



z/OS Language Environment Setup & Customization

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Reflection

- "Language Environment is 100% compatible with previous Run-Time environments" - An unnamed, misinformed marketing rep
- "Read the Language Environment Migration Guide(s) for details of migration problems you **WILL** encounter." - An unnamed Language Environment developer



Agenda

- o Introduction
- o Which Libraries? When?
- o User Exits
- o Setting Run-Time Options
- o Key Run-Time Options
- o Additional Information
- o Appendix: AMODE 64 Run-Time Options



Introduction

- Language Environment is made up of several components
 - Common Execution Library (CEL) 568819801
 - COBOL Run-Time Library 568819802
 - PL/I Run-Time Library 568819803
 - FORTRAN Run-Time Library 568819804
 - C/C++ Run-Time Library 568819805
 - Enterprise PL/I (a.k.a. VisualAge PL/I) 568819806



Supported Releases

Supported Release Level	FMID	Support Withdrawn
z/OS V1.4	HLE7707	3/31/2007
z/OS V1.5	HLE7708	3/31/2007
z/OS V1.6	HLE7709	
z/OS V1.7	HLE7720	



Introduction

- Upward Compatibility
 - All releases of Language Environment are upward compatible. Applications compiled/linked with a particular release of Language Environment will run on that Language Environment level or higher (see APAR II11316)



Introduction

- Downward Compatibility
 - Starting with OS/390 2.10 Language Environment, applications can be compiled/linked at OS/390 2.10 Language Environment (or higher) and run on lower levels of Language Environment with downward compatibility toleration APARs.
 - New function is excluded. You can only use function available on the lowest level target system. In many cases CEE3728S message will be received when this is attempted.



Introduction

- Many z/OS elements, features, and functions require Language Environment to be at the level shipped with that release of z/OS...
 - BookManager, C/C++ compiler & class libraries, Communications Server (IP & SNA services), Cryptographic Services, DFSMS (CDRA), DCE Base Services, Distributed File Service, DFSORT Locale Processing, IBM HTTP Server Base, Infoprint Server, Integrated Security Services (DCE & LDAP Server), Library Server, msys for Operations, msys for Setup, NSF, OSA/SF, RMF, z/OS UNIX System Services, etc.
- See z/OS Program Directory section "LNKLSTxx Considerations" under "PARMLIB Member Considerations" section for additional information



Which Libraries? When?

- Customization
 - SCEESAMP
- C/C++ compile steps
 - SCEEH.* in SYSLIB
- C/C++ XPLINK Bind step
 - SCEEBND2 in SYSLIB
 - SCEELIB in SYSLIN



Which Libraries? When?

- Non-XPLINK Prelink/Link step
 - SCEEOBJ (UNIX System Services), SCEECPP (C++) in prelink SYSLIB
 - SCEELKED in SYSLIB
 - SCEELIB in SYSLIN (for z/OS V1.2 C++ Class Library)
- Non-XPLINK Bind step
 - SCEELKEX then SCEELKED in SYSLIB
 - SCEELKEX not needed for Enterprise PL/I
 - SCEELIB in SYSLIN (for z/OS V1.2 C++ Class Library)



Which Libraries? When?

- Run/Go step
 - SCEERUN in STEPLIB/LPA/LNKLST
 - SCEELPA in LPALSTxx
 - SCEERUN2 in STEPLIB/LNKLST for C/C++ XPLINK
 - Cannot be in LPALSTxx since PDSE
 - Can use Dynamic LPA to add these modules
- Remove all pre-Language Environment runtime libraries from search order



Which Libraries? When?

- Run/Go step (*continued*)
 - CICS TS...
 - SCEECICS (COBOL) then SCEERUN in DFHRPL
 - SCEERUN in STEPLIB (if not in LNKLST/LPALST)
 - CSD must be updated to include the definitions in SCEESAMP (autoinstall will do this)
 - CEECCSD
 - CEECCSDX (for CICS TS 3.1 XPLINK support)
 - Create CESE/CESO/CIGZ transient data queues using CEECDCT in SCEESAMP



User Exits

- Allows customization of Language Environment initialization and termination behavior
- When linked with Language Environment, acts as a system wide exit
- When linked with an application, affects only that application
 - Supersedes exit linked with Language Environment



User Exits

- CEEBXITA – Assembler user exit
- CEEBINT – High-level language (HLL) user exit
- CEEEXTAN – Abnormal termination exit
- CEEBLNUE – Load notification user exit
- CEEBSTX/CEECSTX – Storage tuning user exit



Setting Run-Time Options

- Installation defaults (CEEDOPT/CEECOPT/CELQDOPT)
 - Also referred to as system-wide defaults
 - SMP/E USERMOD to Language Environment modules
 - SCEESAMP(CEEWCOPT) - CICS TS only
 - SCEESAMP(CEEWDOPT) - non-CICS environments
 - SCEESAMP(CEEWQDOP) - AMODE 64
 - All options must be specified



Setting Run-Time Options

- Installation Defaults (*continued*)
 - To change Installation defaults
 1. uninstall USERMOD, if already installed
 2. modify the options
 3. install/reinstall the USERMOD
 - Note: Reinstall may be needed if run-time options are added or changed in the service stream.
(++HOLD(ACTION) will be used on these PTFs to identify when this needs to be done).



Setting Run-Time Options

CEEDOPT

ABPERC= ((NONE) , OVR) ,

CEEDOPT CSECT
CEEDOPT AMODE ANY
CEEDOPT RMODE ANY

CEEXOPT **ABPERC= ((NONE) , OVR) ,**

ABTERMENC= ((ABEND) , OVR) ,
AIXBLD= ((OFF) , OVR) ,
ALL31= ((OFF) , OVR) ,
ANYHEAP= ((16K , 8K , ANYWHERE , FREE) , OVR) ,
BELOWHEAP= ((8K , 4K , FREE) , OVR) ,
CBLOPTS= ((ON) , OVR) ,
CBLPSHPOP= ((ON) , OVR) ,
CBLQDA= ((OFF) , OVR) ,
CHECK= ((ON) , OVR) ,
COUNTRY= ((US) , OVR) ,
DEBUG= ((OFF) , OVR) ,
DEPTHCONDLMT= ((10) , OVR) ,

continuation
character

00110000
00120000
00130000
X00140000
X00150000
X00160000
X00170000
X00180000
X00190000
X00200000
X00210000
X00220000
X00230000
X00240000
X00250000
X00260000



Setting Run-Time Options

- System defaults
 - New for z/OS V1.7
 - Options may be specified in a PARMLIB member
 - CEEPRMxx
 - Options may be specified with an operator command
 - SETCEE
- Reduces the need to maintain USERMODs for CEEDOPT/CEECOPT/CELQDOPT



Setting Run-Time Options

- System defaults (*continued*)
 - Specifying options in PARMLIB member
 - Member name CEEPRMxx
 - Options specified in groups
 - CEEDOPT
 - CEECOPT
 - CELQDOPT



Setting Run-Time Options

- System defaults (*continued*)
 - Sample CEEPRMxx

```
CEEDOPT(ABPERC(NONE) ALL31(ON)  
        rptopts(on) ) /* Options report */
```

```
CEECOPT(anyheap(4k,4080,anywhere,free))
```

```
CEEDOPT(ALL31(OFF) ) /* Turn off this option */
```



Setting Run-Time Options

- System defaults (*continued*)
 - Using the CEEPRMxx member
 - At IPL
 - Add CEE=xx to IEASYSxx member
 - Use CEE=xx at system parameter prompt
 - R 0,SYSP=AA,CEE=xx
 - After IPL, can select a different CEEPRM member
 - SET CEE=yy command



Setting Run-Time Options

- System defaults (*continued*)
 - Using the SETCEE system command
 - Overrides the current system defaults
 - Usage
 - Specify one group per command
 - Up to 126 characters
 - Example:

```
SETCEE ceedopt,rptstg(on),rptopts(on)
```



Setting Run-Time Options

- System defaults (*continued*)
 - Displaying the system defaults
 - D CEE displays the active members
 - Examples:

```
d cee  
CEE3744I 17.56.05 DISPLAY  
NO MEMBERS SPECIFIED
```

or

```
d cee  
CEE3744I 17.57.31 DISPLAY  
CEE=(JM)
```




Setting Run-Time Options

- System defaults (*continued*)
 - Displaying the system defaults
 - D CEE,groupname displays the options for a particular group

- Example:

```
d cee,ceedopt
```

```
CEE3745I 17.59.44 DISPLAY CEEDOPT
```

```
CEE=(01)
```

```
LAST WHERE SET OPTION
```

```
-----
```

```
CEEPRM01          ENVAR("testing=roger","verify=1 2 3")
```

```
CEEPRM01          HEAP(4194304,5242880,ANYWHERE,KEEP,  
                      16384,16384)
```

```
CEEPRM01          PROFILE(OFF,"XXX")
```

```
CEEPRM01          RPTOPTS(ON)
```

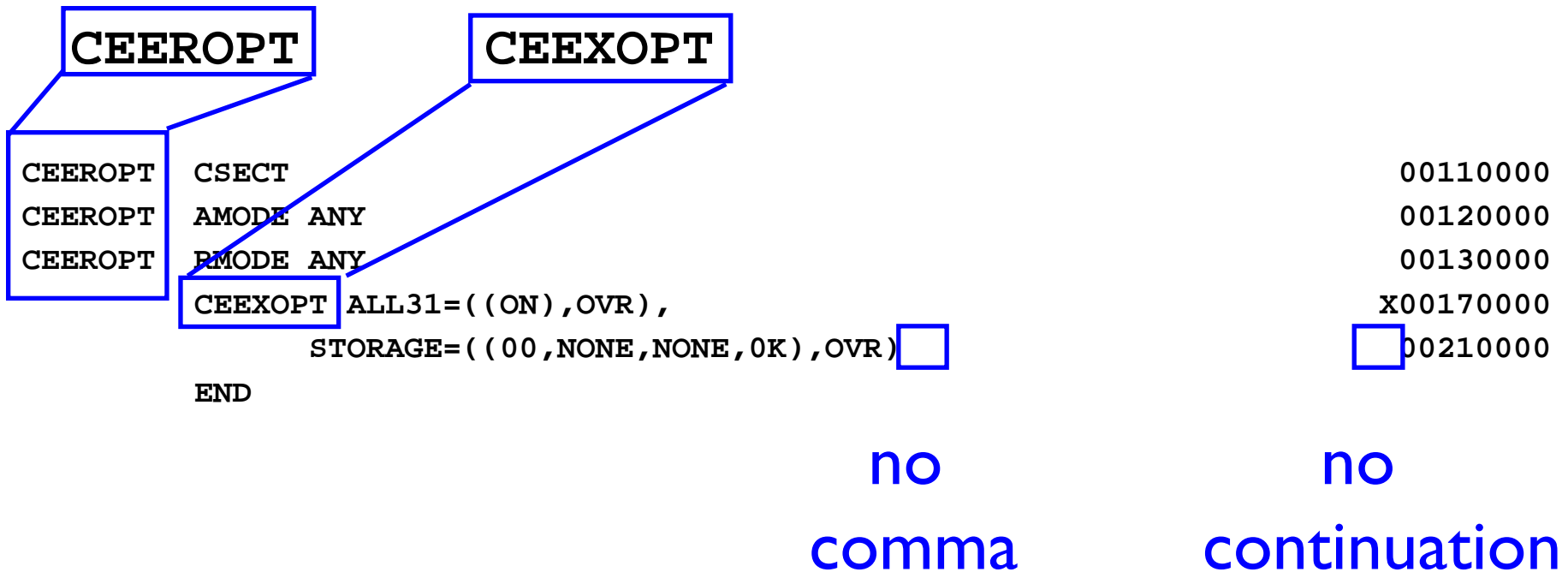


Setting Run-Time Options

- Region Level Overrides (CEEROPT)
 - CICS TS and LRR users (e.g. IMS) only
 - Separate load module dynamically loaded at run-time during region initialization
 - SCEESAMP(CEEWROPT)
 - Must be found in search order, such as STEPLIB for IMS or DFHRPL for CICS TS
 - Specify only those options you wish to change



Setting Run-Time Options





Setting Run-Time Options

- Region Level Overrides (CEEROPT) *(continued)*
 - Certain options can be overridden dynamically in CICS TS region via CLER transaction
 - ALL31
 - CBLPSHPOP
 - RPTOPTS
 - RPTSTG
 - TERMTHDACT
 - TRAP



Setting Run-Time Options

- Application Level Overrides (CEEUOPT/CELQUOPT)
 - CSECT linked with the application
 - SCEESAMP(CEEWUOPT/CEEWQUOP)
 - Specify only those options you wish to change
 - Note: It is recommended to use options at this level when specific options are needed for an application. It is not a good idea to rely on installation defaults. This is especially important for vendors.



Setting Run-Time Options

CEEUOPT

```
CEEUOPT CSECT                                00110000
CEEUOPT AMODE ANY                            00120000
CEEUOPT RMODE ANY                            00130000
CEEEXPT HEAP=(10M,10M,ANYWHERE,FREE),  X00180000
      STACK=(1M,1M,ANYWHERE,KEEP)           00250000
END
```

no "OVR" or
outer parens



Setting Run-Time Options

- Programmer Overrides
 - Compiled into program
 - #pragma runopts for C/C++
 - PLIXOPT for PL/I
 - not available for COBOL
 - Internally generates CEEUOPT/CELQUOPT
 - Specify all program requirements, never **ever** rely on installation/system/region defaults. This is especially important for vendors.



Setting Run-Time Options

- Programmer Overrides (*continued*)
 - For example
 - ```
#pragma runopts(ALL31(ON),ERRCOUNT(0),\
STORAGE(NONE,NONE,NONE,30K),\
TRAP(ON,SPIE),LIBSTACK(4K,4K,FREE),\
STACK(2M,1M,ANYWHERE,KEEP),\
ANYHEAP(16K,8K,ANYWHERE,FREE),\
BELOWHEAP(8K,4K,FREE),\
HEAP(1M,500K,ANYWHERE,KEEP))
```





# Setting Run-Time Options

- Programmer Overrides (*continued*)
  - For example
    - DCL PLIXOPT CHAR(140) VAR  
INIT('ALL31(ON) ERRRCOUNT(0)  
STORAGE(NONE,NONE,NONE,30K)  
TRAP(ON,SPIE) LIBSTACK(4K,4K,FREE)  
STACK(2M,1M,ANYWHERE,KEEP)  
ANYHEAP(16K,8K,ANYWHERE,FREE)  
BELOWHEAP(8K,4K,FREE)  
HEAP(1M,500K,ANYWHERE,KEEP)')  
STATIC EXTERNAL;



# Setting Run-Time Options

- Program Invocation Overrides
  - In UNIX System Services shell (case sensitive)
    - export \_CEE\_RUNOPTS='run-time options'
      - No application parameters allowed, thus '/' not needed
        - export \_CEE\_RUNOPTS='TERM(UADUMP)'
    - Can also contain AMODE 64 run-time options
      - Only applicable options are used, but propagation of all options are done for spawn()ed and exec()ed programs



# Setting Run-Time Options

- Program Invocation Overrides (*continued*)
  - In batch, on EXEC card
    - COBOL (with CBLOPTS(ON))
      - PARM='program arguments/run-time options'
    - C/C++, PL/I, FORTRAN, Language Environment-conforming Assembler
      - PARM='run-time options/program arguments'
    - First program must be Language Environment-conforming
    - The slash is required to delineate the run-time options, even when no program arguments.



# Setting Run-Time Options

- Program Invocation Overrides (*continued*)
  - In batch, on EXEC card (*continued*)
    - EXEC PGM=MYCOBAPP,PARM='TODAY/TER(UADUMP)'
    - EXEC PGM=MYCOBAPP,PARM='10/27/00'
      - The entire parameter is considered to be application arguments because there are no valid run-time options after the last forward-slash.
  - Note that PARM= is limited to 100 characters



# Setting Run-Time Options

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- DD:CEEOPTS Overrides
  - New for z/OS V1.7
  - Optional data set in which run-time options may be specified
  - Allows up to 3K characters
  - Allows run-time options to be passed to non-Language Environment conforming main routines



# Setting Run-Time Options

- DD:CEEOPTS Overrides (*continued*)
  - Usage: Add or allocate a CEEOPTS DD
    - As in-stream data:

```
//MYAPPL01 EXEC PROG=MYPRG, PARM='RPTOPTS(ON) / '
//CEEOPTS DD *
* THESE ARE MY OPTIONS:
ALL31(ON), HEAP(64K),
ENVAR("JOHN=MONTI"),
TERMTHDACT(UADUMP)
/*
```



# Setting Run-Time Options

- DD:CEEOPTS Overrides *(continued)*
  - Usage: Add or allocate a CEEOPTS DD
    - As a sequential file:

```
//MYAPPL01 EXEC PROG=MYCPROG,PARM='RPTOPTS(ON)'
//CEEOPTS DD DSN=JMONTI.MYCPROG.LEOPTS
```

- As a member of a PDS:

```
//MYAPPL01 EXEC PROG=MYCPROG,PARM='RPTOPTS(ON)'
//CEEOPTS DD DSN=JMONTI.MYCPROG(LEOPTS)
```



# Setting Run-Time Options

- DD:CEEOPTS Overrides (*continued*)
  - Supported under:
    - Batch
    - TSO
    - Preinit (CEEPIPI) during call\_main or init\_sub(dp)
    - IMS without LRR
    - DB2
  - Not supported under:
    - CICS
    - IMS/LRR
    - Preinit Compatibility (PICI)
    - System Program C (SPC)
    - Exec()ed programs (BPXBATCH or UNIX shell programs)





# Setting Run-Time Options

- Options Merge (priority)
  - Program Invocation Overrides
  - **DD:CEEOPTS Overrides**
  - Programmer Overrides
  - Application Level Overrides
  - Region Level Overrides (where applicable)
  - **System Defaults (CEEPRMxx and SETCEE)**
  - Installation Defaults

Note: Some options can only be specified as Installation Defaults, e.g. CBLOPTS(ON)



# Setting Run-Time Options

- Installation Default options must be set based on needs of the applications
  - Language used (PL/I, COBOL, C/C++, FORTRAN) will drive some option settings
    - May require some compromise
  - Subsystem application runs under (CICS TS, IMS, batch, UNIX System Services, etc.) will drive some option settings
  - Specific applications can then override options as needed



# Key Run-Time Options

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- Tuning
- Diagnostics



# Key Run-Time Options

## Tuning

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- ALL31
- ANYHEAP
- BELOWHEAP
- HEAP
- HEAPPOOLS
- STACK
- RPTSTG



# Key Run-Time Options

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- ALL31 (option)
  - ON For AMODE 31 programs
  - OFF For AMODE 24 programs  
(is determined dynamically under CICS TS)  
(also determined non-CICS with z/OS V1.2)



# Key Run-Time Options

- ANYHEAP(initial, increment, location, disp)
  - initial                      Minimum size of initial heap segment
  - increment                  Minimum size of additional segments
  - location                      BELOW (<16MB), ANYWHERE
  - disp                              KEEP, FREE (action when empty)
- Notes:
  - Used internally by Language Environment



# Key Run-Time Options

---

- **BELOWHEAP(initial, increment, disp)**
  - initial                      Minimum size of initial heap segment
  - increment                  Minimum size of additional segments
  - disp                          KEEP, FREE (action when empty)
- Notes:
  - Used internally by Language Environment



# Key Run-Time Options

- HEAP(initial, increment, location, disp, init24, incr24)
  - initial Minimum size of initial heap segment
  - increment Minimum size of additional segments
  - location BELOW, ANYWHERE
  - disp KEEP, FREE (action when empty)
- Notes:
  - COBOL working storage (for RENT programs)
  - Dynamic storage (C malloc, C++ new, PL/I ALLOCATE)





# Key Run-Time Options

- **HEAPPOOLS(ON|OFF, size1, prcnt1, ..., size12, prcnt12)**
  - **size*N*** Up to 12 cell pool sizes to be utilized
  - **prcnt*N*** Percentage of HEAP(initial) to be used for cell pool
- **Notes:**
  - C/C++ and Enterprise PL/I only
  - Use RPTSTG(ON) to tune settings for each application



# Key Run-Time Options

- STACK(init, incr, location, disp, dsinit, dsincr)
  - init Actual size of initial stack segment
  - incr Minimum size of additional segments
  - location BELOW, ANYWHERE
  - disp KEEP, FREE (action when empty)
  - dsinit XPLINK initial stack
  - dsincr XPLINK increment stack



# Key Run-Time Options

- STACK(init, incr, location, disp, dsinit, dsincr) *(continued)*
  - Notes:
    - Dynamic Save Area
    - C/C++ and PL/I local variables
    - **Must use STACK(,,BELOW) when running ALL31(OFF)**



# Key Run-Time Options

- RPTSTG(option)
  - OFF Storage report not requested
  - ON Generates a report of stack/heap usage
    - including recommended settings
- Caution:
  - Use only for application tuning. Do not make RPTSTG(ON) system wide default due to significant performance impact.

Consider CICS TS dynamic storage tuning as an alternative.



# Key Run-Time Options

Storage Report for Enclave main 01/23/01 1:18:38 PM  
Language Environment V02 R10.00

## STACK statistics:

|                                         |        |
|-----------------------------------------|--------|
| Initial size:                           | 131072 |
| Increment size:                         | 131072 |
| Maximum used by all concurrent threads: | 29024  |
| Largest used by any thread:             | 29024  |
| Number of segments allocated:           | 1      |
| Number of segments freed:               | 0      |

## THREADSTACK statistics:

|                                         |   |
|-----------------------------------------|---|
| Initial size:                           | 0 |
| Increment size:                         | 0 |
| Maximum used by all concurrent threads: | 0 |
| Largest used by any thread:             | 0 |
| Number of segments allocated:           | 0 |
| Number of segments freed:               | 0 |

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# Key Run-Time Options

## HEAP statistics:

|                                               |        |
|-----------------------------------------------|--------|
| Initial size:                                 | 32768  |
| Increment size:                               | 32768  |
| Total heap storage used (sugg. initial size): | 417624 |
| Successful Get Heap requests:                 | 91     |
| Successful Free Heap requests:                | 52     |
| Number of segments allocated:                 | 4      |
| Number of segments freed:                     | 0      |

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## BELOWHEAP statistics:

|                                               |       |
|-----------------------------------------------|-------|
| Initial size:                                 | 10240 |
| Increment size:                               | 2048  |
| Total heap storage used (sugg. initial size): | 168   |
| Successful Get Heap requests:                 | 1     |
| Successful Free Heap requests:                | 0     |
| Number of segments allocated:                 | 1     |
| Number of segments freed:                     | 0     |



# Key Run-Time Options

## HeapPools Summary:

| Cell Size | Extent Percent | Cells Per Extent | Extents Allocated | Maximum Cells Used | Cells In Use |
|-----------|----------------|------------------|-------------------|--------------------|--------------|
| 8         | 10             | 204              | 0                 | 0                  | 0            |
| 32        | 10             | 81               | 0                 | 0                  | 0            |
| 128       | 10             | 24               | 1                 | 1                  | 1            |
| 256       | 10             | 12               | 0                 | 0                  | 0            |
| 1024      | 10             | 3                | 1                 | 2                  | 2            |
| 2048      | 10             | 1                | 0                 | 0                  | 0            |

## Suggested Percentages for current Cell Sizes:

```
HEAPP(ON,8,1,32,1,128,1,256,1,1024,7,2048,1)
```

## Suggested Cell Sizes:

```
HEAPP(ON,48,,280,,584,,2048,,0)
```



# Key Run-Time Options

## Diagnostics

---

- ABTERMENC
- ERRCOUNT
- HEAPCHK
- STORAGE
- TERMTHDACT
- TRAP
- RPTOPTS
- USRHDLR





# Key Run-Time Options

---

- ABTERMENC(option)

- ABEND                      Step will be ABENDED (job terminates)
- RETCODE                    Step ends with return code (job continues)



# Key Run-Time Options

- ERRCOUNT(threshold)
  - 0 Conditions are not counted
  - >0 The number of conditions allowed before Language Environment terminates the process
- Notes:
  - ERRCOUNT(0) required by PL/I for ON-unit processing and by C/C++ for signal processing



# Key Run-Time Options

- HEAPCHK(ON|OFF, frequency, delay, level, call-depth)
  - OFF Normal processing
  - ON Checks HEAP structures on get/free
  - frequency How often the HEAP is checked
  - delay Number of get/free before starting
  - level Number of calls to be displayed in Heap Storage Diagnostic Report
  - call-depth Number of calls to be displayed for HEAPPOOLS Serviceability



# Key Run-Time Options

- HEAPCHK(ON|OFF, frequency, delay, level, call-depth)

*(continued)*

- Caution:

- Use only for application tuning/diagnostics. **Do not make HEAPCHK(ON) system wide default due to serious performance impact.**

- Notes:

- To generate only Heap Storage Diagnostic Report use, e.g.
  - HEAPCHK(ON,0,0,10,0)
- To activate only HEAPPOOLS Serviceability use, e.g.
  - HEAPCHK(ON,0,0,0,5)



# Key Run-Time Options

## Heap Storage Diagnostics

| Stg Addr | ID       | Length   | Entry               | E Addr   | E Offset  | Load Mod |
|----------|----------|----------|---------------------|----------|-----------|----------|
| 1FB3C038 | 00000000 | 00000C20 | CEEV#GTS            | 0CE7C610 | +00000000 | CEEPLPKA |
|          |          |          | CEEVGQP             | 0CE855E0 | +000001FC | CEEPLPKA |
|          |          |          | setlocale           | 0CC7BFA0 | +000000FC | CEEEV003 |
|          |          |          | tzset               | 0CBD34E8 | +0000059A | CEEEV003 |
|          |          |          | _cinit              | 0CAC3588 | +00002E48 | CEEEV003 |
|          |          |          | CEEZINV             | 0CEB4870 | +00000C58 | CEEPLPKA |
| 1FB3CC58 | 00000000 | 00000828 | CEEV#GH             | 0CE84690 | +00000000 | CEEPLPKA |
|          |          |          | realloc_name_buffer | 0CC7BAD8 | +00000070 | CEEEV003 |
|          |          |          | setlocale           | 0CC7BFA0 | +0000013C | CEEEV003 |
|          |          |          | tzset               | 0CBD34E8 | +0000059A | CEEEV003 |
|          |          |          | _cinit              | 0CAC3588 | +00002E48 | CEEEV003 |
|          |          |          | CEEZINV             | 0CEB4870 | +00000C58 | CEEPLPKA |

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# Key Run-Time Options

- STORAGE(getheap, freeheap, stack, reserve)
  - getheap One byte value used to initialize every heap allocation
  - freeheap One byte value used to initialize every heap free
  - stack One byte value used to initialize every stack allocation
  - reserve Amount of space to reserve for out of storage condition processing



# Key Run-Time Options

- STORAGE(getheap, freeheap, stack, reserve) *(continued)*
  - Notes:
    - STORAGE(AA,EE,,) useful for debugging
      - When HEAPCHK(ON), free elements are checked to ensure they contain the freeheap value
    - STORAGE(00,,,) is equivalent to COBOL WSCLEAR
    - STORAGE(,,00,) is very expensive
      - Especially for C/C++
      - Solution: STORAGE(,,CLEAR)
        - Sets to binary zeros the unused portion of the initial stack segment just prior to the “main” getting control
        - Available via APAR PK02614 (z/OS V1.4 and later)



# Key Run-Time Options

- TERMTHDACT(option)
  - QUIET Messages off, no dump
  - MSG Messages only, no dump
  - TRACE CEEDUMP with traceback only
  - DUMP CEEDUMP
  - UADUMP CEEDUMP, optional system dump
  - UAONLY System dump only, no CEEDUMP
  - UATRACE System dump and traceback
  - UAIMM System dump of original error





# Key Run-Time Options

---

- TERMTHDACT(option) *(continued)*
  - Notes:
    - UAIMM requires TRAP(ON,NOSPIE)
      - Takes dump in Language Environment ESTAE via SETRP prior to Language Environment condition handling for program checks only
    - SYSMDUMP DD card required for system dump



# Key Run-Time Options

- TRAP(option)
  - ON,SPIE Condition handling enabled
  - ON,NOSPIE Allows user applications to have their own SPIE routine, Language Environment condition handling will take place via the ESTAE
  - OFF Condition handling disabled, some functionality not available **(AVOID)**
- Notes:
  - TRAP(ON,SPIE) highly recommended for normal processing



# Key Run-Time Options

---

- RPTOPTS(option)
  - OFF Options report not requested
  - ON Generate a report of all current options (upon successful termination)
- Notes:
  - Automatically included in CEEDUMP



# Key Run-Time Options

Options Report for Enclave main 07/13/05 12:18:07 PM  
Language Environment V01 R07.00

| LAST WHERE SET       | OPTION                            |
|----------------------|-----------------------------------|
| Installation default | ABPERC(NONE)                      |
| Installation default | ABTERMENC(ABEND)                  |
| Installation default | NOAIXBLD                          |
| Invocation command   | ALL31(OFF)                        |
| Installation default | ANYHEAP(16384,8192,ANYWHERE,FREE) |
| Installation default | NOAUTOTASK                        |
| Programmer default   | BELOWHEAP(10240,2048,KEEP)        |
| Installation default | CBLOPTS(ON)                       |
| Installation default | CBLPSHPOP(ON)                     |
| Installation default | CBLQDA(OFF)                       |
| Installation default | CHECK(ON)                         |
| PARMLIB(CEEPRMxx)    | COUNTRY(KY)                       |
| Installation default | NODEBUG                           |
| DD:CEEOPPTS          | DEPTHCONDLMT(15)                  |
| Installation default | ENVAR("")                         |
| SETCEE command       | ERRCOUNT(0)                       |

7/12/2006



# Key Run-Time Options

- USRHDLR(CEEWUCHA)
  - User condition handler to provide traditional CICS TS ABEND behavior
    - Convert unhandled COBOL detected software errors to U1xxx ABEND issued by COBOL II
      - Allow EXEC CICS HANDLE ABEND LABEL statements to get control
  - Convert PL/I software-raised conditions back to APLS abends



# Key Run-Time Options

- USRHDLR(CEEWUCHA) *(continued)*
  - Prevents message IGZ0014W warning of backlevel IGZETUN or IGZEOPT
    - Use CEEUOPT instead
  - Installed as usermod via CEEWWCHA
    - Found in SCEESAMP
  - CEEWUCHA must be defined in PPT and must be available at run-time (e.g., STEPLIB, LPA, etc.)
  - Not recommended for batch



# Additional Information

- All Language Environment documentation available:
  - z/OS CD collection
  - Language Environment website:
    - <http://www.ibm.com/servers/eserver/zseries/zos/le/>
- Language Environment Programming Reference
- Language Environment Programming Guide
- Language Environment Customization
- Language Environment Run-Time Application Migration Guide
  - Run-time Option Summary and Recommendations chapter



## Appendix: AMODE 64 Run-Time Options

Existing run-time options supported in AMODE 64:

ARGPARSE/NOARGPARSE

ENVAR

EXECHOPTS/NOEXEHOPTS

FILETAG

HEAPCHK

INFOMSGFILTER

NATLANG

POSIX

PROFILE

REDIR/NOREDIR

RPTOPTS

RPTSTG

STORAGE \*

TERMTHDACT \*

TEST/NOTEST

TRACE \*

TRAP

- All other existing run-time options are not supported
- \* indicates some suboptions have changed or are not supported





## AMODE 64 Run-Time Options (continued)

- HEAPPOOLS64(ON|OFF, cell1 size, cell1 count, ..., cell12 size, cell12 count)
- ON|OFF                      Are heappools on?
- cellX size                      Size of cells with this pool (8 to 64K)
- cellX count                      Number of cells in this pool (min 4)

NOTE: Different from AMODE 24/31 (HEAPPOOLS) – was percentage (not changing in AMODE 24/31)



## AMODE 64 Run-Time Options (continued)

- HEAP64(init64,inc64,disp64,init31, inc31, disp31, init24, inc24, disp24)
  - Controls user heap storage
- IOHEAP64(init64,inc64,disp64,init31, inc31, disp31, init24, inc24, disp24)
  - Controls I/O storage for the run-time
- LIBHEAP64(init64,inc64,disp64,init31, inc31, disp31, init24, inc24, disp24)
  - Controls heap storage usage for the run-time (non I/O)



## AMODE 64 Run-Time Options (continued)

- AMODE 64 Heap Run-Time Options Parameters
  - init64 Initial size of above the bar storage (in MB)
  - inc64 Increment size of above the bar storage (in MB)
  - disp64 KEEP or FREE (how to treat 64 increments)
  - init31 Initial size of above the line storage (in bytes)
  - inc31 Increment size of above the line storage (bytes)
  - disp31 KEEP or FREE (how to treat 31 increments)
  - init24 Initial size of below the line storage (in bytes)
  - inc24 Increment size of below the line storage (bytes)
  - disp24 KEEP or FREE (how to treat 24 increments)



## AMODE 64 Run-Time Options (continued)

- STACK64(initial, increment, maximum) - Controls the allocation of user stack
- THREADSTACK64(initial, increment, maximum) - Controls the allocation of user stack
- initial                      Size of initial stack (in MB)
- increment                  Size of increments of stack (in MB)
- maximum                    Maximum stack size (in MB)
- NOTES:
- Stack is always above the bar, one contiguous segment, downward growing (XPLINK)
- Initially we reserve "maximum" space
- Only use initial size and increase in increments until maximum is reached.
- Only what is actually used counts towards MEMLIMIT