



IBM CICS Transaction Server for z/OS™ V3 Highlights and V3.2 Functionality

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Notes

- The major themes of CICS® Transaction Server for z/OS® (CICS TS) V3 and new functions in CICS TS V3.2 are described in this presentation. For more details, please refer to IBM Software Announcement 207-051 and the CICS TS V3.2 Information Center, in particular the 'What's New' section (or Release Guide) available from <http://www.ibm.com/cics> then follow the links to CICS TS V3.2, then Library.
- CICS TS V3 delivers significant innovation for integration, application transformation, systems management, and architectural enhancements.
- CICS is a modern transactional application server designed to execute demanding mixed-language application workloads and to enable those applications easily to be integrated with enterprise solutions. CICS TS V3.2 provides open standards-based connectivity, enabling CICS applications to be integrated within a Service Oriented Architecture (SOA), while preserving the long-established CICS qualities of security, reliability, data integrity and optimal application responsiveness.
- CICS TS V3.2 is recommended for all CICS customers migrating from older releases.
- The general availability for CICS TS V3.2 was on June 29, 2007.



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Notes

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Agenda

- **CICS Transaction Server V3**
 - Strategy and values

- **CICS TS V3.2**
 - Application connectivity
 - Application reuse
 - Service management
 - Architectural enhancements

 - Packaging
 - Planning and migration
 - CICS On-Demand Seminars

- **Summary**

Notes

This presentation gives some background to the strategy for version 3 of CICS Transaction Server, and explains the four main themes for this version.

CICS TS version 3 delivers:

- Services to easily develop applications that exploit new technology by building on CICS skills
- Efficient and optimized runtime for the extension and reuse of existing CICS applications
- First class management and support of mixed application types and workloads

CICS® Transaction Server for z/OS® V3.2 introduces a range of major enhancements which fall into those main areas, and we'll take a look at those enhancements in some more detail. The presentation also covers packaging and migration for CICS TS 3.2.

What's on the Minds of 450 of the World's Leading CEOs



CEO needs

- **Revenue growth** with cost containment
- Key competency: **responsiveness**
- Critical success factor: enable **effectiveness of people**

Source: CEO Study of 456 WW CEOs IBM Corporation - Feb 2004



CIO challenges

- **Aligning IT and business goals** to grow revenue and contain costs
- **Building responsiveness and agility into the organization through IT**
- **How can IT help** enable people and teams to be more effective

Source: Operating Environment Market Drivers Study, IBM Corp. 2004

Common focus on flexibility and simplification

Notes

IBM has carried out primary research to understand the needs of our customers...

CEO Needs:

- IBM conducted a survey to find out what was on the minds of CEOs. The study — the first of its kind ever done by IBM — was conducted by BCS's Strategy & Change practice and Institute for Business Value, together with The Economist and Nikkei Research. Over 450 CEOs participated.
- The study revealed that growth is a top concern among CEOs; it also found the people are a top priority, they feel that their organizations are too rigid; that China is a key market, and that they need to accomplish the 'transformation' to achieve this in the next 5 years.

CIO's Challenge:

- Information from the OE Market Drivers study shows the challenges that CIOs are trying to address daily

From CEOs: “Now It Is About Growing The Top Line While Keeping The Bottom Line In Check.”

Source: CEO Study of 456 Global CEOs , IBM Corporation, Feb 2004

IT Imperatives

Support the growth agenda –
Improve flexibility and
responsiveness

Keep costs in check – Do
more with less

Driving Need to 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**



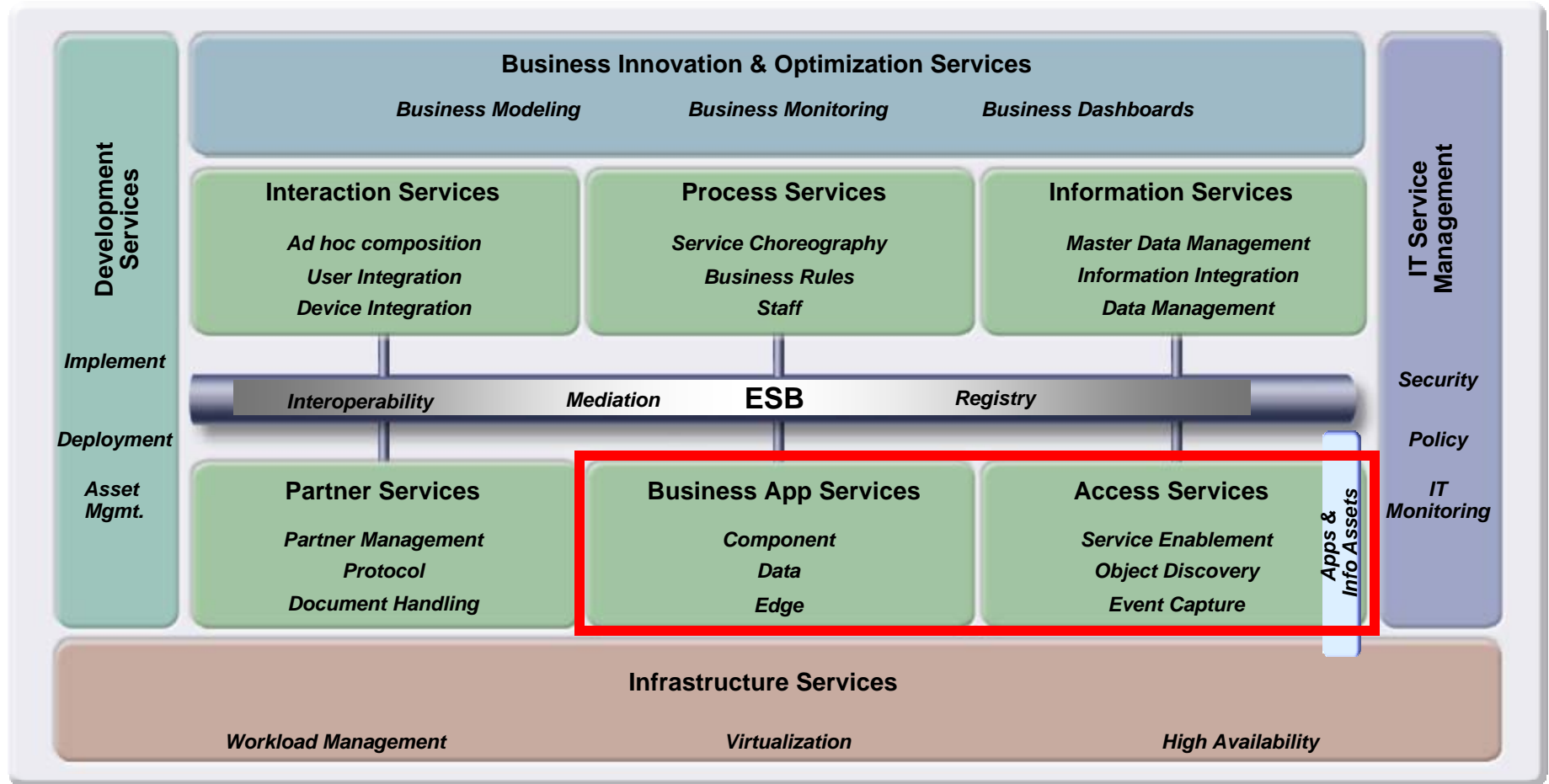
“By exploiting the next generation of integration tools, enterprises can **liberate decades' worth of legacy value.**”

InfoWorld: Tapping Into Big Iron, Eric Knorr, March 29, 2004

Notes

- IT Imperatives are towards supporting growth by improving the ability to respond and change quickly, and also towards controlling costs. This is driving the need to transform existing applications, to make them available in new ways while exploiting existing skills and resources.
- Customers are looking to redefine their applications quickly and effectively to meet their business demands. There is a need for rapid business process adaptation and reshaping. Application maintenance consuming 60-80% of IT budgets and staff turnover or retirement lessens individual programmer familiarity with existing systems, so application maintenance efficiency is a key driver.
- There is also a need to meet increasing development workloads. The growth in complexity of development platforms and integration needs will require organizations to adopt efficient development paradigms in place of code-centric development practices, and to make existing applications available for new uses. They need better tooling to deliver more effective and efficient development processes.
- The industry adoption and proliferation of Web Services capabilities into development platforms and tools are making it easier for companies to adopt a service-based development approach. The need for richer than HTML experiences and disconnected operations will lead most companies to adopt multiple user interfaces delivery architectures.
- Because of recent pressures for cost reductions and market demand for better processes, we expect continued pressure from business executives to switch to new, business-differentiating activities. There will be a continued strong drive from business for process improvements.

Service Oriented Architecture at the Core of A Flexible IT Environment and the transformation of existing applications



Notes

The figure shows the SOA Reference Architecture.

- Looking at a Service Orientated Architecture (SOA) from a business perspective, SOA is a set of business, process, organizational, governance and technical methods to reduce or eliminate frustrations with IT, quantifiably measure IT's business value and create an agile business environment for competitive advantage.
- From a technical perspective, SOA is a way for different computers, from different vendors, with different programs, from different functional areas of the business (or externally to customers, suppliers or vendors) to intelligently talk and exchange data with each other.
- The key to an On Demand Enterprise is to employ flexible business models, implemented through composable processes which in turn call composable services. At the heart of the SOA architecture are the building blocks of Development, Infrastructure and Management.
- The strategy for CICS TS V3 is to deliver a set of capabilities to allow your valuable CICS applications to evolve to participate in flexible business models. This is consistent with IBM's continued investment in the mainframe and joins with the latest versions of WebSphere, DB2, and IMS, in enabling companies to deploy Web Services to benefit from a service oriented architecture based on standards.
- The focus of CICS TS V3.2 is to align with the building blocks of a Service Orientated Architecture, and to deliver a set of capabilities which provide customer value by enabling business flexibility through IT simplification. The SOA building blocks align to the strategy and values of CICS Transaction Server V3; application integration, application reuse, service management, and architectural enhancements.

CICS Transaction Server V3 values

Application Connectivity

Enables extending existing applications beyond their original designs to support integrated business processes via standard APIs and protocols

Application Reuse

Enables the creation of components from existing applications which are more flexible & configurable for use in new applications.

Service Management

Enables effective management of large runtime configurations via modern user interfaces, so that demanding service level and IT governance objectives can be met

Architectural Enhancements

Relieves constraints on processing, configuration or data capacities to allow for continued application and system growth

Notes

- CICS Transaction Server for z/OS® is a modern transactional application server designed to execute demanding mixed-language application workloads, and to enable those applications easily to be integrated with enterprise solutions.
- We have introduced features and enhancements within the three themes of CICS TS Version 3 of Application connectivity, Application Reuse and Service Management plus some architectural enhancements.
- CICS Transaction Server for z/OS (CICS TS) V3.2 provides open standards-based connectivity, enabling CICS applications to be integrated within a service-oriented architecture (SOA), while preserving the long-established CICS qualities of security, reliability, data integrity, and optimal application responsiveness.

CICS TS V3 highlights

	Application connectivity	Application reuse	Service management
CICS TS V3.1 March 2005	<ul style="list-style-type: none"> Web services and the CICS Web services assistant HTTP/1.1 including outbound API and URIMAPs Transport Layer Security, 256-bit encryption, and improved SSL V3 	<ul style="list-style-type: none"> Containers and channels Language support enhancements Architectural patterns CICS Service Flow Feature Information Center 	<ul style="list-style-type: none"> Open Transaction Environment for all thread safe applications XPLink for C & C++ programs Thread safe WEB commands CICSplex SM Web User Interface including user favourites, group profiles, and 2 column views Batchrep callable via the Web User Interface
CICS TS V3.2 June 2007	<ul style="list-style-type: none"> Maturing Web Services and SOAP standards Wider support of other payload format (XOP & MTOM) Conforming with WSDL 2.0 Optimization of the HTTP Transport to give better performance, robustness and manageability Delivering a consistent approach between CICS systems for an IP environment. 	<ul style="list-style-type: none"> Exploitation of 64-bit storage for channels and containers More extensive Web Services support for COBOL data types Java Enhancements Service Flow Feature 	<ul style="list-style-type: none"> Enterprise wide workload management – ARM correlator CICSplex SM Integrated install and definition & CICSplex SM WUI enhancements JDK 1.4.2 JVM management and PD improvements Continued enhancements to OTE enabling some File Control configurations and the MQ Bridge Adapter Remove capacity restraints relating to Data

Notes

The major new features in CICS TS V3.1 and V3.2 are summarised on the slide

CICS application connectivity

- New bidirectional Web services capabilities were provided in CICS TS V3.1, and matured in V3.2 with support for recent standards, interoperability profiles, and the ability to send large amounts of binary data efficiently. The Web Services Assistant was introduced in V3.1 to ensure easy transformation of existing CICS applications to Web services. The ability to interconnect CICS regions over TCP/IP for Distributed Program Link (DPL) allows exploitation of System z™ IP networking, and provides an alternative to Systems Network Architecture (SNA). All CICS IP Interconnectivity workloads benefit from simple and robust systems and workload management facilities.

CICS application reuse

- CICS TS V3.1 provides an easy and flexible mechanism for exchanging large volumes of data between CICS programs: channels and containers. This removes constraints imposed by COMMAREA mechanism, and is especially targeted at large volumes of structured data (e.g. XML). Applications in CICS TS V3.2 will automatically utilize 64-bit storage for data held in containers, providing for improved scalability and performance. Enhancements to the efficiency of deploying Web services into CICS TS 3.2 include handling a wider range of programming language and XML data types and attributes, and improvements to performance and diagnostics. The CICS integrated translator will be supported by the z/OS XL C/C++ compiler, delivering more comprehensive development and debug capabilities. The CICS Service Flow Feature is an optional no charge feature which provides tooling and runtimes to create CICS business service flows by composition of CICS applications.

CICS service management

- CICSplex® SM is an integral part of CICS TS V3, and reduces the complexity of managing multiple CICS regions. An easy-to-use Web User Interface is provided. In V3.2, the Web User Interface has new help and map capabilities and usability enhancements. Further threadsafe capabilities are provided in CICS TS V3, offering performance benefits to appropriate applications. V3.1 introduces XPLINK support for higher performance with C/C++. LE-enabled assembler is also supported. In V3.2, online management of program libraries makes it easier to maintain continuous system availability while bringing new or changed applications into production. Support for Enterprise Workload Manager (EWLM) makes possible end-to-end workload monitoring in heterogeneous environments. There is improved management of Java™ workloads.

CICS architectural enhancements

- IN CCIS TS V3.2, Larger amounts of data can now be stored in shared data tables (>2 GB) and VSAM entry sequenced data set (ESDS) files (>4 GB). Improvements to monitoring and statistics facilities include more precise timing data and compression of monitoring records. The default internal trace table size has been increased for better problem diagnosis. The limit on the number of CICS regions supported in a sysplex is increased by enabling a CICS region to join a named XCF group.

CICS Transaction Server V3.2

- **Application connectivity**
 - Web services standards, interoperability profiles, large messages, and data mapping
 - Intercommunications over TCPIP
 - HTTP and TCP/IP management and performance

- **Application reuse**
 - 64-bit storage for CONTAINER data
 - CICS integrated translator support for C and C++
 - Java enhancements

- **Service management**
 - On-line management of program libraries
 - Enterprise Workload Manager
 - CICSplex SM Web User Interface help, usability, and MAP support
 - CICSplex SM and CICS-WMQ adapter installation and management

- **Architectural enhancements**
 - Capacity of VSAM ESDS files >4GB, shared data tables >2GB, CICS regions in a Sysplex
 - Trace, monitoring and statistics
 - Threadsafe core APIs for accessing VSAM files, journals, WebSphere MQ

Notes

Going into detail of the function provided in each area, we'll start by looking at new capabilities that are provided in the area of Application Connectivity, which include:

- Support of Web services standards and interoperability profiles, and handling of large messages and data mapping.
- Exploitation of System z IP networking. IP intercommunications options reduce SNA dependency as part of a move towards IP for CICS interconnectivity, starting with DPL. As part of this support, a simple-to-use management capability for TCP/IP workloads in CICS is provided.
- Enhancements to CICS Web support, which continues to deliver high performing and compliant HTTP transport in order that Web services flows are processed efficiently.

CICS TS V3 support of external standards (1 of 2)

■ XML

- Extensible Markup Language Version 1.0 (3.1 & 3.2)
- XML Encryption Syntax and Processing (3.1 APAR & 3.2)
- XML-Signature Syntax and Processing (3.1 APAR & 3.2)
- XML-binary Optimized Packaging (XOP) (3.2)

■ Profiles

- WS-I Simple SOAP Binding Profile Version 1.0 (3.2)
- WS-I Basic Profile Version 1.1 (3.2)

Notes

CICS version 3 Web services support is bi-directional, allowing existing applications to be exposed as Web services, and also allowing development of CICS applications which are consumers of Web services. An important aspect of this is support for Web services standards. This and the following slide lists the standards supported by CICS.

XML standards and the Web Services Interoperability organisation's specifications for Basic Profile and Simple SOAP Binding Profile are supported.

CICS TS V3 support of external standards (2 of 2)

- **SOAP**

- SOAP 1.1 and 1.2
- SOAP 1.1 Binding for MTOM 1.0
- SOAP Message Transmission Optimization Mechanism (MTOM)
- Web Services Security: SOAP Message Security

- **Web services**

- Web Services Atomic Transaction Version 1.0
- Web Services Coordination Version 1.0
- Web Services Trust

- WSDL (Web Services Description Language) Version 1.1
- WSDL 1.1 Binding Extension for SOAP 1.2
- WSDL Version 2.0

Notes

SOAP 1.1 and 1.2, and a number of other SOAP standards are supported.

The Web services and Web Services Description Language (WSDL) standards that are supported are listed on the slide.

WebSphere Developer for System z (WDz) provides support for CICS Web services applications.

CICS Web services assistant (1 of 2)

■ New options

- MAPPING-LEVEL={1.0, 1.1, 1.2, 2.0}
 - Level of mapping that the CWSA should use when generating the Web service binding file and Web service description or language structure
- MINIMUM-RUNTIME-LEVEL={MINIMUM, 1.0, 1.1, 1.2, 2.0, CURRENT}
 - Minimum CICS runtime environment that the Web service binding file can be deployed into
- CCSID
 - Specifies the CCSID to be used at runtime
- TRANSACTION
 - In a service provider, specifies the name of an alias TRANID
- USERID
 - In a service provider, specifies a user ID which can be used by any client

Notes

The CICS Web Services Assistants provide for conversion between high-level language structures (such as a Cobol data structure), and Web services descriptions. Enhanced support is provided in CICS TS 3.2, with an extended range of data types being supported. The mapping level indicates the level of mapping support to be used, while other options can be declared in the metadata rather than requiring handlers to be written.

CCSID is the CCSID that is used at run time to encode character data in the application data structure.

Transaction gives the transaction under which the requests is run. By default, HTTP requests use CPIH and MQ requests use CPIQ. This can be overridden on the URI map or the bind file.

Userid can be specified to override the CICS default userid.

CICS Web services assistant (2 of 2)

- **Mapping level (retrofitted to CICS TS V3.1 via the service channel)**
 - 1.0
 - CICS TS V3.1 base level
 - 1.1
 - Variable length binary data mapped to container
 - XML schema list and union types mapped to character arrays
 - Other character and binary data mappings to containers depending on data length
 - 1.2
 - Character and binary data of more than 32,767 bytes mapped to a container
 - CHAR-VARYING, CHAR-VARYING-LIMIT
 - CHAR-MULTIPLIER
 - DEFAULT-CHAR-MAXLENGTH
 - Support for:
 - Multiple variable length mappings
 - COMP-1 (float), COMP-2 (double)
 - LEVEL 88 toleration
 - Base64binary data mapped to a field in the language structure
 - Improved messages in the event of conversion errors
 - 2.0
 - Currently the same as level 1.2

Notes

This slide shows the various mapping levels and what is supported in each.

Each mapping level builds on the previous one. We have introduced support for additional language data types and XML data types in response to customer demand, and will continue to do so.

Mapping levels 1.1 and 1.2 were made available for CICS TS V3.1 via PTFs, and 2.0 is the CICS TS 3.2 base level.

Support for binary attachments (1 of 3)

- **In standard SOAP messages:**
 - Binary objects are base64 encoded
 - Included in the message body
 - Can significantly increase message size, impacting transmission time and latency

- **MTOM/XOP provides a solution to this problem**
 - The MTOM specification
 - Defines a method for optimizing SOAP messages
 - Separates out binary data
 - Sends it in separate binary attachments using a MIME Multipart/Related message
 - The XOP specification
 - Defines an implementation for optimizing XML messages
 - Uses binary attachments in a packaging format
 - > Includes but is not limited to MIME messages

Notes

In standard SOAP messages, binary objects are base64 encoded and included in the message body. This encoding significantly increases the message size, and for very large binary objects (such as might be used for images or sound files), this can impact transmission time. The entire message also needs to be parsed. Implementing MTOM/XOP provides a solution to this problem.

The SOAP Message Transmission Optimization Mechanism (MTOM) and XML-binary Optimized Packaging (XOP) specifications, often referred to together as MTOM/XOP, define a method for optimizing the transmission of large binary data objects within SOAP messages.

The MTOM specification conceptually defines a method for optimizing SOAP messages by separating out binary data (which would otherwise be base64 encoded), and sending it in separate binary attachments using a MIME (Multipurpose Internet Mail Extensions) Multipart/Related message. This type of MIME message is called an *MTOM message*. This optimizes both transmission and parsing efficiency.

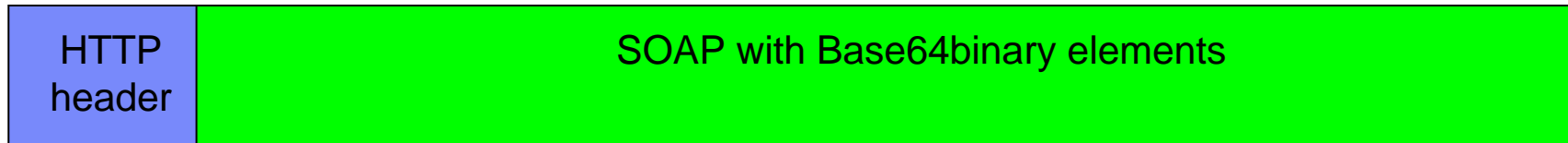
The XOP specification defines an implementation for optimizing XML messages using binary attachments, in a packaging format that includes but is not limited to MIME messages.

The attachments are encoded in binary format and the XML in the SOAP message is then converted to XOP format by replacing the base64binary data with a special `<xop:Include>` element that references the relevant MIME attachment using a URI.

Support for Binary Attachments (2 of 3)

- **Standard SOAP message:**

- Showing binary objects base64 encoded in the message body



- **MTOM/XOP message:**

- Showing binary elements separated out (*not to scale*)



Notes

This attempts to illustrate the difference between a standard SOAP message with a binary object included as base64 encoded data in the message body, and an MTOM/XOP message in which binary objects are packaged as binary data in separate MIME attachments

Support for binary attachments (3 of 3)

- **CICS implements MTOM/XOP support**
 - in both the requester and provider pipelines
- **New modes of operation in the pipeline**
 - Direct mode
 - Binary attachments associated with an MTOM message
 - Passed in containers through the pipeline and handled directly by the application handler
 - Inbound messages
 - > Application handler passes the binary attachments to the application program without needing to perform any data conversion
 - Outbound messages
 - > XOP-enabled applications can pass binary attachments from the application program to the pipeline without any data conversion
 - Compatibility mode
 - XOP document contained in inbound MTOM messages
 - Converted into a SOAP message
 - Associated binary attachments are converted into base64binary data..
 - Outbound SOAP messages converted into MTOM message after all other processing taken place
 - Each binary object has to be converted from a base64 encoding in the pipeline
 - WS-Security and WSDL validation run with compatibility mode

Notes

CICS implements support for MTOM/XOP in both requester and provider pipelines. As an alternative to including the base64binary data directly in the SOAP message, CICS applications that are deployed as Web service providers or requesters can use this support to send and receive MTOM messages with binary attachments. You can configure this support by using additional options in the pipeline configuration file.

There are certain scenarios where CICS cannot support the XOP document format in MTOM messages directly. For example, the Web Services security functionality and Web services validation cannot parse the <xop:Include> elements in the XOP document. Therefore, two modes of support are provided in the pipeline to handle XOP documents and any associated binary attachments.

If the application handler program is capable of supporting XOP documents, such as the standard handlers that are provided when you deploy a Web service using the Web services assistant, then CICS performs XOP processing in direct mode. If you are using a different application handler in the pipeline that is not capable of handling XOP documents, all XOP processing is performed in compatibility mode.

Compatibility mode is used if you are using the Web Services Security functionality (where the original message is needed to do the security checking) or are testing with validation switched on. In such cases, all XOP processing is performed in compatibility mode even if you have specified direct mode in the pipeline configuration file. The switch to compatibility mode is done automatically by CICS,

Support for WSDL 2.0 (1 of 4)

- **WSDL 2.0 is a W3C Recommendation (26 June 2007)**
- **Mandatory requirements**
 - Only the message exchange patterns in-only, in-out, robust in-only, and in-optional-out may be used in the WSDL
 - Only one Endpoint is allowed for each Service
 - There must be at least one Operation
 - Endpoints may only be specified with a URI
 - There must be a SOAP binding
 - The XML schema type must be used
- **CICS SupportPac CA1N**
 - CICS support for WebSphere Service Registry and Repository

Notes

One of the benefits of SOA is that it allows you to specify what your services are and do, in one place. CICS support for Web Services Description Language (WSDL) 2.0 is part of an ongoing commitment to supporting this capability.

WSDL 2.0, which was finalised as a recommendation of the World Wide Web Consortium (W3C) on 26th June 2007, defines a web services description language which is both richer and simpler in its definition than the previous version, especially in the area of message exchange patterns.

The IBM WebSphere Service Registry and Repository is a metadata repository for service descriptions and related artefacts. CICS TS had day-one support for the WebSphere Service Registry and Repository via a SupportPac available for CICS TS V3.

Support for WSDL 2.0 (2 of 4)

■ CICS Web Service Assistants

- DFHLS2WS new options
 - WSDL_1.1(<HFS filename location>)
 - WSDL_2.0(<HFS filename location>)
 - SOAPVER(1.1|1.2|ALL)
 - URI parameter may now specify a relative or absolute URI

- DFHWS2LS new options
 - Automatically determines the WSDL version
 - OPERATION=*value*
 - Specifies the subset of valid operations that are required for a requestor
 - Used to limit the size of the WSBIND file
 - WSDL-SERVICE=*value*
 - Specifies the wsdl:Service element to be used when there is more than one Service element for a Binding element

Notes

The CICS Web Services Assistants have been enhanced in their support of WSDL. When generating a web service description and binding file from a language structure (using DFHLS2WS), there are options to specify the WSDL version or versions to be generated (and where in the z/OS UNIX file system the output is to be written). The SOAP version will be deduced based on the WSDL version, or can be specified explicitly, as well as allowing the URI to be relative or absolute.

When generating a language structure and web service binding from WSDL (using DFHWS2LS), the WSDL version is automatically deduced, and there are new options to select only a subset of the operations in the WSDL, and the `wsdl:Service` to be used.

Support for WSDL 2.0 (3 of 4)

▪ **Message exchange patterns supported**

- In-Only
 - CICS as the provider
 - CICS will receive a message and send no response
 - CICS as the requester
 - CICS application will send a message and expect no response
- In-out
 - CICS as the provider
 - CICS will receive a message and respond with a normal response or fault
 - CICS as the requester
 - CICS application will send a message and expect a normal response or fault

Notes

This and the next slide show the various message exchange patterns supported by CICS:

In-only : where CICS is the provider, CICS receives a message and will not return anything to the requester even if some fault occurs. CICS Web Service support puts the DFHNORESPONSE container into the SOAP handler channel to indicate that the pipeline must not send anything to the requester.

In-only : where CICS is the requester, CICS will send a message to the service provider and expect no response. The task sending the message knows that no response is to be expected, so it will not wait for one.

In-out is probably the most common exchange pattern for CICS, as it is natural behaviour for a CICS application:

In-out : where CICS is the provider, CICS will receive a message from the requester and respond with either a normal response or a fault message.

In-Out : where CICS is the requester, CICS will send a message to the service provider and receive a response, which may either be a normal response or a fault message.

All of these were already supported in CICS TS 3.1 (but not known as MEPs then), and will continue to be supported.

Support for WSDL 2.0 (4 of 4)

- **Message exchange patterns supported (continued)**
 - Robust in-only
 - CICS as the provider
 - CICS will receive a message and respond only if an error occurs
 - CICS as the requester
 - CICS application will send a message and expect a response only if an error occurs
 - > New response wait time on the PIPELINE definition
 - In-optional-out
 - CICS as the provider
 - CICS will receive a message and may respond with
 - > A normal response
 - > An error response
 - > Nothing (no response)
 - CICS as the requester
 - CICS application will send a message and expect:
 - > A normal response
 - > An error response
 - > Nothing (no response)

Notes

Robust in-only and In-optional-out are supported in CICS TS 3.2.

For **Robust in-only**, where CICS is the service provider, CICS need only respond if an error occurs. If an error occurs in the pipeline, a SOAP fault will be sent back to the requester.

For **Robust in-only**, where CICS is the service requester, CICS needs to handle the situation that a response of some sort may or may not be received. A response wait time needs to be specified to define how long CICS will wait for any possible response. A new 'respwait' parameter has been added to the PIPELINE resource. The value specified is stored in binary form in a new container called DFHWS-RESPWAIT. This allows the value to be interrogated and perhaps changed by handlers in the PIPELINE if desired. If not specified, the transport's wait time is used by default.

In-optional-out : where CICS is a service provider, with this MEP CICS will receive a message from the requester and may send a normal response, an error response or nothing back to the requester. CICS is in control of what happens, although the option which will occur is not known until runtime. The application program will need to indicate to DFHPITL that it does not intend to send a response by deleting the DFHWS-DATA container from the channel.

In-optional-out : where CICS is a service requester, it will send a message to the service provider and the provider may respond with a normal response, an error response or never respond at all. The situation is very similar to that for the robust in-only pattern where CICS is the requester, and the response wait value is also used in this situation.

CICS support of WS-Trust

- **Web Services Trust Language (or WS-Trust) specification**
- **CICS can now interoperate with a Security Token Service (STS) to validate and issue security tokens in Web services**
 - e.g. Tivoli Federated Identity Manager
- **Supports sending and receiving Web services messages that contain a wide variety of security tokens to interoperate securely with other Web services**
 - e.g. SAML assertions and Kerberos tokens
- **Configured via pipeline configuration elements within <wsse_handler>**
- **CICS can either validate or exchange the first security token or the first security token of a specific type in the message header**
 - Trust client interface can be used for detailed customisation
 - Can use the Trust client instead of the security handler or in addition to it

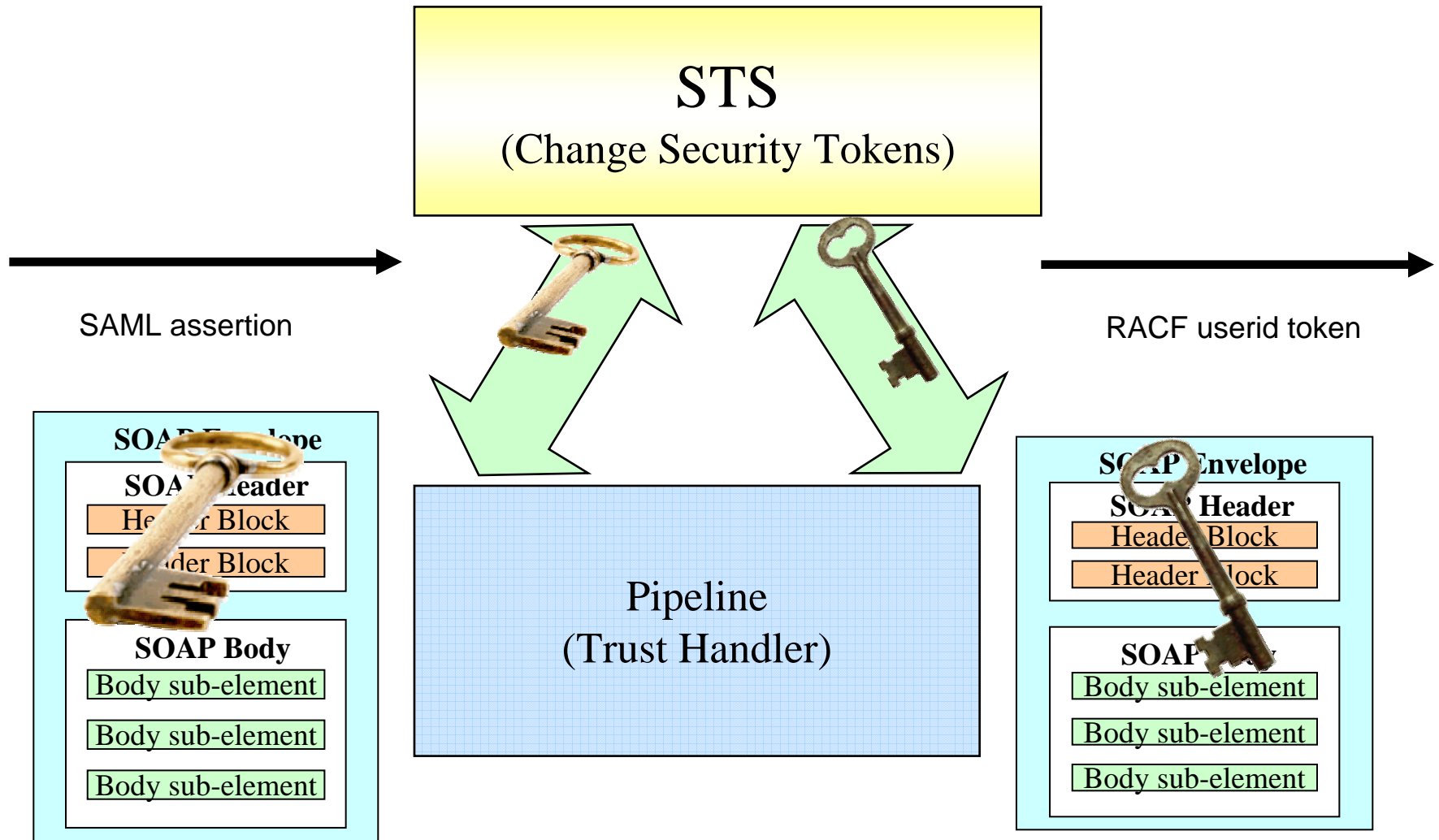
Notes

CICS support for securing Web services has been enhanced to include an implementation of The Web Services Trust specification.

CICS can interoperate with a Security Token Service (STS), such as Tivoli® Federated Identity Manager, to validate and issue security tokens in Web services. This enables CICS to send and receive messages that contain a wide variety of security tokens, such as SAML assertions and Kerberos tokens, to interoperate securely with other Web services.

You can configure the CICS-supplied security handler to define how CICS should interact with an STS.

CICS support of WS-Trust



Notes

The figure shows an example of a message inbound to CICS which has security credentials that CICS cannot handle, such as a SAML assertion. By using the Trust handler in the pipeline, CICS can request an STS for alternative credentials which CICS is able to understand. Typically, this would be a RACF userid token. The STS is able to understand and issue credentials as requested and CICS must trust the STS to issue valid credentials.

CICS IP interconnectivity – Some Background

- **SNA networking and VTAM have been at the heart of CICS for 30 years**
 - No plan to remove existing SNA support
 - No requirement to change CICS applications to exploit IP

- **Customers are asking for TCP/IP alternatives for CICS to CICS connectivity**
 - Network convergence
 - SNA skills shortage

- **CICS IP interconnectivity**
 - Provide a new transaction IP communications protocol for connectivity between and into CICS
 - Long term plan to provide CICS with IP choice for most of the CICS programming model
 - CICS TS V3.2
 - Distributed Program Links (DPL)
 - JCA
 - Exploit zSeries IP networking enhancements
 - OSA, QDIO, Gigabit ethernet – Inter system communication
 - Hipersockets – cross LPAR communication

- **CICS TCP/IP network management**
 - Systems and User correlation data tracking with CICSplex Systems Manager

Notes

Another application connectivity function of CICS TS 3.2 is CICS support for IP Interconnectivity. This slide provides some background to this function.

CICS has been the leader in support for SNA and VTAM for over 30 years. Indeed, CICS was the first IBM program product to support LU6.2 and APPC (Advance Program to Program Communication). There are no plans to remove this existing SNA support.

However, customers are now looking for IP alternatives to VTAM, to allow them to simplify their systems management by converging their networks, and to address the problem of declining VTAM and SNA skills. New programmers are familiar with TCP/IP (Transport Control Protocol/Internet Protocol) but not with SNA.

CICS has a multi-release plan to provide a new transactional IP protocol between CICS regions and into CICS systems. This strategy will allow CICS to realize value from advances in TCP/IP, exploit System z technology (e.g. hipersockets) and provide for a standard IP infrastructure for access into CICS.

In CICS TS 3.2, Distributed Program Link (DPL) and JCA will be able to take advantage of the new IP interconnectivity

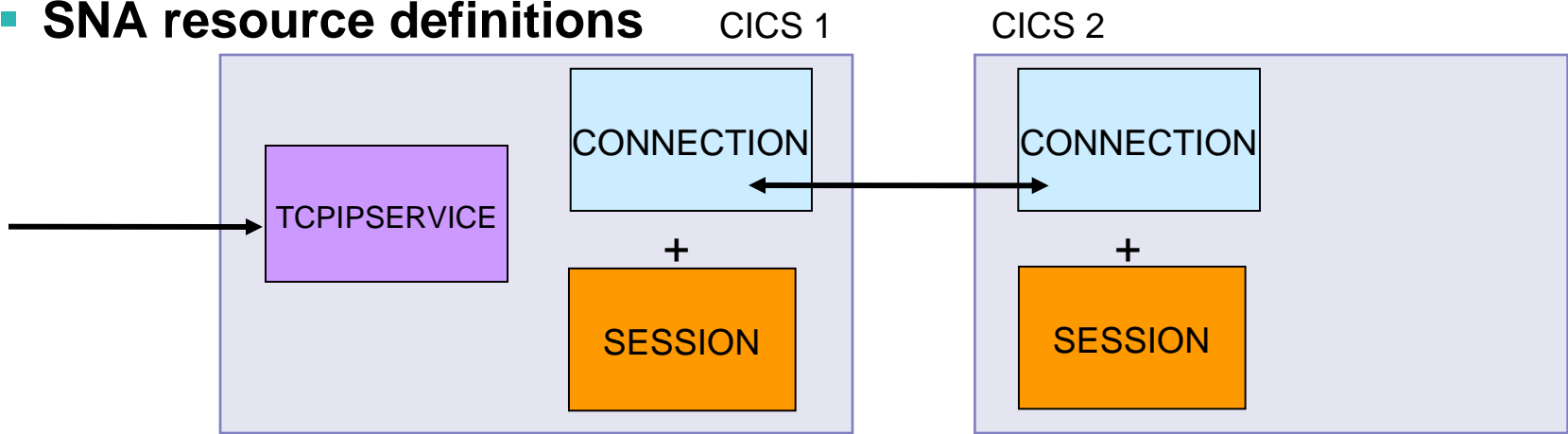
There is **NO** plan to remove the existing SNA and VTAM function from CICS, nor to require a customer to migrate to CICS IP Interconnectivity.

There is also no requirement for CICS applications to change in order to take advantage of the new IP function.

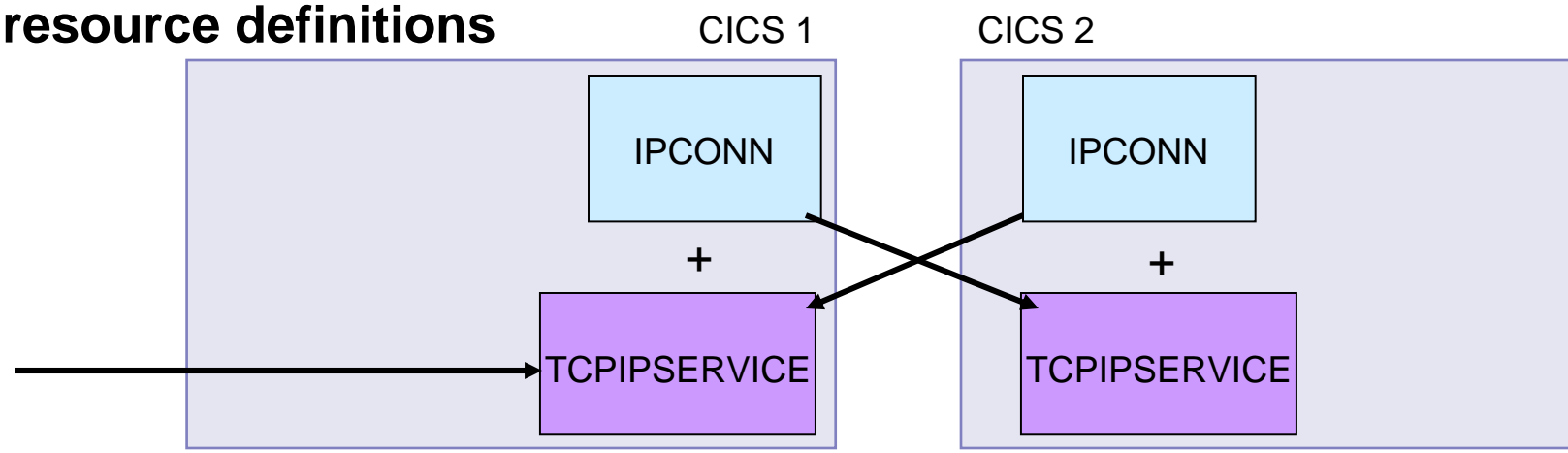
A key aspect to the support is the provision of management and control facilities, to allow a CICS request to be tracked as it flows between regions, using system correlation data and user associated data (user associated data can be specified using a new CICS global user exit). This will allow CICSplex Systems Manager to provide information about traffic across the CICSplex.

CICS SNA resource definitions

- SNA resource definitions**



- IP interconnectivity resource definitions**



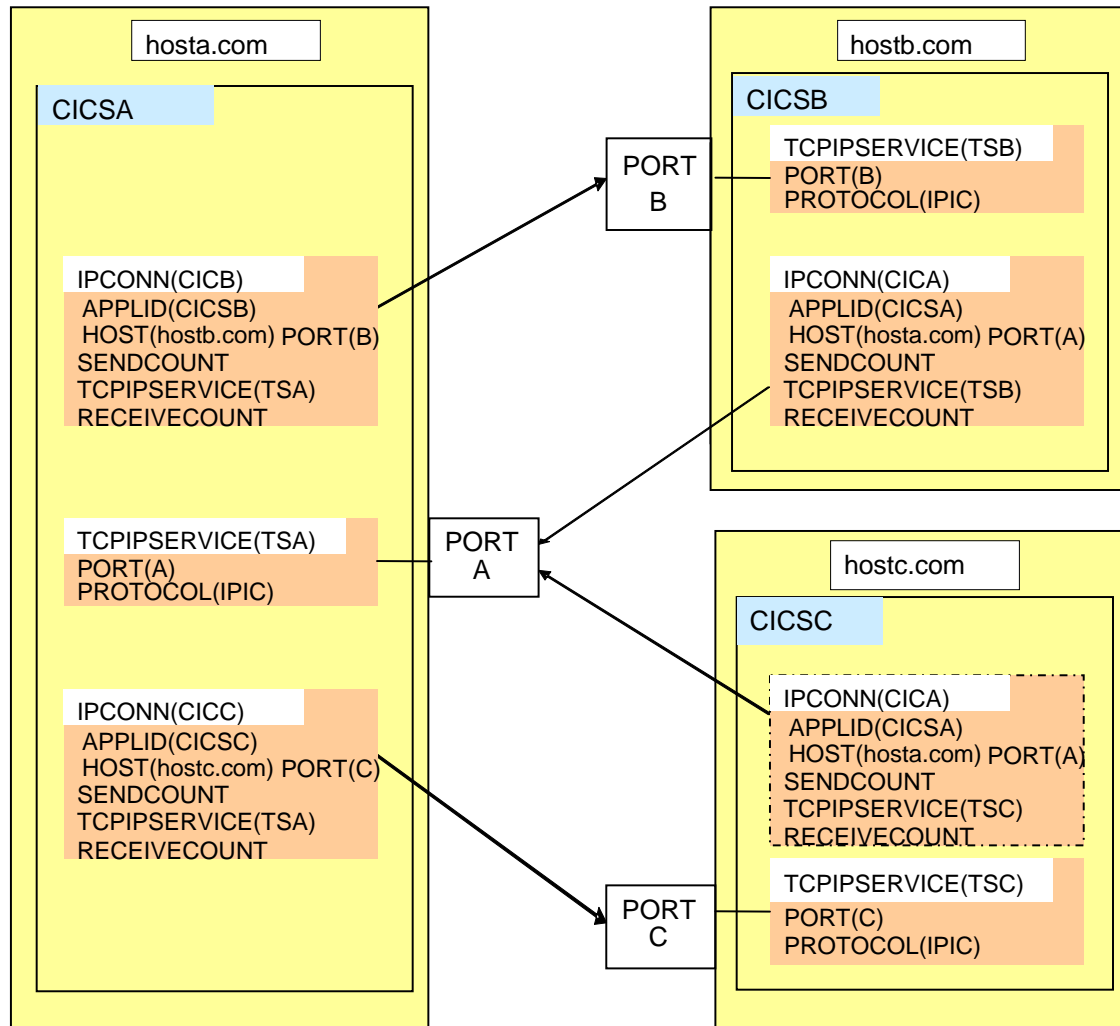
Notes

For connecting systems prior to CICS TS 3.2, a CONNECTION defines a remote system with which the CICS system communicates, using intersystem communication (ISC) or multi-region operation (MRO). A CONNECTION definition provides enough information to identify the system and specify its basic attributes. SESSIONS definitions are used to contain details about the sessions used to communicate with the system, and CICS uses the CONNECTION name to identify the other system when the definition has been installed. A TCPIP SERVICE resource is used to describe a way of getting work into a CICS system, and defines which TCP/IP services are to use CICS internal sockets support. Amongst other things, it defines a port and a protocol. In CICS TS 3.1, the internal CICS protocols that can be defined are ECI over TCP/IP (for CICS Clients), IIOIP, CICS Web support (HTTP) or a user-defined protocol.

In CICS TS 3.2, an IP connection is a TCP/IP communication link to a remote system. An IPCONN definition specifies the **outbound** attributes of the TCP/IP connection. The **inbound** attributes of the connection are specified by the TCPIP SERVICE definition named on the TCPIP SERVICE option of the IPCONN definition.

Thus TCPIP SERVICE resource definitions are also used with IPCONNs - the internal CICS protocols that can be defined in CICS TS 3.2 are ECI over TCP/IP, IIOIP, HTTP, **IP Interconnectivity (IPIC)**, or a user-defined protocol.

CICS IP interconnectivity example



Notes

This figure shows an example of the relationships between the IPCONN and the TCPIP SERVICE definitions, and how they specify the connections between systems.

The protocols that can be specified for a TCPIP SERVICE in CICS TS 3.2 include IP Interconnectivity (IPIC). IPIC specifies that the TCPIP SERVICE is to be used for distributed program link (DPL) over IP connections.

The figure also shows that a single TCPIP SERVICE can be used to receive messages from more than one connected CICS region, while an IPCONN resource can only direct messages to a single CICS region.

CICS IP interconnectivity security

- **TCPIPSERVICE and IPCONN settings**
 - Bind time security
 - SSL client certificates on the TCPIPSERVICE definition
 - Link security
 - SECURITYNAME parameter on the IPCONN definition
 - User security
 - USERAUTH parameter on the IPCONN definition

Notes

Full security is provided for IP connections. The mechanisms are equivalent to those for APPC (LU6.2) connections (although implemented differently).

There is support for bind-time security, link security and user security. IP connections support SSL controls and encryption.

Bind-time security prevents an unauthorized remote system from connecting to CICS. On IP connections, bind security is enforced by the exchange of Secure Sockets Layer (SSL) client certificates.

Link security defines the complete set of CICS transactions and resources that the remote system is permitted to access across the IP connection.

User security checks that a user is authorized both to attach a CICS transaction and to access all the resources and SPI commands that the transaction is programmed to use. User security is a subset of link security: that is, a user cannot access a resource, even if it is included in the set defined as accessible by their userid, if it is not also included in the set of resources accessible by the link userid.

SYSID Processing: IPCONN vs CONNECTION

- **CICS TS V3.2 supports IP Interconnectivity for DPL**

- **If a single region supports both DPL and other forms of function shipping then:**
 - Both an IPCONN and a CONNECTION, with the same name, will have to be installed
 - DPL will search for IPCONN match before looking for CONNECTION
 - IPCONN and CONNECTION with same name must have same APPLID

Notes

This slide explains how you can combine function shipping of program links using IPIC as well as other function shipping (such as for file control requests).

To do this, the CICS region will need to define both an IPCONN and a CONNECTION with the same sysid. If an IPCONN is installed, then that will be used for DPL in preference to any CONNECTION. There is also an install-time check to ensure that the applids of an IPCONN and CONNECTION with the same sysid match up correctly.

You cannot install two or more IPCONN definitions that specify the same APPLID and the same NETWORKID. (The combination of APPLID and NETWORKID can be used to ensure unique naming of systems across the network.) You can install an IPCONN definition that specifies the same APPLID as the NETNAME of an installed MRO, APPC, or LUTYPE6.1 CONNECTION definition.

If an installed IPCONN definition has the same name (sysid) as an installed CONNECTION definition, the APPLID of the IPCONN definition must match the NETNAME of the CONNECTION definition.

The IPCONN definition takes precedence over the CONNECTION definition: that is, if an IPCONN and a CONNECTION have the same name, CICS uses the IPCONN connection. Also, the TCPIP SERVICE and CONNECTION definitions have the same name then DPL requests will fail if the IPCONN is released or out of service, even if the CONNECTION resource is fully functioning. The IPCONN must be discarded before the CONNECTION becomes available for DPL request.

The above rules are validated at install time.

IPCONN AUTOINSTALL

- **Enabling AUTOINSTALL for IPCONN**
 - TCPIP SERVICE must be defined with PROTOCOL (IPIC) and URM (DFHISAIP | program_name)
 - Optionally, an IPCONN definition to be used as a template can be installed

- **URM (DFHISAIP | program_name)**
 - Invoked at INSTALL
 - Must return the name to be used for the IPCONN
 - May specify name of template IPCONN
 - May override HOST and PORT
 - Invoked at DELETE
 - No action necessary
 - Values returned by the user program in its communications area

Notes

Autoinstall is supported for IP connections, with an installed IPCONN used as the template.

The IP autoinstall user program performs a similar role for IP connections to that performed for APPC connections by the APPC autoinstall user program. Like the APPC autoinstall user program, the IP autoinstall user program chooses an installed connection to use as a template for the new connection, the main difference being that the template is an IPCONN rather than a CONNECTION definition. If IP autoinstall is active, CICS installs the new IPCONN connection using:

- The information in the connect flow
- The IPCONN template selected by the IP autoinstall user program
- Values returned by the user program in its communications area

For IP autoinstall to be active:

- The receiving region must have installed at least one TCPIP SERVICE that specifies PROTOCOL(IPIC).
- The name of the IP autoinstall user program must be specified on the URM option of the installed TCPIP SERVICE definition. This differs from autoinstall of APPC connections, where the name of the autoinstall user program is specified on the AIEXIT system initialization parameter. There is no equivalent system initialization parameter for IP autoinstall; instead, the name of the autoinstall user program is specified on the TCPIP SERVICE definition. As with APPC, putting the template IPCONNs out-of-service disables the autoinstall function.

The purpose of the autoinstall user program is to provide CICS with any extra information it needs to complete an autoinstall request. For IP connections, the user program selects the template to be used, and provides a name for the new connection. Optionally, it can modify the values of the APPLID, HOST, and PORT attributes of the new connection from those supplied by the IPCONN template. All other attributes of the new IP connection are taken from the selected IPCONN template and cannot be modified by the user program. If the selected template is usable, CICS makes a copy of the definition within it and attempts to install the new IPCONN definition. If the installation is not successful, a message is issued.

The default autoinstall user program, DFHISAIP, is an assembler-language program but versions in C, COBOL and PL/1 are also provided.

CICS Web Support Performance improvements - Optimization for WEB OPEN

■ CICS TS V3.1 processing

- An OPTIONS request is made when a WEB OPEN command is issued
 - Determine the HTTP version of the partner
 - Forces an additional network flow

■ CICS TS V3.2 processing

- Server version can be determined when the first response is received from the server
- An OPTIONS request is still made when WEB OPEN command is issued if HTTPVNUM and HTTPRNUM are specified (provides Version/Release level of HTTP server)
- Web Services path benefits as version not specified on OPEN

Notes

The next slides cover enhancements to CICS Web support. CICS Web Support is used internally by IP Interconnectivity and Web services, and the sockets support is used by IIOF and ECI.

The first enhancement is a performance optimization for WEB OPEN.

In CICS Transaction Server 3.1, CICS as the Client sends a flow to the server to determine the HTTP version of the server up-front, by making an HTTP request with the OPTIONS method whenever the EXEC CICS **WEB OPEN** command is issued. This is done to store the version for later command checking; for example, if the application tried to use an HTTP facility that was not supported by a server of that version (such as chunking to an HTTP/1.0 server) then CICS could respond as such. This was also done in order to return values for the version parameters HTTPVNUM and HTTPRNUM.

The presence of this flow can be a performance issue, in particular for applications where the pattern is just OPEN, SEND, RECEIVE, CLOSE, as each open repeats the flow. In fact, this is the case CICS Web services support.

In CICS Transaction Server 3.2, CICS no longer sends the OPTIONS flow as the default behaviour on a WEB OPEN, but will only send the flow if the HTTPVNUM and HTTPRNUM options are specified on the WEB OPEN command. Otherwise, when CICS receives the first response from the server, the server's HTTP version can be identified from the response, and CICS applies this for the remainder of the session. The information can be obtained explicitly using the WEB EXTRACT command.

CICS Web Support Performance improvements - Use of Containers; Codepage conversion

- **HTTP headers now use Containers instead of Temporary Storage**
 - Both Client and Server sides use Containers
 - TSQPREFIX now redundant on TCPIPSERVICE definition

- **Optimized support for codepage conversion**
 - Performance enhancements to data conversion services in CICS
 - Used by CICS Web Support and Web services

Notes

The new container support that was introduced in CICS TS 3.1 is now used internally in CICS TS 3.2 to store HTTP headers. CICS Web Support no longer uses temporary storage queues to store request lines, status lines, and HTTP headers for inbound and outbound messages. This means that the TSQPREFIX attribute is no longer required on TCPIP SERVICE definitions, and you do not need to create TSMODEL definitions for this purpose.

Containers defined by CICS are now used for request lines, status lines, and HTTP headers. The containers used are:

- SERVER_HDR_IN - for headers received on request (includes request line)
- SERVER_HDR_OUT - for headers to be sent on response
- SERVER_RESP_LINE - for response line to be sent (i.e. status line)
- CLIENT_HDR_IN - for headers received on response (includes response line)
- CLIENT_HDR_OUT - for headers to be sent on request

Another enhancement is optimizations for CCSID data conversions such as can occur in the CICS Web interface and Web services.

Channel & container support for WEB commands (1 of 2)

- **New WEB SEND command options**

- CHANNEL

- Specifies the name of the channel that the container belongs to

- CONTAINER

- Is the container from which the HTTP request body will be sent

- Chunked requests

- May not use the channel and container option
- Must send all chunks in the same codepage

Notes

Channel and container support has also been added to the WEB API, so you can specify on the EXEC CICS WEB SEND command the container where the HTTP body is to be held before it is sent, and the channel to which it belongs (or the current channel if not specified).

The CHUNKING option cannot be specified when the CONTAINER option is used: a chunked response cannot be sent from a container.

Channel & container support for WEB commands (2 of 2)

▪ New WEB RECEIVE command options

- BODYCHARSET character set of the HTTP request body
- TOCHANNEL name of the channel that owns the TOCONTAINER
- TOCONTAINER container into which the HTTP response body will be received

▪ New WEB CONVERSE command options

- BODYCHARSET returns the character set of the HTTP response body
- CHANNEL name of the channel that the container belongs to
- CONTAINER container from which the HTTP request body will be sent
- TOCHANNEL name of the channel that owns the TOCONTAINER
- TOCONTAINER container into which the HTTP response body will be received

Notes

EXEC CICS WEB RECEIVE and EXEC CICS WEB CONVERSE (which combines send and receive in one command) have similar new options to use containers, and to specify the character set of the HTTP request or receive body.

BODYCHARSET specifies the character set of the HTTP request body:

If the HTTP body is received into an application buffer, the character set returned is as follows:

- If the INTO or SET option is specified, and the HTTP body is converted, CICS returns the character set of the HTTP body before conversion.
- If the INTO or SET option is specified, and the HTTP body is not converted, CICS returns the character set specified in the Content-Type header. If character set information is not available, blanks are returned.

If the HTTP body is received into a named container, the character set returned is as follows:

- If the container is a CHAR container, CICS returns the character set of the encoded data.
- If the container is a BIT container, CICS returns blanks.

If the value returned is more than 40 bytes, the data is truncated. If the value returned is less than 40 bytes, the data is padded to the right with blanks.

Document template enhancements - caching

■ Document templates now cached

- Document domain always caches templates from
 - A PDS, a CICS file, the z/OS UNIX file system, a TS queue, a TD queue
- Document domain may cache templates from:
 - A CICS user exit
 - The exit may override by setting `dhtx_cache_response` to '1'
- Loader domain caches templates from:
 - A CICS application program

■ Refresh document template

- New CICS command `SET DOCTEMPLATE NEWCOPY`
- Deletes cached copy and replaces it with the new copy

Notes

A new caching and refreshing facility improves performance for application access to CICS document templates. The document handler domain always caches a copy of the following types of document template:

- Templates in a partitioned data set
- Templates in a CICS file
- Templates in a z/OS UNIX System Services HFS file
- Templates in a temporary storage queue
- Templates in a transient data queue

The document handler domain may cache templates from the following source:

- Templates in an exit program: Document templates generated by exit programs might be different every time the exit program is called, so CICS only caches a copy of these templates if the exit program specifies caching in its exit parameter list.

The loader domain always caches the following types of document template:

- Templates in a CICS program: Document templates retrieved from CICS programs are never cached by the document handler domain, because programs are already cached elsewhere in CICS.

If you make changes to a document template that has been cached, you can refresh the copy of the document template held by the document handler domain using the CEMT or EXEC CICS SET DOCTEMPLATE NEWCOPY command. (Note that with the SET DOCTEMPLATE command, which is not part of the EXEC CICS DOCUMENT API, you need to specify the name of the DOCTEMPLATE resource definition which defines the document template, rather than the 48-character name of the template.)

Document template enhancements - docdelete

- **New commands and options to allow deletion of a document**
 - Especially useful in long-running transactions
 - EXEC CICS DOCUMENT DELETE command
 - DOCSTATUS(DOCDELETE) option
 - Added to WEB SEND and WEB CONVERSE commands

Notes

In releases prior to CICS TS V3.2 a document exists until the end of the transaction. For long running transactions that make heavy use of documents this can consume a large amount of storage.

CICS TS V3.2 introduces a new DOCUMENT DELETE command and a new DOCSTATUS option on the EXEC CICS WEB CONVERSE and WEB SEND commands that allow the application to avoid consuming large amounts of storage.

DOCUMENT DELETE enables you to delete documents that are no longer required during a transaction. The command allows the application to request deletion of a document and all storage related to the document. On execution of this command, the storage allocated to the document is released immediately.

If the DOCUMENT DELETE command is not invoked, the document exists until the application ends unless the application has issued the WEB SEND or CONVERSE command with the DOCSTATUS(DOCDELETE).

The new DOCSTATUS parameter on the WEB CONVERSE and WEB SEND commands allows you to specify if you want to delete a document during a transaction. This parameter applies to all commands where a DOCTOKEN is specified, as this indicates that the command is processing a document.

If a WEB SEND command specifies the option DOCSTATUS(DOCDELETE), the WEB RETRIEVE command cannot retrieve the document, and a NOTFND response is returned. RETRIEVE is only for documents sent without the ACTION(IMMEDIATE) option (a deferred send).

Changes to HTTP-related sample programs

- **Samples have been changed to use new WEB commands**
 - DFH\$WB1A, DFH\$WB1C
- **New samples have been added to demonstrate pipelining**
 - DFH\$WBPA, DFH\$WBPC, DFH0WBPO
- **New samples have been added to demonstrate chunking**
 - Client and server chunking samples
 - Assembler, C and COBOL versions
- **Sample URIMAP definitions provided**

Notes

A range of new and changed samples are provided to help take full advantage of capabilities of CICS Web support, such as pipelining and chunking.

The names of the samples for the new WEB commands and pipelining are given on the slide.

Client chunking samples

- DFH\$WBCA - Assembler Client Side Chunking
- DFH\$WBCC - C Client Side Chunking
- DFH0WBCO - COBOL Client Side Chunking

Server chunking samples

- DFH\$WBHA - Assembler Server Side Chunking
- DFH\$WBHC - C Server Side Chunking
- DFH0WBHO - COBOL Server Side Chunking

WEB API available in Converter & Web Error Program

- **Web Commands now available for converter programs and Web Error Program (DFHWBEP)**
 - Can replace the manual method of constructing responses
 - Allows your programs to take advantage of:
 - CICS assistance in constructing structured responses
 - HTTP protocol compliance
 - CICS provided code page conversions
 - Parameter lists remain unchanged
 - Cautions
 - Must specify ACTION(IMMEDIATE) on the commands
 - EXEC CICS WEB SEND command will ignore and discard storage pointed to by ENCODE_DATA_PTR in the encode routine
 - Analyzer code page conversion does not apply to WEB Commands

- **DFHWBEP is called for errors during the delivery of static responses**

Notes

The EXEC CICS WEB API commands can now be used in converter programs and in the user-replaceable Web error program DFHWBEP. The Web error program DFHWBEP is now called if an error occurs during the delivery of static responses. This program can be used to customize the error responses that CICS sends to the Web client. CICS messages are also produced when the errors occur.

As an alternative to constructing the responses from these programs manually in a block of storage, WEB API commands can be used to construct and send the response. ACTION(IMMEDIATE) must be specified on the command as the default of ACTION(EVENTUAL) is not permitted with DFHWBEP. Using the error program takes advantage of all the available CICS Web support features, including assistance with structuring responses and with HTTP protocol compliance, and enhanced code page conversion capabilities, with minimal disruption to existing CICS Web support architecture. The input and output parameter lists remain unchanged for these programs, and the information provided by these facilities can be used in combination with the EXEC CICS WEB API commands.

DFHWBERX does not use the EXEC CICS WEB RECEIVE command to receive the content of the Web client's request. If DFHWBERX is being replaced with an application program, note that this command should not be used in Web error programs. If using the CICS-supplied default analyzer DFHWBAAX, then DFHWBERX is used to send an error response to any request that is not matched by a URIMAP definition. The content of these requests cannot be known, and their intent could potentially be malicious, so it is not advisable to attempt to receive the request.

When using EXEC CICS WEB API commands in the Web error program to produce a new error response and send it to the Web client, code page conversion takes place as specified in the commands, in the same way as for any other program which uses the EXEC CICS WEB API commands.

Security for documents

- **Resource level security added for DOCTEMPLATES**
 - Documents delivered as a static response to a Web request
 - TEMPLATE name specified on the URIMAP definition
 - Document templates used by an application program
 - CREATE, INQUIRE and DISCARD DOCTEMPLATE commands
 - EXEC CICS DOCUMENT CREATE and INSERT commands

- **Resource security is activated by:**
 - XRES parameter in the systems initialization table
 - XRES = YES | name | NO
 - Security check will be made on the userid associated with transaction

Notes

This and the next slide cover some security enhancements that can be used for static content with CICS Web support.

You can apply access controls to individual CICS document templates. Security checking for this resource is applied using the XRES system initialization parameter, which is set to YES by default. You can use this capability to secure individual Web pages delivered as static responses (using URIMAP definitions). You can also secure document templates that are used by application programs, either for Web delivery as part of an application-generated response, or for any other purpose.

When XRES is YES (the default) or a general resource class name, each time a document template is requested, CICS calls the external security manager to check that the user ID associated with the transaction is permitted to access the template. When YES is specified, the default resource class name RCICSRES and grouping class name WCICSRES are used. Alternatively, you can specify a different resource class name. If you set XRES to NO, no security checks are performed for document templates.

Access to CICS document templates is controlled in the following cases:

- Document templates delivered as a static response to a Web client's request (specified on the `TEMPLATENAME` attribute of the URIMAP definition for the request).
- Document templates delivered as part of an application-generated response to a Web client's request (used by an application program that handles the request).
- All EXEC CICS CREATE, INQUIRE, and DISCARD DOCTEMPLATE commands.
- All EXEC CICS DOCUMENT INSERT and CREATE commands with the TEMPLATE option.

Security for z/OS UNIX files (HFS files)

- **Access to z/OS UNIX files can be controlled based on USERID**
 - Only for CICS Web clients
 - Only for pages delivered as static content
 - Specified in a URIMAP definition

- **z/OS UNIX resource security is activated by:**
 - XHFS parameter in the systems initialization table
 - XHFS = YES | NO
 - Security check will be made on the Web client USERID
 - USERID from basic authentication or a client certificate

- **CICS region userid must have read access**

Notes

Files stored in z/OS UNIX file systems (referred to as HFS files) can be used to supply Web pages through CICS Web support, as static responses provided by URIMAP definitions. When access control for HFS files is specified, you can control access to HFS files on the basis of the user IDs for individual Web clients. Access control for HFS files is enabled by default.

Access control for HFS files is activated by the XHFS system initialization parameter. The default for this parameter is YES, meaning that resource security for HFS files is active. The RESSEC option on the transaction resource definition does not affect this security checking.

The CICS region user ID must always have a minimum of read access to all HFS files that it uses for CICS Web support, and the directories containing them. The user ID of the Web client is only used when accessing HFS files as a static response, but the CICS region user ID applies to all other attempts to access the HFS file. If the CICS region user ID does not have permission to access the file, even an authorized Web client will be unable to view it. This is the case even when the HFS file is defined as a CICS document template.

Basic authentication assistance for HTTP client apps

- **Parameters added to WEB SEND and WEB CONVERSE commands**
 - to allow application to specify credentials (username and password)

- **AUTHENTICATE (NONE|BASICAUTH) option**
 - If BASICAUTH is specified credentials may be specified
 - USERNAME, USERNAMELEN, PASSWORD, PASSWORDLEN
 - If BASICAUTH is specified and credentials are not supplied
 - User exit XWBAUTH will be invoked to do the credentials lookup

Notes

The WEB SEND and WEB CONVERSE commands have been expanded to allow you to provide basic authentication credentials (a username and password). CICS sends these details in an Authorization header to a server that is expecting it or in response to a HTTP 401 WWW-Authenticate message.

CICS converts the supplied username and password to the format that the HTTP basic authentication protocol is expecting. This allows you to supply your credentials in your usual EBCDIC character set through the WEB SEND or WEB CONVERSE command, or through the XWBAUTH user exit.

The AUTHENTICATE option allows you to specify user authentication details (credentials), to control access to restricted data. NONE is the default for this option, and specifies that there are no restrictions on accessing this data, therefore no credentials are required. BASICAUTH specifies that HTTP Basic Authentication credentials are required for this session (these credentials can be supplied within the command or by using the XWBAUTH global user exit).

XWBAUTH global user exit (GLUE)

- **Used to supply credentials to a remote HTTP server**
 - When invoked:
 - The EXEC CICS WEB SEND or WEB CONVERSE command specifies AUTHENTICATE(BASICAUTH), but the USERNAME and PASSWORD are not specified
 - Inputs are the host and path components from the target URL
 - REALM name if returned on the 401 challenge
 - Output from the exit is a username and password
 - Specific to the platform on which the remote server is running
 - May be up to 256 characters in length
 - > CICS will provide a predefined 64 byte area to store the username
 - > Alternatively, you can place your username in your own area and replace the address in UEPUSNM with your username's address
 - > If you create your own username area, the field can be up to 256 bytes in length
 - No validation of syntax performed by CICS

- **Sample exits using LDAP or TFIM for credentials provided**

Notes

The new Client Send Exit, XWBAUTH, allows you to specify basic authentication credentials (username and password) for a target server. XWBAUTH passes these to CICS on request, to create an Authorization header. XWBAUTH is called during processing of an EXEC CICS WEB SEND or EXEC CICS WEB CONVERSE command. The host name and path information are passed to the user exit, with an optional qualifying realm.

When AUTHENTICATE(BASICAUTH) is specified within the EXEC CICS WEB SEND or WEB CONVERSE command, a username and password can be provided directly by the application. If these are not supplied, XWBAUTH is invoked, providing an alternative way of specifying these credentials.

The username and password are usually specific to the remote server environment, and might be longer than the standard eight characters used by RACF systems. The username and password fields can be up to 256 characters in length. The syntax of these fields is not validated.

The host is passed to the user exit program as the UEPHOST parameter, and the path is passed as the UEPPATH parameter. The realm is passed optionally as the UEPREALM parameter. In response, the user exit program returns the username and password as the UEPUSNM and UEPPSWD parameters.

A return code of UERCNORM indicates a successfully returned username and password. Return code UERCBYP indicates that the username and password cannot be identified, so the Authorization header will not be added to the request. If XWBAUTH sets return code UERCERR then the WEB SEND fails with NOTAUTH (the send is not even attempted)

Sample exits are provided using LDAP for the credentials (DFH\$WBX1) or using TFIM (Tivoli® Federated Identity Manager) as the Security Token Service (DFH\$WBX2).

CICS Transaction Server V3.2

- **Application connectivity**
 - Web services standards, interoperability profiles, large messages, and data mapping
 - Intercommunications over TCPIP
 - HTTP and TCP/IP management and performance
- **Application reuse**
 - 64-bit storage for CONTAINER data
 - CICS integrated translator support for C and C++
 - Java enhancements
- **Service management**
 - On-line management of program libraries
 - Enterprise Workload Manager
 - CICSplex SM Web User Interface help, usability, and MAP support
 - CICSplex SM and CICS-WMQ adapter installation and management
- **Architectural enhancements**
 - Threadsafe core APIs for accessing VSAM files, journals, WebSphere MQ
 - Capacity of VSAM ESDS files >4GB, shared data tables >2GB, CICS regions in a Sysplex
 - Trace, monitoring and statistics

Notes

The next major theme is Application Reuse. This includes a range of enhancements to modern programming constructs.

- 64-bit exploitation for CICS data extends channels and containers to use 64-bit support. This reduces storage limitations as a result of container data being held above the 2GB bar
- C/C++ Integrated Translator: the z/OS V1.7 XL C/C++ and z/OS V1.8 XL C/C++ compilers will provide support for translation of EXEC CICS commands as an integrated part of the compilation process via enabling PTF.
- JAVA Enhancements include improved system management and problem determination for Java programs – pool management, timeout control, garbage collection accounting

New 64 bit Storage Manager

- **Used by channels and containers**
 - Exploits z/OS 64-bit storage
- **Based on existing Storage Manager domain:**
 - New domain level CICS64 subpools
 - Storage objects managed in 2GB increments

 - Amount of storage based on MEMLIMIT
 - Specified in SMFPRMxx or JCL or overridden by IEFUSI
 - No GDSASIZE SIT parameter as storage cannot be preallocated
 - Size could not be guaranteed
 - CICS TS V3.2 requires a MEMLIMIT which is at least as big as EDSALIM
 - Recommend at least 2GB
 - Provides services to copy data to and from storage above the bar
 - Monitoring and statistics gathering similar to that done currently
 - New messages in range DFHSM0601 upwards

Notes

A 64-bit storage manager is introduced to exploit 64-bit storage. This is used in CICS TS 3.2 to move container storage above the bar.

Because storage above the bar cannot all be allocated and then sub-managed, as CICS does with storage below the bar, CICS needs to maintain a more dynamic picture of storage usage. This must take into account the following:

- The amount of storage allocated by CICS
- The amount of CICS-allocated storage that is usable (i.e. actually contains data)
- The amount of CICS-allocated storage that is guarded
- The total amount of storage allocated for the address space (e.g. by Java, by DB2, by CICS itself)
- The total amount of allocated storage that is usable
- The total amount of allocated storage that is guarded

Containers exploit 64-bit storage

- **Applications are unchanged. Containers are created and manipulated in 31-bit working storage areas.**
 - Applications still address containers using 31-bit pointers
- **PUT CONTAINER command copies the container data into 64-bit storage giving performance enhancements**
 - No 4K segmentation
 - Data conversion performed in 64-bit storage if necessary
- **GET CONTAINER command copies the container data from 64-bit to 31-bit storage for the application to access**
 - Hence size of each container still limited by ECDSA

Notes

The first exploiter of 64-bit storage is channels and containers, which were introduced in CICS TS 3.1 as the modern programming construct for passing data and communicating between programs.

We are seeing a lot of use of containers by CICS TS 3.1 customers, and CICS itself is also using the mechanism (seen earlier with HTTP headers).

In CICS TS 3.2 the storage used for containers within the CICS region is moved to above the 2GB bar; in other words, using 64-bit storage. This both frees up space below the bar for application programs and other use, and also allows greater amounts of data to be passed between CICS programs.

The data is no longer broken up into chained 4K segments, and especially for large containers, the use of 64-bit storage gives improved performance.

CICS Java enhancements

- **Java 5 to be supported (post-GA)**
- **JVM profile and properties changes**
 - Any JVM option or system property may now be specified
 - “X” options now use standard Java format
 - System properties may be specified in JVM properties or profile
- **JVM application isolation utility**
 - Standalone Utility
 - Code analyzer tool (Support Pac CH1B)
 - Useful for migrating to continuous mode JVMs
 - Reports modifications to static objects
- **Resettable JVM removed**
 - Many removed, renamed and replaced options
 - Migration toward “Standard” JVMs
 - > Most old options are ignored or tolerated
 - Improved error messages
- **Improved problem determination**
 - CICS formats JVM trace output

Notes

A range of enhancements in the Java area are covered by this slide:

IBM intends to provide support for J2SE 5.0 for CICS TS 3.2.

A number of changes to options in JVM profiles and property files have been introduced, to simplify and standardize. Properties such as Classpath and Libpath are created automatically.

A new JVM Application Isolation Utility is provided to help with the migration of Java programs to continuous mode by identifying potential problems in your Java applications, such as modifications to static objects which need to be reset.

Note that the resettable mode for JVMs has been removed, as part of the move towards more standard Java practices that was started in CICS TS 2.3 with the introduction of continuous mode. A JVM cannot now be started in resettable mode.

JVM trace is now formatted as part of the CICS trace, making it easier to see how it fits into the flow and more of the information is interpreted. There is a plug-in which intercepts the Java trace and formats it before output, rather than just providing hex characters.

CICS Java enhancements for startup & shutdown

- **New JVM Profile option `IDLE_TIMEOUT={30 | number}`**
 - Specifies timeout threshold for JVMs

- **PERFORM JVMPOOL START**
 - JVMCOUNT – number of JVMs to start
 - JVMPROFILE – JVM profile name as it is stored in HFS
 - EXECKEY – Execution Key in which JVM is to run

- **PERFORM JVMPOOL TERMINATE**
 - PHASEOUT – running programs allowed to complete
 - PURGE – running programs terminated via the CICS PURGE facility
 - FORCEPURGE – running programs terminated via the CICS FORECEPURGE facility
 - JVMPROFILE(data-area) – optional. Only JVMs started with that profile are terminated

- **SET JVMPOOL TERMINATE**
 - Deprecated: use PERFORM JVMPOOL

Notes

Further enhancements in the Java area provide means to

- Specify the timeout threshold for idle JVMs
- Pre-emptively start JVMs using the PERFORM JVMPOOL START command
- Terminate a subset of JVMs within a JVM pool, rather than the entire JVM pool

Timeout was previously hard-wired to 30 minutes. IDLE_TIMEOUT allows the timeout threshold to be specified. A value of 0 means no timeout, and a timeout up to the equivalent of 7 days can be specified.

You can use this timeout in conjunction with the PERFORM JVMPOOL START to set up all JVMs in the way required.

SET JVMPOOL TERMINATE in CICS TS 3.1 terminated every JVM and terminated the classcache.

The new PERFORM JVMPOOL TERMINATE command is preferred usage as it terminates a subset of JVMs and not the classcache. This is also in preparation for Java 5 (in Java 5 the classcache is completely different and persists across CICS restarts. All JVMs are equal in Java 5; there is no master JVM).

CICS Java garbage collection

- **CICS TS V3.1 garbage collection process**
 - GC runs after nn Java programs executed in JVM
 - GC statistics count against last user program in JVM

- **CICS TS V3.2 garbage collection process**
 - Separate transaction (CJGC)
 - Triggered by storage utilization in non-system heap
 - User-defined storage utilization threshold
 - Runs in JVM immediately after user program terminates
 - Statistics not attributed to user programs
 - JVM not available for work until GC complete
 - Allocation failures
 - GC runs as part of user task
 - Statistics attributed to user task
 - User processing is suspended until GC is complete

Notes

There is also an enhancement in CICS TS 3.2 to Java Garbage Collection.

In CICS TS 3.1, garbage collection runs after a specified number of programs have executed, and runs under the program which encounters this limit.

In CICS TS 3.2 a threshold can be specified for the percentage of heap utilization beyond which garbage collection will be scheduled, and the collection runs under a separate transaction. The one exception to this is if an allocation failure occurs in a program which began while still below the threshold, in which case that task takes the hit.

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- **Architectural enhancements**
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Notes

The third major theme is Service Management, in which a range of new capabilities are aimed at further simplifying the management of CICS environments.

- Online management of program libraries make it easier to maintain continuous system availability. PDSs and PDSEs from which programs are to be loaded can be specified to CICS (added, removed, or reordered) without restarting CICS
- Enterprise Workload Management with ARM allows an end to end view of an application, measuring availability, performance and usage through EWLM support.
- Integrated CICSplex SM install: CICSplex SM is installed, configured and started as part of CICS, reducing operations management costs – EYUISTAR is no longer needed, and nor are any special resource definitions.
- CICSplex SM Web User Interface functional enhancements provide WUI menus and viewsets with field level help, summary view expansion, and also provides MAP support.
- CICS TS 3.2 takes ownership of the CICS-WebSphere MQ adapter.

On-line management of program libraries

■ **Dynamic Program Library Management**

- Specify the data sets and order that CICS will search for programs and program artifacts
 - Without restarting CICS
- In addition to the existing static DFHRPL
- Organise such data sets in dynamically definable LIBRARY resources
 - More flexible way of representing your applications
 - Defined via CICSplex SM BAS, CEDA, DFHCSDUP, or CREATE
 - SPI: INQUIRE, SET, DISCARD
 - CICSplex SM views
 - Statistics: Library resource statistics
- INQUIRE Program will report from where a program has been loaded

Notes

Dynamic program library management provides support for dynamically specifying the data sets from which programs and program artifacts will be loaded, without the need to restart CICS, which will assist towards achieving 24x7 operations. This will be in addition to the existing DFHRPL mechanism for specifying load library data sets to the system, and it will be your choice whether you use the new mechanism, and whether you use it mainly in development and test or also in production.

A new CICS resource will allow you to define groups of data sets that represent an application, and to install those data sets into the system, making them available for the system to locate programs from. This provides for a more flexible and controlled way of introducing applications, and allows for a better mapping between the application structure and the runtime structure.


```

Session C - [24 x 80]
File Edit View Communication Actions Window Help
[Icons]

OVERTYPE TO MODIFY                                CICS RELEASE = 0650
CEDA DEFINE Library( ACCOUNTS )
Library      : ACCOUNTS
Group       : NEWAPPS
Description ==> PROGRAM ARTIFACTS FOR NEW ACCOUNTS APP
Ranking     ==> 50           1-9 | 11-99
Critical    ==> No         No | Yes
Status      ==> Disabled   Enabled | Disabled

DATA SET NAMES
DSNAME01   ==>
DSNAME02   ==>
DSNAME03   ==> ACMECO.ACCOUNTS.INITIAL
DSNAME04   ==> ACMECO.ACCOUNTS.APPLICN.BITS
DSNAME05   ==>
DSNAME06   ==>
DSNAME07   ==>
DSNAME08   ==>
DSNAME09   ==>
+ DSNAME10 ==>

SYSID=CIGO APPLID=IYCWZCGO
DEFINE SUCCESSFUL                                TIME: 11.37.38 DATE: 06.306
PF 1 HELP 2 COM 3 END                            6 CRSR 7 SBH 8 SFH 9 MSG 10 SB 11 SF 12 CNCL

MA c                                             06/022

```

Notes

This example CEDA screen shot shows a dynamic LIBRARY definition. The attributes are explained on the next slide.

The new LIBRARY resource

- **Typically, define one LIBRARY per application or related set of applications, or per vendor package**
 - But up to installations how they organise their data sets
- **The LIBRARY resource definition includes**
 - LIBRARY Name (used as a DD name)
 - Up to 16 data set names which will form a concatenation
 - Can have just 1 data set (and must have *at least* 1)
 - Can have up to 16 data sets, for different pieces of the application
 - Can specify data sets 5, 10, and 15 (say) to leave room to add more
 - **Ranking**
 - Where this library belongs in the search order of all LIBRARYs
 - Determines order in which CICS searches for programs to be loaded
 - **Critical** status (Critical or Noncritical)
 - Whether this LIBRARY is critical to starting CICS
 - **Enablement** status (Enabled or Disabled)
 - An enabled LIBRARY is active in the search order

Notes

This support introduces a new resource, called a LIBRARY. The way of dynamically defining data sets to CICS is to group them in a LIBRARY resource.

The expectation is that the LIBRARY resources would be used to map each application to a separate LIBRARY, but there is nothing to impose this behaviour.

This is a CICS resource, which is always spelt in uppercase, to distinguish it from various other uses of the word 'library'. The plural is "LIBRARY resources", "LIBRARY concatenations" or, where space is a premium, "LIBRARYs". It is worth noting that although 'library' is often used to refer to a single data set, the MVS use of this word is the same as the CICS use, for a concatenation of one or more data sets.

The name given to the LIBRARY will become the DD name for the concatenation of data sets which it contains. There can be between 1 and 16 data sets defined in a LIBRARY, and these will be concatenated together in the order in which they are specified in the definition.

When a program is to be located for loading, prior to CICS TS 3.2 (or if no dynamic LIBRARY resources are installed), CICS will search the data sets in the DFHRPL concatenation in the order in which they are specified until the first instance of that program is located. For dynamic LIBRARY resources, the RANKING is used to define the search order that will be used when looking for a program. A LIBRARY with a smaller ranking number will be searched before a LIBRARY with a larger ranking (and then the data sets within that LIBRARY will be searched in concatenation order). The ranking can be a number between 1 and 99 (but not 10, which is reserved for DFHRPL itself).

The critical status of a LIBRARY provides a way to mimic the behaviour of DFHRPL at CICS startup, which is that CICS will not start if a data set in DFHRPL is not available. For dynamic LIBRARYs, where this behaviour is necessary, the LIBRARY can be defined as CRITICAL. The default is for the LIBRARY to be NONCRITICAL, meaning that (unlike with DFHRPL), CICS can be started when the data sets required for that LIBRARY are not available. The CRITICAL setting does not fully mimic DFHRPL, in that rather than just failing CICS, a WTOR message is issued to give the operator a choice.

CICSplex SM LIBRARY Tabular View

LIBRARY

EYUVC1280I 4 records collected at 03/29/07 10:01:02.

Context: ALI2CPSM
 Scope: ALI2CPSM
 LIBRARY name: = []
 Critical status: = []
 Enable status: = []

Automatic refresh: 60 seconds. Refresh

4 records on 1 pages.

Record	CICS system name	LIBRARY name	Search position	Ranking	Critical status	Enable status	Number of DSNAMEs
1	IYK3ZAB6	DFHRPL		1	10 Critical	Enabled	17
2	IYK3ZAB6	FRANK		2	65 Noncritical	Enabled	1
3	IYK3ZAB6	LIB01		0	50 Noncritical	Disabled	1
4	IYK3ZAB6	LIB02		0	65 Noncritical	Disabled	1

4 records on 1 pages.

Set attributes... Enable... Disable... Discard...

Resource name: LIBRARY. View name: EYUSTARTLIBRARY.TABULAR

Notes

- This example screenshot shows the CICSplex SM view that displays information about every LIBRARY installed in the current context and scope.
- The “LIBRARY name” field links to a LIBRARY DETAILED view for the selected LIBRARY, which shows the attributes of the LIBRARY such as its ranking, enablement status, and the number of program loads from it.
- The “Number of DSNAMEs” field links to a LIBDSN TABULAR view which shows all the data sets in the selected LIBRARY.

```
Session C - [24 x 80]
File Edit View Communication Actions Window Help
I PROG(CFDTREQS)
RESULT - OVERTYPE TO MODIFY
  Program(CFDTREQS)
+ Rescount(001)
  Usecount(0000000001)
  Dataloc(Below)
  Execkey(Uexeckey)
  Executionset( Fullapi )
  Concurrency(Quasirent)
  Apist(Cicsapi)
  Remotesystem()
  Runtime( Notknown )
  Library(REALDSNS)
  Librarydsn(MOXEYC.GENERAL.LOAD)
  Jvmclass( )
  Jvmclass( )
  Jvmclass( )
  Jvmclass( )
  Jvmclass( )
  Jvmprofile( DFHJVMPR )

                                SYSID=CIGO APPLID=IYCWZCGO
                                TIME: 13.19.09 DATE: 05.18.07
PF 1 HELP 2 HEX 3 END          5 VAR          7 SBH 8 SFH          10 SB 11 SF
MA c                                                                    01/020
Connected to remote server/host winmvs2d.hursley.ibm.com using lu/pool IYCXTC68 and port 23
```

Notes

This example CEMT screen shot shows how the LIBRARY and LIBRARYDSN can be seen on CEMT INQUIRE PROGRAM, by selecting the program details and scrolling down to the second screen. This shows the LIBRARY and the data set within the LIBRARY from which the program was loaded.

This information is not only provided for dynamic LIBRARY resources, but also when a program has been loaded from a data set in DFHRPL.

This information is also provided on the INQUIRE PROGRAM SPI, in the CICSplex SM PROGRAM view and resource table, in program statistics and on the XPI.

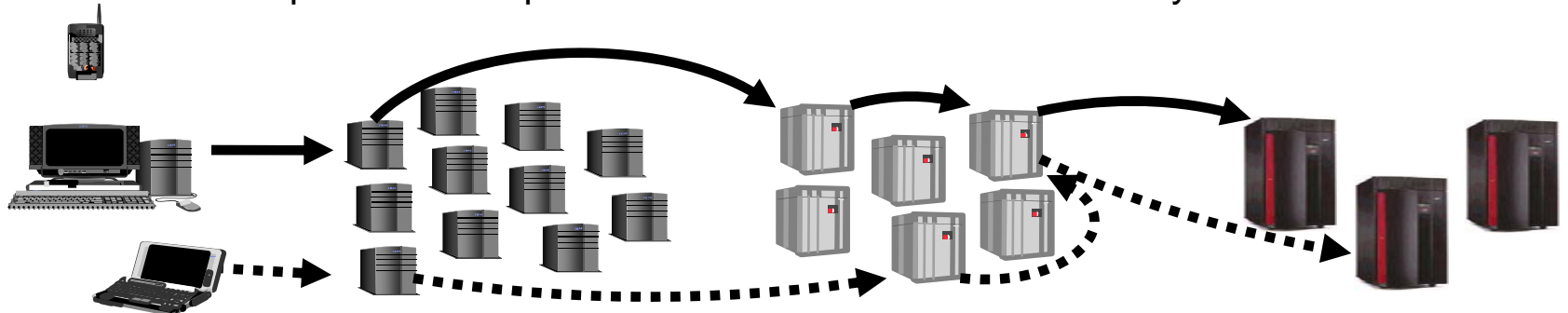
EWLM - a high level overview (1 of 3)

Improves
utilization of IT
resources

Manages
business process
service levels

... e-business environment issues ...

- Are my business performance objectives being met?
- What components of the environment are contributing to the problem?
- What resources are being used by an application or business process?
- What workloads are impacted by the problem?
- How these performance problems can be resolved without any human intervention?



Notes

A significant Service Management capability for which CICS TS 3.2 is providing support is the Enterprise Workload Manager, or EWLM. This is IBM's implementation of the Open Group's Application Response Measurement standard, ARM 4.0. (Note that ARM in this context does not stand for 'Automatic Restart Manager').

EWLM allows for end-to-end workload monitoring across a complicated e-business environment involving multiple servers and heterogeneous environments.

This provides answers to the kind of questions that arise in a complex e-business environment.

ELWM - A high level overview (2 of 3)

- **Enterprise Workload Manager (EWLM)**
 - Provides dynamic policy-based workload management to help improve optimization of resources in multi-tiered heterogeneous application environments
 - Application Response Measurement (ARM)
- **EWLM Domain Manager**
 - Management focal point for each EWLM Management Domain
- **EWLM Managed Server**
 - Communicates between the operating system and the EWLM Domain Manager
 - Gathers resource usage and delay statistics data
- **EWLM Control Center**
 - Browser-based application for the EWLM administrator, analyst, and operator

Notes

EWLM components include the workload manager, and also a domain manager, a managed server, and a control center.

EWLM – a high level overview (3 of 3)

- **Ability to monitor *all* or *specific* transactions that an application processes.**
- **Ability to monitor *all* or *specific* operating system processes.**
- **Monitor application transactions *separate* from operating system processes.**
- **Obtain end-to-end transaction data**
 - Example transaction flow:
 - Hop 0 – WebSphere Application Server
 - Hop 1 – CICS TS V3.2
 - Hop 2 – DB2 Universal Database
- **Autonomic resource management based on business goals and importance specified in the customer supplied policy.**

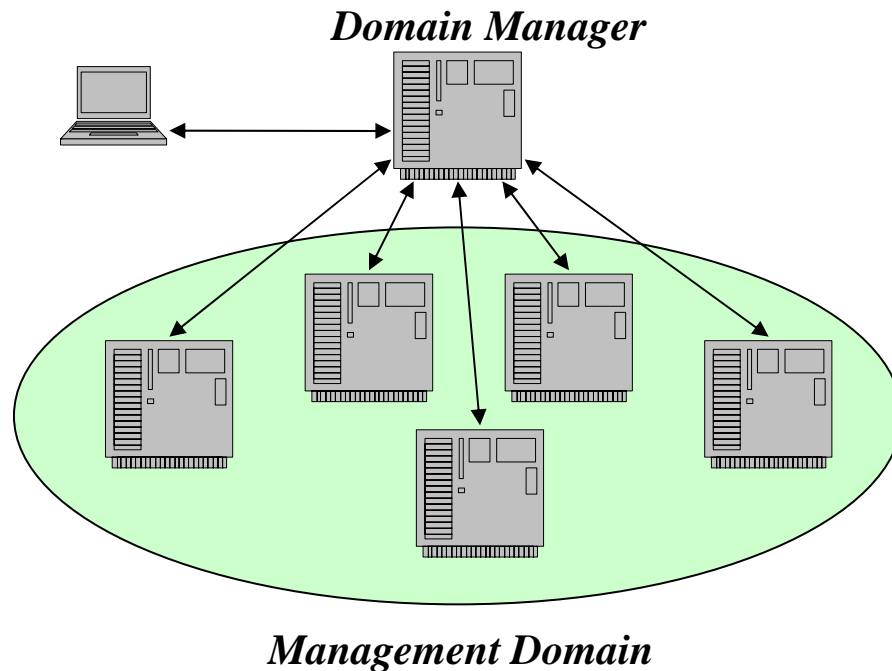
Notes

A Hop is a transaction flow from one middleware system to another.

On arrival at HOP0 (the first hop), a correlator is created.

An example of a Hop is a transaction going from a TOR to an AOR. The above example flow is from WAS to CICS to DB2, and the correlator is passed with the flow.

EWLM Management Domain



- Scope of EWLM performance management and reporting
- Set of servers communicating with a single domain manager
- Transactions classified on entry to domain
- Flexible scope ...
 - Servers supporting a business app.
 - Single tier
 - Single server to support testing

Notes

This diagram shows the components of EWLM within the EWLM management domain.

EWLM Domain Manager is a global management component supporting thousands of distributed web servers, application servers, database servers, and transaction servers.

EWLM Domain Manager coordinates policy actions across all servers in the management domain (e.g. “deploy”, “activate”) and aggregates server, application, and transaction statistics to construct the global view.

The figure is of a Sysplex with the EWLM Control Center running in a server with Domain manager. The other systems are managed servers.

CICS support of EWLM

- **No application changes required**
- **Correlators accepted and passed**
 - CICS ↔ CICS
 - Flowing into CICS
 - Flowing out from CICS
- **Transports**
 - SOAP, HTTP, IP Interconnectivity for DPL, IIOp, MRO
- **EWLM Control Center used to set up policies, show CICS workloads, etc.**

Notes

The CICS exploitation of EWLM does not require any changes to applications to allow them to be monitored with EWLM. It allows the flow between CICS systems to be followed as well as flows into CICS and out from CICS, making use of the 'ARM correlators' which correlate transactions on different subsystems.

In z/OS, DB2, WAS, CICS and IMS have used zWLM proprietary instrumentation interfaces. This existing instrumentation is mapped to ARM calls, and EWLM is supported via existing zWLM Performance Block instrumentation points. CICS will pass correlators from CICS to the EWLM support in zWLM, and extract the correlators from the Performance Block. It manages the flow of correlators between connected CICS systems, receives correlators on work coming into CICS from other systems, and ensures the correlators are available to be passed to zWLM. On work being transferred out of CICS, correlators are passed in whatever form the transport expects.

Correlators are accessible from task related user exits (TRUES) and certain global user exits (GLUES) via the performance block token.

EWLM is supported for a range of transports.

The EWLM control center can be used to see information about CICS transaction workloads.

EWLM Control Center

- **Browser-based application interface**
- **Ability to create and activate Domain Policy**
- **View server topology and applications**
- **Ability to view performance from a business perspective**



Notes

The EWLM control center is a web-based interface that can be used to set policies and view information about application topologies, relationships between middleware instances, response times at each hop, etc.

EWLM Control Center

Hop details - Transaction class 'CICS Transactions starting with E'

View the data for the hops that are processing work in the class.

Interval: 3/20/07 7:47:30 AM to 3/20/07 7:52:30 AM

Selected node ▾

- CICS Transactions starting with E
 - Hop 0
 - CICS
 - winmvs27.hursley.ibm.com
 - winmvs2c.hursley.ibm.com
 - SPUD20
 - IYK3ZC35
 - IYK3ZSC1
 - IYCWSTS1
 - IYK3ZC32
 - IYK3ZC21
 - IYCWCTGO
 - winmvs28.hursley.ibm.com
 - winmvs26.hursley.ibm.com
 - CICS
 - winmvs2c.hursley.ibm.com
 - IYK3ZC35
 - Hop 1
 - CICS
 - winmvs2c.hursley.ibm.com
 - IYK3ZC35

1. The Hops of eWLM transaction recorded.

3. eWLM average timing.

2. The eWLM transaction counts.

- Show response time data
- Show transaction counts
- Show resource data
- Show in progress data

Hop number	Name	Type	Platform	Average response time	Standard deviation	Average active time	Average queue time	Successful transactions	Failed transactions
	CICS Transactions starting with E	Class		03.561359	00.000000	03.561838	00.002023	1	0
0	IYK3ZC32	Instance	z/OS	03.561359	00.000000	03.539838	00.000023	1	0
1	IYK3ZC35	Instance	z/OS	03.399788	00.000000	00.013679	00.001750	1	0
Total: 3									

Hide Tree

Close

Notes

The figure shows an example of some of the information that can be obtained from the EWLM Control Center. In this example, there are hops starting at one CICS system and going across to another CICS system.

As can be seen, information is available for each hop on such things as response times, transaction success and failure, etc.

CICSplex SM installation merge with CICS

- **FMIDs**
 - CICSplex SM becomes a dependent FMID
- **Simplified installation and configuration**
 - Single set of Jobs
 - EYU1STAR merged into DFH1STAR
 - New JCL samples for CMAS, WUI Server and MAS
 - EYU1NST merged into DFH1NST
 - EYU9XDUT enhancements to create definitions for the WUI server & CMAS
- **EYUCMSDS & EYU9XDUT**
 - Enhanced CICSplex SM Data repository setup
- **New installation verification programs (IVPs)**
- **Web user interface (WUI) is the interface into CICSplex SM**
 - **TSO EUI has been removed**

The screenshot displays the 'CICS regions' page in the CICSplex SM Web User Interface. The page shows a table with columns for Record #, CICS system name, Job name, MV's system ID, Current number of tasks, CICS status, CICS Release, Total CPU time used, Number of page-in requests, Number of page-out requests, and Number of I/O requests. The table lists 18 records, each representing a different CICS system and its associated job name and metrics.

Record #	CICS system	Job name	MV's system ID	Current number of tasks	CICS status	CICS Release	Total CPU time used	Number of page-in requests	Number of page-out requests	Number of I/O requests
1	ICNLSQ04	ICNLSQ04 MV23		3	ACTIVE	0530	0:06:19.0189	245	202	4790
2	ICNLSQ0A	ICNLSQ0A MV20		14	ACTIVE	0530	0:03:01.1911	364	239	5794
3	ICNLSQ0B	ICNLSQ0B MV20		14	ACTIVE	0620	0:02:56.7303	63	480	3030
4	ICNLSQ0C	ICNLSQ0C MV20		14	ACTIVE	0630	0:03:10.1986	82	562	8645
5	ICNLSQ0D	ICNLSQ0D MV20		14	ACTIVE	0640	0:06:04.3745	9	1	9065
6	ICNLSQ0A	ICNLSQ0A MV21		14	ACTIVE	0530	0:07:59.6019	145	200	5487
7	ICNLSM09	ICNLSM09 MV21		14	ACTIVE	0620	0:01:30.4538	5	0	0741
8	ICNLSQ0A	ICNLSQ0A MV23		14	ACTIVE	0530	0:02:59.2772	113	418	5902
9	ICNLSQ0B	ICNLSQ0B MV23		14	ACTIVE	0620	0:02:58.9553	7	0	9141
10	ICNLSQ0C	ICNLSQ0C MV23		14	ACTIVE	0630	0:03:07.9552	0	4	8897
11	ICNLS13	ICNLS13 MV26		3	ACTIVE	0650	0:00:16.3402	10	0	15846
12	ICNLS18	ICNLS18 MV26		6	ACTIVE	0650	0:06:22.0524	165	0	45711
13	ICNLS10	ICNLS10 MV27		14	ACTIVE	0650	0:26:53.7018	0	1	6554910
14	ICNLS106	ICNLS106 MV27		14	ACTIVE	0650	0:05:23.8604	20	0	973037
15	ICNLS107	ICNLS107 MV27		4	ACTIVE	0650	0:00:04.8228	0	0	14827
16	ICNLS117	ICNLS117 MV27		14	ACTIVE	0650	1:46:18.7769	58	106	69885

Notes

CICSplex Systems Manager is seen as providing the primary interface for managing CICS resources and systems. CICS TS 3.2 removes some of the last inhibitors that may have prevented some users from getting the full benefit of CICSplex SM.

As part of this, the Web User Interface becomes the single, fully functional, interface to systems management in a CICSplex, and the TSO End User Interface is removed in this release.

Another aspect is the simplification of the installation of CICSplex SM and further integration into the CICS base. In particular, a lot of focus has been given to simplifying the set up and use of the CICSplex SM environment, so that the capabilities can be more readily exploited.

This is a non-optional install, containing default values for all parameters which makes CICSplex SM a 'plug and play'. Running DFHISTAR creates a basic CICSplex SM for a WUI server. This is a 'bootstrap' capability giving you definitions which allow you to connect a WUI server from your CMAS.

The EYU9XDUT utility can now create the definitions required to start a Web User Interface and its CICSplex (previously it just created a definition for a CMAS)

EYUCMSDS defines and initializes all the CICS and CICSplex SM datasets you need for a CMAS.

A new Installation Verification Program (IVP), with a set of instructions in the Information Centre, guides you through using the new set of jobs produced by DFHISTAR.

As CICSplex SM and CICS are becoming more connected (for example, CICSplex SM uses some of CICS services, such as for issuing messages), the two products will share an APAR: If a fix is required to both, one APAR will contain two PTFs – one for CICS and one for CICSplex SM. This is enabled by making CICSplex SM a dependent FMID (function modification ID) of CICS.

CICSplex SM installation

- **Default resource definitions created at startup for**
 - CMAS
 - WUI
 - MAS

- **Removed requirement to customize DFHCNV**

- **Enhanced EYUSAMP set**
 - EYU\$CDEF (CMAS)
 - EYU\$WDEF (WUI)
 - EYU\$MDEF (MAS)

Notes

As part of the simplification of CICSplex SM setup, the CICS resource definitions required to run a CMAS, Web User Interface Server, and to manage CICS regions are all installed dynamically, and no longer need to be created manually in the CSD. The samples in EYUSAMP set show the definitions, as CSD DEFINE statements, which can be altered to use in preference to those created by default for you.

The code page conversion tables needed for the WUI are now automatically included in DFHCNV, rather than requiring you to customize this.

The supplied sample set has been enhanced to get you up and running faster with CICSplex SM.

CICSplex SM Web User Interface Enhancements

- **Map support added**

- Explore associations between resource definitions
- Also as PTF on CICS TS 3.1

Map of CICS system definition IYK3ZAB2



Context: ALISCP5M

CICS system definition	↔	Workload management (WLM) specification	↔	Workload management (WLM) group	↔	Workload management definition	↔	Transaction group definition
IYK3ZAB2	=	<input type="radio"/> WLMSPEC1	—	<input type="radio"/> WLMGRP1	—	<input type="radio"/> WLMDEF1	—	<input type="radio"/> TRANGRP1
				<input type="radio"/> WLMGRP2				
				<input type="radio"/> WLMGRP3				

- **Help**

- Help information for all fields

- **Consistent terminology used throughout**

- **ALL option added to COVC transaction**

- Export WUI repository in one step

Notes

Other enhancements to CICSplex SM include the addition of MAP support to the web user interface. This was a capability of the TSO end user interface which was not provided via the WUI.

The MAP function shows associations between resource definitions to be viewed diagrammatically. It is useful for understanding the topography of BAS, WLM and RTA definitions.

Field-level help has been provided, and the terminology used throughout the WUI has been made consistent.

The COVC transaction now has an option to allow the whole repository to be exported in a single step, rather than specifying each resource type in turn.

CICS – WebSphere MQ adapter installation

- **Components integrated into CICS install in CICS TS 3.2**
 - Transferred from WebSphere MQ
 - **CICS-MQ Adapter** and the **MQ trigger monitor for CICS**
 - For use with all supported releases of Websphere MQ
 - **MQ bridge**
 - Includes DPL bridge and link 3270 bridge
 - Does not include the 3270 start bridge (obsolete)
 - For WebSphere MQ V6 and above
 - With WebSphere MQ V5.3.1, control will be transferred to the bridge installed with WebSphere MQ
 - CICS Level 2 and Level 3 will service CICS shipped components

- **Websphere MQ will continue to ship components for use with CICS TS V3.1 & below**
 - Until such time as all releases of CICS TS prior to V3.2 are out of service
 - Limited enhancements over time, will functionally stabilize
 - MQ Level 2 and Level 3 will continue to service MQ shipped components

Notes

In CICS TS 3.2, CICS TS assumes responsibility for the components that are used to communicate between CICS and WebSphere MQ. This allows CICS to provide enhancements to these components, such as threadsafety, as well as improved diagnostics and statistics using CICS facilities.

This slide shows the WebSphere MQ components that will be shipped with CICS TS 3.2:

- CICS-MQ Adapter
- MQ trigger monitor for CICS
- MQ bridge

The first two will work with all supported releases of WebSphere MQ. The bridge will work with version 6 and above, but when using MQ version 5.3.1, control will be transferred to the WebSphere MQ shipped bridge.

WebSphere MQ will continue to ship the equivalents of these for use with CICS TS 3.1 and below as long as those versions are in service.

CICS Transaction Server V3.2

- **Application Connectivity**
 - Web services standards, interoperability profiles, large messages, and data mapping
 - Intercommunications over TCPIP
 - HTTP and TCP/IP management and performance
- **Application Reuse**
 - 64-bit storage for CONTAINER data
 - CICS integrated translator support for C and C++
 - Java management and Java 5
- **Service Management**
 - On-line management of program libraries
 - Enterprise Workload Manager
 - CICSplex SM Web User Interface help, usability, and MAP support
 - CICSplex SM and CICS-WMQ adapter installation and management
- **Architectural Enhancements**
 - Threadsafe core APIs for accessing VSAM files, journals, WebSphere MQ
 - Capacity of VSAM ESDS files >4GB, shared data tables >2GB, CICS regions in a Sysplex
 - Trace, monitoring and statistics

Notes

The final major theme is that of Architectural Enhancements. This addresses some of the constraints and limitations in CICS.

Customer systems are growing, with increasing transaction rates and volumes of application data in memory and on DASD. System Z capacity is increasing in, for example, CPUs, DASD and Sysplex capabilities. CICS needs to keep up with this growth.

The architectural enhancements in CICS TS 3.2 covered are:

- Threadsafety for aspects of File control (not all access methods and not all SPI)
- Journal APIs are now threadsafe, and the WebSphere MQ interfaces shipped with CICS now exploit OTE.
- Constraint Relief Support for shared Data Tables > 2 GB via multiple dataspaces enables large quantities of read-only application data for high performance access
- Support for large capacity VSAM ESDS files is provided via eXtended RBAs
- The ability is provided to connect more than 2047 CICS systems over XCF
- Monitoring enhancements include improved timing data precision and support for monitoring record compression.

Threadsafe CICS commands (1 of 2)

■ File Control

- Commands now **threadsafe** (local VSAM and VSAM RLS)
 - READ, READNEXT, READPREV - STARTBR, RESETBR, ENDBR
 - WRITE, REWRITE - DELETE, UNLOCK
 - INQUIRE FILE
- Commands that remain **non-threadsafe**
 - SET FILE
 - INQUIRE/SET DSNAME
 - CREATE/DISCARD FILE
 - Access methods that remain **non-threadsafe**
 - Remote files, Shared Data Tables, Coupling Facility Data Tables, BDAM files
- **File Control global user exit programs**
 - Should be made threadsafe
 - If not, excessive TCB switching will occur

Notes

One of the limitations that has been addressed relates to CICS ability to take advantage of multiprocessing by running workloads on multiple TCBs. Over the course of a number of releases we have been making more and more commands threadsafe, allowing programs which use the commands to run on open TCBs.

In CICS TS 3.2, some aspects of File Control are made threadsafe. The File Control APIs for access to local VSAM files, and to VSAM RLS files, will be threadsafe. The relevant APIs are listed on the slide, along with the INQUIRE FILE SPI which is also threadsafe, although other SPI commands will not be.

This gives greater throughput and for certain workloads, such as mixed File Control and DB2 workloads, can give significant performance benefits.

Other File Control access methods remain non-threadsafe.

Note that any exits enabled at the File Control exit points must be threadsafe, and defined as threadsafe, to avoid unnecessary TCB switching.

Threadsafe CICS commands (2 of 2)

- **CICS-MQ adapter provided with CICS TS V3.2 enhanced to use OTE**
 - The CICS-MQ TRUE is enabled as OPENAPI
 - The CICS-MQ TRUE uses L8 TCBs not private TCBs
 - MQ API commands from CICS applications are threadsafe

 - Note: The CICS-MQ adapter provided with WebSphere MQ will not support OTE

- **JOURNAL commands**
 - WRITE JOURNALNAME (and WRITE JOURNALNUM)
 - WAIT JOURNALNAME (and WAIT JOURNALNUM)
 - XPI WRITE_JOURNAL_DATA

- **System “autoinstalled” global user exits**
 - Can be defined as threadsafe

Notes

The CICS-MQ Adapter that is shipped with CICS TS 3.2 is threadsafe, and enabled to use CICS open TCBs.

The journaling API is now threadsafe, as is the write_journal_data XPI.

Also, Global User exits that are enabled from first-phase PLT programs can now be defined as threadsafe (using the THREADSAFE keyword on EXEC CICS ENABLE).

Current (pre-3.2) Shared Data Tables support

- **Total shared data tables per region limited to 2GB**
 - Aggregate limit for one or many tables
- **Each shared data table limited to 2GB of data**
 - Maximum size of a single data space
- **Storage for control structures (table entry descriptors and index storage) comes from the CICS region**
 - Allocated within the CICS address space
- **Storage for data records allocated in a data space of up to 2GB**
 - Only one data space per CICS region, DFHDT001

Notes

The capacity of shared data tables is increased in CICS TS 3.2. This slide explains the situation pre-3.2.

In releases prior to CICS TS 3.2, the space available for shared data tables was limited to 2GB. Any individual shared data table could not be larger than 2GB, nor could the total size of all data tables exceed this limit.

In addition, the control structures used by shared data tables were allocated from within the CICS address space, thus using CICS region storage and adding an additional limit to the size of shared data tables.

Shared data tables greater than 2GB

- **New Data Space allocations**
 - Multiple data spaces now available, up to 100
 - Total table space per shared data table owning region potentially 200GB
 - Individual tables > 2GB, or many more tables, or both
- **Entirely transparent to applications**
 - Only difference is not running out of space!
 - Performance unaffected
- **Data Spaces:**
 - DFHDT001
 - Table Entry Descriptors
 - Previously stored in CICS Address Space
 - DFHDT002
 - Index Nodes
 - Previously stored in CICS Address Space
 - DFHDT003 – DFHDTnnn
 - Up to 2 GB of Record Data each
 - Up to 100 Dataspaces per CICS region (98 for record data)
 - New data spaces created when needed
 - Deallocated when the owning region is shutdown

Notes

In CICS TS 3.2 the constraint on shared data table storage has been removed, by allowing shared data tables to extend across multiple data spaces. Thus any given shared data table can be larger than 2GB, and the total storage for data tables can be up to around 200GB.

In addition, the control structures for table entry descriptors and the table index, which were within the CICS address space, have been moved to their own dedicated data spaces, DFHDT001 and DFHDT002. Data spaces DFHDT003 up to DFHDT100 can be used for shared data table records. The data spaces are deallocated when the owning region is shut down (data table record storage is deallocated when the shared data table is closed).

This change is entirely transparent to applications which use shared data tables support.

Controlling Shared Data Table storage usage

- **XDTRD / XDTAD**
 - CICS GLUEs
 - Selectively limit the records saved in a data table
- **IEFUSI**
 - z/OS exit
 - Limits the amount of data space an address space can own
- **z/OS Console Command**
 - `D J, jobname`
 - Lists dataspaces in use by jobname
- **DFH0STAT**
 - Several fields report record counts and storage usage

Notes

As noted on the slide, the data tables user exit points XDTRD and XDTAD can be used to determine whether or not a record is to be added to a data table (XDTRD controls this for data table loading and when a record is read which is not already in the data table, while XDTAD is invoked on writes to the data table). These exits can therefore be used to control the size of a data table.

The IEFUSI exit can override the maximum data space storage.

The Display Job MVS console command can show details of the data spaces owned by a CICS region, from which you can see how many data spaces are being used for shared data tables.

The DFH0STAT statistics report includes information about data table storage.

ESDS files greater than 4GB

- **New XRBA keyword on file control commands**
 - May be specified anywhere RBA is used
 - READ, WRITE, STARTBR, RESETBR, READNEXT, READPREV
 - XRBA mutually exclusive with RBA
 - NOT generally transparent to applications
 - Requires 8-byte RIDFLD variable

 - XRBA API may be used on non-Extended ESDS

 - Remote files are supported

 - No Alternate Indexes over Extended ESDS - VSAM does not support this

Notes

An ESDS (Entry Sequenced Data Set) is a VSAM dataset that behaves rather like a sequential data set. As new records are added to an ESDS, they are appended to the end of the data set. It is not possible to insert a new record between two existing records, nor is it possible to delete a record once it has been created. Records in an ESDS may be of either fixed or variable length. As each record is added to an ESDS it is assigned an RBA (Relative Byte Address) which is an unsigned 32-bit number. The RBA is the number of bytes from the beginning of the ESDS at which the record is located. The use of RBAs implies that an ESDS may not contain more than 4 gigabytes of data.

The limit of 4 gigabytes for an ESDS became a problem when customers found that existing data sets grew and eventually exceeded 4 gigabytes in size. Consequently, VSAM introduced a new kind of ESDS that supported 64-bit RBAs.

The new ESDS is correctly called an **extended format, extended addressing** data set. An XRBA is normally used as a token to identify a record, which may be stored. It is an 8-byte field.

To support 64-bit RBAs, a new keyword XRBA has been added to the File Control API. XRBA is mutually exclusive with RBA. A change to exploit extended addressing ESDS files is not therefore transparent to applications.

It is possible to issue XRBA requests against remote files. If the File owning region is not at release 3.2 or higher then READ, STARTBR and WRITE requests will receive a response of ILLOGIC.

New Keyword on INQUIRE FILE

■ RBATYPE

- EXEC CICS INQUIRE FILE
 - Returns CVDA values
 - EXTENDED - Only returned for Extended ESDS
 - STANDARD - For all non-ESDS VSAM datasets
 - NOTAPPLIC – BDAM, Remote Files, Closed Files
- CEMT INQUIRE FILE
 - RBATYPE returned on secondary view
- CICSplex SM LOCFILE
 - RBATYPE displayed on Detail View

Notes

EXEC CICS INQUIRE FILE supports a new keyword of RBATYPE which returns CVDA values of EXTENDED, STANDARD or NOTAPPLIC.

NOTAPPLIC is for BDAM files, remote files and files which are currently not open.

RBATYPE EXTENDED is only returned for ESDS data sets.

All other VSAM datasets return RBATYPE STANDARD.

Impact on Applications

- **Non-extended ESDS**
 - No change to existing programs
- **RBA Insensitive**
 - Program does not use RBA to access records
 - May use RBA to access Extended ESDS
 - WRITE, STARTBR, READNEXT, READPREV
- **RBA Sensitive**
 - Program specifies RBA to Read/Update records
 - Must use XRBA to access Extended ESDS

Notes

There is no change to existing programs that use the RBA API to access traditional ESDS files.

Also, there is a common class of applications known as “RBA insensitive” in which records are first written sequentially and then, later, browsed sequentially from the beginning. Although RBAs are being passed between CICS and the program, the program actually makes no use of them; the program is only interested in reading or writing the next record. An “RBA Insensitive” program may be reused without change for an extended ESDS.

Programs such as those that directly read and/or update records by specifying an RBA are “RBA Sensitive”. Such programs must be modified to access an Extended ESDS. The RIDFLD (key) data areas must be converted from 4 bytes to 8 bytes, and the RBA keyword must be changed to XRBA.

New Log and Journal Records

- **New records for Extended ESDS**
 - Existing log records do not change
 - New Records similar to existing log and journal records
 - There is an “extended addressing ESDS” indicator in the tie-up record and in the individual log records.
 - WARNING!!
 - Log record types match Dataset Type, not API mode of access
 - Key fields are length 8. Key length fields are set to 8.
 - The various base_esds_rba fields which occur in several types of log record are not used and are set to 0.
- **CICS VR V4.2 supports the new log record format**

Notes

Existing log records for non-Extended datasets do not change.

Forward recovery log records and autojournal records for extended addressing ESDS need to log the full 64-bit RBA. Therefore log, journal and autojournal records for extended addressing ESDS data sets are new (similar to, but not the same as, those for a standard ESDS).

- There is an “Extended ESDS” bit set in the Tie-up records and the individual log records.
The log record type is determined by the dataset type, not by the API used to access the file. In some circumstances, it is possible to access Extended ESDS with RBA and to access non-Extended ESDS with XRBA.
- Key fields are 8 bytes and key length fields are set to 8
- BASE_ESDS_RBA fields are set to 0

This new format of log record is supported by the CICS VSAM Recovery product V4.2.

Impact on Exits

- **Changes to API may affect:**
 - XFCREQ
 - XFCREQC
 - XFCFRIN
 - XFCFROUT

- **New log and journal records may affect:**
 - XFCLDEL
 - XFCBFAIL
 - XFCBOVER
 - XFCBOUT

Notes

The introduction of XRBA support can have an impact on user exit programs.

The user exit points XFCREQ and XFCREQC are essentially unaffected, but there is a new bit in the EID for XRBA. If the XRBA bit is on, the parameter FC_RIDFLD will point to an 8-byte XRBA.

The XFCFRIN and XFCFROUT exits are presented with the DFHFCFR parameter list which has a new UEP_FC_RECORD_ID_TYPE of UEP_FC_XRBA. There are also new FCFR return codes introduced.

User Exits XFCLDEL, XFCBFAIL, XFCBOVER, and XFCBOUT are all presented with log records, so exit programs must be modified to handle the new Extended ESDS journal records.

XCF group limit relief

- **Allow specification of which XCF group to join**
 - New systems initialization parameter for CICS
 - XCFGROUP= name | DFHIR000
 - New EXCI options table parameter batch programs
 - XCFGROUP= name | DFHIR000

- **Display which XCF group a region has joined**
 - EXEC CICS INQUIRE IRC
 - CEMT INQUIRE IRC
 - CICSplex SM CICSRRGN and CMAS

Notes

There is a limit of 1023 (z/OS 1.5) or 2047 (z/OS 1.6) on the number of members that can join an XCF group, Prior to CICS TS 3.2, CICS regions could only join one XCF group (DFHIR000). This placed a limit of 2047 on the number of CICS regions that can communicate over XCF (and therefore on the number that a single Sysplex can support).

While XCF allows up to 2047 members in a XCF group there is an increasing performance penalty associated with increasing group membership numbers, related to maintaining the group topology as members enter and leave the group.

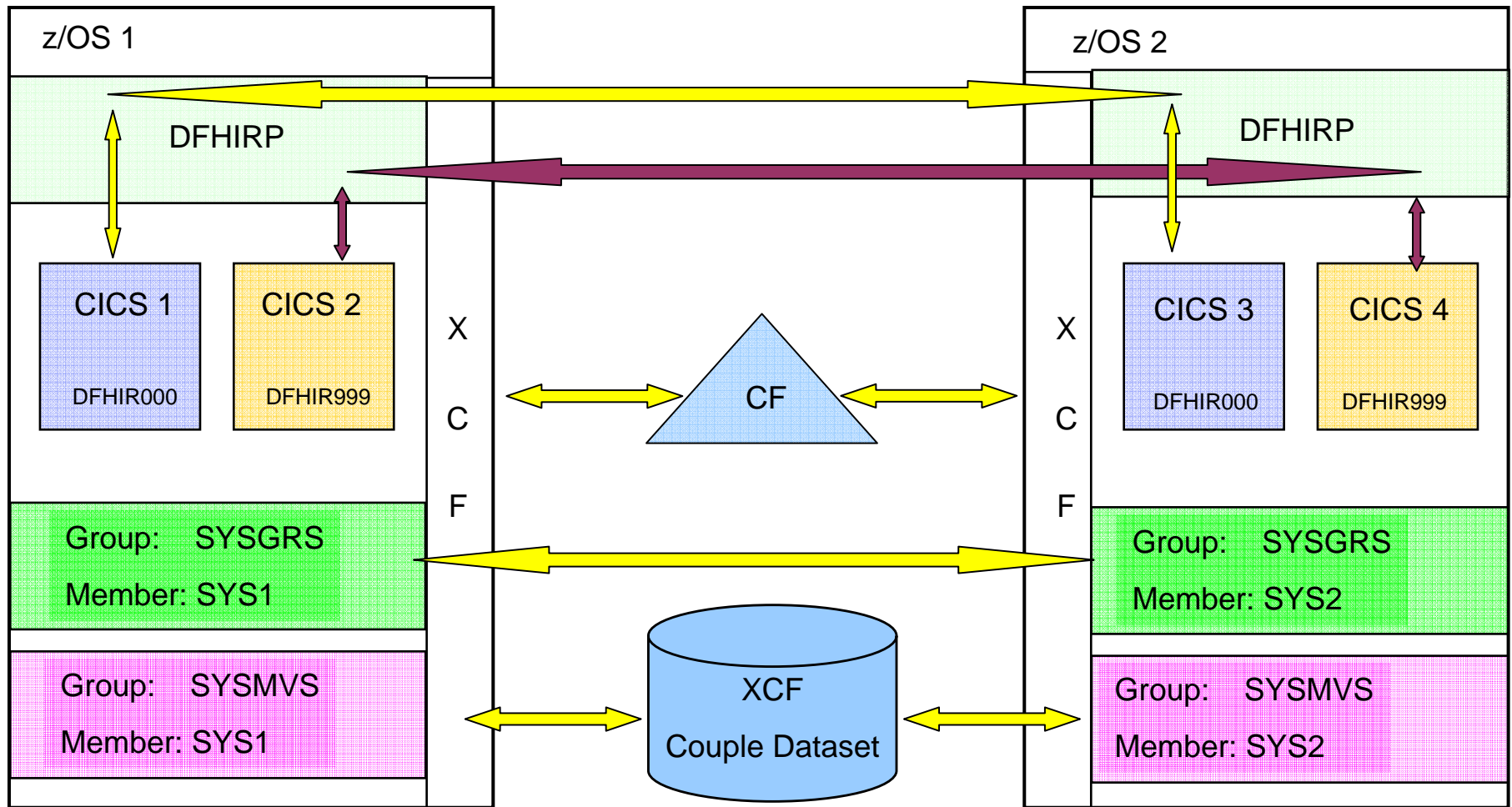
CICS systems are rather stable and will not join and leave groups on a regular basis. The disruption tends to come from other work using EXCI.

New function in CICS TS 3.2 allows a CICS region to specify the XCF group it will join. This might be used to separate production systems (in one XCF group) from development/test systems (in another XCF group). It could also be used to split the production systems, but in this case CICS regions in different XCF groups will not be able to communicate with one another using MRO.

XCF groups apply to both CICS regions and CICS Transaction Gateway daemons. The XCF group can be specified as the XCFGROUP system initialization parameter, and for programs using EXCI as the XCFGROUP options table parameter. In both cases, the default group is DFHIR000.

A new XCFGROUP option on INQUIRE IRC (CEMT and SPI), and a new XCFGROUP attribute on the CICSplex SM CMAS and CICSRRGN resource tables and views, will show which XCF group the region has joined.

XCF group limit enhancements...



Notes

This figure shows an example of four CICS regions in two XCF groups, and shows how the systems within an XCF group can communicate across the Sysplex.

It shows two CICS systems (CICS1 and CICS2) in one MVS image (z/OS 1) and two more CICS systems in a separate MVS image (z/OS 2) within the same Sysplex. CICS1 and CICS3 are defined as being in the default XCF group DFHIR000, and CICS2 and CICS4 are defined as being in a separate XCF group DFHIR999.

In CICS 3.1 all four CICS systems join the same XCF group DFHIR000, and all four CICS systems can communicate with one another.

In CICS 3.2, the MRO links between CICS1 and CICS2, and between CICS3 and CICS4, use either IRC or XM access methods, as defined for the link. Intercommunication between CICS1 and CICS2, and between CICS3 and CICS4, is not permitted as they belong to different XCF groups, even though they do not communicate via XCF

The MRO links between CICS regions on z/OS 1 and the CICS regions on z/OS 2 use the XCF method, selected by CICS dynamically.

CICS1 can communicate with CICS3 over XCF (same XCF group) and CICS2 can communicate with CICS4.

CICS1 cannot communicate with CICS4 (different XCF groups) and CICS2 cannot communicate with CICS3.

If CICS2 were to be moved from z/OS 1 to z/OS 2, it would still not be able to communicate with CICS3 or CICS1 as they are in different XCF groups.

Monitoring clock precision

■ Old Clock Format

- 8 byte area
- 32 bits for Timer component
- 16 microsecond units
- About 19 hour capacity

■ New Clock Format

- 12 byte area
 - 64 bits for Timer Component
 - 1 microsecond units – 6 decimal places
 - Several years capacity
- Reserved 8 bits and Period Count (24 bits) are unchanged
 - Performance Class Clocks Only

■ More granularity plus more capacity

Notes

Some enhancements have been made in the area of monitoring.

On CICS TS 3.1 the monitor s-type clock is contained in a 8 byte field, of which the first 4 bytes contained the clock value. The 4 byte clock can only record a value of 16 micro seconds or greater, so any time less than 16 micro seconds would not be seen and any time greater than 16 micro seconds would be rounded down to the nearest 16 micro seconds. With faster processors these problems were being noticed more often. At the other end of the scale the maximum interval that can be stored in the 4 byte clock field is approximately 18 hours. This causes problems with long running transactions which can run for days.

The size of the monitoring record clock format has been increased in CICS TS 3.2, resulting in an increase both to the precision and capacity of monitoring time fields. This increased accuracy is especially needed with the speed of today's processors and CICS systems, and the increased capacity supports long-running transactions.

The new clock format applies to Performance Class monitoring, not to resource or exception class.

Monitoring data compression

- **Monitoring Domain issues CSRCESTRV SERVICE=QUERY at Domain Initialization**
 - COMPRESS=YES|NO in DFHMCT TYPE=INITIAL macro
 - Default is COMPRESS=NO
 - Compression Length Field added to SMF 110 records
 - SMFMNCRL
 - Non-zero value indicates record is compressed
- **Monitoring Domain Subroutine issues CSRCESTRV FUNCTION=COMPRESS**
 - Algorithm chosen exploits occurrence of repeated characters in a data stream
- **Monitor Domain Dump Formatter formats compression management information**
- **DFH\$MOLS contains logic and calls to decompress monitoring records**

Notes

Another monitoring enhancement in CICS TS 3.2 is support for compression of monitoring records. This is selectable, and is off by default.

However, it is in some ways a no-cost benefit because, although CPU is obviously required to carry out the compression, there are then savings in moving the compressed data.

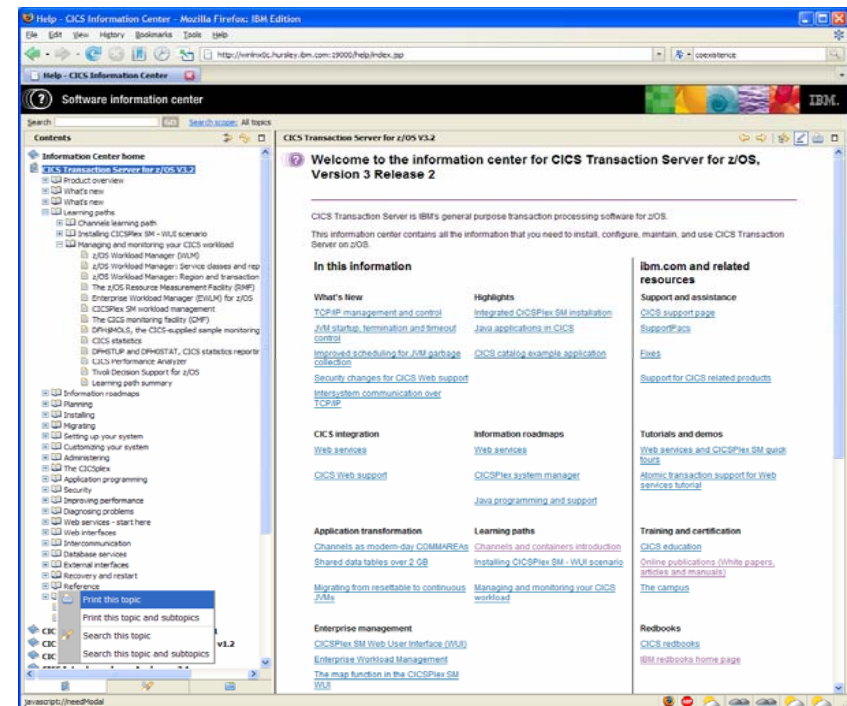
The Customization Guide contains details for utilities on Monitoring Record Compression

Note: Compression only applies to SMF 110 Subtype 1 Records

CICS Information Center

Content

- Builds upon navigational improvements introduced in V3.1
- Now includes previously licensed publications
- New and updated learning paths and product overview, including Managing, measuring, and analyzing your CICS workload
- New headers and footers on every page
 - Feedback link
 - Timestamp of last update
 - A link to the PDF
 - URL for the displayed topic
- Anchors enable the Info Center to be extended with your own documentation



Upgraded to IBM Eclipse Help System V3.1

- Update Manager – install or update documentation from an IBM server via FTP or HTTP
- Enhanced search and results
- "Quick menu" to search or print a topic or section of the navigation
- Icon to turn search highlighting on and off

Use via IBM Web site, workstation, or server

Notes

- We continue to invest in enhancing and improving the CICS Information Center, both in terms of the information provided and the navigation and search capabilities.
- In CICS TS 3.2 there are a number of improvements, some of which arise from a move to the Eclipse Help System 3.1
- One significant change is the provision of 'anchor points' which allow you to add your own information to the Information Center via Eclipse plug-ins, such as your installation's standards and procedures.
- The Information Center is powered by Eclipse technology: it consists of an Eclipse Help System, with the information for CICS TS V3.2 as a set of plug-ins. The Information Center can be run from the CD-ROM provided with the product, or installed onto a workstation or server. The CICS TS V3.2 Information Center builds on the improvements introduced in the previous release including sections on What's New, Learning paths, Information roadmaps, and integrated Troubleshooting and support.
- The previously licensed CICS publications are now included in the CICS Information Center. These include the Data Areas, Supplementary Data Areas, Diagnosis Reference, Debugging Tools Interfaces Reference
- In the CICS TS V3.2 Information Center, the CICS documentation has been enhanced to include the following:
 - New headers and footers on every page, providing a feedback link, timestamp for when the topic was last updated, a link to the PDF, and a URL for the displayed topic.
 - Additional learning path and new product overview section
 - Anchors. The CICS navigation now includes a number of anchor points, allowing users to write their own document plug-ins to extend the information center navigation.
- The CICS TS V3.2 Information Center has been upgraded to run on the IBM Eclipse Help System V3.1 level. As a result, the Information Center has a number of enhancements:
 - Update Manager can be used to obtain refreshes to the documentation directly.
 - An enhanced search engine and search result listing.
 - Improvements to the user interface, including the "Quick menu", which allows a user either to search or print a topic or section of the navigation, and a new icon to turn search highlighting on and off.

CICS TS V3.2 packaging

- **CICS TS V3.2 product elements**
 - CICS Transaction Server
 - CICSplex System Manager
 - CICS Information Center
 - REXX Development System and REXX Runtime Facility for CICS
 - CICS Application Migration Aid

- **CICS Service Flow Feature**
 - No cost feature; can easily be ordered with CICS TS

- **WebSphere Developer for System z V7 promotion**
 - Integrated development environment for CICS and WebSphere
 - COBOL, PL/I, Java and J2EE, and Web services development
 - Integration with z/OS file systems and job scheduling
 - One license included, but service entitlement if required is not included



Notes

- CICS Transaction Server for z/OS V3.2 (5655-M15) product elements includes
 - CICS V6.5
 - CICSplex System Manager V650
 - CICS Information Center
 - REXX Development System for CICS/ESA
 - REXX Runtime Facility for CICS/ESA
 - CICS Application Migration Aid V1.1

- The CICS Service Flow Feature of CICS TS V3.2 is an optional, no-charge feature. In a single offering, the CICS Service Flow Feature provides the tooling and run-time capabilities to enable the creation of CICS business services by composing existing CICS applications and resources into service flows that implement the required business service behaviour.

- Also shipped with this product as a marketing promotion is a media pack with one free license of WebSphere Developer for System z (WDz) V7. WDz is not part of CICS TS, and is not required in order to use CICS TS. WDz is an Integrated Development Environment (IDE) that helps developers create dynamic Web applications including support for Java 2 Enterprise Edition (J2EE), XML and Web services technologies that can integrate WebSphere software and traditional transactional environments, including CICS, IMS, and Batch systems. It promotes the reuse and transformation of existing applications, and supports Java, COBOL, PL/I, and Enterprise Generation Language (EGL) development.

Planning and migration (1 of 2)

- **Operating System required**
 - z/OS (5694-A01) V1.7, or later

- **Java runtime supported**
 - IBM SDK for z/OS Java 2 Technology Edition, V1.4.2
 - Required for
 - CICS Web services assistant
 - CICS applications written in Java, including Enterprise JavaBeans

- **Latest language compilers supported**
 - IBM Enterprise COBOL for z/OS and OS/390 V3 (5655-G53)
 - IBM Enterprise PL/I for z/OS and OS/390 V3 (5655-H31)
 - z/OS C/C++ (component of 5694-A01)

- **See the Announcement Letter for the full list of older compilers supported and other software and hardware requirements**

Notes

- CICS TS for z/OS V3.2 requires z/OS V1.7 (5694-A01), or later, and will not initialize in an environment with a lower level of operating system installed.
- For Java application programs, enterprise beans, or the Web Services Assistant, the IBM SDK for z/OS, Java 2 Technology Edition, Version 1.4 (5655-I56). This must be at the V1.4.2 level.
- The Language Environment library SCEERUN must be available to CICS during CICS initialization, by inclusion in either the STEPLIB concatenation or the LNKLIST. Language Environment services are used by a number of CICS functions.
- Other details, including platforms and browser versions supported for the Information Center, can be obtained from the Announcement Letter (available from <http://www.ibm.com/cics>) or from the Information Center.

Planning and migration (2 of 2)

- **CICS TS V3.2 is applicable to all CICS customers**
 - CICS TS V1.3 service was discontinued in April 2006
 - CICS TS V2.2, V2.3, V3.1 continue to be serviced
 - CICS TS V2.3 continues to be orderable for customers requiring OS/VS COBOL runtime

- **SOAP for CICS Feature coexistence supported for migration to base CICS TS V3.2 function**
 - Modify your message adapters to use the new interfaces
 - Review your use of containers. The SOAP for CICS feature uses BTS containers; the Web services support in CICS TS V3.2 does not use BTS. In addition, the containers used in the new Web services support, and those used in the feature, have different names
 - Replace function in user-written handlers with function provided in this release

- **Statement of direction**
 - IBM intends to deliver, in the second half of 2007, a release of the CICS Transaction Gateway that enables Java applications to exchange large amounts of data (greater than 32KB) with CICS applications that use the containers and channels APIs, and enables transactional (two-phase commit) support when using the JCA. This will also support EWLM over JCA. These capabilities will exploit the new IP interconnectivity for DPL provided in CICS TS V3.2
 - IBM also intends to deliver, via the service channel on CICS TS V3.2, support for the new WS specifications in WS-Security

Notes

- CICS TS V3.2 is recommended for all CICS customers migrating from older releases. The base software prerequisites for CICS TS V3.1 are similar to CICS TS V2.3 (e.g. z/OS V1.4 as a base).
- A primary consideration on migrating to CICS TS V1.3 or later is the language and compiler level used by the applications. CICS TS V3.1 removed support for the execution of OS/VS COBOL programs. CICS TS V2.3 continues to support the execution of OS/VS COBOL.
- The capabilities in the SOAP for CICS feature, which was orderable with CICS TS V2.2 and V2.3, became part of the base CICS TS product at CICS TS V3.1. However, to assist migration for customers who already have this feature, the feature may be used and is supported with CICS TS V3.2, and applications will continue to run. Customers are recommended to migrate to the Web services support capabilities of CICS TS V3.2.
- CICS has announced plans to remove some older and obsolete functions. In a future release of CICS, we plan to remove; the ONC RPC feature, the CICS Web Interface COMMAREA interfaces and the CICS Web Server plug-in.

CICS Transaction Server – support and news

ibm.com/software/http/cics/tserver/support/

- Search technotes (4,000+), APARs
 - Download SupportPacs
 - Read white papers, articles and brochures
 - Full Information Center and manuals
 - Updates via RSS feeds + e-mails
 - Submit and track problems
-
- Transaction Servers and Tools eNews
ibm.com/software/http/cics/enews/
 - Events
ibm.com/software/http/cics/events/
 - developerWorks articles
 - CICS user groups
 - CICS-L forum

The image displays two screenshots of the IBM Software - CICS Transaction Server support website. The top screenshot shows the main support page with navigation tabs (Home, Products, Services & solutions, Support & downloads, My account) and a search bar. The page content includes sections for 'Primary support resources', 'Solve a problem', 'Download', and 'Learn'. The bottom screenshot shows a specific article titled 'Enable atomic transaction support for Web services in CICS' with a 'developerWorks' header and a 'Tutorial' label. The article content includes a 'Level: Intermediate' and a 'Before you start' section.

Notes

There are a number of ways in which you can get more information on this release. The CICS web site, www.ibm.com/CICS, can be a good starting point.

For support and news, this slide gives a number of sources of information.

The Objectives of CICS On-Demand Seminars (CODS)

- The CICS Seminar program presents to customers, at their site, a customised technical agenda of CICS TS and CICS tools delivered by CICS Technical specialist.
- **C**onvey our CICS family message and strategy to a wide audience and skill set (AD & System Programmers, Architects etc) at customers own location thus ensuring the customer does not incur travel and lodging costs.
- **O**btain customer testimonies and references in support of the SOA capabilities of the latest CICS release.
- **D**evelop new workload on CICS; show customers how they can use the new features in the latest release to leverage their existing solutions and investments.
- **S**end a note to cicssem@uk.ibm or contact your Sales Representative to nominate yourself and construct a customised agenda to your requirements

Notes

Another way to get in-depth information tailored to your situation is a CICS seminar.

The CICS Seminar program presents to customers, at their site, a customised technical agenda of CICS TS and CICS tools. The objective is to help you to keep and develop new workload on CICS, as well as potentially to solicit references, and generate opportunities for the EPS tools. Delivering the seminar at the customer location will hopefully allow more of your employees to attend, and we can speak to a wider audience and skill set (AD Progs, Sys Progs, Architects etc). It is also envisaged that the discussion can be more open than if other customers were present.

If you are interested in this program, please contact your account rep (or send a note to cicssem@uk.ibm.com)

There are a set of suggested agendas:

- Leveraging Existing CICS Assets/SOA
- Optimising CICS environments/applications
- Governance and Compliance of your CICS environments/applications
- Modern CICS Application Development

And further customization of the agenda can be made from a selection of swappable sessions.

Notes: Suggested agendas for CICS seminars

Leveraging Existing CICS Assets/SOA

- 09:30 - 10:30 CICS TS V3.1 Technical Overview
- 10:45 - 11:45 Strategic Connectivity Opinions
- 12:45 - 13:45 Integration with CICS using Web Services
- 14:00 - 15:00 CICS Application Development with the Service Flow Modeler
- 15:15 - 16:15 Using CONTAINERS and CHANNELs to break free of the 32KB limit
- 16:15 - 16:30 Next steps & open discussion

Optimising CICS environments/applications

- 09:30 - 10:30 CICS TS V3.1 Technical Overview
- 10:45 - 11:45 Integration with CICS using Web Services
- 12:45 - 13:45 CICS System Management (CICSplex SM)
- 14:00 - 16:15 CICS TOOLS for optimising... featuring: CICS IA & CICS PA, Config Manager, BAC
- 16:15 - 16:30 Next steps & open discussion

Governance and Compliance of your CICS environments/applications

- 09:30 - 10:30 CICS TS V3.1 Technical Overview
- 10:45 - 11:45 Integration with CICS using Web Services
- 12:45 - 13:45 CICS System Management: CICSplex SM
- 14:00 - 16:15 Config Manager, BAC, OTTO, IA, Session Manager, PA
- 16:15 - 16:30 Next steps & open discussion

Modern CICS Application Development

- 09:30 - 10:30 CICS TS V3.1 Technical Overview
- 10:45 - 11:45 Integration with CICS using Web Services
- 12:45 - 13:45 CICS Application Development with the Service Flow Modeler
- 14:00 - 15:00 Using CONTAINERS and CHANNELs to break free of the 32KB limit
- 15:15 - 16:15 Migration to an SOA environment using CICS Tools
- 16:15 - 16:30 Next steps & open discussion

Notes: Further topics for CICS seminars

Further customization of the agenda can be discussed with the seminar coordinator if you find the suggested agendas are not suitable.

Examples of other sessions that could be included within the agenda:

- Migration to an SOA environment using CICS Tools
- CICS Strategic Connectivity Options
- Java
- HTTP
- CICSplex SM
- CICS Transaction Gateway
- Dedicated sessions on individual CICS Tools;
- CICS Configuration Manager
- CICS Batch Application Control
- CICS Interdependency Analyzer
- CICS Performance Analyzer
- CICS VSAM Recovery
- IBM Session Manager
- CICS Online Transmission Time Optimiser
- CICS VSAM Transparency
- WebSphere Developer for System z
- CICS Service Flow Modeler
- Revealed! The Next Generation of Distributed CICS! (TXSeries)

Summary

- **CICS TS provides the base for the majority of mainframe applications today**
 - An efficient and optimized runtime for the reuse and transformation of existing CICS applications
 - Provides easy to use services that exploit new technologies by building on CICS skills
 - First class support and management of mixed application types and workloads

- **CICS TS V3.2 was made generally available 29 June, 2007**
 - Details are available from <http://www.ibm.com/cics>

- **CICS TS and WebSphere Application Server are IBM's strategic middleware products that together support practically any mission critical solution**
 - Interoperate well using Web services and connectors to support end-to-end on demand systems
 - Complement z/OS qualities of service such as high availability, scalability, low cost per transaction, and excellent security

Notes

To summarise

CICS TS 3.2 builds on v3.1 to provide an efficient and optimized runtime, allowing you to take advantage of SOA technologies as well as offering benefits for traditional workloads.

Developers will benefit from features that support reuse and transformation of existing applications and that ease new application development. Systems programmers will benefit from first class management and support of mixed applications and workloads.

CICS Transaction Server interoperates with WebSphere Application Server to support mission critical solutions, and delivers z/OS qualities of service.

Questions

