IBM Software Group

Ask the Experts
Demystifying Event Processing in CICS

05 June 2014

WebSphere® Support Technical Exchange

ON DEMAND BUSINESS™

Agenda

- Introduce the panel of experts
- Introduce CICS Transaction Server Demystifying Event Processing in CICS
- Answer 5 questions submitted by email
- Open telephone lines for questions
- Summarize highlights

Panel of Experts

Panelist	Role at IBM
Chris Carlin ccarlin@us.ibm.com	**Staff Software Engineer, CICS Level 2 Support** Chris is a Staff Software Engineer in the United States. He has nine years of experience as a CICS Level II Technical Support representative in Research Triangle Park, North Carolina. Chris has worked at IBM for 18 years, spending his first 9 years as an Application Developer at various IBM clients. Chris has experience working on client Event Processing problems and was a speaker at Share on Event Processing.
Wang Chengfang wangcfbj@cn.ibm.com	**CICS Transaction Server L3 Support** Chengfang joined IBM China development lab in January 2008 as a functional tester for CICS TS and focusing on event processing test. After 3 years, she transferred to CICS L3 team in February 2011 and start processing APARs/PMRs for CICS TS. Meanwhile, Chengfang is also working as lab advocate for Bank of China to support customer cases and lead CDL CICS team to promote lab advocacy program in China main customers and some AP customers. Besides, she is responsible for all CICS services requests coming to CDL CICS team.
Catherine Moxey Catherine_moxey@uk.ibm.com	**STSM, Architect for CICS EP Support, Performance & Optimization** Catherine is an IBM Senior Technical Staff Member in CICS Strategy and Architecture, based at IBM Hursley near Winchester. Catherine has over 25 years' development experience with IBM, primarily in CICS transaction processing and System z but also in WebSphere Application Server web services technologies. She is the CICS Performance and Optimization architect, and is also architect for the Event Processing support in CICS. Catherine frequently speaks about Event Processing and other topics at conferences around the world, including Guide Share Europe, Impact and Transaction and Messaging conferences.
Andy Wharmby Andy_wharmby@uk.ibm.com	**Developer for CICS EP and Policy Support** Andy is an Project Programmer in CICS Development, based at IBM Hursley near Winchester. Andy has over 28 years' development experience with IBM, primarily in CICS transaction processing but has also worked for a number of years writing Garbage Collectors for the IBM Java Virtual Machine . Andy was a member of the team which developed CICS System Event support in CICS TS 4.2 and lead the development of CICS Policy support in CICS TS 5.1.

Introduction

- We will be covering a number of questions to help Demystify Event Processing within CICS Transaction Server such as
  - Application Changes
  - Event Capture Points
  - Consumers of Events
  - Ways Events are Used
  - Common Problems
  - Demo

Introduction Continued

- An **event** is something that happens that is significant to a system. Events include the following examples:
  - Open a bank account.
  - Sense a temperature change.
  - Click a mouse button.
  - Detect loss of connectivity to a database.
  - Browse an inventory without making a purchase.
  - An unusual history of purchases on a credit card.
  - An increasing frequency of application failures.
- ***Event*** is the term that is used to describe an electronic message that indicates a change in the state of some aspect of a system. An event has a name and usually some data, sometimes referred to as the *event payload*.
- Some events can be detected by CICS alone and some require a Complex event processing engine such as IBM Operation Decision Manager (ODM) which integrates business events with business rules to enable decision making in real time.

Question 1

- Do I need to change my CICS applications to get events from them?

Answer to Question 1

Application events are *noninvasive*, meaning that events can be captured from a CICS application without the need to change or recompile the application, and with minimal if any overhead in the performance of the application.

- Event processing addresses the need for agility
  - Modern businesses must react quickly to circumstances without changing code and going through a long development cycle
  - Decision makers need reliable, timely information
  - Many shops do not have source code or want to avoid the risk of changing the source code

CICS systems run an enormous amount of existing business logic and using an Event-based approach, there is potential to gain insight into the processing in CICS and to introduce additional extensions to applications in a dynamic, de-coupled fashion.

Question 2

- Where can events be captured in CICS?

Answer to Question 2

Application Events – An application event results from application program activity and contains application data.

- CICS APIs
  - Event can be captured at a subset of EXEC CICS API commands. For example, LINK PROGRAM. Don't need to modify application.
  - Users can also add SIGNAL EVENT API in application to provide data for an event.
- Program init
  - Event can also be captured at program initiation (PGMINIT).

Answer to Question 2 Continued

System Events – A system event results from system activity and contains system data.

- Resource state change - The change can occur either through explicit operator actions, EXEC CICS SET commands, or implicitly as a result of CICS internal processing.
  - DB2CONN connection status
  - FILE enable or disable status
  - FILE open or close status
- CICS messages - You can capture an event whenever CICS emits a DFHxxnnnn message or CPSM emits an EYUxxnnnn message (available in CICS TS 5.1)

Answer to Question 2 Continued

System Events

- Thresholds being crossed
  - Filter on a threshold to MXT or TRANCLASS MAXACTIVE value. Possible threshold values you can select are 50%, 60%, 70%, 80%, 90%, and 100%.
  - Events are emitted only when the number of active tasks crosses a new threshold boundary.

- Unhandled transaction abend
  - You can capture an event whenever a transaction encounters any unhandled abend.

Answer to Question 2 Continued

Policy Event Actions (available with CICS TS 5.1)

- Event can be captured when tasks that are running exceed defined thresholds for resource usage.
  - For example, database request, file request, storage request, CPU time, etc.
- The event has the same behavior as CICS system events
- The information that is captured in the event is predetermined and cannot be customized

CICS TS 5.2 Introduce Threshold Policy Events:

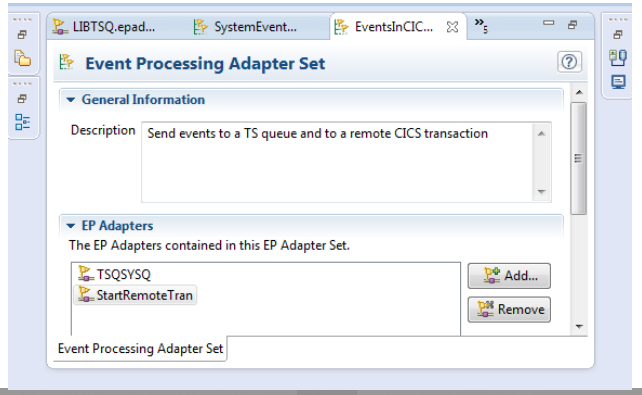
- Elapsed Time
- TSQ Bytes Written

Question 3

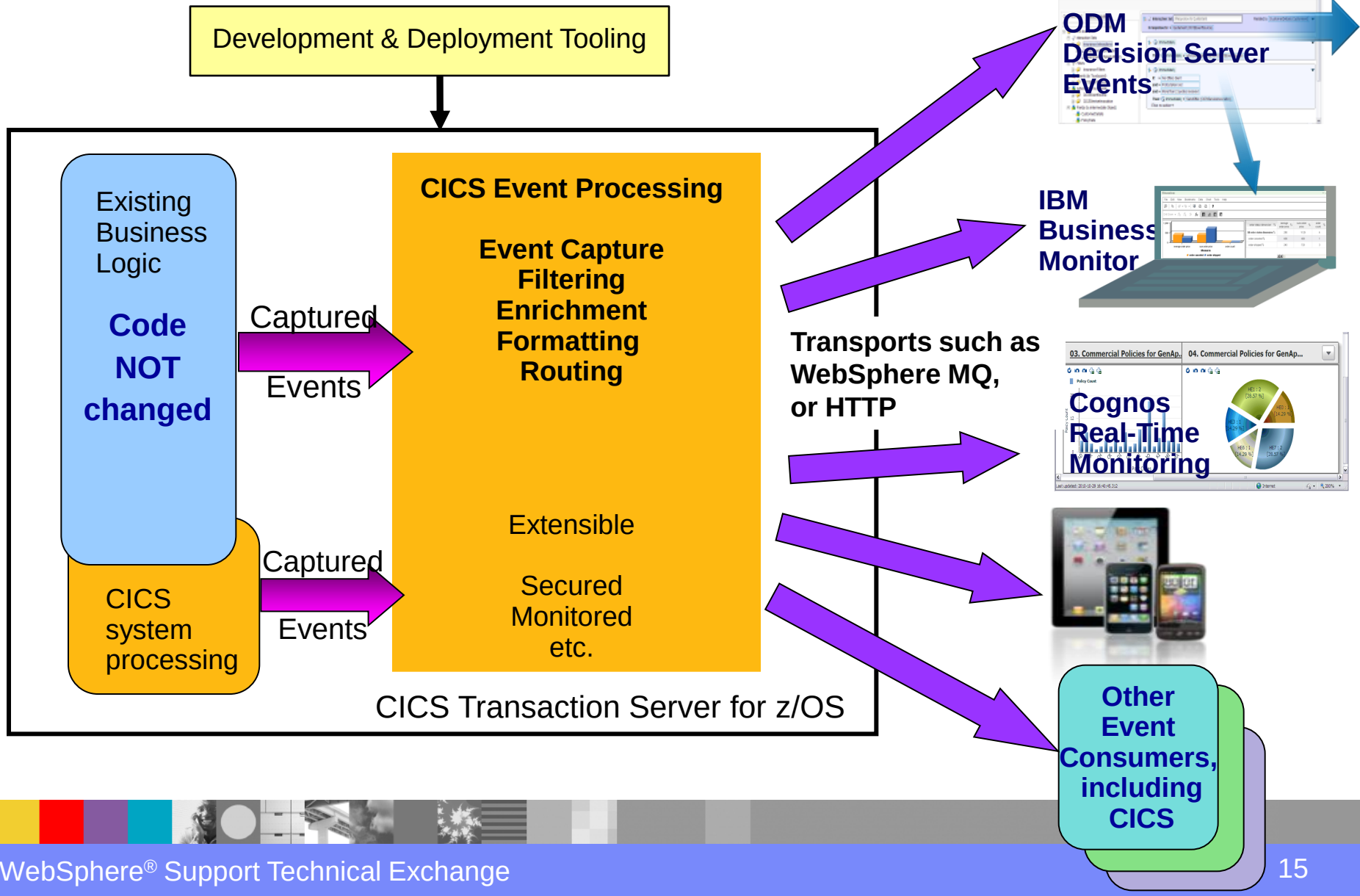
- Where can I send events?

Answer to Question 3

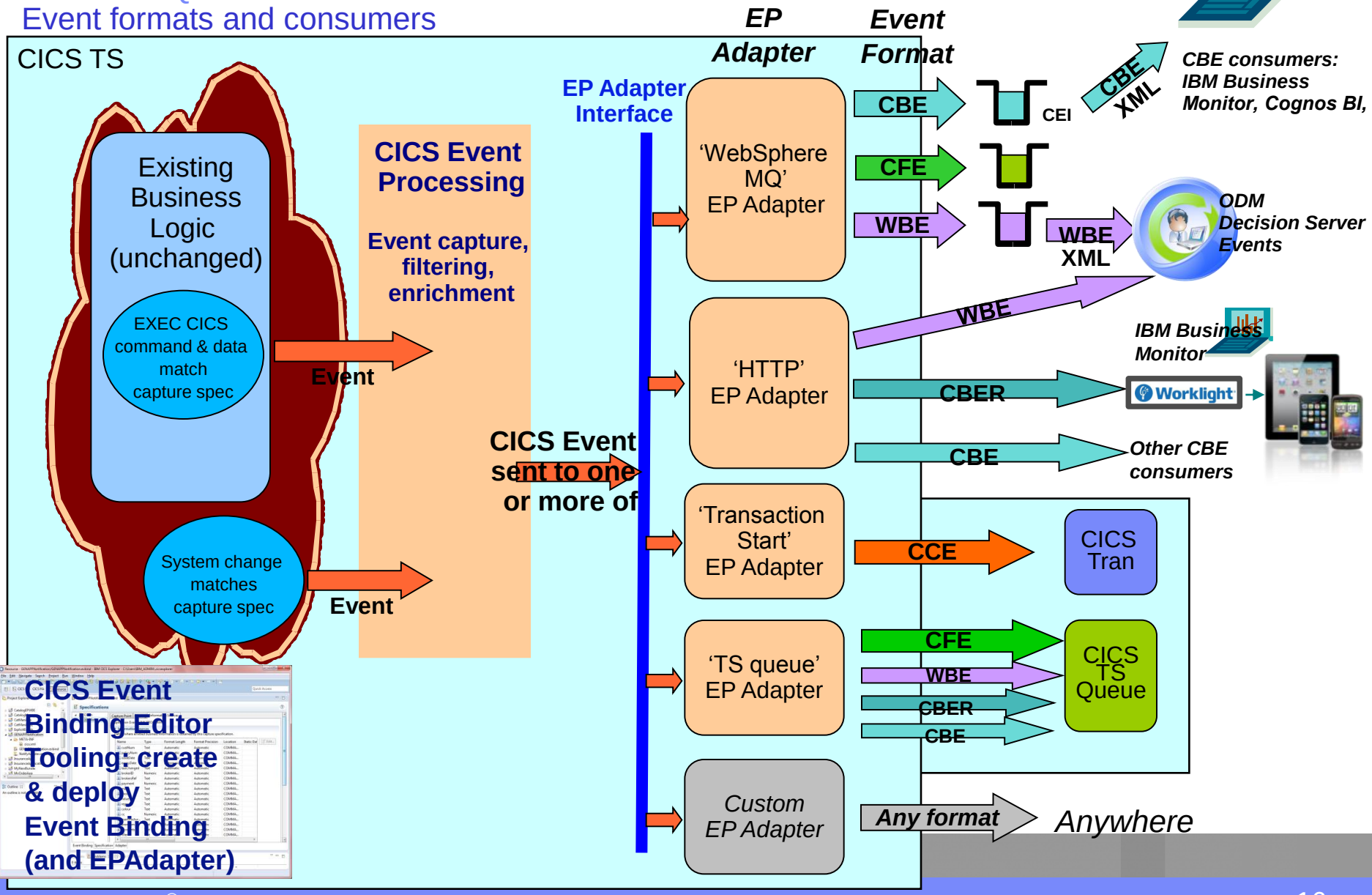
- Experiment and check that you are capturing the right events, with the right data and formatting
  - Write to a temporary storage queue
  - (Bear in mind TS queues can fill up)
- Extend an application without changing it
  - Start a CICS transaction, passing it event data – in the same or another region
- Send an email containing data captured from CICS
  - SupportPac CA1Y provides an SMTP client to send emails and attachments from CICS events
- Emit events with a custom format, e.g. to third party event consumer
  - Write a custom EP adapter, gives you full flexibility
  - Simple sample provided with CICS
  - Additional samples in SupportPacs



Answer to Question 3 Continued
Sending events using other products



Answer to Question 3 Continued
Event formats and consumers



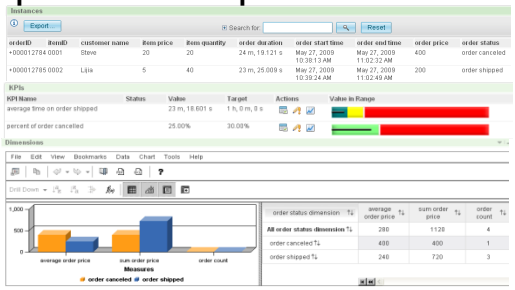
CICS Event Binding Editor Tooling: create & deploy Event Binding (and EPAdapter)

Question 4

- What are some of the things that people use CICS events for ?

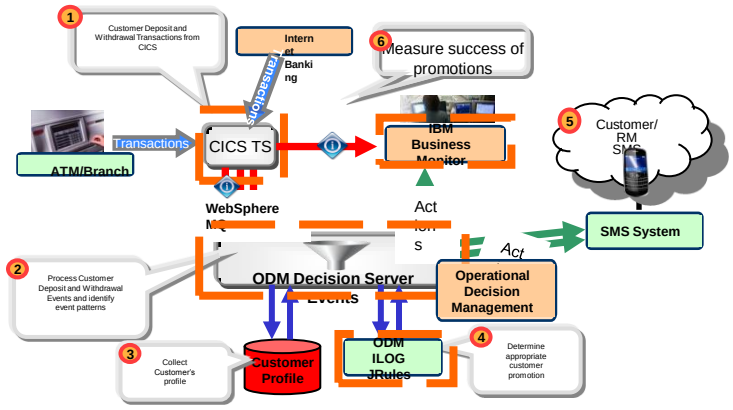
Answer to Question 4
Insight and Monitoring

- Take events from CICS to **populate a business operations dashboard**. Non-invasive event emission means that changes can be made quickly and with confidence, with minimal disruption to the production and test systems.



BigData and Analytics

- Growing use of events from CICS to provide data for analytics
- Providing access to the large volume of corporate data within CICS to enable analytics



Customize promotional offers

- Customer purchase transactions at tills are processed in CICS
- Generate events from each purchase to provide information on what sells well to which customers (could enrich with location and demographic data using ODM)
- Also use ODM to set business rules about what items are on offer, enabling real-time tweaking of the offers to optimize sales.

Answer to Question 4 Continued

Governance and compliance

- Comply with corporate, industry or government policies
  - Example: Italy's data protection authority (*Garante per la protezione dei dati personali)* introduced requirements for the circulation of information in banking and tracking of banking operations in May 2011, which had to be actioned by December 2013
  - Includes mandatory requirements to track details of transactions, preserve a log of them and issue alerts for suspicious or malicious access and for investigations

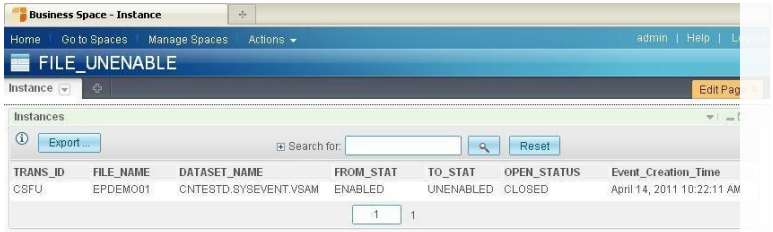
http://www.garanteprivacy.it

- **Italian banks using CICS events to capture transaction details and save as audit logs**
  - Non-invasive events allow support of the requirements without application change, while use of SIGNAL EVENT involves minor change but full flexibility in gathering the tracking data
  - Functional and workload tests showed that the banks' initial requirements were met in terms of the increase in consumption of application transactions and their isolation in the event of problems with the tracking system

Answer to Question 4 Continued

System events for business and IT uses

- Emit events if any files that ought to be opened during start-up fail to open
- Display as alert on IBM Business Monitor dashboard



- Optimize fraud checking
  - A business checks some proportion of requests for fraud, using business rules to decide which ones to check in more detail
  - The proportion that get detailed checking has to be set such that when the system is heavily loaded, the problem is not compounded by lengthy fraud checking
  - Using **system events**, adjust the business rules depending on system load
  - Enables an overall **increase** in the amount of detection
  - But continue to have some stringent checking during heavily loaded times!

Question 5

- What are some Common "gotchas" when using CICS events?

Answer to Question 5
Expected events missing

- Check event processing started
  - CEMT INQUIRE EVENTPROCESS
- Check eventbinding and EP adapter are enabled
  - CEMT INQUIRE EVENTBINDING and CEMT INQ EPADAPTER
- All predicates must be TRUE for event to be captured
  - Event option predicate specifies optional argument, e.g. UPDATE on READ FILE
  - Application data predicate data from container, COMMAREA or data area that's too short
    - Offset + length > size of data area
  - Trace with EC=ALL shows evaluation of predicates

Answer to Question 5 Continued
Expected events missing

- System or Policy events missing ?
  - Check EPADAPTER definition as Transactional and Synchronous events not supported.
    - Check for DFHEC1023/4 or DFHMP3003/5.
- Check EP adapter name specified in event binding when using separate EP adapters introduced in CICS TS 4.2
  - EP adapter name is case sensitive.
    - Check for message DFHEC1022
- No events written to TSQ ?
  - XML format (CBE, CBER, WBE) events not supported until CICS TS 4.2
  - Beware of upper-case translation when using CEBR to view events

Answer to Question 5 Continued
Too many events

- Specified predicates too generic, e.g. FILE Starts With “AB”
  - Always try to specify primary predicate with EQUALS. Its the “Event option” predicate marked with an asterisk

- Some DFH modules are event enabled:
  - CICS TS 4.1: CICS samples (DFH£ and DFH0) and DFHECID
  - CICS TS 4.2: + DFHW2FI, DFHW2TS, DFHMQBP0
  - CICS TS 5.1: + DFHMIRS, DFHMQBP3.

Answer to Question 5 Continued
Captured data missing or incomplete

- Asterisks in output
  - Capture data not available
    - Capture item specifies an optional EXEC CICS command argument, e.g. COMMAREA on LINK or RETURN
  - Capture item from container, COMMAREA or data area that's too short for data item
    - offset + length > size of data area
    - Use capture length zero to capture to end of a variable length data area, commarea or container
      - **But beware when using 0 when capture items specifies an argument that has no separate length argument, e.g. INTO on RECEIVE MAP**
  - Capture data is numeric and value too large for formatted field width

Short Demo

Open Lines for Questions

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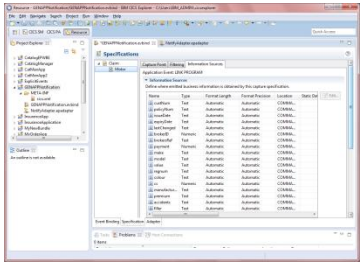
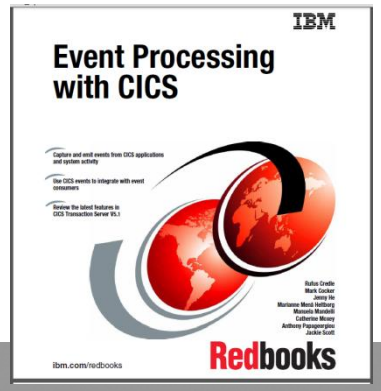
Summary

- Unlock the information in your CICS applications and systems using CICS events
- Emit events without application change and with minimal system overhead
- Useful value with CICS, plus additional capability with other products
  - Especially IBM ODM, Worklight, Business Monitor
- Events captured from application processing, system activity, threshold policies
- Use events to populate business dashboards, comply with governance requirements, customize promotional offers, drive analytics, and more…



Some resources

- http://www.redbooks.ibm.com/abstracts/REDP4642.html?Open : Conceptual Model for Event Processing Systems
- http://www.redbooks.ibm.com/abstracts/sg247815.html : Smarter Banking with CICS
- http://www.ibm.com/software/products/en/category/operational-decision-management : Operational Decision Management (including ODM for Dummies e-book)
- http://www.ibm.com/software/products/en/category/business-monitoring : Business Monitoring
- http://www.redbooks.ibm.com/abstracts/sg247792.html : Event Processing with CICS **(*completely updated August 2013*)**
- http://www.ibm.com/support/docview.wss?uid=swg24033197 : SupportPac CA1Y: Send email from CICS Transaction Server for z/OS



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