CICS Transaction Server V4.1 for z/OS

Technical Overview

Noel Javier C. Sales

Software Engineer, zCICS Development

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Session Agenda

- **CICS TS V4.1**
  - ▶ Strategy and Themes

  - ▶ Compete
    - Event Processing
  - ▶ Control
    - CICS Explorer
  - ▶ Comply
    - Management of CICS resource definitions
  - ▶ Architectural enhancements
    - Improvements to XML parsing
    - Initiation of AMODE(64) support
- **Summary**

Strategy and Customer Trends

- **SOA continues to be major driving force**
  - ▸ Driving increased IT flexibility
  - ▸ Faster time to market for new solutions
  - ▸ Greater reuse of existing assets
- **Maturing of new programming architectures**
  - ▸ WEB 2.0
  - ▸ Event Based Processing
- **Skills and expertise shortages**
- **Increased Governance requirements and regulations**
- **Interoperability and synergy with other SOA products**

CICS Transaction Server V4 Themes

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

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

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

Architectural Enhancements *to relieve constraints on processing, configuration or data capacities allowing for continued application and system growth*

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

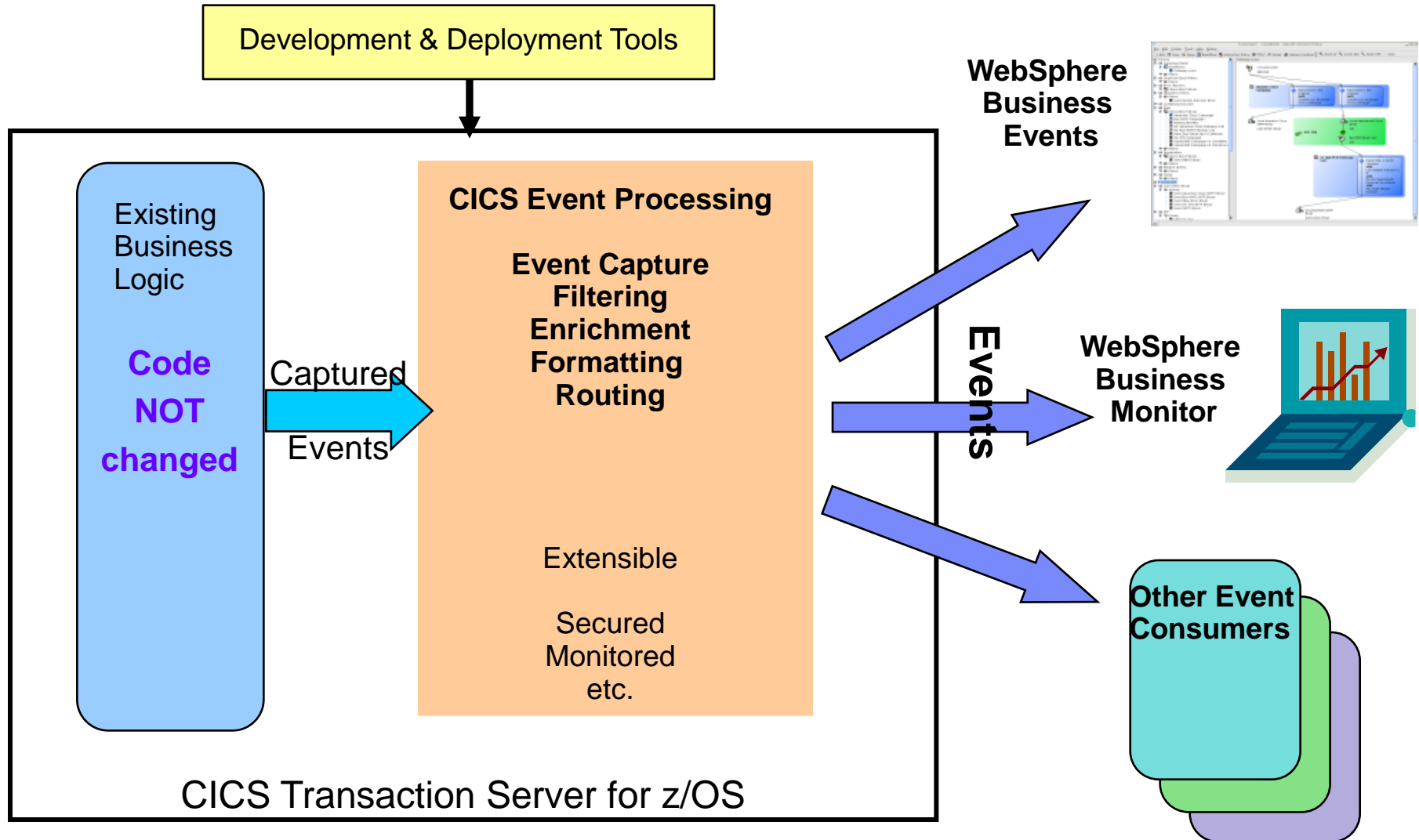New SPI commands for managing the CSD

Dynamic Library Adaptor

Architectural Enhancements

Improvements to XML parsing in CICS

Large file hosting

Performance Improvements

Event Processing

- **An event is something that happens that is relevant to the business**
  - "**simple**" event: meaningful in itself
    - Order placement, stock trade
  - "**complex** event processing": detect and respond to patterns of events over time
    - 3 orders from a customer in 2 days, suspicious pattern of ATM activity
  - "Business Event Processing" extends event processing capabilities to business users
- **CICS can be significant source of events**
  - Focus is on events relevant to the Line-of-Business
  - *CICS will emit single events*
  - Events emitted by CICS could
    - Drive another CICS transaction
    - Be written to a WebSphere MQ queue
    - Be written to a temporary storage queue
    - Be input to a monitor or business manager's dashboard
      - e.g. WebSphere Business Monitor
    - Be sent to a "complex event processing" engine such as WebSphere Business Events
    - …

Event Processing…

Development & Deployment Tools

WebSphere Business Events

CICS Event Processing

**Event Capture
Filtering
Enrichment
Formatting
Routing**

Existing Business Logic

Code NOT changed

Captured Events

Extensible

Secured
Monitored
etc.

Events

WebSphere **Business Monitor**

Other Event Consumers

CICS Transaction Server for z/OS

Event Processing

- **Non-intrusive instrumentation of events**
  - ▸ No requirement to change existing business logic
- **EXEC CICS SIGNAL EVENT for explicit instrumentation of events**
- **Tooling to create event specifications**
  - ▸ Event binding editor in CICS Explorer
  - ▸ Deployed to CICS via event bindings in BUNDLE resources
    - Specifies event and its payload, and how it can be detected/captured by CICS
    - Specify event capture points as EXEC CICS command
    - Filtering on command parameters and data
- **Events dispatched to specified EP adapter for formatting and emission to event consumer**
  - ▸ CICS-supplied EP adapters
  - ▸ Capability to write custom EP adapters

Atom feeds from CICS

- **What is an Atom Feed?**

  - Protocol and XML format for content publishing
    - Provide XML based feed of updated content
    - Process is known as syndicating a feed
      - Follow-on to Real Simple Syndication (RSS)
    - Simple publish/subscribe implementation
      - Polling model
      - Based on http support

  - Described by two Internet Request for Comments
    - The Atom Syndication Format
      - Targeted at producing feeds
      - RFC4287: (Dec 2005)   **http://tools.ietf.org/html/rfc4287**

    - The Atom Publishing Protocol
      - Targeted to creating and updating resources
      - RFC5023: (Oct 2007)   **http://tools.ietf.org/html/rfc5023**

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
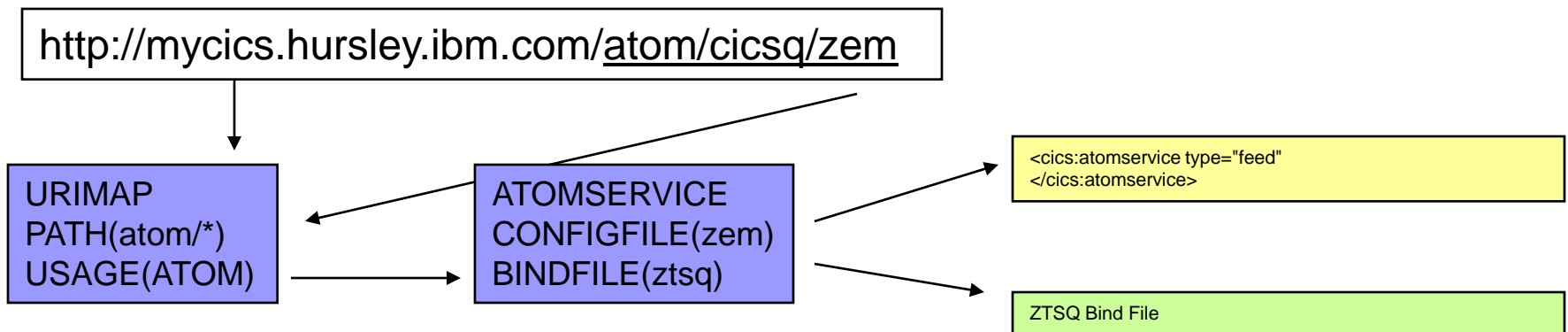
- ## Develop using WebSphere sMash or RD/z with EGL

Mainframe

z/OS

CICS Transaction Server

ATOMSERVICE

DB2 for z/OS

Customers & Insurance Policies

Atom feeds

Unix

IBM Lotus Mashups Server

Servlet

Map API

PC Browser
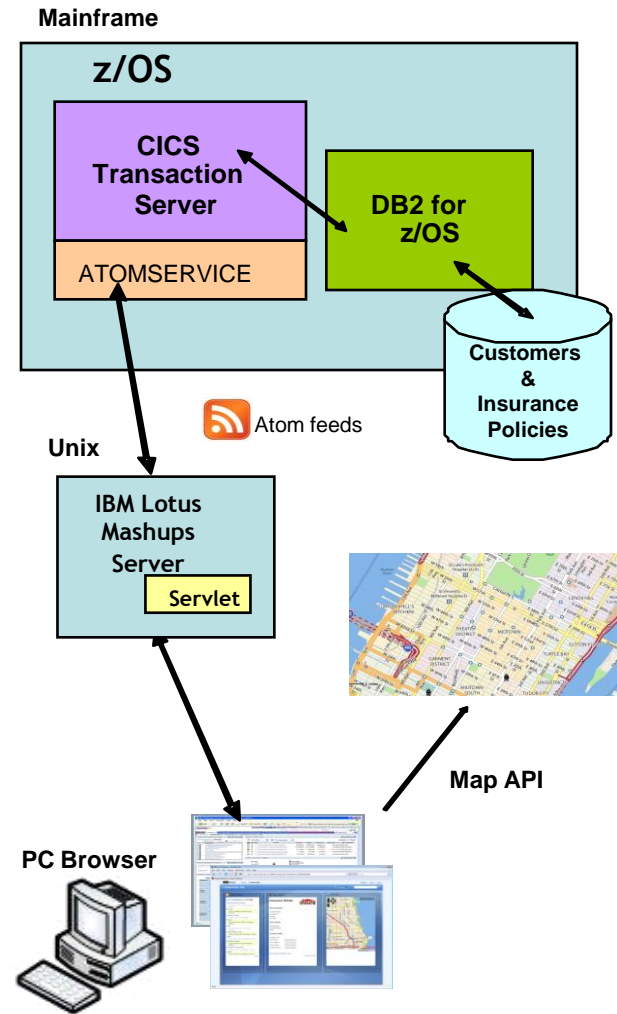
High level architecture: CICS Atom feeds

Atom feeds from CICS…

- **Definitions for Atom Feeds**
  - ▸ URIMAP definition
  - ▸ ATOMSERVICE definition
    - Describes the type of Atom document returned
      - – FEED, SERVICE, COLLECTION, CATEGORY
    - Specifies the type of CICS resource that provides the data for this Atom feed or collection
      - – FILE, PROGRAM, TSQUEUE
  - ▸ Atom Service Configuration file
    - Specifies metadata/field names for the returned document
  - ▸ XML Binding file
    - Describes the CICS resource format
    - Created by the CICS XML Assistant

```
http://mycics.hursley.ibm.com/atom/cicsq/zem
```

URIMAP
PATH(atom/*)
USAGE(ATOM)

ATOMSERVICE
CONFIGFILE(zem)
BINDFILE(ztsq)

<cics:atomservice type="feed"
</cics:atomservice>

ZTSQ Bind File

Application Bundles

- **New resource type: BUNDLE**

- **Defines a unit of deployment for an application**
  - The collection grouping is maintained for the life of the bundle install
    - All resources are enabled or disabled as a group
    - Managed by a new Resource Lifecycle domain (RL)

- **A collection of:**
  - CICS resources
  - Artifacts
  - References
  - A manifest file

- **Extensible Resource Definitions**
  - Registration Program
    - Name (register) the callback program for a resource
    - URI that describes the resource that the callback program can manage
  - Callback Interface
    - Creates and manages the life cycle of a user resource
      - Create, enable, disable, or discard the user resource

Service Component Architecture

A new service-oriented programming model for IBM middleware to simplify the development of applications and integration of applications into solutions

- **Open programming model for assembling SOA solutions from flexible, reusable service components based on diverse business IT assets**
- **Specifications that describe a model for building applications & systems using SOA**
- **Extends, exploits and complements existing standards**
  - Web Services, JMS, JEE, JCA, etc
- **Provides business functions by assembling services together in a composite application**
  - Application assembly, NOT application flow
- **Services can be implemented in various programming languages**
- **Services are bound together by various communication technologies**
- **Simple deployment and packaging model**
- **Benefits include:**
  - Loose Coupling, Flexibility, Re-use

Service Component Architecture…

- **Provide capability to easily develop flexible and reusable CICS application components**
  - ▸ Rapid assembly and deployment of new Services
  - ▸ Express existing applications as re-usable components

- **Separation of bindings from application code allows flexible infrastructure changes**

- **Reduce skills and effort required to view and manage business applications**

Service Component Architecture…

- **CICS SCA Infrastructure**
  - ▶ Types of services
    - **Channel based services**
      - – Allow CICS LINKable assets to be defined as a component interface
        - – Channel and container support
        - – COMMAREA support
      - – Available to other CICS programs that use the INVOKE SERVICE command
    - **XML based services**
      - – Available to CICS applications that use the INVOKE SERVICE command
      - – Available to business services on an external network

  - ▶ Use SCDL to describe and deploy a composite
    - RDz SCA tooling
      - – Wizards for CICS Component and Composite creation
      - – Composite editor
      - – Wizard for Bundle creation/deployment

  - ▶ New EXEC CICS INVOKE SERVICE command
    - INVOKE WEBSERVICE command now a synonym of INVOKE SERVICE

Java 6

- **Support for provided the IBM 31-bit SDK for z/OS Java Technology Edition, V6**
  - ▸ Pre-requisite for CICS Web services and XML assistants, Java programs in CICS
  - ▸ Compliant with the Java SDK 6 compatibility tests
  - ▸ Can utilise System z Application Assist Processors (zAAPs)
  - ▸ Support for Java 1.4.2 and Java 5 has been removed
    - Java SDK 6 supports upward compatibility

XML & Web Services

- **CICS Web Services Addressing**
  - ▸ Defines transport neutral mechanisms to address Web Services
    - Facilitates message transmission through networks
  - ▸ Consists of a SOAP Header describing
    - Endpoint Reference
      - – Uniquely identify the service requested
    - Message addressing properties
      - – Convey information about message relationships
      - – Provide information on where messages are to be directed
  - ▸ WS-Addressing Specifications
    - Recommended
      - – http://www.w3.org/TR/ws-addr-core/
      - – http://www.w3.org/TR/ws-addr-soap/
      - – http://www.w3.org/TR/ws-addr-metadata/

    - Submission
      - – www.w3.org/Submission/ws-addressing

Web Service Addressing Example
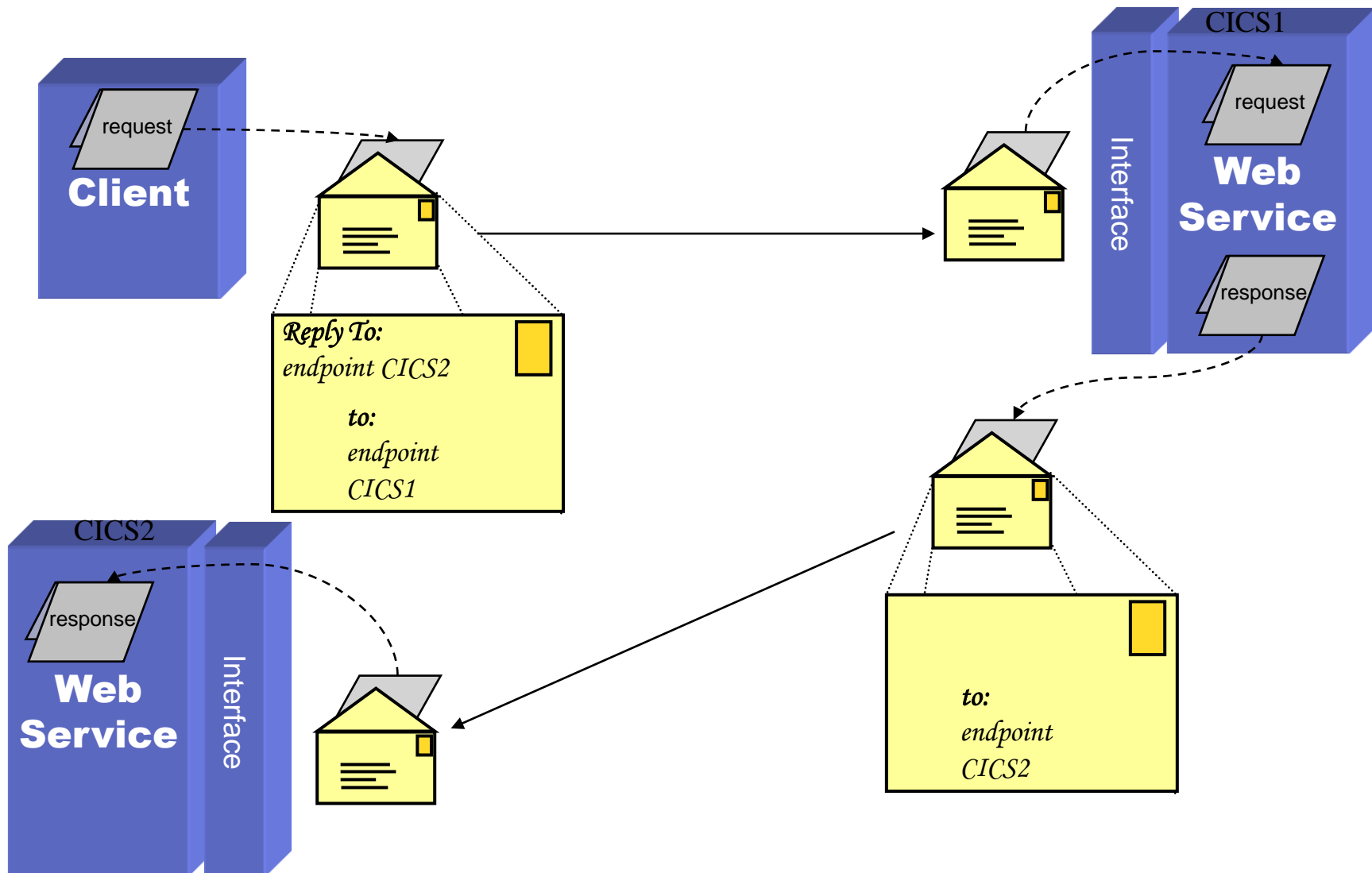
XML & Web Services…

- **CICS Web Service Addressing…**
  - ▸ CICS Pipeline Configuration (Requester and Provider)
    - New SOAP header handler to processing WSA constructs
  - ▸ New CICS commands
    - EXEC CICS WSAEPR CREATE
      - Create an endpoint reference (EPR) to represent a Web service or Web service resource
    - EXEC CICS WSACONTEXT BUILD
      - Build an addressing context
    - EXEC CICS WSACONTEXT GET
      - Get the message addressing properties (MAPs) of the service requester
      - Get the MAPs of a service provider

XML & Web Services…

- **New Markup Language Domain (ML)**
  - Uses the z/OS systems services parser
    - Eligible for off-load to zAAP engines
    - Parsing storage acquired from 64 bit storage

- **Generic XML Mapping**
  - EXEC CICS TRANSFORM command
    - XML to Data
    - Data to XML

  - New XML Assistants
    - Language structure to schema
    - Schema to language structure
    - Generates artifacts necessary to define a BUNDLE
      - New XMLTRANSFORM resource definition

CICS Explorer

- **Intuitive and common tooling for CICS architects, analysts, developers, administrators**
  - ▶ Quick and easy to install via Web browser
  - ▶ Eclipse based, runs on Linux and Windows
  - ▶ Fast, highly customizable and extensible
- **CICS Explorer provides operations, workload, resource management and application deployment**
  - ▶ Rich set of views, tasks and editors
  - ▶ Supports a single CICS region to large CICSplex
- **Supports CICS tools and the CICS Transaction Gateway**
  - ▶ Other IBM tools
  - ▶ Easy to link and perform tasks across products
  - ▶ Unified resource representation and terminology
- **Transfer skills, knowledge and best practice to new CICS technical staff**
- **Powerful, context-sensitive resource editors**
  - ▶ Show only applicable attributes and tabs
  - ▶ Clear explanation of options and context help
  - ▶ Parameter case sensitivity, length and relationship to other parameters handled by intelligent controls
  - ▶ Instant feedback for errors
- **Create your own dashboard to quickly perform common tasks**
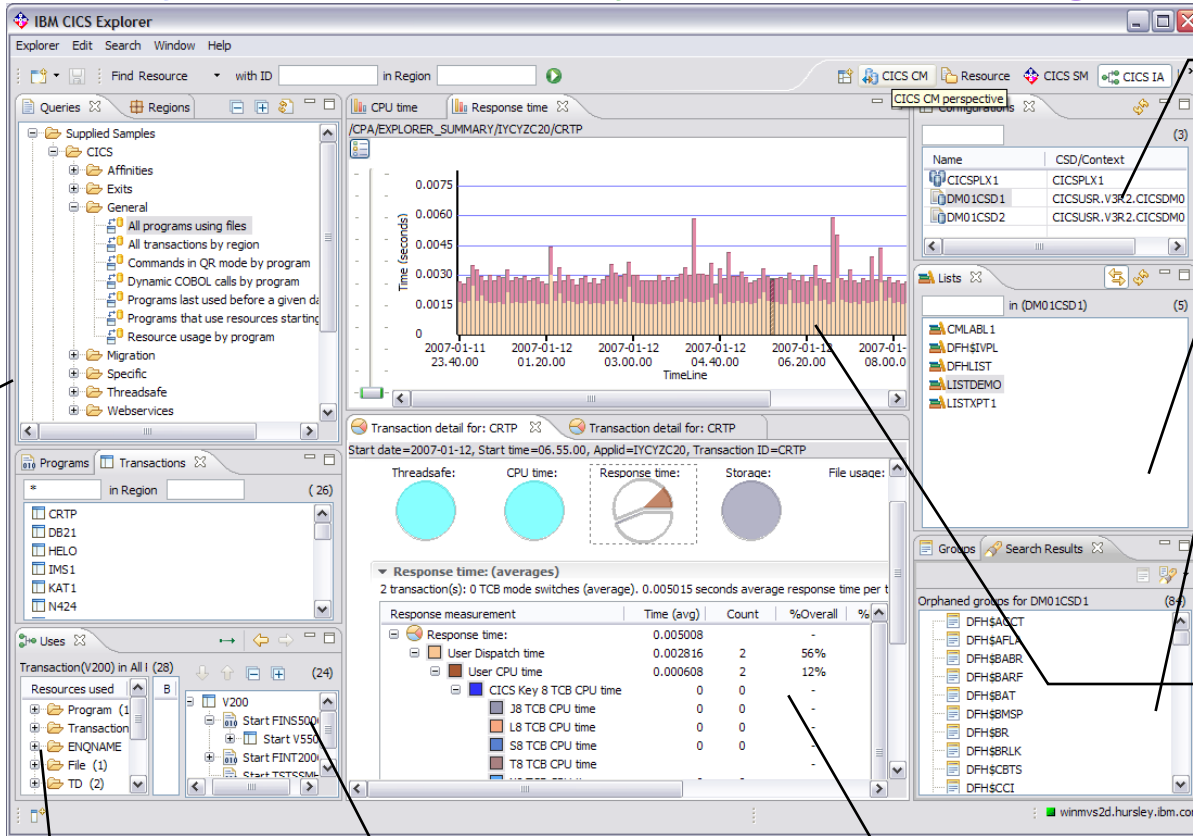 - ▶ Save your windows, views and filters

CICS Explorer…

CICS Explorer…

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

IPv6 Background

- **Evolution of the current version of IP (IPv4)**
  - ▸ Work started on this in the early 90's
- **IPv4 has <u>32 bit</u> addresses**
  - ▸ IPv4 address – 10.67.122.66
  - ▸ Practical limit: less than 1 billion useable global addresses
- **IPv6 has <u>128 bit</u> addresses**
  - ▸ IPv6 address – 2001:0db8:0000:0000:0000:0000:1428:57ab
  - ▸ No practical limit on global addresses
    - 2^{128} addresses
    - 5×10^{28} addresses for each of the 6.5 billion people alive today

- **IPv4 format**
  - ▸ Native   1.2.3.4   with each element 0-9, 00-99 or 00-255
- **IPv6 format to represent IPv4**
  - ▸ Compatibility   ::1.2.3.4   with each element 0-9, 00-99 or 00-255
  - ▸ Mapped   ::FFFF:1.2.3.4   with each element 0-9, 00-99 or 00-255
- **IPv6 format**
  - ▸ 1:2:3:4:5:6:7:8   with each element 0-F, 00-FF, 000-FFF or 0000-FFFF
  - ▸ If one or more 4 digit groups are 0000 the zeros may be replaced by two colons

CICS Support for IPv6

- **Allow for IPv4, IPv6 or host names in:**
  - ▶ Resource definitions
  - ▶ Application Programming Interface
  - ▶ Systems Programming Interface
  - ▶ User Replaceable Modules
  - ▶ Global User Exits
  - ▶ Monitoring Records

IP Interconnectivity

- **Continuation of the CICS IP interconnectivity strategy**
  - ▸ Provide a new transaction IP communications protocol for connectivity between and into CICS
  - ▸ Long term plan to provide CICS with IP choice for most of the CICS programming model
- **Enhancements to support 3270 transaction routing**
  - BMS, security and monitoring support
  - Shippable terminals supported
  - Restrictions
    - Routable(YES) on transaction definition
    - No EDF
    - No routing for APPC devices
- **Enhancements to Asynchronous Starts**
  - ▸ ATI over IPIC supported

MQ Group Attach

- **Connect to any active member of a WMQ Queue Sharing Group**

  ▸ Allows common resource definitions for CICS regions

  ▸ Connect to only one QMGR at a time

  - RESYNCMEMBER attribute for in-doubt resolution

  ▸ QMGR must be on the same LPAR

- **Changes to CICS externals**
  ▸ Resource definition
  - New MQCONN resource

  ▸ SPI
  - EXEC CICS SET MQCONN
    – Quiecse or forceclose the connection
  - CPSM WUI views
  - CICS Explorer support

Workload Management and CICSPlex SM

- **Sysplex-optimization to significantly reduce workload batching effects**
  - ▸ Exploitation of z/OS coupling facility
    - "Near real time" Sysplex-wide focus on target region status
    - No impact to "non-optimized" WLM
  - ▸ Optimized WLM routing enabled by configuring a Region Status Server
    - Uses CF Data Table to hold Region Status information
      - SOS, MaxTask, System or transaction dump in progress, Current Tasks?
    - Shared by all routing regions (in the Sysplex)
- **Percentile goals**
  - ▸ CICSPlex SM WLM support for percentile goals
- **Support in CICSPlex SM for all new resources, statistics, etc**

CPSM WLM: Optimized versus Non-optimized Routing

Non Sysplex Optimized Workload

Sysplex Optimized Workload
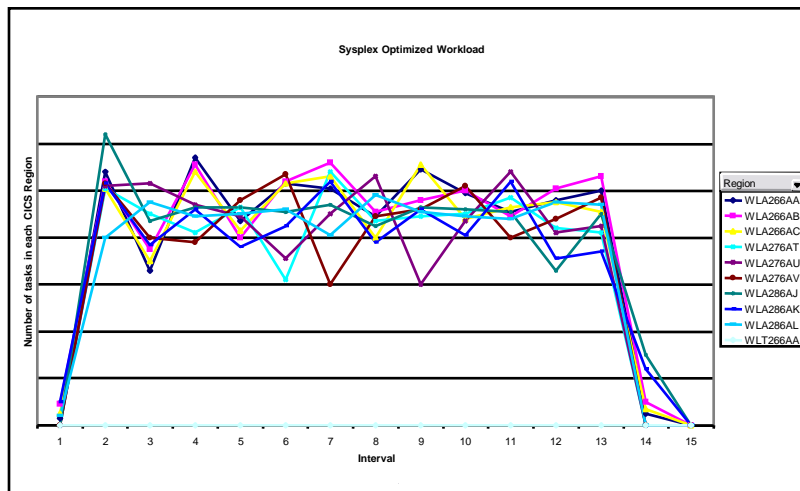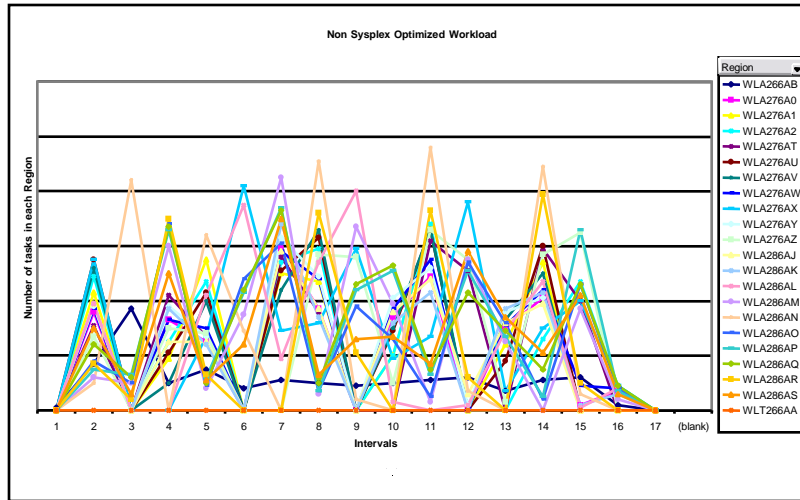
- **Non-optimized Routing**
  - ▸ 27 CICS regions on 3 LPARs

- **Optimized Routing**
  - ▸ 9 CICS regions on 3 LPARs

- **Comparison**
  - ▸ Workload is 10K started transactions
  - ▸ Number of tasks in each region measured every 10 second interval

- **Results**
  - ▸ Non-optimized environment shows "batching effects
  - ▸ Optimized results shows smoother distribution of work and higher throughput

Dynamic Library Adapter

- **The IBM Discovery Library facilitates a common way to share information about discovered resources and relationships**
  - ▶ A set of specifications, components, and best practices for communicating the discovery of resources and the relationships between resources within the enterprise
  - ▶ A way to exchange resource and relationship data across <u>multiple</u> applications.
  - ▶ XML schema specification
- **CICS is providing a Tivoli DLA for CICS resources**

Dynamic Library Adapter…

- **CICS DLA Utility (EYUJXDDP)**
  - ▸ Runs as Batch Job or Started Task
    - Range and depth of discovery controlled by parameters
    - Select the books to create:
      - CICSPLEX, CICSREGION, CTSPLEX
  - ▸ Uses CICSPlex SM services to generate XML files
    - Writes IdML books to a PDS
  - ▸ Runs against a specified CMAS
    - CMAS must be current level of CICSPlex SM
    - CICS regions discovered by the DLA can be an earlier release

CICS Resource Signatures

- **Definition signature attributes added to CICS resources**
  - ▶ Signature data added when you add/alter a resource
    - DEFINESOURCE
    - DEFINETIME
    - CHANGETIME
    - CHANGEUSRID
    - CHANGEAGENT
    - CHANGEAGREL

- **Installation signature attributes added to CICS resources**
  - ▶ Signature data added when you Install a resource
    - INSTALLAGENT
    - INSTALLTIME
    - INSTALLUSRID

CICS Resource Signatures…

- **Signature information**
  - ▸ CEDA
    - ▪ New panel option (PF2)
  - ▸ CEMT
  - ▸ INQ SPI
  - ▸ CICS Explorer
  - ▸ CICSPlex SM Views
  - ▸ DFHCSDUP
    - ▪ New SIGSUMM Option produces a signature report
      - – LIST GROUP(group) SIGSUMM   (group can be generic)
      - – LIST LIST(list) SIGSUMM
      - – LIST ALL SIGSUMM

CICS Resource Signatures…
CEDA View

CICS Resource Signatures…
CEDA View

CICS Resource Signatures…
CEMT View


```
I TRANS(CADP) _
RESULT - OVERTYPE TO MODIFY
   Transaction(CADP)
+  Remotesystem()
   Remotename()
   Indoubtmins(000000)
   Otstimeout(000000)
   Installtime(02/24/09 13:14:04)
   Installusrid(CICSUSER)
   Installagent(Grplist)
   Definesource(DFHDP)
   Definetime(01/26/09 12:28:59)
   Changetime(01/26/09 12:28:59)
   Changeusrid(JTILLI1)
   Changeagent(Csdbatch)
   Changeagrel(0660)




                                     SYSID=JOHN APPLID=IYK2Z2G1
                              TIME: 14.57.31   DATE: 02/24/09
PF 1 HELP 2 HEX 3 END       5 VAR       7 SBH 8 SFH    10 SB 11 SF
```

CICS Resource Signatures…
CICS Explorer View

WebSphere Services Registry and Repository

- **Enables governance**
  - ▶ Configurable service life-cycle, classifications and access controls
- **Manages service meta-data**
  - ▶ Providing better search granularity than most UDDI-based products
- **User-friendly UI**
  - ▶ Facilitates design time discovery
- **Provides location transparency through runtime access**
- **Stores all service artifacts**
  - ▶ Not just WSDL
- **Provides fully configurable functionality to classify services**
- **Supports state model functionality**
  - ▶ Manages service life-cycles in a shared environment
- **Service notification**
  - ▶ Facilitates communication between service consumers and providers
- **Enforces consumer access to services**
- **Simple version management functionality**

CICS Support for WSRR

- **DFHLS2WS**
  - ▸ Can now publish the generated WSDL to WSRR
  - ▸ Allows specification of the WSDL meta-data
  - ▸ SSL support
- **DFHWS2LS**
  - ▸ Can now retrieve WSDL from WSRR

Identity Context Propagation

- **z/OS Identity Propagation initiative to provide asserted identity for end-to-end distributed security**
  - ▸ Logically tie together distributed end-user identities with z/OS userids
  - ▸ Enhance the ability for z/OS applications to participate centrally in SOA solutions
  - ▸ Function will require z/OS 1.11
- **ID Context Propagation allows an end user's identity to be propagated through to CICS**
  - ▸ Currently, the end users' identity is lost before the request gets to CICS
- **Scenarios for ID context propagation**
  - ▸ Inbound to CICS from IBM WebSphere Application Server through the CICS ECI resource adapter over a trusted IPIC connection
  - ▸ Inbound to CICS as a WS-Security header element in a Web services request
  - ▸ Propagating out across IPIC and MRO connections between CICS systems in the same sysplex
  - ▸ …

Identity Context Propagation…

- **Support for Inbound Web services, propagating on as Web Service provider**
  - ▸ Provides support for Web Services callers
- **Support for Inbound over IP Interconnectivity (IPIC)**
  - ▸ Used by CICS TG when operating as a WebSphere connector
    - ▪ Will require use of JCA resource adapter
- **Sysplex Support**
  - ▸ CICS will propagate on over MRO and IPIC Connections only
- **Additional items**
  - ▸ SPI and API to obtain IDID
  - ▸ Remove need for USRDELAY timeout for ACEE refresh

Additional Enhancements

- **New SPI for managing CSD definitions**
  - ▶ EXEC CICS CSD commands

- **CICS monitoring improvements**
  - ▶ Transaction resource class data for DPL requests
  - ▶ Additional data
    - Web Services (Operation name, URIMAP, SOAP request/response length)
    - Parsing data (number bytes parsed, CPU time for parsing)
  - ▶ CMF Record compression is now the default

- **Configurable VTAM Persistent Sessions**
- **Wild branch diagnostic improvements**
  - ▶ Supports Breaking Event Address Register (BEAR) in the TACB & DFHPEP COMMAREA

- **Future Positioning**
  - ▶ JVM Server runtime environment
    - Provides a mechanism for CICS to use the same JVM for multiple tasks concurrently
    - New T8 TCB pool
    - Architectural enhancement that is provided for CICS to perform system processing
    - The JVM server is not available for use by Java applications
- **Initial AMODE(64) support**
  - ▶ Task Save Areas are now 64 bit enabled
  - ▶ Dispatcher context switching is now 64 bit enabled

Summary

- **CICS Transaction Server V4.1 allows you to:**

  Compete for new opportunities 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**