What's new in CICS

CICS TS V5.5 Technical Overview

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IBM

November 2018
Session GE

Notes

Every second slide in this presentation is a notes slide like this one and provides a background on the previous slide's content.

Not all main presentation slides require an accompanying notes slide, however one is always provided to maintain the even / odd numbering scheme.

On 2nd October 2018 we announced CICS TS for z/OS V5.5. Planned general availability is 14th December 2018.

Announcement letter is here: ibm.biz/cicsv55-announceletter

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IBM CICS Announcements 2018

2018-01-09	IBM z/OS Provisioning Toolkit V1.1
2018-01-09	CICS TS V5.4 Continuous Delivery (Q1 2018)
2018-04-03	CICS TS V5.4 Continuous Delivery (Q2 2018)
2018-07-03	CICS TS V5.4 Continuous Delivery (Q3 2018)
2018-10-02	CICS Transaction Server for z/OS V5.5 (Available 2018-12-14)
2018-10-02	CICS Explorer V5.5 and IBM Explorer for z/OS V3.2
2018-10-02	CICS Interdependency Analyzer for z/OS V5.5

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Service Planning

Release	Availability	Service
CICS TS V5.5	14th December 2018	
CICS TS V5.4	16th June 2017	
CICS TS V5.3	11th December 2015	
CICS TS V5.2	Withdrawn	31st December 2020
CICS TS V5.1	Withdrawn	1st July 2019
CICS TS V4.2	Withdrawn	30th September 2018
CICS TS V4.1	Withdrawn	30th September 2017

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Major new and enhanced capabilities in V5.5

- ✓ **Support for Node.js applications**
- ✓ **A simplified & fully capable CICS Explorer aimed at improving customer experience**
- ✓ **A new GraphQL API for querying system configuration and inter-resource relationships**
- ✓ **System management advancements that greatly improve control and ownership**
- ✓ **Enhanced security and resiliency of applications across all languages**
- ✓ **Greater API and SPI control with the use of commands and keywords**
- ✓ **Enhancements and deliverables for Java**

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In addition to the new functionality introduced by CICS TS V5.5, any functionality delivered via PTF to V5.4 is also incorporated into the V5.5 release.

The minimum required hardware prerequisite is the IBM System z 196 or subsequent 64-bit IBM z/Architecture processors.

The minimum required level of operating system is IBM z/OS, V2.2 (5650-ZOS).

The minimum required level of Java is IBM 64-bit SDK for z/OS, Java Technology Edition, V8.0.

See the What's New section in the IBM Knowledge Center: ibm.biz/kc-whatsnew-v55

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IBM **CICS**
Transaction Server for z/OS

Support for Node.js applications

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CICS TS V5.5 now provides support for running Node.js applications.

Node.js is a server-side runtime for applications that are written in JavaScript. Designed to be lightweight, efficient, and best suited for data-intensive applications, Node.js applications are typically event-driven, single-threaded, and process requests in a non-blocking manner to achieve high throughput.

The Node.js runtime encourages a module-driven, highly scalable approach to application design and development. A large selection of Node.js modules, for many existing tasks, are available on a public package registry, saving considerable time for application developers.

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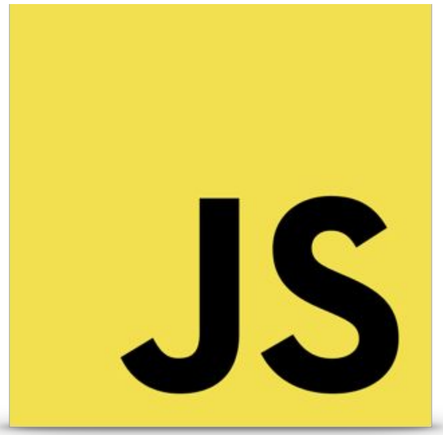
JavaScript™

First released in Netscape Navigator 2.0 in 1995



Scripting programming language for dynamic content

- Typically used with HTML and CSS
- User interactions, asynchronous API calls, …

Designed to complement Java with a similar syntax

Standardised as ECMAScript

- 1st edition 1997, latest 9th edition 2018

Most browsers embed a JavaScript runtime and compete on its performance

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Example JavaScript engines: SpiderMonkey in Firefox, V8 in Google Chrome

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Node.js

Server-side JavaScript runtime platform

- Governed by the Node.js Foundation
- Built on Google's V8 JavaScript engine

Designed to build scalable network applications

- Best suited for data and I/O intensive applications

Lightweight and efficient

- Uses an event-driven, single-threaded, non-blocking I/O model
- Leverages the underlying asynchronous I/O support in z/OS

Module-driven approach to application design

- Scalable and encourages agile practices

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IBM SDK for Node.js – z/OS

Compatible with Node.js V6.x

Available from IBM Shopz and installed via SMP/E

- Includes IBM support using standard support processes
- Options for IBM support for popular frameworks

Bundled with C/C++ for compiling native add-ons

90-day evaluation for non-production use

Run Node.js applications in z/OS UNIX shell

Container pricing for IBM Z with details in Technote

- Application Development and Test Solution
- New Application Solution

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Summary in IBM Systems Magazine article:
http://ibmsystemsmag.com/mainframe/trends/modernization/ibm-sdk-nodejs/

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Why use Node.js in CICS ?

Host APIs and web applications that consume APIs and data on z/OS

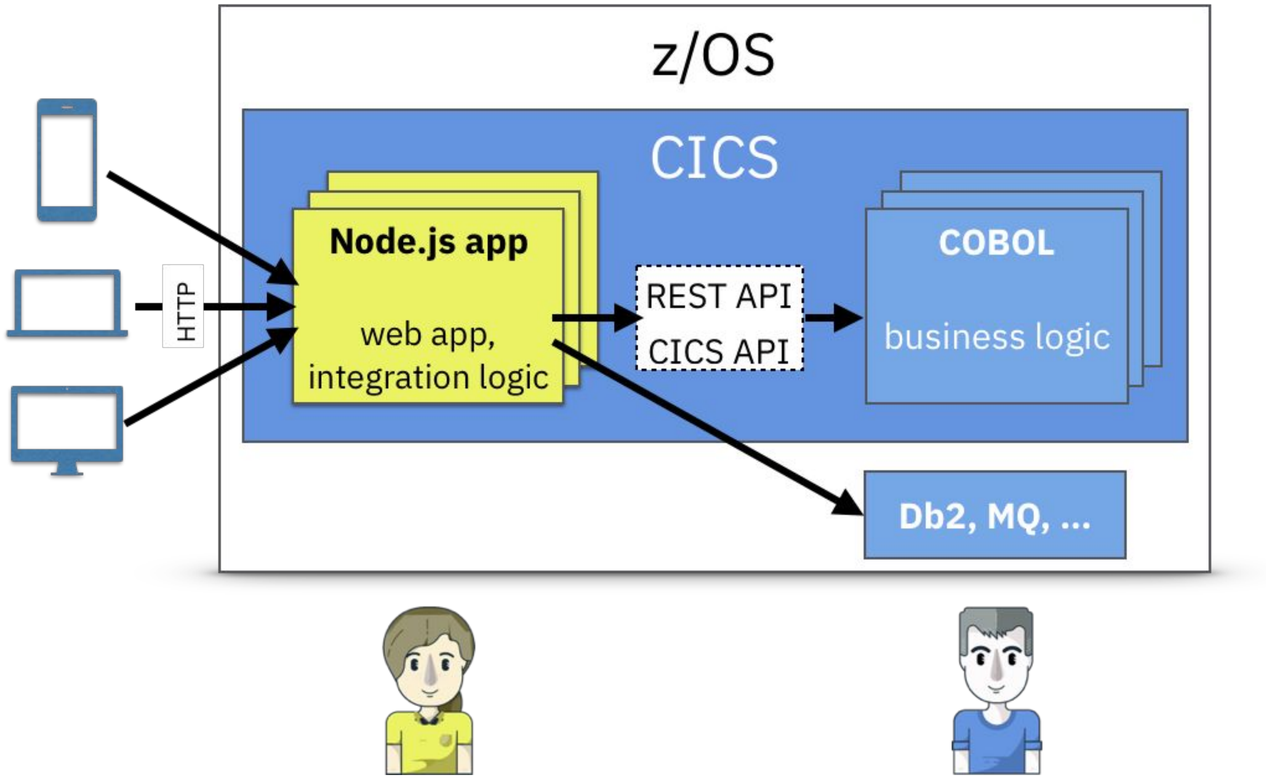
- Add logic to existing APIs
- Aggregate APIs and data
- Reuse modules to access external APIs

Co-location for optimized response times

Simplified deployment and management with CICS applications

Welcome a new set of API and front-end developers onto z/OS platform

CICS Developer Center for Q&A



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Node.js application in CICS

Add Node.js application to a CICS bundle

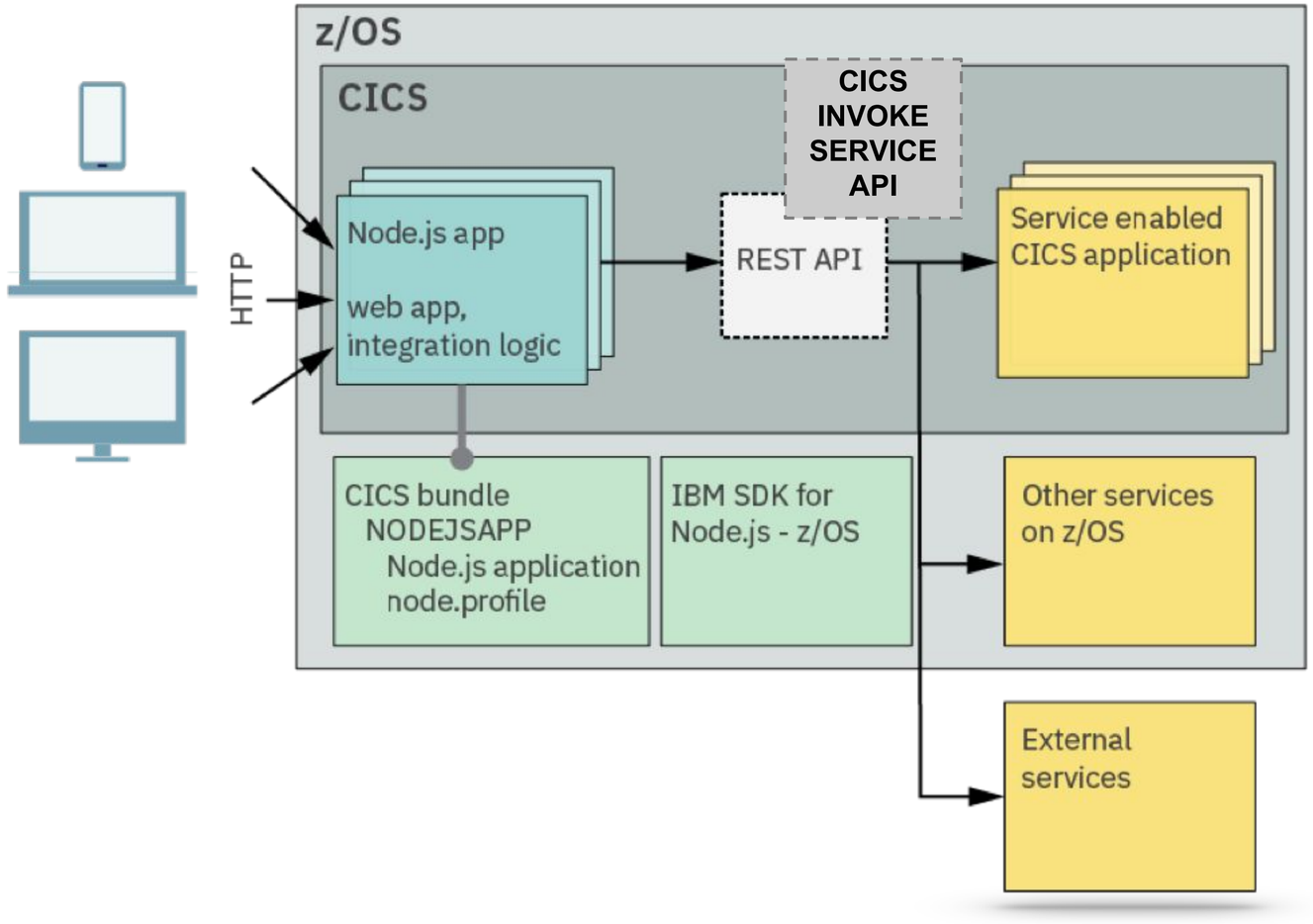
1. NODEJSAPP bundle part
2. Profile
3. Nodejs. application
   - Start script
   - Other application assets

Build CICS bundle from source and deploy to zFS

- CICS build toolkit
- Tag text files, otherwise EBCDIC assumed
- Run npm to resolve dependencies
- DFHDPLOY, CICS TS plug-in for UCD, …

Lifecycle CICS bundle as usual

- CEDA, CEMT, SPI, CICS Explorer, CMCI, …
- Node.js app is running when bundle part enabled
- IBM SDK used by CICS to run the application
- Unix signals used by CICS to end application



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CICS invoke API

1. **Enable the CICS program to be called via JSON web service**
   - As today, using DFHLS2JS, TCPIPSERVICE, PIPELINE, URIMAP, WEBSERVICE

2. **Write a Node.js application to invoke the service**

3. **Invoke API**
   - Uses HTTP if run outside of CICS
   - Uses native CICS JSON pipeline

```
const cics = require('ibm-cics-api');

let uri = "http://winmvs2c.hursley.ibm.com/exampleApp/json_inquireCatalogWrapper";
let requestData = {
    "inquireCatalogRequest": {
      "startItemRef": 10,
      "itemCount": 774
    }
};

cics.invoke(uri,requestData,function(err, data)
{
    if (err) {
        ... do something with error ....
    } else {
        .... do something with response data
    }
});
```

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Notes

Use the standard tooling to expose CICS programs as a JSON web service.

When the Node.js application is hosted inside CICS, it uses cross-memory calls to avoid needing to use the network later and removes the requirement to encrypt traffic between the Node.js engine and the CICS server.

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Transaction Server for z/OS

CICS Explorer

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A system programmer no longer needs to configure and deploy the WUI because the capabilities they need are better in Explorer

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Notes

The goal of the V5.5 release is to ensure a CICS system programmer is at least as productive with the CICS Explorer tool as they were with the WUI.

To fulfil this hill, we've concentrated on 'gaps' in the Explorer experience. Particularly, we've focused on:

- Aggregation (summary, in WUI terms)
- Mapping WLM and BAS resources
- A new system management API, alongside our CMCI REST API

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Simplified and fully capable CICS Explorer

A new **getting started guide** which gets a system programmer up and running within **10 minutes**!

New getting started guide

Visualizing relationships such as transaction groups or workload specifications with the **new map view**.

Visualising CPSM Definitions (Map)

Aggregation that allows commonalities and disparities between resources to be **highlighted quickly**.

Aggregating Records

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Aggregation in CICS Explorer

Large numbers of systems

- Usually clones
- Common standards

Minor differences can cause problems

- Hard to spot

Aggregation highlights the differences

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Notes

Often, CICS users have vast systems to manage.

These systems are often clones of one another, and their contents have common standards.

A tiny difference in these large systems can be the explanation behind outages and unexpected behavior.

Aggregation allows you to spot the differences.

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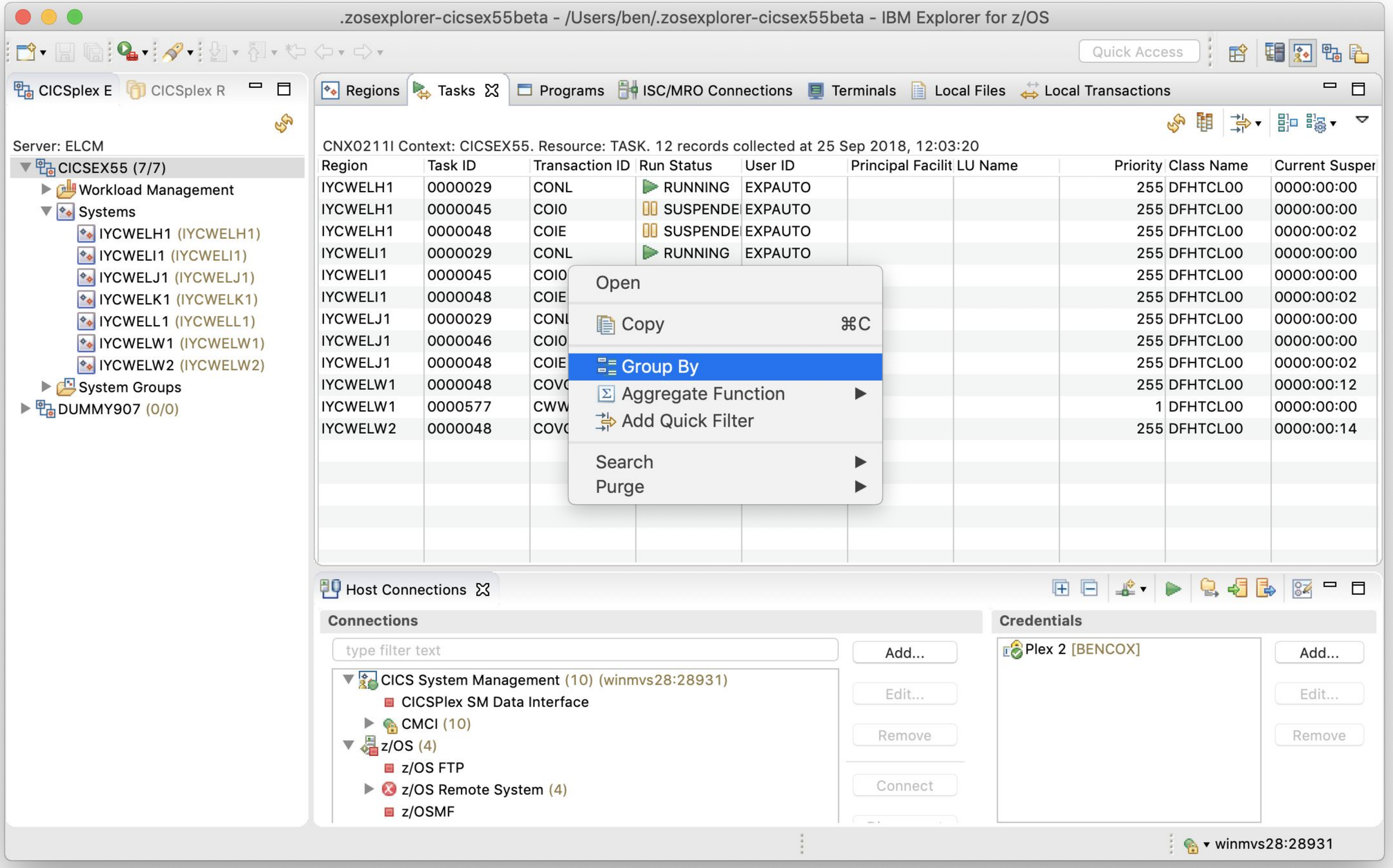

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Notes

In the **Tasks** view we right-clicked on the *Transaction ID* column and selected **Group By**.

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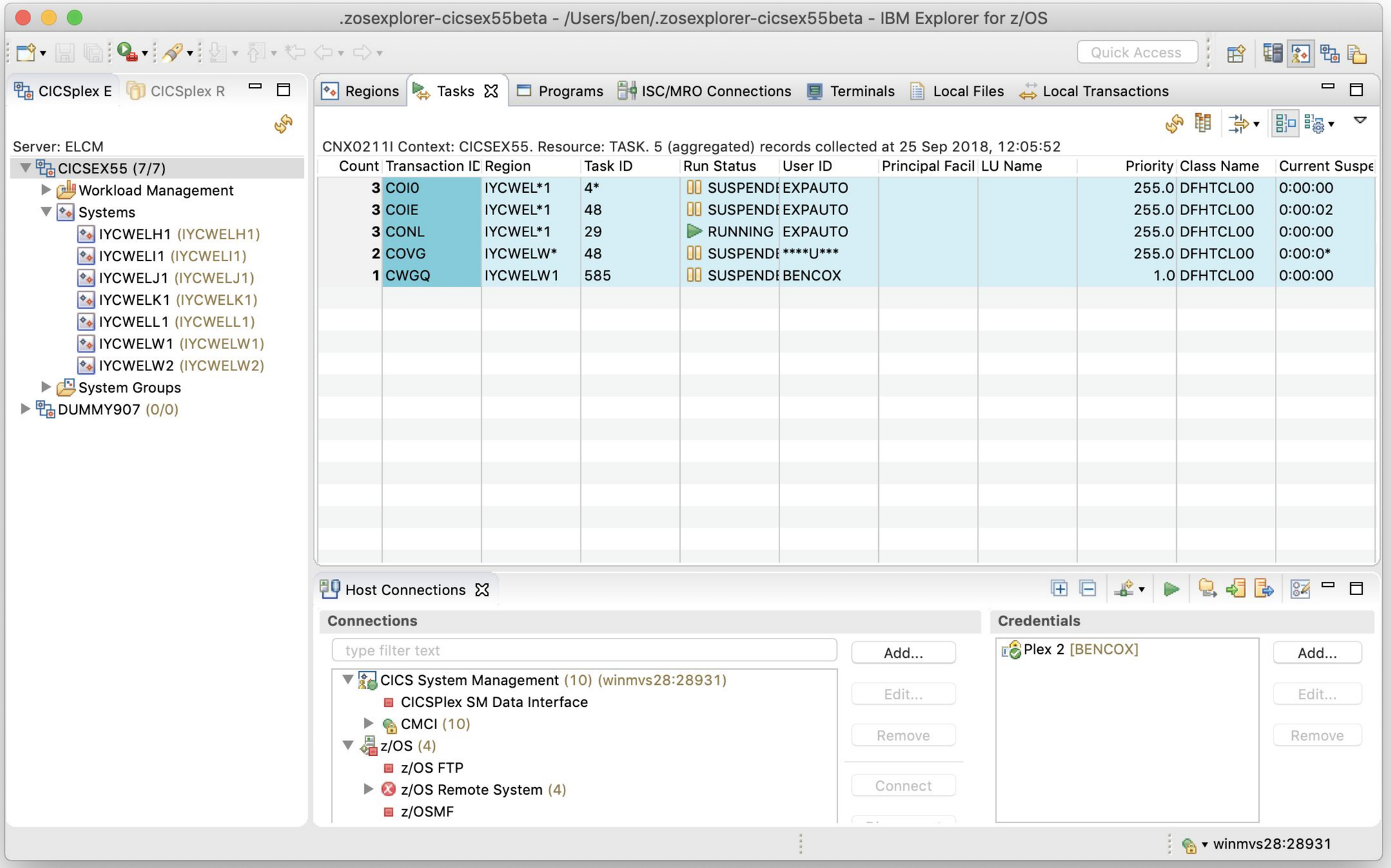

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Notes

The view shows all the currently running tasks, grouped by their transaction IDs.

Note how the transaction ID column has moved all the way to the left and a new count column has appeared. The values in all other columns have their values aggregated.

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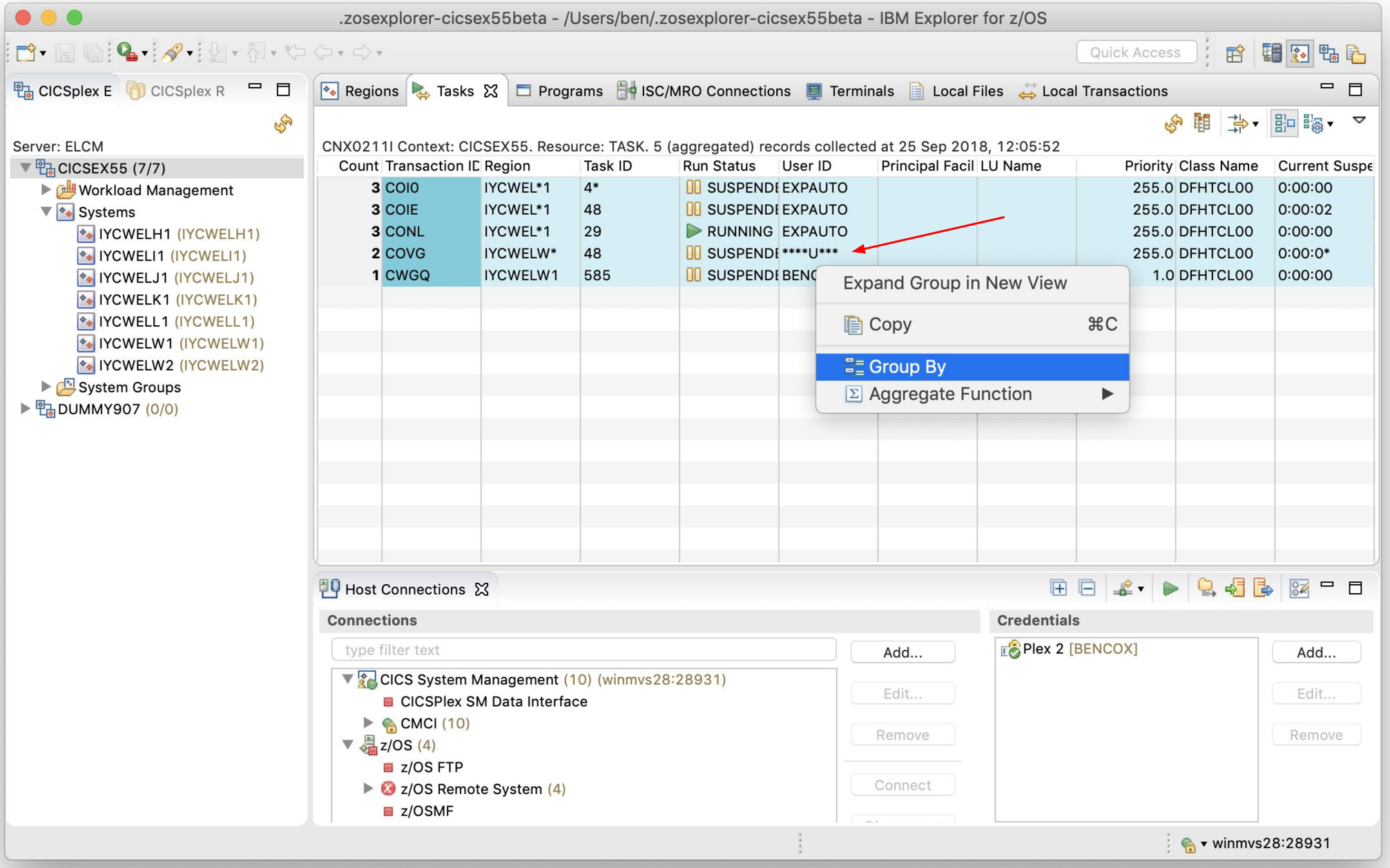

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Notes

Where possible, we have also tried to exceed the capabilities of the WUI.

In this screenshot, we notice that the COVG transactions are running with more than one userid. Right click on the *User ID* column and select **Group By**.

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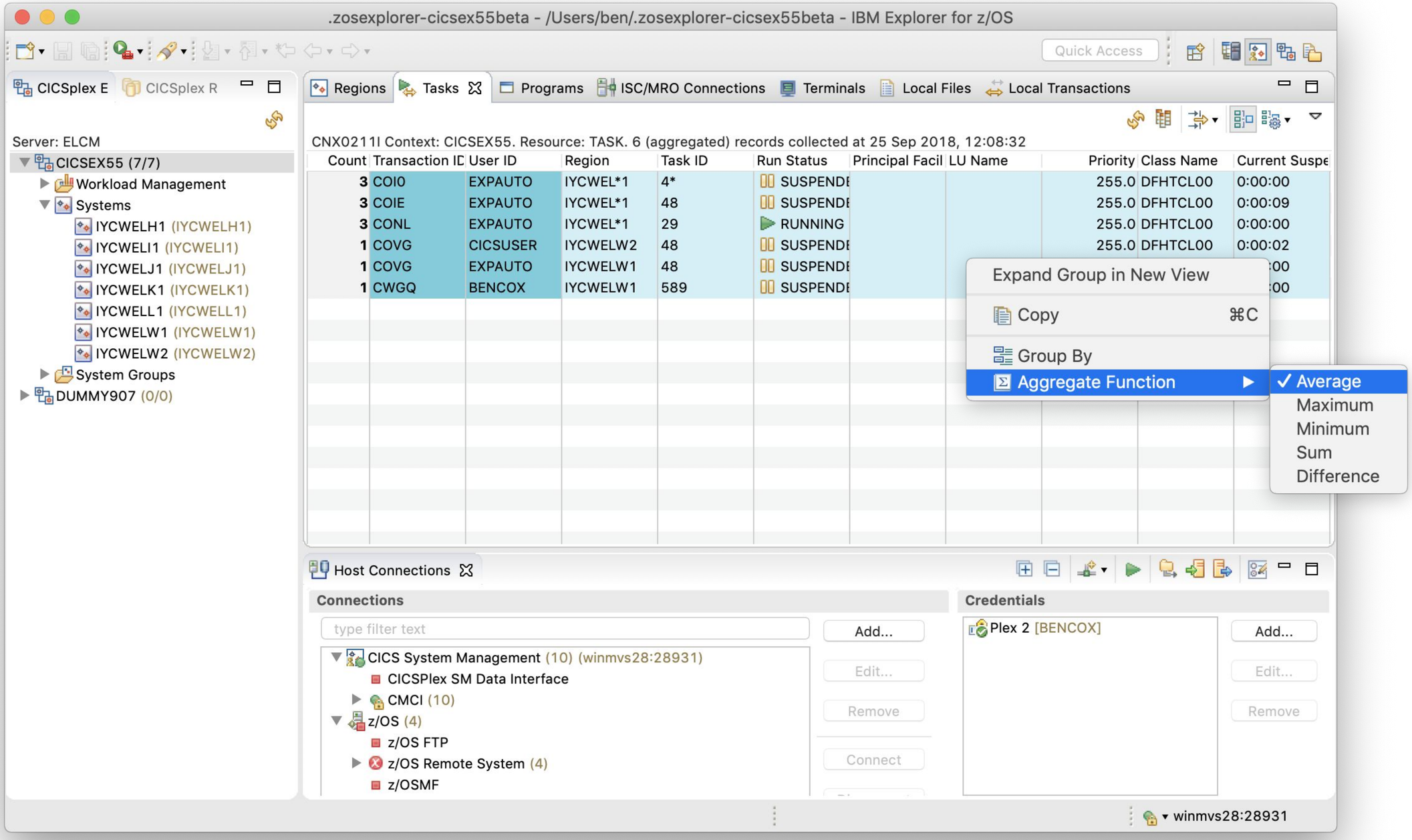

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Notes

We are now grouping by both *Transaction ID* and *User ID* columns. Note again the *User ID* column has moved to the left.

We can now see that one COVG transaction is running as the userid CICSUSER, the other is EXPAUTO.

The other columns have their values aggregated. This aggregation function can be changed and here we right click on the *Priority* column and choose **Aggregate Function** to change how the values are aggregated.

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Mapping in CICS Explorer

Several CICS and CICSPlex SM resources interconnected

- Frequently in complex ways
- Notably in BAS and CICSPlex SM WLM

Map support presents a much better mental model

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Certain areas of CICS and CPSM — particularly workload management and BAS — involve complicated and interconnected resources.

‘Map’ support allows you to visualize those interconnections, to gain a mental model of the topology.

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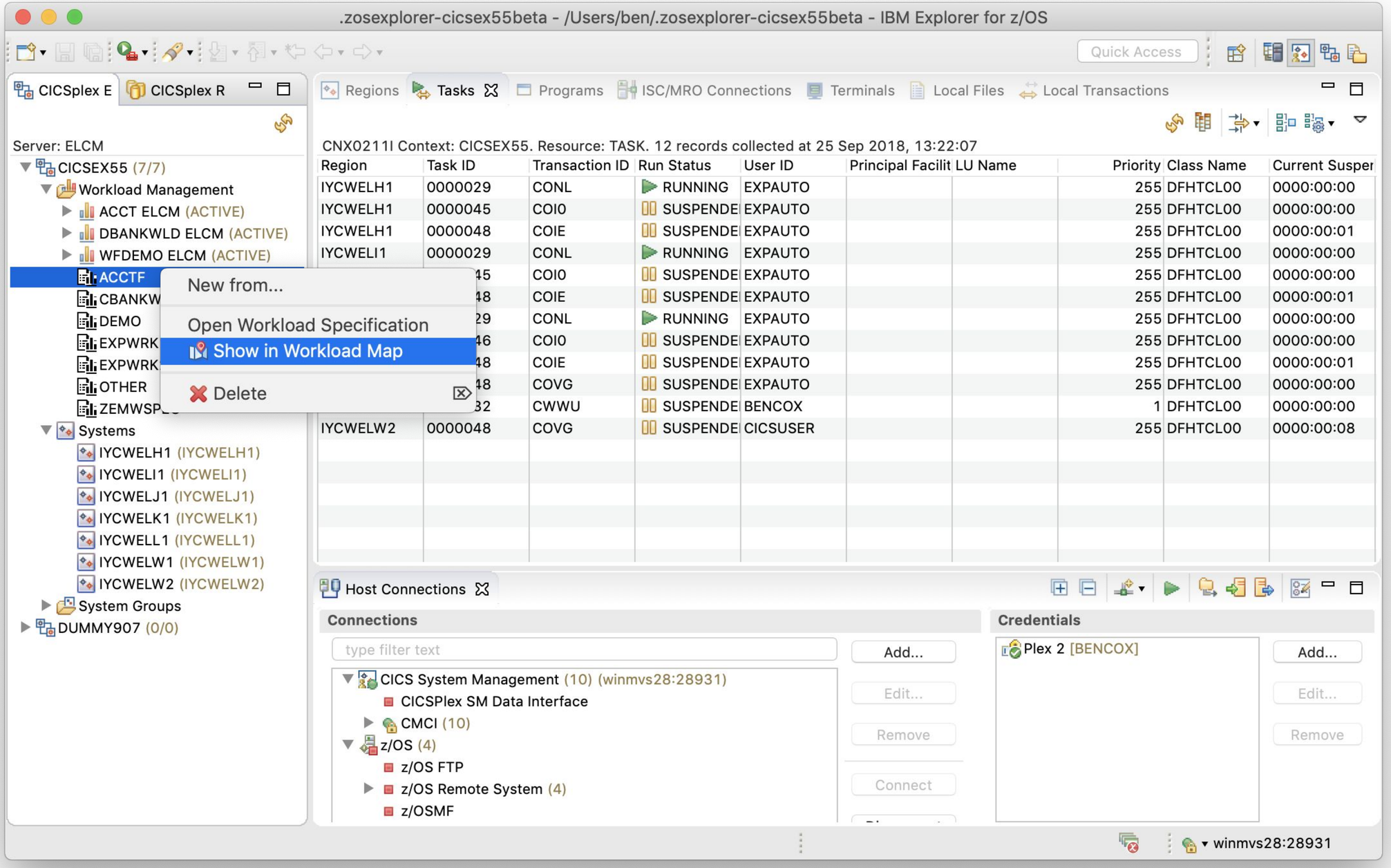

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Notes

Here we right click on a workload management specification and open it in the map view.

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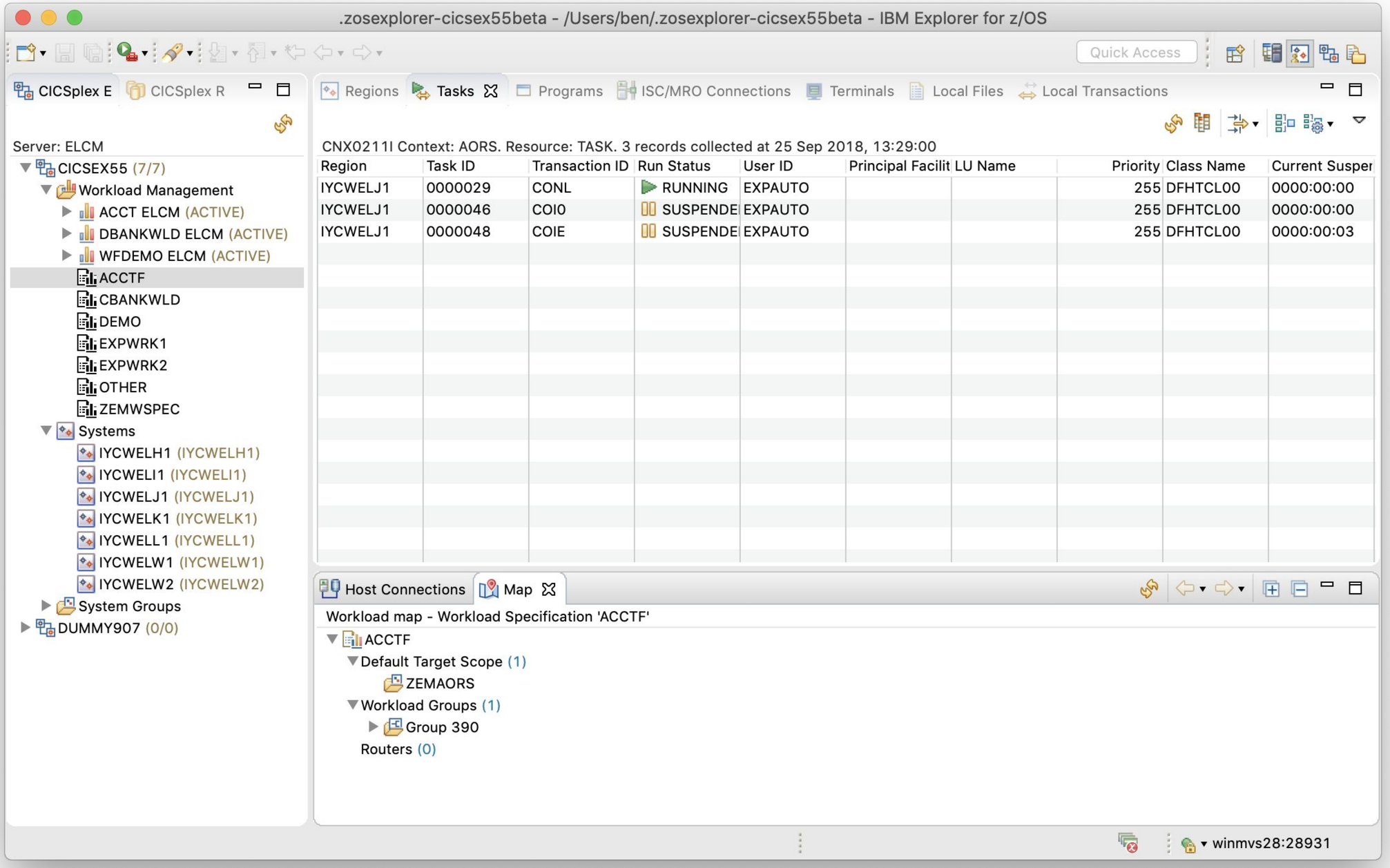

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Notes

Map view is at the bottom of the screen.

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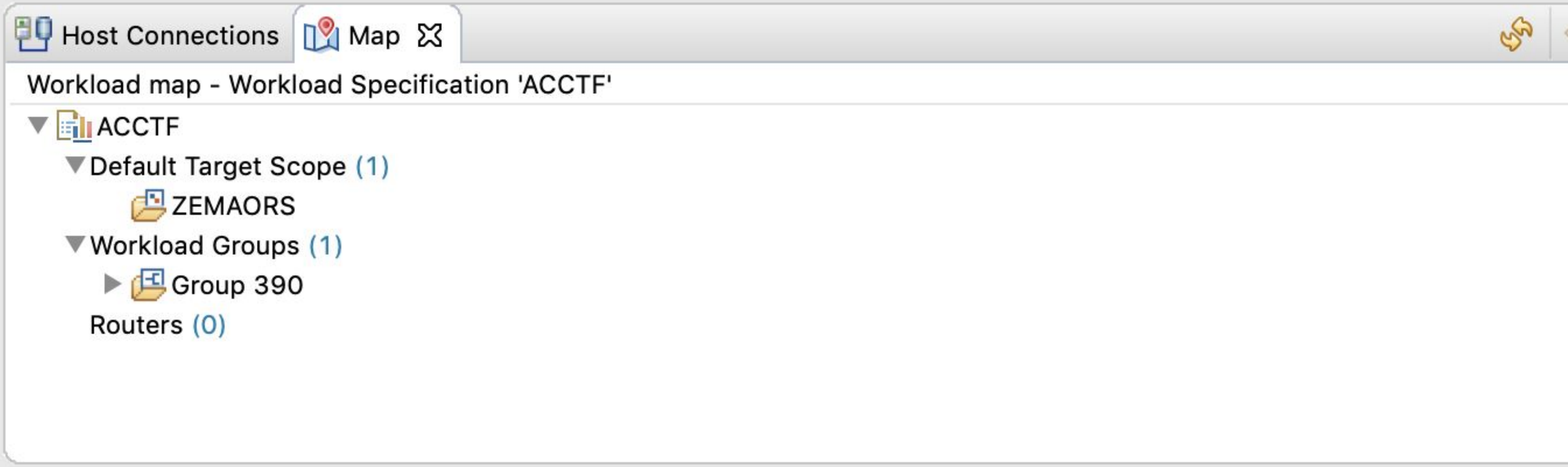
WELH1)
WELI1)
WELJ1)
WELK1)
WELL1)
WELW1)
WELW2)



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Notes

Zooming in, we can see the workload specification ACCTF has a default target scope of ZEMAORS; while the workload groups have the description *Group 390*.

Note CICS Explorer displays the description of the resource, rather than the 8-character name.

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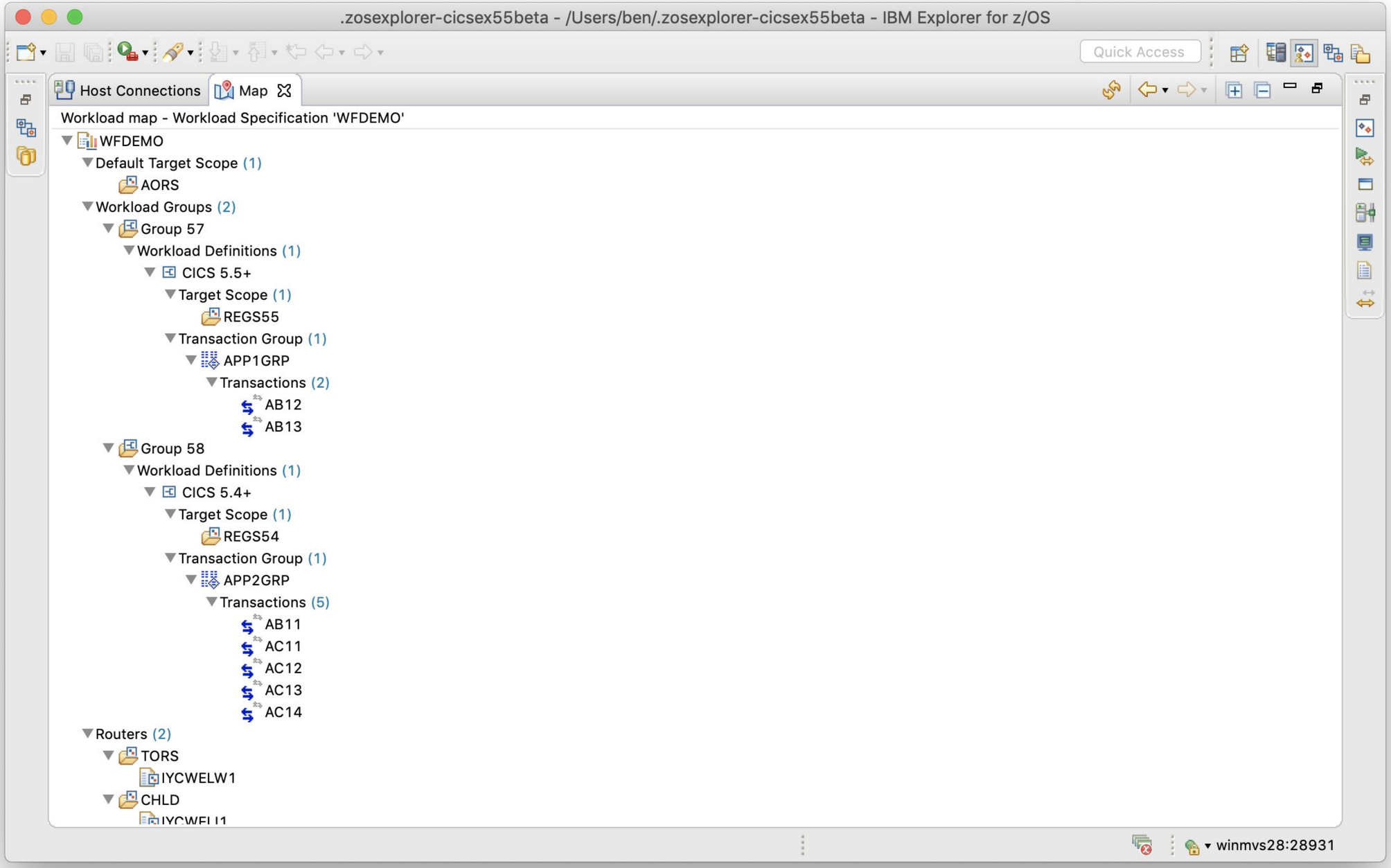

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Notes

Expanding the full tree, we can navigate from the WLM specification all the way down to individual transactions.

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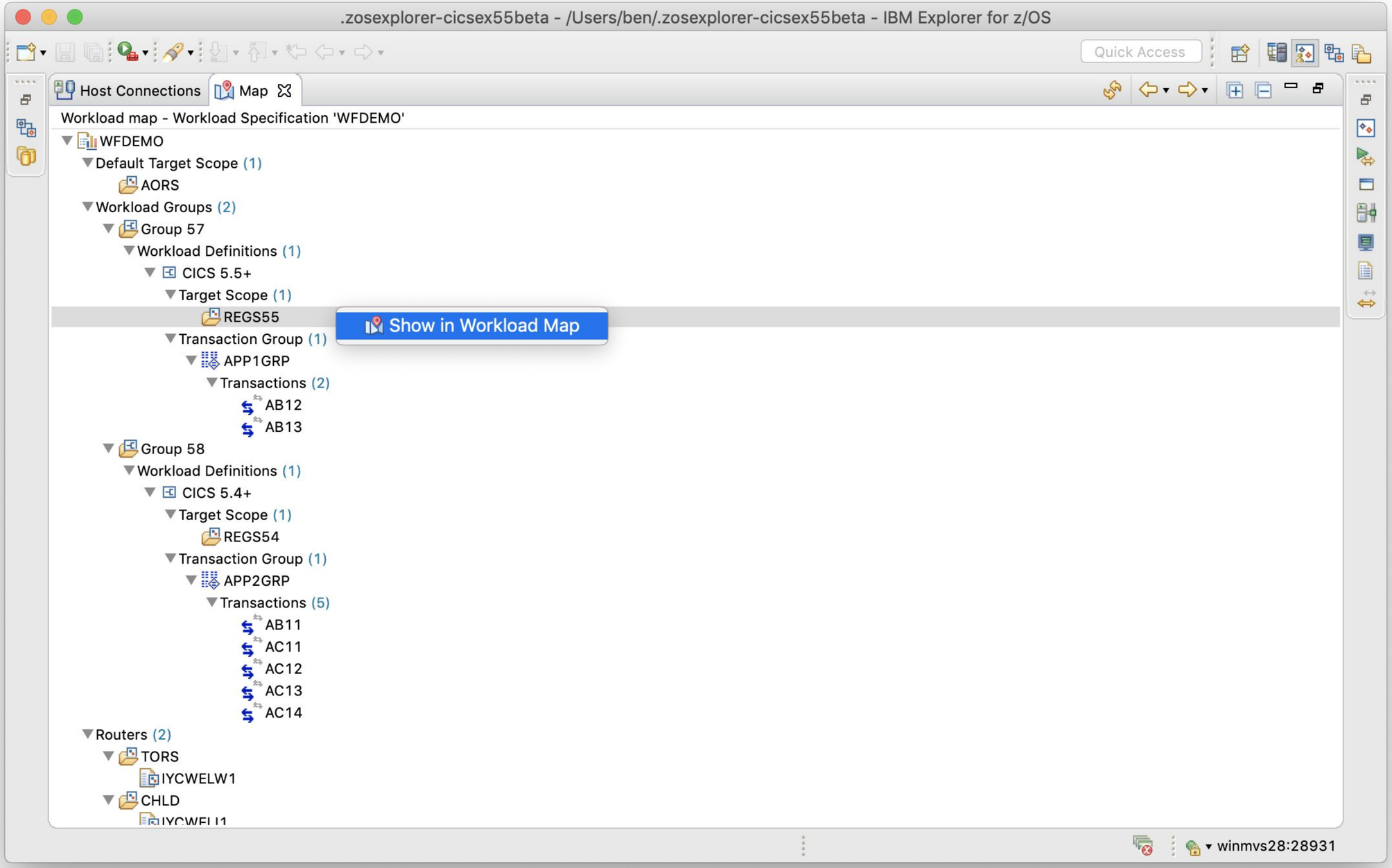

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Notes

You can right-click at any point in the tree to focus on that specific element. Here we right-click on the REGS55 target scope.

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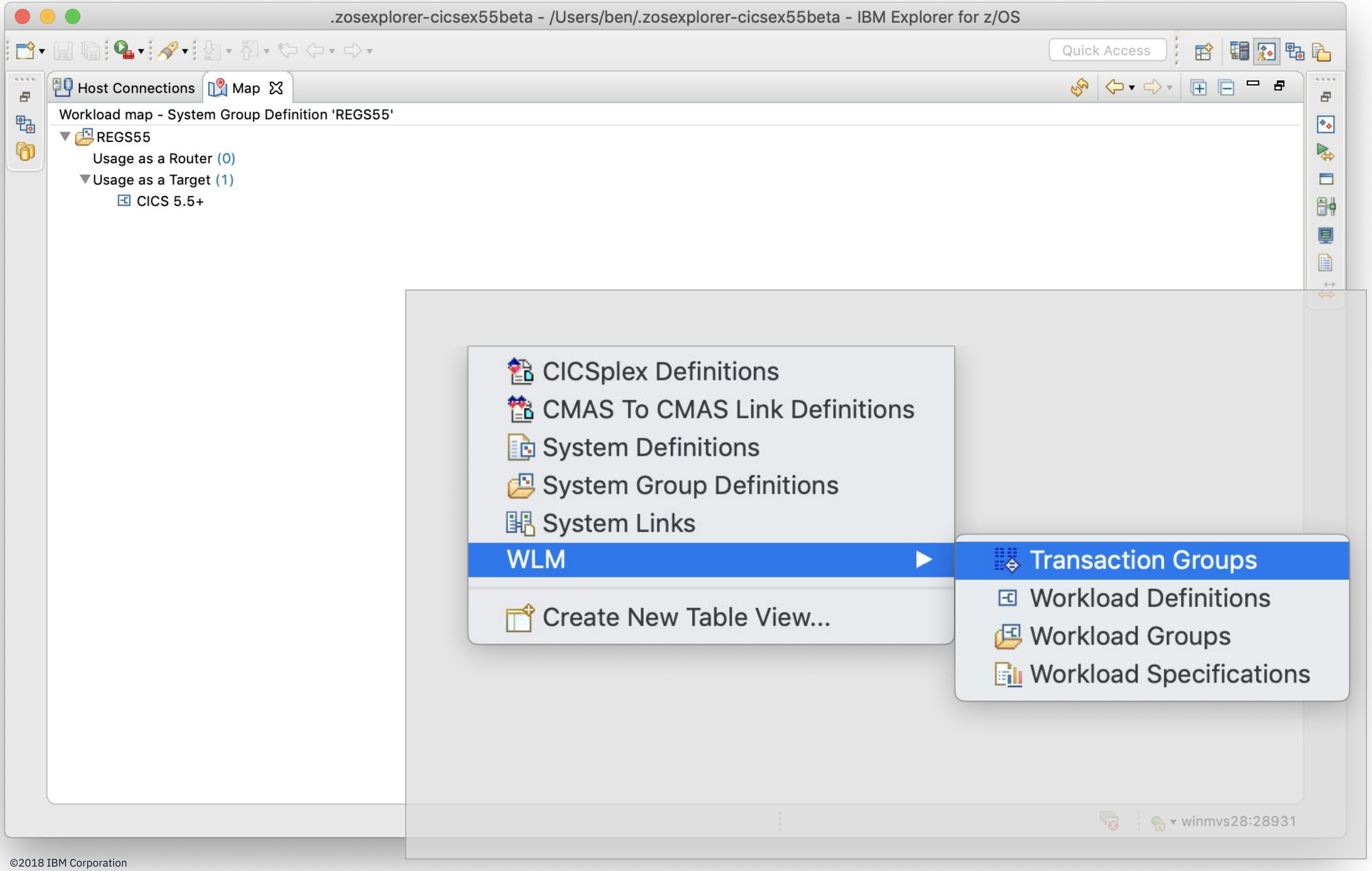

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Notes

After focusing on the target scope, we can see which workload definition is using the selected target scope.

Note that new table views are available for all workload definitional resources.

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GraphQL

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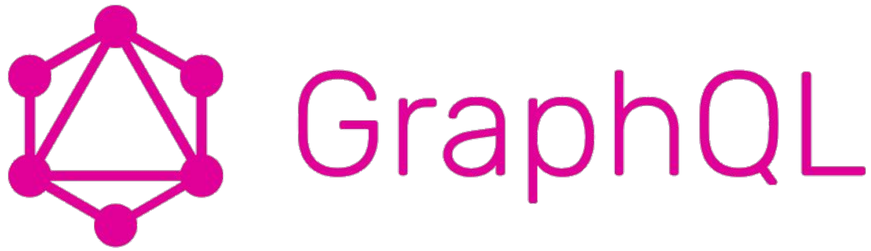
GraphQL API

A new **HTTP API** for CICS TS allows for the querying of **CICSplexes** using the **GraphQL paradigm**.



Customers can use this to develop **their own dashboard** or **automation** for example:

- Dashboard showing CICS layout and status.
- Automation to deploy applications and check their state.

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Some of what we've achieved with aggregation and map would be very painful client-side. Lots of data would be downloaded (expensive on the server and with long response times), only for the data to be summarized in the client.

We've produced a new HTTP system management API, using the GraphQL paradigm (instead of REST).

This new CMCI GraphQL API complements the existing CMCI REST API.

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GraphQL CICS example

```
query allLocalTransactions {
  cicsplex(name: "CICSEX55") {
    loctran {
      records {
        regionName
        CICSRelease
        name
        commandSecurity
        deadlockTimeout
        dumping
        priority
        program
        purgeability
        readTimeout
        screenSize
        status
        tracing
        TWASize
      }
    }
  }
}
```

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Notes

This query retrieves selected information about local transactions defined in all members of the CICSEX55 CICSplex.

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Foundation

Ensuring CICS delivers its core capabilities

- ✓ System management advancements that greatly improve control and ownership
- ✓ Enhanced security and resiliency of applications across all languages
- ✓ Greater API and SPI control with the use of commands and key words

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Notes

Alongside the two main hills of the CICS TS V5.5 release is the foundation work which ensures that CICS continues to deliver its core capabilities. This foundation work can be split into three main areas.

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Control and ownership

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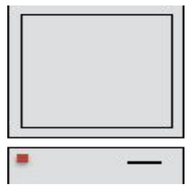
Policies



CICS TS

Policy

Trigger: _____

Action: _____

Task

DB2 | File | Message

MXT | TCLASS | Abend

Abend Task

Emit Event

Output Message

Policy Scope
CICS Region
Entry Point: Tranid
Entry Point: Program
Entry Point: URI
Application Platform

V5.4	Async API	System Rules			
V5.3	EXEC CICS	MQ	IMS DLI	Shared TS	Named Counter
V5.2	Cumulative Time	Syncpoint	Start	TSQ	TDQ
V5.1	DB2 SQL	Files	Storage	CPU Time	Prog. Link

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Notes

Policy system rules were introduced in CICS TS V5.4 and were also made available via PTF for all previous V5 releases.

Policy system rules have been enhanced in CICS TS V5.5.

Important

- CICS system events are now deprecated and may be removed in a future release of CICS.
- CICS policies are the strategic replacement for the CICS system events technology.
- All events emitted by policy make use of the existing CICS events infrastructure.
- The underlying CICS events infrastructure and CICS application events remain strategic.

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New policy system rules to monitor

- Enable status and available status of a BUNDLE resource
- Status of MRO and IPIC CONNECTION resources
- Enable status of a PROGRAM resource
- Total number of AIDs in the local CICS system

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Notes

CICS TS V5.4 provided the ability to use system rules to monitor the following :

- Db2 connection status
- File enable status and open status
- CICS DFHxxnnnn and EYUxxnnnn messages
- Transaction class task counts
- Transaction abend
- User task counts

The following system rules are also available in CICS TS V5.4 with APAR PI92806

- Enable status and available status of a BUNDLE resource
- Status of MRO and IPIC CONNECTION resources
- Enable status of a PROGRAM resource

Total number of AIDs in the local CICS system is CICS TS V5.5 only

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Statistics for CICS policy rules

Resource statistics collected for each rule:

- Policy and bundle names
- Rule name and type
- Action type, count, and last time occurred

Data collected for both task and system rules

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Notes

Statistics are now available for CICS policy rules.

CICS collects resource statistics for each rule that is defined in a policy, and supplies a summary report. Policy rule statistics are retrieved by using the EXEC CICS PERFORM STATISTICS RECORD POLICY system command.

https://www.ibm.com/support/knowledgecenter/SSGMCP_5.5.0/reference/statistics/policy-statistics.html

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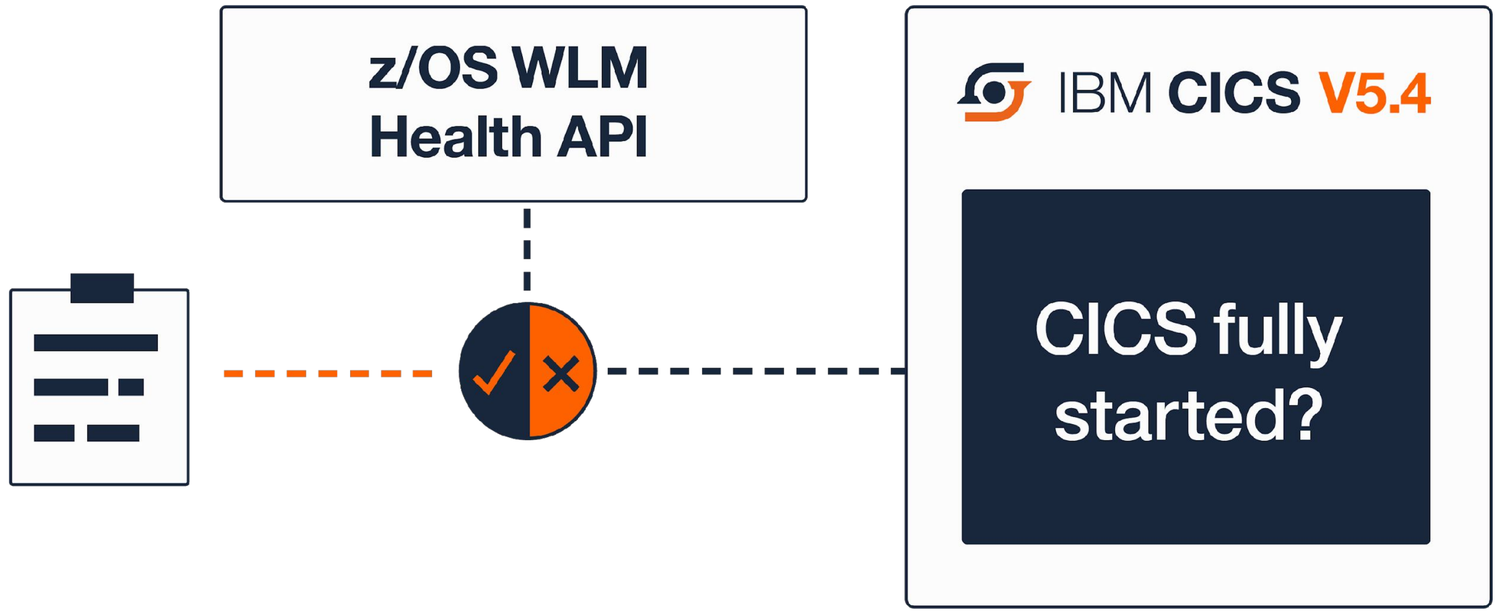
z/OS Workload Manager Health API (CICS V5.4)

CICS TS can utilize the z/OS Workload Manager Health API as a means of controlling the flow of work into a CICS region.

This can allow a CICS region to have a warm-up process after system initialization, to help to ensure that the CICS region is ready to receive work.



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Notes

Provision to notify the z/OS Workload Manager Health API of CICS status was introduced in CICS TS V5.4.

The SIT parameter `WLMHEALTH` can be set to `OFF` or a pair of values – default is `(20,25)`.

The first value specifies the increment amount, and the second value specifies the frequency with which CICS increments the health status of the region.

An SPI also exists to allow applications to specify WLM Health status values themselves. For example, an in-memory table may need to be initialized before work starts to flow into CICS. The initial load program can call the `EXEC CICS SET WLMHEALTH` command on completion.

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z/OS WLM Health Effects (CICS TS V5.4)

TCP/IP Sysplex Distributor & port sharing

- Avoids new TCP/IP connections being sent to CICS regions that are not ready
- Works with all TCP/IP listeners, CICS Web support, EZA sockets, Liberty, ...
- Allows JVM servers and web service pipelines to fully initialize
- Shutdown of TCP/IP services sends HTTP close headers

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z/OS WLM Health Effects contd. (CICS TS V5.4)

CICSPlex SM WLM

- WLM dynamic routing will avoid AORs with WLMHEALTH = 0
- Enhanced in CICS TS V5.5

MQ adapter

- Prevents trigger message floods at start-up
- Extended in CICS TS V5.5

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CICSPlex SM and z/OS WLM health API

Target region z/OS WLM health status when using CICS TS V5.4:

- 0% → high penalty weighting factor
- 1%-99% → same as 100%
- 100% → no restrictions on workload routing

Target region z/OS WLM health status when using CICS TS V5.5:

- 0% → no work routed to target
- 1%-99% → work scaled according to health status
- 100% → no restrictions on workload routing

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Notes

When CICS TS V5.4 was announced, it provided support for the z/OS workload manager (WLM) health API. CICSPlex System Manager (SM) exploited this API by using changes to its routing algorithm. For a zero health value, CICSPlex SM applied a high-penalty-weighting factor to discourage work from being routed there. All non-zero values were treated the same as a health value of 100%.

The CICSPlex SM exploitation of the WLM API is changed in CICS TS V5.5. A zero health value now means that the application-owning region (AOR) becomes non-selectable as a routing target. Therefore, work will not be routed there. In addition, CICSPlex SM now reacts to target region health values between 1% and 99%.

The value CICSPlex SM uses as maximum task (MXT) in its routing calculations now scales up in proportion to the target region's health value. This allows regions to gradually accept more work as their health value increases.

This new behavior is also being made available on CICS TS V5.4 via APAR PI90147.

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CICS-MQ Alert Monitor

CICS TS V5.4: CKAM monitors z/OS WLM health status

- MQMONITOR resources not started until health > 0%
- Throttle connection if health < 100%

CICS TS V5.5: CKAM also monitors MXT status

- Throttle connection if MXT limit reached

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Notes

The CKAM transaction is the CICS-MQ alert monitor.

In CICS TS V5.4 CKAM provided the mechanism to monitor the z/OS WLM health status of the local region and throttle any MQMONITOR resources accordingly.

In CICS TS V5.5 this transaction has been extended to also monitor if CICS has reached a MXT condition. If CICS encounters an MXT condition, CKAM calculates the maximum number of MQGET calls that an MQMONITOR can issue per second when this condition exists, effectively imposing a restriction on the number of tasks being started by MQMONITOR resources while CICS is at MXT.

If CICS TS encounters a maximum task (MXT) condition, then transaction CKAM calculates the maximum number of MQGET calls that an MQMONITOR can issue per second when this condition exists. This imposes a restriction on the number of tasks being started by MQMONITORs while CICS is at MXT.

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Task management

DELAY requests cancelled by another task - new RESP2 value

- RESP(NORMAL) RESP2(23) returned if CANCEL REQID() from another task

IBM Db2 threads when CICS task is purged

- TASK PURGE and FORCEPURGE enhanced
- if CICS detects the task has an active thread, a Db2 cancel thread will be issued before purging the CICS task
- review DB2CONN COMAUTHTYPE or COMAUTHID for authority to issue cancel thread
- Requires APAR PI92893 on Db2 V11 or later

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Notes

Enhanced management of requests that are cancelled by another task

The CICS command DELAY is enhanced so that a user can distinguish between a delay completing successfully and a delay completing because of a cancel request. If a DELAY command is cancelled by command CANCEL REQID from another task, the DELAY completes with RESP(NORMAL) and a RESP2 value of 23.

Enhanced management of IBM Db2 threads that are used by CICS TS tasks

The management of Db2 threads that are used by CICS tasks and subject to PURGE or FORCEPURGE requests, is enhanced.

The SET TASK command is enhanced, such that CICS processing of task PURGE or FORCEPURGE requests will attempt to cancel active Db2 threads, which are used by CICS tasks, that are purged. If CICS detects that the task to be purged has a thread active in Db2, then it issues an instrumentation facility interface (IFI) Db2 cancel thread command to cancel the request in Db2 before it initiates the purging of the CICS task.

This enhancement ensures that the purge does not cause problems for Db2 and that the Db2 updates are safely backed out.

This capability requires APAR PI92893 on Db2 V11, or later.

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Other enhancements

Simplified upgrading

- No requirement to assemble and linkedit PLTs for each release

Multi-factor authentication for CMCI enhancements

- Use named Liberty angel and wait for initialization

Real-time monitoring of outbound web requests

- New URIMAP and WEBSERVICE resource monitoring records

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Notes

Simplified upgrading

Upgrading has been simplified by removing the requirement to assemble and linkedit program list tables (PLTs) for each release. CICS will now read the PLT source from either PARMLIB or the new DFHTABLE DD statement in the JCL.

Support for multi-factor authentication for CMCI enhancements

New configuration options in CICS TS V5.5 simplify installation and implementation of the CMCI JVM server. The CMCI JVM server runs in the CICSPlex SM Web User Interface (WUI) region and handles CMCI requests when multi-factor authentication (MFA) is required. These new options include allowing a named Liberty angel to be used for the CMCI JVM server. The CMCI will wait for the Liberty angel initialization, rather than failing CMCI initialization.

Real-time monitoring of outbound web requests

Clients may now monitor, in real time, the URIMAPs and WEBSERVICEs that are opened or invoked by CICS TS as a web client. CICS TS monitoring is enhanced with new monitoring records URIMAP and WEBSERVICE in the resource monitoring class. Multiple URIMAP or WEBSERVICE records can be monitored for one task.

A URIMAP record monitors the completion of WEB OPEN URIMAP, WEB RECEIVE, WEB SEND, and WEB CONVERSE requests that are issued by the user task for a URIMAP.

A WEBSERVICE record monitors the completion of INVOKE SERVICE requests that are issued by the user task for a WEBSERVICE, and tracks the name of the PIPELINE resource definition that was used.

This enhancement makes it easier to identify the URIMAPs or WEBSERVICEs associated with prolonged socket wait time and diagnose troublesome destinations.

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Changes to PLTs

- **CICS has been changed so as to read in the source of PLTs**
  - PLT source can either be
    - in a PARLMIB which is part of the IPL concatenation
      - no change to CICS JCL required to pick this up
    - in a member specified by a DD card

- **A new DD of DFHTABLE has been introduced**
  - currently only used for PLTs but could be used for other tables in the future
  - specify location via DD card such as
    - //DFHTABLE DD DSN=pds name,DISP=SHR

- **PLTPI and PLTSD now accept up to 8 characters**

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Security and resilience

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Security and resilience

Security checks on submitting jobs by using the CICS spool

- Feature toggle `com.ibm.cics.spool.surrogate.check`

Improved security for JCL job submissions to the JES internal reader

- Surrogate user checking

User terminal access is restricted when using a default user ID

- `GMTRAN=CESN,DISCONNECT`

Increased minimum Transport Layer Security (TLS) level

- `MINTLSLEVEL=TLS12`

User ID changes for use with Kerberos service principle for a CICS region

- SIT parameter KERBEROSUSER

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Notes

Security checks on submitting jobs by using the CICS spool

A new surrogate security check restricts the ability of users to submit jobs using the EXEC CICS SPOOLWRITE command. The new command is available by using feature toggle com.ibm.cics.spool.surrogate.check.

Improved security for JCL job submissions to the JES internal reader

For JCL jobs that are submitted to the JES internal reader by using spool commands, CICS TS now performs surrogate user checking to verify if the user is authorized to submit a job with the user ID specified on the job card.

To support this verification, the following new toggle-enabled features are introduced:

1. Surrogate user checking for spool commands
2. User ID that is used for JCL job submission when no job user ID is specified on the job card

This enhancement makes job submissions from CICS TS to the JES internal reader more secure.

User terminal access is restricted when using a default user ID

New options, EXIT or DISCONNECT, on the GMTRAN system initialization parameter, are provided for users who use the CICS-supplied sign-on transaction CESL or CESN for log-on. These new options allow users to control what happens if the sign-on fails to complete.

Increased minimum Transport Layer Security (TLS) level

The default value for the MINTLSLEVEL system initialization parameter, which specifies the minimum TLS protocol that CICS uses for secure TCP/IP connections, is changed to TLS12.

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Greater API and SPI control

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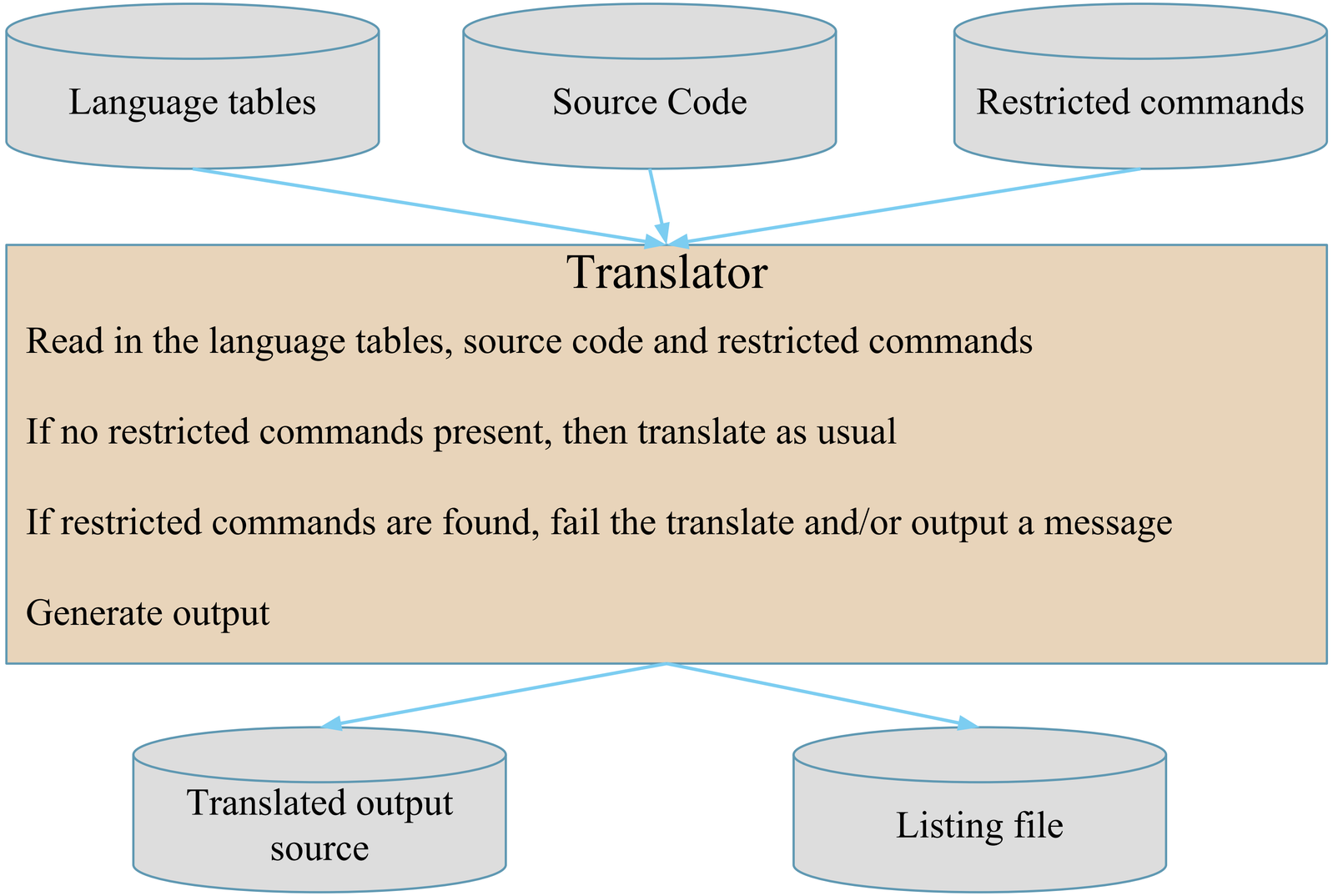
CICS Translator - restricted commands



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Notes

You can now define a restricted commands parmlib member DFHAPIR, to impose rules on the use of specific CICS API and SPI commands.

The CICS translator has been enhanced to process the restricted commands parmlib member. During translation, the CICS translator checks a source file against the specified restricted commands or keywords, and will generate warning or error messages in case of violation.

The check is performed only when a program is being translated, and does not affect translated programs.

You can use this capability to prevent the use of specific commands and keywords in application programs.

This capability is applicable only to CICS API and SPI commands. It is not applicable to EXEC CICS GDS, EXEC DLI, EXEC CICS FEPI, and EXEC CPSM commands.

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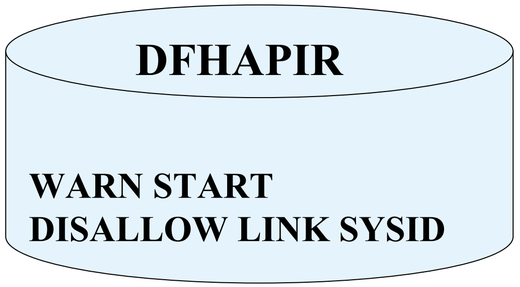
DFHAPIR - SYS1.PARMLIB member

- Can code either WARN or DISALLOW followed by the command to be checked for (without EXEC CICS)
  - WARN START
  - DISALLOW LINK SYSID

- Member read automatically by translator
  - no need to edit JCL to pick it up

- No runtime checks
  - no performance hit at run time
  - but no checking of existing applications



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DFHAPIR - scope of restrictions

- By default, the commands in DFHAPIR will be restricted for everyone on the LPAR

- The scope can be controlled, if desired, by defining a new RACF profile
  - Define a new profile in the FACILTY class
  - Define a profile either for DFHAPIR.** or DFHAPIR.***lpar*** where ***lpar*** is the four character name of the LPAR
    - using DFHAPIR.***lpar*** means that users can have different restrictions on different LPARs e.g. different restrictions on test and production LPARs
  - Give UACC(NONE). Most users will be subject to restrictions
  - Grant exempt users access of READ. These users will not be subject to the restrictions

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Threadsafe Coupling Facility data tables

Access CFDTs from Open TCB applications without TCB switch

- Includes syncpoint processing

Opening and loading of a CFDT still occurs on QR TCB

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Notes

Access to Coupling Facility data tables (CFDTs) is now threadsafe.

Therefore, CFDTs can be accessed by applications that run on Open task control blocks (TCBs) without incurring a TCB switch. Syncpoint processing of CFDTs can also run on an Open TCB.

However, the opening and loading of a CFDT still occurs on the quasi-reentrant (QR) TCB.

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New EXCI commands for containers

EXCI provides four new commands:

- QUERY CHANNEL
- STARTBROWSE CONTAINER
- GETNEXT CONTAINER
- ENDBROWSE CONTAINER

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The EXCI interface enables standalone applications that run on z/OS to programmatically interoperate with CICS-hosted applications and APIs.

CICS TS V5.4 introduced support for CICS channels and containers. It provides a mechanism to exchange large volumes of structured parameter data between batch applications and CICS applications.

Any CICS applications coded to the channel and containers API and invoked using Distributed Program Link (DPL) can also be invoked unchanged from an EXCI client, **including CICS applications that run on earlier CICS TS releases** that support channels and containers.

This new API can also be used as a way to pass data between programs that run outside CICS, such as programs that make up a batch application, even if the application does not communicate with CICS.

CICS TS V5.5 adds four new commands: QUERY CHANNEL, STARTBROWSE CONTAINER, GETNEXT CONTAINER, ENDBROWSE CONTAINER.

These new commands enable EXCI users to query the number of containers on a channel and to browse the names of the containers on a channel.

These new commands are also available regardless of the CICS TS server version. Only the client libraries need to be updated (use the latest SDFHEXCI library).

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Java

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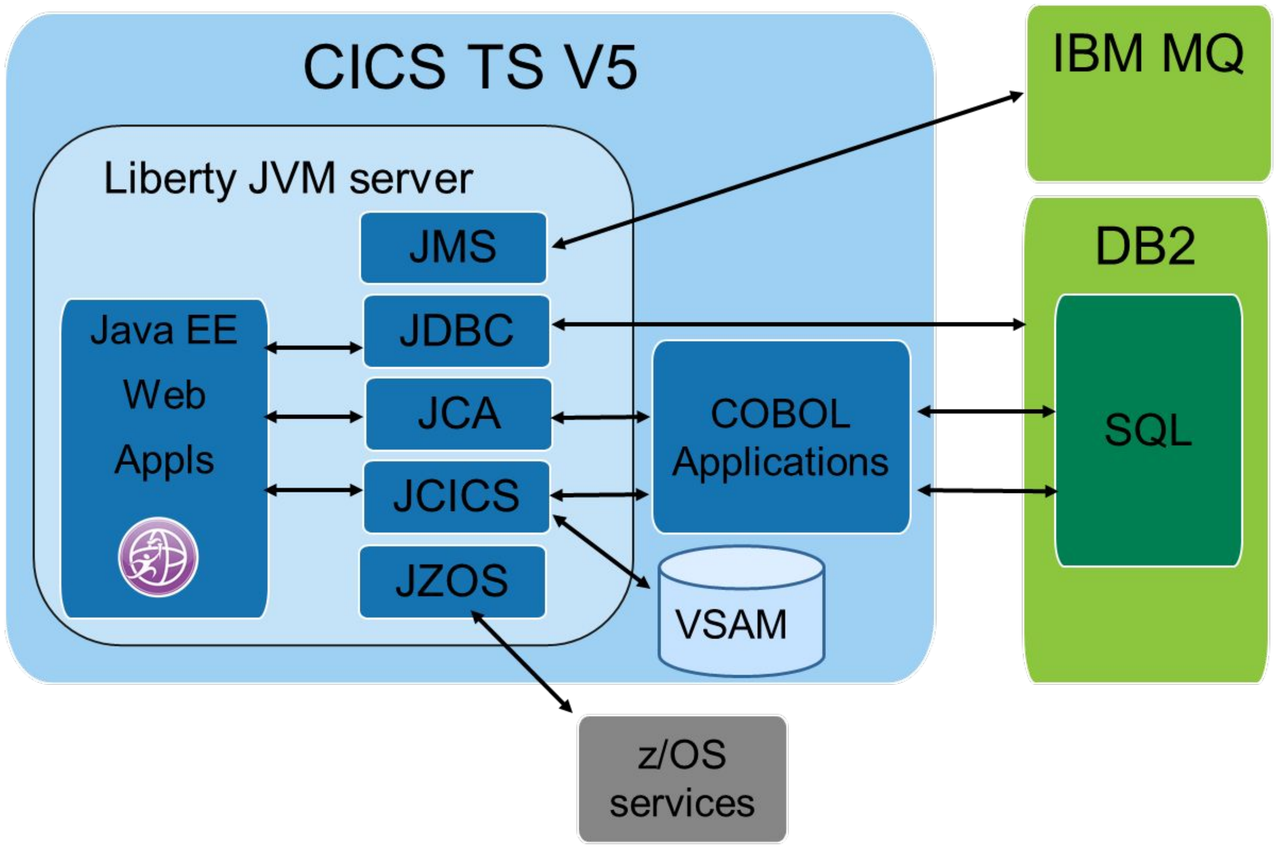
Java EE 7 Full Platform in CICS



- ✓ The full **Java EE 7 profile** supported in an integrated Liberty JVM server
- ✓ **JMS** support for MQ in client mode
- ✓ **JDBC** and **SQLJ** for Db2 data sources and other relational databases
- ✓ **JCICS** to provide access to CICS API including linking to other CICS programs
- ✓ **JCA** local ECI adapter supports porting of CICS TG ECI applications into CICS
- ✓ **JZOS** provides access to z/OS services such as console, files

CICS TS V5.5 now provides support for Java EE 8 Full Platform when running in standard mode.

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Notes

A topology diagram showing how a Liberty instance runs inside CICS.

Work is accepted from the network by the Liberty runtime, and then business logic in the application can use a variety of methods to access data and other applications in the CICS server, or use remote resources.

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Java 8 recommended for CICS TS V5

CICS TS V5.5 requires IBM 64-bit Java SDK for z/OS, V8

IBM 64-bit SDK for z/OS, Java Technology Edition V7.0.0 and V7.1.0

- To be withdrawn from service on September 30, 2019
- Withdrawal Announcement 916-121 – August 2, 2016

WebSphere Application Server Liberty

- WebSphere Application Server Liberty base – Removal Notices
- Liberty fix pack 19.0.0.3: Liberty kernel will be recompiled and can no longer run with Java SE 7

For details see article Java 8 recommended for CICS TS V5

Notes

We have been recommending customers move to Java 8 for a while now.

CICS TS V5.5 and later will no longer support versions of the Java runtime earlier than Java 8.

https://developer.ibm.com/cics/2018/02/19/cics-support-ibm-sdk-java-technology-edition-version-8-service-refresh-5/

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Liberty angel process

Multiple secure Liberty servers in a CICS region

- Provides improved application isolation or scalability without increasing number of regions
- Each Liberty server can have its own configuration and lifecycle – ideal for developers

Wait for Liberty angel process

`-Dcom.ibm.ws.zos.core.angelRequired=true`

- More robust CICS start-up and IPL procedures
- Integrates with named Liberty angel process `-Dcom.ibm.ws.zos.core.angelName`

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Notes

Multiple Liberty servers in a CICS region

It is now possible to run multiple CICS Liberty JVM servers in the same CICS region and have them connect to a Liberty angel process, for security and other services. This allows applications to be isolated from each other with each Liberty server having its own configuration and lifecycle. It also allows for an application to be hosted in more than one Liberty server in the same CICS region, for improved redundancy and development scenarios.

Wait for Liberty angel process

A new JVM server option is provided to ensure that a Liberty JVM server will connect to a Liberty angel process before reaching the ENABLED state. This results in a more robust startup of CICS systems using Liberty. For example, after a system restart and CICS is started ahead of the angel process.

This support is integrated with the named angel support, allowing each CICS region or Liberty JVM server to use its own dedicated angel process

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CICS JVM profiles

Include & share common configuration

- For example unique ports, database configuration or log settings

```
%INCLUDE=<file>
```

Define unique variables

```
CLONEDIR=&USSHOME;/&JVMSERVER;/bundles
OSGI_BUNDLES=&CLONEDIR;/mybundle.jar
```

Append to variables

```
OSGI_BUNDLES=&USSHOME;/&JVMSERVER;/bundles
+OSGI_BUNDLES=/newpath/bundles
```

... is equivalent to ...

```
OSGI_BUNDLES=&USSHOME;/&JVMSERVER;/bundles,/newpath/bundles
```

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Notes

Include & share common configuration

The JVM profile is the configuration file for a JVM server that contains Java launcher options, system properties, environment variables, and JVM server options. When cloning JVM servers across multiple CICS regions, JVM profiles can now be shared, and unique values such as HTTP ports or debug options easily overridden.

A new JVM profile directive `%INCLUDE` is provided that loads additional configuration from another file. This enables configuration that is common to several JVM profiles to be shared between configurations, or overridden using the predefined symbols for APPLID or JVMSERVER as part of the include path.

Define unique variables

Custom variables can now be defined in the JVM server and referenced using symbol notation &SYMBOL;

Appending variables

The value of variables can be built up over multiple lines, which allows includes files to incrementally extend specific variables and improves readability

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Liberty server.xml

Passing variables into server.xml

- In JVM profile

```
SERVER_INCLUDE=&USSHOME;/&APPLID;/server.xml
```

- In server.xml

```
<include location="${env.SERVER_INCLUDE}" />
```

Inject Liberty configuration into server.xml

- In JVM profile

```
LIBERTY_INCLUDE_XML=<file>
```

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Passing variables into server.xml

Symbols defined in the JVM profile can now be passed into the Liberty server.xml configuration file as variables. This enables shared configurations to be included across cloned Liberty servers, by using zFS paths that are based on the pre-defined variables, USSHOME, APPLID, JVMSERVER, or on custom defined variables.

Inject Liberty configuration into server.xml

A new JVM profile option `LIBERTY_INCLUDE_XML` is provided that enables CICS to autoconfigure the loading of shared configuration into server.xml. Examples of commonly shared configuration.

- Inclusion of shared applications or shared library JARs
- Data sources for IBM Db2 and connection factories for JMS

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Removal of restrictions

Removal of DPL subset restrictions for Link to Liberty

- Liberty Java applications invoked via LINK can now issues CICS SYNCPOINT and use JTA
- DPL calls to Java can use SYNCONRETURN option

Removal of SDFJAUTH

- All load modules are now in the SDFHAUTH library to simplify Java setup

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Notes

Removal of DPL subset restriction for L2L

Removes syncpoint architectural restrictions when using Link to Liberty, allowing Java application to perform a CICS syncpoint or to use the Java Transaction API (JTA).

Note, not possible to import a transaction context from a CICS UOW into an XA Java transaction

Removal of SDFJAUTH

SDFJAUTH library has been merged with SDFHAUTH library simplifying CICS JCL procedures and reducing number of authorized libraries.

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Continuous Delivery

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CICS Continuous Delivery in 2018

Q1

Capability	Availability method
Support for system rules in CICS policies across CICS TS V5 releases	Use CICS TS V5.1, CICS TS V5.2, and CICS TS V5.3 APAR PI83667
Introduce CICS TS V5.4 MFA support for CICS Explorer	Use CICS TS V5.4 APAR PI87691
Support for static data on CICS policy events across CICS TS V5 releases	Use CICS TS V5.1, CICS TS V5.2, CICS TS V5.3, and CICS TS V5.4 APAR PI88500

Q2

Capability	Availability method
Eclipse MicroProfile 1.2	Use CICS TS V5.4 APAR PI91554 and IBM 64-bit SDK for z/OS, Java Technology Edition, V8.0
OAuth 2.0, JSON Web Token, and OpenID Connect support	Use CICS TS V5.3 and CICS TS V5.4, with APAR PI91554
JSON Mapping Level 4.2	Use CICS TS V5.4 APAR PI86039
JSON Mapping Level 4.3	Use CICS TS V5.4 APAR PI88519
Multi-factor authentication for CMCI enhancements	Use CICS TS V5.4 APAR PI92676
VSAM dynamic buffer addition disabled for CICS LSR pools	Use CICS TS V5.1, CICS TS V5.2, CICS TSV5.3, and CICS TS V5.4, with APAR PI92486

Q3

Capability	Availability method
New policy system rules for PROGRAM, BUNDLE, MRO and IPIC CONNECTION status	Use CICS TS V5.4 APAR PI92806

Q4

Capability	Availability method
Changes to CICSPlex SM exploitation of the CICS TS support for the z/OS Workload Manager Health API	Use CICS TS V5.4 APAR PI90147
Enhanced management of Db2 threads that are used by CICS TS tasks	Use CICS TS V5.1, CICS TS V5.2, CICS TS V5.3, and CICS TS V5.4, with APAR PI98569

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Getting started

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Availability and documentation

Planned availability date: 14th December 2018

- CICS TS for z/OS, V5.5
- CICS TS for z/OS VUE V5.5
- CICS TS for z/OS Developer Trial V5.5

Documentation

- Announce letter
- What’s new
- Changes between releases

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Notes

https://www.ibm.com/support/knowledgecenter/SSGMCP_5.5.0/whats-new/intro.html

https://www.ibm.com/support/knowledgecenter/SSGMCP_5.5.0/upgrading/changes/version_intro.html

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CICS TS V5.5 Developer Trial

Try before you buy

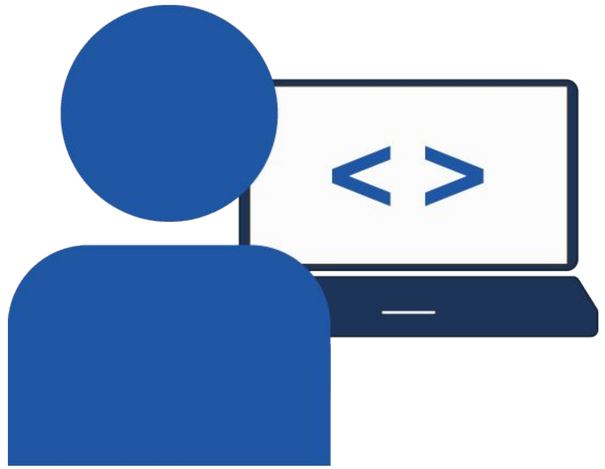
- No charge license, no single version charging period

Feature rich for evaluation

- Some restrictions – 30 max tasks, works for 90+ days from download date

Supported

- Assistance via dwAnswers and normal IBM service
- APARs delivered in periodic service refresh
- See technote for details



Evaluate the value

Explore the capability

Create the business case

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- Db2 Utilities Solution for z/OS
- Machine Learning
- Open Data Analytics
- Operational Decision Manager for z/OS

IT Operations trials

- OMEGAMON JVM on z/OS

Database and application server trials

- CICS Transaction Server
- Information Management System (IMS)
- SDK for Node.js – z/OS

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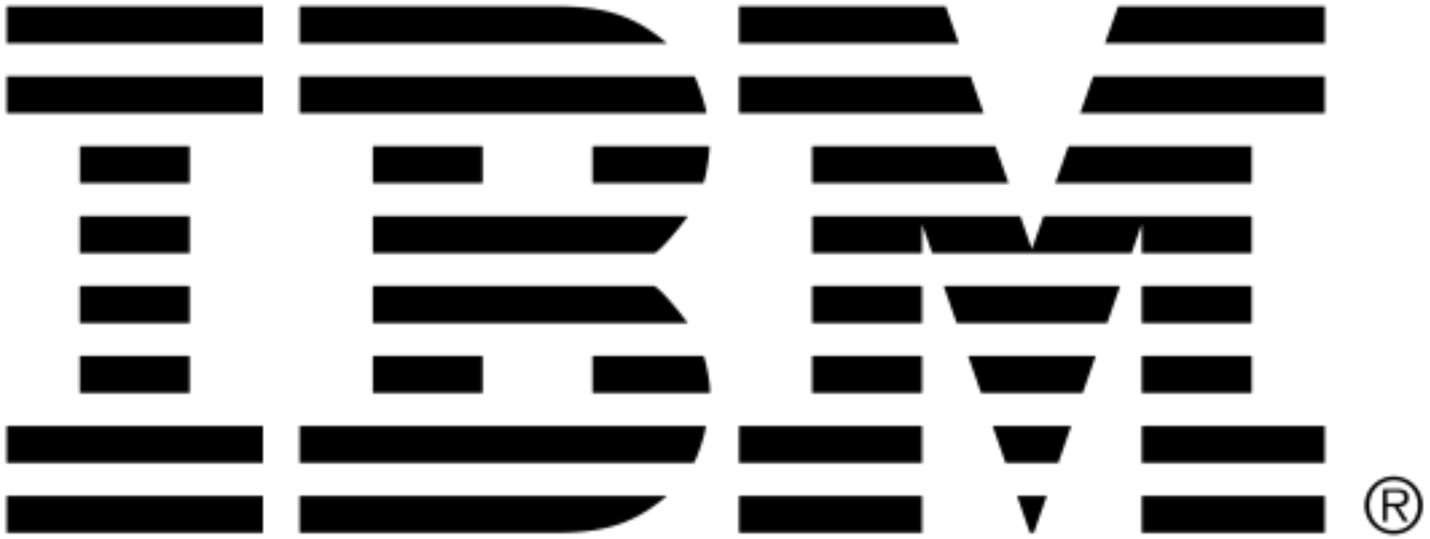

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