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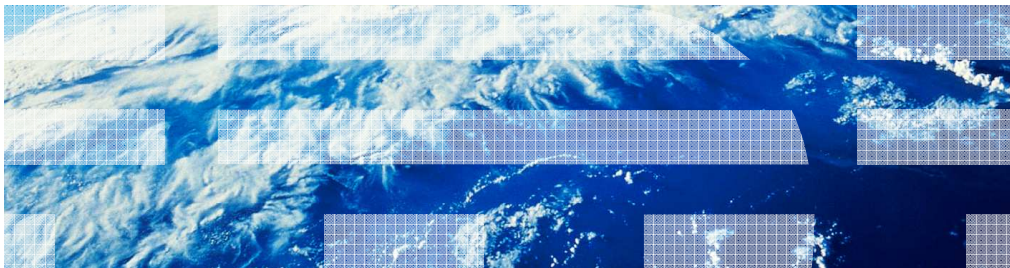# CICS Transaction Server for z/OS V4.2

Everything you need to know about upgrading – part 2

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

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

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Upgrading to CICS Transaction Server Version 4.2 is split into two modules. This module is part 2 and covers the statements of direction, the software prerequisites, the upgrading process, and where you can get more information. Part 1 describes the changes to externals including resource definition, application and system programming interfaces, global user exits, monitoring, statistics and more.

Statements of direction

- IBM intends in the future for IBM WebSphere® MQ for z/OS to provide Group Units of Recovery (Group UR) support for IBM CICS Transaction Server for z/OS (CICS TS)

- IBM intends in the future to deliver a Dynamic Scripting Feature Pack for use with CICS TS 4.2

- IBM intends a future release of CICS TS to discontinue support for both:
  - Session beans using Enterprise Java™ Beans (EJB)
  - The Java pool infrastructure

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IBM declares these statements of general direction. IBM intends in the future for IBM WebSphere MQ for z/OS to provide Group Units of Recovery (Group UR) support for IBM CICS Transaction Server for z/OS (CICS TS). IBM intends in the future to deliver a dynamic scripting feature pack for use with CICS TS V4.2.

IBM intends in a future release of CICS TS to discontinue support for both session beans using Enterprise Java Beans (EJB) and the Java pool infrastructure. If you use Java, you are encouraged to migrate Java applications to the new JVM server infrastructure. You can migrate EJB applications to Java SE components and make them available through web services or the JEE Connector architecture (JCA). CICS will continue to support Java as a first class application programming language for CICS applications, including enhancements to the CICS interfaces, the deployment infrastructure, and Java runtime environment.

IBM's statements regarding its plans, directions, and intent are subject to change or withdrawal without notice at IBM's sole discretion. Information regarding potential future products is intended to outline the general product direction and it should not be relied on in making a purchasing decision. The information mentioned regarding potential future products is not a commitment, promise, or legal obligation to deliver any material, code or functionality. Information about potential future products might not be incorporated into any contract. The development, release, and timing of any future features or functionality described for our products remains at our sole discretion.

Software prerequisites (1 of 2)

- CICS TS 4.2 requires z/OS Version 1.11, or later
  – The product cannot initialize with a lower level of operating system installed
  – z/OS Version 1.12 with OA34311 required for 64-bit subspace support

  IBM 64-bit SDK for z/OS, Java Technology Edition V6.0.1
  – Required if using Java application programs, enterprise beans, or the CICS web services assistant
  – Download from http://www.ibm.com/servers/eserver/zseries/software/java

- The IBM XML Toolkit Version 1.10 for z/OS is not required for installation
  – Required at run time if WS-Security is used
  – If not present at run time DFHPI0119 is issued

  IBM XML Toolkit and Java SDK NOT shipped with CICS

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CICS TS 4.2 requires z/OS Version 1.11 or later. CICS TS 4.2 cannot initialize in an environment with a lower level of operating system installed. If you have installed z/OS Version 1.12, you must install APAR OA34311 to enable 64-bit subspace support. The IBM 64-bit SDK for z/OS, Java Technology Edition V6.0.1, or later, is required if using Java application programs, enterprise beans, or the CICS web services assistant. The IBM SDK for z/OS is available, without charge, on tape or by download from the IBM website. The IBM XML Toolkit is not required for installation, but it is required if you run web services security. If you try to run web services security and the toolkit is not installed, CICS issues a message.

Software prerequisites (2 of 2)

- CICS Tools
  - Performance Analyzer Version 3.2 with PM30692
  - Interdependency Analyzer Version 3.1 with PM34054
  - Configuration Manager Version 2.1 with PM32874
  - Deployment Assistant Version 1.1 with PM34068
  - CICS VSAM Recovery Version 4.2 or 4.3 with PM34799
- CICS Transaction Gateway Version 7.1 or later
- IMS™
  - Version 10 with PM31730
  - Version 11 with PM31729
  - Version 12 with PM31420 for threadsafe support
  - At GA of CICS TS 4.2, IMS Version 12 is available through a Quality Partnership Program
- DB2® Version 8.1 or later
- WebSphere MQ Version 6.0 or later
- WebSphere Application Server for z/OS Version 6.1 or later

- Current® prerequisite levels are maintained at:
  http://www.ibm.com/support/docview.wss?uid=swg27020857

The CICS tools portfolio has been updated to support CICS TS 4.2. If you have any of the CICS tools, you can apply APARs to support CICS TS 4.2 regions. CICS TS 4.2 also works with CICS Transaction Gateway Version 7.1 or later. If you are using IMS, versions 10, 11, and 12 all support CICS TS 4.2 with an enabling APAR. CICS TS 4.2 also works with DB2 Version 8.1 or later, WebSphere MQ Version 6 or later, and WebSphere Application Server for z/OS Version 6.1 or later.

All the prerequisite levels of software for CICS TS 4.2 are maintained on the IBM website.

Conditions for CICS facilities to use 64-bit storage

z/OS Level	TRANISO setting	Storage used
V1R11 V1R12	YES	31-bit
V1R11 V1R12	NO	64-bit
V1R12 (with OA34311 applied) or later	YES or NO	64-bit

CICS operates without transaction isolation when the TRANISO system initialization parameter is set to NO. In CICS TS 4.2, some CICS facilities use 64-bit storage rather than 31-bit storage, depending on the version of the z/OS operating system and whether the CICS region operates with transaction isolation. This table reflects the conditions in which some CICS facilities uses 64-bit storage.

64-bit storage – MEMLIMIT parameter

- CICS TS 4.2 requires a minimum of 4 GB
- DFHSM0602 message is issued and CICS terminates
  - if MEMLIMIT is less than 4 GB
- Possible above-bar storage usage
  - Main temporary storage
  - Minimum 1 MB
    - Limited to 25% of MEMLIMIT
  - Channels and containers
    - Limited to 5% of MEMLIMIT
  - Internal trace table
    - Minimum 16 KB
    - Maximum 1 GB
  - Transaction dump table (TRTRANSZ parameter)
    - Minimum 16 KB
    - Maximum 1 GB

To provide sufficient 64-bit storage, also known as above-the-bar storage, for a CICS TS 4.2 region, set the value for the z/OS MEMLIMIT parameter equal to or greater than four GB. The default value in z/OS for MEMLIMIT is two GB. A CICS region requires at least four GB of 64-bit storage. You cannot start a CICS region with a MEMLIMIT value that is lower than 4 GB. If you attempt to do so, message DFHSM0602 is issued, a system dump with the dump code KERNDUMP is produced, and CICS terminates. You cannot alter the MEMLIMIT value for the CICS region while CICS is running. You can specify a new MEMLIMIT value on the next start of the CICS region.

MEMLIMIT calculation

- MEMLIMIT possible above-bar storage usage

    – Association data control blocks (1 KB per active task)
    – Message tables (3 MB for English + 3 MB for each additional language
    – Event processing capture queues
    – I/O buffers for z/OS system services parser
    – CICSPlex® SM API results sets
    – CMCI retained results
    – Pooled JVMs
        -Xmx + HEAP64 + LIBHEAP64 + (STACK64 *5)
        + JVMCCSIZE if using shared class cache
        DFHJVMRO contains HEAP64, LIBHEAP64 and STACK64
    – JVM servers
        Xmx + HEAP64 + LIBHEAP64 + (STACK64 * (THREADLIMIT + Xgcthreads)

- For more information:
    http://publib.boulder.ibm.com/infocenter/cicsts/v4r2/topic/com.ibm.cics.ts.performance.doc/topics/dfht3_dsa_memlimit.html

The above-the-bar storage that CICS uses can vary depending on what CICS functions you are using. You can calculate the value for MEMLIMIT by using the detailed information in the CICS TS 4.2 Information Center. See the "Estimating, checking, and setting MEMLIMIT" topic for the detailed subpool usage in the CICS Performance Guide.

Upgrade process – operating system setup

- CICS uses z/OS conversion services
  - Conversion facility must be enabled
  - Documented in "z/OS Support for Unicode Using Conversion Services"

- SDFHLINK modules are downward compatible
  - For example SVC, DFHIRP
- SEYULINK modules are not downward compatible

- MEMLIMIT needs to be set equal to or greater than 4 GB

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For Unicode conversion support, you must enable the z/OS conversion services and install a conversion image which specifies the conversions that you want CICS to perform. Refer to the instructions in the z/OS Support for Unicode: Using Conversion Services manual SA22-7649 to find out the steps needed to set up and configure conversions supported though the operating system services.

Unless otherwise stated, the CICS TS 4.2 levels of the modules in SDFHLINK are compatible with earlier releases of CICS. The CICSPlex SM modules in SEYULINK are not compatible with earlier releases. CICSPlex SM modules in SEYULINK are release specific. If you plan to run multiple releases of CICSPlex SM on the same MVS image, you must have the equivalent modules specific to the releases you are running.

Upgrade process - installation

- Default installation process
  - Common IBM install procedures
  - SMP/E RECEIVE, APPLY, ACCEPT commands
  - Described in the CICS Program Directory:

http://publib.boulder.ibm.com/infocenter/cicsts/v4r2/topic/com.ibm.cics.ts.doc/cicsts42-gaz.pdf

- DFHISTAR process
  - CICS generated installation job stream
  - Described in the CICS Installation Guide:

http://publib.boulder.ibm.com/infocenter/cicsts/v4r2/topic/com.ibm.cics.ts.installation.doc/topics/Installing.html

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This release of CICS is installed using the SMP/E RECEIVE, APPLY, and ACCEPT commands. The SMP/E dialogs can be used to accomplish the SMP/E installation steps. The process is described in the CICS TS Program Directory. It is in line with IBM Corporate Standards, and might be familiar to those who have installed other z/OS products. The traditional method, DFHISTAR, of installing CICS is described in the CICS Installation Guide.

Upgrade process – local and global catalogs

- Define new local and global catalogs
- Initialize the catalogs
- Perform a START=INITIAL
- For instructions, see:

http://publib.boulder.ibm.com/infocenter/cicsts/v4r2/topic/com.ibm.cics.ts.doc/dfha2/topics/dfha2_set_catalog_datasets.html

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Define and initialize new local and global catalogs, following the instructions in the topic "Setting up the catalog data sets". When you initialize the catalogs, make sure that you use the CICS TS 4.2 versions of the DFHRMUTL and DFHCCUTL utility programs and the sample jobs. When you start the CICS region for the first time after upgrading, make sure that it is an initial start with the START=INITIAL parameter.

Upgrade process - CSD

- Define new CSD
- REPRO existing CSD to new data set
- Run DFHCSDUP UPGRADE
  - Use DFHCSDUP SCAN command to check for user changes
  - MIGRATE command has been removed
- Sharing the CSD
  - CICS TS 4.2 CSD can be shared with prior releases
    - DFHCOMPE (41)
    - DFHCOMPD (32)
    - DFHCOMPC (31)

Everything you need to know about upgrading – part 2

Run the DFHCSDUP utility program, specifying the UPGRADE command, to upgrade the supplied definitions in your CSD to the latest CICS TS level. You can create a new CSD using the DFHCSDUP INITIALIZE command. A CICS TS 4.2 CSD can be shared with lower level CICS TS releases. Support for the DFHCSDUP MIGRATE command was withdrawn in CICS TS 4.1.

Upgrade process - Java

- All JVMs run in 64-bit
  - Review your MEMLIMIT specification
- JCICS packaging has changed
  - Now uses OSGi bundles for JVMSERVER
    - Review PM36832 and PM36838 for DB2 JDBC drivers
- New JVM profile options
  - JAVA_PIPELINE
  - OSGI_BUNDLES
  - OSGI_STARTUP_TIMEOUT
  - &JVMSERVER
    - Name of the JVMSERVER is substituted at run time
- Obsolete JVM profile options
  - CICS_HOME used if USSHOME=NONE

All JVMs run in a 64-bit environment. Although you can continue to use a supported SDK to build your Java applications, you must use the IBM 64-bit SDK for z/OS, Java Technology Edition, Version 6.0.1, to run your Java workloads. When you are upgrading CICS, you must perform these steps to make sure your Java applications work in a 64-bit environment.

Ensure that CICS has enough memory available to run 64-bit JVMs. To do this, set a suitable value for the z/OS MEMLIMIT parameter before you start your CICS regions. You must allow for other CICS facilities that use 64-bit storage as described earlier in this module.

Ensure that any Java Native Interface (JNI) code can run in a 64-bit environment. You might have to recompile or rewrite application code if it uses JNI. You must also check that any third-party products that have JNI can run in a 64-bit environment.

CICS provides two runtime environments for Java applications. The pool of JVMs still provides support for Java applications. These JVMs are called pooled JVMs. However, you can move your applications to run in a JVM server if they are threadsafe. The JVM server can handle multiple requests for Java applications concurrently in a single JVM, saving on the number of JVMs that are required in the CICS region. JVM servers can use class caches, but these class caches are not managed by CICS interfaces, such as the SPI and CEMT.

The JCICS API packaging has changed. The dfjcics.jar and dfjoutput.jar files have been replaced by a set of OSGi bundles that can run in both a JVM server and pooled JVMs. Any existing Java applications that use JCICS can run without requiring recompiling. However, if you want to change your Java applications, you must import the OSGi bundles for the JCICS API.

The JVM server has new profile options to support running an OSGi framework or Axis2. Use the USSHOME system initialization parameter instead of the CICS_HOME option.

Upgrade process – CICSPlex SM

- CICSPlex upgrade similar to previous releases
  - Maintenance point CMAS must be upgraded first
- CMAS and MAS agent code must all be at Version 4.2 level
- WUI server and its connected CMAS must be at Version 4.2 level

Everything you need to know about upgrading – part 2

You must migrate your CICSPlex SM CMAS to CICS TS 4.2 at the same time as you migrate the CICS system on which it runs. This is because a CICSPlex SM CMAS will run only in a CICS system at the same release level. Both the Web User Interface server and the CMAS that it connects to must be at the highest level of CICSPlex SM within the CICSplex. This means that both must be at the same level as the maintenance point CMAS.

Before you migrate a Web User Interface server, you must migrate the CMAS that it connects to. You must migrate the Web User Interface server before you migrate any other MASs. If the CMAS that the Web User Interface server connects to is not the maintenance point CMAS, you must migrate the maintenance point CMAS at the same time. As the CICS system that acts as your Web User Interface server is a local MAS, all the considerations that apply to a local MAS also apply to a Web User Interface server.

Upgrade process – miscellaneous items

- New DSAs
  - GCDSA: above bar CICS dynamic storage
  - ETDSA: extended trusted dynamic storage

- Release Sensitive XPI call RELSENSCALL
  - Support is stabilized in CICS TS V4.2

- CICS Messages and Codes file (CMAC)
  - IBM will no longer provide updates using PTFs

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There are new dynamic storage areas for above the bar dynamic storage and extended trusted dynamic storage.

Support for the release sensitive XPI call RELSENSCALL is stabilized in CICS TS 4.2. A future release of CICS TS intends to discontinue support for RELSENSCALL. For CICS TS 4.2 and later, IBM will no longer provide updates to CICS Messages And Codes (CMAC) files using PTFs. Changes to message definitions that arise either from APARs which add or amend a message, or from Readers Comment Forms, are made available in the CICS Information Center only. A refreshed CMAC file incorporating all Information Center updates made during the service of CICS TS 4.2 are shipped in a future release of CICS TS.

CICS Information Center
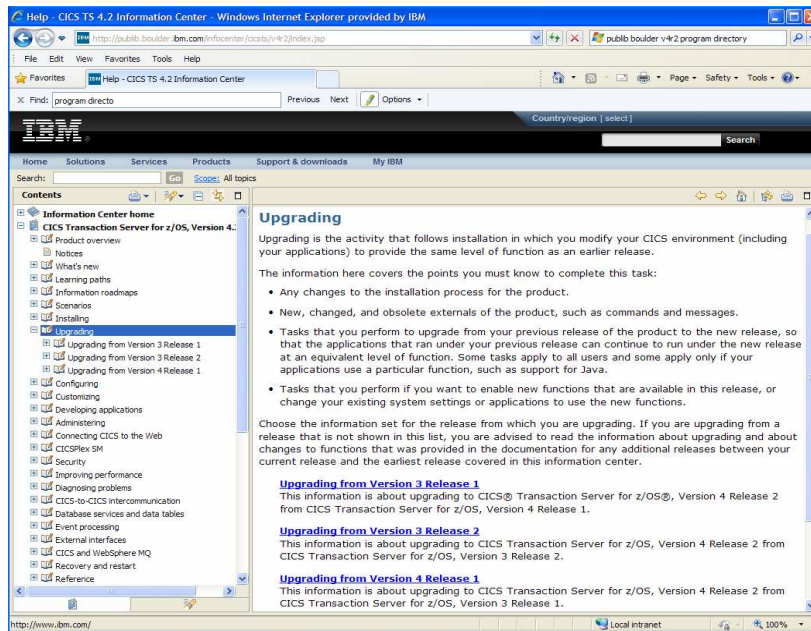
Detailed information about the changes to externals and upgrading process are described in the CICS TS 4.2 Information Center. Upgrading information is provided for each release of CICS that is in service.

CICS Interdependency Analyzer

- Upgrade analysis
  - Can help identify changes related to CICS upgrades
  - Query results can help target testing
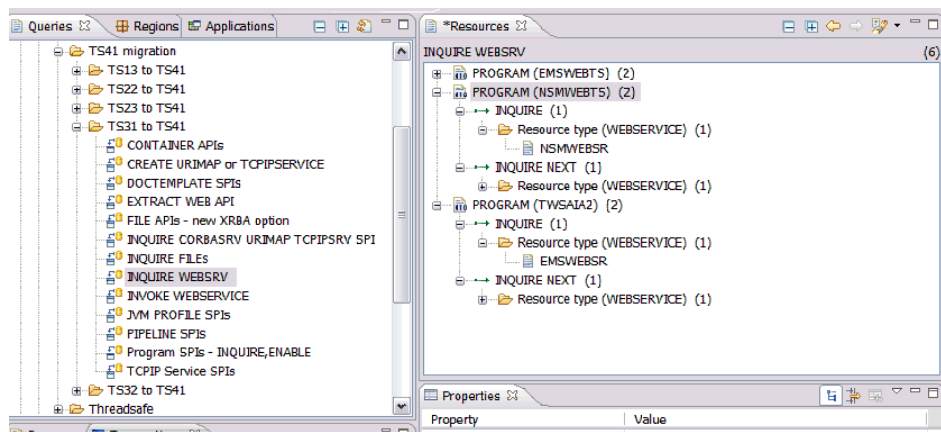
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You can also use the CICS Interdependency Analyzer to help you analyze your CICS regions for an upgrade. For example, you can create queries to help target testing for an upgrade.

Summary

- Installation
  - Similar to previous releases
  - Standard IBM procedure or DFHISTAR

- Upgrading
  - Application developers
    - Review Java programs and procedures
  - System programmers
    - "Normal" release process
    - Review all GLUEs, TRUEs, URMs, and resource definitions

The installation of CICS TS 4.2 is similar to previous releases of the product. For application developers, review Java programs and procedures to understand the effect of 64-bit JVM support. For system programmers, the upgrade to CICS TS 4.2 is business as usual. Review all exits for parameter list changes and threadsafe applicability. Regions must be analyzed to determine if function removed in CICS TS 4.2 is being used and Independent Software Vendor (ISV) products must be review to determine the correct release levels required to support CICS TS 4.2.

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