS using WLM to determine where best to route certain kinds of work**

The key is the controller / servant architecture …

WebSphere Application Server on z/OS Architecture



Collocation Benefits



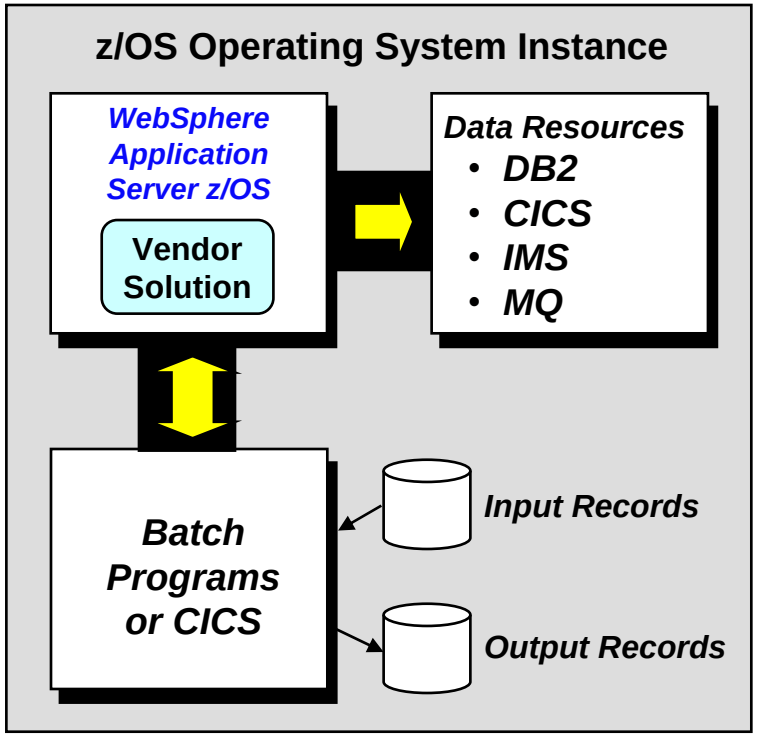
- ***Extremely*** **fast data transfer**
- **Tightly controlled by z/OS authorization processes**
- **Eliminate need to serialize and deserialize data and objects**
- **Eliminate need for encryption overhead**
- **Propagate several forms of user identity**

Efficient -- very low overhead so scalability can be addressed

Secure -- no network, can't be sniffed or hacked

Fast -- for very high volume workloads

Leveraging Collocation through Local Connectors



Advantages:

- *Very* low overhead
- *Very* high throughput
- Exploit data assets in DB2, CICS, IMS or across MQ using their local connectors
- Maintain transaction integrity with RRS
- Security Propagation
- Workload Context Propagation

- **JDBC Type 2 local connector to DB2 for higher throughput, lower CPU utilization, cross memory data transfer**

versus

- **JDBC Type 4 remote network connector with network latency**

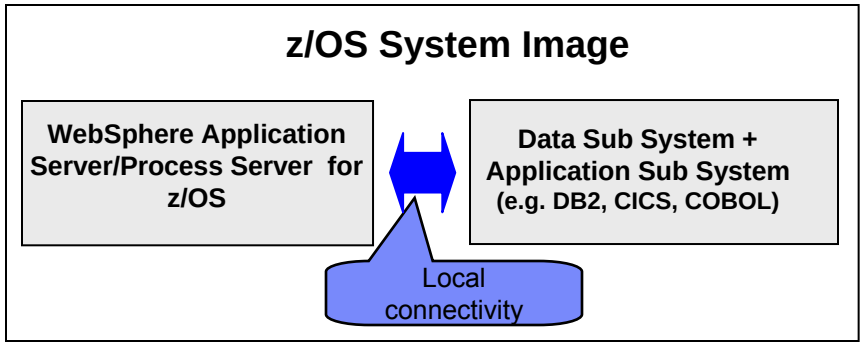
- ***WebSphere Optimized Local Adapter (WOLA) -- z/OS exclusive -- an extremely efficient bi-directional cross-memory mechanism***

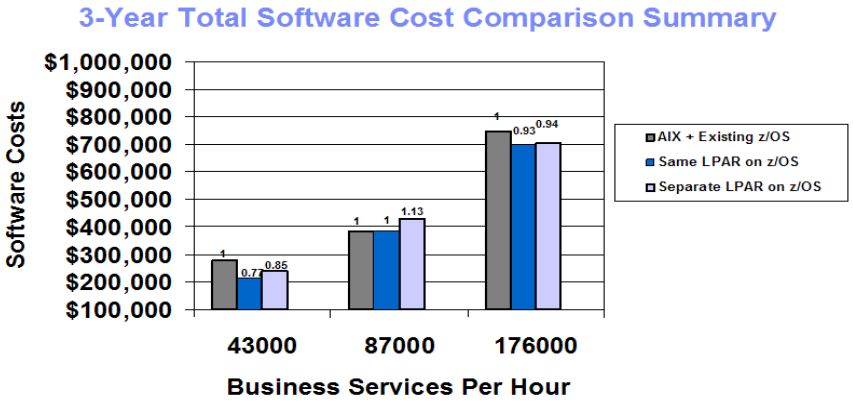
Leveraging the platform's capabilities to address your business needs

Performance Optimization through Co-location

Deploying application servers, data sub systems and application sub systems

Co-located Deployment





Top 5 Reasons for Co-location

- 52% more throughput when WAS for z/OS is co-located with DB2 in the same LPAR
- Up to 34% overall CPU savings with WebSphere Application Server and DB2 on the same LPAR
- 500% improvement over Web Services when WebSphere Application Server co-located with application sub systems
- 3-year TCO for and TCA shows WAS / WPS are price neutral when compared to running equivalent workload on distributed servers
- Networking costs plunges, while infrastructure is drastically simplified by leveraging existing assets and infrastructure

Additional Benefits

Improving team collaboration

Align business goals with downstream design

Operational benefits (QoS), such as DR, scalability, and high availability

Incremental strategic modernization

Building Up Solutions -- Leveraging the AppServer

We call these "stack products" -- solutions that use the power of WebSphere Application Server as its base (WESB, WPS, WBSF, WBE, iLOG, Portal, WSRR). One Example we can look at: "Compute Grid"

IBM WebSphere Compute Grid

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IBM WebSphere Application Server

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IBM System z, z/OS and Parallel Sysplex

Challenge:

Perform business critical batch processing using Java and enterprise data located on the mainframe

What we've seen:

The challenges of enterprise batch quickly overwhelm simple Java batch solutions:

- *Checkpointing and restarts*
- *Job suspend and restart*
- *Clustering and dividing work across servers*
- *Development tooling to support all this*

Solution:

IBM WebSphere Compute Grid

- *Enterprise-strength Java batch environment*
- *Supported with batch development tooling*
- *Makes full use of WebSphere Application Server z/OS features*

The challenges of Java batch addressed with IBM solution that exploits WebSphere Application Server, which as we've seen exploits System z and z/OS

Summary: WAS on z/OS Exclusives/Differentiators

- **WebSphere Application Server on z/OS leverages z/OS, Parallel Sysplex and System z Hardware capabilities.**
- **Consequently WAS on z/OS has capabilities that are exclusive and not available when WAS is deployed in a distributed environment.**
- **These exclusives become differentiators that add to WAS functionality when deployed on z/OS.**
- **Exploiting these exclusives requires no changes to the application so from a development, administration and application perspective WAS is the same on z/OS as it is on other platforms providing ease of portability and reuse of skills.**
- **The differences are delivered by the platform on which WAS is deployed.**

The next two charts detail the WAS on z/OS exclusives/differentiators and list their advantages for performance/scalability, reliability/availability, security, manageability, total cost of ownership as well as distributed alternatives where they exist. Note that the distributed alternatives are not as functionally rich as the z/OS offerings.

WAS on z/OS Exclusives/Differentiators versus Distributed

WAS on z/OS Exclusives/Differentiators	Perf/ Scal	Rel/ Avail	Sec	Mgmt	TCO	Dist Alt
Server Architecture – CR/SR, multiple JVMs, Appl. Isolation	✓	✓		✓		WVE
WLM spawning servant regions/JVMs/Address Spaces	✓	✓		✓	✓	WVE
WLM queuing	✓	✓				WVE
Pull versus Push architecture for routing/balancing	✓	✓		✓		None
WLM routing/load balancing	✓	✓		✓		WVE
WLM classification/priorities – SLA enforcement guarantee	✓			✓		**WVE**
WLM stateful work placement	✓			✓		None
zAAP (Java) Offload					✓	None
zIIP Offload across LPARs					✓	Same
Resource Recovery Services (RRS) – 2-phase commit		✓		✓		XA
Automatic Restart Manager (ARM)		✓		✓		None
RACF/SAF interface security			✓			None
Type 2 local connector	✓	✓				None
WebSphere Optimized Local Connector (WOLA) to CICS/Batch	✓		✓	✓	✓	None
CTG adapter only – not need to run address space	✓	✓		✓		None
Fast Response Cache Accelerator (FRCA)	✓					None
Hung Thread Management/Failover/Recovery	✓	✓		✓		None
High Availability Manager – XCF instead of heartbeat	✓	✓		✓		Heart beat
SMF for Chargeback/Usage Reporting				✓		None
RMF for Monitoring				✓		None
SMP/E install				✓		None
zPMT/WCT				✓		None

WAS on z/OS Exclusives/Differentiators versus Distributed (continued)

WAS on z/OS Exclusives/Differentiators	Perf/ Scal	Rel/ Avail	Sec	Mgmt	TCO	Dist Alt
Hipersockets between LPARs	✓		✓	✓	✓	None
Sysplex Distributor for TCP/IP routing	✓	✓		✓		None
Parallel Sysplex exploitation	✓	✓		✓		None
GDPS disaster recovery		✓		✓		None
Capacity Backup (CBU)		✓		✓	✓	None
On/Off Capacity on Demand (ooCoD)	✓					None
Cryptographic processors	✓		✓	✓	✓	None
System z10 hardware instructions for Java	✓					None
High I/O bandwidth	✓					None
Intelligent Resource Director (IRD)	✓	✓		✓		None
HiperDispatch	✓					None
GMT vs. local time for error log msgs/traces versus WTO				✓		None
Logging response failures and return exceptions		✓		✓		None
Dynamically changing trace routing – BUFFER, SYSPRINT, TRCFILE				✓		None
Message routing and output handling (convert WTO to DD)				✓		None
Spinning output stdout/stderr				✓		None
Display Command improvements				✓		None
Pause/Resume listeners		✓		✓		None
Servant Survivor – staying up during a timeout flurry	✓	✓		✓		None
Enclave propagation	✓	✓		✓		None
Handling large IIOP msgs in 64-bit mode	✓	✓		✓		None
Support for 120K+ HTTP clients	✓				✓	None

Right Fit Platform Selection Methodology
Selecting a Platform for "Right Fit" Application Deployment

- There are many application characteristics that lend themselves to different deployment options for optimal performance, cost and qualities of service.
- Most organizations have diverse application portfolios with multiple different characteristics and requirement mixes.
- It is important to evaluate Total Cost of Ownership, non-functional requirements and data/transaction proximity advantages for each application.
- Deploying the application runtime infrastructure, such as WAS, on multiple diverse platforms provides the ultimate flexibility for proper application deployment for the best business benefit often referred to as "right fit".

I have developed a two page matrix that can be used to help map the application characteristics/requirements to the best platform for delivering those advantages.

Topics for today's discussion

- WebSphere Application Server for z/OS and Compute Grid
- **CICS Transaction Server V4.1**
- CICS Tools and Problem Determination Tools

CICS TS V4.1 is aimed at helping users to

Compete *for new opportunity by gaining insight into business processes and responding by modifying key business applications quickly and with confidence*

– Business Flexibility and Innovation

Comply *with corporate, industry and government policies to manage business risk of critical business applications*

– Governance and Compliance

Control costs *by simplifying IT infrastructure and improving development and operations productivity through easier-to-use interfaces and functions*

– IT Simplification

CICS Transaction Server V4.1 Key Enhancements

Comply

Resource signatures

WebSphere Registry & Repository Support

Support for distributed identities

Compete

Support for event processing

Atom feeds from CICS

Application Bundles

Service Component Architecture

Java 6

Web Services Addressing

Improvements to data mapping

Control

CICS Explorer

IPv6

IPIC Transaction Routing

MQ Group attach

Improvements to CPSM workload management

New SPI commands for managing the CSD

Discovery Library Adaptor

Architectural Enhancements

Improvements to XML parsing in CICS

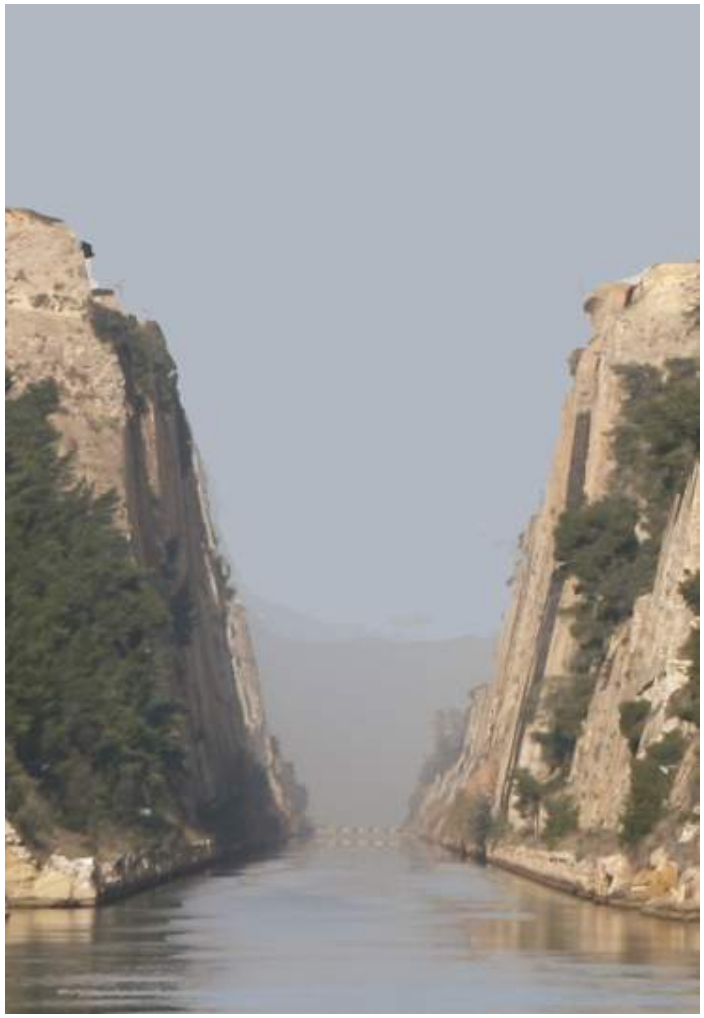
Large file hosting

Performance Improvements

The gap between LOB and IT limits

Business users know which event patterns are relevant and what actions are required, but aren't equipped to implement themselves

Business User



IT people *may* have event-based tools and technologies but can't respond quickly enough to changing business requirements

Business Event Processing Bridges the Gap

Puts power in the hands of the business user

- No coding required for defining business event patterns
- Tasks performed via tooling

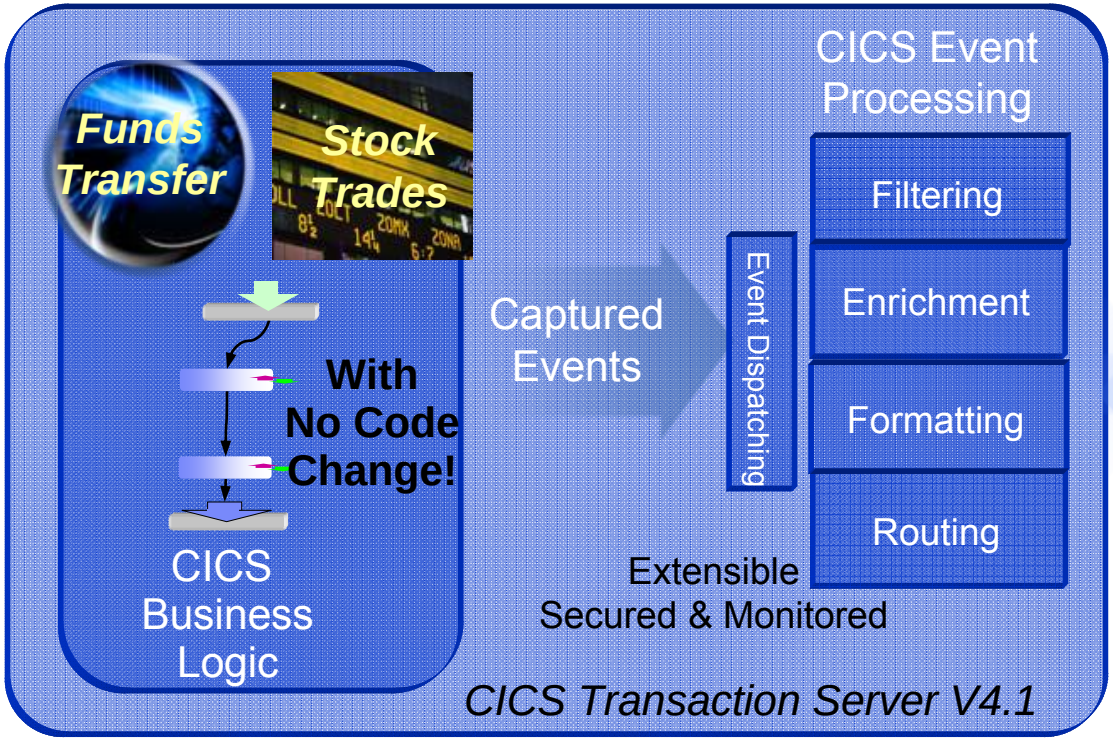
Business User

Provides unique convergence of power, flexibility, and ease of use

- IT configures end-points and payloads
- Leverages SOA infrastructure

An Overview of CICS Event Processing for smarter business outcomes

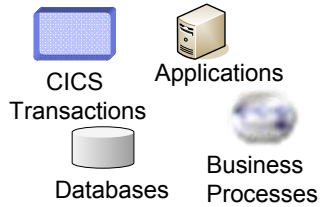
CICS Event Sources



Detect fraud and take action

WebSphere Business Monitor

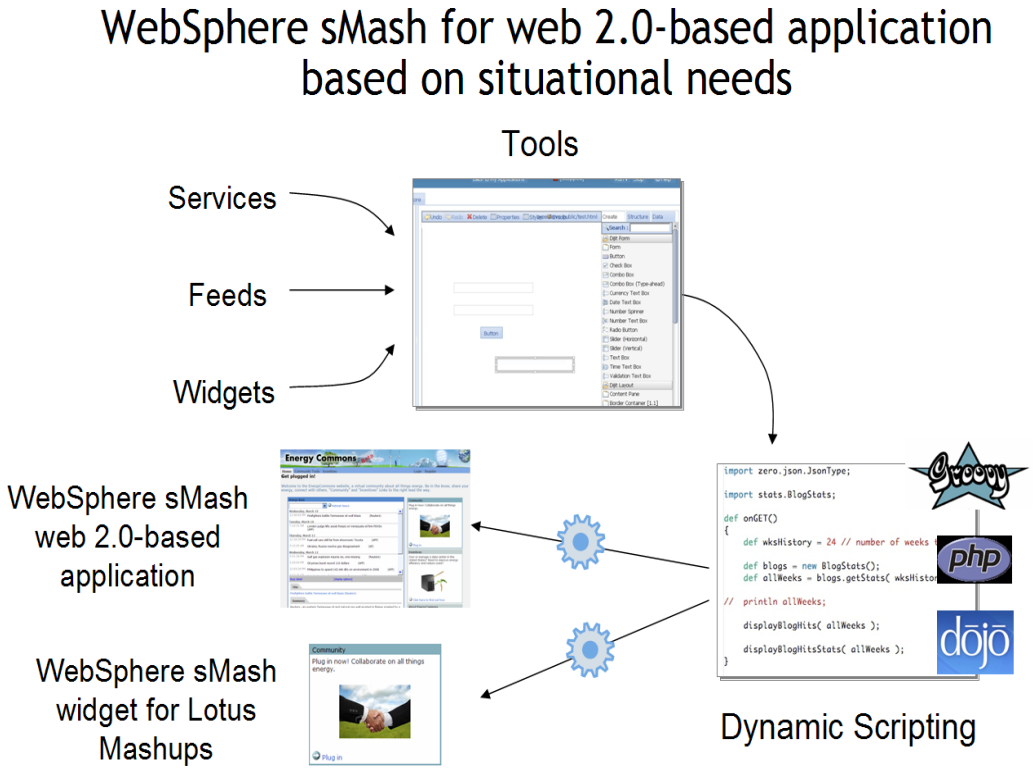
WebSphere Business Events



Other Event Consumers

A core component of the CICS runtime providing all the qualities of service you expect of CICS

WebSphere sMash for quickly delivering Web 2.0 applications



WebSphere sMash

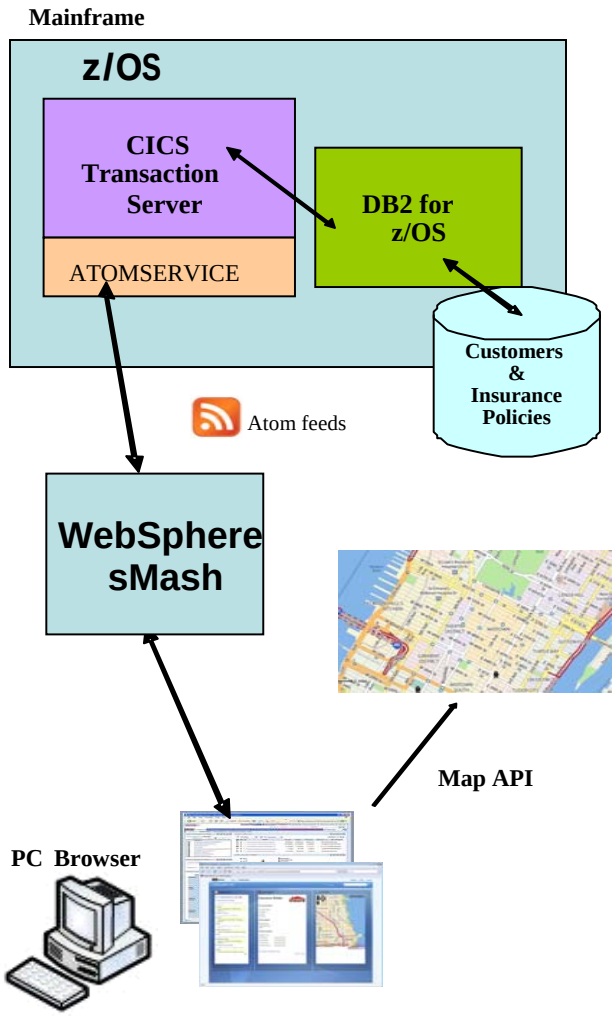
Improves developer productivity and efficiency through the support of dynamic scripting languages

Leverages Web 2.0 technologies for service invocation, service composition and data interchange

Visual tools for developers to build Widgets for use in Lotus Mashups

Web 2.0 Atom feeds from CICS

- **Enables CICS applications to:**
  - Provide live information for Web 2.0 consumption
  - Integrate with related data
  - Give full picture in a single holistic view
- **Create new applications based on up-to-date content and information**
  - Decision-support tools for knowledge workers
  - Composite user interfaces for expert workers
  - Information feeds & widgets to consumers for use in their own mashups
- **Develop using WebSphere sMash or RDz with EGL**



High level architecture: CICS Atom feeds

The Changing World

- **First- and second-generation System z specialists exit the industry**
  - Enterprises must transfer skills, knowledge and best practice to new CICS technical staff
  - Productivity must be maintained, and service-levels protected
  - Experienced CICS systems programmers, developers, and support personnel are asked to do more with less
- **Opportunity to build new System z skill pool**
  - Specialists can collaborate with new developers and administrators to create new applications
  - Operational management of IT resources with consistent and consolidated views
  - 550 schools worldwide are offering coursework on IBM System z
- **CICS family committed to reducing skill barriers**
  - To the management of CICS systems
  - To the development of CICS applications

Our Solution

- **Simplify CICS**
  - Single user interface for CICS & CICSPlex SM
    - Common, intuitive, Eclipse-based tooling environment for both new and experienced
      - Architects
      - Developers
      - System administrators
      - System programmers
      - Operators

- **Integration platform - Value of the sum exceeds the part**
  - First class cross tooling integration
  - Consistent views across tooling
  - Consolidated tooling with a central view into the CICS world
  - Supports CICS runtime, CICS tools, CICS connectors, plus other IBM and third-party software products
  - Integrated access to a broad range of data and control capabilities

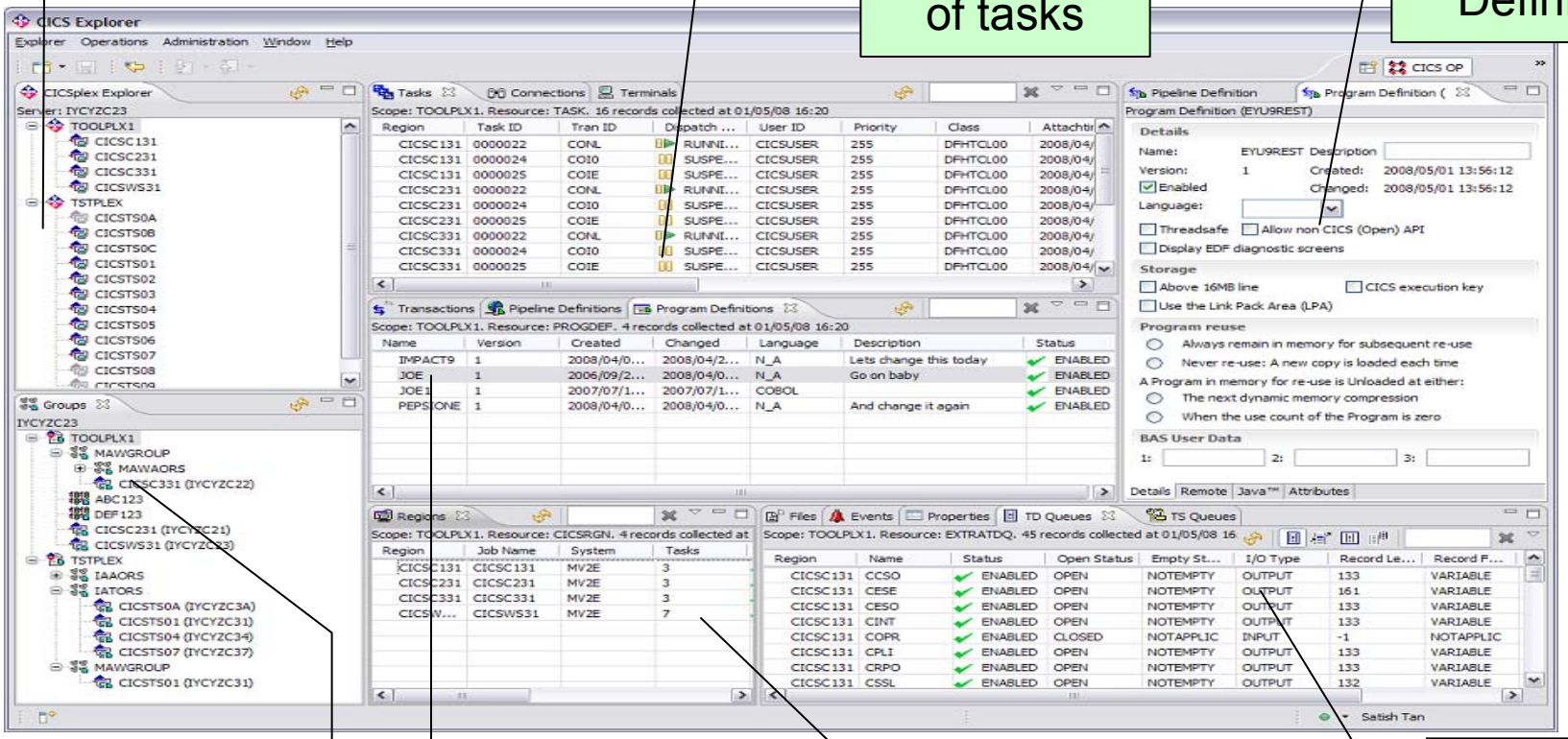
- **Software Development Kit (SDK)**
  - Provides separately packaged plug-ins for any Eclipse-based environment including RDz
  - API allows 3rd parties to extend or integrate existing capability
  - Layered architecture allows Eclipse-independent components to be used in any environment

The CICS Explorer

View Systems

View status of tasks

Edit Resource Definitions



Resource and System Groups

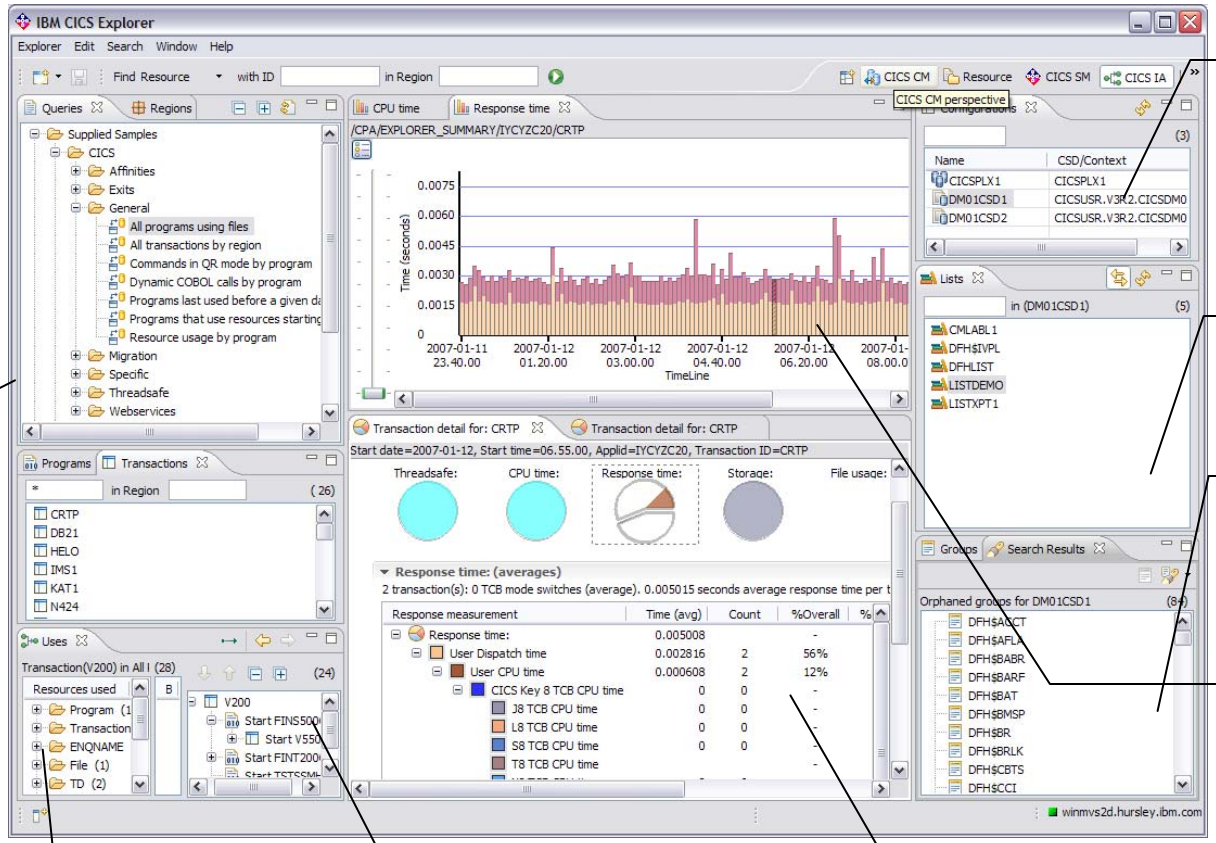
Views Program Definitions

Active CICS Systems in the selected PLEX

View Queue Information

CICS Explorer & CICS Tools: Putting it all Together

Interdependency Analyzer | **Performance Analyzer** | **Configuration Manager**



Single point of control for CSDs and DREPs

Lists and ResDescs

Search for Orphaned groups

Timeline of response times

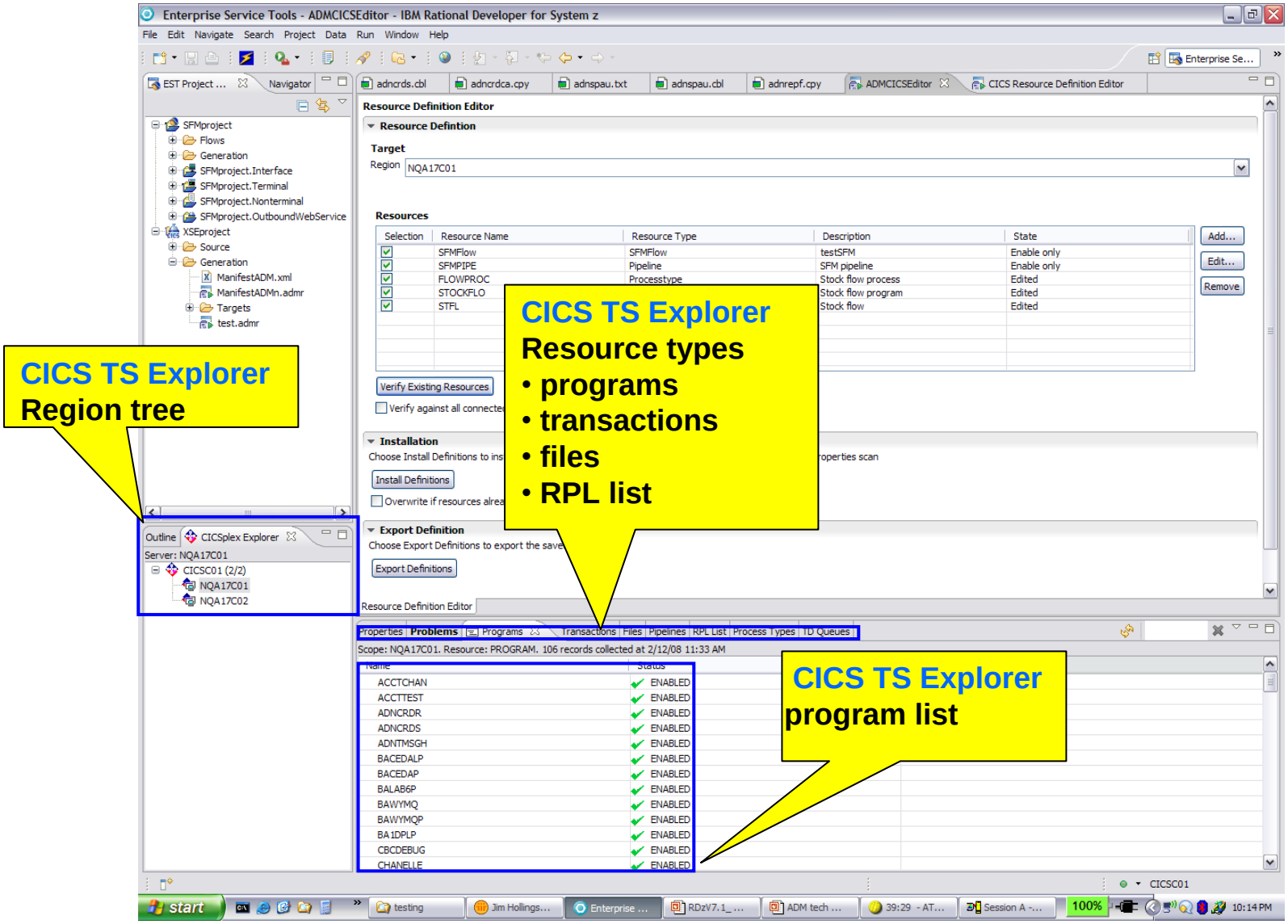
Shipped Sample Queries

View tree of resources used

Resources used by a transaction

Drilldown into transaction

CICS Explorer and Rational Developer for System z



Performance Improvements

- **CICS TS V4.1 performance improvements compared against CICS TS V3.2:**
  - **Optimized use of MVS timer services:**
    - When compared with CICS TS V3.2, between **1% to 5% CPU reduction** was observed due to optimizations in the use of MVS timer services on System z9 or z10 hardware
  - **Faster XML processing:**
    - CICS TS V4.1 showed a **reduction in the CPU time** used to parse XML messages, due to CICS now utilizing the z/OS XML parser.
  - **Improved capacity and faster intersystems:**
    - When compared to workloads currently using LU6.2 and VTAM for transaction routing or Dynamic Program Link (DPL), CICS TS V4.1 showed a **reduced response time and overall CPU usage** by migrating to TCP/IP and the IPIC functionality.
  - **System z9 and z10 hardware:**
    - Users could see a **reduction in CPU per transaction** for those applications running on IBM System z9 or z10, due to exploitation of this new IBM hardware.
  - **Throughput improvements with CICSPlex SM Work Load Management:**
    - Users who exploit the CICSPlex SM Work Load Management component should see **throughput improvements**, particularly for distributed workload requests when exploiting the new sysplex optimized workload management facilities.
  - **Improved efficiency and resilience management:**
    - Changes have been made to CICSPlex SM Topology that allow it to track more resource types, and provide customizable limits on the number of resources to be returned. Users should therefore benefit from **more efficient and resilient management**, particularly when using CICSPlex SM APIs, CICS Management Client Interface (new in this release), Web User Interface (WUI), and the CICS Explorer.

Topics for today's discussion

- WebSphere Application Server for z/OS and Compute Grid
- CICS Transaction Server V4.1
- **CICS Tools and Problem Determination Tools**

Compelling Set of CICS Tools

Controlling CICS Costs

CICS Application Insight

CICS Interdependency Analyzer (IA)

Collect active application inventory for efficient resource understanding

CICS Configuration Manager (CM)

Administrating and maintaining CICS resource definitions

CICS Performance Analyzer (PA)

Batch performance reporting/analysis for tuning and capacity planning

CICS VSAM Recovery (VR)

Automate the recovery of lost VSAM data

IBM Session Manager (ISM), CL/SuperSession (CL/SS), CL Conference (CL/CON)

Access to multiple z/OS applications from a single terminal

CICS VSAM Transparency (VT)

Enable VSAM to DB2 migration without changes to existing applications

CICS Batch Application Control (BAC)

Manage state of file resources from a batch program

CICS OTTO (OTTO)

Optimize outbound 3270 data streams to improve performance

CICS Performance Analysis

Managing CICS Configurations

z/OS Problem Determination Tools

- **Fault Analyzer for z/OS**
  - Captures and analyzes abend information about application and environment
- **File Manager for z/OS**
  - Manages production, test, and development data across multiple file formats and storage media
- **Debug Tool z/OS**
  - Interactive source level debugging for multiple languages
- **Application Performance Analyzer for z/OS**
  - Helps maximize application performance
- **Application Performance Analyzer Automation Assistant for z/OS**
  - Provides automation and integration of Application Performance Analyzer and its reports

z/OS Problem Determination Tools

- **Workload Simulator for z/OS and OS/390**
  - Regression, performance, stress, function, and capacity testing
- **Migration Utility**
  - Replaces CA-Easytrieve Plus® run-time and development tools with standard IBM COBOL programs
- **Hourglass**
  - Provides date and time manipulation for time sensitive applications
- **ISPF Productivity Tool**
  - Integrates with ISPF providing improved access to key functionality, reducing time-consuming navigation steps
- **Optim Move**
  - Enables you to quickly build related sets of test data

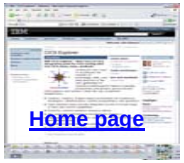
CICS and PD Tools support key business issues

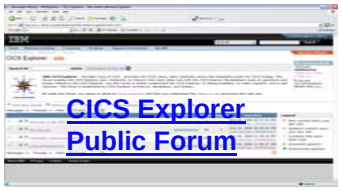
Solutions \ Benefit	Business Flexibility	IT Service Management	Governance & Compliance	Reduced TCO
CICS Interdependency Analyzer	√	√	√	√
CICS VSAM Transparency	√	√		√
CICS Configuration Manager	√	√	√	√
CICS Performance Analyzer	√	√	√	√
CICS VSAM Recovery		√	√	√
CICS Batch Application Control		√		√
IBM Session Manager		√	√	√
CICS Online Transmission Time Optimizer		√		√
Application Performance Analyzer for z/OS	√			√
Fault Analyzer for z/OS	√	√		√
Debug Tool for z/OS	√			√
File Manager for z/OS	√	√	√	√
Optim Move	√		√	√
Workload Simulator for z/OS	√	√	√	√

CICS Tools **PD Tools**

CICS Communities and Information

- **CICS Transaction Server V4.1**
  - http://ibm.com/cics/tserver/v41/
- **CICS Explorer home page**
  - Remember this link ibm.com/cics/explorer
- **CICS Explorer Forum**
  - http://tinyurl.com/68bndw
  - IBM developerWorks forum with FAQs, Links and resources, ISV Contributions, etc. Ask questions, suggest improvements, report problems, chat
- **New! CICS Hub on the Rational COBOL Café**
  - http://ibm.com/software/rational/cafe/community/cobol/cics
- **Twitter**
  - Subscribe to the IBM_System_z channel and the ibm_cics channel to get System z and CICS news flashes
- **CICS Blog**
  - Information, comment and opinion at TheMasterTerminal.com
- **CICS eNews**
  - Subscribe for news about CICS and related products
- **YouTube channels**
  - CICS Explorer - Videos, demos and other cool stuff
  - CICSFluff - Other CICS videos





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