Intermediate CICS Debugging Techniques:
More IPCS for CICS Dump Analysis

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Agenda

- Review: What you should already know
- IPCS commands: (SETDEF, RETP)
- Hints & Tips (diagnosis shortcuts)
- CICS Verbexit commands: XM, DS, NQ, APS, LD, PG, TR/TRS
- Additional CICS Trace options
- New IPCS Verbexit capability available with CICS TS 4.1

Review: What You Should Already Know

Prereq: CICS Debugging Basics (WebSphere Technical Exchange, September 2007), currently available for replay at
http://www.ibm.com/support/docview.wss?rs=1083&uid=swg27010540

Topics Discussed:

- Setting up and using IPCS to examine CICS System dumps
- Review of different dump types (SLIP, Console, CICS)
- Common IPCS commands
    - Looking at different Address spaces/jobnames
    - Formatting 'Store Clock' timestamps
- CICS-specific Verbexit options, plus detailed information about KE, LD, PG, AP, XM, TR, and DS domains, as well as MTRACE
- Example diagnosis: application S0C7 (data exception abend)

Roadmap: IPCS commands discussed

- **IPCS commands:**
  - ‣ SETDEF
  - ‣ RETP
  - ‣ IPLData
  - ‣ List
- **SDATA options**
  - ‣ GRSQ affects on dump performance

- **CICS Verbexit options:**
  - ‣ XM
  - ‣ DS
  - ‣ NQ
  - ‣ APS
  - ‣ LD
  - ‣ PG
  - ‣ TR, TRS
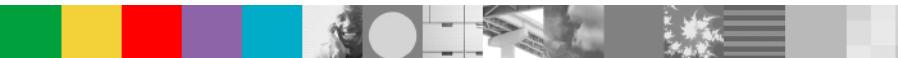
IPCS Commands: SETDEF

```
/*-------------- Global Default Values for IPCS Subcommands --------------*/
SETDEF GLOBAL NOPROBLEM                    /* Current problem number       */
SETDEF GLOBAL NOPRINT   TERMINAL           /* Routing of displays          */
SETDEF GLOBAL FLAG(WARNING)                /* Optional diagnostic messages */
SETDEF GLOBAL   CONFIRM                    /* Double-checking major acts   */
SETDEF GLOBAL NOTEST                       /* IPCS application testing     */
SETDEF GLOBAL   DSNAME('WIESE.IYNX32.HUNGTT12')
SETDEF GLOBAL LENGTH(4096)                 /* Default data length          */
SETDEF GLOBAL   VERIFY                     /* Optional dumping of data     */
SETDEF GLOBAL DISPLAY(  MACHINE)           /* Include storage keys, ....   */
SETDEF GLOBAL DISPLAY(  REMARK)            /* Include remark text          */
SETDEF GLOBAL DISPLAY(  REQUEST)           /* Include model LIST subcommand */
SETDEF GLOBAL DISPLAY(  STORAGE)           /* Include contents of storage  */
SETDEF GLOBAL DISPLAY(  SYMBOL)            /* Include associated symbol    */
SETDEF GLOBAL ASID(X'0042')                /* Default address space        */
```

IPCS Commands: SETDEF *notes*

- SETDEF allows you to set default values for IPCS subcommands.
- One of the options most frequently set by level 2 is LENGTH, associated with the IP List command
- Here is an example that shows how to set this:

```
IP SETDEF LENGTH(x'1000')
```

IPCS Commands: RETP

```
-------------------- IPCS Subcommand Entry ----------------------
            Retrieve
 Options   Help

    1. Set minimum number of characters saved in retrieve stack
    2. Select cursor position for retrieve
    3. Exit


              More:     +    | LISTMAP,  LMAP    | RUNCHAIN,
  1.  f syseib                | LISTSYM,  LSYM    | SCAN
  2.  verbx dfhpd650 'aps>    | LISTUCB,  LISTU   | SELECT
  3.  verbx dfhpd650 'aps>    | LITERAL           | SETDEF,
  4.  f 'task-02347'          | LPAMAP            | STACK
  5.  verbx dfhpd650 'tr=>    | MERGE             | STATUS,
  6.  f 'task-02347'          | NAME              | SUMMARY,
  7.  verbx dfhpd650 'tr=>    | NAMETOKN          | SYSTRACE
  8.  ip verbx mtrace         | NOTE,      N      | TCBEXIT,
  9.  verbx dfhpd650 'tr=>    | OPEN              | VERBEXIT,
  10.                         | PROFILE,  PROF    | WHERE,
  11.
```

IPCS Commands: RETP   *cont'd*

```
---------------------- IPCS Subcommand Entry -----------
              Retrieve                a CLIST or REXX exec
  Options   Help
                      Retrieve
            ISPF Retrieve Panel

    Set minimum number of characters to be
    saved in the retrieve stack

    Enter minimum number of
    characters . . . . . . . . . . 5




   11.
   12.
   13.
```

IPL information

- IP IPLDATA
- Displays last IPL date/time, z/OS release, and other related information

```
******** TOP OF DATA ********
System IPLed at 05:36:31.053 on 03/27/2009
Release z/OS 01.09.00
Used LOADP1 in SYS1.PARMLIB on 9608
IEASYM LIST=(00,23)
IEASYS LIST=23 (OP)
IODF device 9608
IPL device 960F volume P1SY02
******** END OF DATA ********
```

LIST: Is my dump "Complete"?

- To verify if the dump captured was complete issue the following IPCS "List" command:

```
L E0. BLOCK(0) L(16)
```

- The 4 fullwords displayed at 000000E0 correspond to the SDRSN codes from message IEA911 or IEA611:

```
LIST E0. BLOCK(0) LENGTH(X'10') AREA
    000000E0. 00000000 00000000 08000000 00000000
```

- Fullword #3: 08000000

  ‣ The dump dataset is full, but more data needs to be dumped.

"My Dump takes too long to capture!"

- Consider removing the SDATA "GRSQ" option

  ▶ This captures MVS-related "contention" information

  ▶ Unnecessary if your problem scope is limited to a single CICS region (if no other regions, or non-CICS subsystems involved)

  ▶ Including "GRSQ" can significantly increase the time required to capture a system dump, depending on your system

Basics: Verbexit options through CICS TS 4.1

Keyword	Functional area	
AI = 0|2	Autoinstall Model Manager	
AP = 0|1|2|3	Application Domain	
APS=<TASKID=nnnnn>		
AU = 0|2	CICS affinities utility	
BA = 0|1|2|3	Business application manager	
BR = 0|1|2|3	3270 bridge	
CC = 0|2	CICS catalog domain	
CP = 0|2	Common Programming Interface	
CQ = 0|1|2	Auto install model manager	
CSA=0|2	CICS Common System Area	
DB2=0|1|2|3	The CICS DB2 interface	
DD = 0|1|2|3	Directory Domain	
DH = 0|1|2|3	Document handling domain	
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	
EC = 0|1|2|3	Event Capture domain	(660)
EJ = 0|1	Enterprise JAVA	(610)
EM = 0|1|2|3	Event manager domain for BTS	
EP = 0|1|2|3	Event Processing domain	(660)
FCP=0|2	File Control Program	
FT = 0|1|2|3	CICS WEB Interface	
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	
IS = 0|1|2|3	IP Interconnectivity domain	(650)
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	
LM = 0|1|2|3	Lock Manager domain	
ME = 0|2	Message domain	
ML = 0|1|2|3	Markup Language domain	(660)
MN = 0|1|2|3	Monitoring domain	
MQ = 0|1|2|3	CICS-MQ interface	(650)

Keyword	Functional area	
MRO=0|2	CICS Multi-Region Operation	
NQ = 0|1|2|3	Enqueue Manager	
OT = 0|1|2|3	Object Transaction Domain	(610)
PA = 0|2	Parameter manager domain	
PCP=0|2	Program Control Program	
PCT=0|2	Program Control Table	
PG = 0|1|2|3	Program Manager Domain	
PI = 0|1|2|3	Pipeline Domain	(640)
PR = 0|2	Partner Resource management	
PT = 0|1|2|3	Partner Domain	(620)
RD = 0|2	Resource definition manager	
RL = 0|1|2|3	Resource Lifecycle domain	(660)
RM = 0|2	Recovery Management	
RS = 0|1|2|3	Region Status domain	(660)
RX = 0|1|2|3	Recoverable EXCI domain	
RZ = 0|1|2|3	Request Streams	(610)
SH = 0|1	Scheduler services domain for BTS	
SJ = 0|1|2|3	JVM Domain	(610)
SM = 0|1|2|3	Storage Manager domain	
SO = 0|1|2|3	Sockets domain	
SSA=0|2	Static Storage Areas	
ST = 0|1|2|3	Statistics domain	
SZ = 0|1	Front End Programming Interface	
TCP= 0|1|2|3	Terminal Control Program	
TDP= 0|1|2|3	Transient Data Program	
TI = 0|1|2|3	Timer domain	
TMP=0|2	Table Manager Program	
TR = 0|1|2|3	Trace domain	
TRS=<trace selection parameters>		
TS = 0|1|2|3	Temporary Storage Program	
UEH=0|2	User Exit Handler	
US = 0|1|2|3	User Domain	
WB = 0|1|2	The web interface	
W2 = 0|1|2|3	Web 2.0 domain	(660)
XM = 0|1|2|3	The transaction manager	
XRF=0|2	The extended recovery facility	
XS = 0|1	Security Domain	

Basics: Verb exit options (notes)

CICS Transaction Server is based on domain architecture. Each domain encapsulates the code and control blocks for a given function. Access to the data belonging to a given domain is via the domain interface. Each domain, with the exception of the application domain (AP), is responsible for a given CICS function. All domains are contained in each CICS address space.

For example, the catalog domain is responsible for the data content and access to the CICS local and global catalogs.   When other domains require access to information managed by the catalog domain, it is obtained using a catalog domain call.

The exception to the rule is the AP domain which defines the environment for application execution.   The AP domain includes file control (FCP=), terminal control (TCP=), and Multi-region operation (MRO=) which are not yet full domains, but have separate formatting routines.

To format the control blocks and data, there are normally three (3) levels of detail available as noted in the chart on the prior page:
- **Summary only**
- **Full Control Block formatting**
- **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.

Also note, as new function is introduced, or significantly changed, the release is identified in the chart. For example the Event Capture (EC) domain was introduced in R660 (CICS/TS R4.1), and the Pipeline (PI) domain in R640 (CICS/TS R3.1).

The CICS Problem Determination Guide (Appendix A) contains two cross reference listings providing the control blocks formatted by IPCS keyword and the IPCS keyword used to format a given control block.

Hints & Tips: "Shortcuts"

- Don't overlook the sometimes obscure causes behind processing problems in CICS regions:
    - ▸ "Is CICS generally healthy?"
- CICS getting dispatched (TCP dispatch)
- "Sympathy" sickness
- SOS
- Unusually large allocations (i.e., TSQueues)
- MaxTask
- TCLASS

Sample Problem: "Hung tasks"

- End users complained their transactions, which normally experience sub-second response times, are hung.
- Transactions begin with "TT1*", and are all a part of the same application
- CICS was still functional, and a dump was requested from the Master Terminal transaction (CEMT PERFORM SNAP)

```
CEMT PERFORM SNAP
    TITLE("Why are my TT1* tasks hung?")
```

When was this dump requested?

- CICS Verbexit formatting:

```
=== DUMP SUMMARY
  DUMPID:     1/0055
  DUMPCODE:   MT0001
  DATE/TIME:  14/05/09 20:17:49 (LOCAL)
  SYMPTOMS:   PIDS/5655M1500 LVLS/650 MS/NOID RIDS/DFHEDCP PTFS/HCI6500
  TITLE:      Why are my TT1* tasks hung?
  ASID:       X'0042'
```

- IPCS "ST SYS" information:

```
SYSTEM STATUS:
  Nucleus member name: IEANUC01
  I/O configuration data:
    IODF data set name: SYS1.IODF01
    IODF configuration ID: PLX1
    EDT ID: P1
  Sysplex name: SYSPLEX1
  TIME OF DAY CLOCK: C42F54E5 7838939C  05/14/2009 20:17:49.306761 local
  TIME OF DAY CLOCK: C42F477C 3DF8939C  05/14/2009 19:17:49.306761 GMT
```

Verbx DFHPD650 'XM=3'

```
==XM: GLOBAL STATE SUMMARY

    XM domain status:                          Initialised
    Maximum user tasks (MXT):                  32
    System currently at MXT:                   No
    XXMATT user exit currently:                Inactive
    XM state lock currently held:              No
    XM trandef state lock currently held:      No
    System attaches delayed for SOS:           No

    Force-purge has been issued:               Yes
    Kill has been issued:                      No

…
==XM: MXT SUMMARY

    Maximum user tasks (MXT):                  32
    System currently at MXT:                   No
    Current active user tasks:                 6
    Current queued user tasks:                 0
 *  Peak active user tasks:                    12
 *  Peak queued user tasks:                    0
 *  Times at MXT limit:                        0
```

Verbx DFHPD650 'XM=3' *notes*

- Why did we <u>start</u> with 'XM=3'?

  ▶ End-user description of the problem made us want to review the current MXT condition

  ▶ This will also permit us to see the actual TT1* task numbers present in the system at the time of the dump

  ▶ While we're in XM, it also gives us the opportunity to review TCLASS conditions

Verbx DFHPD650 'XM=3' *cont'd*

```
Tran Tran  TxnAddr Start Sys  Status    DS        Facility Facility
id   num   TxdAddr code  Tran           token     type     token
---------------------------------------------------------------------
…
CSNE 00027 1450A900 C    Yes  ACT       00020003 None
           153F9850
TT12 02347 1450A500 T    No   ACT       040001A7 Terminal 1535EBC0
           15520C60
TT13 02348 1450A700 T    No   ACT       04080017 Terminal 1563F030
           15520E00
TT13 02349 1563C100 T    No   ACT       0406012F Terminal 1565D720
           15520E00
TT13 02350 1563C300 T    No   ACT       03820033 Terminal 1565D030
           15520E00
TT13 02351 1563C500 T    No   ACT       04100021 Terminal 1535E970
           15520E00
TT13 02352 1563C700 T    No   TCLASS    00000000 None
           15520E00           MYCLASS
TT12 02353 1563C900 T    No   TCLASS    00000000 None
           15520C60           MYCLASS
TT12 02354 1563CB00 T    No   TCLASS    00000000 None
           15520C60           MYCLASS
CEMT 02361 1450AD00 T    No   ACT       040E0183 Terminal 1535E4D0
           153EFED0
```

Verbx DFHPD650 'XM=3': TCLASS Summary

```
==XM: TCLASS SUMMARY
```

Tclass Name	Max Active	Purge Threshld	Current Active	Current Queued	Total Attaches	Queuing TranNum	Queuing Transid	Queuing Start Time
DFHCOMCL	10	0	0	0	0			
DFHEDFTC	10	0	0	0	0			
DFHTCIND	10	0	0	0	0			
DFHTCL01	1	0	0	0	0			
DFHTCL02	1	0	0	0	0			
DFHTCL10	1	0	0	0	0			
DFHTSDEL	25	0	0	0	0			
MYCLASS	**5**	**0**	**5**	**6**	1032	02352	TT13	19:09:21.646
						02353	TT12	19:09:22.552
						02354	TT12	19:09:24.978
						02355	TT12	19:09:26.334
						02356	TT12	19:09:27.995
						02357	TT12	19:09:32.159

Verbx DFHPD650 'DS=3'

```
DS_TOKEN KE_TASK    T S F P TT RESOURCE  RESOURCE_NAME  W TIME OF      TIMEOUT      DTA       AD M XM_TXN_TOKEN
                               TYPE                       SUSPEND      DUE          (DSTSK)

00000001 13AA3C00 S S N N - ENF       NOTIFY      M 18:16:33.659       -       1445F080 DM RO
00020003 1670E400 S S N N - ZC        DFHZNAC1    S 17:23:37.917       -       1445F200 XM QR 1450A9000000027C
00040003 14450800 S S N N - SODOMAIN  SO_NOWORK   M 19:17:22.839       -       1445F380 XM SL 145095000000004C
00060003 13AA3000 S S N N - TIEXPIRY  DS_NUDGE    S 19:17:22.838       -       1445F500 TI QR
00080003 13AC0C00 S R                                                          1445F680 AP CQ
000C0003 152FD900 S S N N IN LGHARTBT LG_MGRST    S 19:12:12.198 19:22:12.198 1445F980    QR
00120003 144B6800 S S N N - ICMIDNTE  DFHAPTIM    S 23:00:24.275       -       1445FE00 XM QR 145097000000005C
00820003 15381900 S S N N - CSNC      MROQUEUE    M 18:16:37.614       -       14484200 XM QR 1450A3000000021C
00840003 1534B100 S S N N - ICEXPIRY  DFHAPTIX    S 19:16:56.886       -       14484380 XM QR 145099000000006C
008E0003 1534B900 S S N N - TCP_NORM DFHZDSP      W 19:18:12.733       -        14484B00 XM QR 14509D000000008C
00900003 13AA3800 S S N N - IS_INPUT  IS_PROCQ    S 18:16:38.424       -       14484C80 XM QR 1450A1000000025C
01080003 14451C00 S S N N - IS_ERROR  IS_ERROQ    S 18:16:38.417       -       144CC680 XM QR 1450AB000000026C
010E0003 1539C500 S S N N IN FCCFQS               M 19:17:12.877 19:22:12.877 144CCB00 XM QR 145091000000019C
01920003 15381100 S S N N - FCCFQR               M 23:36:25.929       -       16716E00 XM QR 14509B000000020C
02060001 1452D100 S S N N IN SMSYSTEM             S 19:14:19.862 19:19:19.862 1675F500 SM QR
02080001 1452D500 S S N N - smsyre    smva_ecb    M 18:16:33.763       -       1675F680 SM QR
020A0001 1672CC00 S S N N - RRMSEXIT  NOTIFICATION M 06:23:41.849      -       1675F800    QR
020C0001 1452D900 S S N N - RRMSEXIT  RESYNC      M 18:16:33.763       -       1675F980    QR
020E0003 13AC0000 S S N N IN SHSYSTEM             S 19:17:39.878 19:18:39.878 1675FB00 XM QR 145093000000023C
03820033 152FD100 N S P N - ENQUEUE   EXECSTRN    S 19:09:19.366       -        14499200 XM QR 1563C30000 02350C
040001A7 152C9100 N S P N - ENQUEUE   EXECSTRN    S 19:09:16.824       -        144CE080 XM QR 1450A50000 02347C
0406012F 152FD500 N S P N - ENQUEUE   EXECSTRN    S 19:09:18.237       -        144CE500 XM QR 1563C10000 02349C
04080017 152F5100 N S P N - ENQUEUE   EXECSTRN    S 19:09:16.272       -        144CE680 XM QR 1450A70000 02348C
040E0183 152DF900 N R                                                          144CEB00 XM QR 1450AD000002361C
04100021 152F5900 N S P N - ENQUEUE   EXECSTRN    S 19:09:20.600       -        144CEC80 XM QR 1563C50000 02351C
```

Verbx DFHPD650 'DS=3' *notes*

- Remember from our Hints & Tips page, where we suggested noting the TCP dispatch time, to insure CICS is generally healthy.
- The 'problematic' TT1* transactions were found from the XM=3 listing to be task numbers 2347-2351. These tasks were SUSPENDED, with Resource Type = ENQUEUE and Resource Name = EXECSTRN. Our investigation will usually begin with the Task with the OLDEST Suspend time(s) (2347, 2348, and 2349).
- An additional task 2361 is currently Running, and represents the CEMT transaction that was used to capture the dump we're now examining.
- To learn more about Resource types and waits, you can search the CICS TS Info Center for the codes that are displayed here.
- ENQUEUE EXECSTRN is interpreted as "EXEC CICS ENQ Wait"

VERBX DFHPD650 'NQ=3'

- The table below illustrates a classic "deadly embrace" scenario
  - Task 02347 owns ENQUEUE1, and is the first *waiter* for ENQUEUE2.
  - Task 02348 owns ENQUEUE2, and is the first *waiter* for ENQUEUE1.
  - Task **02349** doesn't own any enqueues, and is a victim in this hang.

OWNER / Enqueue Name		Len	Sta	NQEA Address	Tran id	Tran Num	Local Uowid	Lifetime Uow	Tsk	Hash Indx
ENQUEUE1		8	Act	1455A940	TT12	**02347**	ʹ42F45926E9A093E	1	0	22
	Waiter :			1455AB80	TT13	02348	ʹ4592F96BEF70	1	0	22
ENQUEUE2		8	Act	1455AC40	TT13	02348	ʹ4592F96BEF70	1	0	51
	Waiter :			1455AA00	TT12	**02347**	ʹ42F45926E9A093E	1	0	51
ENQUEUE3		8	Act	1455A7C0	TT13	02348	C42F4592F96BEF70	1	0	63
	Waiter :			1455A880	TT13	**02349**	C42F4594D9263EF1	1	0	63
	Waiter :			1455A700	TT13	02350	C42F4595ECE10F90	1	0	63
	Waiter :			1455AAC0	TT13	02351	C42F459719FC5E3B	1	0	63
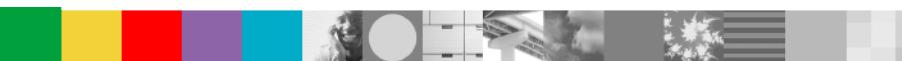
Verbx DFHPD650 'APS=<taskid=*2347*>'

```
SYSEIB.02347 145CDB14 System EXEC Interface Block
  -0008                                                   5CE2E8E2 C5C9C240  *                            *SYSEIB *
   0000   0200851C 0109134F E3E3F1F2 0002347C   E3C3F4F6 00000004 00007D 12 04000000  *..e....|TT12...@TC46......'.....*
   0020   00000000 00000000 00000000 00000000   00000040 40404040 40404000 00000000  *...................     .....*
   0040   00000000 00000000 00000000 00000000   00000000 00                          *....................      *

EIB.02347 154300D0 EXEC Interface Block
  -0010                                                   00656EC4 C6C8C1D7 6DC4C6C8 C5C9C25C  *            ..>DFHAP_DFHEIB**
   0000   0200851C 0109134F E3E3F1F2 0002347C   E3C3F4F6 00000004 00007D 10 04000000  *..e....|TT12...@TC46......'.....*
   0020   00000000 00000000 00000000 00000000   00000040 40404040 40404000 00000000  *...................     .....*
   0040   00000000 00000000 00000000 00000000   00000000 00                          *....................      *

EIUS.02347 15430008 EXEC Interface User Structure
   0000   00B46EC4 C6C8C5C9 E4E24040 40404040   00000000 00000000 00000000 00000000  *..>DFHEIUS      ................*
   0020   00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000  *................................*
   0040   00000000 00000000 154300D0 00000000   15431778 00000000 00000000 00000000  *...........}....................*
   0060   80087914 963120E8 00000420 15430050   8004F200 14A0975E 152CD298 152CD958  *....o..Y.......&..2...p;..Kq..R.*
   0080   14A06862 152CDBA8 00000001 14503100   15430008 155C886C 007B3000 00000000  *.......y.....&.......*h%.#......*
   00A0   00000000 15430050 15430054 00000000   00000000                             *.......&............      *
```
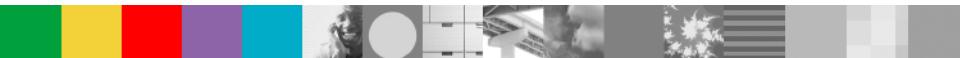
IP L 15431778 len(999)
```
15431778.                                              00000000 1543005C |                .......*|
15431780. 00000000 9631225E 00000000 163123D4  154317E0 8004F200 963120E8 152CD298 |....o..;.......M...\..2.o..Y..Kq|
154317A0. 152CD958 14A06862 152CDBA8 00000001  14503100 15430008 154300D0 007B3000 |..R........y.....&.........}.#..|
…
```

Verbx DFHPD650 'APS=<taskid=*2347*>' *notes*

- The "APS" component keyword provides a handy way of limiting the formatting of system dumps to only those storage areas relating to the task identifier specified.

- Search CICS Information Center for EIB codes, and select the topic on "EIB fields" to determine:

  - SYSEIB+x'1B' =x'1204' ->ENQ   (current command)

  -          EIB+x'1B' =x'1004' ->DELAY   (previous command)

- EIUS + x'50' = @ HLL Save area

  - + x'C' are registers R14-R12 at the time the current EXEC CICS command was issued

  - R14 holds the Return Address in the application, that will get control upon completion of the EXEC CICS command being executed.

Verbx DFHPD650 'APS=<taskid=*2348*>'

```
SYSEIB.02348 145CEB14 System EXEC Interface Block
  -0008                                                          5CE2E8E2 C5C9C240  *                          *SYSEIB *
  0000  0200852C 0109134F E3E3F1F3 0002348C  E3C3F5F8 00000004 00007D 12 04 000000  *..e....|TT13....TC58......'.....*
  0020  00000000 00000000 00000000 00000000  00000040 40404040 40404000 00000000  *...................     .....*
  0040  00000000 00000000 00000000 00000000  00000000 00                          *...................        *

EIB.02348 154400D0 EXEC Interface Block
  -0010                                                          00656EC4 C6C8C1D7 6DC4C6C8 C5C9C25C  *            ..>DFHAP_DFHEIB**
  0000  0200852C 0109134F E3E3F1F3 0002348C  E3C3F5F8 00000004 00007D 0A 02 000000  *..e....|TT13....TC58......'.....*
  0020  00000000 00000000 00000000 00000000  000000E3 E2D860D7 C3F1F300 00000000  *...................TSQ-PC13.....*
  0040  00000000 00000000 00000000 00000000  00000000 00                          *...................        *

EIUS.02348 15440008 EXEC Interface User Structure
  0000  00B46EC4 C6C8C5C9 E4E24040 40404040  15440478 00000000 15444D00 00000000  *..>DFHEIUS      ...........(.....*
  0020  00000000 00000000 00000000 00000000  00000000 00000000 00000000 00000000  *...............................*
  0040  00000000 00000000 154400D0 00000000  15449DC8 00000000 00000000 00000000  *............}.......H...........*
  0060  94A07270 005404D8 13B0CF30 152F7818  152F7910 14A0975E 152F7250 0004E948  *m.......Q..............p;...&..Z.*
  0080  145CEA08 152F7B60 00000009 152F7ABD  152F786C 155C86D4 145CE700 00000000  *.*....#-.......:....%.*fM.*X.....*
  00A0  00000000 15440050 15440054 00000000  00000000                            *.......&............        *
```
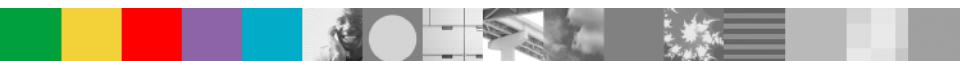
IP L 15449DC8 len(999)

```
15449DC8.                        00104001 15449C20  15449EF8 96310FBA 00000000 1544B0F4 |       .. ........8o..........4|
15449DE0. 15449ED0 1544B178 1544B718 16310770  40000000 152F77CC 00000000 1544B1F8 |...}............. ...........8|
15449E00. 1544AFB8 16310864 16310B14 15448FF8  00000000 15449EF8 00000000 00000000 |...............8.......8........|
…
```

Verbx DFHPD650 'APS=<taskid=*2348*>' *notes*

- Search CICS Information Center for EIB codes, and select the topic on "EIB fields" to determine:

  ▸ SYSEIB+x'1B' =x'1204' ->ENQ   (current command)

  ▸   EIB+x'1B' =x'0A02' ->WRITEQ TS (previous command)

- Since task 2348 is currently executing a COBOL program, the APS format display has the additional benefit of displaying Language Environment (LE) details, illustrated on the next page.

Verbx DFHPD650 'APS=<taskid=*2348*>' *cont'd*

```
Invoking the Language Environment dump formatter
VERBEXIT CEEERRIP ASID(0042) CAA(15448FF8) DSA(15449DC8) ALL


Language Environment Run-Time Options in effect.

LAST WHERE SET          Override   OPTIONS
*************************************************************************
INSTALLATION DEFAULT     OVR          ABPERC(NONE)
INSTALLATION DEFAULT     OVR          ABTERMENC(ABEND)
INSTALLATION DEFAULT     OVR       NOAIXBLD
INSTALLATION DEFAULT     OVR          ALL31(ON)
INSTALLATION DEFAULT     OVR          ANYHEAP(00004096,00004080,ANY  ,FREE)
INSTALLATION DEFAULT     OVR       NOAUTOTASK
INSTALLATION DEFAULT     OVR          BELOWHEAP(00004096,00004080,FREE)
INSTALLATION DEFAULT     OVR          CBLOPTS(ON)
INSTALLATION DEFAULT     OVR          CBLPSHPOP(ON)
INSTALLATION DEFAULT     OVR          CBLQDA(OFF)
INSTALLATION DEFAULT     OVR          CEEDUMP(00000060,SYSOUT=*,
                                             FREE=END,SPIN=UNALLOC)
INSTALLATION DEFAULT     OVR          CHECK(ON)
INSTALLATION DEFAULT     OVR          COUNTRY(US)
etc.
```

Verbx DFHPD650 'LD=3'

- The R14 addresses found in our APS displays were
    - ‣ `Task 2347:        9631225E`
    - ‣ `Task 2348:        96310FBA`
- Format your dump for the LOADER domain with LD=3, then search for the address reflected in your R14 value shown from the AP domain (`find ' 9631'`):

```
 ==LD: PROGRAM STORAGE MAP

        …
        PGM NAME ENTRY PT  CSECT    LOAD PT. REL.
        CL2PA011 96310000 DFHYA620 16310000 620
        CL2PA013 963103F0 DFHYA620 163103F0 620
        CL2PC013 96310738 DFHYI650 16310710 650
        CL2PA012 96311EC0 DFHYA650 16311EC0 650
        CL2PAX12 963120C0 DFHYA650 163120C0 650
        <end of listing>
 ==LD: RPS LOADER ACTIVE PROGRAM ENTRIES (APE) ON NOT-IN-USE CHAIN
```

Using the Windows CALCULATOR app

- You can use the "scientific" view in the Windows®-provided calculator application to perform math on the Hex addresses, to determine the location that control *should* have been returned to after completing the EXEC CICS ENQ requests (R14 – entry point):

  - Task 2347: Program CL2PAX12 + x'19E' `(9631225E – 963120C0)`

  - Task 2348: Program CL2PA013 + x'882' `(96310FBA – 96310738)`
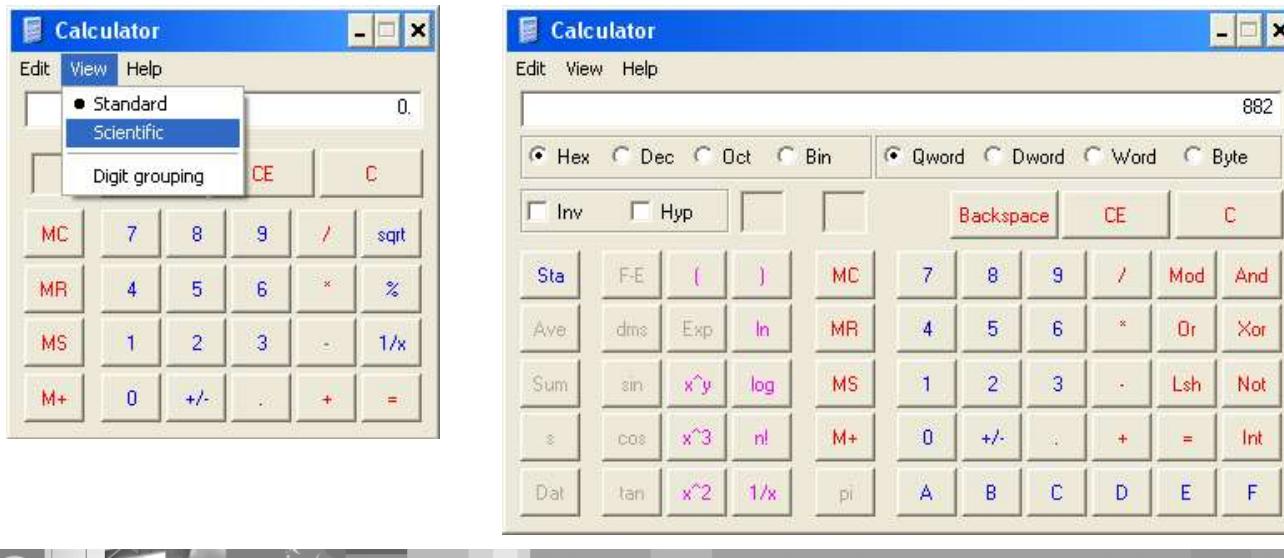
Instruction Attribute on IPCS List command

- Now that you have identified the program involved, you can display its instruction stream in the dump.
- Use the IPCS command: `L xxxxxxxx INSTR`
  where `xxxxxxxx` is the beginning address

  ▸ `IP l 16312240 Instr`

```
LIST 16312240. ASID(X'0042') LENGTH(X'0600') INSTRUCTION
ASID(X'0042') ADDRESS(16312240.) KEY(90) ABSOLUTE(79CE2240.)
16312240 | 4110 D068      | LA    R1,X'68'(,R13)
16312244 | 41E0 32FD      | LA    R14,X'2FD'(,R3)
16312248 | 41F0 31D8      | LA    R15,X'1D8'(,R3)
1631224C | 4100 32EC      | LA    R0,X'2EC'(,R3)
16312250 | 90E0 1000      | STM   R14,R0,X'0'(R1)
16312254 | 9680 1008      | OI    X'8'(R1),X'80'
16312258 | 58F0 32E0      | L     R15,X'2E0'(,R3)
1631225C | 0DEF           | BASR  R14,R15
```
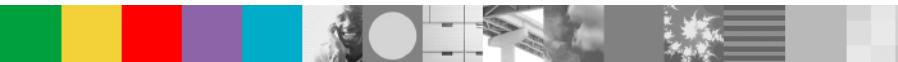
Verbx DFHPD650 'PG=3'

- Confirms what we saw with APS and LD
- Shows container usage

```
_____
==PG: PTA SUMMARY FOR TRAN NUM : 02347,  PTA ADDRESS : 145FC570
LOG-LVL : 2        SYS-LVL : 0          TASK-LLE : 00000000  PLCB : 152CCDA8
=PG: TASK PLCB SUMMARY

PROG CL2PAX12 LVL   2 PLCB 152CCDA8 LD 163120C0 ENT 963120C0 LEN 000368 PPTE 155BEB30 ENV EXEC INV CL2PA012 EXIT
 PROGRAM: CL2PAX12 CPE: 155BF1D0 LIB: DFHRPL   CONCAT: 01
  CHANNEL    012_CHANNEL      *CURRENT* CHCB 15668090 LEN 000000A0 CCSID 000025 GN 0002 CPCB 1566A090
    CONTAINER X12_CONTAINER#2  TYPE USER CRCB 1566E190 LEN 00000050 DTYPE (BIT)  GN 0002 CSCB 1566F0D0
    CONTAINER 012_CONTAINER    TYPE USER CRCB 1566E138 LEN 00000050 DTYPE (BIT)  GN 0001 CSCB 1566F0A8
  CHANNEL    X12_CHANNEL             CHCB 156680C0 LEN 00000050 CCSID 000025 GN 0001 CPCB 1566A0C0
    CONTAINER X12_CONTAINER   TYPE USER CRCB 1566E1E8 LEN 00000050 DTYPE (BIT)  GN 0001 CSCB 1566F0F8

PROG CL2PA012 LVL   1 PLCB 152CAF00 LD 16311EC0 ENT 96311EC0 LEN 0001F8 PPTE 155BEA28 ENV EXEC INV CICS     EXIT
 PROGRAM: CL2PA012 CPE: 155BF920 LIB: DFHRPL   CONCAT: 01
  CHANNEL    012_CHANNEL             CHCB 15668090 LEN 000000A0 CCSID 000025 GN 0002 CPCB 1566A090
    CONTAINER X12_CONTAINER#2  TYPE USER CRCB 1566E190 LEN 00000050 DTYPE (BIT)  GN 0002 CSCB 1566F0D0
    CONTAINER 012_CONTAINER   TYPE USER CRCB 1566E138 LEN 00000050 DTYPE (BIT)  GN 0001 CSCB 1566F0A8
_____
==PG: PTA SUMMARY FOR TRAN NUM : 02348,  PTA ADDRESS : 145FC7B0
LOG-LVL : 1        SYS-LVL : 0          TASK-LLE : 00000000  PLCB : 152F6F00
=PG: TASK PLCB SUMMARY
PROG CL2PC013 LVL   1 PLCB 152F6F00 LD 16310710 ENT 96310738 LEN 0017B0 PPTE 155BEAD8 ENV EXEC INV CICS     EXIT
 PROGRAM: CL2PC013 CPE: 155BFB90 LIB: DFHRPL   CONCAT: 01

_____
```

Fun with Trace!   ("What, are they KIDDING?")

- Using the TRS component keyword of the Verbx DFHPD*xxx* TR command, you can supply additional parameters identical to the Aux Trace formatting. This can help to focus your attention on the area of CICS processing that concerns you. For example:

  ```
  'TR=1,TRS=<taskid=2347>'

  'TR=2,TRS=<typetr=(SO0201-0202)>'
  ```

- These commands can provide a useful tool in the debuggers' toolkit, for helping to understand and diagnose problems.

Verbx DFHPD650 'TR=1,TRS=<taskid=*2347*>'

- Excerpt from an Abbreviated trace listing for Task 02347:

```
02347 QR     AP EA00 TMP    ENTRY LOCATE            PFT,DFHCICST                                           =006448=
02347 QR     AP EA01 TMP    EXIT  LOCATE            PFT,DFHCICST,145C5B50,NORMAL                           =006449=
02347 QR     SM 0301 SMGF   ENTRY GETMAIN           FA0,YES,EI_TRACE,USER                                  =006450=
02347 QR     SM 0302 SMGF   EXIT  GETMAIN/OK        15430478                                               =006451=
…
02347 QR     PG 0901 PGPG   ENTRY INITIAL_LINK      CL2PA012                                               =006490=
02347 QR     LD 0001 LDLD   ENTRY ACQUIRE_PROGRAM   155BFAC0                                               =006491=
02347 QR     LD 0002 LDLD   EXIT  ACQUIRE_PROGRAM/OK 96311EC0,16311EC0,1F8,REUSABLE,ESDSA,OLD_COPY,        =006492=
02347 QR     AP 1940 APLI   ENTRY START_PROGRAM     CL2PA012,CEDF,FULLAPI,EXEC,NO,155C864C,00000000 , 00000000,1,NO  =006493=
02347 QR     SM 0C01 SMMG   ENTRY GETMAIN           330,YES,00,TASK                                        =006494=
02347 QR     SM 0C02 SMMG   EXIT  GETMAIN/OK        15431428                                               =006495=
02347 QR     AP 00E1 EIP    ENTRY PUT-CONTAINER                        0004,15431438 ....,09003416 ....    =006496=
02347 QR     AP E160 EXEC   ENTRY PUT               '012_CONTAINER   ' AT X'16311FE4','012_CHANNEL     ' AT X'96311FF4' =006497=
…
02347 QR     AP E161 EXEC   EXIT  PUT               '012_CONTAINER   ' AT X'16311FE4','012_CHANNEL     ' AT X'96311FF4' =006516=
02347 QR     AP 00E1 EIP    EXIT  PUT-CONTAINER     OK                         00F4,00000000 ....,00003416 ....        =006517=
02347 QR     AP 00E1 EIP    ENTRY LINK                                 0004,15431438 ....,09000E02 ....    =006518=
02347 QR     AP E160 EXEC   ENTRY LINK              'CL2PAX12' AT X'16312004','012_CHANNEL     ' AT X'96311FF4',ASM    =006519=
02347 QR     PG 1101 PGLE   ENTRY LINK_EXEC         CL2PAX12,NO,NO,012_CHANNEL                             =006520=
```

- We can focus on LINK commands in the trace, for both tasks 2347 and 2348

```
'TR=1,TRS=<TYPETR=(XM1101,DS0002,PG0901-0902,PG1101-1102)>'
02347 QR     PG 0901 PGPG   ENTRY INITIAL_LINK      CL2PA012                                               =006490=
02347 QR     PG 1101 PGLE   ENTRY LINK_EXEC         CL2PAX12,NO,NO,012_CHANNEL                             =006520=
02348 QR     DS 0002 DSAT   ENTRY SET_PRIORITY      1                                                      =006649=
02348 QR     PG 0901 PGPG   ENTRY INITIAL_LINK      CL2PC013                                               =006680=
```
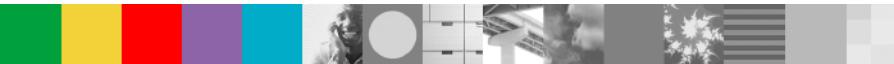
Verbx DFHPD650 'TR=1' for EXEC CICS commands

- Now let's focus on the EXEC CICS commands in the trace, for both tasks 2347 and 2348
  - **EXEC CICS entries: TYPETR=(AP00E1,APE160-E161)**

```
DFHPD650 'tr=1,trs=<typetr=(ap00e1,ape160-e161),taskid=(2347-2348)>'
```

```
02347 QR    AP 00E1 EIP    ENTRY ENQ                                          0004,15431778 ....,09001204 ....    =006581=
02347 QR    AP E160 EXEC   ENTRY ENQ            'ENQUEUE1' AT X'163122B8',8 AT X'963123D4',ASM                     =006582=
02347 QR    AP E161 EXEC   EXIT  ENQ            'ENQUEUE1' AT X'163122B8',8 AT X'963123D4',0,0,ASM                 =006591=
02347 QR    AP 00E1 EIP    EXIT  ENQ            OK                            00F4,00000000 ....,00001204 ....    =006592=
02347 QR    AP 00E1 EIP    ENTRY DELAY                                        0004,15431778 ....,09001004 ....    =006593=
02347 QR    AP E160 EXEC   ENTRY DELAY          1 AT X'963123D0',ASM                                              =006594=
02348 QR    AP 00E1 EIP    ENTRY ENQ                                          0004,15449DC8 ...H,09001204 ....    =006689=
02348 QR    AP E160 EXEC   ENTRY ENQ            'ENQUEUE3' AT X'1544B240',8 AT X'9544B718',COBOLII,00051          =006690=
02348 QR    AP E161 EXEC   EXIT  ENQ            'ENQUEUE3' AT X'1544B240',8 AT X'9544B718',0,0,COBOLII,00051      =006699=
02348 QR    AP 00E1 EIP    EXIT  ENQ            OK                            00F4,00000000 ....,00001204 ....    =006700=
02348 QR    AP 00E1 EIP    ENTRY ENQ                                          0004,15449DC8 ...H,09001204 ....    =006701=
02348 QR    AP E160 EXEC   ENTRY ENQ            'ENQUEUE2' AT X'1544B238',8 AT X'9544B718',COBOLII,00054          =006702=
02348 QR    AP E161 EXEC   EXIT  ENQ            'ENQUEUE2' AT X'1544B238',8 AT X'9544B718',0,0,COBOLII,00054      =006711=
02348 QR    AP 00E1 EIP    EXIT  ENQ            OK                            00F4,00000000 ....,00001204 ....    =006712=
02348 QR    AP 00E1 EIP    ENTRY WRITEQ-TS                                    0004,15449DC8 ...H,09000A02 ....    =006753=
02348 QR    AP E160 EXEC   ENTRY WRITEQ         TS 'TSQ-PC13' AT X'1544B248','THIS IS A TEST MESSAGE FOR WRITEQ TS, =006754=
02348 QR    AP E161 EXEC   EXIT  WRITEQ         TS 'TSQ-PC13' AT X'1544B248','THIS IS A TEST MESSAGE FOR WRITEQ TS, =006761=
02348 QR    AP 00E1 EIP    EXIT  WRITEQ-TS      OK                            00F4,00000000 ....,00000A02 ....    =006762=
02348 QR    AP 00E1 EIP    ENTRY ENQ                                          0004,15449DC8 ...H,09001204 ....    =006763=
02348 QR    AP E160 EXEC   ENTRY ENQ            'ENQUEUE1' AT X'1544B230',8 AT X'9544B718',COBOLII,00077          =006764=
02347 QR    AP E161 EXEC   EXIT  DELAY          1 AT X'963123D0',0,0,ASM                                          =006800=
02347 QR    AP 00E1 EIP    EXIT  DELAY          OK                            00F4,00000000 ....,00001004 ....    =006801=
02347 QR    AP 00E1 EIP    ENTRY ENQ                                          0004,15431778 ....,09001204 ....    =006802=
02347 QR    AP E160 EXEC   ENTRY ENQ            'ENQUEUE2' AT X'163122C0',8 AT X'963123D4',ASM                    =006803=
```
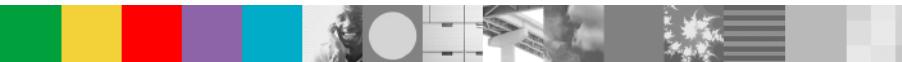
Verbx DFHPD650 'TR=2' for EXEC CICS commands

- Here's a small excerpt from the FULL Tracing output on EXEC CICS commands

```
AP 00E1 EIP ENTRY ENQ                                   REQ(0004) FIELD-A(15449DC8 ...H) FIELD-B(09001204 ....)
            TASK-02348 KE_NUM-0047 TCB-QR    /007C0E88 RET-96310FBA TIME-20:08:52.2725359648 INTERVAL-00.0000005000        =006763=


AP E160 EXEC ENTRY ENQ RESOURCE('ENQUEUE1' AT X'1544B230') LENGTH(8 AT X'9544B718') COBOLII STMT_#(00077)
            TASK-02348 KE_NUM-0047 TCB-QR    /007C0E88 RET-80083324 TIME-20:08:52.2725370585 INTERVAL-00.0000010937        =006764=
                1-0000  00320000 00121544 9EE01204 C0000700  000001F0 F0F0F7F7 0001010C 1544B230  *.........\..{......00077........*
                  0020  C5D5D8E4 C5E4C5F1 01020206 9544B718  0008                                 *ENQUEUE1....n.....             *
                2-0000  15449EE0 1544B230 9544B718                                                 *...\....n...                   *
                3-0000  15449ED0                                                                   *...}                           *
                4-0000  0200852C 0109134F E3E3F1F3 0002348C  E3C3F5F8 00000004 00007D0A 02000000  *..e....|TT13....TC58......'.....*
                  0020  00000000 00000000 00000000 00000000  000000E3 E2D860D7 C3F1F300 00000000  *..................TSQ-PC13.....*
                  0040  00000000 00000000 00000000 00000000  00000000 00                          *.....................          *
                5-0000  15449DC8                                                                   *...H                           *
AP 00E1 EIP ENTRY ENQ                                   REQ(0004) FIELD-A(15431778 ....) FIELD-B(09001204 ....)
             TASK-02347 KE_NUM-0041 TCB-QR    /007C0E88 RET-9631225E TIME-20:08:52.8245572475 INTERVAL-00.0000024687        =006802=


AP E160 EXEC ENTRY ENQ RESOURCE('ENQUEUE2' AT X'163122C0') LENGTH(8 AT X'963123D4') ASM
            TASK-02347 KE_NUM-0041 TCB-QR    /007C0E88 RET-80083324 TIME-20:08:52.8245590444 INTERVAL-00.0000017968        =006803=
                1-0000  002D0000 000D1631 23E51204 C0000800  00000100 01010C16 3122C0C5 D5D8E4C5  *.........V..{.............{ENQUE*
                  0020  E4C5F201 02020696 3123D400 08                                             *UE2....o..M..                  *
                2-0000  163123E5 163122C0 963123D4                                                 *...V...{o..M                   *
                3-0000  154317E0                                                                   *...\                           *
                4-0000  0200851C 0109134F E3E3F1F2 0002347C  E3C3F4F6 00000004 00007D10 04000000  *..e....|TT12...@TC46......'.....*
                  0020  00000000 00000000 00000000 00000000  00000040 40404040 40404000 00000000  *..................       .....*
                  0040  00000000 00000000 00000000 00000000  00000000 00                          *.....................          *
                5-0000  15431778                                                                   *....                           *
```

Hung TT1* Tasks: Problem Summary

- Our approach to this problem led us to review what tasks were active in our system – then to look at the DISPATCHER status for these tasks.
- This helped us to focus on ENQUEUE requests and waits, which revealed a classic "Deadly Embrace" situation.
- This example has also served as a platform to exhibit various CICS Verbexit options and their use.

Leveraging Trace

- Using trace can be a "two-edged sword"; at what point does "plenty of detailed info" become *Too Much*?
- Filtering trace output to meet your needs can help to make Trace more helpful
- With today's multi-TCB environment, it's not uncommon to see many tasks executing at the same time on different threads. Wise use of various Trace options can help significantly eliminate excess "noise" from your trace output.

Additional Trace Options

- **List specific Trace Entries:**

    `ENTRY_NUM=(nnnnnn-nnnnnn)`

- **List activity for a specific Kernel Number:**

    `KE_NUM=(nnnn,nnnn)`

- **List trace pertaining to a specific Terminal ID:**

    `TERMID=(TTTT)`

- **List trace entries from a specific time range:**

    `TIMERG=(hhmmss-hhmmss)`

- **List all trace records related to a transaction ID:**

    `TRANID=(TRN1)`

- **List Abbreviated Trace entries, WITH timestamps:**

    `SHORT`

Useful Trace Examples: TYPETR

- **What transactions and task numbers were attached during this trace?**

    ```
    typetr=(xm1101,ds0002)
    ```

- **What programs did we LINK/XCTL to, and RETURN from?**

    ```
    typetr=(pg0901-0902,pg1101-1102)
    ```

- **How are Containers being used?**

    ```
    typetr=(wbff60,pg1900,pg1910,pg1912)
    ```

- **What data am I sending and receiving on TCPIP Sockets?**

    ```
    typetr=(so0201-0202)
    ```

New VERBX Functions for TS 4.1

- **Enhanced dump capabilities:**
  - ▶ TR (Trace domain) displays will include a listing of the trace options active at the time of the dump

  - ▶ UEH (User Exit domain) displays will included detailed information regarding the trace points active when the dump was captured

  - ▶ Resource signatures (multiple domains)

- **New Domains and Verbexit options**
  - ▶ Events: EC (Event Capture), EP (Event Processing)

  - ▶ Web: ML (XML Parsing), W2 (Web 2.0)

  - ▶ Bundles: RL (Resource Lifecycle Manager)

  - ▶ Composite improvement: RS (Region Status)

Enhanced IPCS Verbx TR information

- TR (Trace domain) displays include detailed information regarding the trace points active when the dump was captured

```
TRACE FLAG SETTINGS AT TIME OF DUMP

 Master System Trace Flag is ON

Component   Standard      Special
---------   --------      -------
   AP       1             1-2
   BA       1             1-2
   BM       1             1
   BR       1             1-2
   CP       1             1-2
   DC       1             1
   DD       1             1-2
   DH       1             1-2
   DM       1             1-2
   DP       1             1-2
   DS       1             1-2
   DU       1             1-2
   EC       1             1-2
   EI       1             1-2
   EJ       1             1-2
   EM       1             1-2
```

Enhanced IPCS Verbx User Exit information

- UEH (User Exit domain) displays include detailed information regarding the User Exits active when the dump was captured

```
===UEH: USER EXIT HANDLER - CONTROL BLOCKS

 UET 208E3000 User Exit Table
    0000  00000000 00000000 00000000 00000000  00000000 00000000 00000000 00000000  *................................*
    0020 -    007F LINES SAME AS ABOVE
    0080  20D41030 208E42D0 12F80000 00000000  1FA6FCC8 000000BE 25F1D810 00000000  *.M.....}.8.......w.H.....1Q.....*
    00A0  1FA6FC14 000000BF 00000000 00000000  00000000 00000000 00000000 00000000  *.w..............................*
    00C0  00000000 00000000 00000000 00000000  00000000 00000000 00000000 00000000  *................................*
    00E0 -    10FF LINES SAME AS ABOVE
    1100  00000000 00000000 00000000 00000000  00000000 00000000 00000000 00002780  *................................*
    1120  208E4128 00000000 00000000 00000000  C43108FC 3FED8172 20D41110 00000000  *................D.....a..M......*
    1140  00000000 00000000 00000000 00000000  00000000 00000000 00000000 00000000  *................................*
    1160 -    12DF LINES SAME AS ABOVE
    12E0  00000000 00000000 00000000 00000000  00000000 00000000                    *......................          *

Active Global User Exits       Exit Program Name       EPB address

XWSPRRWI

                               L2XWSPRR                20D41110
End of active exits
```

Enhanced IPCS Verbx "Resource Signatures"

- Resource signatures provide detailed information about the origin of resource definition:

  ▶ Pipeline example:

```
PEB 1FB476A0 Provider Pipeline Element

    Definetime   2009/03/26 18:21:00     Definesource AOR1#WS
    Changetime   2009/03/26 18:21:00     Changeusrid  WIESE       Changeagent  CSDBATCH        Changeagrel 8869
    Installtime 2009/05/16 05:46:50      Installusrid CICSUSER    Installagent GRPLIST

  0000   05A86EC4 C6C8D7C9 D7C5C240 40404040   00000000 00000000 1FB47688 20C9A010   *.y>DFHPIPEB      ...........h.I..*
  0020   C5E7D7C9 D7C5F0F1 00000000 00000007   00000000 00000000 00000000 00000000   *EXPIPE01.........................*
```

  ▶ URIMap example:

```
UME.$443040 20CAD620 URIMAP mapping element

    Definetime   2009/05/16 05:46:55     Definesource EXPIPE01
    Changetime   2009/05/16 05:46:55     Changeusrid  CICSUSER    Changeagent  DYNAMIC         Changeagrel 0869
    Installtime 2009/05/16 05:46:55      Installusrid CICSUSER    Installagent DYNAMIC
  0000   01306EC4 C6C8E6C2 E4D9C9D4 C1D74040   20CAD750 20CAD030 5BF4F4F3 F0F4F040   *..>DFHWBURIMAP  ..P&..}.$443040 *
  0020   20CB2030 20CC21B0 01038300 20CB6430   00000000 00000000 30000019 00000000   *..........c.....................*
   …
Usage:    PIPELINE Scheme:    HTTP  Host-UVH:   20CB2030 Path-UMX:   20CB6430
Status:   ENABLED  Redirect:  NONE  Tcpips:     *NONE*   Generic:    NO
Content: PIPELINE Pipeline:   EXPIPE01 Webservice: dispatchOrderEndpoint           Transaction: CPIH
```

Summary

- IPCS commands: (SETDEF, RETP)
- Hints & Tips (diagnosis shortcuts)
- CICS Verbexit commands: XM, DS, NQ, APS, LD, PG, TR/TRS
- Additional CICS Trace options
- New IPCS Verbexit capability available with CICS TS 4.1

References

- Useful Manuals
  - CICS Operations and Utilities Guide (SC34-6816)

    Details and instructions for configuring IPCS for CICS
  - CICS Problem Determination Guide (SC34-6826)
  - CICS Trace Entries (SC34-6828)
  - CICS Data Areas (GC34-6863)

  - z/OS 1.9 Interactive Problem Control System User's Guide (SA22-7596)
  - z/OS 1.9 Interactive Problem Control System Customization (SA22-7595)
  - z/OS 1.9 Interactive Problem Control System Commands (SA22-7594)
  - z/OS 1.9 Diagnosis: Tools and Service Aids (GA22-7589)

    Great for looking at systrace
  - z/OS 1.9 Initialization and Tuning Reference (SA22-7591)

    Information on PARMLIB support
  - z/OS Principles of Operation (SA22-7832)

    Information on program interrupts and instructions
  - z/OS R1.9 Language Environment Debugging Guide (GA22-7560)

Additional Product Resources

- CICS Transaction Server Support Web page:
  http://www.ibm.com/software/htp/cics/tserver/support/

- IBM® Education Assistant modules:
  http://publib.boulder.ibm.com/infocenter/ieduasst/stgv1r0/index.jsp

- Webcasts for CICS and OMEGAMON:
  http://www.ibm.com/support/docview.wss?rs=1083&uid=swg27007244

- CICS Featured documents:
  http://www.ibm.com/support/docview.wss?rs=1083&uid=swg27006900

- Sign up to receive technical support emails:
  http://www.ibm.com/software/support/einfo.html

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Questions and Answers