

CICS Version 4 – Event Processing

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Agenda



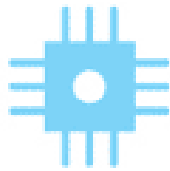
- Changing landscape of technologies
- Event Processing in CICS TS V4.1
- Event Processing in CICS TS V4.1 Demo
- Event Processing in CICS TS V4.2
- Event Processing in CICS TS V4.2 Demo

Agenda

- **Changing landscape of technologies**
- Event Processing in CICS TS V4.1
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We are living in a new landscape...

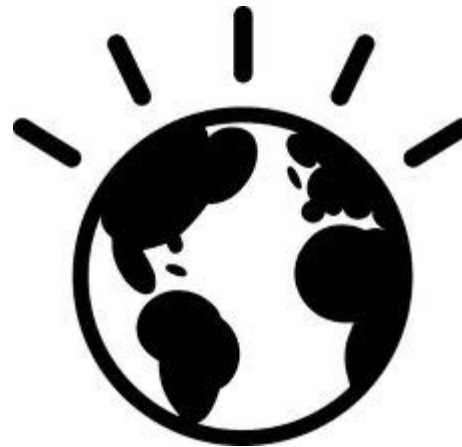
Instrumented.
Interconnected.
Intelligent.



+



+



People

Companies

Institutions

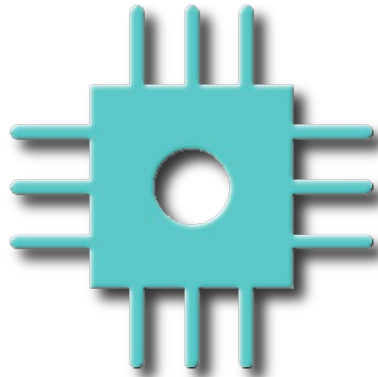
Industries

Man-made systems

Nature's systems

Instrumented

“Today, there are **1 billion** transistors for each person on the planet”¹

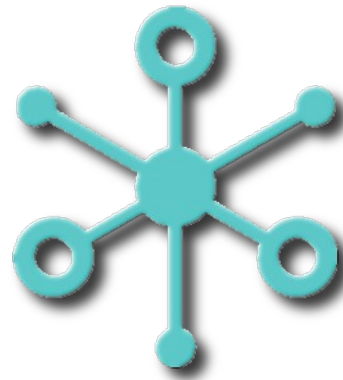


“There are **30 billion** RFID tags embedded into our world and across entire ecosystems”¹

¹ Sam Palmisano speech, November 12, 2008

Interconnected

“The internet of people is nearly **2 billion** strong. Almost one third of the world’s population”¹



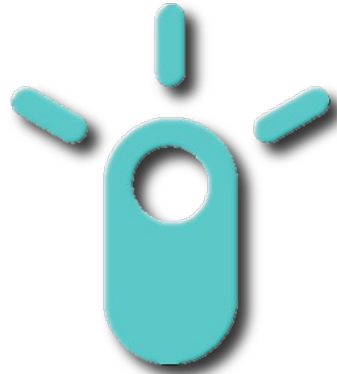
“Over **4 billion** mobile phone subscribers worldwide”²

¹ World Internet Users and Population Stats

² World Bank, World Development Indicators

Intelligent

“Every day, **15 petabytes** of new information are being generated. This is 8x more than the information in all U.S. Libraries”¹



“An average company with 1,000 employees spends **\$5.3 million** a year to find information stored on its servers”¹

¹ New Intelligence White Paper from ThinkForward website

Information is Everywhere and Consumable



What does this mean for businesses?

- If a business can become **instrumented** and **interconnected** then end to end process visibility can be achieved.
- This visibility allows **intelligent** decisions to be made which enables the business to...

Mitigate Risk and
Identify Opportunities



React with
Greater Agility



Deliver Faster
Time to Value



What's the problem?

- Clearly businesses need to keep up with the changing landscape of technologies...
- ...but struggle to do so because they can't update the old applications that underpin their processes.



The Solution?

CICS TS

“The **computing environments** on which business applications run must provide capabilities to non-invasively instrument them to take advantage of these **technologies**”¹

Event Processing

¹ Paraphrased from: Smarter Banking with CICS Transaction Server Redbook

Agenda



- Changing landscape of technologies
- **Event Processing in CICS TS V4.1**
- Event Processing in CICS TS V4.1 Demo
- Event Processing in CICS TS V4.2
- Event Processing in CICS TS V4.2 Demo

What are Business Events?

*“As the pace of interactions increases, untapped potential exists in the **business events** flowing throughout our enterprises”*

Nearly **4 Trillion**
RFID events are
emitted each day



Large companies can experience up to
800 Billion business events daily



Over **30 Billion** CICS
transactions per day



*“A **business event** is an action that has happened, or the absence of it happening, which has relevance to the business”*

What is Business Event Processing?

“Turn insight into action”

Event
Pos Purchase



Business Context

2nd purchase in a week
and total purchases
this year > \$1000



Action: Offer
loyalty program
membership
before
customer
leaves the store

Event
No meter signal



Business Context

Third consecutive
period without signal



Action: Trigger
automated
troubleshooting
process

Event
GPS Signal



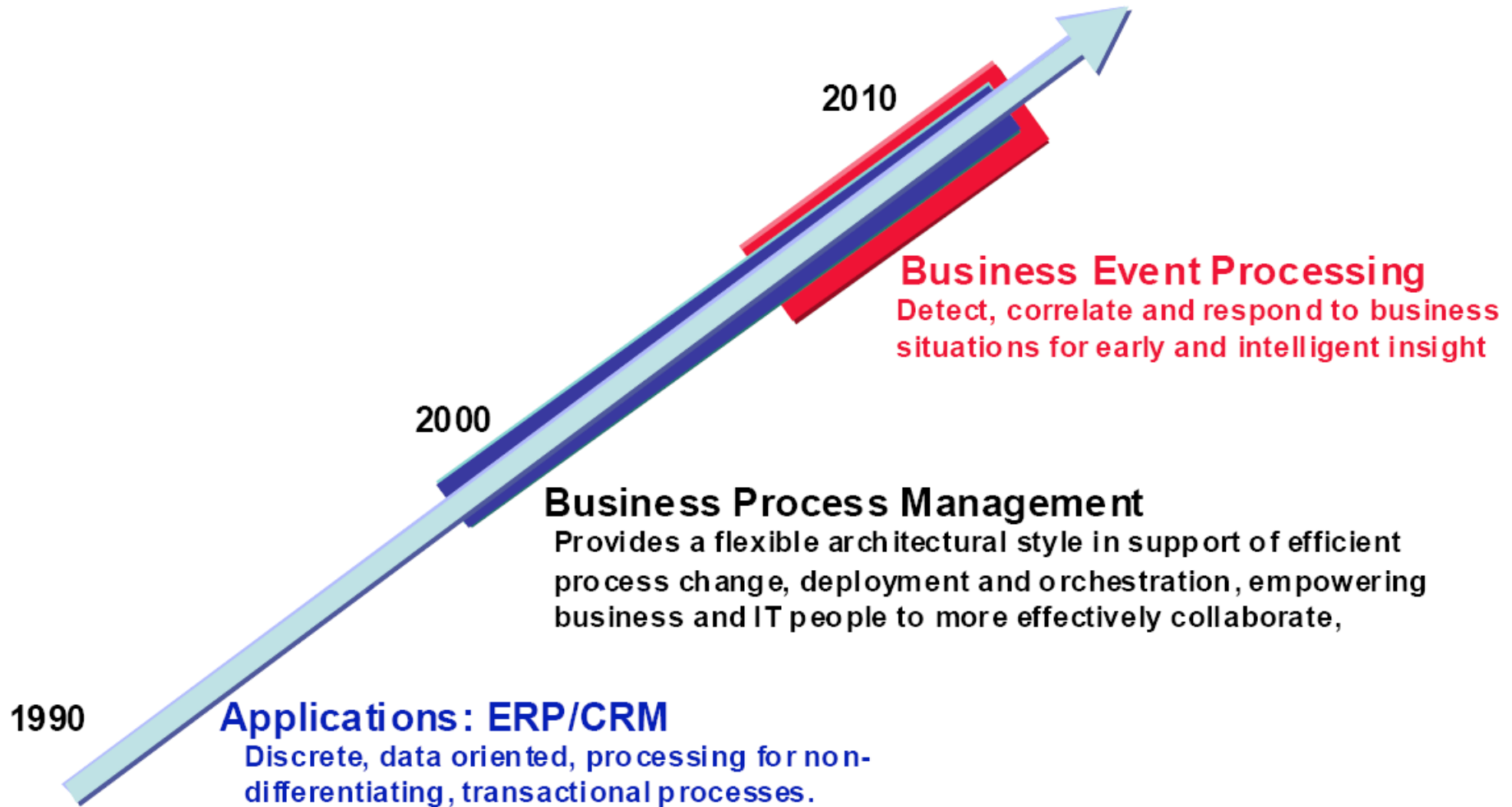
Business Context

Calculated arrival > 30
min over SLA



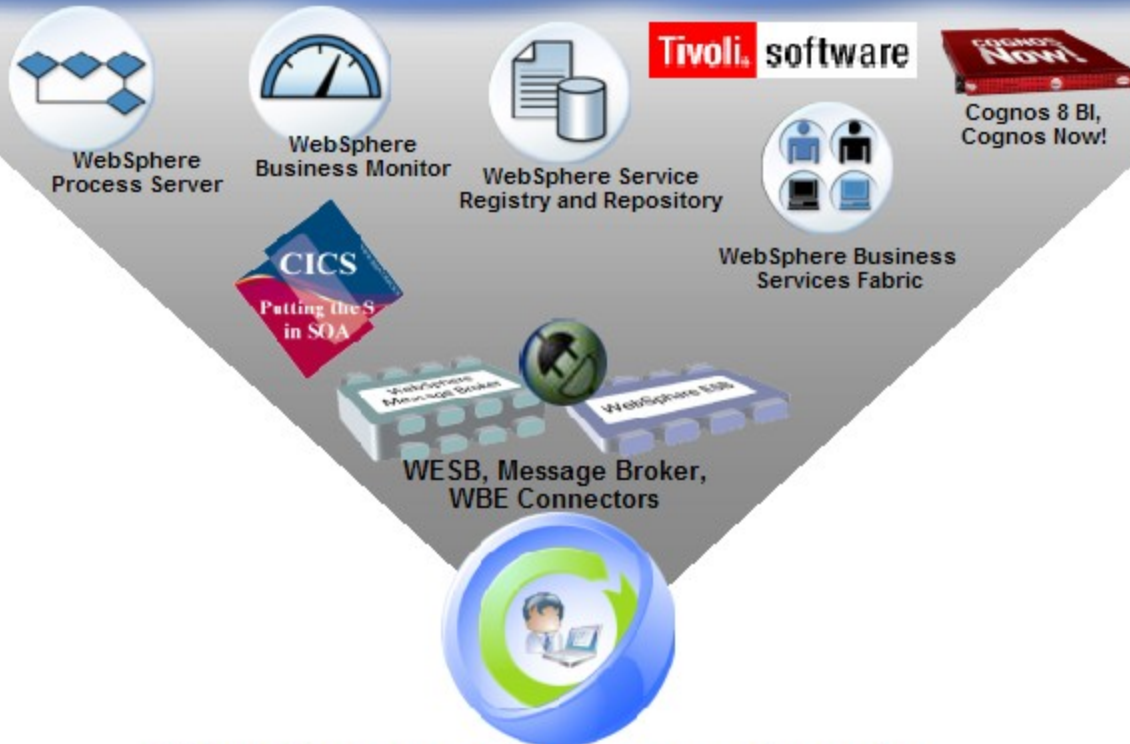
Action: Phone
customer to re-
arrange delivery

The Path to Event Aware Enterprise



IBM Delivers Business Event Processing

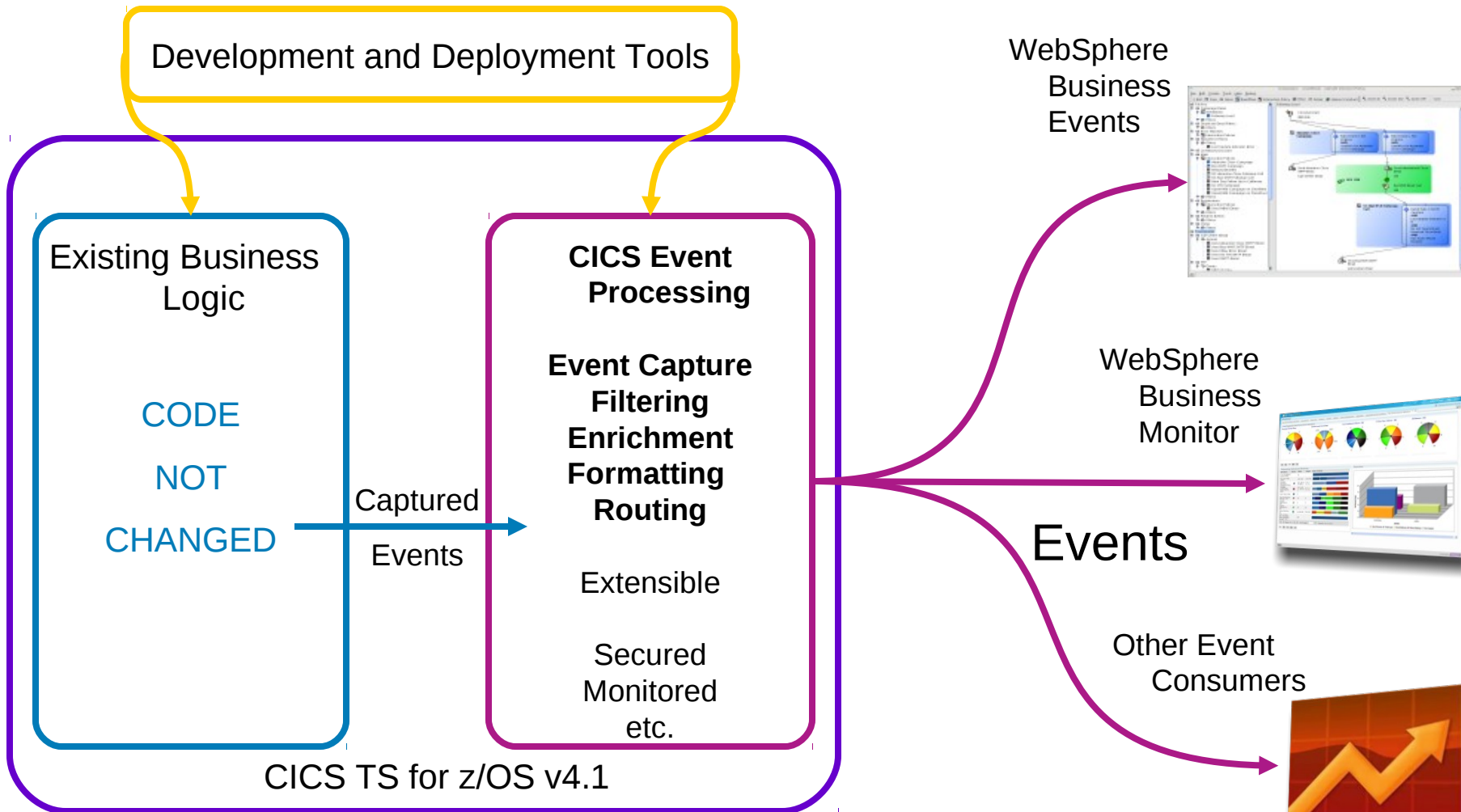
Event Cloud



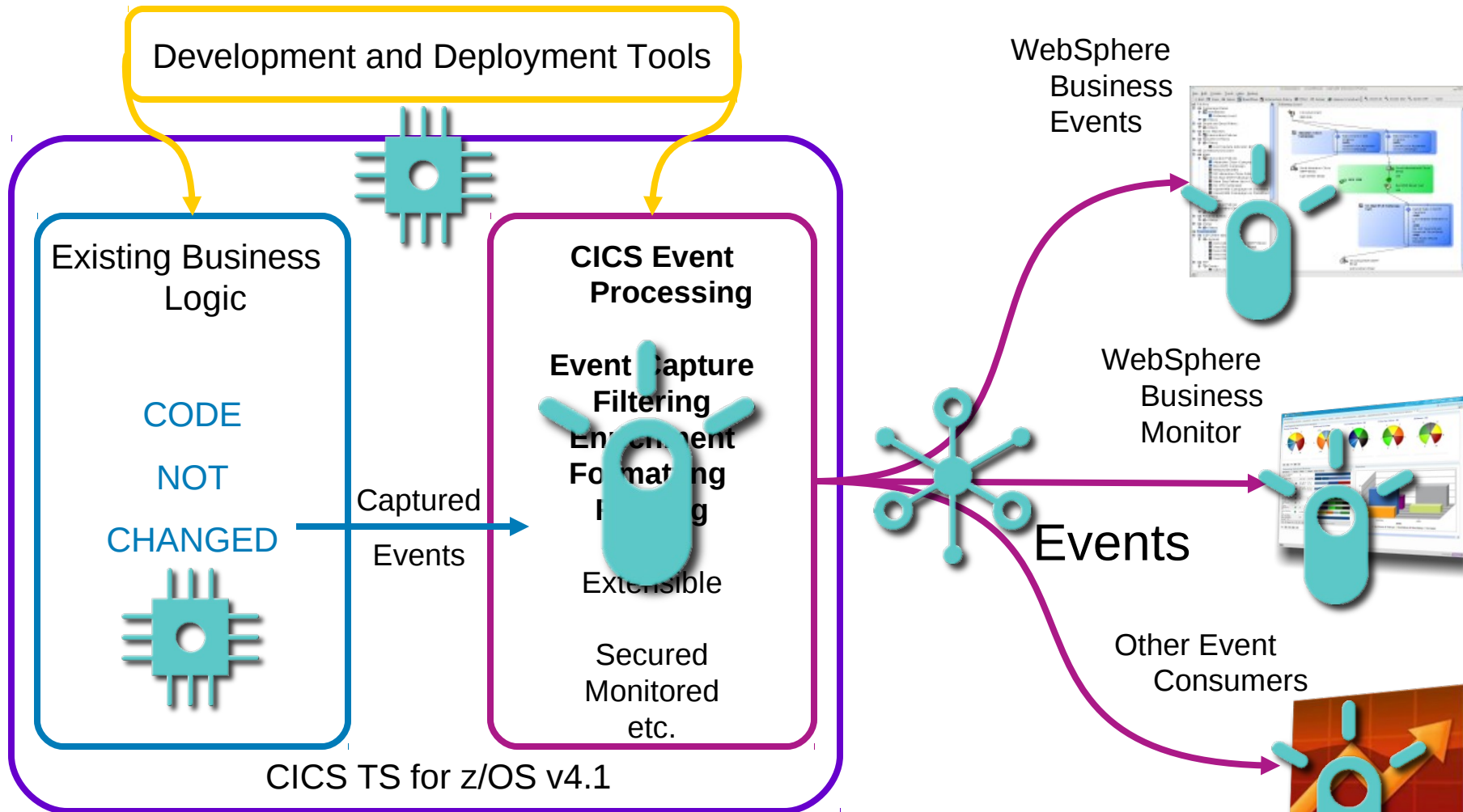
CICS has a key part to play



CICS TS V4.1 Event Processing Support Overview

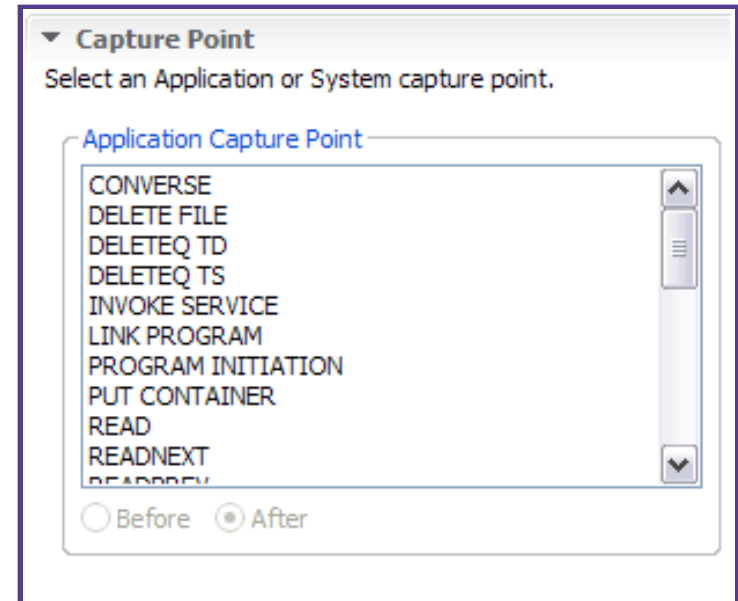


CICS TS V4.1 Event Processing Support Overview



Where can events be captured?

- In CICS V4.1 events can be captured at...
- **...any event enabled API call**
 - Non invasive
- **...program initialisation**
 - Non invasive
- **...an explicit EXEC CICS SIGNAL EVENT call**
 - Small program change required



▼ **Capture Point**
Select an Application or System capture point.

Application Capture Point

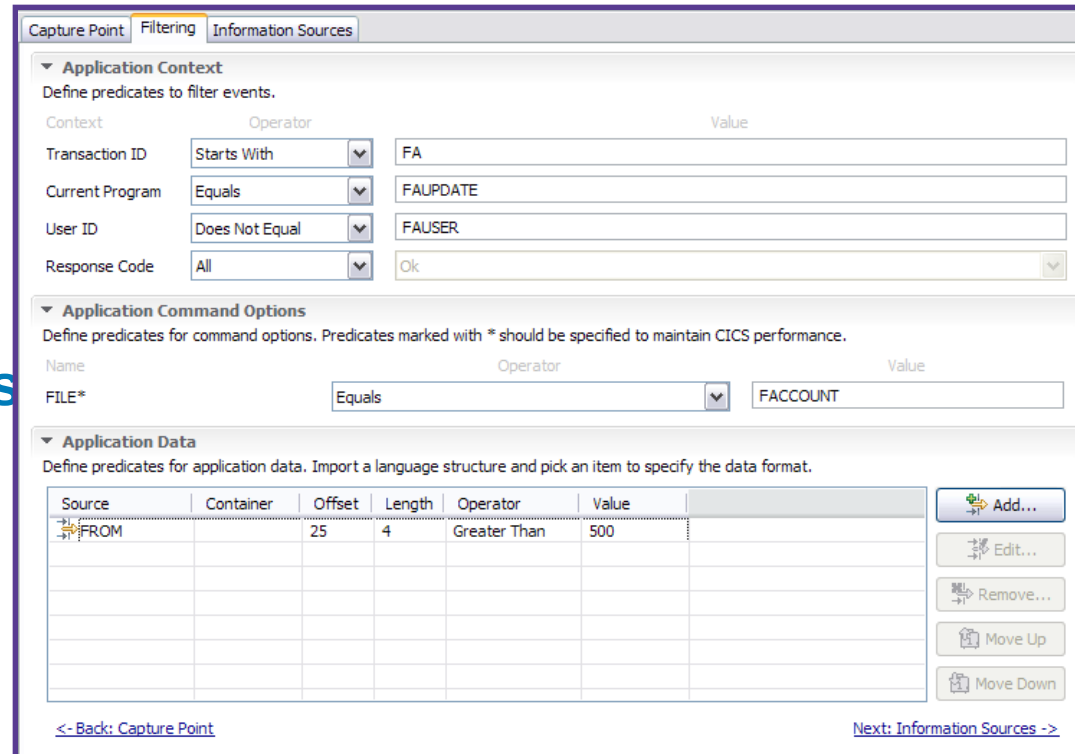
- CONVERSE
- DELETE FILE
- DELETEQ TD
- DELETEQ TS
- INVOKE SERVICE
- LINK PROGRAM
- PROGRAM INITIATION
- PUT CONTAINER
- READ
- READNEXT
- READPREV

Before After

Filters

- There are 3 types of filter that can be used to determine that an event has happened at a particular capture point:

- **Context filters**
- **Command option filters**
- **Data filters**



The screenshot shows the 'Filtering' tab of a software interface. It is divided into three main sections:

- Application Context:** Define predicates to filter events. It contains four rows of filters:
 - Transaction ID: Starts With (Operator) | FA (Value)
 - Current Program: Equals (Operator) | FAUPDATE (Value)
 - User ID: Does Not Equal (Operator) | FAUSER (Value)
 - Response Code: All (Operator) | Ok (Value)
- Application Command Options:** Define predicates for command options. Predicates marked with * should be specified to maintain CICS performance. It contains one row:
 - FILE*: Equals (Operator) | FACCOUNT (Value)
- Application Data:** Define predicates for application data. Import a language structure and pick an item to specify the data format. It contains a table with one row:

Source	Container	Offset	Length	Operator	Value
FROM		25	4	Greater Than	500

Navigation buttons at the bottom: '<- Back: Capture Point' and 'Next: Information Sources ->'. On the right side of the Application Data section, there are buttons for 'Add...', 'Edit...', 'Remove...', 'Move Up', and 'Move Down'.

Context Filters

- Allow you to identify events based on context, for example:

- **Current Transaction**

- **Current Program**

- **Current User ID**

▼ **Application Context**
Define predicates to filter events.

Context	Operator	Value
Transaction ID	Starts With ▼	FA
Current Program	Equals ▼	FAUPDATE
User ID	Does Not Equal ▼	FAUSER
Response Code	All ▼	Ok

Command Option Filters

- Allow you to identify events based on attribute values in the API command of the capture point, for example:
 - **File name on a WRITE FILE command**
 - **Channel name on LINK PROGRAM**

▼ **Application Command Options**
Define predicates for command options. Predicates marked with * should be specified to maintain CICS performance.

Name	Operator	Value
FILE*	Equals	FACCOUNT

Data Filters

- Allow you to identify events based on data values in the application, for example:
 - **Integer at offset 25 in the FROM field on a WRITE FILE command is greater than 500**
 - **Data in a certain container in the current channel**

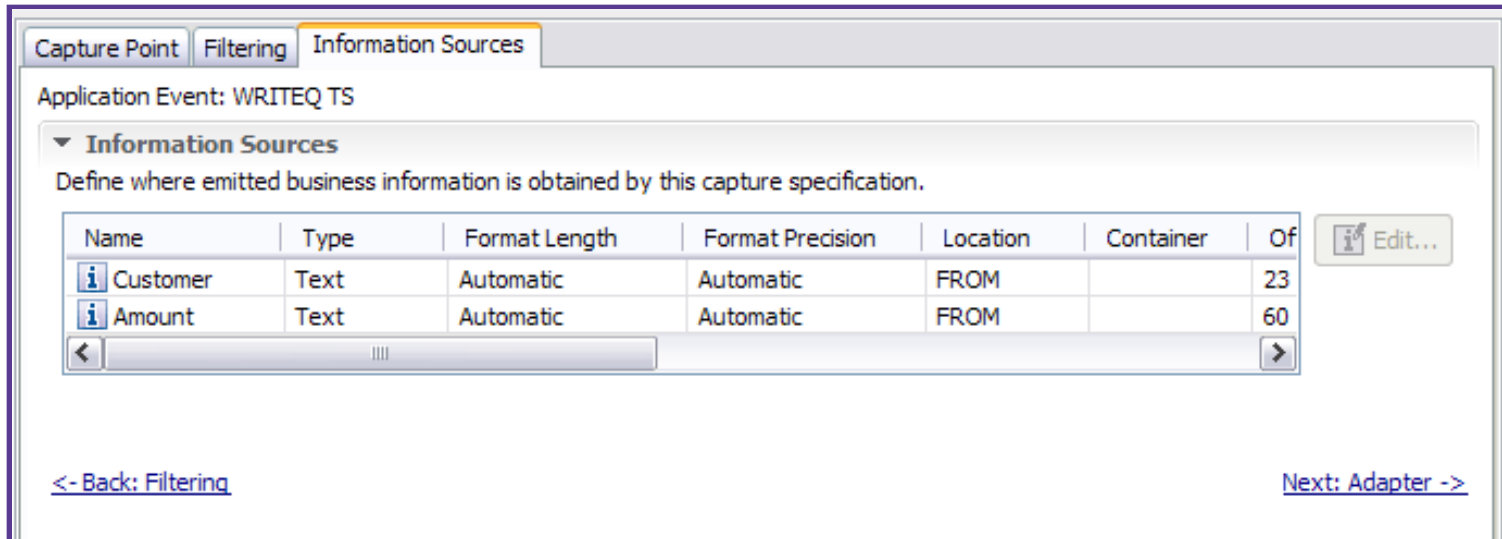
▼ **Application Data**
Define predicates for application data. Import a language structure and pick an item to specify the data format.

Source	Container	Offset	Length	Operator	Value	
FROM		25	4	Greater Than	500	



Buttons: Add..., Edit..., Remove..., Move Up, Move Down

Capture Data

- Once an event point is identified, data can be captured from the application to populate the event



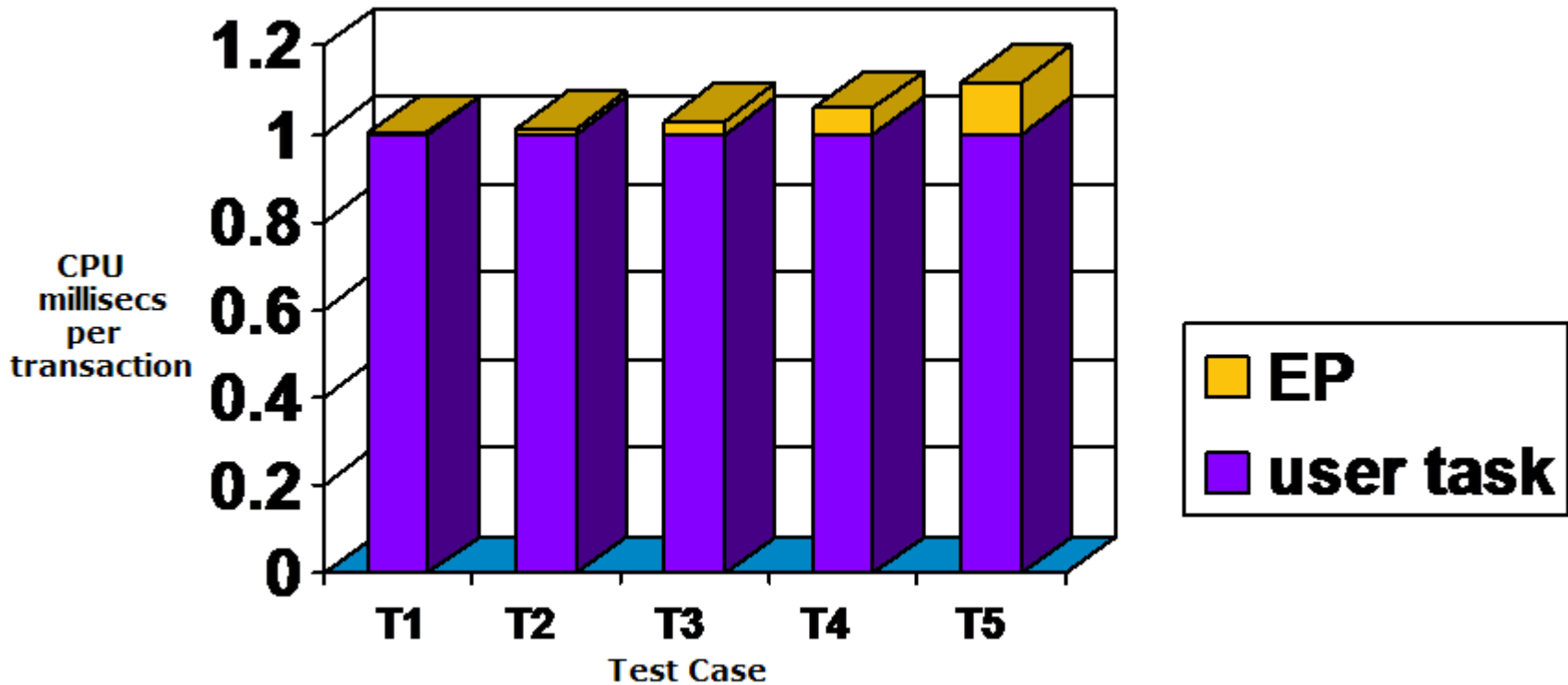
The screenshot shows a software interface for configuring data capture. It has three tabs: 'Capture Point', 'Filtering', and 'Information Sources'. The 'Information Sources' tab is active. Below the tabs, it says 'Application Event: WRITEQ TS'. There is a section titled 'Information Sources' with a dropdown arrow and the instruction 'Define where emitted business information is obtained by this capture specification.' Below this is a table with columns: Name, Type, Format Length, Format Precision, Location, Container, and Of. There are two rows of data: 'Customer' and 'Amount'. An 'Edit...' button is to the right of the table. At the bottom, there are navigation links: '<- Back: Filtering' and 'Next: Adapter ->'.

Name	Type	Format Length	Format Precision	Location	Container	Of
 Customer	Text	Automatic	Automatic	FROM		23
 Amount	Text	Automatic	Automatic	FROM		60

The Performance Question...

EP On/Off	API in spec	Primary Predicate Match	Other Predicate Match	Capture Process	Cost
OFF					negligible
ON	NO				negligible
ON	YES	NO			0.18 microseconds
ON	YES	YES			0.225 microseconds
ON	YES	YES	NO		+0.01 microseconds per predicate
ON	YES	YES	YES	YES	+11 microseconds

The Performance Question...



Event Emission

- Once an event is captured it is queued for emission via an Event Processing Adapter
 - EP Adapters format and emit events from CICS using a range of transports:
 - WebSphere Message Queue
 - Transaction Start
 - TS Queue
 - Custom

▼ Adapter
Choose the adapter to emit events produced by this binding.

Adapter

Emits events to a WebSphere® Message Queue either in an XML format for consumption by WebSphere Business Events, the Command Center, or in a non-XML format

Queue Name	<input type="text" value="MYQUEUE"/>
Persistent	<input type="text" value="Queue Default"/>
Priority (Optional)	<input type="text" value="0"/> <input checked="" type="checkbox"/> Queue Default
Expiry Time (1/10 secs) (Optional)	<input type="text" value="1"/> <input checked="" type="checkbox"/> Never Expire
Data Format	<input type="text" value="WebSphere Business Events (XML)"/>

Customer Question



**“But I don’t have MQ.
How do I emit my events from CICS?”**

Solution: A new HTTP EP adapter.



- Once an event is captured it is queued for emission via an Event Processing Adapter
 - EP Adapters format and emit events from CICS using a range of transports:
 - WMQ
 - **HTTP - APAR PK94205** <http://www-01.ibm.com/support/docview.wss?uid=swg1PK94205>
 - Transaction Start
 - TS Queue
 - Custom

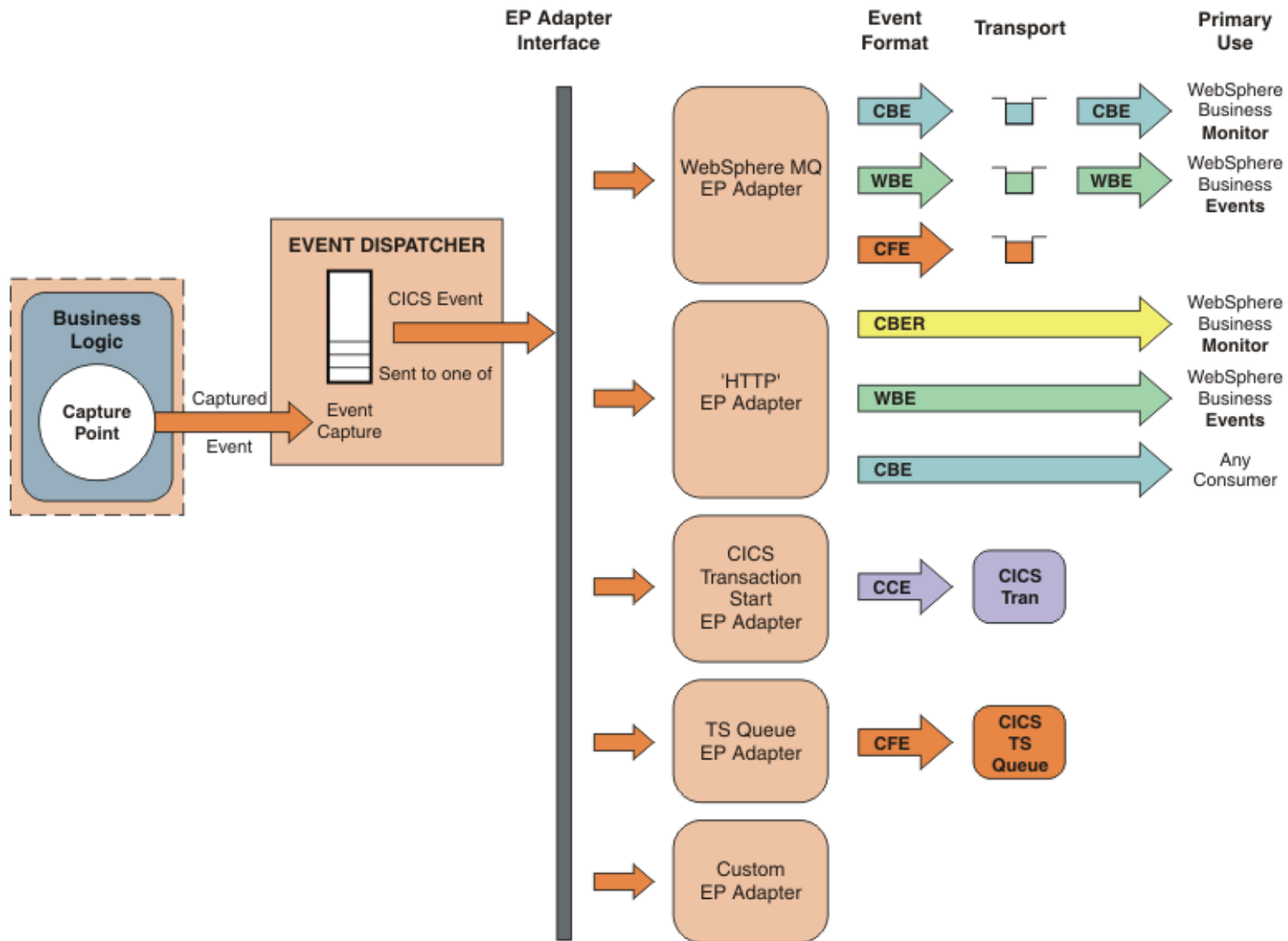
▼ **Adapter**
Choose the adapter to emit events produced by this binding.

Adapter
Emits events to an HTTP server using HTTP POST in XML format for consumption by products such as WebSphere Business Events and WebSphere Business M

Urimap

Data Format

Event Emission



EP Adapters Advanced Options

- **Dispatcher Priority** – Normal or High
- **Transaction ID** – Run the EP adapter with a specific Transaction ID
- **User ID** – Run the EP adapter with a specific User ID
- **Events are Transactional**
 - When set, causes CICS to wait for sync point completion before either emitting or discarding event (depending on sync point outcome)
 - *Note:* Transactional events are not emitted until the UOW reaches sync point – for some transactions, this could mean the events are not very close to real-time

Advanced Options

These optional dispatcher settings are for advanced users.

Dispatch Priority

Normal

Transaction ID

User ID

Use Context User Id

Events are Transactional

Event Bindings



- Tells CICS how to indentify, capture, format and emit events
- Created using the CICS Explorer Event Binding Editor
- Installed via a Bundle and managed like any other CICS resource

Event Bindings

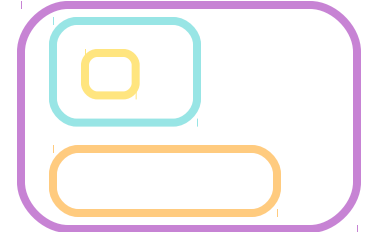
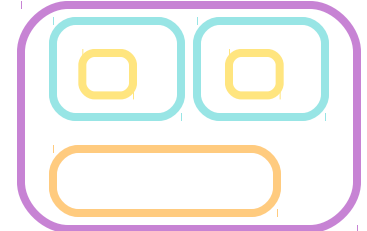
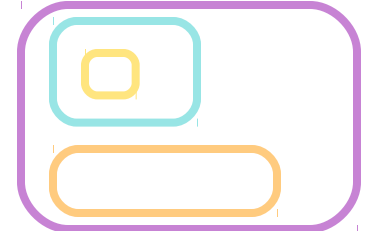
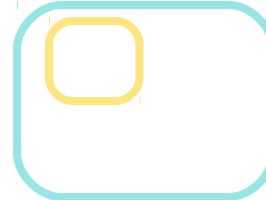
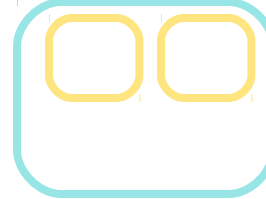
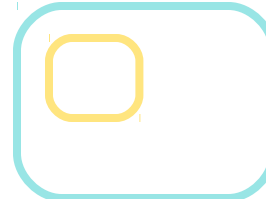
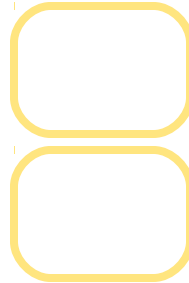
Bundle

Event Binding

Business Event Specification

Capture Specification

EP Adapter Configuration



Agenda

- Changing landscape of technologies
- Event Processing in CICS TS V4.1
- **Event Processing in CICS TS V4.1 Demo**
- Event Processing in CICS TS V4.2
- Event Processing in CICS TS V4.2 Demo

Agenda



- Changing landscape of technologies
- Event Processing in CICS TS V4.1
- Event Processing in CICS TS V4.1 Demo
- **Event Processing in CICS TS V4.2**
- Event Processing in CICS TS V4.2 Demo

Event Processing in V4.x



- Event Processing in CICS TS V4.1 is a good foundation.
- Event Processing in CICS TS V4.2 builds on that foundation to enhance both capability and usability.
- Event Processing in CICS TS V4.2 aims to address customer questions arising from interest in the V4.1 capability.

Event Processing in V4.2 basic improvements



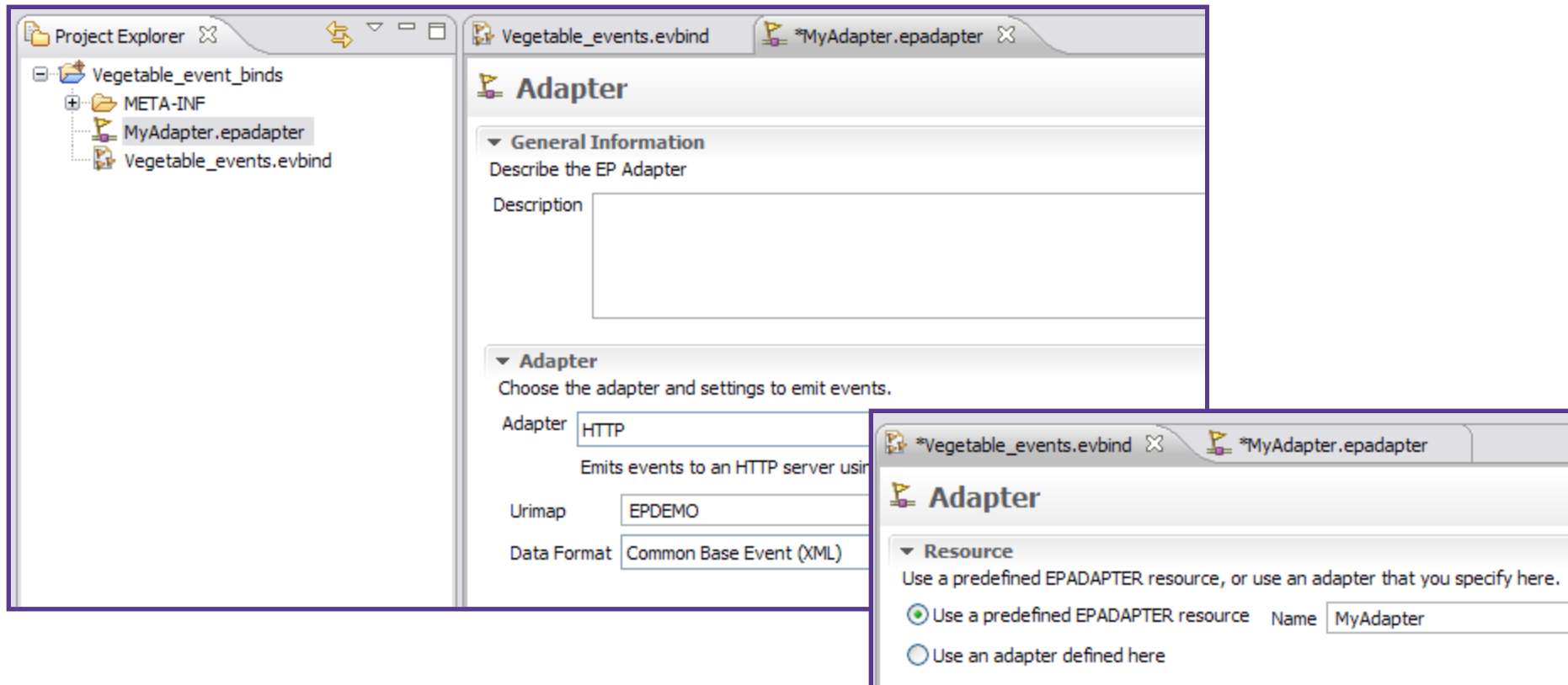
- More data types supported for filter and capture:
 - Sign leading/trailing Zoned Decimal
 - Hexadecimal floating point
 - Binary floating point
 - Decimal floating point (requires optional hardware facility)
 - Null terminated character
 - Null terminated hex
- HTTP EP adapter performance improvements if using a URIMAP with SOCKETCLOSE set.

Customer Question

“We’ve started using events and we have many event bindings. All of our events are emitted using identical EP adapter specifications. What happens if need to change the EP adapter specification? We worry that it would be a lot of work to change it due the number of event bindings we have.”

Solution: Separate EP adapters

- In CICS TS V4.2 EP adapter specifications can be defined and managed separately to Event Bindings.
- Event Bindings can reference these EP adapters by name.



The screenshot displays the IBM Rational Developer for System z interface. On the left, the Project Explorer shows a project named 'Vegetable_event_binds' containing a folder 'META-INF' and two files: 'MyAdapter.epadapter' and 'Vegetable_events.evbind'. The main editor area is split into two panes. The top pane, titled 'Vegetable_events.evbind', shows the 'Adapter' configuration for the event binding. The 'General Information' section has a 'Description' field. The 'Adapter' section is expanded, showing 'Adapter' set to 'HTTP', 'Emits events to an HTTP server using' checked, 'Urimap' set to 'EPDEMO', and 'Data Format' set to 'Common Base Event (XML)'. The bottom pane, titled '*MyAdapter.epadapter', shows the 'Adapter' configuration for the EP adapter. The 'Resource' section is expanded, showing 'Use a predefined EPADAPTER resource' selected with the 'Name' set to 'MyAdapter', and 'Use an adapter defined here' unselected.

EP adapters in bundles

Bundle

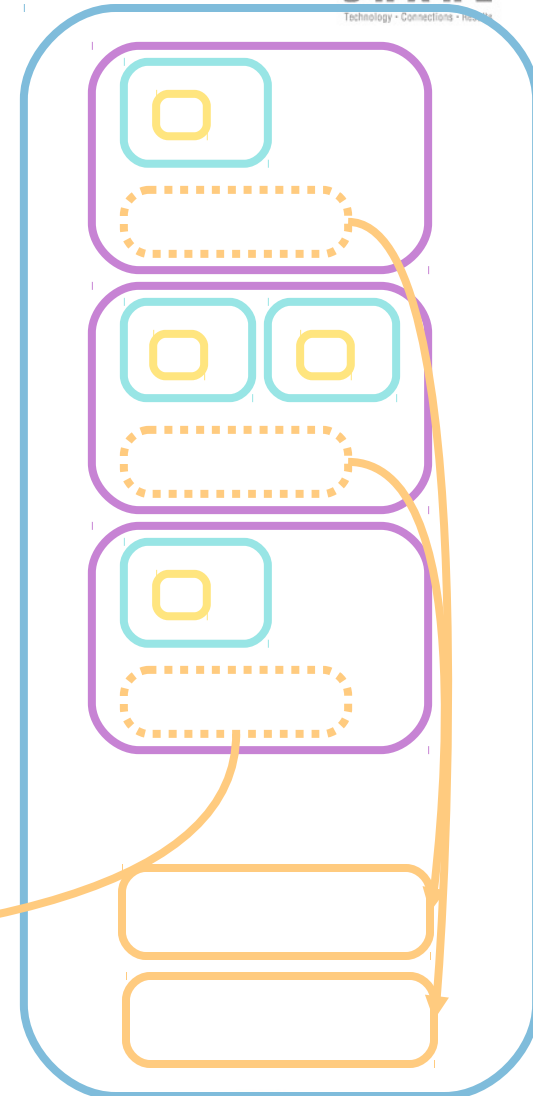
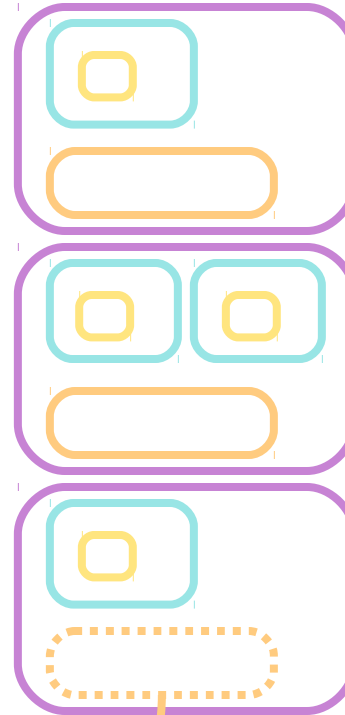
Event Binding

Business Event Specification

Capture Specification

EP Adapter Reference

Separate EP Adapter Specification



Customer Question



“We emit events from a number of our applications. If we ever needed to make a change to any of those applications how would we know which event capture specifications could be affected and may need updating?”

Solution: EP Search



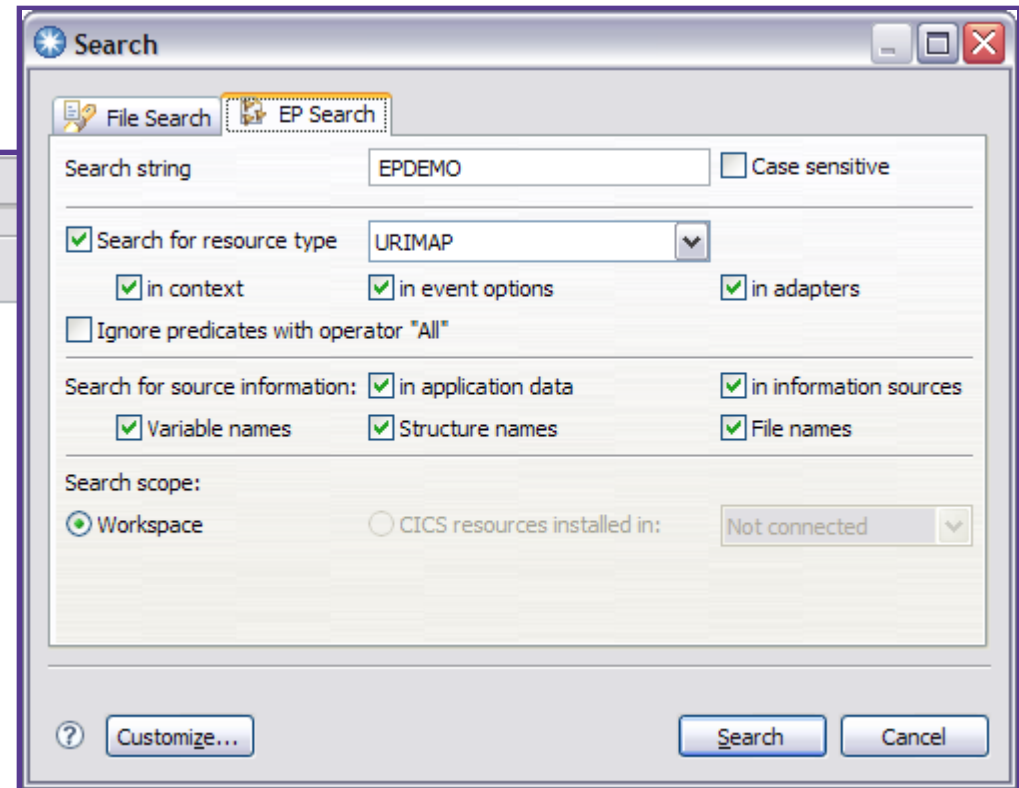
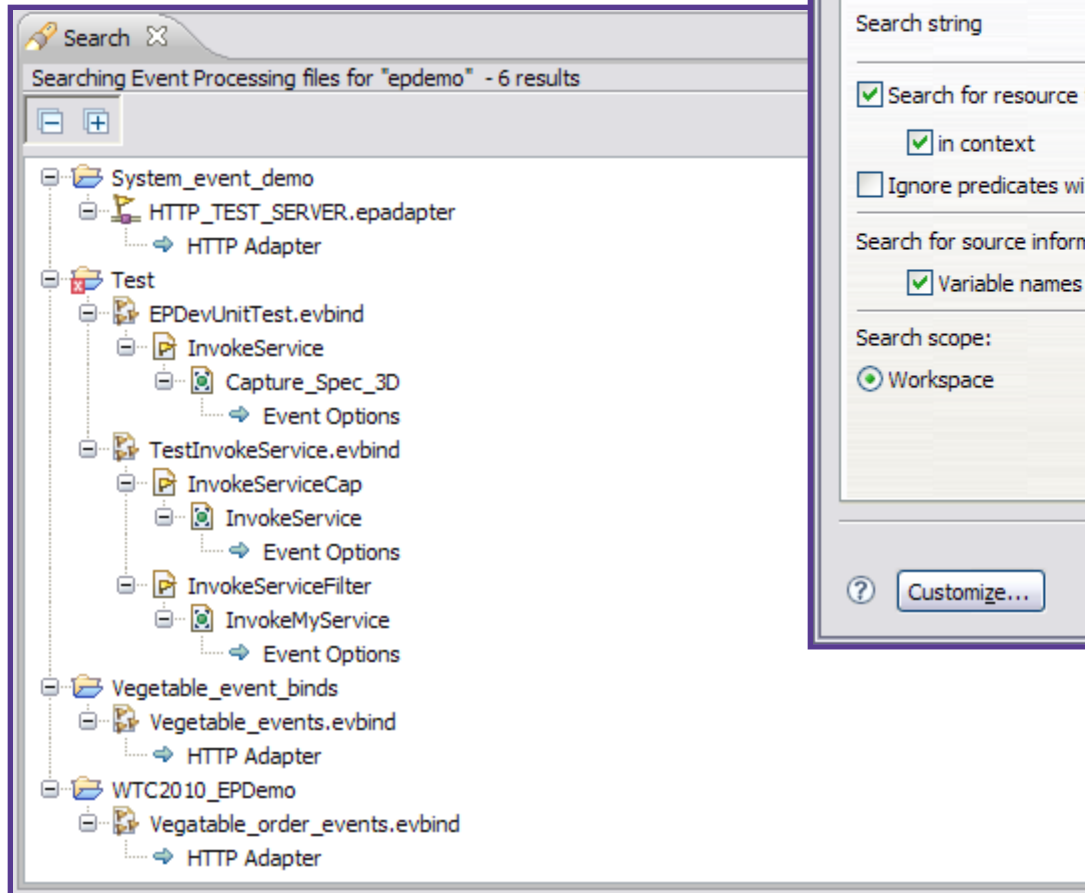
- Available in the CICS Explorer

- Enter the name of the thing you have changed and EP search will tell you which event bindings may be affected.

- 'Things' include:
 - CICS resource names
 - Language Structure names
 - Language Structure field names

- Searches event bindings in the CICS Explorer workspace and those installed in CICS regions that Explorer is connected to.

EP Search Interface



Customer Question

“I can see how events can be used for non critical functions like monitoring and analytics, but how can I reliably use events to extend my applications if an application can complete successfully even if an event captured from it fails to be emitted?”

Solution: Synchronous emission mode



- New Synchronous emission mode option on the EP adapter:
When Synchronous emission is used event emission is Assured.
- Causes events to be formatted and emitted as part of the capturing UOW.
- If the event fails to be emitted the capturing UOW will be backed out at syncpoint and its transaction is abended with ASP7.
- Not available for the Transaction Start adapter.

A screenshot of a software configuration window titled 'Advanced Options'. The window contains several settings. The 'Emission Mode' setting is highlighted with a purple box and shows two radio buttons: 'Async' (unselected) and 'Sync' (selected). Other settings include 'Dispatch Priority' set to 'Normal', 'Transaction ID' (empty text box), 'User ID' (empty text box), and 'Events are Transactional' (checkbox, unchecked).

4

Synchronous Transactional Event Emission



- Use Synchronous Emission with a Transactional EP adapter
- Capturing UOW is backed out if the event emission fails
- Event is backed out if the capturing UOW fails.
- Event must be emitted to a recoverable resource.
- Adapter options
 - WMQ adapter – where the queue is recoverable
 - TSQ adapter – where the queue is recoverable
 - Custom adapter – where all actions are recoverable if the EPAP_RECOVER flag is set in the DFHEP.ADAPTPARM container.

Let's see that in action...

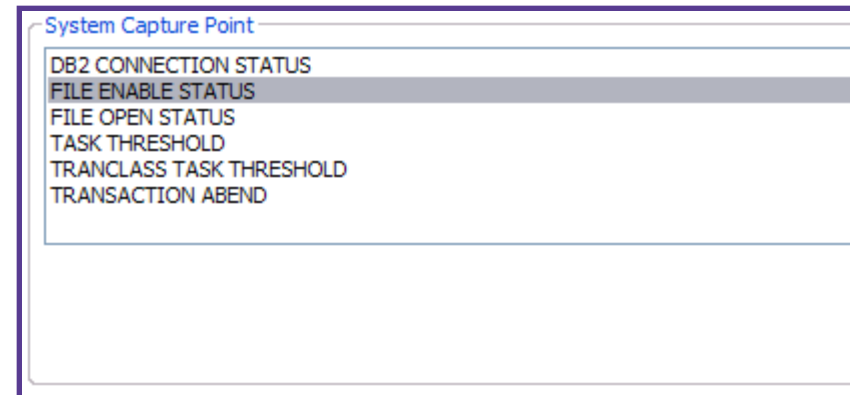
Customer Question

“Can I capture events when something happens in my system, e.g. when a transaction abends or the system load goes over 80% of MAXTASKS?”

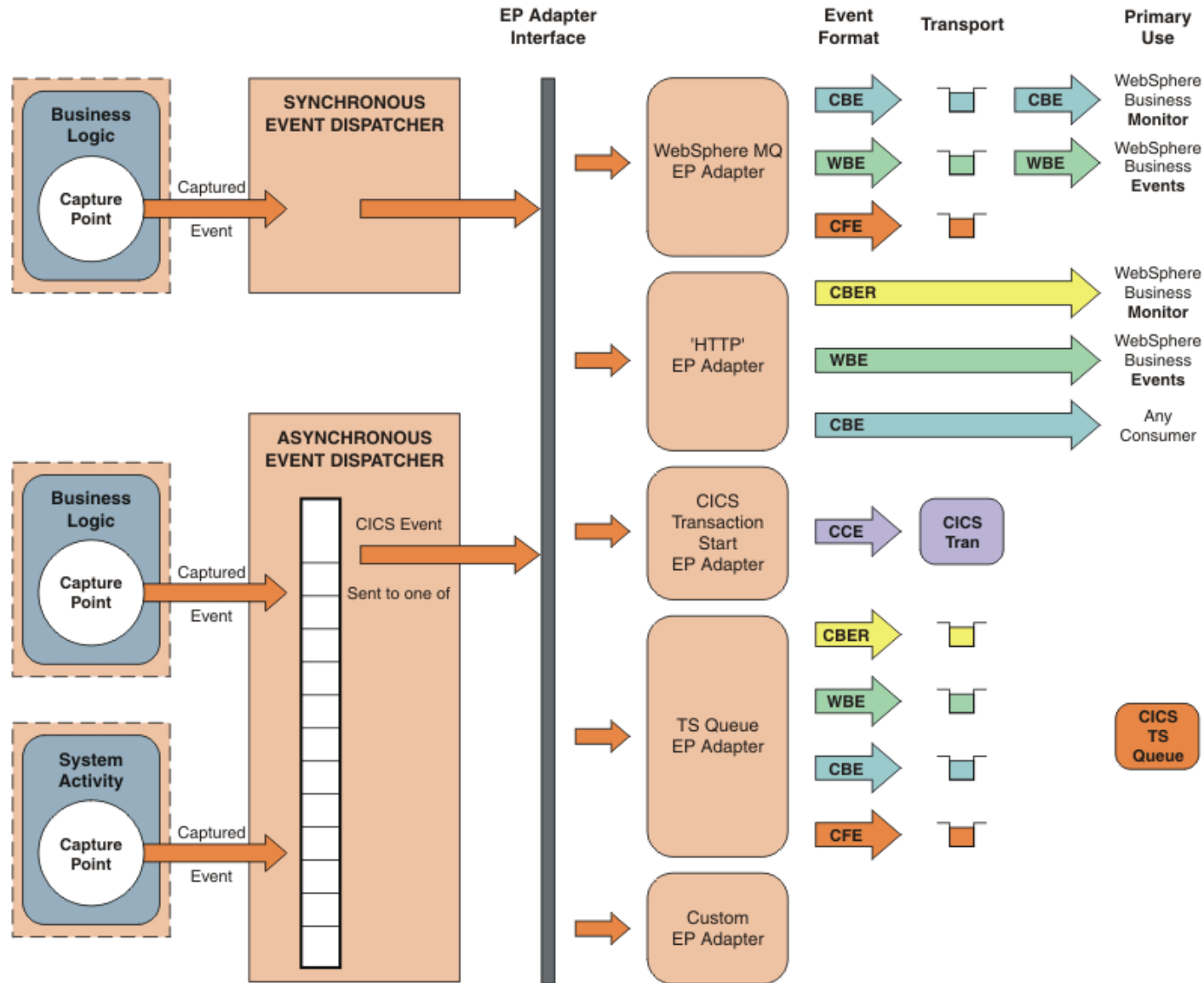
Solution: System event capture points

- 6 new system event capture points

- Capture events when:
 - DB2 connection status changes
 - FILE enable status changes
 - FILE open status changes
 - Unhandled transaction abends
 - Current active tasks for a TRANCLASS goes above or below a certain percentage of MAXACTIVE.
 - Current active task in a region goes above or below a certain percentage of MAXTASKs.



System event capture points



System event capture point details



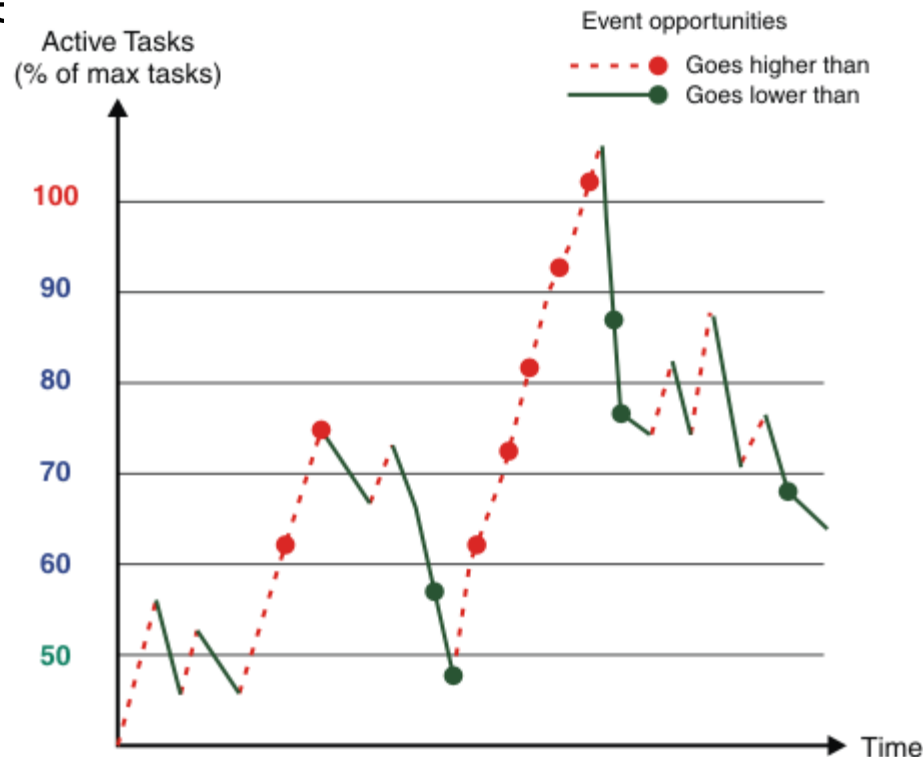
- No Polling - Events are captured and emitted when the system condition of interest occurs.
- Configured, managed and deployed using the Event Binding Editor just like application events in CICS V4.1.
- Emitted using EP adapters
- Do NOT support synchronous or transactional EP adapters.

Task Threshold capture point details

- TASK_THRESHOLD and TRANCLASS_TASK_THRESHOLD
 - Can capture an event when current active tasks for a region or a TRANCLASS
 - Goes above 60%, 70%, 80%, 90%, 100%*
 - Goes below 50%, 60%, 70%, 80%, 90%*
- *of MAXTASKs or MAXACTIVE.
- Need to consider the effect of tasks attached as a result of event emission e.g. some EP adapters are run under a new task
 - Cannot capture task threshold events for MAXACTIVE or MAXTASKS less than 10.

Preventing task threshold event flooding

- Events can be captured only when the number of active tasks crosses a new threshold boundary
- This prevents event flooding when workloads flip flop across a threshold



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- Event Processing in CICS TS V4.1 Demo
- Event Processing in CICS TS V4.2
- **Event Processing in CICS TS V4.2 Demo**

Summary

- **Changing landscape of technologies**
 - Information everywhere and consumable.
 - Need to instrument applications...
 - ...through functionality provided by the computing environment.

- **Event Processing in CICS V4.1**
 - Business event processing
 - CICS 4.1 event processing capabilities
 - Concepts and configuration

- **Event Processing in CICS V4.1 Demo**

- **Event Processing in CICS V4.2**
 - Separate EP adapters
 - EP Search
 - Synchronous Emission Mode and Assured Events
 - System Events

- **Event Processing in CICS V4.2 Demo**

Want to know more?

***Session TAC-2264:
CICS Events Usage Patterns and
Implementation Scenarios***

***Wednesday 1:30pm
Venetian - Murano 3203***

Thank you for listening.

Any Questions?

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