



CICS What's in it for the Application Programmer? Share session 13341

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Abstract



According to the CICS Information Center, a CICS application is "a collection of programs that together perform a business operation. Each program runs as part of a transaction under the control of CICS and using CICSprovided services and interfaces to access resources." But what are these services and interfaces? In today's environment with many application servers available, why would an application programmer choose to develop applications for CICS? How does CICS benefit the application programmer? You'll find answers to these questions and more at this session.



Agenda



- CICS Explorer
- Application development
 - Languages
 - APIs
- Connectivity
- Events
- Interfaces





CICS Explorer



IBM CICS Explorer - The New Face of CICS

- New Modern Interface
 - Common look and feel
- Base functionality for operations
 - CEMT
 - CEDA
- •Provides a Platform for Product and Tools PlugIns
- New Function Enabler for application developers
 - Event Binding Editor
 - ATOM Binding Editor
 - OSGI Binding Editor
 - Application Binding Editor
- Interfaces with RDz as a PlugIn
- Customizable Interface via SDK





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Technology - Connections - Result

IBM CICS Explorer – New Modern Interface

BM CICS Explor Explorer Edit Operations Administration RTA WLM Window Help 📅 🍪 Events 🕼 CICS SM 🔓 Resource 📲 CICS IA 🔚 CICS PA 🍶 CICS CM 📑 🕈 🔚 🗄 🛷 🗍 CICS 🏭 Conf 🗖 🗖 00 ISC 🖳 Ter 📴 File 🔩 Tra 🛅 Pro - -🗐 Reg 🙀 Tas 🖾 🔪 CICS Program Definition (TEST) F Server: CPSM S CNX0211I Context: CICSPLX1. Program Definition (TEST) test an 22 Transaction ID: 0 儒 🖃 💠 CICSPLX1 (10/10) ? User ID Su: ^ Overview Task ID Tran... Dispatch Status Region CICSAOR1 (CICSACB1) RUNNING SYSSTC CICSAOR1 0000028 CONL CICSAOR2 (CICSACB2) Basic SUSPENDED SYSSTC USE CICSAOR1 0000050 CSKL CICSAOR3 (CICSACB3) USE CICSAOR1 0000051 COIO SUSPENDED SYSSTC TEST Description: test Name: CICSAOR4 (CICSACB4) CICSAOR1 0000058 COIE **SUSPENDED** SYSSTC USE Version: Created: Dec 7, 2009 11:32:07 AM CICSAOR5 (CICSACB5) CICSAOR2 0000026 CONL ■ RUNNING SYSSTC Enabled Changed: Dec 7, 2009 11:32:07 AM CICSAOR6 (CICSACB6) CICSAOR2 0000041 SUSPENDED SYSSTC USE CICSAOR7 (CICSACB7) Details COIE SUSPENDED SYSSTC USE CICSAOR2 0000050 CICSAOR8 (CICSACE8) **RUNNING** Non-CICS (Open) API CICSAOR3 0000021 CONL SYSSTC Language: N_A CICSCM (CICSCM) CICSAOR3 0000033 COIO **SUSPENDED** SYSSTC USE Threadsafe (able to use open TCB) CICSWUI (CPSMWUI) CICSAOR3 0000035 COIE **SUSPENDED** SYSSTC USE Display Execution Diagnostic Facility (EDF) screens CICSAOR4 CONL RUNNING SYSSTC 0000027 CICSAOR4 0000029 COIO SUSPENDED SYSSTC USE Storage COIE SUSPENDED SYSSTC USE CICSAOR4 0000030 Can handle 31 bit addresses (above the 16MB line) CICSAOR4 0000038 CSKL SUSPENDED SYSSTC USE Use Program from the Link Pack Area (LPA) CICSAOR5 0000027 CONL **UP** RUNNING SYSSTC Program can write to CICS-key storage SUSPENDED SYSSTC USE 🗸 CICSAOR5 0000029 COIO > < Program reuse Reuse if possible - 7 History 🔗 Search Results 🥼 Events 🔲 Properties 🖾 - -Resource Group Defini O Force reuse 日学园マ CNX0211I Context; CICSPLX1, Resourc ▽ O Always load a new copy ^ Value Property S OX C Load a new copy whenever use count drops to zero Name: 😑 Basic Description Change Ti Abcodec **User** Data Name Abcodeo DNET215 Mads Zan... Sep 28, 2. 1: 2: 3: TTY CICS Conf ... Oct 22, 20 4040404040404040404040404040404... Actvtvid Actvtynm Allocates 0 < HIL. > Applnameprog Overview Remote Java™ Attributes < > v IIII **₽**Ŷ TemoMVS - CMCI V4

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IBM CICS Explorer – CICS System Management Views SHARE

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IBM CICS Explorer – CICS System Management Views

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Technology - Connections - Results

IBM CICS Explorer – Operations Views

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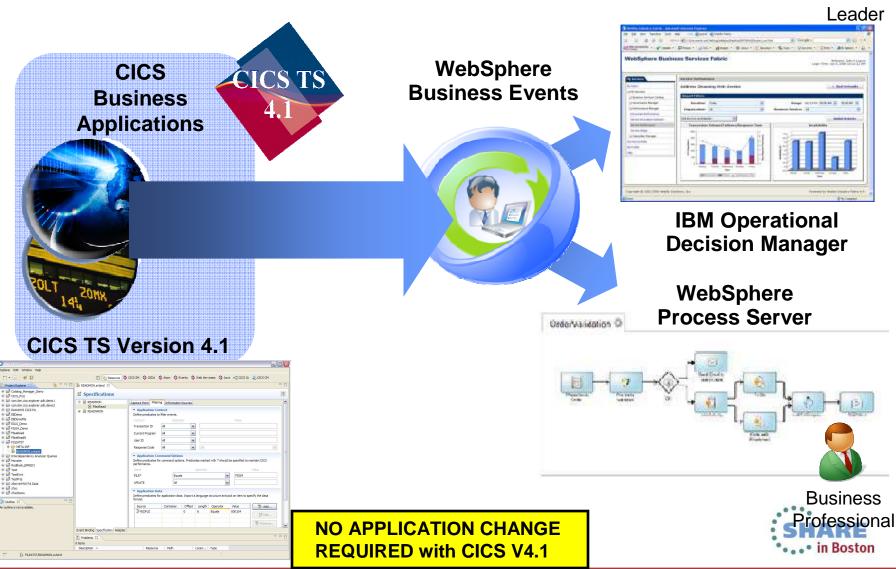
IBM CICS Explorer – Administration Views

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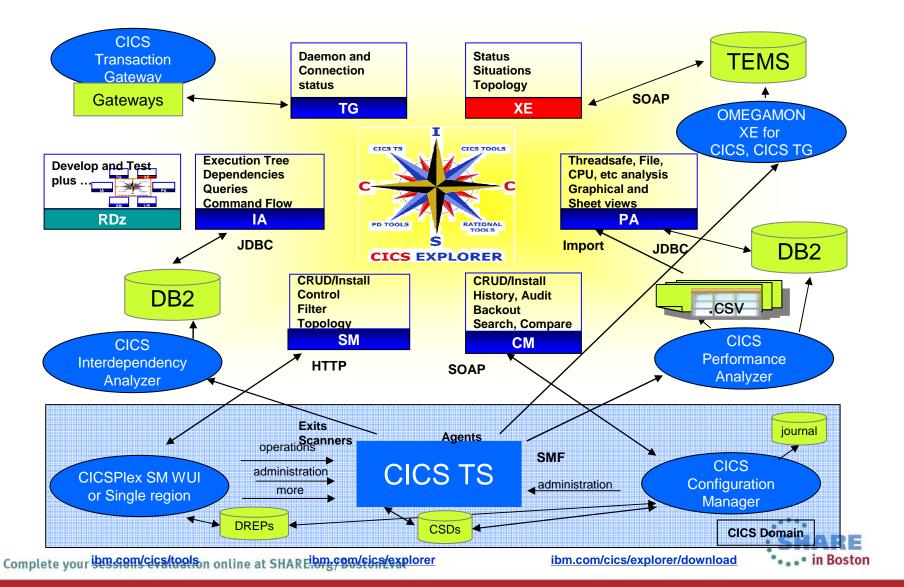
IBM CICS Explorer – CICS Event Binding Edito

Business



IBM CICS Explorer™ ecosystem







Development



Programming Languages



- ASM
- COBOL
- PL/I
- C/C++
- REXX
- Java
- PHP



APIs



- CICS
 - Application Programming Interface (EXEC CICS)
 - Systems Programming Interface
 - JCICS classes
- Databases
 - DB2 (EXEC SQL)
 - IMS (EXEC DLI)
- Messaging
 - WMQ (CALL 'MQPUT', etc.)
- Communications
 - Socket API (CALL 'EZASOKET')



The CICS API



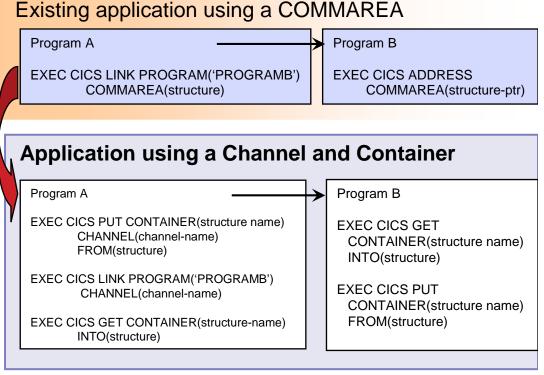
- File control VSAM data sets
- Interval control timer services
- Terminal control and Basic mapping services
- Storage control and task control
- Transient data and Temporary storage
- Documents
- Business Transaction Services
- FEPI 3270 terminal simulation



WithHARE

Optimized data exchange between CICS programs with HARE Channels and Containers

- Offers a more flexible and intuitive alternative to the COMMAREA
 - By using separate containers for logically different data it will simplify language structures and minimize the impact of changes to the interface
 - For example; input, output, error
 - Avoids "overloading"
 - Dynamic creation and discovery by applications
- Enables large amounts of data to be passed between CICS applications
 - Not subject to 32KB restriction
- Optimized and managed by CICS
- Requires minimal application changes
 required to use





Channels and Containers



Container

- Named block of data designed for passing information between programs
- No CICS enforced size limitation
 - Channels are stored above the bar in CICS TS V3.2 and above
- Multiple containers can be passed between programs
- Channel
 - A group of Containers
 - No limit on the number of containers in a channel
 - Non-persistent
 - Non-recoverable resource
 - Specified on LINK, XCTL, START and RETURN commands
 - Only one channel can be passed
 - Channels and COMMAREAS are mutually exclusive
- Supported between CICS regions and within the Web services support
 - Only modified data is transferred between regions
- Dynamic data conversion via GET and PUT APIs and transport resource definitions
 - Uses CICS or z/OS Support for Unicode



Channel and Container commands



- Container commands
 - PUT CONTAINER
 - GET CONTAINER
 - MOVE CONTAINER
 - DELETE CONTAINER
- Program transfer commands
 - LINK PROGRAM [CHANNEL|COMMAREA]
 - XCTL PROGRAM [CHANNEL|COMMAREA]

- Inquiry commands
 - ASSIGN CHANNEL(data-area)
 - STARTBROWSE CONTAINER [CHANNEL(data-area)]
 - GETNEXT CONTAINER (data-area)
 - ENDBROWSE CONTAINER

Transaction transfer commands

- RETURN TRANSID [CHANNEL|COMMAREA]
- START TRANSID [CHANNEL|FROM]

New JCICS classes Channel, Container, ContainerIterator provide access to containers and channels for Java programs



CICS XML Extensions



- New Markup Language Domain (ML)
- Generic XML Mapping
 - EXEC CICS TRANSFORM command
 - XML to Data
 - Data to XML
- New XML Assistants
 - Generates a language structure from a schema
 - Generates a schema from a language structure









Java and CICS

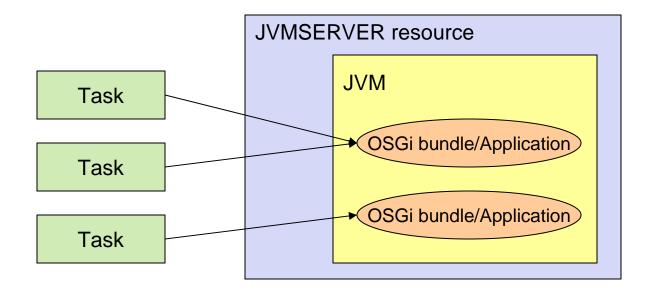


- Support for 64 bit JVMs
 - Java stack and heap are now allocated in above the bar storage
 - Java 6.0.1 for CICS TS V4.1
 - Java 7 for CICS TS V5.1
 - IBM zEnterprise optimized version of Java
 - Exploits new z196 and EC12 instruction sets
 - Improved GC
 - Improved JIT
 - Significant performance improvements
 - Support for 31 bit JVMs dropped
- OSGi
 - OSGi development and packaging now required to deploy CICS applications to a JVM server
 - Existing CICS Java applications using main() method linkage can run unchanged if wrapped in an OSGi bundle
 - All JVM server applications must be thread-safe



What is a JVM server...?



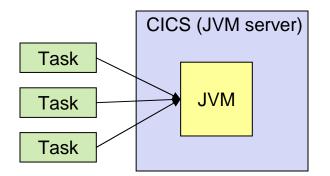


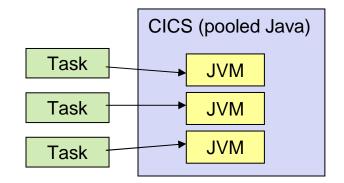
- A new CICS resource containing a **long-running** JVM.
- The strategic direction of Java in CICS
 - Pooled Java discontinued in V5.1
- A JVM that serves multiple transactions concurrently.
- A JVM in which applications/tasks run as OSGi bundles.



JVM server vs. previous Java support?







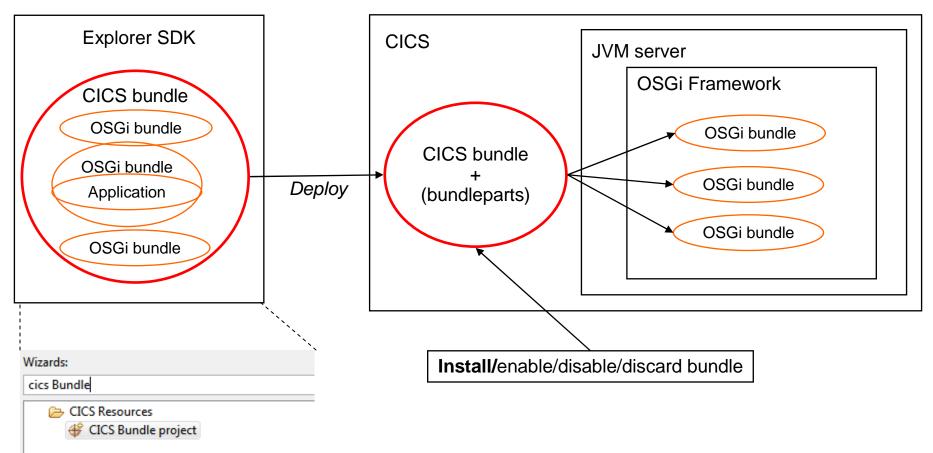
Single JVM - serves many tasks (reduced storage)	Pool of JVMs - each serves only a single task.
(concurrent, multi-threaded, up to 256 threads per JVM server)	Java Program Isolation
T8 (CICS key)	J8 (CICS key), J9 (User key)
MAXTHRDTCBS (automatically calculated), up to max of 1024 per region	MAXJVMTCBS, SIT parm
More standard Server model (+ data-sharing)	Difficult, convoluted to share data and state.
Dynamic update and replace of modules	JVMs must be restarted to effect changes



CICS TS V4 Java...



Deploying OSGi Applications





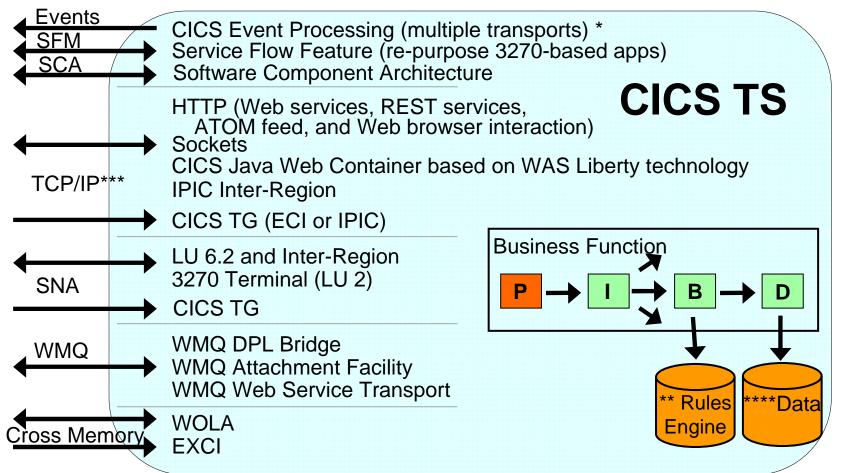


Connectivity



CICS Connectivity Techniques





* Events can have different transports or CICS can process its own events

** IBM Operational Decision Manager

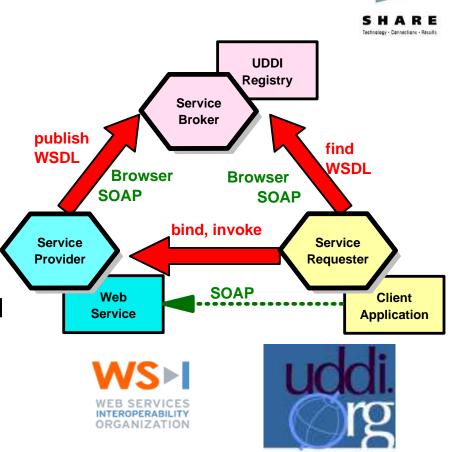
*** IBM Worklight – can access CICS Data using REST, Web Services, and ATOM feeds **** VSAM. DB2. and IMS • in Boston

Web Services

- Architecture for
 - Application to application
 - Communication
 - Interoperation
- Definition:
 - Web Services are software components described via <u>WSDL</u> that are capable of being accessed via standard network protocols such as <u>SOAP</u> over <u>HTTP</u>
- WS-I.org (Web Services Interoperability Organization):
 - An organization to ensure interoperability

The entire industry is agreeing on one set of standards !!







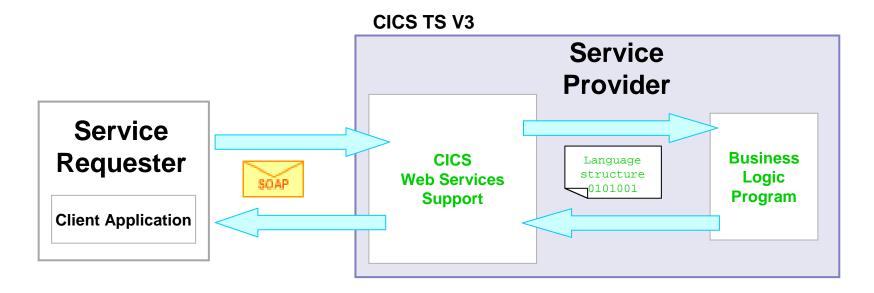
Reasons to use Web Services in CICS

- Transform Existing Applications
- Extend existing applications to new audiences and opportunities
- Exploit existing resources and skills
- Improve performance of existing workloads for faster response times and reduced costs
- Improve system management to enable management of more with less
- Simplify the development process to reduce application development costs and time to deployment



Very High Level: CICS Web Services





SOAP Message - XML, tag delimited data

 zero or more headers
 body containing application data

 Languages Structure – e.g. COBOL copybook

 01 DFHCOMMAREA.

 03 CUSTOMER-FIRST-NAME PIC X(30).

 03 CUSTOMER-LAST-NAME PIC X(30).

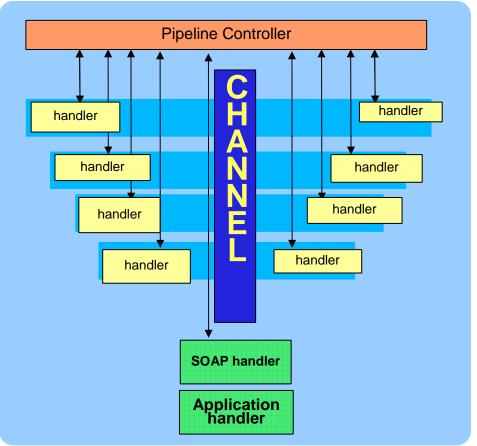
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Axis2 for Web Services

- Axis2
 - Java-based open source web services engine
- Axis2 Java SOAP message handlers
 - Axis2 SOAP processing and some of the CICS pipeline processing become eligible for zAAP offload
- Application handler written in Java
 - Executes in a JVMSERVER
 - Eligible for zAAP off-load processing
 - XML data conversion can be offloaded

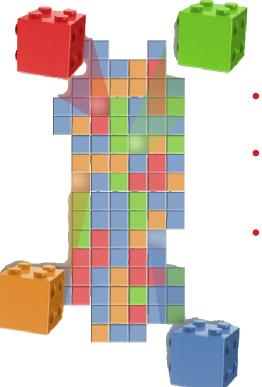




Service Oriented Architecture



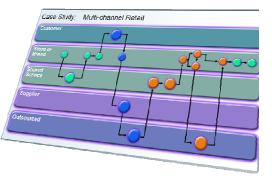
- Align with Business process to respond faster to Business needs
- Compose new applications by combining Services



SOA Levels

- Service Enablement Transform existing applications to services
- Service Integration –Align with business, abstract integration layer, look into ESB
- Process Integration Composite applications with process choreography and service aggregation









Web 2.0: A Philosophy, not just a Technology



- An important trend in delivering software applications
- An enabler for richer web applications
 - New business models
 - Peer-to-peer user participation
 - New technologies
 - Interactive filtering, presentation, data entry
- A combination of core technology components
 - Rich user experience (maps, grids, animation, D&D,
 - Loose-coupling, composite applications via reuse and
 - Technologies (SOAP, REST, JSON, ATOM, Java, PHP, Dependency, Python, Perl, etc)



Community

Economic

Technology

REST Services



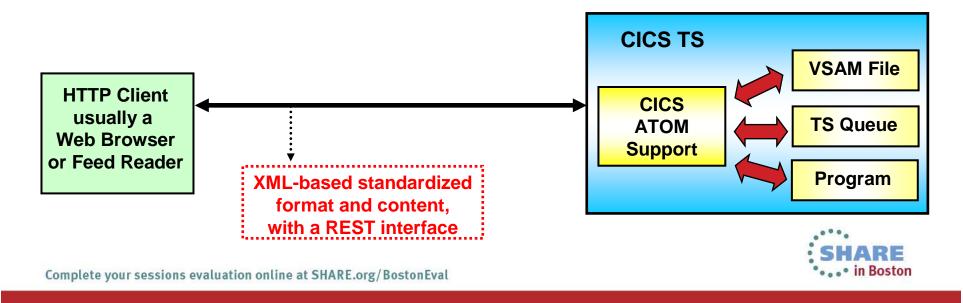
- Similar in concept to hyperlinked data
- Lightweight data transfer
- Representational State Transfer
 - Nouns (URLs) indicate what is being worked on
 - Verbs (GET, PUT, POST, DELETE) indicate the action to be performed (List, Create, Read, Update, Delete)
- Format of results is not defined
 - Popular formats of returned data are XML and JSON
- Can use EXEC CICS TRANSFORM for XML parse/create
- Approaches in CICS
 - CICS WEB API
 - ATOM Feed (CICS TS V4.1+)
 - Dynamic Scripting (CICS TS V4.1 and CICS TS V4.2)
 - Liberty Profile Java web apps (CICS TS V5.1)



CICS ATOM Support...



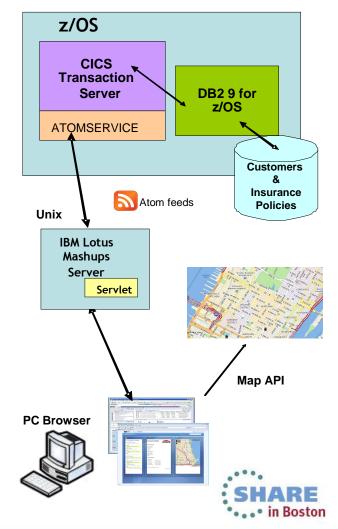
- An Atom Feed is a standards-based protocol and XML format for content publishing
 - Provide XML-based feed of updated content
 - Process is known as syndicating a feed
 - Follow-on to Real Simple Syndication (RSS)
 - Simple publish/subscribe implementation
 - Polling model



CICS ATOM Support...

- 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

Example High level architecture: CICS Atom feeds





S H A R E



Modern Application Interfaces



Modern Application Interfaces



- CICS Web Support
 - CICS API commands for HTTP communication
 - CICS Document support
- Dynamic Scripting Feature Pack for CICS
 - PHP and Groovy for CICS TS V4.1 and V4.2
- Liberty Profile Web Container
 - Standard Java servlet and JSP support in CICS TS V5.1
- Interoperability with Mobile Apps
 - Browser-based
 - REST & Web 2.0
 - Web services
 - CICS TS FeaturePack for Mobile Extensions
 - With or without IBM Worklight server



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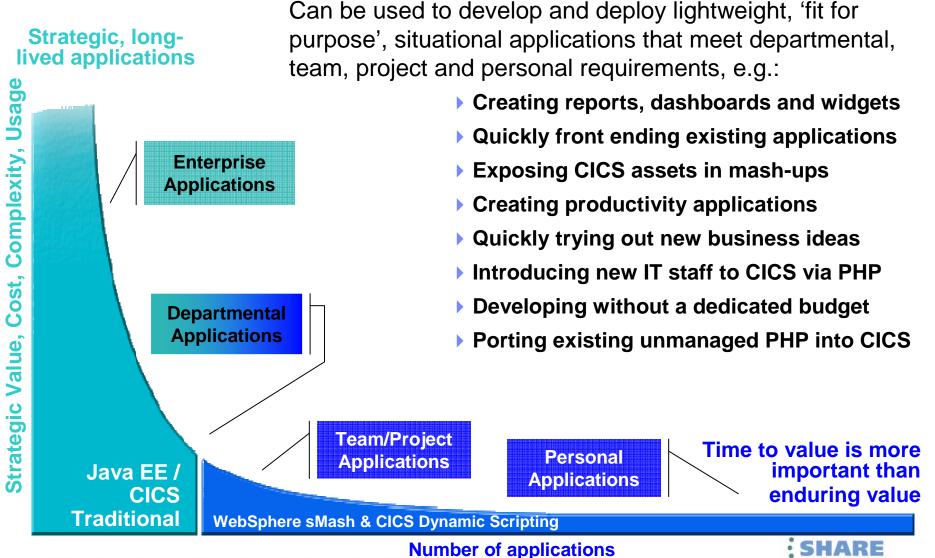
Complete your sessions evaluation online at SHARE.org/BostonEval

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CICS Dynamic Scripting



• in Boston



CICS Dynamic Scripting Feature Pack

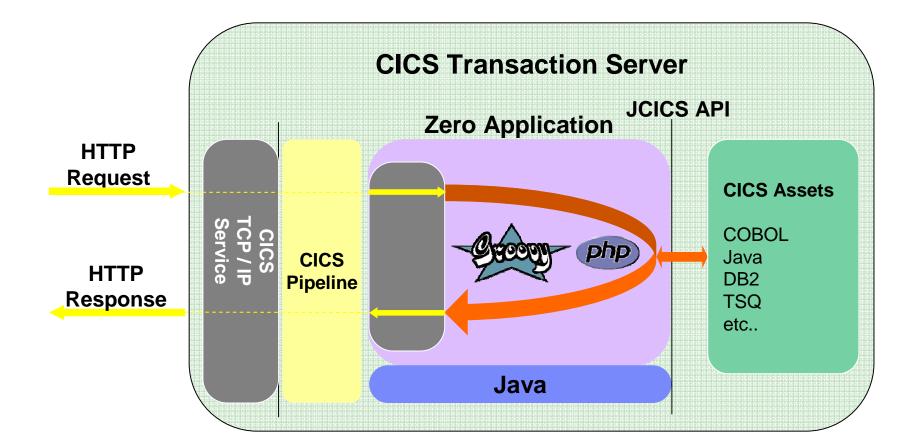


- Provides PHP and Groovy support in CICS agile, productive environment
- Technology from Project Zero, WebSphere sMash v1.1.1.3 (projectzero.org)
- Robust environment for situational reports, dashboards, and Web feeds
- Manageability, Scalability, and Security
- Zero Resource Model (ZRM) with data managed by DB2 for z/OS
- Uses CICS TS JVMServer Technology
- Situational applications Quickly try business ideas
- Introduce new staff to CICS via PHP
- Run unmanaged PHP and WebSphere sMash applications in CICS
- Easily expose CICS assets with RESTful interfaces
- Optional no charge product extension to CICS TS V4.1 and V4.2



Project Zero Environment (in CICS)







Liberty Profile Web Container



- New Java web container is built on WebSphere Application Server Liberty profile technology:
 - Liberty is a lightweight, composable, 'profile' of WebSphere Application Server
 - Provides a fast and lightweight Java web container
 - Provides "off the shelf" Web-server capabilities (JSPs and Servlets)
 - Provides potential to re-use even more WebSphere technology in CICS.
 - JSP and Web servlets have direct, local, access to CICS data and resources.
 - Servlets can take advantage of existing CICS OSGi applications to provide a Dynamic Web front end.

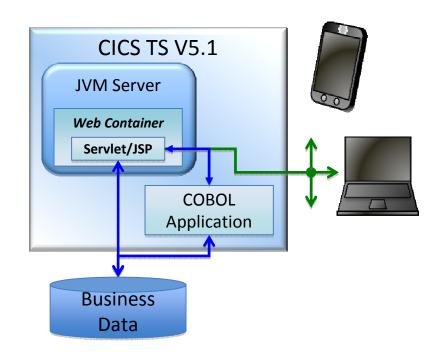


Liberty Profile Web Container



- The Web Container enables:
 - A production-ready web container with CICS qualities of service
 - Deployment of lightweight Java servlets and Java Server Pages (JSP)
 - Improved performance through local access to CICS applications and data
 - Rapid roll-out of interface updates through OSGi-packaged deployments
 - Full integration with first-class applications and platforms
 - Technology built on the WebSphere Application Server Liberty profile for compatibility

The best connector is no connector!

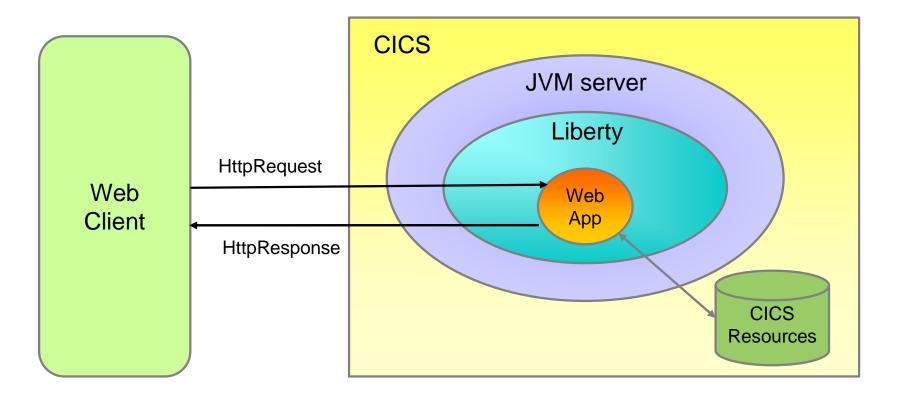




Liberty Profile WEB Container



• in Boston

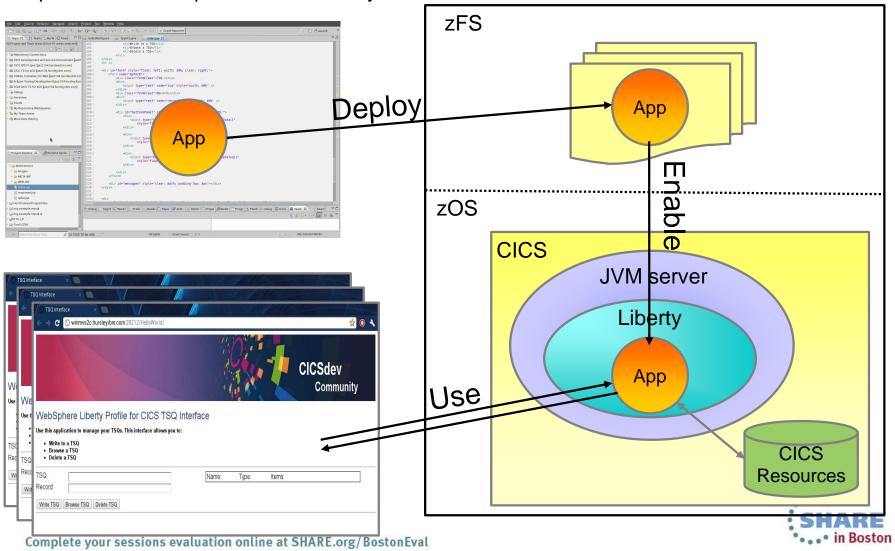


- Liberty Profile runs in a JVMSERVER
 - Use sample JVMSERVER profile DFHWLP
- Web App developed and deployed using Eclipse IDE & CICS Explorer SDK

Modern interfaces - Putting it all together



Eclipse with CICS Explorer SDK & Liberty Tools





Mobile extensions - simplified integration with mobile devices

CICS Transaction Server Feature Pack for Mobile Extensions

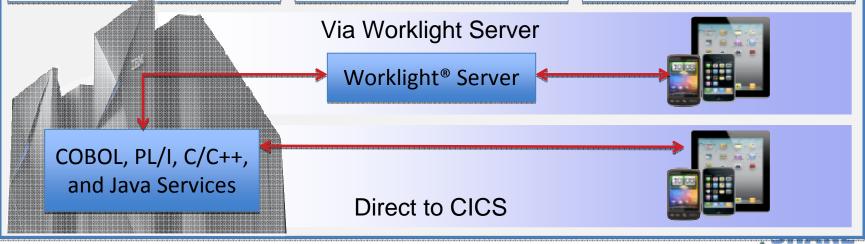


CICS TS V5.1's advanced scalability makes it the ideal platform for managing mobile workloads Service enablement

COBOL, C/C++, PL/I and Java programs can be RESTful service providers

Agile integration

JSON data and RESTful interface makes integration with mobile devices simple and efficient



Complete your sessions evaluation online at SHARE.org/BostonEval



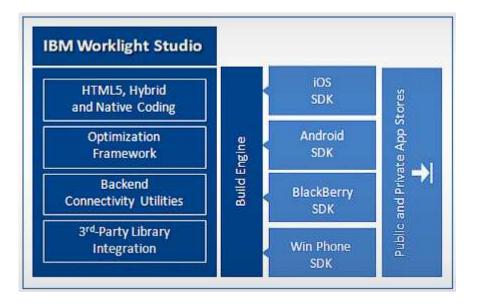
Results

SHARE Tethningy - Cancellos - Retuils

IBM Worklight

- IBM's Mobile offering
 - iPhone, Android, Blackberry, and Windows Phone
 - Develop rich HTML5, hybrid and native applications
 - Develop in a WYSIWYG environment
 - Maximize code share between environments
 - Utilize native and standard web languages within same application
 - Leverages frameworks like JQuery Mobile, Sencha Touch, and Dojo Mobile
 - Development is IBM Worklight Studio (Eclipse based)
 - Display data from REST Services, Atom Feeds, Web services, and JSON







Events



What is Business Event Processing?





Event Processing...



- An event is something that happens that is relevant to the business
 - "simple" event: meaningful in itself (not an aggregation of information)
 - Order placement, stock trade
 - "complex event processing": detect and respond to patterns of events
 - 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 emits single events
 - Events emitted by CICS could
 - Drive another CICS transaction
 - Be written to a temporary storage queue
 - · Be input to a monitor or business manager's dashboard
 - Be sent to a "complex event processing" engine such as IBM Operational Decision Manager
- Can be business events (CICS TS V4.1+)
- System events (CICS TS V4.2+)
- Policy notifications (CICS TS V5.1)



CICS Event Processing

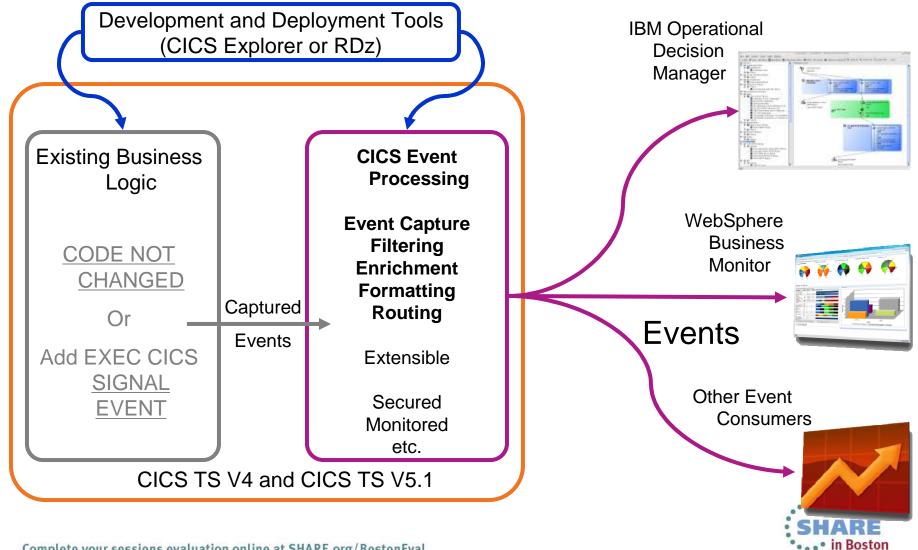


- Provide information relevant to your business processes to a variety of systems
 - IBM Operational Decision Manager
 - WebSphere Business Monitor
 - Emit to WMQ queues or via HTTP
 - CICS-based transactions and programs
 - User-written programs
- Receiving system analyzes business information from one or more sources and takes appropriate action



Event Processing...





IBM Operational Decision Manager (Rules Execution)



Place business rules in an Execution Server

Quickly add/change/delete business rules

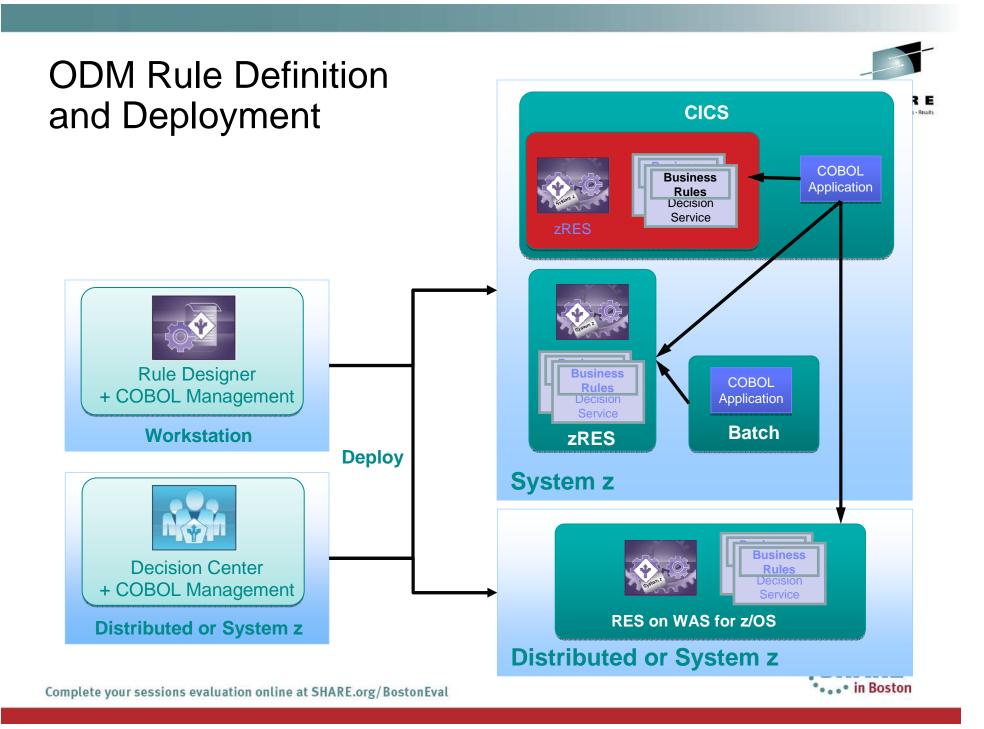
Separate Runtime enablement

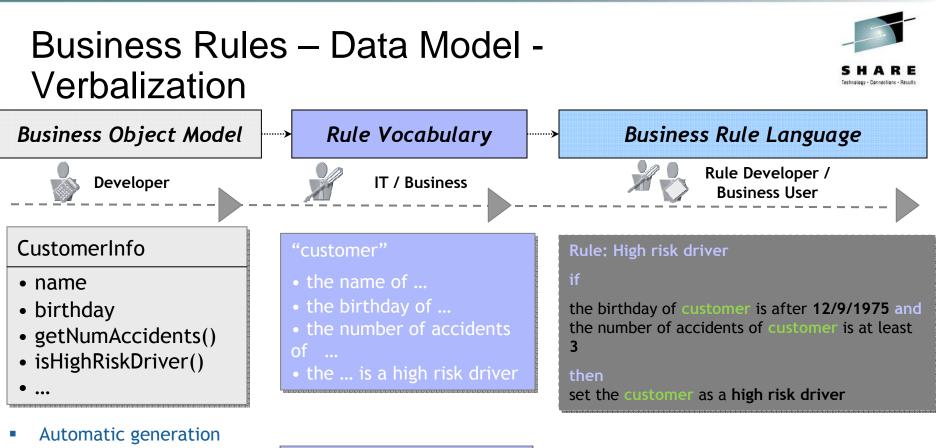
- Write the Decision Service invocation in COBOL
- COBOL code remains independent of Business Rules lifecycle on a stable decision service signature

Decision Service Hot Deployment

- New decision version 'instantly' available
- From Rule Designer & Decision Center
- Versioned service made ready for execution from COBOL
- Let running executions complete

```
*---> Prepare request area
*---> Reference request area
    Move Length of REQUEST to HBRA-RA-DATA-LENGTH(1)
    Move 'request' to HBRA-RA-PARAMETER-NAME(1)
    Set HBRA-RA-DATA-ADDRESS(1) to address of REQUEST
*---> Reference response area
    Move Length of RESPONSE to HBRA-RA-DATA-LENGTH(2)
    Move 'response' to HBRA-RA-PARAMETER-NAME(2)
    Set HBRA-RA-DATA-ADDRESS(2) to address of RESPONSE
*----> Specify Rule Set
    Move '/InsuranceDemo/insurance'
                       to HBRA-CONN-RULEAPP-PATH
*---> Connect to the zRule Execution Server (zRES)
    Call 'HBRCONN' using HBRA-CONN-AREA
*---> Invoke zRule Execution Server
    Call 'HBRRULE' using HBRA-CONN-AREA
*---> Test Rule completion codes
    If HBRA-CONN-COMPLETION-CODE = HBR-CC-OK
*----> Do successful Rule completion logic here
    Else
*----> Do unsuccessful Rule completion logic here
     . . .
    End-If
*---> Close the connection
    Call 'HERDISC' using HERA-CONN-AREA
```





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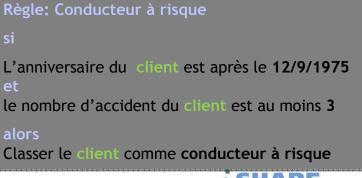
 Comprehensive industry focused business terms to define its data and associated actions.

of the rule vocabulary.

Localizable vocabulary

"client"
• le nom du
• l'anniversaire du
• Le nombre d'accide

```
• le ... est un conducteur à risque ...
```







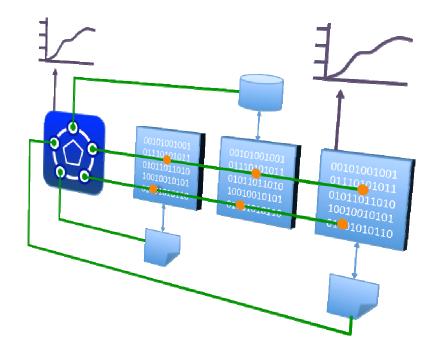
New view of applications



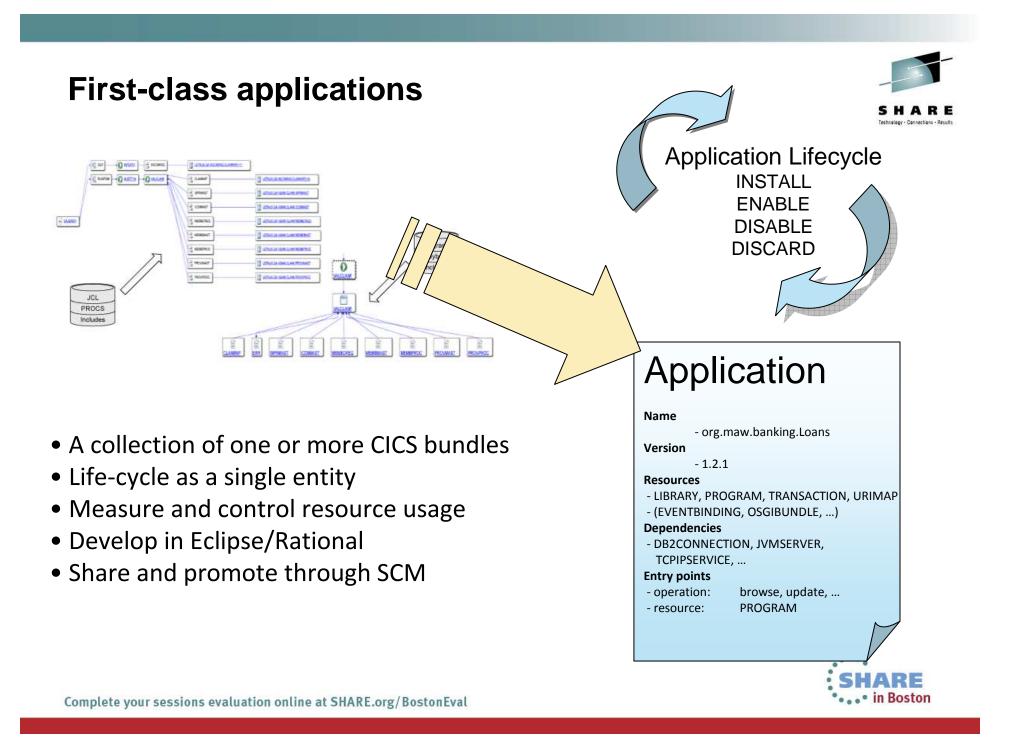
Create agile services from existing assets



- By defining an application you can:
 - Combine and manage disparate application resources as a single entity
 - Rapidly move versioned applications through development, test and production
 - Automate dependency management throughout the application lifecycle
 - Ensure rigorous yet flexible provisioning with application bindings
 - Measure entire application resource usage for tracking and internal billings
 - Dynamically manage applications by applying policies during runtime





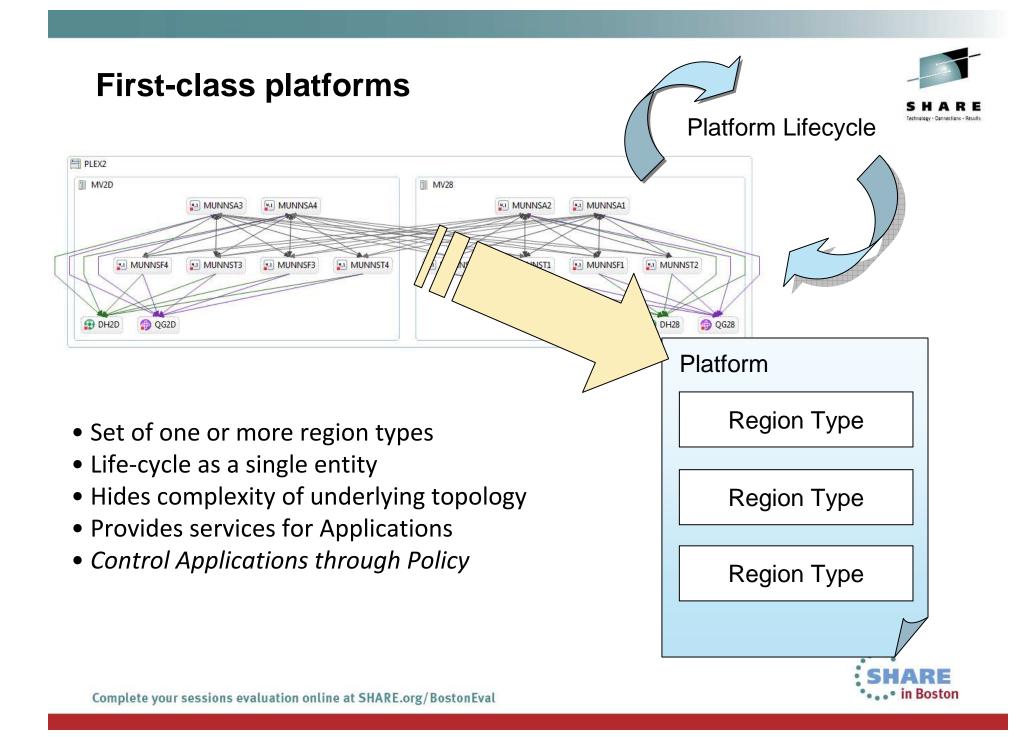


Application context



- Allows measurement and resource usage control at the application level
- Define the application entry point
 - PROGRAM...
- Associate Task with Application operation
 - PROGRAM LINK...
- The application context follows the application flow from Task to Task & Region to Region across MRO and IPIC connections
- Recorded in monitoring data
 - Includes Platform, Application, Version (major.minor.micro), Operation





Summary



- CICS TS provides
 - An environment for running transactions; CICS Transaction Server manages concurrency, sharing of resources, integrity of data, and prioritization of work.
 - Support for business applications written in COBOL, C, C++, PL/I, Java, and Assembler, providing an application programming interface to access CICS services.
 - Access by applications to data stored in DB2 and DL/I databases and in VSAM and BDAM data sets.
 - Connectivity with WebSphere MQ and access to the Message Queue Interface from CICS application programs.
 - Distribution of work between multiple CICS regions in a z/OS sysplex.
 - Connectivity with other systems in client/server and peer-to-peer configurations.
 - Interfaces for configuring and managing your CICS regions.
 - Aids for debugging application programs, and for diagnosing problems in your system.

