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
Acknowledgements

Many thanks to Ed Addison (IBM) and Jim Grauel (IBM, retired) for providing help in the production of this presentation.
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

------------------- z/OS 01.11.00 IPCS PRIMARY OPTION MENU
OPTION  ===>

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

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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

--------------------------------- 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.
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 INVENTORY - T#RUSS2.DDIR

<table>
<thead>
<tr>
<th>Command</th>
<th>SCROLL</th>
</tr>
</thead>
<tbody>
<tr>
<td>CUR</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AC Dump Source</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>dd DSNAME('T#RUSS.TEG1.D050218.T064841.S001')</td>
<td>CLOSED</td>
</tr>
<tr>
<td>Title=Abend S0C7 in Job REE9DM2 at 06:48:41 on Friday, February 18, 20</td>
<td></td>
</tr>
<tr>
<td>No symptoms</td>
<td></td>
</tr>
<tr>
<td>dd DSNAME('T#RUSS.TEG1.D050309.T082716.S001')</td>
<td>CLOSED</td>
</tr>
<tr>
<td>Title=Abend U3489 in Job REE9DM2 at 08:27:16 on Wednesday, March 09, 20</td>
<td></td>
</tr>
<tr>
<td>No symptoms</td>
<td></td>
</tr>
<tr>
<td>dd DSNAME('T#RUSS.TEG1.D050314.T113540.S001')</td>
<td>CLOSED</td>
</tr>
<tr>
<td>Title=Abend S0C7 in Job REE9DM2 at 11:35:40 on Monday, March 14, 20</td>
<td></td>
</tr>
<tr>
<td>No symptoms</td>
<td></td>
</tr>
</tbody>
</table>

**************************************** END OF IPCS INVENTORY ****************************************
IPCS

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

   DSN NAME   ==> '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.
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:

<table>
<thead>
<tr>
<th>ID</th>
<th>Name</th>
<th>Panelid</th>
<th>Applid</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>JCLLIB</td>
<td>ISREDDE2</td>
<td>ISR</td>
</tr>
<tr>
<td>2</td>
<td>SDSF</td>
<td>ISFPCU41</td>
<td>ISF</td>
</tr>
<tr>
<td>4</td>
<td>IPL</td>
<td>BLSPNTRC</td>
<td>BLSG</td>
</tr>
<tr>
<td>3</td>
<td>KCB</td>
<td>BLSPDISD</td>
<td>BLSL</td>
</tr>
<tr>
<td>5*</td>
<td>SOURCE</td>
<td>ISREDM01</td>
<td>ISR</td>
</tr>
</tbody>
</table>

* Indicates the window viewed when SWAP LIST was issued

- Indicates the second to last window.

SWAP (PF9) toggles between the last two windows.

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.
Generating a dump

Several methods:

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

**CEMT P SNAP**

<table>
<thead>
<tr>
<th>P SNAP</th>
<th>STATUS: RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sna</td>
<td>SDUMP SUPPRESSED</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>CICS TS Release</th>
<th>DFHPDxxx</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.2</td>
<td>650</td>
</tr>
<tr>
<td>4.1</td>
<td>660</td>
</tr>
<tr>
<td>4.2</td>
<td>670</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Keyword</th>
<th>Functional area</th>
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<td>AI</td>
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</tr>
<tr>
<td>AP</td>
<td>0</td>
</tr>
<tr>
<td>APS</td>
<td>&lt;TASKID= &gt; (520)</td>
</tr>
<tr>
<td>AU</td>
<td>0</td>
</tr>
<tr>
<td>BA</td>
<td>0</td>
</tr>
<tr>
<td>BR</td>
<td>0</td>
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<td>CC</td>
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<td>CP</td>
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<td>CSA</td>
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<tr>
<td>DB2</td>
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<td>DD</td>
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<td>SZ</td>
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<td>TI</td>
<td>0</td>
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<tr>
<td>TMP</td>
<td>0</td>
</tr>
<tr>
<td>TR</td>
<td>0</td>
</tr>
<tr>
<td>TRS</td>
<td>&lt;trace selection parameters&gt; (410)/(510)</td>
</tr>
<tr>
<td>TSP</td>
<td>0</td>
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<td>TS</td>
<td>0</td>
</tr>
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<td>UEH</td>
<td>0</td>
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<tr>
<td>US</td>
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<td>0</td>
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<tr>
<td>XM</td>
<td>0</td>
</tr>
<tr>
<td>XRF</td>
<td>0</td>
</tr>
<tr>
<td>XS</td>
<td>0</td>
</tr>
</tbody>
</table>
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/HC16400
  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

Messages from IPCS

IKJ56650I TIME-09:23:57 AM. CPU-00:00:01 SERVICE-1270316 SESSION-00:06:56 AUGUST 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 bypass.

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 AUGUST 9, 2005

BLS18224I Dump of z/OS 01.05.00 - level same as IPCS level

***
Problem Analysis

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

Locate the Abending Transaction

<table>
<thead>
<tr>
<th>KE_NUM</th>
<th>KE_TASK</th>
<th>STATUS</th>
<th>TCA_ADDR</th>
<th>TRAN_#</th>
<th>TRANSID</th>
<th>DS_TASK</th>
<th>KE_KTCB</th>
<th>ERROR</th>
</tr>
</thead>
<tbody>
<tr>
<td>0001</td>
<td>1966DC00</td>
<td>KTCB Step</td>
<td>00000000</td>
<td></td>
<td></td>
<td></td>
<td>00000000</td>
<td>196B0000</td>
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<tr>
<td>0002</td>
<td>1966D800</td>
<td>KTCB QR</td>
<td>00000000</td>
<td></td>
<td>19903030</td>
<td>196B3000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0003</td>
<td>1966D400</td>
<td>KTCB RO</td>
<td>00000000</td>
<td></td>
<td>19903148</td>
<td>196B2000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0004</td>
<td>1966D000</td>
<td>KTCB FO</td>
<td>00000000</td>
<td></td>
<td>19903260</td>
<td>196B1000</td>
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<td></td>
</tr>
<tr>
<td>0005</td>
<td>1968AC00</td>
<td>Not Running</td>
<td>00000000</td>
<td></td>
<td></td>
<td></td>
<td>19843080</td>
<td>196B2000</td>
</tr>
<tr>
<td>0006</td>
<td>1968A800</td>
<td>Unused</td>
<td></td>
<td></td>
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<tr>
<td>0007</td>
<td>1968A400</td>
<td>KTCB SL</td>
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<td>19877000</td>
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<tr>
<td>0008</td>
<td>1968A000</td>
<td>Not Running</td>
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<td></td>
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<td>19843500</td>
<td>196B3000</td>
</tr>
<tr>
<td>0009</td>
<td>196A7C00</td>
<td>*<strong>Running</strong></td>
<td>00000000</td>
<td></td>
<td></td>
<td></td>
<td>19843980</td>
<td>1984D000</td>
</tr>
<tr>
<td>000A</td>
<td>1A6E2480</td>
<td>Not Running</td>
<td>0005E680</td>
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<td>CSSY</td>
<td></td>
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<td>198FA200</td>
<td>196B3000</td>
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</table>

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## Problem Analysis

### Locate the Abending Transaction

#### ===KE: Kernel Domain KE_TASK Summary

<table>
<thead>
<tr>
<th>KE_NUM</th>
<th>KE_TASK</th>
<th>STATUS</th>
<th>TCA_ADDR</th>
<th>TRAN_#</th>
<th>TRANSID</th>
<th>DS_TASK</th>
<th>KE_KTCB</th>
<th>ERROR</th>
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</thead>
<tbody>
<tr>
<td>0001</td>
<td>1966DC00</td>
<td>KTCB Step</td>
<td>00000000</td>
<td></td>
<td></td>
<td></td>
<td>00000000</td>
<td>196B0000</td>
</tr>
<tr>
<td>0002</td>
<td>1966D800</td>
<td>KTCB QR</td>
<td>00000000</td>
<td></td>
<td></td>
<td></td>
<td>19903030</td>
<td>196B3000</td>
</tr>
<tr>
<td>0003</td>
<td>1966D400</td>
<td>KTCB RO</td>
<td>00000000</td>
<td></td>
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<td></td>
<td>19903148</td>
<td>196B2000</td>
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<tr>
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<td></td>
<td>19903260</td>
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<td>0005</td>
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<td>19843080</td>
<td>196B2000</td>
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<tr>
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<tr>
<td>0007</td>
<td>1968A400</td>
<td>KTCB SL</td>
<td>00000000</td>
<td></td>
<td></td>
<td></td>
<td>19903490</td>
<td>19877000</td>
</tr>
<tr>
<td>0008</td>
<td>1968A000</td>
<td>Not Running</td>
<td>00000000</td>
<td></td>
<td></td>
<td></td>
<td>19843500</td>
<td>196B3000</td>
</tr>
<tr>
<td>0009</td>
<td>196A7C00</td>
<td>*<strong>Running</strong></td>
<td>00000000</td>
<td></td>
<td></td>
<td></td>
<td>19843980</td>
<td>1984D000</td>
</tr>
<tr>
<td>000A</td>
<td>1A6E2480</td>
<td>Not Running</td>
<td>0005E680</td>
<td>00005</td>
<td>CSSY</td>
<td></td>
<td>1BB29080</td>
<td>158B3000</td>
</tr>
<tr>
<td>000B</td>
<td>1992A880</td>
<td>Unused</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>0088</td>
<td>168CC480</td>
<td>Unused</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>0089</td>
<td>168CC880</td>
<td>Not Running</td>
<td>0005D080</td>
<td>00041</td>
<td>CEMT</td>
<td></td>
<td>1BB29080</td>
<td>158B3000</td>
</tr>
<tr>
<td>008A</td>
<td>168E3080</td>
<td>*<strong>Running</strong></td>
<td>0005F080</td>
<td>00100</td>
<td>TEG1</td>
<td></td>
<td>1BB29200</td>
<td>158B3000</td>
</tr>
</tbody>
</table>

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Problem Analysis

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 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

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

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 A20C58F0 202C5830  *.&J..5...*.0....*  1B0DBD90
2DA0  C0484110 377505EF  FA3371E8 71ECF833  *{...........Y..8.*  1B0DBDA0
2DB0  71E871E8 5840D17C 07F45820 905C58F0  *.*.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

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Problem Analysis

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 00000000 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

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 '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'

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Problem Analysis

VERBX DFHPD640,’ AP=3’

===AP: AP DOMAIN TRANSACTION SUMMARY

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

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......1.{..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

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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 *02000120

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

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

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**

**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

**Browse the Dump**

<table>
<thead>
<tr>
<th>Command</th>
<th>SCROLL</th>
</tr>
</thead>
<tbody>
<tr>
<td>00000000 00A0000 00130E1 00000000 00000000</td>
<td>...............</td>
</tr>
<tr>
<td>00000010 00FCC290 00000000 7FFFF000 7FFFF000</td>
<td>..B....&quot;.0.&quot;.0.</td>
</tr>
<tr>
<td>00000020 7FFFF000 7FFFF000 7FFFF000 7FFFF000</td>
<td>&quot;.0.&quot;.&quot;0.&quot;.&quot;0.&quot;.0.</td>
</tr>
<tr>
<td>00000030 00000000 00000000 7FFFF000 7FFFF000</td>
<td>........&quot;.&quot;.&quot;.&quot;.&quot;.&quot;</td>
</tr>
<tr>
<td>00000040 00000000 00000000 00000000 00FCC290</td>
<td>...............B.</td>
</tr>
<tr>
<td>00000050 00000000 00000000 00A0000 00140E1</td>
<td>.................</td>
</tr>
<tr>
<td>00000060 00000000 00000000 00A0000 00160E1</td>
<td>........&amp;........-</td>
</tr>
<tr>
<td>00000070 00000000 00170E1 00A0000 00180E1</td>
<td>.................</td>
</tr>
<tr>
<td>00000080 00000000 0011202 0020003 0060011</td>
<td>.................</td>
</tr>
<tr>
<td>00000090.:9F.--All bytes contain X'00'</td>
<td></td>
</tr>
<tr>
<td>000000A0 0C000001 0143E708 00000000 00002001</td>
<td>.......X...........</td>
</tr>
<tr>
<td>000000B0 00000000 00000000 00100F6 00F31588</td>
<td>............6.3.h</td>
</tr>
<tr>
<td>000000C0 18000000 00000000 E000A000 00000000</td>
<td>...............</td>
</tr>
<tr>
<td>000000D0.:012F.--All bytes contain X'00'</td>
<td></td>
</tr>
</tbody>
</table>

All bytes contain X'00'
Problem Analysis

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 (i.e., 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

L 1B5000C0

ASID(X'0059') ADDRESS(1B5000C0.) STORAGE

Command ===>
equ r7

SCROLL ===>
CSR

1B5000C0  E3C5C7F1  E3C5C7F1  D4C4D440  E3C5C7F1  | TEG1TEG1MDM TEG1 |
1B5000D0  C4C5D4D6  00000000  00000000  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'

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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

Storage owned by task

Crumple zone

Storage Check Zone

x

– Subpool Type

nnnnnnn – Task number

U EUDSA
C ECDSA
M CDSA
B UDSA

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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

<table>
<thead>
<tr>
<th>Point</th>
<th>Module</th>
<th>Lvl</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM</td>
<td>0F0C</td>
<td></td>
<td>DFHSMAR Exc Storage check failure</td>
</tr>
<tr>
<td>1</td>
<td>SMAR</td>
<td>1</td>
<td>parameter list</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>2</td>
<td>Address of storage element</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>3</td>
<td>Length of storage element</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>4</td>
<td>First 512 bytes (max) of storage element</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>5</td>
<td>Last 512 bytes (max) of storage element</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>6</td>
<td>Data preceding storage element (1K max)</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>7</td>
<td>Data following storage element (1K max)</td>
</tr>
</tbody>
</table>
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'

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Problem Analysis

IPCS OUTPUT STREAM ------------------------------- Line 498 Cols 13 90

Command ====> f =000431=  SCROLL ====> CSR

XM  QR  SM 0F01 SMAR ENTRY RELEASE_TRANSACTION_STG
XM  QR  SM 0F0D SMAR EVENT StorageReleased USER24 storage at 0020A008
XM  QR  XM 1001 XMIQ ENTRY SET_TRANSACTION INCREMENT
XM  QR  XM 1002 XMIQ EXIT SET_TRANSACTION/OK
XM  QR  AP 1700 TFIQ ENTRY SET_TERMINAL_FACILITY YES
XM  QR  AP 1701 TFIQ EXIT SET_TERMINAL_FACILITY/OK
XM  QR  SM 0401 SMSR ENTRY INQUIRE_ACCESS 1A8141EF,1
XM  QR  SM 0402 SMSR EXIT INQUIRE_ACCESS/OK EUDSA,USER
XM  QR  SM 0F0C SMAR *EXC* Storage_check_failed_at_address 1A80BB20 RELEASE_TRANSACTION_STG
XM  QR  ME 0301 MEME ENTRY SEND_MESSAGE 66,SM0102,1953289E,00000002,19532880,00000008
XM  QR  KE 0101 KETI ENTRY INQ_LOCAL_DATETIME_DECIMAL
XM  QR  KE 0102 KETI EXIT INQ_LOCAL_DATETIME_DECIMAL/OK 08112005,062126,424469,MMDDYYYY
Problem Analysis

TASK-XM  KE_NUM-0089  TCB-QR  /007DA930  RET-99540700  TIME-06:21:26.424436328  INTERVAL-00.0000018125

1-0000  00280000  0000001D  00000000  00000000  B0000000  00000000  02000100  00000000

2-0000  1A80BB20

3-0000  000082D0

4-0000  D4C5F0F4  F1F0F240  40404040  F2F0F7F5  F5F5F1F2  F1F2F2F0  F7F5F5F5  F1F2F1F2

5-0000  00000000  00000000  00000000  00000000  00000000  00000000  00000000  00000000

6-0000  01A0  00F0F9F9  F2F74040  40F7F440  40403E20  1A813E28  1A813E30  1A813E38  1A813E40

01C0  1A813E48  1A80BFB0  1A813E50  1A813E58  1A813E60  1A813E68  1A813E70  9A80BFA1

01E0  4A048083  78083B0  00000000  00F1F2F5  F3F74040  40000000  E4F0F0F0  F0F8F3F3

02A0  1C02D0C0  1C02E0C0  1C0300C0  1C0310C0  1C0320C0  1C0330C0  1C0340C0

02C0  1C0350C0  1C0360C0  1C0370C0  1C0380C0

03A0  40404040  40404040  40404040  40404040  40404040  40404040  40404040  40404040

03C0  40404040  40404040  40404040  40404040  40404040  40404040  40404040  40404040

03E0  40404040  40404040  40404040  40404040

04A0  18A0B78C  1A8B78C  9C20F0C0  1C0400C0  1C0410C0  1C0420C0  1C0430C0  1C0440C0

0380  E4F0F0F0  F0F8F3F3  D1968895  40E29489  A3884040  40404040  40404040  40404040

03A0  40404040  40404040  40404040  40404040  40404040  40404040  40404040  40404040

03C0  40404040  40404040  40404040  40404040  40404040  40404040  40404040  40404040

03E0  40404040  40404040  40404040  40404040

7-0000  E4F0F0F0  F0F8F3F3  00000000  00000000  00000000  99D43BF8  0002EB68  196F3F30

0020  1A6DDDCC  004E948  99D43288  1A6DDC20  19D44287  00000003C  00000003C  1A6DDDE4

0040  1AA62B14  8004F0C0  1A6DDF10  0005E080  1A80DB88  00000000  1A80DB88  00000000

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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  1A6DDDC0  0004E948  99D43288  1A6DDC20  | ....Z.rM.h._. |
1A80BB50  19D44287  0000003C  0000003C  1A6DDED4  | .M.g.........._.M |
1A80BB60  1AA62B14  8004F0C0  1A6DDF10  0005E080  | .w....0{..._. |
1A80BB70  1A80D888  00000000  1A80D8D0  F0F8F3F3  | ...h......Q)083 |
1A80BB80  1C1450C0  1C146000  1C1470C0  1C1480C0  | ...&{..-....{{{ |
1A80BB90  1C1490C0  1C14A0C0  1C14B0C0  1C14C0C0  | {...}....{}{ |
1A80BBA0  1C14D0C0  1C14E0C0  1C14F0C0  1C1500C0  | }{...Resolve{... |
1A80BBB0  1C1510C0  1C1520C0  E4F0F0F0  F0F8F1F3  | {...}U0000813 |
1A80BBC0  E4F0F0F0  F0F8F1F3  C8C1D5C3  1A805CC0  | U000081HANC..*{ |
# Problem Analysis

**How was storage acquired: trace table**

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

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Problem Analysis

Identify the Transaction

VERBEXIT DFHPD640,’ XM=3’

IPCS OUTPUT STREAM

Task 833 is running under Tranid REDM

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Problem Analysis

Find the Program

VERBEXIT DFHPD640,’PCT=1’

IPCS OUTPUT STREAM

Command ===>

TXDINST.REDM 1B8C1100 TXD current instance

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

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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-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).  John Smith
03 comm-address    pic x(20).  123 Main St.
03 comm-city       pic x(40).  Anytown
03 comm-state      pic x(2).  ME
03 comm-zip        pic x(10).  04102
03 comm-phone      pic x(10).  
03 comm-fax

**--------------------------------------------------------

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 |
```

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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
+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

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Problem Analysis

verb x dfhp620,’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:
  Current suspended: 0
* Hwm suspended: 0
* Times cushion released:
  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

```
verbatim dfhpd620,'sm=1'
```

**==SM: EUDSA Summary**

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>1024K</td>
</tr>
<tr>
<td>Cushion size</td>
<td>0K</td>
</tr>
<tr>
<td>Current free space</td>
<td>1024K (100%)</td>
</tr>
<tr>
<td>* Lwm free space</td>
<td>960K (93%)</td>
</tr>
<tr>
<td>* Hwm free space</td>
<td>1024K (100%)</td>
</tr>
<tr>
<td>Largest free area</td>
<td>1024K</td>
</tr>
<tr>
<td>* Times nostg returned:</td>
<td>5596829</td>
</tr>
<tr>
<td>* Times request suspended:</td>
<td>2</td>
</tr>
<tr>
<td>Current suspended</td>
<td>1</td>
</tr>
<tr>
<td>* Hwm suspended</td>
<td>1</td>
</tr>
<tr>
<td>* Times cushion released:</td>
<td>0</td>
</tr>
<tr>
<td><strong>Currently SOS:</strong></td>
<td>YES</td>
</tr>
<tr>
<td>* Times went SOS:</td>
<td>2</td>
</tr>
<tr>
<td>* Time at SOS:</td>
<td>00:00:02.109</td>
</tr>
<tr>
<td>* Storage violations:</td>
<td>0</td>
</tr>
<tr>
<td><strong>Access:</strong></td>
<td>CICS</td>
</tr>
<tr>
<td>* Extents added:</td>
<td>3</td>
</tr>
<tr>
<td>* Extents released:</td>
<td>2</td>
</tr>
</tbody>
</table>

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 dfhp620,’sm=1’

SM: Domain subpool summary (ESDSA)

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

SM SHRU31 “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’

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

verbx dfhp3620, ‘ap=3’

EIB.00286 001000D0 EXEC Interface Block

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

verbx dfhp620, ‘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

<table>
<thead>
<tr>
<th>KE</th>
<th>Task</th>
<th>Tran #</th>
<th>Susptok</th>
<th>Subpool</th>
<th>DSA</th>
<th>Request</th>
</tr>
</thead>
<tbody>
<tr>
<td>097CC400 0000286 020E002D U0000286 EUDSA</td>
<td>2097168</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

Task 286 is suspended, waiting on Extended User storage.
## Problem Analysis

```plaintext
verbx dfhpd620, ‘sm=3’

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

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

*********** 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 dfhp620, ‘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

\texttt{verbx dfhpdp620, ‘sm=3’}

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

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 
Specify additional search strings 1 1. Foreground 1 1. View
Mixed Mode 2. Batch 2. Browse
Bypass selection list

Copyright (c) 2012 The Evans Group, Inc.
Problem Analysis

Scan the Source Library

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

Copyright (c) 2012 The Evans Group, Inc.
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

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**

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>10240K</td>
<td></td>
</tr>
<tr>
<td>Cushion size</td>
<td>0K</td>
<td></td>
</tr>
<tr>
<td><strong>Current free space:</strong></td>
<td><strong>2688K</strong></td>
<td>(26%)</td>
</tr>
<tr>
<td>* Lwm free space:</td>
<td>2688K</td>
<td>(26%)</td>
</tr>
<tr>
<td>* Hwm free space:</td>
<td>4800K</td>
<td>(46%)</td>
</tr>
<tr>
<td>Largest free area</td>
<td>960K</td>
<td></td>
</tr>
<tr>
<td>* Times nostg returned:</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>* Times request suspended:</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Current suspended</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>* Hwm suspended:</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>* Times cushion released:</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Currently SOS:</strong></td>
<td><strong>YES</strong></td>
<td></td>
</tr>
<tr>
<td>* Times went SOS:</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>* Time at SOS:</td>
<td>00:00:00.0000</td>
<td></td>
</tr>
<tr>
<td>* Storage violations:</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Access:</td>
<td>CICS</td>
<td></td>
</tr>
<tr>
<td>* Extents added:</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>* Extents released:</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Number of extents</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>1024K</td>
</tr>
<tr>
<td>Cushion size</td>
<td>128K</td>
</tr>
<tr>
<td>Current free space</td>
<td>1016K  (99%)</td>
</tr>
<tr>
<td>* Lwm free space</td>
<td>1016K  (99%)</td>
</tr>
<tr>
<td>* Hwm free space</td>
<td>1024K  (100%)</td>
</tr>
<tr>
<td>Largest free area</td>
<td>1016K</td>
</tr>
<tr>
<td>* Times nostg returned</td>
<td>0</td>
</tr>
<tr>
<td>* Times request suspended</td>
<td>0</td>
</tr>
<tr>
<td>Current suspended</td>
<td>0</td>
</tr>
<tr>
<td>* Hwm suspended</td>
<td>0</td>
</tr>
<tr>
<td>* Times cushion released</td>
<td>0</td>
</tr>
<tr>
<td>Currently SOS</td>
<td>NO</td>
</tr>
<tr>
<td>* Times went SOS</td>
<td>0</td>
</tr>
<tr>
<td>* Time at SOS</td>
<td>00:00:00.000</td>
</tr>
<tr>
<td>* Storage violations</td>
<td>0</td>
</tr>
<tr>
<td>Access</td>
<td>CICS</td>
</tr>
<tr>
<td>* Extents added</td>
<td>1</td>
</tr>
<tr>
<td>* Extents released</td>
<td>0</td>
</tr>
</tbody>
</table>

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

Review Storage Manager: SM=1

==SM: Suspend queue summary

KE Task  Tran #  Susptok  Subpool  DSA       Request

08CF9780  0000351  01920029  U0000351  EUDSA       2097168

There is only one task waiting for storage.
Problem Analysis

Review Storage Manager: SM=3

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.
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=*  
//SYSTEM DD SYSOUT=*   
//DFHSNAP DD SYSOUT=*  
//IPCSPRINT 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 
//IPCSDDIR 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

Share Presentations