



IBM Software Group

Ask the Experts

Shedding light on CICS Storage

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WebSphere® Support Technical Exchange



Agenda

- Introduce the panel of experts
- Introduce CICS Storage Topics
- Answer questions submitted by email (5 questions)
- Open telephone lines for questions
- Summarize highlights

Panel of Experts

Panelist	Role at IBM
Sarah Bertram	Advisory Software Engineer in CICS level 2
Byron Baldwin	Advisory Software Engineer in CICS level 2
Andy Wright	Senior Software Engineer in CICS L3 change team
Julian Horn	Advisory Software Engineer in CICS Development

Introduction

- During this presentation we plan to shed light on CICS Storage and its functionalities and capabilities when used in a support CICS TS environment.
- This discussion will be covering how CICS Storage is managed. We will provide understanding as to what it means for CICS to be Short on Storage and also demystify what a Storage Violation entails. Also the presentation will cover the SIT parameters as well as discuss the storage tuning parameters which affect storage control.

Question 1

- How does CICS manage storage?

Answer to Question 1

- CICS initialization reserves virtual storage...
 - ▶ Below 16M line based on SIT DSALIM value
 - ▶ Above 16M line based on SIT EDSALIM value
 - Can update these values with CEMT SET DSALIMIT and CEMT SET EDSALIMIT
- CICS initialization sets GDSALIM (above the bar limit) to MVS MEMLIMIT value
 - ▶ If MEMLIMIT is below 6 GB CICS abends with DFHSM0602

Answer to Question 1

- CICS divides storage into extents. Extents are allocated to DSAs using extent size multiples ...
 - ▶ Below 16M 0.25 Megabytes
 - ▶ Above 16M 1.0 Megabytes
 - ▶ Above the bar 1.0 Megabytes
- Each DSA has different characteristics for example
 - ▶ ECDSA – KEY8 EUDSA – KEY8|9
ESDSA - KEY8|9 ERDSA – KEY0|8
 - ▶ ETDSA – KEY8

Answer to Question 1

- Every CICS getmain allocates storage from a CICS subpool
 - ▶ Hundreds of CICS subpools for many different purposes. Two subpool types ...
 - Task storage subpools for EXEC CICS getmain and EXEC CICS SET commands
 - Domain storage subpools used internally by CICS
 - ▶ Each subpool has an affinity with one of the CICS DSAs. Subpool storage allocated in 4K pages apart from EUDSA which has 64K pages

Question 2

- What does it mean if CICS is Short on Storage?

Answer to Question 2

- Simply put, if CICS cannot satisfy a getmain request, a Short On Storage condition will be flagged

- Steps CICS takes before flagging SOS
 - ▶ Program compression
 - ▶ Look for a free extent

Answer to Question 2

- Once an SOS condition occurs, CICS will issue one of the following messages to the console
 - ▶ DFHSM0131 for storage below 16 MB
 - ▶ DFHSM0133 for storage above 16 MB but below 2 GB
 - ▶ DFHSM0606 for storage above the bar

- During an SOS condition
 - ▶ CICS defers ATTACH requests

Answer to Question 2

- Things to consider to avoid SOS condition
 - ▶ Should DSALIM/EDSALIM be increased?
 - ▶ Lower Maxtask (MXT)
 - ▶ Utilize TCLASS

Question 3

- What exactly is a Storage Violation?

Answer to Question 3

- CICS detected violations are identified by the following message:
 - ▶ DFHSM0102 A storage violation (code *X'code'*) has been detected by module *modname*

- CICS puts an 8 byte 'check zone' at the beginning and end of each piece of task storage
 - ▶ **M00xxxxx** CICS24 (task storage - below 16MB, CICS key)
 - ▶ **C00xxxxx** CICS31 (task storage - above 16MB, CICS key)
 - ▶ **B00xxxxx** USER24 (task storage - below 16MB, user key)
 - ▶ **U00xxxxx** USER31 (task storage - above 16MB, user key)

Answer to Question 3

- Leading zone will always start at offset 0
- Trailing zone will always start at offset 8

USER24.00116 00105660 USER storage below 16MB

```
0000  C2F0F0F0 F0F1F1F6 4085A781 94979385 *B0000116 example*
0010  40404040 40404040 40404040 40404040 * *
0020  40404040 40404040 C2F0F0F0 F0F1F1F6 * B0000116*
```

- Check zones are compared when the storage is freemained
 - ▶ Typically this is at task termination
- Default action if they do not match is to take a dump on the SM0102

Question 4

- What storage SIT parameters are available?

Answer to Question 4

- DSA management:
 - ▶ DSALIM, EDSALIM
 - ▶ CDSASZE, RDSASZE, SDSASZE, UDSASZE
 - ▶ ECDSASZE, ERDSASZE, ESDSASZE, EUDSASZE
- Storage size settings:
 - ▶ TRTABSZ, TSMMAINLIMIT
- Non-SIT storage settings:
 - ▶ REGION=, MEMLIMIT=

Answer to Question 4 (continued)

- Storage management settings:
 - ▶ STGPROT
 - ▶ TRANISO
 - ▶ CMDPROT
 - ▶ RENTPGM
- Storage checking and recovery options:
 - ▶ CHKSTRM
 - ▶ CHKSTSK
 - ▶ STGRCVY

Question 5

- What storage tuning parameters are available?

Answer to Question 5

- System Initialization Table Tuning Parameters
 - ▶ Autodst
 - ▶ Ruwapool

- Transaction Tuning Parameters
 - ▶ Taskdataloc

- Program Tuning Parameters
 - ▶ Datalocation

Answer to Question 5

- LE Run-time Options Tuning Parameters
 - ▶ ALL31
 - ▶ HEAP
 - ▶ ANYHEAP
 - ▶ BELOWHEAP
 - ▶ STACK
 - ▶ LIBSTACK

Question 6 (submitted by customer)

- How is storage above the bar managed, specifically storage for channels and containers?
- Current doc is a little unclear about when allocated storage for channels and containers is released.
- Example: Long running transaction doing many EXEC CICS LINK Program() Channel()

Answer to Question 6

- Channels and Containers – what are they ?
 - ▶ Containers hold named data blocks for passing between programs
 - ▶ Containers are grouped into channels – storage allocated above the bar – limited to 5% of MEMLIMIT per task
- When is container storage allocated ?
 - ▶ EXEC CICS PUT | PUT64 CONTAINER CHANNEL('NEWCHANNEL')
 - ▶ EXEC CICS MOVE CONTAINER CHANNEL TOCHANNEL
 - ▶ EXEC CICS START TRANSID CHANNEL

Answer to Question 6

- When is container storage released ?
 - ▶ EXEC CICS DELETE container command
 - ▶ EXEC CICS RETURN – deletes all channels (and their containers) created by the returning link-level program except ...
 - Channel named on EXEC CICS RETURN
 - ▶ EXEC CICS XCTL – delete all channels (and their containers) created by the XCTLing link-level program except...
 - Channel named on EXEC CICS XCTL

Answer to Question 6

- When is container storage released ?
 - ▶ Transaction abend will de-allocate container storage as each program link-level is unstacked by CICS abend processing.
 - ▶ Pseudo-conversational channel deleted by CICS when (for example) a LOSTTERM condition occurs at the terminal which owns the channel.

Question 7

- Why does the CICS TS 5.1 Upgrade manual say the EDSALIM for the WUI and CMAS be set at 800 Mb?

Answer to Question 7

- CICS TS 5.1 has increased the allowable CICS MAXTASK value (SIT parm MXT)
 - Up to 2000
- Various CPSM components preallocate storage to allow fast allocation and deallocation of work areas
- New CICS functionality
 - Such as Platform and Application
 - Introduces new control block chains and saveareas
- Basically CPSM has to adopt new CICS functions
 - It inevitably requires more CICS storage

Question 8

- How do the CMAS and WUI use the EDSA?

Answer to Question 8

- The CMAS uses the ECDSA for data that does not need sharing with its MASes and does not need to persist across a CICS restart
- The WUI is effectively a CPSM application
 - ▶ It has no data persistence requirements and does not directly exploit the data spaces
 - ▶ All its storage use is for its own state management

Question 9

- What is the ESSS and how are its dataspace used by the CMAS?

Answer to Question 9

- Each CMAS is associated with at least 10 dataspaces
- Dataspaces are owned by the ESSS address space
- Only one ESSS per active CPSM version per LPAR
- A single ESSS instance will own all the dataspaces for a given CPSM version
- The dataspaces are also used between CMASes and MASes
 - ▶ Volumes of data can be huge
 - ▶ Secondary dataspaces may be allocated if required

Open Lines for Questions



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