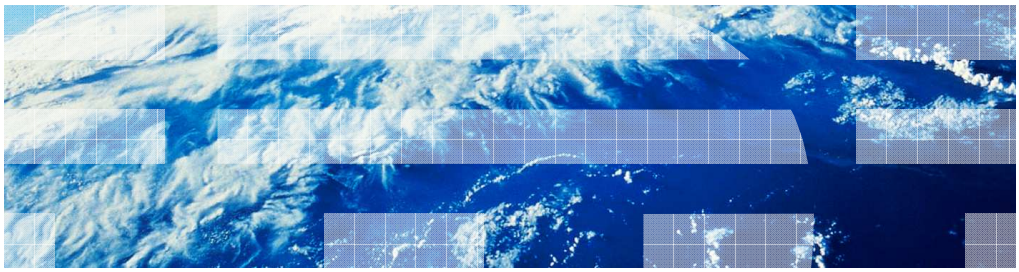
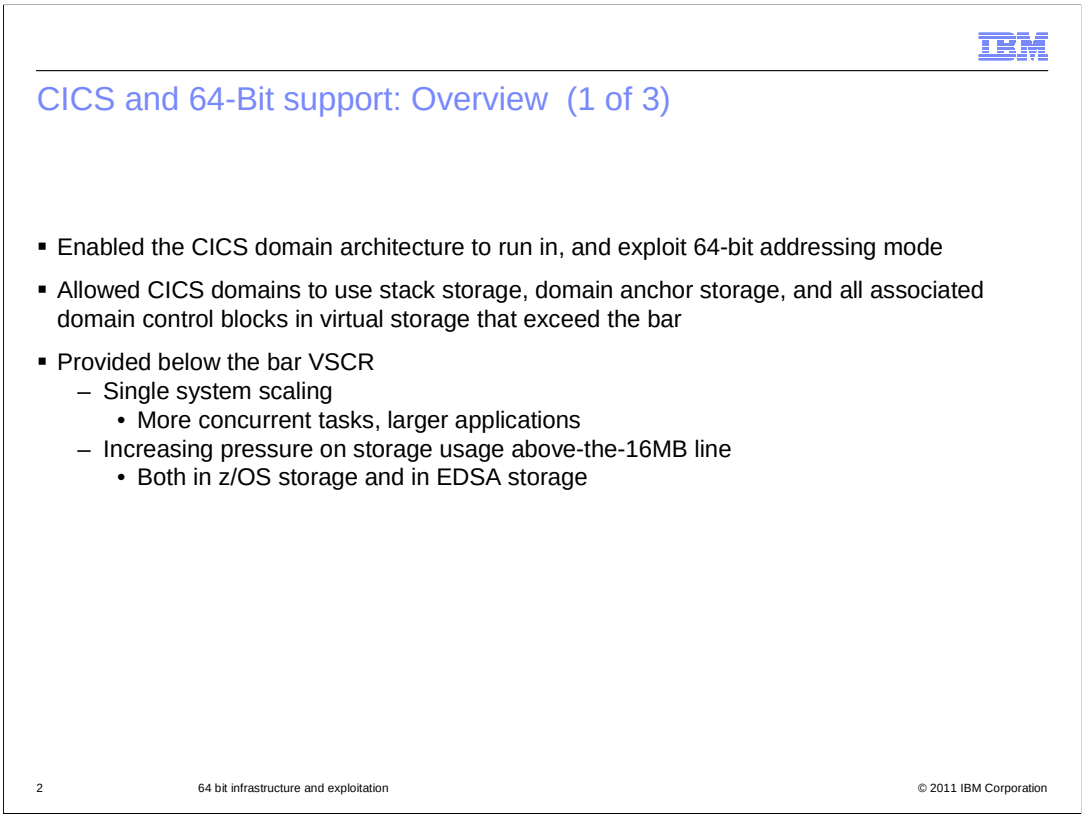
CICS Transaction Server V4.2

64 bit infrastructure and exploitation



The scalability theme of CICS TS 4.2 is concerned with being able to do more work, more quickly in a single region.

This presentation explains the 64 bit infrastructure and exploitation in CICS 4.2.



The aim of the CICS 64-bit re-architecture is to provide a CICS domain architecture environment, that exploits the underlying z/Architecture for 64-bit addressing.

As well as providing the infrastructure for the future, so that CICS applications are able to use and exploit the 64-bit addressing mode.

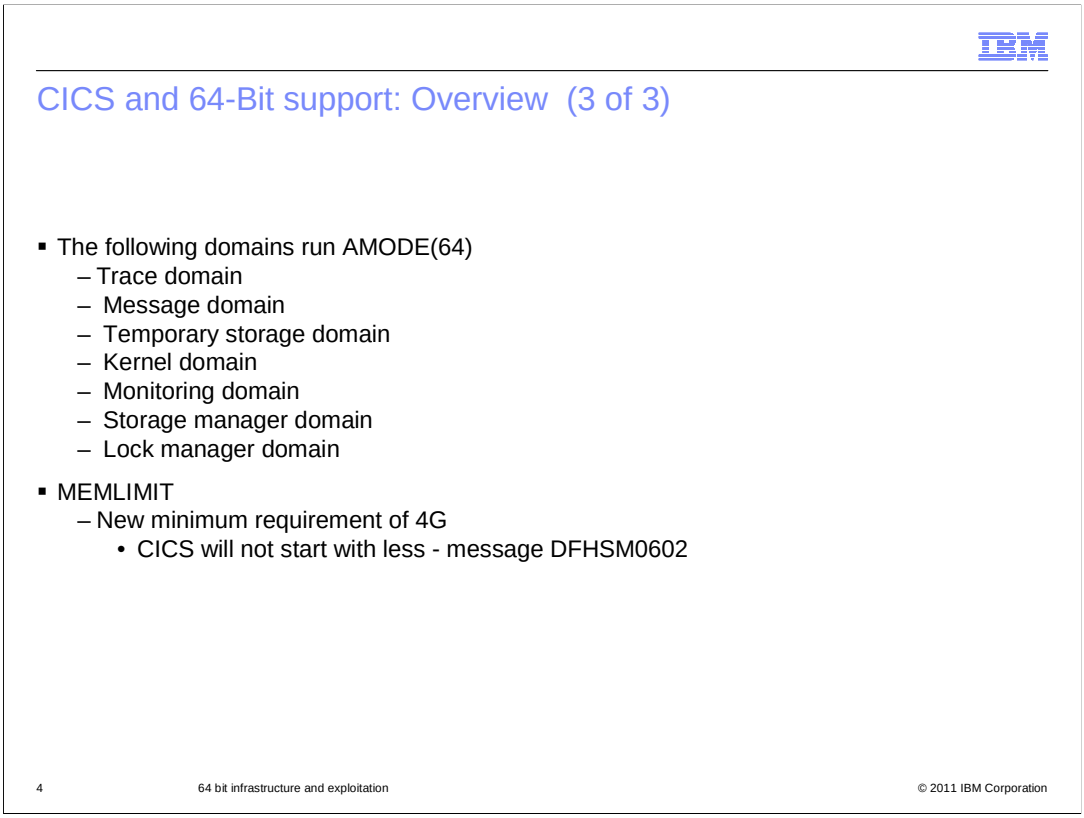
This enables CICS to remove some of the previous limitations that affected scalability and availability by delivering large address spaces with the exploitation of the 64-bit addressing provided by the z/Architecture.

With z/OS 64-bit virtual storage, CICS can make use of this large 64-bit virtual storage to increase capacity by supporting a larger number of concurrent users and concurrent transactions. It can also keep up with the virtual storage demands of increased workload of existing applications and the larger memory requirements of new applications and new technologies.

CICS and 64-Bit support: Overview (2 of 3)

- CICS Transaction Server for z/OS V4.2 contains significant changes to the CICS domain architecture. They exploit the underlying z/Architecture for 64-bit addressing and provides the infrastructure for CICS domains to use AMODE 64
- These changes affect several CICS internal interfaces and related control blocks, including (but not limited to)
  - CICS Kernel Anchor and domain table separated
  - Kernel stack, stack segments, larger save AreasKernel task entry (TAS)
  - Common System Area (CSA) – significantly changed
  - Task Control Area (TCA) – 15% smaller
  - Control block changes for these domains
    - Trace, message, loader, temporary storage, monitoring

In CICS TS 4.2, you have enabled the CICS domain architecture to run in, and exploit 64-bit addressing mode. This allows CICS domains to use stack storage, domain anchor storage, and all associated domain control blocks in virtual storage above-the-bar.



The listed domains run AMODE(64).

The z/OS MEMLIMIT parameter limits the amount of 64-bit (above-the-bar) storage that the CICS address space can use. This storage includes the CICS dynamic storage areas above-the-bar (collectively called the GDSA) and MVS storage in the CICS region outside the GDSA.

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 four GB. If you attempt to do so, message DFHSM0602 is issued, a system dump with the dump code KERNDUMP is produced, and CICS terminates. Note: CICS does not try to obtain the MEMLIMIT amount of storage when initializing, 64 bit storage is obtained as required.

Storage manager domain

- Improved 64-Bit storage manager statistics
  - Additional 64-bit storage usage metrics from the z/OS RAX
    - RAX z/OS RSM address space block extension
  - Number of memory objects, number of shared memory objects
  - Allocated private storage objects, high-water-mark
  - Allocated shared storage objects, high-water-mark
  - Current and peak GDSA allocated
- SOS infrastructure for above-the-bar storage implemented
  - SMNT Storage_Notify infrastructure implemented
    - RS domain now notified when SOS occurs – rather than noticing
- Metrics useful to measure the impact of 64 bit JVMs
  - Storage for 64 bit JVMs is outside of the CICS DSAs

The CICS storage manager statistics now provide additional information about 64-bit storage.

The storage manager global statistics, mapped by the DFHSMSDS DSECT and the storage manager dynamic storage areas statistics, mapped by the DFHSMSDS DSECT have been enhanced.

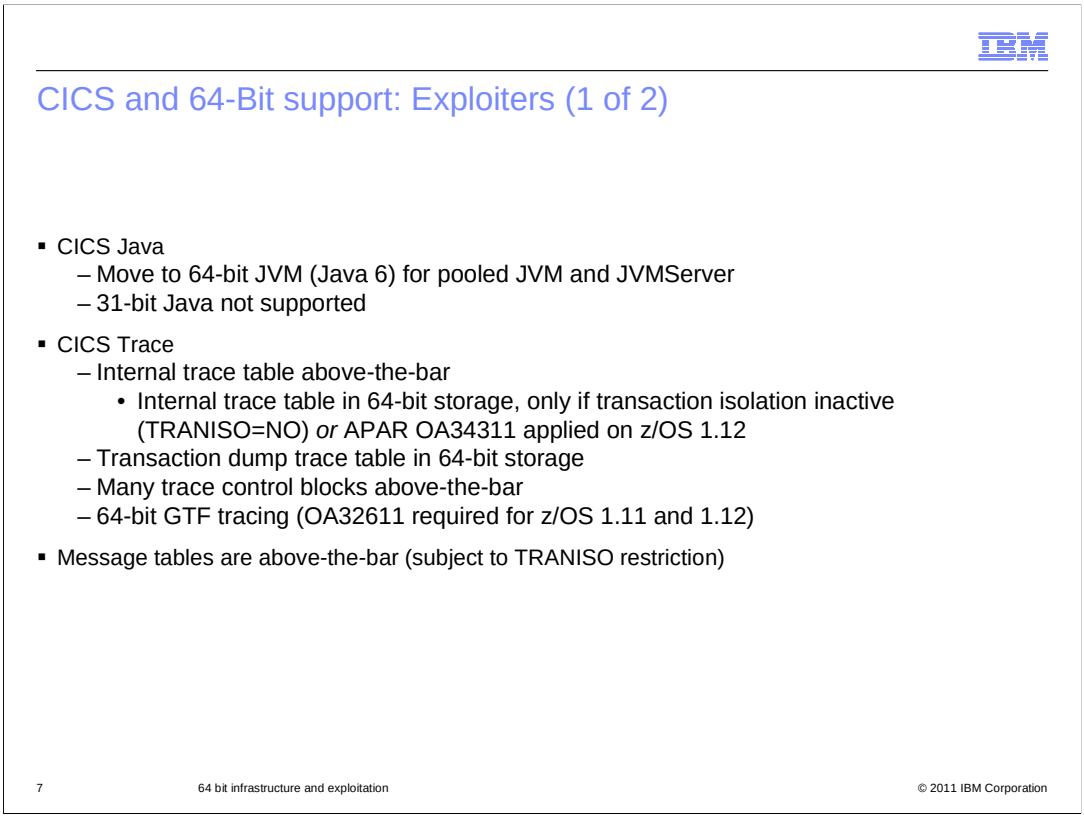
The reports produced by the DFHSTUP and DFH0STAT statistics programs show the new statistics.

CICS and 64-Bit support: Effects on 31 bit storage

- EDSALIM
  - Changes in CICS over the years means that minimum and default EDSALIM sizes are no longer adequate.
  - Current values
    - Minimum size is 10M
    - Default size is 34M
  - New values
    - Minimum size is 48M
    - Default size is 48M
    - Maximum size is unchanged at 2047M
  - Changes reflected in supplied SITs and IVPs

The minimum and default EDSALIM values have changed to 48 MB to ensure that there is sufficient storage for CICS initialization.

The EDSALIM system initialization parameter specifies the upper limit of the total amount of storage. Within which CICS can allocate the individual extended dynamic storage areas (EDSAs) that reside in 31-bit (above-the-line) storage; that is, above 16 MB but below two GB.



All JVMs now run in AMODE(64) instead of AMODE(31), increasing the capacity for running more JVMs in a CICS region.

JVM servers and pooled JVMs use 64-bit storage, significantly reducing the storage constraints in a CICS region for running Java applications. You can therefore reduce the number of CICS regions that run Java in order to simplify system management and reduce infrastructure costs.

You can also use System z Application Assist Processors (zAAPs) to run eligible Java workloads.

CICS uses the IBM 64-bit SDK for z/OS, Java technology edition, version 6.0.1, you must download this version of the SDK to run Java applications in CICS.

You can continue to build java programs using a different version of the SDK. If you have any programs that use the Java Native Interface (JNI), including other products, you must ensure that these programs can run in a 64-bit environment.

CICS can obtain 64-bit (above-the-bar) storage, rather than 31-bit (above-the-line) storage for the internal trace table. However, this depends on the version of the z/OS operating system, and whether the CICS region operates with transaction isolation.

CICS and 64-Bit support: Exploiters (2 of 2)

- CICS DUMP
  - 64-bit storage SDUMP support
    - Requires z/OS APAR OA32271 (z/OS 1.11 and 1.12)
  - Use is now made of DUMPRIORITY for key control blocks in 64-bit storage that should have priority when taking an SDUMP
    - Improves chances of storage being in the SDUMP in case the dump data sets are not big enough
    - Recommend always use SMS managed dump data sets
- EXITS
  - XPI is based on domain architected interfaces
    - Linkage conventions have changed
  - All global user exits using the XPI MUST be reassembled

CICS uses the DUMPRIORITY keyword to ensure that key control blocks, like the trace table are captured in a dump. You are recommended to use SMS managed dump data sets so that the dump datasets are big enough.
The Exit Programming Interface (XPI) used in global user exits is based on the CICS domain architecture. Due to the significant changes made to the domain architecture and the linkage conventions used, all exits that contain XPI calls must be reassembled.

CICS and 64-Bit support: Temporary storage

- Many TS control blocks above-the-bar
- TS main above-the-bar (subject to TRANISO restriction)
- Limiting main temporary storage use
  - A new SIT parameter TSMAINLIMIT={64M|amount}
  - Maximum is 32G, but must not be greater than 25% of MEMLIMIT or else CICS will not start - message DFHTS1608
  - Available on INQUIRE and SET TEMPSTORAGE commands
    - SET TEMPSTORAGE TSMAINLIMIT cannot decrease by too much or increase to >25% of MEMLIMIT
      - INVREQ and message DFHTS1606 or DFHTS1607
  - TSMAININUSE option on INQUIRE TEMPSTORAGE provides current amount of storage occupied

Main temporary storage queues can now use 64-bit (above-the-bar) storage. CICS provides new facilities so that you can check the storage use of main temporary storage queues and limit that storage use.

Main temporary storage is in 64-bit storage rather than 31-bit (above-the-line) storage, depending on the version of the z/OS operating system and whether the CICS region operates with transaction isolation.

If your CICS applications use large amounts of main temporary storage, the move to 64-bit storage can increase the available storage elsewhere in your CICS regions.

Auxiliary temporary storage queues and shared temporary storage queues continue to use 31-bit storage.

If your CICS applications currently specify the location of temporary storage, you can review this.

If an application specifies that auxiliary temporary storage is used, and you do not require recoverable temporary storage, you can change it to specify main temporary storage.

The advantages of this action are that space becomes available in 31-bit storage, and input/output activity to write data to disk is reduced.

You can control how much storage the CICS region makes available to main temporary storage queues by using the TSMAINLIMIT system initialization parameter.

The default is 64 MB. This limit on storage use does not include auxiliary temporary storage queues and shared temporary storage queues.

Temporary storage: Automatic TS cleanup (1 of 3)

- EXPIRYINT can be specified on a TSMODEL definition
  - Applies to
    - TS main and non-recoverable AUX
  - Does NOT apply to
    - Remote queues – use model in QOR instead
    - Recoverable AUX
    - Shared TS queues
    - CICS internal queue
    - Queues that do not match a TS model
  - Default is zero (no expiry), interval can be specified in hours
    - 0 ¦ 1-15000
  - Available using CEDA, CSDUP, CPSM BAS and explorer
  - SPI to inquire and set and using CPSM and explorer

You can specify that CICS deletes temporary storage queues automatically when they are no longer required.

Automatic deletion of eligible temporary storage queues reduces the unnecessary use of virtual storage. To use this feature, you set suitable expiry intervals in the temporary storage models (TSMODEL resource definitions). The expiry interval is available for main temporary storage queues and non-recoverable auxiliary temporary storage queues that match TSMODEL resource definitions in the local CICS region.

Temporary storage: Automatic TS cleanup (2 of 3)

- CICS system task attached every 30 minutes
  - Uses algorithm to minimize how often full scan of queues are performed
  - Quick scan of models to pick up additions/deletions
  - If no TSMODELs with an expiry interval task terminates immediately
  - Not an exact match on expiry interval
    - Queues are deleted by interval +10% subject to 30 minute minimum
  - When performing a scan, it issues message DFHTS1605.
    - Shows the number of temporary storage queues that were scanned and the number that were deleted
  - If the cleanup task ends abnormally, it issues message DFHTS0001 and does not run again until CICS is restarted

EXPIRYINT specifies the expiry interval in hours for a temporary storage queue that matches this model.

The interval count begins after each use of the temporary storage queue.

If the queue is not used again before the expiry interval is reached, the queue becomes eligible for CICS to delete it automatically.

When the CICS cleanup task performs a scan, it issues message DFHTS1605. This message shows the number of temporary storage queues that were scanned and the number that were deleted. If the cleanup task ends abnormally, it issues message DFHTS0001, and does not run again until CICS is restarted.

Temporary storage: Automatic TS cleanup (3 of 3)

- If you change the expiry interval in a TSMODEL
  - existing temporary storage queues that match the model are not affected – use expiry interval that applied when they were created
- Existing TSAGE TST parameter unaffected
  - If your CICS region still uses a temporary storage table (TST), which can be used in combination with TSMODEL resource definitions
    - The TST might include a TSAGE parameter. TSAGE specifies an aging limit in days, up to 512 days, for temporary storage queues
    - If the TST includes a nonzero TSAGE and there is an emergency restart of CICS, CICS deletes temporary storage queues
    - The TSAGE parameter does not cause automatic deletion of queues at any other time

If you change the expiry interval in a TSMODEL resource definition, existing temporary storage queues that match the model are not affected. Those queues continue to use the expiry interval that applied when they were created. If all the TSMODEL resource definitions with a nonzero expiry interval are deleted from a CICS region, CICS stops scanning for expired temporary storage queues.

The existing behavior of the TSAGE parameter specified on a macro TST is unchanged.

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