IPCS For CICS Systems Programmers

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Objectives

- IPCS Basics
- A helpful hint for ISPF
- Generating a dump*
- CICS Domain Analysis
- Problem Analysis
  - S0C7 Transaction Abend
  - Storage Violation
  - SOS Condition #1
  - SOS Condition #2

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IPCS

"*The Interactive Problem Control System (IPCS) is a tool provided as part of the MVS operating system to aid in diagnosing software failures. IPCS provides formatting and analysis support for dumps and traces produced by MVS, program products, and applications executing in an MVS environment*."

- Not CICS friendly
  - IBM CICS provides VERBEXIT to format CICS dump
- Not user friendly
  - Cryptic commands
  - Slow response

IPCS

continued

```
------------------- z/OS 01.11.00 IPCS PRIMARY OPTION MENU  -------------------
OPTION  ===>
                                                          ********************
   0  DEFAULTS    - Specify default dump and options       * USERID  - T#RUSS2
   1  BROWSE      - Browse dump data set                   * DATE    - 11/08/07
   2  ANALYSIS    - Analyze dump contents                  * JULIAN  - 11.219
   3  UTILITY     - Perform utility functions              * TIME    - 15:50
   4  INVENTORY   - Inventory of problem data              * PREFIX  - T#RUSS2
   5  SUBMIT      - Submit problem analysis job to batch   * TERMINAL- 3278
   6  COMMAND     - Enter subcommand, CLIST or REXX exec   * PF KEYS - 24
   T  TUTORIAL    - Learn how to use the IPCS dialog       ********************
   X  EXIT        - Terminate using log and list defaults

Enter END command to terminate IPCS dialog
```

IPCS

continued

Default Panel

- Tell IPCS which dump dataset to use
- Describe the dump
- Always use SCOPE ==> BOTH
- Source must use syntax DSNAME(‘dsn’)
- IPCS will supply the ASID information
- Always use MACHINE in the Display controls

IPCS

continued

```
------------------------ IPCS Default Values --------------------------------
Command ===>

  You may change any of the defaults listed below.  The defaults shown before
  any changes are LOCAL.  Change scope to GLOBAL to display global defaults.

  Scope   ==> both    (LOCAL, GLOBAL, or BOTH)

  If you change the Source default, IPCS will display the current default
  Address Space for the new source and will ignore any data entered in
  the Address Space field.

  Source  ==> DSNAME('sys1.dump001')
  Address Space   ==> ASID(X'0026')
  Message Routing ==> NOPRINT TERMINAL
  Message Control ==> CONFIRM VERIFY FLAG(WARNING)
  Display Content ==> MACHINE REMARK REQUEST NOSTORAGE SYMBOL

Press ENTER to update defaults.

Use the END command to exit without an update.
```

IPCS

continued

When reusing dump dataset names

- IPCS gets confused
- Use the inventory panel to delete information about the old dump
- Command DD
- Don’t delete the dump dataset if it has a new dump in it!

IPCS

continued

```
 IPCS INVENTORY - T#RUSS2.DDIR ------------------------------------------
    ----
Command ===>                                                SCROLL ===>
    CUR

AC Dump Source                                                    Status
dd DSNAME('T#RUSS.TEG1.D050218.T064841.S001')  . . . . . . . . . . CLOSED
    Title=Abend S0C7  in Job REE9DM2  at 06:48:41 on Friday   , February
    18, 20
    No symptoms
___DSNAME('T#RUSS.TEG1.D050309.T082716.S001')  . . . . . . . . . . CLOSED
    Title=Abend U3489 in Job REE9DM2  at 08:27:16 on Wednesday, March
    09, 20
    No symptoms
___DSNAME('T#RUSS.TEG1.D050314.T113540.S001')  . . . . . . . . . . CLOSED
    Title=Abend S0C7  in Job REE9DM2  at 11:35:40 on Monday   , March
    14, 20
    No symptoms
*************************** END OF IPCS INVENTORY ***************************
```

IPCS

continued

```
------------------ CONFIRM IPCS DROPDUMP and DELETE -----------------
Command ===>
You have requested that IPCS delete information related to a data set:

      DSNAME   ==> 'T#RUSS.TEG1.D050218.T064841.S001'

  Please ensure that both actions shown reflect your wishes.

  1.  Dump directory records referring to the data set may be erased.

      RECORDS  ==> ANALYSIS     (ALL, ANALYSIS, TRANSLATION, or NONE)

  2.  The data set, itself, may be deleted.

      DELETE   ==> NO           (YES or NO)
Press ENTER to continue.
Use the END command to exit without deletion.
```

IPCS

continued

Entering IPCS Commands

- Enter from IPCS option 6
- Most commands relate to z/OS but some useful:
  - VERBX MTRACE: view system console buffers
  - ST SYS: basic info about dump from z/OS perspective
  - LISTSYM: list all equated symbols
  - IPLDATA (z/OS 1.3 and above)

Hint

Setting up your ISPF session

- ISPF requires a large region (I use 32000)
- Use SPLIT NEW/SWAP LIST commands
- Use SCRNAME to identify split screens

Hint

CONTINUED

ISPF command SWAP LIST provides the list of all open sessions:

```
   ID  Name        Panelid   Applid
.  1   JCLLIB      ISREDDE2  ISR
.  2   SDSF        ISFPCU41  ISF
.  4-  IPL         BLSPNTRC  BLSG
.  3   KCB         BLSPDISD  BLSL
.  5*  SOURCE      ISREDM01  ISR
.
```

ISPF command SCRNAME <text> provides the information in the Name column.

SWAP 1 or SWAP JCLLIB activates the first session, or use SWAP LIST and cursor select.

* Indicates the window viewed when SWAP LIST was issued

– Indicates the second to last window.

SWAP (PF9) toggles between the last two windows

Generating a dump

Several methods:

- CEMT P SNAP
- Console dump
- SLIP TRAP
- CICS generated from abend or message

Generating a dump

continued

CEMT P SNAP

```
P SNAP
 STATUS:  RESULTS
  Sna                                                    SDUMP SUPPRESSED
```

System dumping set off in SIT. Use CEMT:

CEMT S SYSTEM SYSDUMP

And retry the SNAP

Dump DSN is written to the console:

IEA611I COMPLETE DUMP ON SYS2.TEST.DMP00002 682

DUMPID=002 REQUESTED BY JOB (CICSTEST)

Generating a dump

continued

Console Dump

CICS VERBEXIT requires data areas that are not included in default! From the console (or SDSF) issue command:

DUMP COMM=('MY DUMP DONT DELETE')

In response, message IEE094D will appear with a WTOR number:

***nnn IEE094D SPECIFY OPERAND(S) FOR DUMP COMMAND**

Reply using all of the SDATA listed here:

```
R nnn,JOBNAME=CICSPROD,SDATA=(ALLNUC,CSA,GRSQ,LSQA,NUC,PSA,RGN,SQA,SUM,SWA,TRT,WLM)
```

Message IEA611I provides dump dataset name.

Viewing CICS Domains

IBM supplies an IPCS VERBEXIT to format CICS:

- Enter **VERBEXIT DFHPDxxx** from IPCS option 6
  - Where xxx is the internal CICS release, not TS release

CICS TS Release	DFHPDxxx
3.2	650
4.1	660
4.2	670

Viewing CICS Domains

continued

VERBEXIT Syntax

VERBEXIT DFHPDxxx '*dd=n,dd2=n*'

Where:

xxx = your internal CICS release number
dd = the domain to be formatted
n = the level of detail to be presented:

1 – Summary only
2 – Full Control Block formatting
3 – Both 1 and 2

Note: If you omit the level number, it defaults to level 3 for those components that have a summary, and level 2 for those that do not.

Note that multiple domains can be entered on one command

Viewing CICS Domains

continued

VERBEXIT Problems

```
System ABEND 0C1, reason code 0001
PSW 078D2000 0000D2AA
Instruction area 00000000 00000000 007A5308, ILC 1, INTC 0001
GPR   0R 00000004   1R 0008050C   2R 00242998   3R E2C10000
GPR   4R 00000000   5R 002438DA   6R 0008050C   7R 00000081
GPR   8R 0034E000   9R 00080000  10R 00346155  11R 002428DA
GPR  12R 0005DF20  13R 00346000  14R 602429FA  15R 0000D2A8
IKJ56294I DFHPD630 ENDED DUE TO ERROR, SYSTEM ABEND CODE 0C1
```

Is the result of entering “DFHPDxx,’ xx=3’ without the “verbx”

Viewing CICS Domains

continued

VERBEXIT Problems

BLS17012I LINK to module DFHPD650 failed for VERB DFHPD650

Need to copy DFHPD650 to your linklist

Verbexit Options

```
Keyword   Functional area

AI  = 0|2 Autoinstall Model Manager (321)
AP  = 0|1|2|3 Application Domain (410)
APS = <TASKID= > (520)
AU  = 0|2 CICS affinities utility
BA  = 0|1|2|3 CICS business application manager
BR  = 0|1|2|3 The 3270 bridge (520)
CC  = 0|2 CICS catalog domain
CP  = 0|2 Common Programming Interface (321)
CQ  = 0|1|2 Auto install model manager
CSA = 0|2 CICS Common System Area
DB2 = 0|1|2|3 The CICS DB2 interface (520)
DD  = 0|1|2|3 Directory Domain (410)
DH  = 0|1|2|3 Document handling domain (530)
DLI  = 0|2 CICS DL/I Interface
DM  = 0|1|2|3 Domain Manager
DP  = 0|1|2|3 Debug Profiles manager (630)
DS  = 0|1|2|3 Dispatcher Domain
DU  = 0|2 Dump Domain
EJ  = 0|1 Enterprise JAVA (610)
EM  = 0|1|2|3 Event manager domain for BTS(530)
FCP = 0|2 File Control Program
FT  = 0|1|2|3 CICS WEB Interface (410/510)
ICP = 0|2 Interval Control Program
IE  = 0|1|2|3 IP ECI Domain (620)
II  = 0|1|2|3 IIOP
IND = 0|1|2|3 Page number indexes for output
JCP = 0|2 Journal Control Program
KE  = 0|1|2|3 CICS Kernel
LD  = 0|1|2|3 Loader Domain
LG  = 0|1|2|3 Logger Domain (510)
LM  = 0|1|2|3 Lock Manager domain
ME  = 0|2 Message domain
MN  = 0|1|2|3 Monitoring domain
MRO = 0|2 CICS Multi-Region Operation
```

```
Keyword   Functional area

NQ  = 0|2 Enqueue Manager (510)
OT  = 0|1|2|3 Object Transaction Domain (610)
PA  = 0|2 Parameter manager domain
PCP = 0|2 Program Control Program (use PG in
      410)
PCT = 0|2 Program Control Table
PG  = 0|1|2|3 Program Manager Domain (410)
PR  = 0|2 Partner Resource management (321)
PT  = 0|1|2|3 Partner Domain (620)
RD  = 0|2 Resource definition manager (510)
RM  = 0|2 Recovery Management (321)/(510)
RX  = 0|1|2|3 Recoverable EXCI domain (530)
RZ  = 0|1|2|3 Request Streams (610)
SH  = 0|1 Scheduler services domain for
      BTS(530)
SJ  = 0|1|2|3 JVM Domain (610)
SM  = 0|1|2|3 Storage Manager domain
SO  = 0|1|2|3 Sockets domain (530)
SSA = 0|2 Static Storage Areas
ST  = 0|1|2|3 Statistics domain
SZ  = 0|1 Front End Programming Interface (330)
TCP = 0|1|2|3 Terminal Control Program */(510)
TDP = 0|1|2|3 Transient Data Program */(510)
TI  = 0|1|2|3 Timer domain
TMP = 0|2 Table Manager Program
TR  = 0|1|2|3 Trace domain
TRS = <trace selection parameters> (410)/(510)
TSP = 0|1|2|3 Temporary Storage Program
TS  = 0|1|2|3 Temporary Storage Program (510)
UEH = 0|2 User Exit Handler
US  = 0|1|2|3User Domain (410)
WB  = 0|1|2} The web interface (520)
XM  = 0|1|2|3 The transaction manager.
XRF = 0|2 The extended recovery facility.
XS  = 0|1           Security Domain (410)
```

Viewing CICS Domains

continued

Which Domain Should I Analyze?

Choose based on the symptoms of the problem. For example:

- Kernel Domain (KE) – list of all active tasks
- Application Domain (AP) – for application issues
- Storage Domain (SM) – for SOS and Storage Violations
- Loader Domain (LD) – for program map

Problem Analysis

An ASRA abend in a user program

- Retrieve the dump dataset name from the console:

```
+DFHSR0001  CICSTEST An abend (code 0C7/AKEA) has occurred at offset
X'00002DAE' in program TEG1DEMO.
+DFHME0116 CICSTEST 274
 (Module:DFHMEME) CICS symptom string for message DFHSR0001 is
 PIDS/5655M1500 LVLS/640 MS/DFHSR0001 RIDS/DFHSRP PTFS/HCI6400
 AB/S00C7 AB/UAKEA RIDS/TEG1DEMO ADRS/00002DAE
+DFHDU0201  CICSTEST ABOUT TO TAKE SDUMP. DUMPCODE: SR0001  , DUMPID:
1/0001
+DFHDU0202  CICSTEST SDUMPX COMPLETE. SDUMPX RETURN CODE X'00'
IEA794I SVC DUMP HAS CAPTURED: 276
IEA611I COMPLETE DUMP ON SYS2.TEST.DMP00002 284
DUMPID=002 REQUESTED BY JOB (CICSTEST)
```

- Start by formatting the Kernel Domain:
  VERBEXIT DFHPDxxx ‘KE=3’

Problem Analysis

continued

Messages from IPCS

```
 IKJ56650I TIME-09:23:57 AM. CPU-00:00:01 SERVICE-1270316 SESSION-00:06:56 AUGUS
T 9,2005
 BLS18122I Initialization in progress for DSNAME('SYS2.TEST.DMP00002')
 BLS18124I TITLE=CICS DUMP: SYSTEM=CICSTEST CODE=SR0001    ID=1/0005
 BLS18223I Dump written by z/OS 01.05.00 SVC dump - level same as IPCS level
 BLS18222I z/Architecture mode system
 BLS18160D May summary dump data be used by dump access?  Enter Y to use, N to b
ypass.
Y
 BLS18123I 31,758 blocks, 132,113,280 bytes, in DSNAME('SYS2.TEST.DMP00002')
 IKJ56650I TIME-09:25:05 AM. CPU-00:00:01 SERVICE-1541921 SESSION-00:08:04 AUGUS
T 9,2005
 BLS18224I Dump of z/OS 01.05.00 - level same as IPCS level
 ***
```

Problem Analysis

continued

Verify the Dump

```
=== DUMP SUMMARY

 DUMPID:    1/0001
 DUMPCODE:  SR0001
 DATE/TIME: 23/02/06 11:22:21 (LOCAL)
 MESSAGE:   DFHSR0001 CICSTEST An abend (code 0C7/AKEA) has occurred at
        offset X'00002DAE' in program TEG1DEMO.
 SYMPTOMS:  PIDS/5655M1500 LVLS/640 MS/DFHSR0001 RIDS/DFHSRP PTFS/HCI6400
        AB/S00C7 AB/UAKEA RIDS/TEG1DEMO ADRS/00002DAE
 TITLE:     (None)
 CALLER:    (None)
 ASID:      X'0073'
```

Problem Analysis

continued

Locate the Abending Transaction

```
  ===KE: Kernel Domain KE_TASK Summary
KE_NUM KE_TASK  STATUS       TCA_ADDR TRAN_# TRANSID DS_TASK  KE_KTCB  ERROR
0001   1966DC00 KTCB Step    00000000                00000000 196B0000
0002   1966D800 KTCB QR      00000000                19903030 196B3000
0003   1966D400 KTCB RO      00000000                19903148 196B2000
0004   1966D000 KTCB FO      00000000                19903260 196B1000
0005   1968AC00 Not Running  00000000                19843080 196B2000
0006   1968A800 Unused
0007   1968A400 KTCB SL      00000000                19903490 19877000
0008   1968A000 Not Running  00000000                19843500 196B3000
0009   196A7C00 ***Running** 00000000                19843980 1984D000
000A   1A6E2480 Not Running  0005E680 00005  CSSY    198B0680 196B3000
000B   1992A880 Unused
000C   196A7000 Not Running  199A9080 00020  CSHQ    198B0080 196B3000
000E   1A6E2880 Not Running  199A8680 TCP    CSTP    198FA200 196B3000
```

Problem Analysis

continued

Locate the Abending Transaction

```
   ===KE: Kernel Domain KE_TASK Summary
KE_NUM KE_TASK  STATUS       TCA_ADDR TRAN_# TRANSID DS_TASK  KE_KTCB  ERROR
0001   1966DC00 KTCB Step    00000000                00000000 196B0000
0002   1966D800 KTCB QR      00000000                19903030 196B3000
0003   1966D400 KTCB RO      00000000                19903148 196B2000
0004   1966D000 KTCB FO      00000000                19903260 196B1000
0005   1968AC00 Not Running  00000000                19843080 196B2000
0006   1968A800 Unused
0007   1968A400 KTCB SL      00000000                19903490 19877000
0008   1968A000 Not Running  00000000                19843500 196B3000
0009   196A7C00 ***Running** 00000000                19843980 1984D000
000A   1A6E2480 Not Running  0005E680 00005  CSSY    198B0680 196B3000
000B   1992A880 Unused
0088   168CC480 Unused
0089   168CC880 Not Running  0005D080 00041  CEMT    1BB29080 158B3000
008A   168E3080 ***Running** 0005F080 00100  TEG1    1BB29200 158B3000 *YES*
```

Problem Analysis

continued

Locate the Kernel Error Entry

```
==KE: Tasks in Error; Error Data follows.
** Task in Error; Error Data follows.
=KE: Error Number:  00000001

 KERRD 168E3258 KERNEL ERROR DATA

    0000  F0C3F761 C1D2C5C1 018400C7 0000FFFF  *0C7/AKEA.d.G....*    168E3258 - - -   - - - - - - - - - - -
      - - - - - - - - - - - - - 28 LINE(S) NOT DISPLAYED

                                                                                  Error Code:  0C7/AKEA
     Error Type:  PROGRAM_CHECK      Timestamp:  B

  Date (GMT)    :  23/02/06        Time (GMT)    :  19:17:12.956547
  Date (LOCAL)  :  23/02/06        Time (LOCAL)  :  11:22:12.956547

  KE_NUM:  008A    KE_TASK:  168E3080    TCA_ADDR:  0005F080    DS_TASK:  1BB

Error happened in program DFHYC640 at offset 00002DAE
```

Problem Analysis

continued

PSW and Registers

```
CICS Registers and PSW.

  PSW:  079D3000 9B0DBDAE   Instruction Length:  6  Interrupt Code:  07  Exception Address:  00000000

  Execution key at Program Check/Abend: 9

  Space at Program Check/Abend: Basespace

  REGISTERS 0-15

REGS 1A6CBAA8

   0000  1B0DB430 1B0DA8ED 0006E49C 1B0DA178  *......y...U.....*    1A6CBAA8
   0010  1B0DA178 1B5090C0 1B5080C0 1B5000C0  *.....&.{.&.{.&.{*    1A6CBAB8
   0020  1B0D9178 1A809930 1A80D930 1B0DB99C  *..j...r...R.....*    1A6CBAC8
   0030  1B0D911C 1A80FCD0 9B0DBDA8 9B07BD20  *..j....}...y....*    1A6CBAD8
```

Problem Analysis

continued

Find Failing Instruction

```
IPCS OUTPUT STREAM ---------------------------------------- Line 857 Cols 1 78
Command ===>                                                 SCROLL ===> CSR
     2D50  58F0202C 5830C048 41103781 05EF4140  *.0....{....a... *    1B0DBD50
     2D60  72045040 D3784140 71E85040 D37C9680  *..& L.. .Y& L@o.*    1B0DBD60
     2D70  D37C4110 D37858F0 80044100 A20C58C0  *L@..L..0....s..{*    1B0DBD70
     2D80  908005EF 58C090E8 58409138 40F04008  *.....{.Y. j. 0 .*    1B0DBD80
     2D90  5850D178 07F55820 905C58F0 202C5830  *.&J..5...*.0....*    1B0DBD90
     2DA0  C0484110 377505EF FA3371E8 71ECF833  *{.........Y..8.*    1B0DBDA0
     2DB0  71E871E8 5840D17C 07F45820 905C58F0  *.Y.Y. J@.4...*.0*    1B0DBDB0
     2DC0  202C5830 C0484110 376905EF FA3371E8  *....{.........Y*    1B0DBDC0
     2DD0  71F0F833 71E871E8 5840D180 07F45820  *.08..Y.Y. J..4..*    1B0DBDD0
     2DE0  905C58F0 202C5830 C0484110 375D05EF  *.*.0....{....)..*    1B0DBDE0
     2DF0  FA3371E8 71F4F833 71E871E8 5840D184  *...Y.48..Y.Y. Jd*    1B0DBDF0
```

x'FA' is an Add Packed

Problem Analysis

continued

Are the Instruction's Operands Within the Summary Display?

```
REG 7   1B5000C0
  31-bit data follows:
  REGDATA 1B5000C0

    -0080  00000000 00000000 00000000 00000000  *................*    1B500040
    -0070  00000000 00000000 C9C7E9E2 D9E3C3C4  *........IGZSRTCD*    1B500050
    -0060  00000000 00000000 00000000 00000000  *................*    1B500060
    -0050  00000000 00000000 E2E8E2D6 E4E34040  *........SYSOUT  *    1B500070
    -0040  00000000 00000000 0E000000 00000000  *................*    1B500080
    -0030  0F000000 00000000 00000000 00000000  *................*    1B500090
    -0020  40404040 40404040 40404040 40404040  *                *    1B5000A0
    -0010  40404040 40404040 40404040 40400000  *              ..*    1B5000B0

     0000  E3C5C7F1 E3C5C7F1 D4C4D440 E3C5C7F1  *TEG1TEG1MDM TEG1*    1B5000C0
     0010  C4C5D4D6 00000000 00000BB8 00000000  *DEMO............*    1B5000D0
     0020  00000033 32567552 740C0000 00500002  *............&..*    1B5000E0
     0030  004A0000 00000000 00000000 00000000  *.¢.............*    1B5000F0
     0040  00000000 00000000 00000000 00000000  *................*    1B500100
     0050 -    00FF LINES SAME AS ABOVE
```

Problem Analysis

continued

VERBX DFHPD640,'AP=3'

```
=== DUMP SUMMARY

  DUMPID:    1/0001
  DUMPCODE:  SR0001
  DATE/TIME: 23/02/06 11:22:21 (LOCAL)
  MESSAGE:   DFHSR0001 CICSTEST An abend (code 0C7/AKEA) has occurred at
         offset X'00002DAE' in program TEG1DEMO.
  SYMPTOMS:  PIDS/5655M1500 LVLS/640 MS/DFHSR0001 RIDS/DFHSRP PTFS/HCI6400
         AB/S00C7 AB/UAKEA RIDS/TEG1DEMO ADRS/00002DAE
  TITLE:     (None)
  CALLER:    (None)
  ASID:      X'0073'
```

Problem Analysis

continued

VERBX DFHPD640,'AP=3'

```
===AP: AP DOMAIN TRANSACTION SUMMARY
```

Tran No	Tran Id	Orig Tran	TCA Addr	TWA Addr	EIB Addr	SEIB Addr	EIS Addr
00004	CSSY	CSSY	0005E080	008C4000	000400D0	0005E494	0005E388
00005	CSSY	CSSY	0005E680	008C4000	000470D0	0005EA94	0005E988
TCP	CSTP	CSTP	15BA8680	16927468	169270D0	15BA8A94	15BA8988
00018	CSNC	CSNC	0005F680	008C4000	000610D0	0005FA94	0005F988
00020	CSHQ	CSHQ	15BA9680	008C4000	169200D0	15BA9A94	15BA9988
00022	CSNE	CSNE	15BA9080	008C4000	1691F0D0	15BA9494	15BA9388
00039	CEX2	CEX2	15BAB080	008C4000	16C680D0	15BAB494	15BAB388
00041	CEMT	CEMT	0005D080	008C4000	000420D0	0005D494	0005D388
00100	**TEG1**	**TEG1**	**0005F080**	**008C4000**	**002000D0**	**0005F494**	**0005F388**

We use the Transaction Number from the KE display to find the correct entry

VERBX DFHPD640,'AP=3'

```
 IPCS OUTPUT STREAM ----------------------------------- Line 1779 Cols 1 78
Command ===>                                                SCROLL ===> CSR
  TCA.00100 0005F080 Task Control Area (User Area)

     0000  0005F180 00000001 1693ABC0 0004F948  *..1.....l.{..9.*    0005F080
     0010  168E5C30 00000000 00000000 00000008  *..*............*    0005F090
     0020  0000100C 00000000 00000000 95F83AE0  *............n8.\*    0005F0A0
     0030  16CBD560 00000090 00000000 00000000  *..N-............*    0005F0B0
     0040  00000000 00000000 00000000 00000000  *................*    0005F0C0
     0050  00000000 00000000 00000000 00000000  *................*    0005F0D0
     0060  00C3C5E2 C50600E9 16CBD454 00000002  *.CESE..Z..M.....*    0005F0E0
     0070  00000000 00000000 00000000 00000000  *................*    0005F0F0
     0080  FFFFFFFF 00000000 00500050 00000000  *.........&.&....*    0005F100
     0090  00000000 00000000 00000000 00000000  *................*    0005F110
     00A0 -    00CF LINES SAME AS ABOVE
     00D0  C5FA0200 00000000 00000000 00000000  *E..............*    0005F150
```

A Find on "TCA.ttttt" will locate the start of the detail entries for our task

VERBX DFHPD640,'AP=3'

```
 EIB.00100 002000D0 EXEC Interface Block

  -0010  00656EC4 C6C8C1D7 6DC4C6C8 C5C9C25C  *..>DFHAP_DFHEIB**    002000C0

   0000  0112212F 0106054F E3C5C7F1 0000100C  *.......|TEG1....*    002000D0
   0010  C3D7F6F0 000000EA 00047D02 08000000  *CP60......'.....*    002000E0
   0020  00000000 00000000 00000000 00000000  *................*    002000F0
   0030  00000040 40404040 40404000 00000000  *...        .....*    00200100
   0040  00000000 00000000 00000000 00000000  *................*    00200110
   0050  00000000 00                          *.....           *    00200120

EIUS.00100 00200008 EXEC Interface User Structure

   0000  00B46EC4 C6C8C5C9 E4E24040 40404040  *..>DFHEIUS      *    00200008
   0010  16A00008 00000000 16A03850 00000000  *..........&....*    00200018
   0020  00000000 00000000 00000000 00000000  *................*    00200028
   0030  00000000 00000000 00000000 00000000  *................*    00200038
   0040  00000000 00000000 002000D0 16A037E8  *...........}...Y*    00200048
   0050  00000000 00000000 00000000 00000000  *................*    00200058
```

There's often useful info in the EIB. For example, EIBFN x'0208' is an ASSIGN. If the function had involved a resource, its name would be in EIBRSCE.

Problem Analysis

continued

Browse the Dump to Locate the Operands

```
 ------------------- z/OS 01.05.00 IPCS PRIMARY OPTION MENU
OPTION  ===> 1

   0  DEFAULTS     - Specify default dump and options
   1  BROWSE       - Browse dump data set
   2  ANALYSIS     - Analyze dump contents
   3  UTILITY      - Perform utility functions
   4  INVENTORY    - Inventory of problem data
   5  SUBMIT       - Submit problem analysis job to batch
   6  COMMAND      - Enter subcommand, CLIST or REXX exec
   T  TUTORIAL     - Learn how to use the IPCS dialog
   X  EXIT         - Terminate using log and list defaults

Enter END command to terminate IPCS dialog
```

Problem Analysis

continued

Browse the Dump

```
 ------------------------ IPCS - ENTRY PANEL  --------------------------------
Command ==>

 CURRENT DEFAULTS:
  Source ==> DSNAME('SYS2.TEST.DMP00002')
  Address space ==> ASID(X'0059')

 OVERRIDE DEFAULTS:                          (defaults used for blank fields)
  Source ==> DSNAME('SYS2.TEST.DMP00003')
  Address space ==>
  Password       ==>

 POINTER:
  Address        ==> 1B5000C0                 (blank to display pointer stack)
  Remark         ==>                                 (optional text)
```

Problem Analysis

continued

Browse the Dump

```
 DSNAME('SYS2.TEST.DMP00002') POINTERS  ---------------------------------------
Command ===>                                                 SCROLL ===> CSR
ASID(X'0059') is the default address space
PTR   Address            Address space                          Data type
s0001 00.                ASID(X'0059')                          AREA
      Remarks:
************************** END OF POINTER STACK ****************************
```

Problem Analysis

continued

Browse the Dump

```
 ASID(X'0059') ADDRESS(00.) STORAGE ----------------------------------------
Command ===>                                                 SCROLL ===> CSR
00000000   000A0000   000130E1   00000000   00000000   | ................ |
00000010   00FCC290   00000000   7FFFF000   7FFFF000   | ..B.....".0.".0. |
00000020   7FFFF000   7FFFF000   7FFFF000   7FFFF000   | ".0.".0.".0.".0. |
00000030   00000000   00000000   7FFFF000   7FFFF000   | ........".0.".0. |
00000040   00000000   00000000   00000000   00FCC290   | ..............B. |
00000050   00000000   00000000   000A0000   000140E1   | ............. . |
00000060   000A0000   000150E1   000A0000   000160E1   | ......&.......-. |
00000070   000A0000   000170E1   000A0000   000180E1   | ................ |
00000080   00000000   00011202   00020003   00060011   | ................ |
00000090.:9F.--All bytes contain X'00'
000000A0   0C000001   0143E708   00000000   00002001   | ......X......... |
000000B0   00000000   00000000   000100F6   00F31588   | ...........6.3.h |
000000C0   18000000   00000000   E000A000   00000000   | ........\....... |
000000D0.:012F.--All bytes contain X'00'
```

Problem Analysis

continued

Useful Commands During Browse

- L<ocate storage address>: L 00007000
  L X+*nnn*: Locate the address at the current location plus *nnn*
  Note: addresses starting with an alpha character must be ended with a period (ie., A1234567.) to distinguish them from a label
- PF11: point-and-shoot to 31 bit address
- PF10: point-and-shoot to 24 bit address
- EQU<ate>: relate current storage address to label: EQU tca
  (Use Locate to navigate to EQUated address: L TCA)

Problem Analysis

continued

L 1B5000C0

```
  ASID(X'0059') ADDRESS(1B5000C0.) STORAGE ------------------------------------
Command ===> equ r7                                          SCROLL ===> CSR
1B5000C0   E3C5C7F1   E3C5C7F1   D4C4D440   E3C5C7F1   | TEG1TEG1MDM TEG1 |
1B5000D0   C4C5D4D6   00000000   00000BB8   00000000   | DEMO............ |
1B5000E0   00000033   32567552   740C0000   00500002   | ............&.. |
1B5000F0   004A0000   00000000   00000000   00000000   | .¢.............. |
1B500100.:1B50023F.--All bytes contain X'00'
1B500240   F0F6F4F0   E7F0F861   F0F961F2   F0F0F5F0   | 0640X08/09/20050 |
1B500250   F97AF1F2   7AF3F3F1   F2F2F3F3   F3000000   | 9:12:33122333... |
1B500260   40959500   00000000   E3C5C7F1   C3E3D340   |  nn.....TEG1CTL  |
1B500270.:1B50029F.--All bytes contain X'00'
1B5002A0   00000000   00000000   0000000C   C281840F   | ............Bad. |
1B5002B0   012345EF   01234562   C494F10F   E3C5C7F1   | ........Dm1.TEG1 |
1B5002C0   C4C5D4F1   C494F20F   C494F30F   11223344   | DEM1Dm2.Dm3..... |
1B5002D0   55667788   99112233   44556677   8899AABB   | ...hr.......hr.. |
1B5002E0   CCDDEE40   40D3C2E6   A260D389   959260F5   | ...  LBWs-Link-5 |
1B5002F0   E6A260D3   89959260   F6E6A260   D3899592   | Ws-Link-6Ws-Link |
1B500300   60F7E6A2   60D38995   9260F900   00000000   | -7Ws-Link-9..... |
1B500310.:1B50031F.--All bytes contain X'40', C' '
1B500320   00000000   00000000   C1C1E6E2   60F3F292   | ........AAWS-32k |
1B500330   82C481A3   81C19985   8140A2A3   8199A37A   | bDataArea start: |
1B500340.:1B500FFF.--All bytes contain X'00'
```

Problem Analysis

continued

L x+ 1e8

```
  ASID(X'0059') ADDRESS(1B5002A8.) STORAGE ------------------------------------
Command ===>                                                  SCROLL ===> CSR
1B5002A8                          0000000C   C281840F   |          ....Bad. |
1B5002B0   012345EF   01234562   C494F10F   E3C5C7F1   | ........Dm1.TEG1 |
1B5002C0   C4C5D4F1   C494F20F   C494F30F   11223344   | DEM1Dm2.Dm3..... |
1B5002D0   55667788   99112233   44556677   8899AABB   | ...hr.......hr.. |
1B5002E0   CCDDEE40   40D3C2E6   A260D389   959260F5   | ...  LBWs-Link-5 |
1B5002F0   E6A260D3   89959260   F6E6A260   D3899592   | Ws-Link-6Ws-Link |
1B500300   60F7E6A2   60D38995   9260F900   00000000   | -7Ws-Link-9..... |
1B500310.:1B50031F.--All bytes contain X'40', C' '
1B500320   00000000   00000000   C1C1E6E2   60F3F292   | ........AAWS-32k |
1B500330   82C481A3   81C19985   8140A2A3   8199A37A   | bDataArea start: |
1B500340.:1B500FFF.--All bytes contain X'00'
1B501000.:1B507FFF.--Storage not available
1B508000.:1B50830F.--All bytes contain X'00'
1B508310   00000000   E6E260F3   F29282C4   81A381C1   | ....WS-32kbDataA |
1B508320   99858140   8595847A   004EF5F2   4BF1F0C5   | rea end:.+52.10E |
1B508330   4EF2F74E   F5F2F2F0   C560F2F7   52E3AEB5   | +27+5220E-27.T.. |
1B508340   5392074A   78E69C7F   52E3AEB5   00000000   | .k.¢.W.".T...... |
1B508350   5392074A   78E69C7F   00000000   00000000   | .k.¢.W."........ |
1B508360.:1B50836F.--All bytes contain X'00'
1B508370   00000000   00000000   000000F3   F4F5C6F2   | ...........345F2 |
1B508380   F3F4D5F2   F3F4C5F3   F4F5C6F2   F3F4D5F2   | 34N234E345F234N2 |
1B508390   F3F4C5C3   F4F5F6D2   F3F4F5C2   F3F4F54E   | 34EC456K345B345+ |
```

Problem Analysis

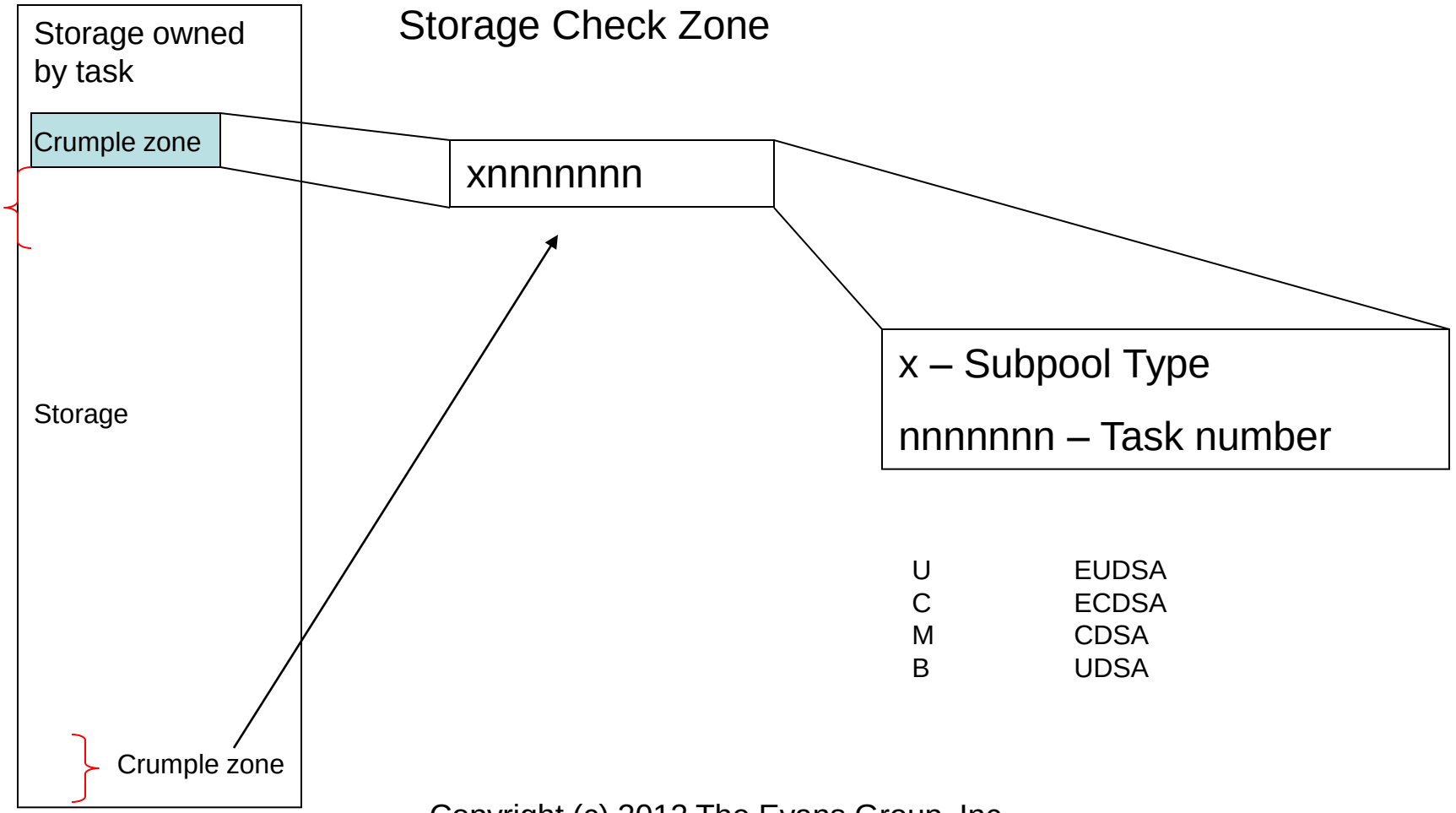
Storage Violation Overview

- CICS marks storage areas with a “crumple zone” before and after

  GETMAIN LENGTH(64) becomes LENGTH(80)

  When freeing storage, CICS checks the crumple zones
- A corrupt crumple zone is a storage violation

Problem Analysis



Problem Analysis

Storage Violation

- Retrieve the dump dataset name from the console:

```
+DFHSM0102 CICSTEST A storage violation (code X'0F0C') has been detected by module DFHSMAR
+DFHME0116 CICSTEST  570
 (Module:DFHMEME) CICS symptom string for message DFHSM0102 is
 PIDS/5655M1500 LVLS/640 MS/DFHSM0102 RIDS/DFHSMAR PTFS/HCI6400
 PRCS/00000F0C
+DFHDU0201 CICSTEST ABOUT TO TAKE SDUMP. DUMPCODE: SM0102  , DUMPID: 1/0007
IEA794I SVC DUMP HAS CAPTURED:  572
+DFHDU0202 CICSTEST SDUMPX COMPLETE. SDUMPX RETURN CODE X'00'
IEA611I COMPLETE DUMP ON SYS2.TEST.DMP00004 580
DUMPID=004 REQUESTED BY JOB (CICSTEST)
```

- Start by reviewing the Messages and Codes Manual

Problem Analysis

DFHSM0102

***applid* A storage violation (code X'*code*') has been detected by module *modname*.**

Explanation:

A storage violation has been detected by module *modname*. The code X'*code*' is the exception trace point ID which uniquely identifies the type of storage violation.

System Action:

An exception entry (X'*code*' in the message) is made in the trace table. Use the exception trace point ID, X'*code*', to investigate the cause of the storage violation. A description of the exception trace point ID, and the data it contains, is in the CICS Trace Entries. A system dump is taken, unless you have specifically suppressed dumps in the dump table.

CICS continues unless you have specified in the dump table that CICS should terminate.

If you have enabled storage recovery (by specifying the system initialization parameter STGRCVY=YES), CICS attempts to repair the storage violation. Otherwise, the storage is left unchanged.

Message DFHME0116 is normally produced containing the symptom string for this problem.

User Response:

Use the exception trace point ID, X'*code*', to investigate the cause of the storage violation. See the CICS Trace Entries for a description of the exception trace point ID and the data it contains.

Problem Analysis

Point	Module	Lvl	Type
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)

Problem Analysis

Review Trace Table Entries for 0F0C

VERBEXIT DFHPDxxx ‘TR=3’

Problem Analysis

```
IPCS OUTPUT STREAM ----------------------------------------- Line 18 Cols 1 78
Command ===> f 0f0c                                          SCROLL ===> CSR

 === DUMP SUMMARY

    DUMPID:    1/0007

    DUMPCODE:  SM0102

    DATE/TIME:  9/08/05 12:21:17 (LOCAL)

    MESSAGE:   DFHSM0102 CICSTEST A storage violation (code X'0F0C') has been detected by module DFHSMAR

    SYMPTOMS:  PIDS/5655M1500 LVLS/640 MS/DFHSM0102 RIDS/DFHSMAR PTFS/HCI6400 P

    TITLE:     (None)

    CALLER:    (None)

    ASID:      X'0059'
```

Problem Analysis

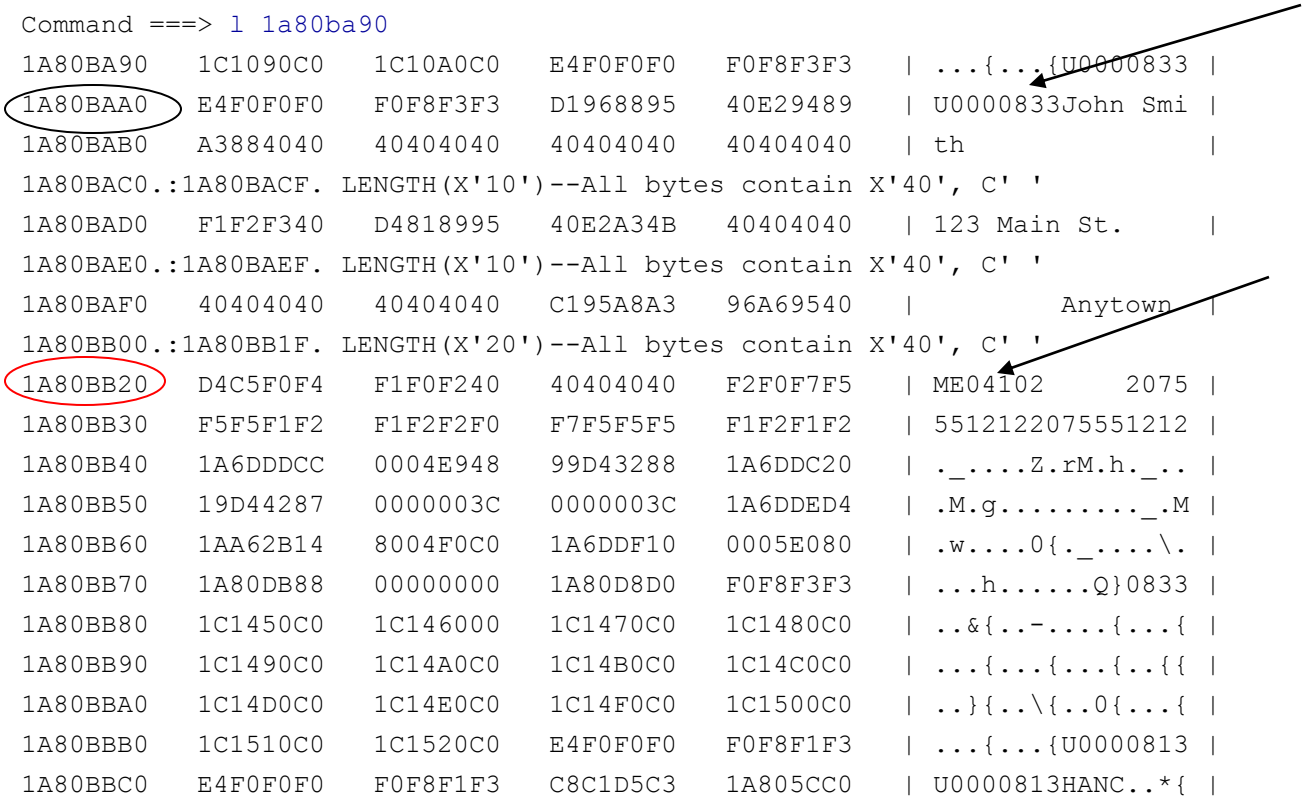
```
IPCS OUTPUT STREAM ------------------------------------ Line 498 Cols 13 90
Command ===>  f =000431=                                    SCROLL ===> CSR
XM    QR    SM 0F01 SMAR  ENTRY RELEASE_TRANSACTION_STG                          =000423=
XM    QR    SM 0F0D SMAR  EVENT Storage_released      USER24 storage at 0020A008 =000424=
XM    QR    XM 1001 XMIQ  ENTRY SET_TRANSACTION       INCREMENT                  =000425=
XM    QR    XM 1002 XMIQ  EXIT  SET_TRANSACTION/OK                               =000426=
XM    QR    AP 1700 TFIQ  ENTRY SET_TERMINAL_FACILITY YES                        =000427=
XM    QR    AP 1701 TFIQ  EXIT  SET_TERMINAL_FACILITY/OK                         =000428=
XM    QR    SM 0401 SMSR  ENTRY INQUIRE_ACCESS        1A8141EF,1                 =000429=
XM    QR    SM 0402 SMSR  EXIT  INQUIRE_ACCESS/OK     EUDSA,USER                 =000430=
XM    QR    SM 0F0C SMAR  *EXC* Storage_check_failed_at_address 1A80BB20 RELEASE_TRANSACTION_STG =000431=
XM    QR    ME 0301 MEME  ENTRY SEND_MESSAGE          66,SM0102,1953289E , 00000002,19532880 , 00000008  =000432=
XM    QR    KE 0101 KETI  ENTRY INQ_LOCAL_DATETIME_DECIMAL                       =000433=
XM    QR    KE 0102 KETI  EXIT  INQ_LOCAL_DATETIME_DECIMAL/OK 08112005,062126,424469,MMDDYYYY  =000434=
```

Problem Analysis

```
TASK-XM    KE_NUM-0089 TCB-QR   /007DA930 RET-99540700 TIME-06:21:26.4244436328 INTERVAL-00.0000018125        =000431=
  1-0000  00280000 000000D1 00000000 00000000  B0000000 00000000 02000100 00000000  *.......J.........................*
    0020  00000000 00000000                                                        *........                        *
  2-0000  1A80BB20                                                                *....                            *
  3-0000  000082D0                                                                *..b}                            *
  4-0000  D4C5F0F4 F1F0F240 40404040 F2F0F7F5  F5F5F1F2 F1F2F2F0 F7F5F5F5 F1F2F1F2  *ME04102     2075551212207555*
    0020  1A6DDDCC 0004E948 99D43288 1A6DDC20  19D44287 0000003C 0000003C 1A6DDED4  *._....Z.rM.h._...M.g........._.M*
    0040  1AA62B14 8004F0C0 1A6DDF10 0005E080  1A80DB88 00000000 1A80D8D0 F0F8F3F3  *.w....0{._....\....h......Q}0833*
    0060  1C1450C0 1C146000 1C1470C0 1C1480C0  1C1490C0 1C14A0C0 1C14B0C0 1C14C0C0  *..&{..-....{...{...{...{...{..{{*
  5-0000  00000000 00000000 00000000 00000000  00000000 00000000 00000000 00000000  *................................*
    01A0  00F0F9F8 F2F74040 40F7F440 40403E20  1A813E28 1A813E30 1A813E38 1A813E40  *.09827   74   ...a...a...a...a. *
    01C0  1A813E48 1A80BFAB 1A813E50 1A813E58  1A813E60 1A813E68 1A813E70 9A80BFA1  *.a.......a.&.a...a.-.a...a.....*
    01E0  4A048083 07808308 00000000 00F1F2F5  F3F74040 40000000 E4F0F0F0 F0F8F3F3  *¢..c..c......12537   ...U0000833*
  6-0000  1C02D0C0 1C02E0C0 1C02F0C0 1C0300C0  1C0310C0 1C0320C0 1C0330C0 1C0340C0  *..}{..\{..0{...{...{...{...{.. {*
    0020  1C0350C0 1C0360C0 1C0370C0 1C0380C0  1C0390C0 1C03A0C0 1C030001 FFC6C0C0  *..&{..-{...{...{...{...{.....F{{*
    0040  1A80B78C 1A80B78C 9C20F0C0 1C0400C0  1C0410C0 1C0420C0 1C0430C0 1C0440C0  *.........0{...{...{...{...{.. {*
    0380  E4F0F0F0 F0F8F3F3 D1968895 40E29489  A3884040 40404040 40404040 40404040  *U0000833John Smith              *
    03A0  40404040 40404040 40404040 40404040  F1F2F340 D4818995 40E2A34B 40404040  *                123 Main St.    *
    03C0  40404040 40404040 40404040 40404040  40404040 40404040 C195A8A3 96A69540  *                        Anytown *
    03E0  40404040 40404040 40404040 40404040  40404040 40404040 40404040 40404040  *                                *
  7-0000  E4F0F0F0 F0F8F3F3 00000000 00000000  00000000 99D43BF8 0002EB68 196F3F30  *U0000833.............rM.8.....?..*
    0020  1A6DDDCC 0004E948 99D43288 1A6DDC20  19D44287 0000003C 0000003C 1A6DDED4  *._....Z.rM.h._...M.g........._.M*
    0040  1AA62B14 8004F0C0 1A6DDF10 0005E080  00000000 00000000 E4F0F0F0 F0F8F3F3  *.w....0{._....\.........U0000833*
```

Problem Analysis

View the Overlaid SAA



```
ASID(X'0070') ADDRESS(1A80BA90.) STORAGE ----------------------------------
Command ===> l 1a80ba90
1A80BA90   1C1090C0   1C10A0C0   E4F0F0F0   F0F8F3F3   | ...{...{U0000833 |
1A80BAA0   E4F0F0F0   F0F8F3F3   D1968895   40E29489   | U0000833John Smi |
1A80BAB0   A3884040   40404040   40404040   40404040   | th               |
1A80BAC0.:1A80BACF. LENGTH(X'10')--All bytes contain X'40', C' '
1A80BAD0   F1F2F340   D4818995   40E2A34B   40404040   | 123 Main St.     |
1A80BAE0.:1A80BAEF. LENGTH(X'10')--All bytes contain X'40', C' '
1A80BAF0   40404040   40404040   C195A8A3   96A69540   |         Anytown  |
1A80BB00.:1A80BB1F. LENGTH(X'20')--All bytes contain X'40', C' '
1A80BB20   D4C5F0F4   F1F0F240   40404040   F2F0F7F5   | ME04102     2075 |
1A80BB30   F5F5F1F2   F1F2F2F0   F7F5F5F5   F1F2F1F2   | 5512122075551212 |
1A80BB40   1A6DDDCC   0004E948   99D43288   1A6DDC20   | ._....Z.rM.h._.. |
1A80BB50   19D44287   0000003C   0000003C   1A6DDED4   | .M.g........._.M |
1A80BB60   1AA62B14   8004F0C0   1A6DDF10   0005E080   | .w....0{._....\. |
1A80BB70   1A80DB88   00000000   1A80D8D0   F0F8F3F3   | ...h......Q}0833 |
1A80BB80   1C1450C0   1C146000   1C1470C0   1C1480C0   | ..&{..-....{...{ |
1A80BB90   1C1490C0   1C14A0C0   1C14B0C0   1C14C0C0   | ...{...{...{..{{ |
1A80BBA0   1C14D0C0   1C14E0C0   1C14F0C0   1C1500C0   | ..}{..\{..0{...{ |
1A80BBB0   1C1510C0   1C1520C0   E4F0F0F0   F0F8F1F3   | ...{...{U0000813 |
1A80BBC0   E4F0F0F0   F0F8F1F3   C8C1D5C3   1A805CC0   | U0000813HANC..*{ |
```

Problem Analysis

How was storage acquired: trace table

```
IPCS OUTPUT STREAM ------------------------------------ Line 498 Cols 13 90
Command ===>  f 1a80bb20 prev                                SCROLL ===> CSR
XM    QR    SM 0F01 SMAR  ENTRY RELEASE_TRANSACTION_STG                                  =000423=
XM    QR    SM 0F0D SMAR  EVENT Storage_released      USER24 storage at 0020A008         =000424=
XM    QR    XM 1001 XMIQ  ENTRY SET_TRANSACTION       INCREMENT                          =000425=
XM    QR    XM 1002 XMIQ  EXIT  SET_TRANSACTION/OK                                       =000426=
XM    QR    AP 1700 TFIQ  ENTRY SET_TERMINAL_FACILITY YES                                =000427=
XM    QR    AP 1701 TFIQ  EXIT  SET_TERMINAL_FACILITY/OK                                 =000428=
XM    QR    SM 0401 SMSR  ENTRY INQUIRE_ACCESS        1A8141EF,1                         =000429=
XM    QR    SM 0402 SMSR  EXIT  INQUIRE_ACCESS/OK     EUDSA,USER                         =000430=
XM    QR    SM 0F0C SMAR  *EXC* Storage_check_failed_at_address 1A80BB20 RELEASE_TRANSACTION_STG  =000431=
XM    QR    ME 0301 MEME  ENTRY SEND_MESSAGE          66,SM0102,1953289E , 00000002,19532880 , 00000008  =000432=
XM    QR    KE 0101 KETI  ENTRY INQ_LOCAL_DATETIME_DECIMAL                               =000433=
XM    QR    KE 0102 KETI  EXIT  INQ_LOCAL_DATETIME_DECIMAL/OK 08112005,062126,424469,MMDDYYYY  =000434=
```

Problem Analysis

How was storage acquired: trace table

```
IPCS OUTPUT STREAM ------------------------------------ Line 498 Cols 13 90
Command ===>                                                SCROLL ===> CSR
QR    SM 0C02 SMMG  EXIT  GETMAIN/OK 1A80BB20
QR    AP 00E1 EIP   EXIT  GETMAIN              OK                        00F4
QR    AP 00E1 EIP   ENTRY WRITEQ-TD                                      0004
QR    DD 0301 DDLO  ENTRY LOCATE              15EDCD80,15EABAC7,DCTE,CESE
QR    DD 0302 DDLO  EXIT  LOCATE/OK           16BFF150 , C4C3E3C5
QR    SM 0301 SMGF  ENTRY GETMAIN             15D3C0D4 , 00000018,1000,YES,KES
QR    SM 0302 SMGF  EXIT  GETMAIN/OK          00043000
QR    AP F600 TDA   ENTRY WRITE_TRANSIENT_DATA  CESE,16BEFD30 , 00000001,YES
QR    DD 0301 DDLO  ENTRY LOCATE              15EDCD80,00043388,DCTE,CESE
QR    DD 0302 DDLO  EXIT  LOCATE/OK           16BFF150 , C4C3E3C5
QR    AP F601 TDA   EXIT  WRITE_TRANSIENT_DATA/OK
```

Problem Analysis

How was storage acquired: Storage Domain

VERBX DFHPD640,'SM=3'

```
 IPCS OUTPUT STREAM ---------------------------------------------------------------------------- Line 2386 Cols 1 130
Command ===>  f 1A80BB20                                                                  SCROLL ===> CSR

  SCE.U0000833 19887788 Storage Element Descriptor

    0000  198871D0 1985A340 1A80BB20 000082D0  1979A208 00000000            *.h.}.et ......b}..s.....       *
```

Start of storage area *

Length of storage *

* SCE layout is described in CICS Supplementary Data Areas. The CICS Information Center CD that was shipped with the install tape includes the Data Areas and Supplementary Data Areas manuals

Problem Analysis

Identify the Transaction

VERBEXIT DFHPD640,'XM=3'

```
 IPCS OUTPUT STREAM ------------------------------------------------------------------------------------------- Line 87 Cols 1 130
Command ===>                                                                                                   SCROLL ===> CSR

 CSNE 00022 199097D8 C    Yes  ACT      00020003 None            199A9680 00000000 00000000 00000000 1A727030 198E00BC FF5B7C00
            1A7A22A0                                             01000000 199FF150 00000000 00000000 1A727158 00000000 00000000

 ESMT 00236 19909030 S    No   ACT      0784010B None            0005F680 00000000 00000000 1992709F 1A76D648 198E01C0 FF5B8100
            1AA56510                                             00000000 199FF2B8 00000000 199290B0 1A76D770 00000000 00000000

 CEX2 00615 19909960 C    Yes  ACT      001000BD None            199AA080 00000000 00000000 00000000 1B8B9648 198E0228 FF5B7D00
            1A73B780                                             00000000 199FF348 00000000 00000000 1B8B9770 00000000 00000000

 REDM 00833 19909AE8 T    No   ACT      07820213 None            00000000 00000000 00000000 00000000 00000000 198E00F0 FF5B7F00
            1B8C1100                                             007C4000 00000000 00000000 00000000 00000000 00000000 00000000
```

Task 833 is running under Tranid REDM

Problem Analysis

Find the Program

VERBEXIT DFHPD640,'PCT=1'

```
 IPCS OUTPUT STREAM ------------------------------------------------------------------------------------- FOUND: LINE 3986 COL 10
Command ===>                                                                                              SCROLL ===> CSR

  TXDINST.REDM 1B8C1100 TXD current instance

    0000  00D06EC4 C6C8E7D4 E3E7C4C9 D5E2E340  D9C5C4D4 1AAC2240 00000000 1B8C1100  *.}>DFHXMTXDINST REDM.. ........*    1B8C1100
    0020  000000D3 00000002 80020000 00000000  00000000 1AA55C00 000000D3 00000000  *...L.................v*....L....*    1B8C1120
    0040  00000000 00000001 1AABE978 00000000  00000000 00000000 00000000 00000000  *.........Z.....................*    1B8C1140
    0060  E3C5C7F1 C4C5D4E9 C4C6C8C3 C9C3E2E3  00000000 02010101 00000000 00000000  *TEG1DEMZDFHCICST..............*    1B8C1160
    0080  01010101 00000000 00000000 02020202  00000000 00000000 00000000 00000000  *................................*    1B8C1180
    00A0  00000000 00000000 02020202 00000000  00000000 02020201 01020100 40404040  *............................    *    1B8C11A0
    00C0  40404040 02000000 00000000 00000000                                       *    ............               *    1B8C11C0
```

A review of the PCT shows that TEG1DEMZ is the initial program for REDM

Problem Analysis

Review Program TEG1DEMZ

```
 01  Link-commarea                pic x(100).
*---------------------------------------------------------------
 *    Getmain area to be passed to called program
 *---------------------------------------------------------------
  P04-ExitClear section.
      exec cics getmain
           set(address of Link-commarea)
           flength(length of Link-commarea)
           nohandle
      end-exec
      exec cics link program('TEG1DEMX') commarea(link-commarea)
      end-exec
      exec cics return end-exec
```

A review of the program source shows a GETMAIN of 100 bytes. We add 16 bytes for the crumple zones, round to the next double-word, and see that the GETMAIN is for x'80' bytes.

Problem Analysis

Review Program TEG1DEMX

```
  01  dfhcommarea.
** -- 8/7/12 increase name and city from 20 bytes to 40
** --        because new CEO's name won't fit.
     03 comm-name                  pic x(40).
     03 comm-address               pic x(20).
     03 comm-city                  pic x(40).
     03 comm-state                 pic x(2).
     03 comm-zip                   pic x(10).
     03 comm-phone                 pic x(10).
     03 comm-fax                   pic x(10).
**-------------------------------------------------------
```

```
John Smith
123 Main St.
Anytown
ME
04102
```

Looking at the linked program, we see that the commarea description is 132 bytes.

Note that TI wouldn't catch this problem, as the storage is all owned by the task

Problem Analysis

Short on Storage Condition Overview

- CICS issues Short on Storage
- New transaction initialization locked out
- Region must be cancelled and restarted

Problem Analysis

Start with VERBX MTRACE

```
------------------------- IPCS Subcommand Entry --------------------------------
Enter a free-form IPCS subcommand or a CLIST or REXX exec invocation below:

===> verbx mtrace


----------------------- IPCS Subcommands and Abbreviations -------------------
ADDDUMP            | DROPDUMP, DROPD   | LISTMAP,  LMAP    | RUNCHAIN, RUNC
ANALYZE            | DROPMAP,  DROPM   | LISTSYM,  LSYM    | SCAN
ARCHECK            | DROPSYM,  DROPS   | LISTUCB,  LISTU   | SELECT
ASCBEXIT, ASCBX    | EQUATE,   EQU, EQ | LITERAL           | SETDEF,   SETD
ASMCHECK, ASMK     | FIND,     F       | LPAMAP            | STACK
CBFORMAT, CBF      | FINDMOD,  FMOD    | MERGE             | STATUS,   ST
CBSTAT             | FINDUCB,  FINDU   | NAME              | SUMMARY,  SUMM
CLOSE              | GTFTRACE, GTF     | NAMETOKN          | SYSTRACE
COPYDDIR           | INTEGER           | NOTE,     N       | TCBEXIT,  TCBX
COPYDUMP           | IPCS HELP, H      | OPEN              | VERBEXIT, VERBX
COPYTRC            | LIST,     L       | PROFILE,  PROF    | WHERE,    W
CTRACE             | LISTDUMP, LDMP    | RENUM,    REN     |
```

Problem Analysis

Start with VERBX MTRACE

```
+DFHSM0133 CICS CICS is under stress (short on storage above

+DFHSM0134 CICS CICS is no longer short on storage above

+DFHSM0133 CICS CICS is under stress (short on storage above

+DFHSM0134 CICS CICS is no longer short on storage above

+DFHSM0133 CICS CICS is under stress (short on storage above

+DFHSM0134 CICS CICS is no longer short on storage above

+DFHSM0133 CICS CICS is under stress (short on storage above

+DFHSM0134 CICS CICS is no longer short on storage above

+DFHSM0133 CICS CICS is under stress (short on storage above
```

Problem Analysis

verbx dfhpd620,'sm=1'

```
===SM: STORAGE MANAGER DOMAIN - SUMMARY

   SM Domain status:                  INITIALISED
   Storage recovery:                  NO
   Storage protection requested:      NO
   Storage protection active:         NO
   Reentrant program option:          PROTECT
   Transaction isolation requested:   NO
   Transaction isolation active:      NO

   Current DSA limit:                    5120K
   Current DSA total:                    1024K
   Currently SOS below 16M:                 NO

   Current EDSA limit:                     24M
   Current EDSA total:                     24M
   Currently SOS above 16M:                YES
```

The SM Summary provides general information regarding storage definition and current usage

Problem Analysis

verbx dfhpd620,'sm=1'

```
==SM: UDSA Summary

   Size:                              256K
   Cushion size:                       64K
   Current free space:                252K  (98%)
 * Lwm free space:                    160K  (62%)
 * Hwm free space:                    256K (100%)
   Largest free area:                 252K
 * 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:                   0
   Access:                            CICS
 * Extents added:                        1
 * Extents released:                     0

   Number of extents:                    1
```

There is no indication of storage constraint in the UDSA, which is consistent with the SOS error messages.

Problem Analysis

verbx dfhpd620,'sm=1'

```
==SM: ECDSA Summary

  Size:                              3072K
  Cushion size:                       128K
  Current free space:                 188K  ( 6%)
* Lwm free space:                      72K  ( 2%)
* Hwm free space:                    188K  ( 6%)
  Largest free area:                  128K
* Times nostg returned:                 0
* Times request suspended:              0
  Current suspended:                    0
* Hwm suspended:                        0
* Times cushion released:              488
  Currently SOS:                       NO
* Times went SOS:                      58
* Time at SOS:                00:00:18.919
* Storage violations:                    0
  Access:                             CICS
* Extents added:                        4
* Extents released:                     1

  Number of extents:                    3
```

Problem Analysis

verbx dfhpd620,'sm=1'

```
==SM: EUDSA Summary

  Size:                          1024K
  Cushion size:                     0K
  Current free space:            1024K (100%)
* Lwm free space:                 960K  (93%)
* Hwm free space:                1024K (100%)
  Largest free area:             1024K
* Times nostg returned:         5596829
* Times request suspended:            2
  Current suspended:                  1
* Hwm suspended:                      1
* Times cushion released:             0
  Currently SOS:                    YES
* Times went SOS:                     2
* Time at SOS:              00:00:02.109
* Storage violations:                 0
  Access:                          CICS
* Extents added:                      3
* Extents released:                   2

  Number of extents:                  1
```

The size of the Extended user DSA is consistent with the size of the ECDSA. It is currently SOS, but has released two extents, indicating that storage requirements fluctuate during the day.

This may indicate he is a victim.

Problem Analysis

verbx dfhpd620,'sm=1'

```
==SM: ESDSA Summary

  Size:                          10240K
  Cushion size:                    128K
  Current free space:             1020K  ( 9%)
* Lwm free space:                 1020K  ( 9%)
* Hwm free space:                 2044K  (19%)
  Largest free area:              1020K
* Times nostg returned:            160
* 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:                0
  Access:                         CICS
* Extents added:                   10
* Extents released:                  0

  Number of extents:                10
```

The Extended Shared DSA is significantly larger than any other DSA, but it is not currently SOS.

He has added 10 extents, but has not freed any. This may indicate a memory leak.

Excessive use of Shared User DSA may be the cause of our problem

Problem Analysis

verbx dfhpd620,'sm=1'

SM: Domain subpool summary (ESDSA)

Name	Id	Chn	Initf	Bndry	Fxlen	Q-c	Gets	Frees	Elems	Elemstg	Pagestg
IE_BUFF	5E			16			0	0	0	0	0K
IIBUFFER	A9			16			0	0	0	0	0K
LDEPGM	32			16			17	16	1	352	4K
LDERES	2E			16			0	0	0	0	0K
SMSHRU31	**8F**	**Y**		**16**			**9**	**0**	**9**	**9437184**	**9216K**
WEBINB	95	Y		8	32768		0	0	0	0	0K

SMSHRU31 "is used for many control blocks of SHARED_USER31 class storage, RMI global work areas, EDF blocks for the life of the transaction being monitored, and other control blocks. " Excessive use of shared storage is consistent with a memory leak.

Problem Analysis

verbx dfhpd620, 'ap=3'

```
===AP: AP DOMAIN TRANSACTION SUMMARY
```

Tran No	Tran Id	Orig Tran	TCA Addr	TWA Addr	EIB Addr	SEIB Addr	EIS Addr
00004	CSSY	CSSY	0005C080	008C9000	0004A0D0	0005C494	0005C388
00005	CSSY	CSSY	0005C680	008C9000	000500D0	0005CA94	0005C988
TCP	CSTP	CSTP	08C98680	0953E480	0953E0D0	08C98A94	08C98988
00018	CSHQ	CSHQ	08C99080	008C9000	095360D0	08C99494	08C99388
00019	CSNE	CSNE	08C99680	008C9000	095370D0	08C99A94	08C99988
00094	CEMT	CEMT	0005B080	008C9000	000470D0	0005B494	0005B388
00286	**STO1**	**STO1**	**0005D680**	**008C9000**	**001000D0**	**0005DA94**	**0005D988**

The only active transaction is task #00286. It is possible, but unlikely, that this one transaction is causing the SOS

Problem Analysis

verbx dfhpd620, 'ap=3'

```
EIB.00286 001000D0 EXEC Interface Block

  -0010  00656EC4 C6C8C1D7 6DC4C6C8 C5C9C25C  *..>DFHAP_DFHEIB**

   0000  0104824C 0107154F E2E3D6F1 0000286C  *..b<...|STO1...%*
   0010  D3F7F0F3 00000004 00007D02 04000000  *L703......'.....*
   0020  00000000 00000000 00000000 00000000  *................*
   0030  00000040 40404040 40404000 00000000  *...        .....*
   0040  00000000 00000000 00000000 00000000  *................*
   0050  00000000 00                          *.....           *
```

EIBFN of x'0204' indicates that the last command the task successfully completed was a HANDLE CONDITION

Problem Analysis

verbx dfhpd620, 'ap=3'

```
SYSEIB.00286 0005DA94 System EXEC Interface Block

  -0008                    5CE2E8E2 C5C9C240  *        *SYSEIB *

   0000  0104824C 0107154F E2E3D6F1 0000286C  *..b<...|STO1...%*
   0010  D3F7F0F3 00000004 00007D0C 02000000  *L703......'.....*
   0020  00000000 00000000 00000000 00000000  *................*
   0030  00000040 40404040 40404000 00000000  *...         .....*
   0040  00000000 00000000 00000000 00000000  *................*
   0050  00000000 00                         *.....           *
```

EIBFN of x'0C02' indicates that the command the task is waiting on was a GETMAIN

Problem Analysis

verbx dfhpd620, 'sm=3'

```
==SM: Suspend queue summary

   KE Task  Tran #  Susptok  Subpool  DSA       Request

   097CC400 0000286 020E002D U0000286 EUDSA     2097168
```

Task 286 is suspended, waiting on Extended User storage.

Problem Analysis

verbx dfhpd620, 'sm=3'

SMX Addr	Name	Id	Loc	Acc	Gets	Frees	Elems	Elemstg	Pagestg
08BC2054	M0000004	01	B	C	1	0	1	1168	4K
	C0000004	03	A	C	0	0	0	0	0K
	B0000004	02	B	C	0	0	0	0	0K
	U0000004	04	A	C	0	0	0	0	0K
08BC2088	M0000005	01	B	C	1	0	1	1168	4K
	C0000005	03	A	C	0	0	0	0	0K
	B0000005	02	B	C	0	0	0	0	0K
	U0000005	04	A	C	0	0	0	0	0K
08B7E020	M0000007	01	B	C	0	0	0	0	0K
	C0000007	03	A	C	1	0	1	1568	4K
	B0000007	02	B	C	0	0	0	0	0K
	U0000007	04	A	C	0	0	0	0	0K
08BC2534	M0000286	01	B	C	0	0	0	0	0K
	C0000286	03	A	C	0	0	0	0	0K
	B0000286	02	B	C	2	0	2	1600	4K
	U0000286	04	A	C	0	0	0	0	0K

Task 286 has minimal storage allocated. It is unlikely that this task is the problem.

Problem Analysis

Review Storage Manager: SM=3

```
SQE 08BC1020 Suspend Queue Element

   0000  08ACE718 08ACE718 08BB3890 00101000
   0010  020E002D 097CC400 C0B13804 37786001
   0020  00000000 0000286C 00000000 00000000
   0030  00000000
```

At offset x'0C' is the length of the GETMAIN request that has been suspended. At +24 is the task number.

This task is waiting for 1,028K of storage.

This request is not excessive, and under normal circumstances would not have caused an SOS

Problem Analysis

verbx dfhpd620, 'sm=3'

```
IPCS OUTPUT STREAM ----------------------------------------- Line 0 Cols 1 78
Command ===> f sce.smshru31                                  SCROLL ===> CSR
 ****************************** TOP OF DATA ********************************

 * * * * * CICS 6.2.0 - IPCS EXIT * * * * *

 CICS620 OPERANDS:

 SM=3

 === SUMMARY OF ACTIVE ADDRESS SPACES


      ASID(hex):          JOBNAME:
      00FC                CICSA


 -- DFHPD0121I FORMATTING CONTROL BLOCKS FOR JOB CICSA
```

We want to look at the Storage Control Elements for shared 31 bit storage, to see if there is any pattern.

Problem Analysis

verbx dfhpd620, ‘sm=3’

```
SCE.SMSHRU31 08B9A968 Storage Element Descriptor

   0000  08B9A9F8 08B9E4A8 09600000 00100000  *..z8..Uy.-......*
   0010  08BA4580 00000000                    *........        *
```

SCE Layout:

@ next SCE | @ prev SCE | @ storage | length of storage

This SCE represents the shared storage area starting at 09600000 for a length of x’00100000’ bytes

Problem Analysis

verbx dfhpd620, 'sm=3'

```
SCE.SMSHRU31 08B9A9F8 Storage Element Descriptor

    0000  08B9A998 08B9A968 0A300000 00100000  *..zq..z.........*
    0010  08BA46D0 00000000                    *...}....        *

 SCE.SMSHRU31 08B9A998 Storage Element Descriptor

    0000  08B9AAA0 08B9A9F8 0A200000 00100000  *......z8........*
    0010  08BA4820 00000000                    *........        *

 SCE.SMSHRU31 08B9AAA0 Storage Element Descriptor

    0000  08B9AAD0 08B9A998 0A100000 00100000  *...}..zq........*
    0010  08BA4970 00000000                    *........        *

 SCE.SMSHRU31 08B9AAD0 Storage Element Descriptor

    0000  08B9ACE0 08B9AAA0 0A000000 00100000  *...\............*
    0010  08BA4AC0 00000000                    *..¢{....        *
```

The first five SCEs in the subpool all describe a storage area that is x'00100000' bytes in length.

This pattern continues for 9 SCEs, and these are the only SMSHRU31 SCE entries.

Problem Analysis

Browse The Dump

```
09600000   E4F0F0F0   F0F0F1F0   000000E7   00000400   | U0000010...X.... |
09600010   C3E2E400   00000000   00000000   00000000   | CSU............. |
09600020.:0960063F.--All bytes contain X'00'
09600640   00000000   00000000   E4F0F0F0   F0F0F1F0   | ........U0000010 |
09600650.:09600FFF.--All bytes contain X'00'
09601000.:096FFFFF.--Storage not available
09700000   6EC4C6C8   01400001   C3C9C3E2   40404040   | >DFH. ..CICS     |
```

The storage pointed to by the first SCE appears to have a crumple zone, but this is most likely residual data, indicating that the GETMAIN did not have an INITIMG.

Note the "storage not available." This most likely indicates that CICS has never accessed these pages of storage. The task that issued the GETMAIN hasn't used it.

Problem Analysis

Browse The Dump

```
09B01000.:0A42BFFF.--Storage not available
0A42C000.:0A42C52F.--All bytes contain X'00'
0A42C530   00000000   00000000   00000000   7F51B018   | ............"... |
0A42C540   0A42CADC   83DBC7D0   00E2E000   00000000   | ....c.G}.S\..... |
0A42C550   00000000   7F51B3D8   0A42C955   0A42CD9C   | ....".Q..I..... |
0A42C560   0A42CA50   00000001   0A42CACC   00000000   | ...&............ |
0A42C570   00000F02   00000002   0A42C538   03DBC3D8   | ..........E...CQ |
0A42C580.:0A42C5CF.--All bytes contain X'00'
0A42C5D0   00000000   7F51B3D8   00000000   00000000   | ....".Q........ |
```

The storage pointed to by each of the remaining SCEs is shown as “storage not available.” The task that issued the GETMAIN has never accessed it.

The pattern of storage size and storage use (or lack) continues. The possibility of a memory leak is growing.

Problem Analysis

Diagnosing Memory Leaks

- Can be difficult to identify the culprit
- No way to tie the storage to the acquirer
- Leak can occur over weeks or months of region uptime
- Use the SCE storage address to view the acquired storage, look for clues to ownership
- Contact application and tools vendors for existing fixes
- Scan source code for GETMAIN SHARED
- Use DFHEISUP to scan load libraries for GETMAIN SHARED

Problem Analysis

Scan the Source Library

```
Search-For Utility
 Command ===>

 Search String  . . "GETMAIN SHARED"

 ISPF Library:
    Project . . .
    Group . . . .          . . .          . . .          . . .
    Type  . . . .
    Member  . . .                  (Blank or pattern for member selection list,
                                     "*" for all members)
 Other Partitioned, Sequential or VSAM Data Set:
    Data Set Name . . . 'PROD.CICS.SOURCE(*)'
    Volume Serial . . .            (If not cataloged)

 Listing Data Set . . . SRCHFOR.LIST
 Data Set Password  . .            (If Search-For data set password protected)

 Enter "/" to select option               Execution Mode        Output Mode
    Specify additional search strings     1  1. Foreground     1  1. View
    Mixed Mode                               2. Batch             2. Browse
    Bypass selection list
```

Problem Analysis

Scan the Source Library

```
 ISRSUPC    -   MVS/PDF FILE/LINE/WORD/BYTE/SFOR COMPARE UTILITY- ISPF FOR z/OS
     2007/08/06  18.53    PAGE     1
 LINE-#  SOURCE SECTION                    SRCH DSN: PROD.CICS.SOURCE


 REESTOR1                    --------- STRING(S) FOUND ------------------

     33  *        EXEC CICS GETMAIN SHARED FLENGTH(DC_STOR_LEN) SET(R1)
     00230003

  ISRSUPC    -   MVS/PDF FILE/LINE/WORD/BYTE/SFOR COMPARE UTILITY- ISPF FOR z/OS
     2007/08/06  18.53    PAGE     2
     SEARCH-FOR SUMMARY SECTION            SRCH DSN: PROD.CICS.SOURCE

LINES-FOUND  LINES-PROC  MEMBERS-W/LNS  MEMBERS-WO/LNS  COMPARE-COLS  LONGEST-LINE
        1         4303            1             29          1:80           80
```

A review of program REESTOR1 showed “DC_STOR_LEN” to be x’00100000’, indicating that this is the problem program.

Problem Analysis

Another Short on Storage Condition

- CICS issues Short on Storage
- New transaction initialization locked out
- Region must be cancelled and restarted

Problem Analysis

Start with VERBX MTRACE

```
$HASP309 INIT 1    INACTIVE ******** C=A
+DFHSM0133 CICS CICS is under stress (short on storage

DUMP COMM=('SOS DUMP')
03 IEE094D SPECIFY OPERAND(S) FOR DUMP COMMAND
R 03,JOBNAME=CICSA,SDATA=(ALLNUC,CSA,GRSQ,LSQA,NUC,PSA,RGN,
```

Problem Analysis

Review Storage Manager: SM=1

```
===SM: STORAGE MANAGER DOMAIN - SUMMARY


   SM Domain status:                  INITIALISED
   Storage recovery:                  NO
   Storage protection requested:      NO
   Storage protection active:         NO
   Reentrant program option:          PROTECT
   Transaction isolation requested:   NO
   Transaction isolation active:      NO

   Current DSA limit:                    5120K
   Current DSA total:                    1024K
   Currently SOS below 16M:                 NO

   Current EDSA limit:                     28M
   Current EDSA total:                     25M
   Currently SOS above 16M:                YES
```

The region is currently SOS above the line, but there is 3,000K of free storage available.

This may indicate a large GETMAIN request caused the SOS

Problem Analysis

Review Storage Manager: SM=1

```
==SM: EUDSA Summary

   Size:                          10240K
   Cushion size:                      0K
   Current free space:             2688K  (26%)
 * Lwm free space:                 2688K  (26%)
 * Hwm free space:                 4800K  (46%)
   Largest free area:               960K
 * Times nostg returned:              0
 * Times request suspended:           2
   Current suspended:                 1
 * Hwm suspended:                     1
 * Times cushion released:            0
   Currently SOS:                   YES
 * Times went SOS:                    1
 * Time at SOS:              00:00:00.000
 * Storage violations:                0
   Access:                          CICS
 * Extents added:                     3
 * Extents released:                  0

   Number of extents:                 4
```

The Extended User DSA is the only one that has experienced a SOS condition. It has 2,688K free storage.

Problem Analysis

Review Storage Manager: SM=1

```
==SM: ESDSA Summary

   Size:                              1024K
   Cushion size:                       128K
   Current free space:                1016K  (99%)
 * Lwm free space:                    1016K  (99%)
 * Hwm free space:                    1024K (100%)
   Largest free area:                 1016K
 * 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:                   0
   Access:                            CICS
 * Extents added:                        1
 * Extents released:                     0

   Number of extents:                    1
```

The Shared storage area appears to be sparsely used. It has only had one extent, which indicates no storage creep.

This does not appear to be a storage leak.

Problem Analysis

There is only one task waiting for storage.

Review Storage Manager: SM=1

```
==SM: Suspend queue summary

   KE Task  Tran #  Susptok  Subpool  DSA       Request

   08CF9780 0000351 01920029 U0000351 EUDSA     2097168
```

Problem Analysis

Review Storage Manager: SM=3

```
SQE 08BC1020 Suspend Queue Element

   0000  08ACE718 08ACE718 08BADC14 00200010  01920029 08CF9780 C1030B79 2D931001
   0020  00000000 0000351C 00000000 00000000  00000000
```

The SQE is not formatted for SM=1, so SM=3 is used.

At offset x'0C' is the length of the GETMAIN request that has been suspended. At +24 is the task number.

This task is waiting for 2,048K of storage.

This request may have exceeded the available storage, meaning we should increase the DSA size.

Problem Analysis

Return to the EUDSA summary

```
==SM: EUDSA Summary

   Size:                          10240K
   Cushion size:                      0K
   Current free space:             2688K  (26%)
 * Lwm free space:                 2688K  (26%)
 * Hwm free space:                 4800K  (46%)
   Largest free area:               960K
 * Times nostg returned:              0
 * Times request suspended:           2
   Current suspended:                 1
 * Hwm suspended:                     1
 * Times cushion released:            0
   Currently SOS:                   YES
 * Times went SOS:                    1
 * Time at SOS:            00:00:00.000
 * Storage violations:                0
   Access:                         CICS
 * Extents added:                     3
 * Extents released:                  0

   Number of extents:                 4
```

Our task is waiting on 2,048K of storage, and there is 2,688K available.

The largest free area is 960K.

Storage fragmentation is restricting the ability of CICS to provide large contiguous areas of storage.

Problem Analysis

Storage Fragmentation

- Is difficult to anticipate
- Usually occurs when there is a mixture of small storage requests with large storage requests
- Requires allocating additional space to the DSA
- Can only be “defragmented” by cycling the region

Alternative to Interactive ISPF

IPCS Verbexit can be run as a batch job

- Eliminate response time issues
- Remove requirement for large TSO region size

Alternative to Interactive ISPF

```
//S010    EXEC IPCSDDIR
//S020    EXEC PGM=IKJEFT01
//STEPLIB  DD  DISP=SHR,DSN=SYS2.CICSTS32.SDFHLINK
//         DD  DISP=SHR,DSN=SYS2.CICSTS32.SDFHLOAD
//SYSTSPRT DD  SYSOUT=*
//SYSPRINT DD  SYSOUT=*
//SYSTERM  DD  SYSOUT=*
//DFHSNAP  DD  SYSOUT=*
//IPCSPRNT DD  SYSOUT=*
//IPCSPARM DD  DISP=SHR,DSN=SYS1.PARMLIB
//         DD  DISP=SHR,DSN=SYS2.CICSTS32.SDFHPARM
//IPCSTOC  DD  SYSOUT=*
//IPCSDDIR DD  DISP=SHR,DSN=your.ddir.dsn
//IPCSDUMP DD  DISP=SHR,DSN=your.dump.dataset.dsn
//SYSTSIN  DD  *
  IPCSDDIR 'your.ddir.dsn'
  PROFILE MSGID
 IPCS NOPARM
  SETDEF DD(IPCSDUMP) LIST NOCONFIRM
* SUMMARY
  VERBEXIT CICS650 'JOB=CURRENT,KE'
  VERBEXIT CICS650 'JOB=CURRENT,TCP=3'
  VERBEXIT CICS650 'JOB=CURRENT,XM'
 END
/*
```

Additional Documentation

CICS Messages and Codes

CICS Problem Determination Guide

CICS Data Areas & CICS Supplemental Data Areas

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