

Diagnosing Application Problems Under Language Environment

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Agenda

- Important Modules
- Messages and ABENDs
- Condition Handling
- Collecting Error Documentation
- Understanding CEEDUMPs
- Using LEDATA in IPCS with System Dumps
- Summary
- Additional Information



Important Modules

■ CEEHDSP

- Always the top CSECT in CEEDUMPs
- Schedules the CEEDUMP to be taken and schedules termination - **Ignore**
 - Language Environment Condition Handling CSECTs start with CEEH*

■ CEEPLPKA

- Language Environment's main 31 bit load module, contains CEEHDSP
- ABENDs reported here can be either LE or application failures



Important Modules

■ CEEBINIT

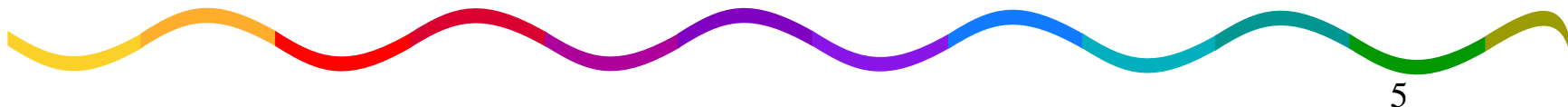
- Language Environment's main initialization load module
 - Errors here are likely setup problems

■ CEECCICS

- Language Environment's main interface load module with CICS
 - Errors here are likely setup problems

● CEEPIPI

- Preinitialization services interface routine



Important Modules

■ CEEHSGLT

- Language Environment signal handler
 - Review cause for signal generation

■ CEEV#GH/CEEV#FH

- Language Environment's Heap Get/Free routine
 - A signal raised here indicates heap damage



Important Modules

- **CEEEVxxx** (31 bit)

- **CELHVxxx** (31 bit XPLINK, C/C++ only)

- Language Environment Event Handler load modules

- xxx is the member number of the language

- 003 C/C++

- 010 PL/I

- 005 COBOL

- 011 Enterprise PL/I

- 007 FORTRAN

- 012 Debug Tool

- 008 DCE



Messages and ABENDs

- Message (and Module) Prefixes

- CEE CEL (but may be reporting a problem elsewhere)
- IGZ COBOL
- IBM PL/I
- FOR (AFH) FORTRAN
- EDC C/C++ and utilities (e.g. iconv, localdef)

- See Language Environment Run-Time Messages for details on LE messages and ABENDs



Messages and ABENDs

- U4038 A severe (unhandled) error occurred, but no dump was requested (useless)
- U4039 A severe error occurred and a CEEDUMP (and optionally System dump) was requested
- U4083 Savearea backchain in error
- U4087 Error during error processing
- U4093 Error during initialization
- U4094 Error during termination



Condition Handling

■ Condition Token (Feedback Code)

–Example: 00030C84 59C3C5C5 xxxxxxxx

•0003 | 0C84 | 59 | C3C5C5 | xxxxxxxx

▶0003

Severity

◆0000

Informational (I)

◆0001

Warning (W)

◆0002

Error (E)

◆0003

Severe (S)

◆0004

Critical (C)



Condition Handling

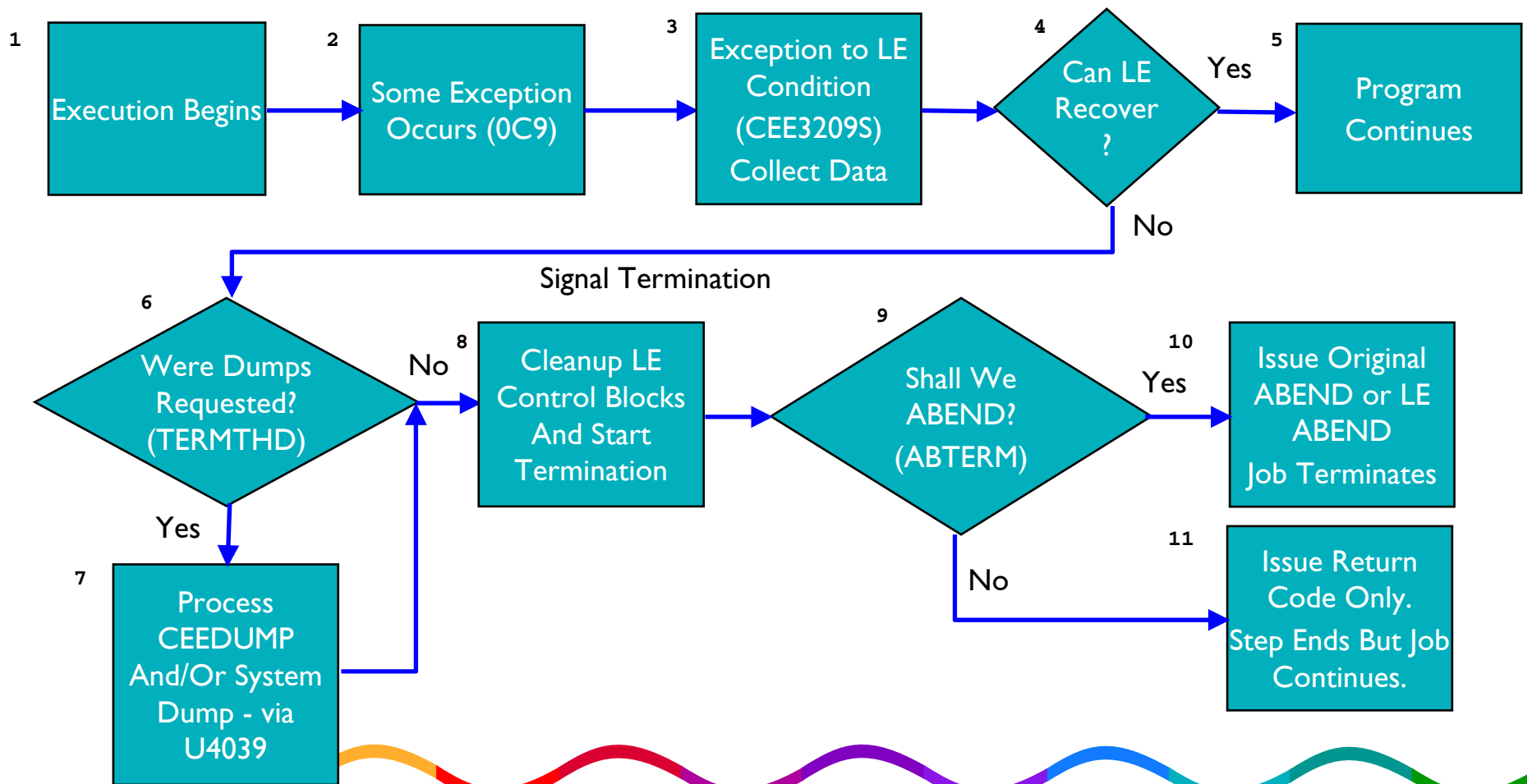
■ Condition Token (*continued*)

- 0003 | 0C84 | 59 | C3C5C5 | xxxxxxxx
 - ▶ 0C84 Hex message number (3204)
 - ▶ 59 Flags (ignore)
 - ▶ C3C5C5 HEX Facility ID (message prefix, CEE)
 - ▶ xxxxxxxx Instance specific information (internal use)
- This token represents message CEE3204S



Condition Handling

■ Condition Handling Flow



Collecting Error Documentation

■ Getting useful information

– Use Language Environment run-time option `TERMTHDACT()` to request Language Environment take a dump

- `DUMP` `CEEDUMP` with storage
- `TRACE` `CEEDUMP` with traceback only

- `UADUMP` `CEEDUMP`, system dump via U4039
- `UAONLY` No `CEEDUMP`, system dump via U4039
- `UATRACE` `CEEDUMP` (traceback) and system dump via U4039

- *(UAIMM)* *System dump via original error (only for debug purposes), also `TRAP(ON,NOSPIE)`*



Collecting Error Documentation

■ Batch

–CEEDUMP DD card

- May be SYSOUT, dataset, UNIX file system
- If not specified, dynamically allocated to SYSOUT=*
- ENVAR('_CEE_DMPTARG=SYSOUT(x)')
where x is any SYSOUT class



Collecting Error Documentation

■ Batch (*continued*)

- Optionally include SYSMDUMP DD for system dump
 - SYSMDUMP DD DSN=dump.name,
SPACE=(CYL,(200,200),RLSE),
DISP=(NEW,DELETE,CATLG),
DCB=(RECFM=FBS,DSORG=PS,LRECL=4160,
BLKSIZE=24960),
UNIT=SYSDA



Collecting Error Documentation

■ USS Shell

- CEEDUMP saved to current working directory by default
 - /tmp if running in root or no write permission
 - To save in a specific directory
 - ▶ export `_CEE_DMPTARG=path` (case sensitive)
- For system dump
 - export `_BPXK_MDUMP=fully.qualified.dsn`



Collecting Error Documentation

- CICS
 - CEEDUMP goes to CESE Transient Data Queue
 - For system dump
 - CEMT SET TRD(40xx) SYS ADD
- See APAR II10573 for additional information
That is “eye eye one zero five seven three”



Collecting Error Documentation

- Getting **NON-USEFUL** information
 - Remember: when ABTERMENC(ABEND) is set the "original " ABEND (eg, 0C4) is reissued
 - **DO NOT SLIP ON THIS ABEND**
 - Language Environment reissues this ABEND at the end of Language Environment termination
 - LE environment has already been cleaned-up and therefore a dump at this point is useless
 - Work with U4039 dump instead



Understanding CEEDUMPs

■ A simple COBOL program

```
000100 CBL NOLIB, APOST, NODYNAM, NOOPT, TEST
000200     PROCESS QUOTE, MAP
000300     IDENTIFICATION DIVISION.
000400     PROGRAM-ID. COBOLED1.
000500     ENVIRONMENT DIVISION.
000600     DATA DIVISION.
000700     WORKING-STORAGE SECTION.
000800     01 WS-VARS.
000900         05 WS-COMP1 PIC S9(4) COMP-4 VALUE ZEROES.
001000     PROCEDURE DIVISION.
001100         CALL "COBOLED2".
001200         STOP RUN.
001300     END PROGRAM COBOLED1.
```

Understanding CEEDUMPs

■ A simple COBOL program (*continued*)

```
001400     IDENTIFICATION DIVISION.  
001500     PROGRAM-ID. COBOLED2.  
  
     ...  
001800     01 WS-VARS.  
001900         05 WS-COMP1 PIC S9(4) COMP-4 VALUE ZEROES.  
002000         05 WS-COMP2 PIC S9(4) COMP-4 VALUE ZEROES.  
002100         05 WS-COMP3 PIC S9(4) COMP-4 VALUE ZEROES.  
002200     PROCEDURE DIVISION.  
002300         MOVE 32 TO WS-COMP3.  
002400         MOVE 10 TO WS-COMP1.  
002500         DIVIDE WS-COMP1 BY WS-COMP2 GIVING WS-COMP3.  
002600         STOP RUN.  
002700     END PROGRAM COBOLED2.
```

Understanding CEEDUMPs

■ Job log shows

IEA995I SYMPTOM DUMP OUTPUT

USER COMPLETION CODE=4039 REASON CODE=00000000

TIME=21.45.36 SEQ=03447 CPU=0000 ASID=0153

PSW AT TIME OF ERROR 078D1000 A3E207B0 ILC 2 INTC 0D

ACTIVE LOAD MODULE ADDRESS=23E19D30 OFFSET=00006A80

NAME=CEEPLPKA

DATA AT PSW 23E207AA - 00181610 0A0D58D0 D00498EC

GPR 0-3 84000000 8400FC7 00024478 23E207B0

GPR 4-7 23E178A0 00000000 00024478 00025017

GPR 8-11 23E238A5 23E228A6 000243D0 A3E206E0

GPR 12-15 00015910 00026180 A3E22F1E 00000000

END OF SYMPTOM DUMP

IEA993I SYSMDUMP TAKEN TO JMONTI.GOYANKS.SYSMDUMP

IEF450I JMONTI@B GO - ABEND=S0C9 U0000 REASON=00000009

Understanding CEEDUMPs

■ Program output

```
CEE3209S The system detected a fixed-point divide exception.  
From compile unit COBOLED2 at entry point COBOLED2 at  
statement 13 at compile unit offset +00000308 at  
address 23E029E0.
```

■ CEEDUMPs are formatted dumps and may simply be browsed

- ISPF Browse
- USS OBROWSE
- CICS CEBR CESE
- Transfer to PC and use a PC editor

Understanding CEEDUMPs

■ Sample CEEDUMP

CEE3DMP V1 R4.0: Condition processing resulted in the unhandled condition. 02/26/03 9:48:42 PM Page: 1

Information for enclave COBOLED1

Information for thread 8000000000000000

Traceback:

DSA Addr	Program	PU Addr	PU Offset	Entry	E Addr	E Offset	Stmt	Load Mod	Service	Status
00024018	CEEHDSP	23E208A8	+000026A6	CEEHDSP	23E208A8	+000026A6		CEEPLPKA	UQ24548	Call
000260C8	COBOLED2	23E026D8	+00000308	COBOLED2	23E026D8	+00000308	13	COBOL1		Exception
00026018	COBOLED1	23E00978	+0000033E	COBOLED1	23E00978	+0000033E	14	COBOL1		Call

Understanding CEEDUMPs

CEE3DMP V1 R4.0: Condition processing resulted in the unhandled condition. 02/26/03 9:48:42 PM Page: 1

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00024018	CEEHDSP	23E208A8	+000026A6	CEEHDSP	23E208A8	+000026A6		CEEPLPKA	UQ24548	Call
000260C8	COBOLED2	23E026D8	+00000308	COBOLED2	23E026D8	+00000308	13	COBOL1		Exception
00026018	COBOLED1	23E00978	+0000033E	COBOLED1	23E00978	+0000033E	14	COBOL1		Call

STATUS

Why I left this entry point!



Understanding CEEDUMPs

Condition Information for Active Routines

Condition Information for COBOLED2 (DSA address 000260C8)

CIB Address: 00024478

Current Condition:

CEE0198S The termination of a thread was signaled due to an unhandled condition.

Original Condition:

CEE3209S The system detected a fixed-point divide exception.

Location:

Program Unit: COBOLED2 Entry: COBOLED2 Statement: 13 Offset: +00000308

Machine State:

ILC..... 0002 Interruption Code..... 0009

PSW..... 078D2000 A3E029E2

Failing PSW

GPR0..... 00026180	GPR1..... 00000000	GPR2..... 00000000	GPR3..... 0000000A
GPR4..... 00000000	GPR5..... 00046038	GPR6..... 00000000	GPR7..... 00FCCBF0
GPR8..... 23F1B100	GPR9..... 23F17700	GPR10.... 23E027E0	GPR11.... 23E028B0
GPR12.... 23E027D4	GPR13.... 000260C8	GPR14.... A3E029D4	GPR15.... A3E02916

Registers at Failure

Storage dump near condition, beginning at location: 23E029D0

+000000 23E029D0 45E0913A 48208000 8E200020 48408002 1D244030 800445E0 913A9140 905558B0 ..j.....

Storage around PSW



Understanding CEEDUMPs

Condition Information for Active Routines

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Machine State:

ILC..... 0002 Interruption Code..... 0009

PSW..... 078D2000 A3E029E2

GPR0..... 00026180 GPR1..... 00000000 GPR2..... 00000000 GPR3..... 0000000A

GPR4..... 00000000 GPR5..... 00046038 GPR6..... 00000000 GPR7..... 00FCCBF0

GPR8..... 23F1B100 GPR9..... 23F17700 GPR10.... 23E027E0 GPR11.... 23E028B0

GPR12.... 23E027D4 GPR13.... 000260C8 GPR14.... A3E029D4 GPR15.... A3E02916

Storage dump near condition, beginning at location: 23E029D0

+000000 23E029D0 45E0913A 48208000 8E200020 48408002 1D244030 800445E0 913A9140 905558B0 ..j.....

DR R2,R4

See Principles of Operation



Understanding CEEDUMPs

Parameters, Registers, and Variables for Active Routines:

CEEHDSP (DSA address 00024018):

Saved Registers:

GPR0.....	00000000	GPR1.....	000243B4	GPR2.....	A3E22F52	GPR3.....	00000003
GPR4.....	23E178A0	GPR5.....	00000000	GPR6.....	00024FA4	GPR7.....	00025017
GPR8.....	23E238A5	GPR9.....	23E228A6	GPR10....	23E218A7	GPR11....	23E208A8
GPR12....	00015910	GPR13....	00024018	GPR14....	8001C0E2	GPR15....	A3E675A0

Registers for
each savearea
on chain

GPREG STORAGE:

Storage around GPR0 (00000000)

+0000 00000000 Inaccessible storage.
+0020 00000020 Inaccessible storage.
+0040 00000040 Inaccessible storage.

Storage around GPR1 (000243B4)

-0020	00024394	23E17934	00025017	23E238A5	23E228A6	23E218A7	23E208A8	00015910	00000000	&...S.
+0000	000243B4	00025097	000250E7	00024FA4	00024FA4	00024E04	00024ED4	00025218	00024478		...&p...&X.\
+0020	000243D4	00024478	00000000	00000000	00000000	00000001	00000005	A3EEBAA0	00000000	

Storage around GPR2 (A3E22F52)

-0020	23E22F32	40404040	00000009	4EF0F0F0	F0F0F1F9	C3000000	00000008	F2F3C4C4	C6F5F1F4	+00
+0000	23E22F52	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	
+0020	23E22F72	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	

Storage around GPR3 (00000003)

...

Storage around
each register



Understanding CEEDUMPs

- Storage displayed starts 20 bytes BEFORE the address in the register
- Don't like the amount of storage formatted around each register?
 - TERMTHDACT(,,96) value can be 0-256
 - TERMTHDACT(,,0) to turn off
 - On CEE3DMP call, use REGSTOR(nn)



Understanding CEEDUMPs

LAST WHERE SET	OPTION
Installation default	ABPERC(NONE)
Installation default	ABTERMENC(ABEND)
Installation default	NOAIXBLD
Installation default	ALL31(ON)
Installation default	ANYHEAP(16384,8192,ANYWHERE,FREE)
Installation default	NOAUTOTASK
Installation default	BELOWHEAP(8192,4096,KEEP)
Installation default	CBLOPTS(ON)
Installation default	CBLPSHPOP(ON)
Installation default	CBLQDA(ON)
Installation default	CHECK(ON)
Installation default	COUNTRY(US)
Installation default	NODEBUG
Installation default	DEPTHCONDLMT(10)
Installation default	ENVAR(" ")
Installation default	ERRCOUNT(0)
Installation default	ERRUNIT(6)
Installation default	FILEHIST
Installation default	FILETAG(NOAUTOCVT,NOAUTOTAG)
Default setting	NOFLOW
Installation default	HEAP(32768,32768,ANYWHERE,KEEP,8192,4096)
Installation default	HEAPCHK(OFF,1,0)

...

Options Report



Understanding CEEDUMPs

Local Variables:

6	01	WS-VARS	AN-GR		
7	02	WS-COMP1	S9999 COMP	+00010	
8	02	WS-COMP2	S9999 COMP	+00000	
9	02	WS-COMP3	S9999 COMP	+00032	

Variable values

•
•
•

Program COBOLED2 was compiled 02/26/99 9:45:32 PM
COBOL Version = 01 Release = 02 Modification = 02
TGT for COBOLED2: 23F17700

Compile date/time

User Level = ' ' ' '

Using LEDATA with System Dumps

- To review a SYSMDUMP, use VERBEXIT CEEERRIP (alias LEDATA) from within IPCS (PQ56893 – if IMS through VI R4)
 - E.g. IP VERBX LEDATA 'CEEDUMP'
 - No options (or 'SUMMARY') for general info and run-time options
 - 'CEEDUMP' for a traceback report similar to that found in a CEEDUMP
 - 'CM' for condition information such as condition code, failing PSW, and registers at the time of error

Using LEDATA with System Dumps

■ VERBX CEEERRIP 'SUMMARY'

```
*****  
LANGUAGE ENVIRONMENT DATA  
*****
```

Language Environment V1 R4.0

TCB: 008ADE88

LE Level: 10

ASID: 0153

Active Members: COBOL

```
CEECAA: 00015910  
+000000 FLAG0:00 LANGP:08 BOS:00026000 EOS:00046000  
+000044 TORC:00000000 TOVF:8000F100 ATTN:23E16B10  
+00015C HLLEXIT:00000000 HOOK:50C0D064 05C058C0 C00605CC  
+0001A4 DIMA:0000F316 ALLOC:0700C198 STATE:0700C198  
+0001B0 ENTRY:0700C198 EXIT:0700C198 MEXIT:0700C198  
+0001BC LABEL:0700C198 BCALL:0700C198 ACALL:0700C198  
+0001C8 DO:0700C198 IFTRUE:0700C198 IFFALSE:0700C198  
+0001D4 WHEN:0700C198 OTHER:0700C198 CGOTO:0700C198  
+0001F4 CRENT:00000000 EDCV:00000000 TCASRV_USERWORD:00000000  
+00025C TCASRV_WORKAREA:23E16460 TCASRV_GETMAIN:00000000  
+000264 TCASRV_FREEMAIN:00000000 TCASRV_LOAD:8000F840
```

Common
Anchor
Area

Using LEDATA with System Dumps

■ VERBX CEEERRIP 'SUMMARY' (continued)

```
CEERCB: 00013918
+000000 EYE:CEERCB          SYSTM:03   HRDWR:03   SBSYS:02   FLAGS:80
+000014 DMEMBR:23E09BB8      ZLOD:23ED4320   ZDEL:23E7D108
+000020 ZGETST:23ED5EC8     ZFREEEST:23ED3FA0   VERSION_ID:04010400
```

```
CEEEEDB: 000148B0
+000000 EYE:CEEEEDB        FLAG1:D0   BIPM:00   BPM:00
+00000B CREATOR_ID:01      MEMBR:000157D0   OPTCB:00014F00
+000014 URC:00000000       RSNCD:00000000   DBGEH:00000000
+000020 BANHP:00014D78     BBEHP:00014DA8   BCELV:0001B038
+00002C PCB:00014558       ELIST:00000000   PL_ASTRPTR:00000000
+000038 DEFPLPTR:000149D0    CXIT_PAGE:00000000
+000040 DEBUG_TERMID:00000000   PARENT:00000000   R13_PARENT:00005F88
+000054 LEOV:00000000        ENVAR:23E16708   ENVIRON:00014908
+000064 OTRB:00000000       PSA31:00000000   PSL31:00000000
+000070 PSA24:00000000      PSL24:00000000   PSRA:23ED3DB0
+00007C CAACHAIN@:00015910      FLAG1A:70   MEMBERCOMPAT1:00
+000090 THREADSACTIVE:00000001   CURMSGFILEDCBPTR:00013B80
+000098 CEEINT_INPUT_R1:00005FD8   LAST_RBADDR:008ADD78
+0000A0 LAST_RBCNT:00000001
```

Region
Control
Block

Enclave
Data
Block

Using LEDATA with System Dumps

■ VERBX CEEERRIP 'SUMMARY' (continued)

```
LAST WHERE SET          Override  OPTIONS
*****
INSTALLATION DEFAULT   OVR      ABPERC(NONE)
PROGRAM INVOCATION     OVR      ABTERMENC(ABEND)
INSTALLATION DEFAULT   OVR      NOAIXBLD
INSTALLATION DEFAULT   OVR      ALL31(ON)
INSTALLATION DEFAULT   OVR      ANYHEAP(00016384,00008192,ANY ,FREE)
INSTALLATION DEFAULT   OVR      NOAUTOTASK
INSTALLATION DEFAULT   OVR      BELOWHEAP(00008192,00004096,FREE)
INSTALLATION DEFAULT   OVR      CBLOPTS(ON)
INSTALLATION DEFAULT   OVR      CBLPSHPOP(ON)
INSTALLATION DEFAULT   OVR      CBLQDA(ON)
INSTALLATION DEFAULT   OVR      CHECK(ON)
INSTALLATION DEFAULT   OVR      COUNTRY(US)
INSTALLATION DEFAULT   OVR      NODEBUG
INSTALLATION DEFAULT   OVR      DEPTHCONDLMT(00000010)
INSTALLATION DEFAULT   OVR      ENVAR(" ")
INSTALLATION DEFAULT   OVR      ERRCOUNT(00000000)
INSTALLATION DEFAULT   OVR      ERRUNIT(00000006)
INSTALLATION DEFAULT   OVR      FILEHIST
INSTALLATION DEFAULT   OVR      FILETAG(NOAUTOCVT,NOAUTOTAG)
DEFAULT SETTING        OVR      NOFLOW
```

Using LEDATA with System Dumps

■ VERBX CEEERRIP 'SUMMARY' (continued)

```
INSTALLATION DEFAULT OVR HEAP(00032768,00032768,ANY ,  
KEEP,00008192,00004096)  
INSTALLATION DEFAULT OVR HEAPCHK(OFF,00000001,00000000)  
INSTALLATION DEFAULT OVR HEAPPOOLS(OFF,  
00000008,00000010,  
00000032,00000010,  
00000128,00000010,  
00000256,00000010,  
00001024,00000010,  
00002048,00000010)  
REGION_DEFAULT OVR INFOMSGFILTER(OFF)  
INSTALLATION DEFAULT OVR INQPCOPN  
INSTALLATION DEFAULT OVR INTERRUPT(OFF)  
INSTALLATION DEFAULT OVR LIBRARY(SYSCEE)  
INSTALLATION DEFAULT OVR LIBSTACK(00000512,00001008,FREE)  
INSTALLATION DEFAULT OVR MSGFILE(SYSOUT ,FBA ,00000121,00000000,  
NOENQ)  
INSTALLATION DEFAULT OVR MSGQ(00000015)  
INSTALLATION DEFAULT OVR NATLANG(ENU)  
IGNORED OVR NONONIPTSTACK(00004096,00004096,BELOW,KEEP)  
INSTALLATION DEFAULT OVR OCSTATUS  
INSTALLATION DEFAULT OVR NOPC
```

Using LEDATA with System Dumps

■ VERBX CEEERRIP 'SUMMARY' (continued)

```
INSTALLATION DEFAULT OVR PLITASKCOUNT(00000020)
INSTALLATION DEFAULT OVR POSIX(OFF)
INSTALLATION DEFAULT OVR PROFILE(OFF,"")
INSTALLATION DEFAULT OVR PRTUNIT(00000006)
INSTALLATION DEFAULT OVR PUNUNIT(00000007)
INSTALLATION DEFAULT OVR RDRUNIT(00000005)
INSTALLATION DEFAULT OVR RECPAD(OFF)
INSTALLATION DEFAULT OVR RPTOPTS(OFF)
INSTALLATION DEFAULT OVR RPTSTG(OFF)
INSTALLATION DEFAULT OVR NORTEREUS
INSTALLATION DEFAULT OVR RTLS(OFF)
INSTALLATION DEFAULT OVR NOSIMVRD
INSTALLATION DEFAULT OVR STACK(00131072,00131072,ANY ,KEEP,524288,131072)
INSTALLATION DEFAULT OVR STORAGE(NONE,NONE,NONE,00008192)
PROGRAM INVOCATION OVR TERMTHDACT(UADUMP)
INSTALLATION DEFAULT OVR NOTEST(ALL,* ,PROMPT,INSPREF)
INSTALLATION DEFAULT OVR THREADHEAP(00004096,00004096,ANY ,KEEP)
INSTALLATION DEFAULT OVR THREADSTACK(OFF,00004096,00004096,ANYWHERE,KEEP,
00131072,00131072)
INSTALLATION DEFAULT OVR TRACE(OFF,00004096,DUMP,LE=00000000)
INSTALLATION DEFAULT OVR TRAP(ON,SPIE)
INSTALLATION DEFAULT OVR UPSI(00000000)
```

Using LEDATA with System Dumps

■ VERBX CEEERRIP 'SUMMARY' (continued)

```
INSTALLATION DEFAULT   OVR      NOUSRHDLR ( )
INSTALLATION DEFAULT   OVR      VCTRSAVE (OFF)
INSTALLATION DEFAULT   OVR      VERSION ( )
INSTALLATION DEFAULT   OVR      XPLINK (OFF)
INSTALLATION DEFAULT   OVR      XUFLOW (AUTO)
*****
Exiting Language Environment Data
```



Using LEDATA with System Dumps

■ VERBX CEEERRIP 'CEEDUMP'

LANGUAGE ENVIRONMENT DATA

Information for enclave COBOLED1

Information for thread 8000000000000000

Traceback:

DSA Addr	Program	PU Addr	PU Offset	Entry	E Addr	E Offset	Stmt	Load Mod	Service	Status
00026180	CEEHSDMP	23E206E0	+00089AD6	CEEHSDMP	23E206E0	+00089AD6		CEEPLPKA		Call
00024018	CEEHDSP	23E208A8	+00002674	CEEHDSP	23E208A8	+00002674		CEEPLPKA	UQ24548	Call
000260C8	COBOLED2	23E026D8	+00000308	COBOLED2	23E026D8	+00000308	13	COBOL1		Exception
00026018	COBOLED1	23E00978	+0000033E	COBOLED1	23E00978	+0000033E	14	COBOL1		Call

.
. .
.



Using LEDATA with System Dumps

■ VERBX CEEERRIP 'CM'

Condition Management Control Blocks

```
HCOM: 23E16AC8
+000000 PICA_AREA:00000000 00000000 EYES:HCOM CAA_PTR1:000FAB00
+000014 CVTDCB:9B FLAG:60504000 EXIT_STK:23EA26F8
+000020 RSM_PTR:23E8FFA8 HDLL_STK:00000000
+000028 SRP_TOKEN:00000000 CSTK:00000000 CIBH:000248C0
+000094 DSA_4083:00000000

CIBH: 000248C0
+000000 EYE:CIBH BACK:23E178A0 FRWD:00000000
+000010 PTR_CIB:00000000 FLAG1:00 ERROR_LOCATION_FLAGS:00
+000018 HDLQ:00000000 STATE:00000000 PRM_DESC:00000000
+000024 PRM_PREFIX:00000000
+000028 PRM_LIST:00000000 00000000 00000000 00000000
+000038 PARM_DESC:00000000 PARM_PREFIX:00000000
+000040 PARM_LIST:00000000 00000000 00000000 00000000 FUN:00000000
+000054 CIB_SIZ:0000 CIB_VER:0000 FLG_5:00 FLG_6:00
+00005A FLG_7:00 FLG_8:00 FLG_1:00 FLG_2:00 FLG_3:00
+00005F FLG_4:00 ABCD:00000000 ABRC:00000000

...
```

- First CIBH always zero and should be ignored

Using LEDATA with System Dumps

■ VERBX CEEERRIP 'CM'

```
CIBH: 23E178A0
+000000 EYE:CIBH BACK:00000000 FRWD:000248C0
+000010 PTR_CIB:00024478 FLAG1:C5 ERROR_LOCATION_FLAGS:1F
+000018 HDLQ:00000000 STATE:00000008 PRM_DESC:00000000
+000024 PRM_PREFIX:00000000
+000028 PRM_LIST:00024490 00024558 00024564 23E17CBC
+000038 PARM_DESC:00000000 PARM_PREFIX:00000000
+000040 PARM_LIST:00024554 00024478 00024564 23E17CBC FUN:00000067
+000054 CIB_SIZ:0000 CIB_VER:0000 FLG_5:48 FLG_6:23
+00005A FLG_7:00 FLG_8:00 FLG_1:00 FLG_2:00 FLG_3:00
+00005F FLG_4:05 ABCD:940C9000 ABRC:00000009
+000068 OLD_COND_64:00030C89 59C3C5C5 OLD_MIB:00000001
+000074 COND_64:00030C89 59C3C5C5 MIB:00000001 PL:23E026EC
+000084 SV2:000260C8 SV1:000260C8 INT:23E029E0
+000090 MID:00000005 HDL_SF:000161A8 HDL_EPT:A3EEBAA0
+00009C HDL_RST:00000000 RSM_SF:000260C8 RSM_POINT:23E029E2
```

CEE3209S

- ⋮
- Second CIBH contains most recent exception

Using LEDATA with System Dumps

■ VERBX LEDATA 'CM'

```
Machine State
+000348 MCH_EYE:ZMCH
+000350 MCH_GPR00:00026180 MCH_GPR01:00000000
+000358 MCH_GPR02:00000000 MCH_GPR03:0000000A
+000360 MCH_GPR04:00000000 MCH_GPR05:00046038
+000368 MCH_GPR06:00000000 MCH_GPR07:00FCCBF0
+000370 MCH_GPR08:23F1B100 MCH_GPR09:23F17700
+000378 MCH_GPR10:23E027E0 MCH_GPR11:23E028B0
+000380 MCH_GPR12:23E027D4 MCH_GPR13:000260C8
+000388 MCH_GPR14:A3E029D4 MCH_GPR15:A3E02916
+000390 MCH_PSW:078D2000 A3E029E2 MCH_ILC:0002 MCH_IC1:00
+00039B MCH_IC2:09 MCH_PFT:00000000 MCH_FLT_0:00000000 00000000
+0003A8 MCH_FLT_2:00000000 00000000 MCH_FLT_4:00000000 00000000
+0003B8 MCH_FLT_6:00000000 00000000 MCH_EXT:00000000
+000418 MCH_FLT_1:00000000 00000000 MCH_FLT_3:00000000 00000000
+000428 MCH_FLT_5:00000000 00000000 MCH_FLT_7:00000000 00000000
+000438 MCH_FLT_8:00000000 00000000 MCH_FLT_9:00000000 00000000
```

General Registers

PSW

Floating Point Registers

■ Machine state information at time of exception



Using LEDATA with System Dumps

■ VERBX CEEERRIP 'NTHREADS(*)'

Unable to determine DSA for TCB at address:007E7B68 CAA at address:00015A80

Language Environment Product V1 R4.0

To Display Additional Information:

```
IP VERBX LEDATA 'CAA(00015910)DSA(00026180) ALL'
```

Information for enclave COBOLED1

Information for thread 8000000000000000

PCB Address: 00161558

Traceback for each Language Environment-enabled TCB

Traceback:

DSA Addr	Program	PU Addr	PU Offset	Entry	E Addr	E Offset	Stmt	Load Mod	Service	Status
00026180	CEEHSDMP	23E206E0	+00089AD6	CEEHSDMP	23E206E0	+00089AD6		CEEPLPKA		Call
00024018	CEEHDSP	23E208A8	+00002674	CEEHDSP	23E208A8	+00002674		CEEPLPKA	UQ24548	Call
000260C8	COBOLED2	23E026D8	+00000308	COBOLED2	23E026D8	+00000308	13	COBOL1		Exception
00026018	COBOLED1	23E00978	+0000033E	COBOLED1	23E00978	+0000033E	14	COBOL1		Call
.										
.										
.										

■ Show traceback for each thread in the process

Using LEDATA with System Dumps

■ ANALYZE ALL

CONTENTION REPORT BY RESOURCE NAME

RESOURCE #0001:

NAME=Mutex Object ADDR=251D72C0

Resource

RESOURCE #0001 IS HELD BY:

JOBNAME=WELLIE0 ASID=0020 TCB=009DDCF0

DATA=MSB ADDR: 251D35C0 SQEL ADDR: 24D2DFC0 CAA ADDR: 24D33CB0
USER MUTEX/CV

Owner

RESOURCE #0001 IS REQUIRED BY:

JOBNAME=WELLIE0 ASID=0020 TCB=009AB288

DATA=MSB ADDR: 251D35C0 SQEL ADDR: 2520AC78 CAA ADDR: 2520BAC0

JOBNAME=WELLIE0 ASID=0020 TCB=009AD190

DATA=MSB ADDR: 251D35C0 SQEL ADDR: 2520FC78 CAA ADDR: 25210AC0

Waiters

■ Show latches, mutexes, and condition variables

.
. .
. .



Using LEDATA with System Dumps

- Other LEDATA (CEEERRIP) options
 - 'HEAP'
 - Heap Storage Management control blocks
 - 'STACK'
 - Stack Storage Management control blocks
 - 'ALL'
 - All control blocks, including C and COBOL specific
 - ▶ C/C++ errno and errnojr at bottom



Using LEDATA with System Dumps

- Other LEDATA (CEEERRIP) options (*continued*)
 - 'TCB(xxxxxxxx)'
 - Allows specific TCB to be used as base
 - Helpful for console dumps
 - 'CAA(xxxxxxxx)'
 - Allows specific CAA to be used as base
 - Required for CICS (R12)



Using LEDATA with System Dumps

- Other LEDATA (CEEERRIP) options (*continued*)
 - 'DSA(xxxxxxxx)'
 - Allows specific DSA to be used for traceback
 - Required for CICS and console dumps (R13)



Summary

- Don't SLIP on Language Environment reissued ABEND (eg, 0C4)
- Use TERMTHDACT(UADUMP) to get a CEEDUMP
 - Add SYSMDUMP DD for system dump
- Use CEEDUMP or LEDATA formatter in IPCS to review traceback, PSW, and registers
 - Use **Exception** line in traceback for program checks
 - Except CEEHSGLT, review reason for signal



Additional Information

- Language Environment Programming Reference
 - Language Environment Programming Guide
 - Language Environment Debugging Guide
 - Language Environment Run-Time Messages
-
- All Language Environment documentation available on
 - z/OS CD collection
 - Language Environment website
 - <http://www.ibm.com/servers/eserver/zseries/zos/le/>

