



# CICS TS Version 5.6: An Overview

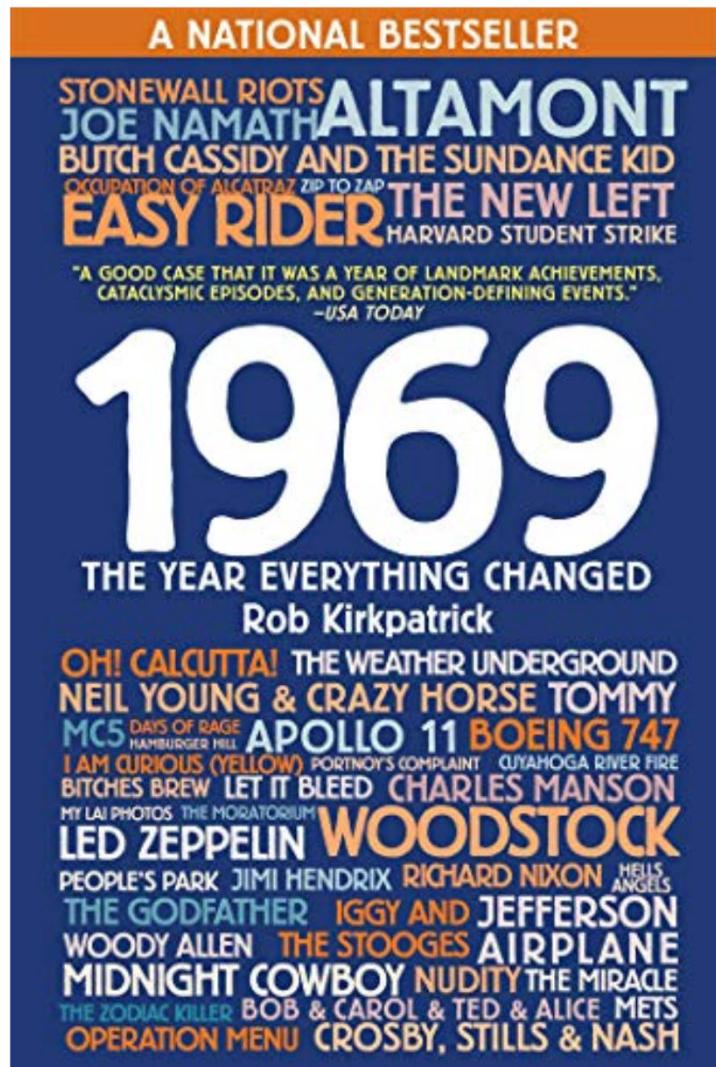
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# 1969

The Year Everything Changed

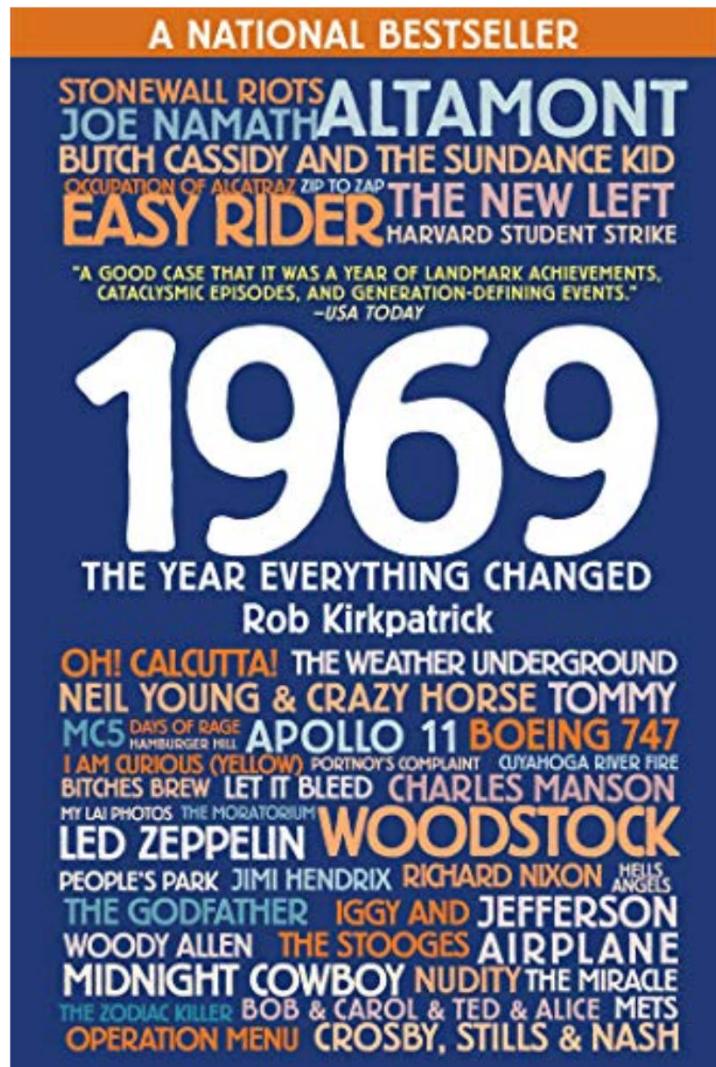


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# 1969

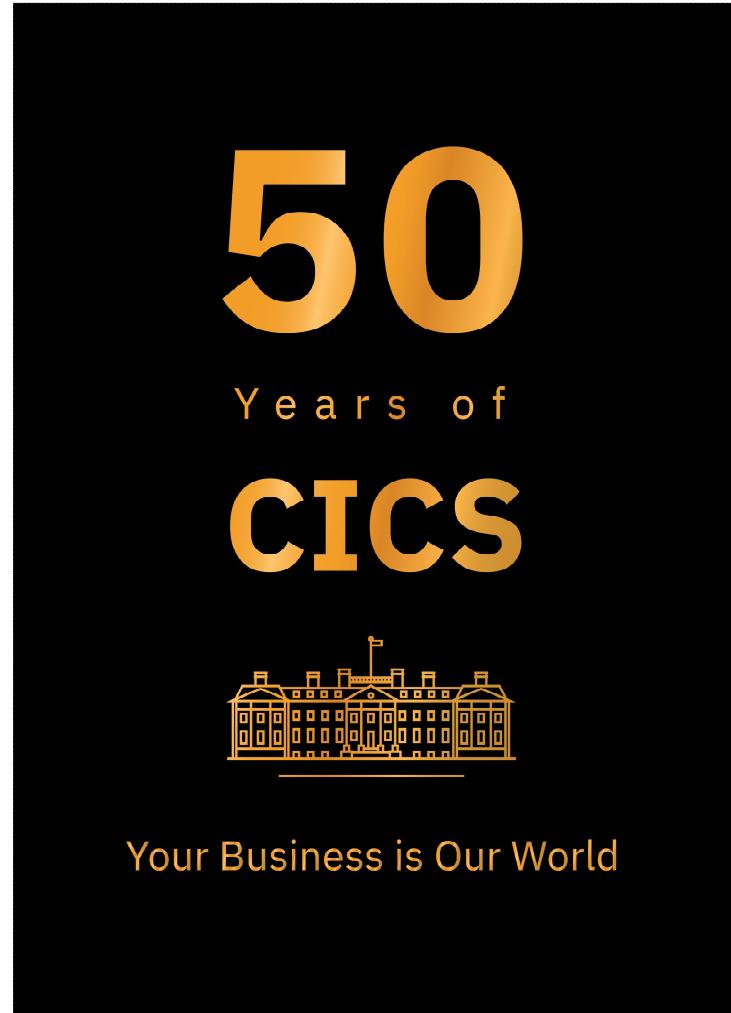
The Year Everything Changed

- First message on ARPANET
- Apollo 11 moon landing
- Frosty the Snowman cartoon debut
- CCD invented
- Prince Charles invested as Prince of Wales
- Wendy's first store
- First ATM in USA
- Walmart incorporated
- Beatles' Abbey Road Album
- First Unix release
- First 747 passenger flight



## And most importantly ...

- July 8, 1969
- The first release of CICS is delivered
  - Assembler language only
  - Macros to invoke CICS services
  - Single region operation

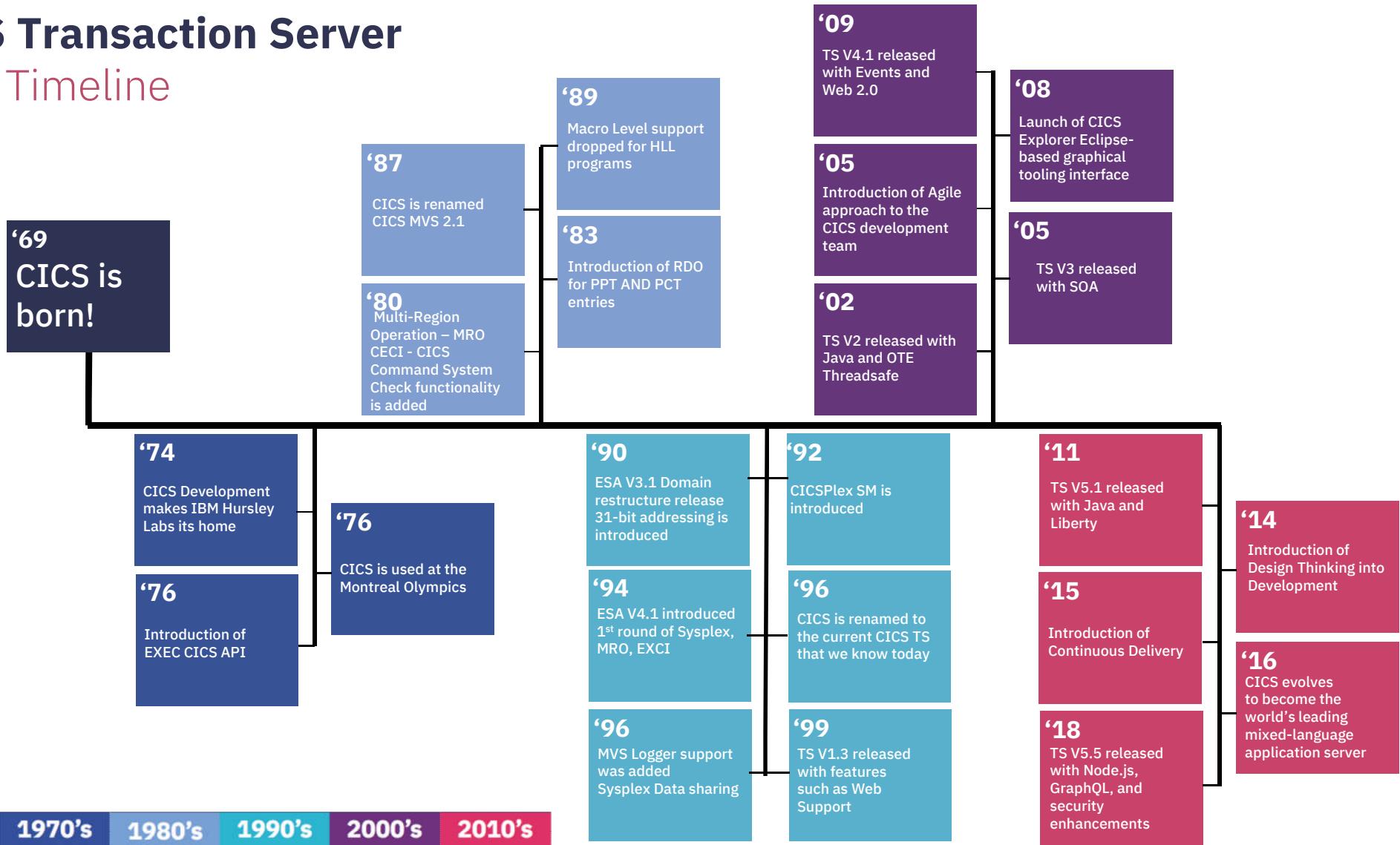


 IBM CICS Transaction Server

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# CICS Transaction Server

## 50th Timeline



1960's    1970's    1980's    1990's    2000's    2010's



# CICS TS for z/OS Version 5.6

- ✓ Developer experience
- ✓ Security
- ✓ Resilience
- ✓ Management
- ✓ Other key enhancements
- ✓ Availability



# Developer experience

- ✓ New support for Pivotal Spring Boot
- ✓ New support for Jakarta EE 8
- ✓ Enhanced CICS Java API
- ✓ New Maven Central libraries for CICS Java application development
- ✓ New plug-ins for Maven and Gradle to automate building CICS bundles
- ✓ New deployment API to simplify CICS bundle deployment during development
- ✓ New support for Node.js version 12

Developer experience



## Support for Spring Boot

- ✓ CICS Liberty JVM server supports Spring Boot applications
- ✓ Supported by Liberty features **springBoot-1.5** and **springBoot-2.0**
  - ✓ Spring Boot JARs can be deployed directly to a Liberty JVM server.
- ✓ Spring Boot applications can:
  - ✓ run on CICS without modification
  - ✓ support integration with CICS transactions and security
  - ✓ call the CICS Java API
  - ✓ be deployed and managed using CICS bundles
  - ✓ use the annotation `@CICSPackage` to define a method as the target of a CICS program.
    - ✓ can be LINKed to from any language using the CICS channel and container interface.
- ✓ This support is also available for CICS TS V5.5 with the PTF for APAR PH14856.

Developer experience



## Support for Jakarta EE 8

- ✓ CICS Liberty JVM server supports Jakarta Enterprise Edition (EE) 8
  - ✓ evolution of Java EE 8
  - ✓ easily transition from Java EE to Jakarta EE
- ✓ Jakarta EE is a community-driven open source model
  - ✓ more frequent releases than Java EE
  - ✓ evolving more quickly to address the needs of modern applications.

Developer experience



## Enhanced CICS Java API

- ✓ Subset of CICS functionality supported by new Java API classes
- ✓ Provide developers with the following capabilities:
  - ✓ more natural, modern, Java style
    - ✓ easier to understand for Java developers new to CICS
  - ✓ API that is easier to unit test using stubbing and mocking approaches
  - ✓ API that is executable on JVMs on the developer's own machine
    - ✓ allowing hot code replace and debug
    - ✓ with access to CICS APIs for during development
- ✓ Code written using the new Java API classes will execute without change
  - ✓ both in remote development mode and when deployed to run in CICS.
- ✓ Existing CICS Java API classes can be used together with the new Java API classes
  - ✓ only the new Java API will benefit from the capabilities listed above

Developer experience



## Maven Central libraries

- ✓ Set of artifacts for CICS are provided on Maven Central
  - ✓ help developers resolve Java dependencies:
  - ✓ CICS Java class library (JCICS)
  - ✓ CICS annotations
  - ✓ CICS annotation processor
  - ✓ Bill of materials (BOM)
- ✓ Java developers can specify these artifacts in the popular Maven or Gradle build tools
  - ✓ build CICS Java applications
  - ✓ dependencies resolved directly from Maven Central or from locally hosted and approved repositories
  - ✓ using tools such as JFrog Artifactory or Sonatype Nexus.
- ✓ This support is also available for CICS TS V5.2, or later.

Developer experience



## Plug-ins for Maven and Gradle

- ✓ Developers can now use Maven or Gradle to build CICS bundles
  - ✓ provide a convenient packaging mechanism for Java applications
    - ✓ and a wide range of CICS resources
- ✓ Capabilities provided by this enhancement:
  - ✓ Open source projects for Maven and Gradle are provided
    - ✓ contain a collection of Maven and Gradle plug-ins and utilities
  - ✓ Plug-ins can push and lifecycle bundles as part of the build process
  - ✓ Add versions of the Java CICS APIs and the CICS annotation processor to dependencies in a Gradle build.
    - ✓ dependencies can be resolved directly from Maven Central
    - ✓ or from an approved local repository
- ✓ This support is also available for CICS TS V5.2, or later.

Developer experience



## Deployment API for bundle deployment

- ✓ Bundle deployment API provided by the CMCI JVM server
  - ✓ simplify the deployment of CICS bundles for developers.
- ✓ Bundle deployment API used in conjunction with the CICS plug-ins for Maven and Gradle
  - ✓ allowing developers to deploy and lifecycle CICS bundles as part of their build process
  - ✓ significantly reducing the time to rebuild and deploy the application.
- ✓ Bundle deployment API receives metadata and the compressed CICS bundle
  - ✓ including details of the CICSplex, the CICS region, and a CICS bundle definition
  - ✓ CICS bundle is installed and enabled into the specified CICS region
    - ✓ with any existing CICS bundle disabled and discarded where required
    - ✓ subset of CICS resources and artifacts are supported within CICS bundles deployed in this way.

Developer experience



## Support for Node.js version 12

- ✓ Support for IBM SDK for Node.js - z/OS V8 1 introduced in CICS TS V5.5
  - ✓ provided a full JavaScript runtime, server-side APIs, and libraries
  - ✓ enabled building high-performance, highly scalable network applications
  - ✓ included optimized calls to CICS programs
  - ✓ allowed applications to be run and managed in CICS.
- ✓ Node.js support is enhanced for version 12
  - ✓ including the Node.js - z/OS long-term support release
  - ✓ provides for:
    - ✓ faster startup
    - ✓ better default heap limits
    - ✓ updates to the V8 JavaScript engine
- ✓ This support is also available for CICS TS V5.5 with the PTF for APAR PH18618.



# Security

- ✓ Enhanced support for CICS TS as an HTTP client when using TLS
- ✓ Enhanced VERIFY TOKEN command to process JSON Web Tokens
- ✓ New CICS monitoring for security domain



## **Enhanced support for CICS TS as an HTTP client when using TLS**

- ✓ CICS TS supports the use of Server Name Indication (SNI)
  - ✓ as defined in Internet Engineering Task Force RFC 6066
- ✓ CICS supports SNI if supported by the communicating HTTP server
- ✓ No configuration change is required
- ✓ Available to CICS TS V5.3, V5.4, and V5.5 in the PTF for APAR PH20063

Security



## Enhanced VERIFY TOKEN command

- ✓ VERIFY TOKEN command enhanced to support JWTs
  - ✓ provided by IBM RACF®
- ✓ User's basic authentication credentials can be converted to a time-limited secure token
- ✓ Useful where applications are converted to use MFA tokens
- ✓ Requires the PTFs for RACF APAR OA55926 and IBM SAF APAR OA55927.



## Monitoring for security domain

- ✓ Monitoring introduced for the CICS security domain
- ✓ Includes the following functional updates:
  - ✓ two new fields that indicate the total elapsed time that a user task spent verifying authentication credentials.
  - ✓ global statistics on user domain
    - ✓ giving a more comprehensive view of user instances
  - ✓ collection of global statistics on the security domain
    - ✓ providing a comprehensive view of authentication requests



# Resilience

- ✓ Improved reporting and action for z/OS short-on-storage conditions
- ✓ Improved usage of BAS data space storage for large CICSplex environments
- ✓ Improved management of CICSplex® System Manager data space usage
- ✓ Support for COMMAREAs up to 32 KB on distributed program links

Resilience



## Improved reporting and action for z/OS SOS conditions

- ✓ Monitor and guard against a shortage of z/OS 24-bit and 31-bit storage
  - ✓ Short-on-storage (SOS) messages will be issued
  - ✓ Policy option of setting WLM Health
    - ✓ direct workloads away from this region until the SOS is resolved
- ✓ Creation of open TCBs can be configured to wait if CICS is in an SOS condition.

Resilience



## Improved usage of BAS data space for large CPSM environments

- ✓ CPSM BAS component enhanced to use all available BAS data space storage
  - ✓ spreading large resource deployment lists across multiple data spaces
  - ✓ enabled by default
  - ✓ controlled with feature toggle
    - ✓ com.ibm.cics.cpsm.bas.largecicsplex.
- ✓ This support is also available for CICS TS V5.4 and CICS TS V5.5 with the PTF for APAR PH19761.

Resilience



## Improved management of CPSM data space usage

- ✓ Enforced protection added for CPSM API programs
  - ✓ CPSM API commands now return an appropriate response
  - ✓ rather than causing CMAS termination from exceeding the available data space storage.
- ✓ Message EYUXC0028 issued for excessive CPSM data space usage
  - ✓ tiers of 70%, 80%, 90%, and 95%
  - ✓ alerts users to potential CPSM storage issues

Resilience



## Support for full 32K Commarea on DPL requests

- ✓ Removal of restriction limiting COMMAREAs to 24 KB when passed on DPL
- ✓ Maximum-sized 32 KB COMMAREA can now be passed between CICS regions
- ✓ Enables full-sized COMMAREAs to be used
  - ✓ together with a transaction channel
  - ✓ and an extended identity context reference (ICRX).
- ✓ Note: The strategic replacement for COMMAREAs is the use of channels and containers. .



# Management

- ✓ New and enhanced system programming interfaces to assist with JVM server administration
- ✓ New Policy system rule types
- ✓ New z/OS workload management health policy action
- ✓ New support for IBM z/OS Workload Interaction Correlator

Management



## SPI to assist with JVM server administration

- ✓ INQUIRE JVMSERVER
  - ✓ returns JVM profile, stdout/stderr/jvmlog/jvmtrace, WORK\_DIR, and JAVAHOME
- ✓ INQUIRE/SET JVMENDPOINT
  - ✓ returns details of all HTTP and JMS MDB ports used in Liberty JVM servers
  - ✓ allows ports to be enabled or disabled.

Management



## SPI to assist with JVM server administration

- ✓ PERFORM JVMSERVER JVM DUMP / LIBERTY SERVERDUMP
  - ✓ takes Java and Liberty dumps
- ✓ PERFORM JVMSERVER GATHER
  - ✓ captures configuration, logs, traces, dumps, and output files
  - ✓ combined into a single archive
- ✓ PERFORM JVMSERVER LIBERTY REFRESH APPLICATION/CONFIGURATION
  - ✓ refreshes a Liberty application or the Liberty server configuration
- ✓ PERFORM JVMSERVER OSGI REFRESHPKGS
  - ✓ configures the OSGi framework and its application components
  - ✓ ensures latest version of packages and dependent libraries are used
  - ✓ can be disruptive and stall workloads..

Management



## New Policy system rule types

- ✓ Support for the following new Policy system rule types is introduced:
  - ✓ DBCTL connection status
  - ✓ IBM MQ connection status
  - ✓ Pipeline enable status
- ✓ This support is also available for CICS TS V5.5 with the PTF for APAR PH07632.

Management



## New z/OS WLM health policy action

- ✓ Increase or decrease the z/OS WLM health value of a CICS region
  - ✓ support added for all system rules when all conditions are met.

Management



## Support for IBM z/OS Workload Interaction Correlator

- ✓ CICS TS can exploit z/OS Workload Interaction Correlator infrastructure
  - ✓ collecting transaction activities at timely intervals, including:
    - ✓ number of tasks
    - ✓ average response time per task
    - ✓ average CPU time per task
    - ✓ CPU time on CP
    - ✓ CPU time on zIIP
- ✓ CICS SMF type 98 subtype 1024
  - ✓ summarizes activities for five-second intervals
  - ✓ recording aggregate activities across CICS regions
- ✓ Generated summary data can be used to:
  - ✓ establish base-line
  - ✓ detect transient anomalies
  - ✓ identify a significant contributing instance.
- ✓ This support is also available for CICS TS V5.4 and CICS TS V5.5 with the PTF for APAR PH16392.



## Other key enhancements

- ✓ Extension of GMTRAN option DISCONNECT to CESF
- ✓ Resource definition online enhancements to support definition of DUMPCODEs
- ✓ Capability to format recent trace entries for tasks
- ✓ New replication log record
- ✓ New feature toggle to support RLS migration
- ✓ Changes to feature toggle configuration
- ✓ Ability of CICS-MQ bridge to write SMF 110 records
- ✓ Enhancements to CONFDATA to redact passwords in traces and dumps
- ✓ Support for HTTP OPTIONS

Key enhancements



## **DISCONNECT option for CESF**

- ✓ SIT GMTRAN option DISCONNECT extended to CESF
  - ✓ forces terminal session to be disconnected upon sign-off
  - ✓ increases control over terminal session security
  - ✓ prevents access to CICS with the default user ID.



Key enhancements

## RDO for DUMPCODE

- ✓ New DUMPCODE resource
  - ✓ define transaction dump codes and system dump codes
  - ✓ DUMPCODEs installed at startup
    - ✓ removes the need to write a program list table (PLT) program
  - ✓ DUMPCODEs have resource signature returned on the SPI commands to denote how they were created and installed.
- ✓ SET TRANDUMPCODE ADD and SET SYSDUMPCODE ADD commands remain supported
- ✓ SIT parameter DUMP extended to support new option, TABLEONLY
  - ✓ allows for all system dumps to be suppressed except for those dump codes that have an entry in the dump table

Key enhancements



## Recent trace entries for all tasks

- ✓ CICS stores data about the most recent trace entries for each task in a separate table
  - ✓ in addition to auxiliary trace and internal trace
- ✓ To format this trace for a particular task, use the trace selection parameter to specify the KE\_NUM of the task of interest
- ✓ Most recent trace entries contain basic information
  - ✓ primarily intended for use in diagnosing problems with stalled tasks
  - ✓ where the data concerning the tasks may have been overwritten in the internal trace table.

Key enhancements



## New replication log record

- ✓ Support Geographically Dispersed Parallel Sysplex® (GDPS®) Continuous Availability
  - ✓ log a REDO record when an application issues an UNLOCK command
  - ✓ enables replication products to cater more efficiently for non-RLS applications
    - ✓ in the absence of browse for update support, issue read-update requests against all records in a file but update few and unlock most records.
- ✓ This support is also available for CICS TS V.5.2, or later, with the PTFs for APAR PH09381 and APAR PH13200..

Key enhancements



## Feature toggle to support RLS migration

- ✓ New feature toggle supports RLS migration
  - ✓ com.ibm.cics.rls.delete.ridfld
  - ✓ when enabled, DELETE command with the RIDFLD option can be issued for a single record
  - ✓ without causing an abend with code AFCG.
- ✓ This support is also available for CICS TS V5.4 and CICS TS V5.5 with the PTF for APAR PH07596.

Key enhancements



## Changes to feature toggle configuration

- ✓ Region ID-specific feature toggle configuration implemented in a subdirectory of the USSCONFIG
  - ✓ directory name equal to the region's APPLID
  - ✓ allows region-specific feature toggles to override the common set of feature toggles in the USSCONFIG

Key enhancements



## CICS-MQ bridge can write SMF 110 records

- ✓ New parameter added to the CICS-MQ bridge initialization
  - ✓ `SMFMQGET=nnnn`
  - ✓ instructs the bridge to write SMF type 110 record every nnnn MQGETs issued
  - ✓ records useful for performance analysis

Key enhancements

## Enhancements to CONFDATA



- ✓ Redact information from additional trace points
  - ✓ including some data in containers and Base64 data
- ✓ SIT CONFDATA option enabled by default

Key enhancements



## Support for HTTP OPTIONS

- ✓ New user-replaceable module, DFHWBOPT
  - ✓ handler program to be invoked to process HTTP OPTIONS requests
  - ✓ OPTIONS handler specified on OPTIONSPGM parameter on TCPIPSERVICE resources
  - ✓ program returns a notification message that it has been invoked
    - ✓ when DFHWBOPT is invoked, an analyzer program is not invoked
- ✓ This support is also available for both CICS TS V5.4 and V5.5 with the PTF for APAR PH16992
  - ✓ uses feature toggle com.ibm.cics.http.options.handler



# Availability and documentation, V5.6

**Availability date: 12<sup>th</sup> June 2020**

- **CICS TS for z/OS, V5.6**
- **CICS TS for z/OS VUE V5.6**
- **CICS TS for z/OS Developer Trial V5.6**

## Documentation

- [Announcement letter](https://www-01.ibm.com/common/ssi/cgi-bin/ssialias?infotype=an&subtype=ca&supplier=897&letternum=ENUS220-077)
  - <https://www-01.ibm.com/common/ssi/cgi-bin/ssialias?infotype=an&subtype=ca&supplier=897&letternum=ENUS220-077>
- [What's new](https://www.ibm.com/support/knowledgecenter/SSGMCP_5.6.0/whats-new/intro.html)
  - [https://www.ibm.com/support/knowledgecenter/SSGMCP\\_5.6.0/whats-new/intro.html](https://www.ibm.com/support/knowledgecenter/SSGMCP_5.6.0/whats-new/intro.html)
- [Changes between releases](https://www.ibm.com/support/knowledgecenter/SSGMCP_5.6.0/upgrading/changes/version_intro.html)
  - [https://www.ibm.com/support/knowledgecenter/SSGMCP\\_5.6.0/upgrading/changes/version\\_intro.html](https://www.ibm.com/support/knowledgecenter/SSGMCP_5.6.0/upgrading/changes/version_intro.html)



# CICS Developer Center

Continuous Delivery of CICS TS also requires  
Continuous Delivery of education

The CICS Developer Center has a number of resources  
to help users make the most of CICS :

- Blogs – around 120 technical articles to date
- Samples – hosted on GitHub
- Support – Q&A forums
- Podcasts, videos, client success stories & more

<https://developer.ibm.com/cics>



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A series of educational videos covering the key topics and considerations for understanding CICS performance.

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- CICS & z/OS WLM

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<https://developer.ibm.com/cics/cics-performance-resouces/>



## CICS Performance Series

The latest information and advice to achieve optimal performance.



# Getting Started with Java in CICS



## IBM CICS

### Video course series from IBM Redbooks

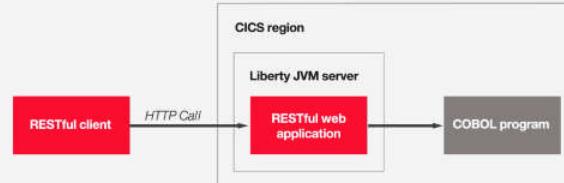
- Developing a RESTful Web application for Liberty in CICS
- Architecting Java solutions for CICS
- Extending a CICS web application using JCICS

#### What you'll learn by the end of this course

1. Developing a RESTful Java web service
2. Using the CICS Java API
3. Deployment of web applications



#### What you'll see in this course



<https://ibm.biz/cics-java-courses>

# CICS TS 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

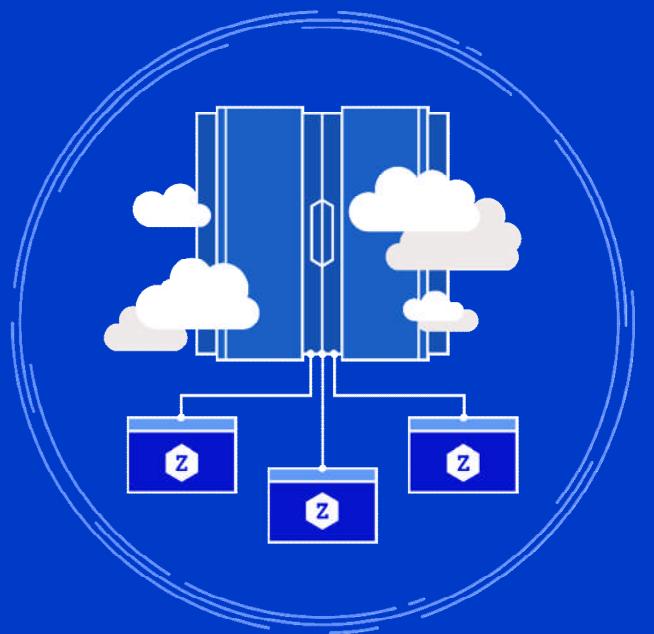
- APARs delivered in periodic service refresh
- See [technote](#) for details



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What does it do?

Removes Single Version Charging penalty for almost all IBM OTC and IBM MLC Products, including z/OS, CICS, DB2, IMS, MQ, z/VSE, etc.

How does it work?

Releases within a version are already measured like this →

$$\begin{array}{c} \text{CICS TS} \\ \text{V5.1} \end{array} + \begin{array}{c} \text{CICS TS} \\ \text{V5.3} \end{array} = \begin{array}{c} \text{CICS TS V5} \end{array}$$

Under MVM, versions are measured in the same way →

$$\begin{array}{c} \text{CICS TS} \\ \text{V4.2} \end{array} + \begin{array}{c} \text{CICS TS} \\ \text{V5.2} \end{array} = \begin{array}{c} \text{CICS TS ALL} \end{array}$$

When was it available?

- Announcement: 14-Feb-2017 <http://mainframeinsights.com/farewell-single-version-charging-svc/>
- June 1, 2017, was the earliest billing effective date for programs under MVM terms.
- By Year End 2017, all eligible products billed using MVM terms.

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