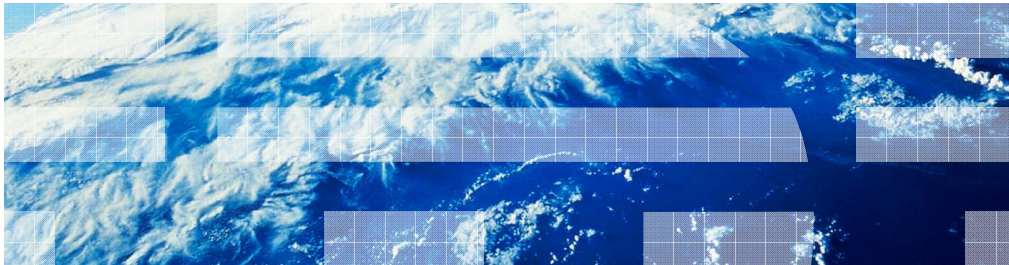


CICS Transaction Server V4.2

Technical overview – Part 1



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CICS[®] Transaction Server for z/OS[®] (CICS TS) is a modern, dependable, cost-effective application platform. It is designed to start mixed language application workloads, supporting both modern and traditional programming languages and models. Its extensive data communication services, and its foundations in service-oriented architecture (SOA), provide unparalleled connectivity and scalability. As a result, CICS TS fits naturally into a smart infrastructure that is needed for a flexible, global enterprise.

CICS TS Version 4.2 builds upon the new and enhanced capabilities delivered in Version 4.1, to enable customers to compete in the marketplace, comply with standards and regulations, and control their IT processes. CICS TS 4.2 delivers technical innovation and significant business value in five main focus areas, satisfying in excess of fifty customer and user group enhancement requests. The result is a powerful new release with a huge amount of value for all stakeholders, delivering a smarter transaction processing experience for CICS users and their customers in turn.

Table of contents

- Product strategy
- Summary of key enhancements
- Event processing
- Connectivity

The technical overview of CICS TS 4.2 is split into two modules. This module is part one and describes the product strategy, summarizes the key themes, and goes into more detail on two of those themes: event processing and connectivity. Part two describes the enhancements in the other themes: Java™, management, and scalability.

CICS product strategy

- **Build an enterprise level transaction processing platform**
 - Support traditional CICS values of quality, performance, and reliability
 - Support enterprise modernization through
 - Mixed programming languages
 - Modern programming architectures (SOA, Web2.0 etc)
- **Simplify management and reduce skills needs for CICS system programmers and application developers**
- **Encourage a vibrant partner ecosystem and community**
- **Extend reach to emerging geographies and new customers**



IBM 100 Icons of Progress

If asked to list the worlds bestselling software, it is unlikely that many people would be able to name IBM CICS, the Customer Information Control System. In fact, this revolutionary product ranks as one of the top 35 technologies that shaped the industry, according to Computerworld magazine. It may well be IBMs best kept secret.

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Technical overview – Part 1

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The strategy around the development of CICS Transaction Server is to build an enterprise level transaction processing platform that supports the traditional CICS values of quality, performance, and reliability but also provides the ability to modernize that enterprise through support for modern programming languages and models. Another aim is to simplify the management of the CICS environment and reduce the skills that are needed by CICS system programmers and application developers. The CICS product team also fosters and maintains relationships with many software companies who provide tools for CICS. The Beta program is an excellent example where IBM and business partners worked together to ensure that many of the tools provided support for CICS TS 4.2 when it was made generally available. The CICS strategy also includes reaching out to new customers in emerging geographies.

CICS product directions

- **Hardware Exploitation**
 - Faster z196 instruction sets
 - Enabling large CICS Regions
 - 64-bit addressing
 - Multi-threading and n-way CP exploitation
 - Hybrid exploitation
- **Modern application platform**
 - Further SOA enhancements
 - Exploitation of CICS multi-threaded JVM
 - Maturing of New programming architectures
 - Event-based processing
 - Web 2.0 (RESTful, WOA...)
 - Dynamic and situational applications
- **Robustness, performance, scalability, cost, governance**
- **Skills and expertise challenges**
 - Application and system programmer productivity

The CICS product team continues to look at ways to exploit the enhancements in the underlying hardware. In this release, some CICS facilities such as the Java environment, make use of the new faster z196 instruction sets. You can also have larger CICS regions through 64-bit addressing and multithreading across many processors. CICS is also a modern application platform and continues to deliver enhancements for service-oriented architecture, a new JVM environment, and enhancements to event processing, Web 2.0 support, and dynamic applications.

CICS also continues to provide robustness, performance, scalability, cost, and governance to make the product attractive for running workloads. By providing simplification and tools such as the CICS Explorer™, the CICS product team are trying to address some of the challenges around skills, and make application developers and system programmers as productive as possible.

CICS TS availability and service dates

- **CICS TS V3.1 and V3.2**
 - In service **until at least** Sept 2013
- **CICS TS V4.1**
 - In service since 26 June 2009
- **CICS TS V4.2**
 - Announced and Open beta on 5 April 2011
 - In service since 24 June 2011
 - System requirements
 - z/OS 1.11, or later
 - IBM 64-bit SDK for z/OS, Java Technology Edition V6.0.1, or later
 - Hardware as per z/OS 1.11
 - Workloads can take advantage of coupling facility, zAAP, cryptography
 - Java workloads can take advantage of new z196 instruction set
 - Further details - www.ibm.com/support/docview.wss?uid=swg27020857
 - Support by ISV products - www.ibm.com/software/http/cics/partners.html



The current in-service releases of CICS are listed here. CICS TS Version 3 is in service until at least September 2013. CICS TS Version 4.1 has been in service since June 26th 2009. CICS TS Version 4.2 was announced on April 5th 2011. An open beta was also made available. The final product was made available on June 24th 2011. This release requires z/OS Version 1.11 or later.

If you use Java, you will need the IBM 64-bit SDK for z/OS, Java Technology Edition, Version 6.0.1 or later. Java is required for the web services assistants, XML assistants, web services validation, web services security, Java applications, and dynamic scripting feature pack. CICS requires no special hardware requirements. However, CICS workloads can take advantage of the coupling facility, zAAP offloading, and cryptography services. Java workloads can also take advantage of the new z196 instruction set. For further information about the system requirements, including other IBM products that work with CICS TS 4.2, see the IBM website. The business partner products that support CICS TS 4.2 are also published on the IBM website.

CICS TS 4.2 key enhancements

Events



- **System events**
- **Assured events**
- **Life cycle management**

Management



- **Transaction tracking**
- **Workload management**
- **Password phrases**

- **64-bit applications**
- **Multithreaded server**
- **OSGi management**

Java



- **More threadsafety**
- **Optimized threadsafety**
- **64-bit exploitation**

Scalability



Connectivity



- **Axis2 Web Services**
- **Web Services Offload**
- **HTTP & IP Extensions**

A smarter transaction processing experience

The enhancements to CICS TS 4.2 are split into five themes to deliver a smart transaction processing experience: Events, Connectivity, Java, Management, and Scalability.



Events

[System events](#) [Additional data types](#)

[Assured event emission](#) [TSQ EP adapter XML format](#)

[EPADAPTER resource](#) [Capture specification improvements](#)

[Search facility](#) [Event capture from Atom support and WebSphere MQ DPL bridge](#)

Event processing was introduced in CICS TS 4.1. The enhancements in CICS TS 4.2 provide a richer and more flexible event processing experience. These enhancements are summarized here and more information is provided in the event processing IBM Education Assistant modules. Select any of the links on this slide to read more in the CICS Information Center.

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 mins over
SLA



Action: Phone
customer to
rearrange delivery

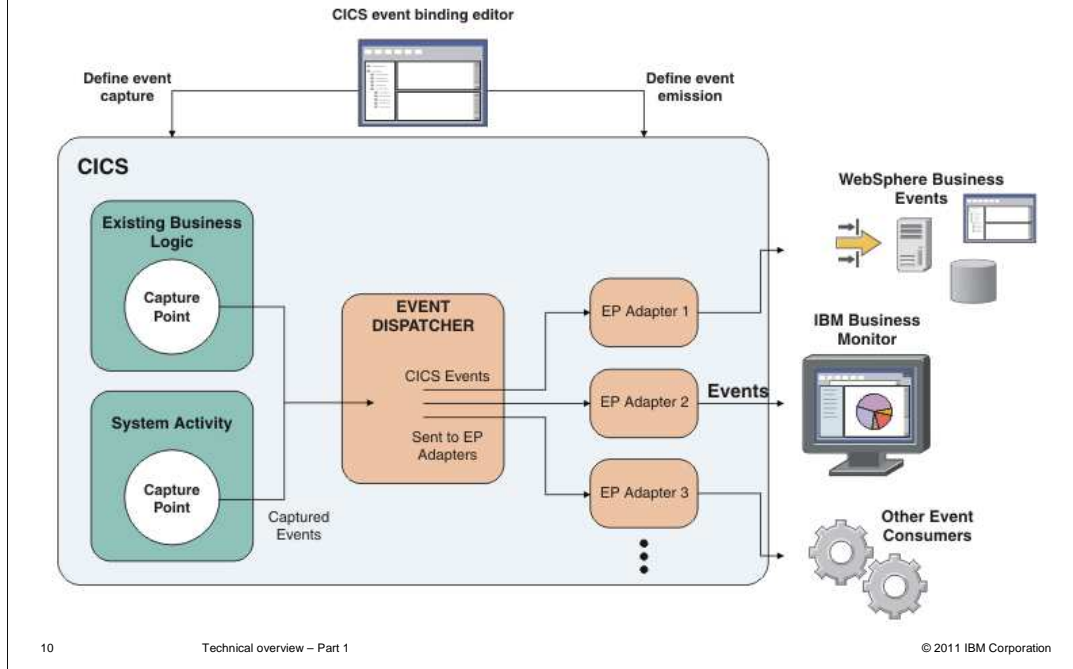
Business event processing is about capturing information to gain an insight into your business and then taking an action based on that information. Here are three examples of how capturing an event and providing some business context can help businesses respond quickly.

CICS and business events

- **Event processing addresses the need for agility**
 - Modern businesses must react quickly to circumstances
 - Decision makers need reliable, timely information
- **CICS systems run an enormous amount of existing business logic**
- **With an event-based approach**
 - Potential to gain insight into the processing in CICS
 - Introduce additional extensions to applications
- **CICS TS V4.1 allows you to emit business events from existing applications**
 - Supporting changing corporate policies
 - Without the need to change the applications
 - In a dynamic, decoupled fashion
 - And driving your choice of destination
 - WebSphere® Business Monitor
 - WebSphere Business Events
 - CICS application
 - WebSphere MQ

Events are valuable to enterprise systems, providing the ability to respond in real-time, or near real-time. Given the considerable amount of business processing which is carried out in CICS systems across the world (over 30 billion transactions a day), CICS is a very significant source of business events. This can provide enhanced business flexibility and the ability to meet governance and compliance regulations. Event emission is asynchronous to the emitting application, and the consumption of the event is decoupled from its originator. CICS TS can emit simple, single events. These events can be consumed by a “complex event processing” engine where they can be combined with events from other sources in addition to CICS. They can be sent to a Business Monitor to provide insight into processing within CICS.

CICS TS Version 4 event processing



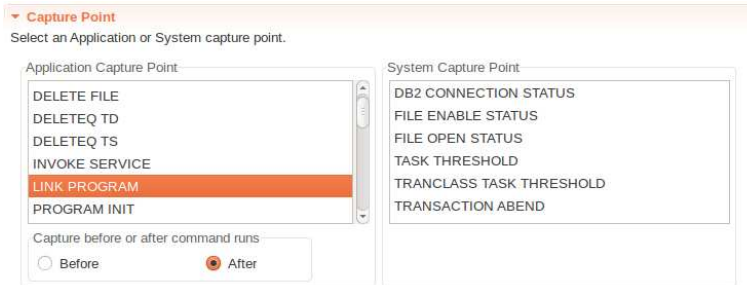
This diagram shows the end-to-end event processing. Events are defined in the event binding editor in CICS Explorer. You define what event to capture and which emission mode to use. You deploy the event to CICS where events are captured from existing application business logic or system activity. The event is dispatched and emitted through one or more adapter to an event consumer. CICS events can be consumed by a variety of products, including IBM WebSphere Business Events and IBM Business Monitor, your own CICS transaction, or you can write your own custom adapters.

Capturing events in the event binding editor

- CICS commands that are enabled for events
 - Program control: LINK PROGRAM, RETURN, INVOKE SERVICE, START, XCTL
 - File: DELETE FILE, WRITE FILE, READ, REWRITE, READNEXT, READPREV
 - Terminal: RETRIEVE, CONVERSE, RECEIVE, RECEIVE MAP, SEND, SEND TEXT
 - TS and TD: READQ, WRITEQ, DELETEQ
 - SIGNAL EVENT
 - Very flexible application event enablement
 - Small program change
 - WEB READ/READNEXT
 - PUT CONTAINER

- Program initialization
 - PROGRAM INT

- New system events



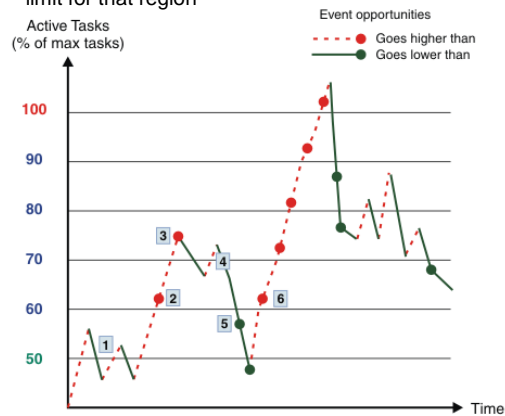
You can capture events on a selection of the CICS API commands, as listed here. These events are emitted without needing to change any application code. You can change your application to explicitly emit an event using the SIGNAL event command. In CICS TS 4.2, you can also capture system events.

Capturing system events

- DB2® connection status changes
- FILE enable status changes
- FILE open status changes
- Unhandled transaction abends
- Current active tasks
 - In a region, go above or below a specified percentage of maximum tasks (MXT)
 - For a TRANCLASS, go above or below a specified percentage of maximum active (MAXACTIVE)
 - Events captured only when the number of active tasks crosses a threshold boundary
 - Prevents event flooding when workloads flip-flop across a threshold

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

- Start an additional cloned CICS region if the number of tasks goes above 90% of maxtasks limit for that region



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System events are emitted when certain changes or conditions arise in the system. For example, you can emit events when a DB2 connection status changes, the state of FILE resources change, or unhandled transaction abends occur. You can also emit events based on the active tasks in the region; for example, if a region goes above or below the maximum number of tasks or a specified percentage. These events are captured only when the number of active tasks crosses a threshold boundary. To avoid flooding the system with events when a boundary is repeatedly crossed, CICS emits an event on the first occurrence. Another threshold boundary must be crossed to emit another event, as shown in the diagram. Examples of an action that you can take following a system event might involve starting an additional CICS region if the number of tasks exceeds 90% of the maximum number of permitted tasks.

Filtering events

- 3 types of filters you can use to determine an event occurred

Filters on the event context

Filters on the event options for this event type

Filters on the application data

Each application data includes variable, structure, file

Location	Container	Offset	Length	Precision	Operator	Value	Variable	Structure	File
FROM		53	4	0	Less Than	0024	WS-IN-STOCK		
FROM		57	3	0	Equals	000	WS-ON-ORDER		

You can use three filters in the capture specification to ensure an event is emitted only when needed. You can filter on the event context, for example the transaction ID and program name. You can filter on the event options for this event type; for example for an event that is emitted when an application writes to a file, you might filter on the name of the FILE resource. By including information about the structure of your application data, you can filter against the data, for example in containers or file records, to only emit events when certain values occur.

Enriching the event binding

Custom information to be emitted for this event

Name	Type	Length	Precision	Description
Program_name	Text	8	0	Program Name
Item_ref	Numeric	4	0	Item reference num
Item_description	Text	40	0	Item description in
in_stock	Numeric	4	0	Current number of
on_order	Numeric	3	0	Number of items or

Where to extract the information from at capture time

New floating point and zoned data types

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You can also specify what information is included in the event; for example you might want to include some customer information that provides additional information to the receiver of the event. To do this, you have to specify where to extract the information from at the point when the event is captured. In CICS TS 4.2, you have some additional options on what type of data can be included (floating point and zoned data types).

Event formatting and routing

- Separate event processing adapter
- Choice of adapters to emit events
 - WebSphere message queue
 - HTTP and HTTPS
 - Transaction start
 - Temporary storage queue
 - Custom
- Choice of formatting options
 - Binary and XML options
- Event emission modes
 - Sync emission mode enables formatting and emission in unit of work of capturing transaction
 - Transaction mode – event emitted if capturing unit of work completes successfully

ExamplesTSQAdapter.epadapter

Adapter

General Information
Describe the EP Adapter
Description EPAdapter for Catalog Sample

Adapter
Choose the adapter and settings to emit events.
Adapter TS Queue
Emits events to a named CICS TS queue. Use this EP adapter to validate that the correct events are being captured with the correct data and to emit events to any consumer that reads from a TS queue.

Queue Name CATMAN
System ID (Optional) Use Local System
Use Auxiliary Temporary Storage
Data Format CICS Flattened Event (Binary)

Advanced Options
These optional dispatcher settings are for advanced users.
Emission Mode Async Sync
Dispatch Priority Normal
Transaction ID
User ID Use Context User Id
Events are Transactional

Adapter

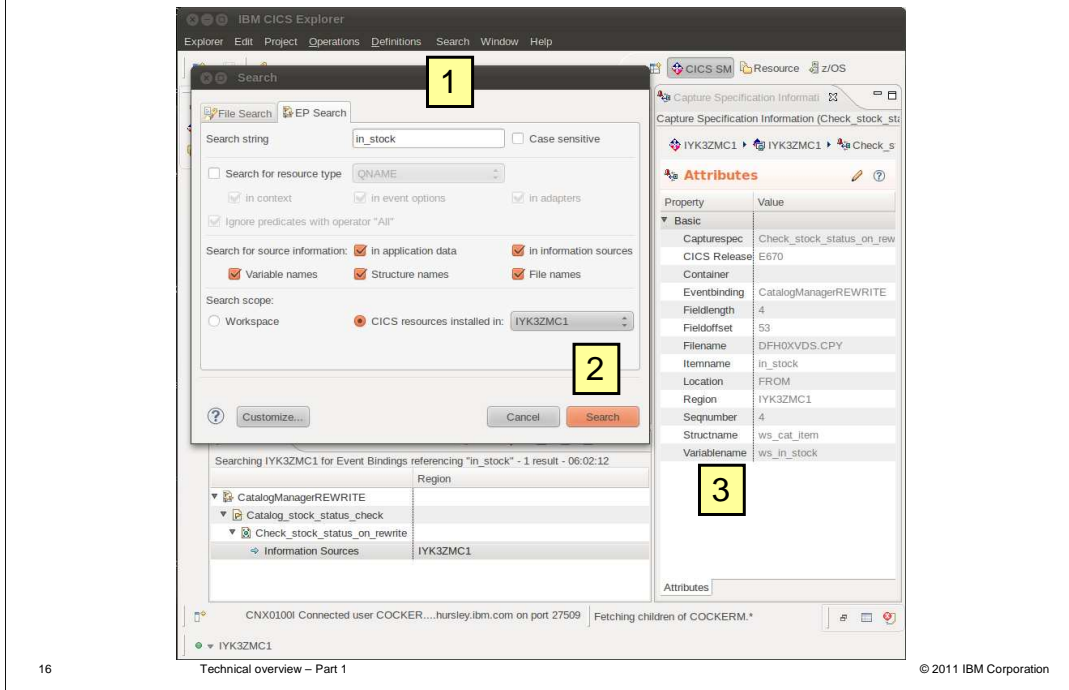
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The event processing adapter is now separate from the event binding. You have a choice of which adapter to use to emit events. You can choose WebSphere MQ, HTTP, transaction start, temporary storage queue, or provide your own custom adapter. You can also select the format of the event – both XML and binary options are available. Pick the option that is suitable for your event consumer. The event emission mode determines whether the capturing unit of work is dependent on the emission of the event. The default value is asynchronous. If you use the Sync option and the event emission fails, the capturing unit-of-work is rolled back at the next sync point. The transaction mode determines if the event is dependent on the capturing unit of work. Transactional events are emitted only when the capturing unit of work completes successfully. If you want events to be synchronous and transactional, you must select an EP adapter that uses recoverable resources; for example, WebSphere MQ.

Searching in CICS Explorer



To understand the impact of application changes on events, you can use the EP search in CICS Explorer. Use the Search option in the CICS Explorer menu to open the search dialog box. Enter the name of the artifact that you are changing, for example, a program name, copybook, or file name. Select the resource type of the artifact if applicable. Optionally, you use the source information to control which parts of event bindings are searched. You can scope your search to select event bindings in the CICS Explorer workspace or event bindings that are installed in CICS regions to which the Explorer is connected. Click the Search button to run the search. The search results tell you which event bindings might be affected. When using the Import from Structure option in the Event Binding Editor, details of the copybook, structure name, and field name are saved in the event binding. The search understands the semantics of capture specifications to return the right results.

CICS TS 4.2 event updates summary

- New system events
- More data types supported for filter and capture
- Separate event processing adapters
- Event processing search
- Synchronous emission mode

In summary, CICS TS 4.2 has introduced system events to capture information about what is happening in the CICS system. The capture specifications have been enhanced to allow you to filter or capture more data types from your applications. The event processing adapters are now separate and represented as a new resource type in CICS. The CICS Explorer has been enhanced to search across your event bindings and capture specifications. You can use the synchronous emission mode to ensure that an event is emitted. For more information about event processing enhancements, see the education modules on events.



Connectivity

[Support for Java-based Axis2 web services pipeline](#)

[Support for web services discovery](#)

[HTTP connection management](#)

[IPIC support for function shipping](#)

[Recovery support for WebSphere MQ](#)

[Enhancements to CICS DB2 thread use](#)

[Enhancements to Atom feeds](#)

The connectivity theme covers a range of enhancements around connecting to and from CICS using industry standards and other IBM products. These enhancements are summarized here and more information is provided in the connectivity IBM Education Assistant modules. Select any of the links on this slide to read more in the CICS Information Center.

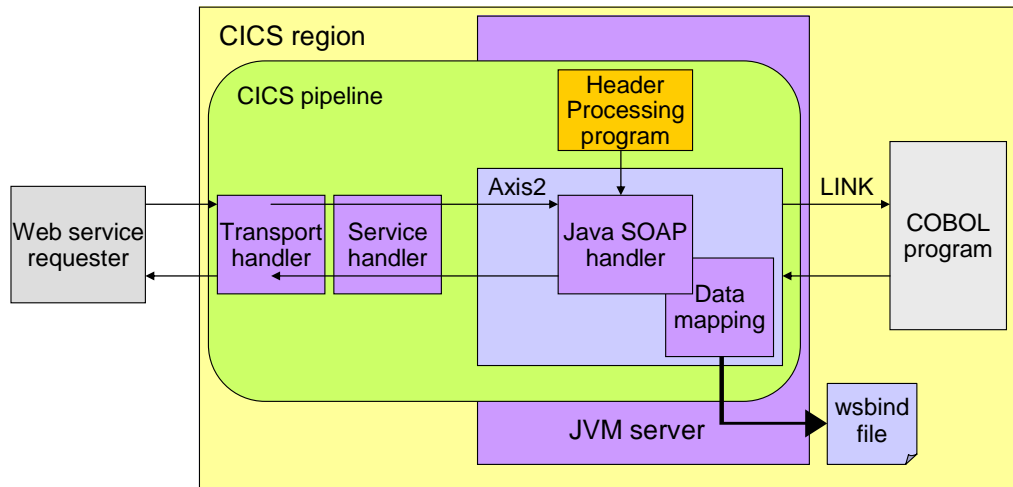
Support for Java-based Axis2 web services

- **Based on Axis2 technology**
 - Java SOAP pipeline/engine that is open source
 - Alternative to the existing CICS web services pipeline
 - Similar support to existing CICS web services pipeline
 - Provider (inbound) and requester (outbound) applications
 - WS-Addressing and MTOM/XOP
 - Runs within CICS JVM server environment
 - Can access existing CICS programs files using JCICS class library
- **Advantages of using Axis2**
 - XML parsing and conversion can off-loaded to zAAP
 - No need to use DFHWS2LS for top-down (wsdl to COBOL) mappings
 - Java components can use Java web services interfaces such as JAX-WS
 - Ability to develop pure Java web services applications
 - Widely used in the industry
 - Note: WS-Security not available for Axis2 WS provider applications

The web services support now includes a Java-based SOAP engine called Axis2. This technology is open source and provides an alternative to the existing web services SOAP pipelines. Axis2 supports both provider and requester applications, and standards such as WS-Addressing and MTOM/XOP. Axis2 runs in a JVM server and can access existing CICS programs using the JCICS class library. The advantages of using Axis2 include offloading the parsing and conversion of XML to a zAAP. You do not have to use DFHWS2L for top-down mappings. Java components can reuse Java 6 web services interfaces such as JAX-WS. You can develop Java web service applications that are widely used in the software industry and port them to run in CICS. However, WS-Security is not available for web service providers that run in Axis2.

Java SOAP handler

- Java SOAP handler and data mappings run in JVM server
- Can use existing wsbind files from CICS tools



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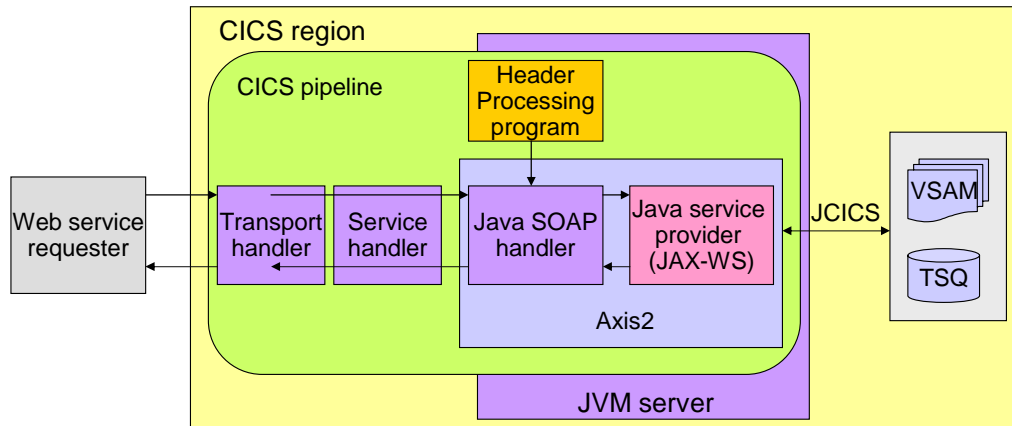
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CICS provides a Java SOAP handler and data mappings. If you add these to your pipeline configuration file, the SOAP processing runs in a JVM server. You can use existing web service bindings and link to existing applications in other languages, such as COBOL.

Axis2 POJO as a Java service provider

- Pipeline can call directly to CICS service provider applications written in Java
- Java applications/components can interact directly with the Java object model of incoming messages, rather than containers used by traditional languages
- Avoids cost of serializing to XML and parsing the XML
- Axis2 pipeline handler will already have built the object model for the message



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You can also use an application that is written in Java. This style of application can run in Axis2 and access the Java object model of SOAP messages. This avoids the cost of serializing the XML and parsing again because the Axis2 pipeline handler has already built the object model of the message.

Support for web services discovery

- **CICS allows web service requester to discover WSDL using a URI**
 - HTTP GET against ServiceURI?wsdl
 - Pipeline scan now scans pickup directory for WSDL
 - If WSDL a single document, defined using existing WSDLFILE attribute on WEBSERVICE resource
 - If multiple documents, accessed as an archive file (.zip) defined using new ARCHIVEFILE attribute on WEBSERVICE resource
 - Dynamically creates a URIMAP which can be used by a URI query
- **Can be used by WebSphere Service Registry and Repository**

CICS now provides support for discovering web services description WSDL files from a HTTP GET command using the endpoint URI appended with "?wsdl". The pipeline scan now picks up the WSDL and dynamically creates a URIMAP resource. If there is a collection of WSDL documents, the documents are accessed as an archive. This support can also be used by WebSphere Service Registry and Repository and many other web services tools and service registries.

HTTP connection management

▪ Connection throttling (inbound)

- CICS can limit number of persistent connections for a given HTTP listener
 - MAXPERSIST parameter on the TCPSERVICE definition (NO | 1-65535)
 - Once this limit is reached, no new connections accepted by the region
- Can prevent overloading of a single CICS region when used in conjunction with Port Sharing or Sysplex Distributor

▪ Connection pooling (outbound)

- CICS can cache outbound HTTP connections for reuse
 - Enables pooling of outbound connections
 - Improves performance of web applications
- Supports any HTTP client including web services or HTTP EP adapter
 - CICS web services applications
 - CICS web support applications
 - HTTP EP Adaptor
- Controlled by new SOCKETCLOSE attribute on a URIMAP
- Requires connection to be in a fit state to be placed into the pool

If multiple web clients set up long-lived persistent connections to CICS as an HTTP server and use the connections heavily, it is possible for a CICS region handling the connections to become overloaded and experience performance problems. If you experience this problem, you can set up connection throttling to make excess web clients connect to other CICS regions that share the port and provide the same service.

With connection throttling, you can set a limit on the number of persistent HTTP connections that a CICS region accepts for a particular port. If the limit is reached and further web clients send requests, CICS sends connection close headers with each response to require the new clients to close their connection. The web clients that already have persistent connections to the CICS region can maintain their persistent connections.

By default, CICS closes a client HTTP connection after a CICS application has finished using the connection, a service requester application has made a web service request and received a response, or the HTTP EP adapter has emitted a business event. When you set up connection pooling, instead of closing the connection CICS can place the connection in a pool in a dormant state. The dormant connection can be reused by the same application or by another application that connects to the same host and port. Connection pooling can provide performance benefits where multiple invocations of CICS web support applications, web services applications, or the HTTP EP adapter make connection requests to a particular host and port, or where a web services application makes multiple requests and responses.

IPIC – a reminder

- **IPIC – IP Interconnectivity Protocol**
 - Provide CICS communications support over TCP/IP as an alternative to that provided over ISC and MRO
- **TCP/IP alternative to SNA for CICS communications, to**
 - Enable network convergence and simplification
 - Address SNA skills shortage
 - Reduce cost of infrastructure
 - Take advantage of TCP/IP features on z/OS
 - Exploit high bandwidth OSA connectivity (QDIO)
- **Multi-version delivery**
 - No plans to remove existing SNA support
 - Migration of infrastructure without modification of CICS applications
 - CICS TS V4.2 provides ability to run a CICSplex® without SNA network
 - Majority of ISC and MRO functions now supported over IPIC
- **White paper IBM CICS IP interconnectivity: New features in Version 4.2**
<http://www.ibm.com/software/htp/cics/tserver/v42/library/index5.htm>

IP interconnectivity, referred to as IPIC, provides CICS communications support over TCP/IP as an alternative to using intersystem communication and multi-region operation. IPIC is an alternative to using SNA for CICS communication and addresses the shortage in SNA skills. It also enables businesses to simplify their networks and reduce costs in infrastructure. IPIC can also use the TCP/IP features available in z/OS and exploit high bandwidth OSA connectivity. IPIC has been delivered over multiple releases of CICS while still continuing to support SNA. Now CICS TS 4.2 provides support for running a CICSplex without using SNA. The majority of functions are now supported over IPIC. For more information, read the connectivity white paper on the IBM website.

IPIC support for function shipping

- **IPIC function shipping**
 - Transient data
 - Temporary storage
 - File control
- **When to use**
 - Use MRO if regions in same sysplex
 - Otherwise use IPIC
- **Improved performance**
 - Threadsafe IPIC mirror to relieve QR contention
 - DPL
 - Function shipping TS and FC (not TD)
 - MIRRORLIFE attribute on IPCONN resource

Capability	V3.2	V4.1	V4.2
ECl requests	Yes	Yes	Yes
3270 transaction routing	No	Yes	Yes
STARTs	No	Yes	Yes
DPL	Yes	Yes	Yes
Function shipping	No	No	Yes
CICSplex SM SYSLINKs	No	Yes	Yes

In CICS TS 4.2, you can now use IPIC for function shipping. It is best to use IPIC to connect to regions outside the sysplex and use MRO to connect regions in a sysplex.

Recovery support for WebSphere MQ

- **Support for WebSphere MQ Group units of work recovery**
 - CICS TS 4.1 introduced support for WebSphere MQ group attach
 - However, if CICS has any outstanding UOWs with the WebSphere MQ server, need to reconnect to that specific server to resolve them
 - Can now attach to any local server in the queue sharing group and have it resolve outstanding UOWs
 - This option can be used only when running a release of WebSphere MQ that supports group unit of recovery for CICS
 - GROUPUR attribute has been enabled in the WebSphere MQ queue managers
- **Updated CICS-WebSphere MQ Adapter to support WebSphere MQ V7**
 - Supports 12 new MQ V7 API commands for message properties, publish subscribe, and asynchronous consume
 - Also available for CICS TS 3.2 and 4.1

CICS TS 4.1 introduced support for WebSphere MQ group attach. However, any outstanding units of work with the WebSphere MQ server had to be resolved by reconnecting to that specific server. In CICS TS 4.2, CICS can now attach to any local WebSphere MQ server in the queue sharing group to resolve the outstanding units of work. This function requires using a release of WebSphere MQ that supports group unit of recovery for CICS.

The CICS to WebSphere MQ adapter has also been updated to support WebSphere MQ Version 7. The update includes support for twelve new API commands that are available in Version 7. This support is also available on CICS TS 3.2 and 4.1 releases.

Enhancements to DB2 thread reuse

- **Long running protected or unprotected DB2 threads**
 - Can cause buildup in the DB2 EDM pool
 - This can lead to storage constraint problems in DB2
 - May force DB2 into a “short on storage” condition
- **New REUSELIMIT attribute on the DB2CONN resource**
 - Limits the number of times a thread can be reused
 - Range of 0-10000, default 1000
 - Applies to both protected and unprotected threads
- **New PURGECYCLE lower value (5 seconds), default still 30 seconds**
- **New DB2 statistics**
 - Thread reuse limit
 - Number of times reuse limit reached (pool and entry threads)

CICS provides new facilities for you to check and limit the number of times a thread can be reused. When a thread reaches its reuse limit CICS terminates it to free up DB2 resources. Long-running CICS DB2 threads can cause resource issues in DB2, particularly in storage. You can now set a reuse limit on the DB2CONN resource definition. The new REUSELIMIT attribute of the DB2CONN resource definition specifies the maximum number of times a thread can be reused before it is terminated. This limit applies to all DB2 threads, whether they are protected or unprotected.

A value of 0 for REUSELIMIT means that no limit is placed on the number of times a thread can be reused; this is the same behavior as in previous releases. However, in CICS TS 4.2 the default has been set to a value of 1000. This change has been implemented to reduce the likelihood of DB2 storage constraint issues, while having a negligible effect on the performance of CICS applications.

You can now use the existing PURGECYCLE attribute on the DB2CONN resource definition to specify a new lower value of five seconds. The default remains the same at 30 seconds. The attribute controls how long protected threads are allowed to stay dormant awaiting reuse before being terminated. The CICS DB2 global statistics now include the maximum number of times a thread can be reused before being terminated and the number of times the reuse limit has been reached by a pool thread. The CICS DB2 resource statistics now include the number of times the reuse limit has been reached by a thread for the DB2ENTRY.

Enhancements to Atom feeds

- **Simplified deployment and administration of Atom feeds**
 - Support for creating the configuration file
- **ATOMSERVICE and XMLTRANSFORM resources can be deployed in CICS BUNDLES**
 - Appropriate URIMAP is dynamically generated
- **CICS Explorer enhancements to generate and deploy the BUNDLE**
- **Sample bundles provided with general-purpose XMLTRANSFORM resources for use in creating Atom feeds**

The CICS Explorer has been enhanced to support simplified deployment and administration of Atom feeds in CICS. The CICS Explorer provides a wizard to create an Atom configuration file, so you do not have to create or edit an XML file manually. The ATOMSERVICE and XMLTRANSFORM resources can also be deployed in a CICS bundle from the Explorer. When you install the BUNDLE resource, the appropriate URIMAP resource is dynamically generated for you. CICS includes some samples to help you get started with creating Atom feeds.

CICS TS 4.2 connectivity summary

- Support for Axis2 SOAP engine
- Discover web services
- Manage HTTP connections
- IPIC support for function shipping

In summary, CICS provides a new solution for Java web services in CICS and a way to discover web services. CICS also provides enhanced connectivity to other products such as WebSphere MQ and DB2. You can manage HTTP connections more effectively and use IPIC connections for function shipping. For a summary of enhancements in the other three themes, see part two of the technical overview.



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