1

UNDERSTANDING STORAGE VIOLATIONS
1.1 THE STORAGE MANAGER DOMAIN

Storage Manager services the DYNAMIC STORAGE AREAS

There are 10 Dynamic Storage Areas

The CICS DYNAMIC STORAGE AREA  Task Usage
The READ-ONLY DYNAMIC STORAGE AREA
The SHARED DYNAMIC STORAGE AREA
The USER DYNAMIC STORAGE AREA  Task Usage
The EXTENDED-CICS DYNAMIC STORAGE AREA Task Usage
1.1 THE STORAGE MANAGER DOMAIN

Storage Manager services the DYNAMIC STORAGE AREAS

The EXTENDED-READ-ONLY DYNAMIC STORAGE AREA
The EXTENDED-SHARED DYNAMIC STORAGE AREA
The EXTENDED-USER DYNAMIC STORAGE AREA Task Usage
The EXTENDED-TRUSTED DYNAMIC STORAGE AREA
The GRANDE DYNAMIC STORAGE AREA
10 DSAs may have the same storage protect keys, or different storage protect keys. This is **STORAGE PROTECTION**

Storage Manager attempts to keep User storage away from CICS storage

Transaction storage areas can be kept separate from each other. This is **TRANSACTION ISOLATION**
1.2 THE DYNAMIC STORAGE AREAS

CDSA key 8

RDSA key 8 (0 if RENTPGM=PROTECT)

SDSA key 8

UDSA key 8 (9 if Storage Protection enabled)

ECDSA key 8

ERDSA key 8 (0 if RENTPGM=PROTECT)

ESDSA key 8

EUDSA key 8 (9 if Storage Protection enabled)

ETDSA key 8
1.3 STORAGE PROTECTION

CICS executes in Key 8

All storage areas subject to rogue transactions

STORAGE PROTECTION offers 2 storage protect keys

CICS-KEY 8 & USER-KEY 9
1.3 STORAGE PROTECTION

STORAGE PROTECTION is enabled in the SIT

STGPROT=YES

CICS honours the protect key as specified in the program definition

Only key 8 and Key 9 possible
1.4 DSA SUBPOOLS

CICS components issue ADD_SUBPOOL during initialisation, to Storage Manager to define their subpools.

Over 200 subpools.

Each subpool has a unique 1 byte Subpool Id. Storage Manager creates a **SUBPOOL CONTROL AREA (SCA)** for each Id.

Storage Manager returns an 8 byte token representing the subpool.
1.4 DSA SUBPOOLS

There are 4 task subpools

These relate to the transaction for storage requests

Storage Manager creates these subpools exclusive to the task

Subpool names are 8 characters:

xnnnnnnnn (where x = indicate which DSA and nnnnnnnnn is taskid)
1.4 DSA SUBPOOLS

**Mnnnnnnn** This subpool is used to satisfy internal 24bit CICS requests for storage in the **CDSA** for services issued by the task or transaction.

**Bnnnnnnn** This subpool is used to satisfy application issued 24bit EXEC CICS GETMAIN commands for storage in the **UDSA**.

**Cnnnnnnn** This subpool is used to satisfy internal 31bit CICS requests for storage in the **ECDSA** for services issued by the task or transaction.

**Unnnnnnn** This subpool is used to satisfy application issued 31bit EXEC CICS GETMAIN commands using the **FLENGTH** option for storage in the **EUDSA**.
## 1.4 DSA SUBPOOLS

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**TASK SUBPOOL SUMMARY**
1.4 DSA SUBPOOLS

Allocated in 256K

Allocated in 1meg

DSALIM

EDSALIM

CDSA

ECDSA

RDSA

ERDSA

SDSA

ESDSA

UDSA

EUDSA
1.5 STORAGE MANAGER CONTROL BLOCKS

Storage Manager control blocks reside outside of the DSAs

Most of them have eyecatchers

They are anchored from the Storage Manager Anchor Block

They exist outside in order to minimise storage corruption
1.5 STORAGE MANAGER CONTROL BLOCKS

SUBPOOL CONTROL AREA

- U0000021
- FIRST SCE ADDRESS
- LAST SCE ADDRESS
- FIRST SCF ADDRESS
- LAST SCF ADDRESS

ALLOCATED STORAGE

FREE STORAGE

SCF

SCE

X'64'

X'6C'

X'74'

X'7C'

X'10'

X'4'

X'0"
1.6 STORAGE VIOLATIONS

Storage Violation is the writing of data into a storage area, not owned or not addressed by the executing transaction.

Storage Protection can offer separation between CICS and User Programs

Detecting Storage Violations is achieved by inspecting the SCZs

Storage Violations are only detected when the SCZ is checked
1.6 STORAGE VIOLATIONS

Transaction Isolation offers support of storage at the Working Storage level

By using the z/OS Subspace Grouping facility

Each Address Space is now a Base Space

Each Subspace is not allowed to have write access to a different transaction
CICS will take a System Dump and write it to a z/OS dynamic dump dataset

Message: **DFHSM0102** will be sent to the CICS Job Log

Message: **DFHME0116** will be sent to the CICS Job Log

A Code will be included in the message of **DFHSM0102**. The CICS/TS User’s Handbook can be used to look up the meaning of the code
1.6 STORAGE VIOLATIONS

Storage Violations will be detected when CICS is forced to check the storage areas.

Explicit Freemain

End of task Freemain

The Storage Violation can be identified in the Trace with an *EXC entry
## 1.6 STORAGE VIOLATIONS

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### KERNEL LINKAGE STACKS FOR A STORAGE VIOLATION
1.7 STORAGE MANAGER CONTROL BLOCKS 4.1

Access Computing Education
DUMP SUMMARY
DUMPID: 1/0001
DUMPCODE: SM0102
DATE/TIME: 14/02/12 06:15:26 (LOCAL)
MESSAGE: DFHSM0102 CICSTS41 A storage violation (code X'0F0C') has been
detected by module DFHSMAR.
SYMPTOMS: PIDS/5655S9700 LVLS/660 MS/DFHSM0102 RIDS/DFHSMAR PTFS/UK57632
PRCS/00000F0C

==SM: EUDSA Summary
Size: 1024K
Cushion size: 0K
Current free space: 768K (75%)
* Lwm free space: 768K (75%)
* Hwm free space: 1024K (100%)
Largest free area: 768K
* Times nostg returned: 0
* Times request suspended: 0
Current suspended: 0
* Hwm suspended: 0
* Times cushion released: 0
Currently SOS: NO
* Times went SOS: 0
* Time at SOS: 00:00:00.000
* Storage violations: 1
Access: CICS
* Extents added: 1
* Extents released: 0
Number of extents: 1
Extent list: Start End Size Free
1FB00000 1FBFFFFF 1024K 768K

INTERNAL TRACE TABLE
XM QR SM 0F0C SMAR *EXC* Storage_check_failed_at_address 1FB3C0C
RELEASE_TRANSACTION_STG

SM 0F0C DFHSMAR Exc Storage check failure
1 SMAR parameter list
2 Address of storage element
3 Length of storage element
4 First 512 bytes (max) of
   storage element
5 Last 512 bytes (max) of
   storage element
6 Data preceding storage
   element (1K max)
7 Data following storage
   element (1K max)

TR: TRACE DOMAIN FULL TRACE
SM 0F0C SMAR *EXC* - Storage_check_failed_at_address - 1FB3C0C
FUNCTION(RELEASE_TRANSACTION_STG)
   TASK-XM KE_NUM-001A TCB-QR /008D07B0 RET-9E74697E TIME-
   06:15:25.0954820000 INTERVAL-00.0000360000 =003627=
   1-0000 00280000 000000D1 00000000 00000000 B0000000
   0000000 02000100 00000000 ........J.........................*
0020 00000000 00000000

*..........
* 2-0000 1FB3C0C0
*..{{
* 3-0000 00000060
*....-
* 4-0000 E4F0F0F0 F0F0F4F2 00000000 00000000 00000000 00000000
00000000 00000000 00000000 *U0000042........................*
0020 00000000 00000000 00000000 00000000 00000000
*............0042
*

==DS: TASKS SUMMARY
DS_TOKEN KE_TASK  T S F P TT RESOURCE RESOURCE_NAME    W TIME OF
TIMEOUT      DTA AD ATTACHER M SUSPAREA XM_TXN_TOKEN
(DSTSK)     TOKEN
0282000B 1F92F700 0 N R
2B376200 XM 1EB09300 QR 1EB09300000042C

==KE: Kernel Domain KE_TASK Summary
KE_NUM KE_TASK  STATUS       TCA_ADDR TRAN_# TRANSID DS_TASK  KE_KTCB  ERROR
0002   1E890530 KTCB QR      00000000                1EB03100 1E8D7FF8
001A   1F92F700 ***Running** 00000000                2B376200 1E8D7FF8

E_NUM @STACK LEN TYPE ADDRESS  LINK REG OFFSET ERR NAME
001A   1F937020 0170 Bot  9E701F00 9E702316 000416     DFHKETA
001A   1F937190 0380 Dom  9E71C268 9E71C480 000218     DFHDSKE
001A   1F937510 0880 Dom  9E744EE0 9E74697E 001A9E     DFHXMTA
001A   1F937D90 0390 Dom  9E735A00 9E737320 001A9E     DFHSMAR
001A   1F938120 0670 Dom  9E7913F0 9E7950F0 003D00     DFHMEME
001A   1F938FC0 0670 Dom  9E834ED8 9E836AEC 001C14     DFHDUDU

==SM: Task subpool summary
SMX Addr Name       Id Loc Acc   Gets  Frees  Elems  Elemstg Pagestg Tran
2B3752C8 U0000042 0004 A C 3 0 3 49440 64K VIOL
==SM: STORAGE MANAGER DOMAIN - CONTROL BLOCKS

SMA 1E92EB00 Storage Manager domain Anchor block
  0000  03906EC4 C6C8E2D4 C1D5C3C8 D6D94040 2B378350 2B31C990 2B337E30
  2B31C7DC *..>DFHSMANCHOR ..c&..H...=-...G.*  1E92EB00

SCA.U0000042 2B31C7DC Subpool Control Area
  0000  E4F0F0F0 F0F0F4F2 1E92EB10 2B34650C 28010600 00000000 00000000
  0000000 *U0000042.k...........................*  2B31C7DC

SCE.U0000042 2B378200 Storage Element Descriptor
  0000  2B338680 2B31C82C 1FB3C0C0 00000060 1EA6B038 00000000
  *..f...H...{....-.w...... *  2B378200
  SCE.U0000042 2B338680 Storage Element Descriptor
  0000  2B338F98 2B378200 1FB33AE0 000085E0 1EA6B038 00000000
  *..q..b....\..e\..w...... *  2B338680
  SCE.U0000042 2B338F98 Storage Element Descriptor
  0000  2B31C82C 2B338680 1FB30000 00003AE0 1EA6B038 00000000
  *..H...f........\..w...... *  2B338F98
  SCF.U0000042 2B338FB0 Free Storage Descriptor
  0000  2B31C83C 2B31C83C 1FB32000 00003EE0 1EA6B038 00000000
  *..H...H...A.\..w...... *  2B338FB0

==XM: TRANSACTION SUMMARY

Tran Tran TnxAddr Start Sys  Status   DS      Facility Facility AP
   PG  XS  US  RM  SM  MN id   num  TxdAddr code Tran  token  type  token  token  token  token  token  token  token

VIOL 00042 1EB09300 T  No  ACT  0282000B None    00000000
  00000000  00000000  00000000  00000000  2B3752C8 FF4FAC00
  1FADEBE0  008C4000
  00000000  00000000  00000000  00000000  00000000  00000000