



IBM Language Environment for z/VSE

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## **CEETRACE Version 1 Release 2.1a**

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### **CEETRACE Feature**

### **Installation and Users Guide**

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## Disclaimer

Use of the CEETRACE feature is solely at the users discretion and responsibility. IBM Corporation has no warranty, implied or otherwise, nor liability for this feature. FIXPACK service and updates will be provided as a complete replacement via the z/VSE or the LE z/VSE IBM developerworks web-sites. No APARs or PMRs will be accepted for this feature. See section “How to report a problem” for support on any CEETRACE issues.

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## CEETRACE Maintenance History

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The following history lists the enhancements and changes to CEETRACE since V1.2.0 and the associated z/VSE and LE z/VSE required levels. All subsequent update levels automatically include any fixes or enhancements from earlier levels :

### **z/VSE 5.1 – CEETRACE V1.2.0, V1.2.0a, V1.2.0b, V1.2.0c (and APAR PI37760)**

- Mini Dump feature. When a statement execution history report is produced in response to an application failure, provide a formatted dump of the condition information block and , if present, the machine state information at the time of the failure.
- Auto Reporting feature. Allows the production of an execution statement history report based upon some simple entry-point-name, statement number or statement execution count criteria.
- HLL statement exit. Provide a user exit point at each HLL statement executed within a CEETRACE enabled application.
- Correct system hard-wait X'0FFF' (SYSTEM ENTERED HARD WAIT <=== PROGRAM-CHECK IN SUPERVISOR) from D CEE,CEETRACE command if issued after CEETRACE environment initialisation failed due to message "CEL4058E CEEBINT module found does not verify. CEETRACE disabled."
- Console message CELT022W issued incorrectly when WARN\_MSGS=ON for a statically called COBOL/VSE subroutine compiled with NOTEST.
- Missing trace table entries for a COBOL/VSE “main” compiled correctly when calling a COBOL/VSE subroutine statically that has been compiled with NOTEST.
- HEAP environment validation improvements. Addition of message CELT060E.
  - See section “CEETRACE Environment Validation Processing” for more information.
- The “Program Execution” trace report heading now includes the CEETRACE fixpack level information. See Pg 11 for a example.
- Console message CELR022W issued incorrectly when WARN\_MSGS=ON for a COBOL/VSE “main” statically calling a COBOL/VSE subroutine and subsequently a DOS/VS COBOL subroutine. Resulting in a missing program execution trace report should a failure subsequently occur.
- Message CELT024S is incorrectly issued for a main DOS/VS COBOL optimised or non-optimised routine calling a COBOL/VSE subroutine.
- When the PTF for APAR PI37760 has been applied and a system IPL is next performed, the “D CEE,CEESTAT” attention routine command report will now include the current CEETRACE version, release, modification and fixpack level information IF CEETRACE has been installed and initialised successfully.

## **z/VSE 5.2 – CEETRACE V1.2.1 and V1.2.1a (and APAR PI41430)**

- Performance improvement for COBOL/VSE applications with a large number of paragraphs.
- New current statement offset and executing hook address fields are now provided via the CEETRACE HLL statement exit. See CELHLLDS.A and the HLL statement sample exit (CELHLLXT.Z) for more information. Also see “High Level Language (HLL) User Exit” for changes to the HLL user exit processing.
- New sample for C/VSE users – CELTVIVP.Z – supplied in the LE z/VSE installation library.
- Any detected VS/COBOL2 main applications programs will now produce a warning message (CELT075W) if WARN\_MSGS is ON.
- CEETRACE deactivation control via a JCL // SETPARM CEETRCE='OFF'. See the “CEETRACE Control Using JCL SETPARM” section for more information.
- Excessive statement elapsed time threshold has been changed from 1 second to 1/300<sup>th</sup> of a second to better reflect excessive statement execution time.
- Correct system hard-wait X'0FFF' (SYSTEM ENTERED HARD WAIT <=== PROGRAM-CHECK IN SUPERVISOR) from D CEE,CEETRACE command if issued after CEETRACE environment initialisation failed due to message "CEL4058E CEEBINT module found does not verify. CEETRACE disabled." (requires the PTF for APAR PI41430 to be installed).
- Detect tight iterative loops of 10 language statements wide or less. Use an optimised trace detail gathering execution process when detected. This optimised processing will be deactivated if any of the "auto\_rprt" options are activated.
- Allow CPU time consumption report to be included in the execution trace report when CEL4RPRT is called by a user application. Note : each CPU millisecond usage data report line issued per call to CEL4RPRT is cumulative only!
- When either “auto\_rprt\_epn” or “auto\_rprt” are set to “off” or “no” using the attention routine console command over-ride, the other related option will also be set off automatically.
- When the PTF for APAR PI41430 has been applied and a system IPL is next performed, the “D CEE,CEESTAT” attention routine command report will now include the current CEETRACE version, release, modification and fixpack level information IF CEETRACE has been installed and initialised successfully.

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# CEETRACE Feature System Requirements

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The following z/VSE system requirements are needed to successfully use the LE z/VSE CEETRACE feature tool and any of the other documented utilities included :

- Language Environment for z/VSE 1.4.8 and z/VSE 5.1 or above.
- Correctly installed and activated LE/VSE Attention Routine – refer to the LE/VSE Debugging Guide and Run-Time Messages for further information.
- The default supplied CEEBXTAN and CEECXTAN modules or a modified version including CEL4RPRT as a pre-dump exit. See the LE z/VSE supplied samples CEEBXTAN.A and CEECXTAN.A
- Applications using the CEETRACE feature tool will require approximately a further 50K for the tracing and reporting tool programs, approximately a further 32K of stack anywhere storage and 8K Heap anywhere storage (up to ~4K of this will be required for the trace table itself). SYSDEBUG file support will require further HEAP storage depending upon COBOL program source size. These requirements are subject to change at any time due to service or development requirements.
- APARs (or their superseded versions) PQ74143 and supporting language APARs (PQ74144 – English or PQ74145 – Japanese) PTFs are required to be installed along with appropriately compiled COBOL/VSE programs if you wish to use CEETRACE and the available supporting utilities with the COBOL/VSE compilers SYSDEBUG (side-file) file support.

## **CEETRACE Feature Overview**

CEETRACE is not intended to replace the LE z/VSE dump information or the Debug Tool for VSE/ESA. Instead it is designed to complement the already available LE z/VSE dump information to aid in faster application problem analysis by providing an execution statement history prior to any subsequent application failure similar to the previously available READY TRACE facility of DOS/VS COBOL.

Note: Applications that do not abend will not *automatically* produce an execution statement report.

## **CEETRACE Feature Performance Impact**

Activating the CEETRACE feature will have a negative impact on application performance. The significance of this impact can be controlled by some of the available CEETRACE feature options. In general there will be a minimum of approximately 10% CPU (estimated) overhead with this increasing relative to the language constructs being executed, the number of heavily iterative loops used and the CEETRACE feature options active.

CEETRACE options such as the heap storage environment validation can substantially increase CPU consumption and should only be used in a non-production environment where possible.

### **CEETRACE V1.2.1 (z/VSE 5.2) and above only :**

COBOL/VSE programs using CEETRACE that have multiple paragraphs frequently executed will now experience a performance improvement as CEETRACE will skip statement number processing for all COBOL/VSE paragraph names. Further performance improvements are available with Fixpack “A” (and the associated APAR PI41430) which will reduce the CPU overhead experienced due to tight application iterative loops.

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## CEETRACE Feature Installation Instructions

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Welcome to the CEETRACE feature! There is nothing further to download. Everything you require is already included in the base installation of your z/VSE 5.1 or above system. There are just a few simple steps to follow and jobs to submit to activate the feature.

- Ensure CEL4CMDR is loaded in the SVA if not already.
- Ensure the LE z/VSE Attention Routine Interface is activated – see the LE z/VSE Debugging and Run-Time Messages Guide for more information.
- Punch out and then tailor member CEETRACE.Z supplied in your LE z/VSE installation library.
  1. Set LELIB to your LE z/VSE installation sub-library
  2. Set INSTALL parameter to Y if this the first run of this job, use N if you have already installed the feature.
  3. Review and modify any of the options included in the job that fit your requirements. Be sure to read carefully all the performance notes for any applicable options.
  4. Continuing from this point on in the installation process will override any previously installed dynamic LE z/VSE High Level Language user exits you may have developed or installed. Only one dynamic LE z/VSE HLL exit (CEE Bint) should be used on a system at a time.
  5. Ensure you have a PRD2.SAVE sub-library defined. The installation job will use this as a temporary storage area.
  6. Tailor the JCL in preparation for submission as required for your system layout.
  7. Submit the tailored job to your VSE system. This will create a CEETRACE.INI librarian member containing all your specified option values in the LE z/VSE installation library and install the feature. Verify message CEL4052I is issued. Review the console status report and ensure the CEETRACE feature is set to your specified state.
- Punch out member CEEWTRCE.Z from the LE z/VSE installation library. Tailor this JCL as required for your system and then submit to a class that can be used at any time and that is of at least 5MB in size. **This job is not intended to run now but only remain resident on the VSE/POWER RDR queue.**
- Ensure the class that contains CEEWARC has a partition allocated to it that is at least 5MB in size.
- If the CEETRACE status is ON you can issue console command D CEE,CEETRACE and review the options report produced matches the options you set in the CEETRACE member previously.
- If performing a new install then a COLD start of any CICS systems that are to use CEETRACE is required.
- **CEETRACE V1.2.1 (z/VSE 5.2) and above** – For fixpack activations only, to dynamically activate a CEETRACE fixpack update in a CICS system already active and that is not excluded, or is included in the partition options list, execute the supplied CICS transaction “NEWC”. Check for message “CEETRACE Feature Refresh Successful.” in the CICS log. A standard PHASEIN CEMT command should be executed against CEL4RPRT also.

The CEETRACE feature is now installed and if set to ON will now produce a program execution report at the defined destination whenever a severity 2 or greater condition occurs and goes un-handled within an appropriately compiled LE z/VSE HLL application.

Refer to the "Preparing a Application for use with the CEETRACE feature" section on pg 11 for information on using the CEETRACE feature with your LE z/VSE applications.

Execution of the supplied installation verification program(s) (IVP) can now be performed. For COBOL users, job CELTCIVP.Z is supplied, for PL/1 VSE users job CELTPIVP.Z is available and for C/VSE users job CELTVIVP.Z is in your LE z/VSE installation library.

## Removing the CEETRACE Feature

To remove the CEETRACE feature from your system execute the following JCL on the system you wish to un-install the feature from :

```
* $$ JOB JNM=UNINSTAL,CLASS=0,DISP=D
* $$ LST DEST=*
* $$ PUN DEST=*
// JOB UNINSTAL – Deactivate and Uninstall the CEETRACE Feature
// EXEC DTRIATTN,PARM='S CEE,CEETRACE=OFF'
/*
// EXEC LIBR,SIZE=256K,PARM='MSHP'
ACC S=PRD2.SCEEBASE
RENAME CEEBINT.PHASE:CEL4TRCE.PHASE
RENAME CEEBINT.DEFAULT:CEEBINT.PHASE
/*
// UPSI 01000000
// LIBDEF *,SEARCH=PRD2.SCEEBASE
// EXEC CEL4VNDR,SIZE=CEL4VNDR
/*
// PWR R RDR,CEEWARC
/&
* $$ EOJ
```

The CEETRACE feature has now been deactivated in the BATCH environment and removed from the system.

CEETRACE will be automatically removed upon the next CICS COLD start.

**CEETRACE V1.2.1 (z/VSE 5.2) and above only** – To immediately deactivate CEETRACE from CICS systems that were previously using CEETRACE after running the above JCL, execute the supplied “NEWC” CICS transaction.

## CEETRACE Control Using JCL SETPARM

### CEETRACE V1.2.1 (z/VSE 5.2) and above only :

#### Batch Environment only!

To deactivate CEETRACE for a particular job or job step, use the “CEETRCE” SETPARM variable. For example, to deactivate CEETRACE for an entire JCL stream, add the following JCL statement to the beginning of the JCL stream :

```
// SETPARM CEETRCE="OFF"
```

To deactivate CEETRACE for a particular job step, add the above // SETPARM statement to your JCL member just prior to the job-step that you wish to deactivate CEETRACE for. Then to re-activate CEETRACE for the following subsequent job steps add the following JCL statement to your JCL stream :

```
// SETPARM CEETRCE=""
```

Note : The only value for the “CEETRCE” SETPARM variable that CEETRACE acknowledges is “OFF”. Setting the “CEETRCE” SETPARM variable to anything else will result in the default CEETRACE initialisation behaviour being performed.



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# CEETRACE Feature Usage Information

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## ***CEETRACE Feature AR operator commands***

- D CEE,CEETRACE Display a console report of the active CEETRACE options.
- S CEE,CEETRACE=RELOAD Reload the CEETRACE options from the CEETRACE.INI file.
- S CEE,CEETRACE=OFF Immediately de-activate the CEETRACE feature
- S CEE,CEETRACE=ON Immediately activate the CEETRACE feature
- S CEE,CEETRACE=(option=new value) Over-ride specified CEETRACE option (see pg 20).

### Notes:

1. Setting an over-ride value for a CEETRACE option is only temporary. Any RELOAD commands, execution of the CEEWARC job (usually performed automatically during IPL) or system IPL's will reset the CEETRACE options back to the installation default values contained in the CEETRACE.INI member. To remove any operator over-rides for CEETRACE, issue the S CEE,CEETRACE=RELOAD command.
2. Only a ***single option over-ride*** can be specified within the enclosing brackets per Attention Routine command invocation.
3. **Fixpack "A" or above users:** To inquire on the fix level status information for CEETRACE issue the 'D CEE,CEESTAT' console command. If the PTF for APAR PI41430 has been applied and CEETRACE has been successfully installed and initialised then the fixpack level information in the format "VxxRxxMxxf" will be displayed. Where V=version, R=release, M=the modification level. If a fixpack has been successfully applied and activated then f=fixpack level will be displayed.

## ***CEETRACE Feature Customisation after installation***

After installation you can optionally customise the CEETRACE options to your requirements. To do this follow these simple steps :

- Edit the created (from the previous installation procedure) CEETRACE.INI member in your LE/VSE installation library using your preferred editor. DITTO/ESA for VSE's online "Library Member Edit" option is available with your z/VSE base installation.
- Carefully read the "NOTES" section at the start of the member before making any changes.
- Make any desired changes to the member. Always remember that the CEETRACE feature will be used in any appropriately compiled LE z/VSE application in both CICS and BATCH environments and for any partition(s) not explicitly excluded or included. Pay careful attention to all the performance notes and warnings associated with any of the CEETRACE feature options.
- Save the modified CEETRACE.INI member.
- Issue the reload command (S CEE,CEETRACE=RELOAD) on the console. Confirm the message "CEETRACE options reload complete" is issued.
- Issue the command "D CEE,CEETRACE" and confirm the report correctly reflects your CEETRACE feature options.

Note – if using the supplied CEETRACE.Z sample member to re-catalog your default CEETRACE options it is recommended that you set INSTALL=N unless you require re-installation of the CEETRACE feature. Re-installation is not required if you are only tailoring the CEETRACE options.

## ***CEETRACE and Debug Tool for VSE Users***

Those users that have Debug Tool for VSE/ESA installed on the same system as CEETRACE will need to ensure that any applications being debugged using the Debug Tool for VSE/ESA product do not use CEETRACE. To do this you can exclude/include certain partitions from CEETRACE using the CEETRACE.INI file and use Debug Tool in the excluded partitions. For system-wide deactivation you can issue the CEETRACE=OFF command (see pg 8) which will completely deactivate CEETRACE from the entire system.

If for some reason an application is run using Debug Tool for VSE/ESA and the CEETRACE feature at the same time, CEETRACE will detect this and automatically deactivate itself.

CEETRACE can be used on PL/1 subroutines running as subtasks in a PL/1 multitasking environment at the same time as the PL/1 “main” program is using Debug Tool for VSE/ESA.

## ***CEETRACE After z/VSE System FSU or Upgrade***

After installing a new z/VSE system or performing an FSU you should re-run the installation job CEETRACE.Z with the INSTALL=Y parameter set. This will then re-instate the CEETRACE exit routine as a system-wide default and re-catalog your CEETRACE options. Verify message CEL4052I is issued. Review the console status report and ensure the CEETRACE feature is set to your specified state.

## Preparing an application for use with the CEETRACE Feature

Compile all the modules in the application with the compilers appropriate TEST compile option specifying ALL,SYM as the sub-options. For COBOL/VSE applications that you wish to use the SYSDEBUG file with CEETRACE use the SEP sub-option also. C/VSE and PL/I for VSE/ESA compilers and run-times do not support the SYSDEBUG side file and so are currently limited to a statement number trace report only.

When the appropriately compiled applications are executed in a partition that is not excluded on a system that has the CEETRACE feature installed and activated any severity 2 or greater un-handled conditions experienced will result in a program execution report at the CEETRACE options specified destination.

A report similar to the following COBOL sample will be produced at the specified destination :

```
-----
CEETRACE V01.02.01 - Program Execution Trace Report Begins.    CEETRACE Using LE z/VSE Version 01 Release 04.09
-----

   Date       Time       Program Name  Entry Name  Stmt#  Stmt Offs  Stmt_Lang  Statement Source Code
14/05/2013 14:46:47.78  CELTCIVP    Ent/Ext/Par  N/A.    +000005E8  COBOL      External Entry/Exit point, End clause or
14/05/2013 14:46:47.78  CELTCIVP    CELTCIVP     689    +000005EC  COBOL      DISPLAY 'CELTTCIVP Begins ' .
14/05/2013 14:46:47.80  CELTCIVP    CELTCIVP     693    +000005FE  COBOL      Call 'CELTVLIB'.
14/05/2013 14:46:47.80          celtvlib     32    +0000006C  C          This Language does not support the SYSDEBUG
14/05/2013 14:46:47.95          celtvlib     33    +00000088  C          This Language does not support the SYSDEBUG
14/05/2013 14:46:47.95          celtvlib     34    +000000A0  C          This Language does not support the SYSDEBUG
14/05/2013 14:46:47.95          celtvlib     41    +0000012A  C          This Language does not support the SYSDEBUG
14/05/2013 14:46:47.95          celtvlib     44    +00000150  C          This Language does not support the SYSDEBUG
14/05/2013 14:46:47.95          celtvlib     45    +00000170  C          This Language does not support the SYSDEBUG
14/05/2013 14:46:47.95  CELTCIVP    Ent/Ext/Par  N/A.    +00000634  COBOL      External Entry/Exit point, End clause or
14/05/2013 14:46:47.95  CELTCIVP    CELTCIVP     695    +00000638  COBOL      Display 'Call the CEETRACE feature reportin
14/05/2013 14:46:47.95  CELTCIVP    CELTCIVP     696    +0000064A  COBOL      Display 'produce a report of where executio
14/05/2013 14:46:47.95  CELTCIVP    CELTCIVP     697    +0000065C  COBOL      Display 'at this point.'.
14/05/2013 14:46:47.95  CELTCIVP    CELTCIVP     699    +0000066E  COBOL      Call 'CEL4RPRT'.
14/05/2013 14:46:48.04  CELTCIVP    Ent/Ext/Par  N/A.    +000006A4  COBOL      External Entry/Exit point, End clause or
14/05/2013 14:46:48.04  CELTCIVP    Ent/Ext/Par  N/A.    +000006A8  COBOL      External Entry/Exit point, End clause or
14/05/2013 14:46:48.04  CELTCIVP    CELTCIVP     706    +000006AC  COBOL      MOVE 8 TO Vstring-length of IN-DATE.
14/05/2013 14:46:48.04  CELTCIVP    CELTCIVP     707    +000006B6  COBOL      MOVE '19/11/08' TO Vstring-text of IN-DATE(
14/05/2013 14:46:48.04  CELTCIVP    CELTCIVP     708    +000006E4  COBOL      MOVE 8 TO Vstring-length of PICSTR.
14/05/2013 14:46:48.04  CELTCIVP    CELTCIVP     709    +000006EE  COBOL      MOVE 'DD/MM/YY' TO Vstring-text of PICSTR(1
14/05/2013 14:46:48.04  CELTCIVP    CELTCIVP     710    +0000071C  COBOL      CALL 'CEEDAYS' USING IN-DATE, PICSTR,
14/05/2013 14:46:48.14  CELTCIVP    Ent/Ext/Par  N/A.    +00000778  COBOL      External Entry/Exit point, End clause or
14/05/2013 14:46:48.14  CELTCIVP    CELTCIVP     714    +0000077C  COBOL      IF CEE000 of FC THEN
14/05/2013 14:46:48.14  CELTCIVP    Ent/Ext/Par  N/A.    +0000078E  COBOL      External Entry/Exit point, End clause or
14/05/2013 14:46:48.14  CELTCIVP    CELTCIVP     715    +00000792  COBOL      DISPLAY Vstring-text of IN-DATE
14/05/2013 14:46:48.14  CELTCIVP    Ent/Ext/Par  N/A.    +00000816  COBOL      External Entry/Exit point, End clause or
14/05/2013 14:46:48.14  CELTCIVP    CELTCIVP     727    +0000081A  COBOL      CALL 'CEEDYWK' USING LILIAN , DAYNUM , FC.
14/05/2013 14:46:48.14  CELTCIVP    Ent/Ext/Par  N/A.    +0000086E  COBOL      External Entry/Exit point, End clause or
14/05/2013 14:46:48.14  CELTCIVP    CELTCIVP     729    +00000872  COBOL      IF CEE000 of FC THEN
14/05/2013 14:46:48.14  CELTCIVP    Ent/Ext/Par  N/A.    +00000884  COBOL      External Entry/Exit point, End clause or
14/05/2013 14:46:48.14  CELTCIVP    CELTCIVP     732    +00000888  COBOL      EVALUATE DAYNUM
14/05/2013 14:46:48.14  CELTCIVP    Ent/Ext/Par  N/A.    +00000902  COBOL      External Entry/Exit point, End clause or
14/05/2013 14:46:48.14  CELTCIVP    CELTCIVP     740    +00000906  COBOL      Move 'Wednesday.' to DOW
14/05/2013 14:46:48.14  CELTCIVP    Ent/Ext/Par  N/A.    +00000976  COBOL      External Entry/Exit point, End clause or
14/05/2013 14:46:48.14  CELTCIVP    CELTCIVP     748    +0000097A  COBOL      DISPLAY 'Lilian day ' LILIAN
14/05/2013 14:46:48.14  CELTCIVP    Ent/Ext/Par  N/A.    +000009DA  COBOL      External Entry/Exit point, End clause or
14/05/2013 14:46:48.14  CELTCIVP    CELTCIVP     756    +000009DE  COBOL      DISPLAY ' ' .
14/05/2013 14:46:48.14  CELTCIVP    CELTCIVP     757    +000009F0  COBOL      DISPLAY 'CELTTCIVP is now complete.'.
14/05/2013 14:46:48.14  CELTCIVP    CELTCIVP     758    +00000A02  COBOL      DISPLAY 'CELTTCIVP will now force a Data Exc
14/05/2013 14:46:48.14  CELTCIVP    CELTCIVP     759    +00000A14  COBOL      DISPLAY ' ' the CEETRACE program exec
14/05/2013 14:46:48.14  CELTCIVP    CELTCIVP     760    +00000A26  COBOL      DISPLAY ' ' .
14/05/2013 14:46:48.14  CELTCIVP    CELTCIVP     764    +00000A38  COBOL      ADD 1 TO REPLY-RED.

CEETRACE      Total CPU time consumed for this job step : 12.352  Milliseconds.
CEETRACE      Message associated with current condition is :
CEE3207S The system detected a data exception.

CEETRACE      Program Execution Trace Report Complete
-----
```

The active condition message information is only displayed if the report is produced in response to an unhandled LE/VSE condition. When the reporting feature is called from an application program no condition message is included.

The CPU consumption report is produced in response to the CEETRACE option TIMER=ON being set. C/VSE applications that use the "clock()" function to calculate CPU consumption will report a number less than that produced by CEETRACE. This is because the LE/C clock() library function subtracts the LE/C run-time initialisation CPU overhead from the calculated CPU amount. CEETRACE does not do this.

Source code lines displayed from a COBOL/VSE SYSDEBUG file may be truncated in comparison to the compiler produced listing. This is simply due to reporting space limitations and does not indicate that only part of the source code line was actually executed.

## ***Understanding the CEETRACE Program Execution Report***

The CEETRACE execution report is divided into columns. Starting from the left-most side the first two columns indicate the date and time (to tenths of a second) that the shown program statement was executed. Statements with longer than a 1/300<sup>th</sup> of a second elapsed time will be indicated by an asterisks (\*).

**Version 1.2.1 Fix-pack "A" users :** Any repeatedly executed application language statements that have been detected within a loop of 10 language statements or less which have then been processed using an optimised trace data collection method will be identified with an exclamation (!) mark. The date and time information reported in these exclamation (!) marked trace entries may at times be inaccurate to improve performance.

The next two columns titled "Program\_Name" and "Entry\_Name" show the currently executing program name and when available, the currently executing entry name. The Entry Name is most relevant to PL/1 VSE and C/VSE applications. In some situations the "Program\_Name" field may be blank. This usually indicates an ILC (cross language) static-type call has been made and the new language is not currently aware of the PHASE name. Since in this situation the call is most likely to be static the PHASE name would actually be the same as the preceding language statement.

After these two columns is the "STMT#" column. When available from the application program and language run-time, it will show the currently executing statement number. When the statement number is not available, the characters "N/A" (not available or not applicable) will be displayed.

With C/VSE applications the "Line Number" in the compiler listing will more accurately represent the CEETRACE reported statement number.

The next column is titled "Stmt Offs" which is short for "Statement Offset". This is the calculated program statement offset from the currently executing entry point. It may be one of a number of possible offsets for this statement number if reviewed using the applications compiler listing.

The following column displays the current statements number or offsets programming language.

The final column titled "Statement Source Code" is only applicable to COBOL/VSE programs that have been compiled with the SEP option and have an available SYSDEBUG file. If available, this column will display the source code executed at the displayed statement number. When no statement number or source code line information is available then information may be displayed in the column to indicate some possible explanation for this result. In the situation where there is a problem with the SYSDEBUG file or with accessing it, an error message will be displayed in this column with the return code received from the language run-time. This return code can then be used with the information in message CELR008W to determine what was the nature of the failure.

On processors that support the BEAR (Breaking-Event Address Register) feature that have CEETRACE activated, when a failure occurs any information available in BEAR is extracted by LE z/VSE at interrupt time and then displayed by CEETRACE in a supplementary message :

```
CEETRACE   Message associated with current condition is :  
CEE3201S The system detected an operation exception.
```

```
CEETRACE   Breaking Event Address Reg : 00420AE4  
CEETRACE   Program Execution Trace Report Complete
```

The displayed BEAR information is the address of the instruction that generated the last successful branch before the interruption occurred.

The reported address can then be used to assist with the diagnosis of the reported failure. See the "z/Architecture Principles of Operation" book (SA22-7832-05) for more information on BEAR.



## ***CEETRACE Trace Table***

The CEETRACE feature keeps an application execution table up to a maximum of 63 entries in a wrap-around format in LE managed HEAP storage. Each application statement executed is stored in a table entry immediately after the proceeding statement along with information such as the programming language of the statement, its offset relative to the program entry point and date/time information.

If a call is made to the report generator and then a subsequent severity 2 or greater condition occurs trace table entries reported in the first report may appear again in the abend report. This is because no deletion of entries occurs until the table is full.

Statement time information can also be used to indicate statements that may be taking an excessive amount of time to execute. Statements with longer than a 1 second elapsed time will be indicated by an asterisks (\*) in the "Time" column.

## ***CEETRACE with COBOL/VSE Application Source Code Notes***

For COBOL/VSE applications, if a few simple source code rules are followed, the CEETRACE feature's accuracy can be improved. To ensure correct statement number reporting and source line extraction the following COBOL source coding techniques should be followed :

- The "PROGRAM-ID" field should name both the program and the SYSDEBUG member. Do not enclose the name in quotes or speech marks or use any special characters that are not valid for librarian member names (ending period excluded). The LE/COBOL run-time must validate the program name in the SYSDEBUG member (taken from the PROGRAM-ID field) matches the one executing when trying to extract the source code for a particular statement number.
- Program ending verbs such as "GOBACK" or "STOP RUN" should be followed by an "Exit Program" statement if they are the last source code statement in the program. Paragraphs that are at the end of the program source should end with a closing paragraph statement only. These recommendations will improve the statement number lookup from program execution offsets and reduce the possibility of trace table reports showing a statement number "0" where a valid source code statement number should be.

The above recommendations are optional only to improve the CEETRACE features accuracy when using the COBOL/VSE SYSDEBUG file. The feature will still function without the above COBOL source code changes.

## CEETRACE Application Programming Interfaces

### Manually Invoking the Program Execution Statement Report

Programmers can call the reporting feature during program execution from their own LE z/VSE applications to get an execution report up to the calling statement in the program. The report feature can be called either dynamically or statically.

Following are some examples in each LE z/VSE HLL showing how to do this :

**COBOL** (Note: the below assumes QUOTE is set at compilation time)  
Statically Call "CEL4RPRT".  
Dynamically 01 Trace-Rprt Pic X(8) Value "CEL4RPRT".  
.....  
Call Trace-Rprt.

**PL1**  
Dcl cel4rprt external entry options(assembler);  
.....  
Call cel4rprt;

The use of PL/1's FETCH is also supported.

**C/VSE**  
#pragma linkage (cel4rprt,os)  
#pragma map (exec\_report,"CEL4RPRT")  
int main() {  
.....  
exec\_report();  
}  
via fetch() :  
typedef int (\*funcPtr)();  
funcPtr Addr;  
int rc;  
.....  
Addr = (funcPtr) fetch("CEL4RPRT"); /\* fetch reporter routine \*/  
if (Addr != NULL)  
rc = (\*Addr)(); /\* call CEL4RPRT reporter routine \*/  
.....

The reporting feature can also be called from an LE z/VSE conforming Assembler program but only to report on any entries in the trace table for previously executed HLL programs. Be aware that if the HLL programs are no longer active or loaded that features such as the COBOL source code extraction may not be available.

The reporting feature can be called statically or via the CEEFETCH/CEERELES macros. It cannot be called from non-LE conforming assembler programs or non-LE High level languages.

### CEETRACE High Level Language (HLL) User Exit

#### (CEETRACE V1.2.0 / z/VSE 5.1 and above only)

The exit\_mod option allows the specification of a user exit module that is to be called for each COBOL statement hook or non-COBOL statement, block-entry or program-exit hook executed in a CEETRACE enabled application on z/VSE 5.2 or above. For z/VSE 5.1 only statement hooks are supported.

This exit will be passed a set of parameters. These parameters are mapped using a supplied DSECT macro called CELHLLDS.A which is available in the LE z/VSE installation library.

A sample HLL user exit (CELHLLXT.Z) is also supplied in the LE z/VSE installation library and demonstrates how to use the exit to count a number of HLL statements executed, issue a simple console message and then deactivate itself.

The user exit is only supported as a LE z/VSE conforming (MAIN=NO) assembler PHASE. The exit should not modify any of the provided parameters as this could cause unpredictable results. The exit, however, can copy or reference these parameters and perform specific processing based upon these parameters.

During initialisation of the CEETRACE environment at the HLL program execution, CEETRACE will attempt to load the specified EXIT\_MOD= option requested program exit module. If this load fails and WARN\_MSGS=ON is set then a console message (CELT050W) will be issued stating that the exit program was not able to be loaded.

If the load completes successfully then as CEETRACE traps each HLL statement executed it will call the exit program with the address of the CELHLLDS DSECT area which will contain the following fields :

	<u>Passed As</u>	<u>Contents</u>	<u>IN/Out/Opt</u>
Field 1 :	Half-word Integer	Number of parameters provided	IN
Field 2 :	Statement Language	Halfword indicating language	IN
Field 3 :	Statement Number	Currently executing Stmt Num.	IN
Field 4 :	Exit_Storage_Addr	Address of an 8-byte available work area	IN
Field 5 :	Return-Code	Exit Return Code	OUT
Field 6 :	Program-Name	Halfword prefix Char String	Opt
Field 7 :	Entry-Name	Halfword prefix Char String	Opt

**(z/VSE 5.2 / CEETRACE V1.2.1 and above) :**

Field 8 :	exit_program_offset	Currently executing stmt offset	IN
Field 9 :	exit_Hook_exec_addr	Currently executing hook address	IN

Optional (Opt) parameters contents will be unpredictable if PARM #1 count does not indicate they are provided. The above layout is provided in the macro – CELHLLDS.A - available in the LE z/VSE installation library and contains further parameter details information.

Field 1 value will always be in the range of 4-6. Fields 8 and 9 (**available only with CEETRACE V1.2.1 and above**) are not counted in this value and are either zero, if not available, or a non-zero value if available.

Any non-zero value returned in field “Return-Code” will result in the HLL exit being deactivated. See the CELHLLDS.A macro provided in your LE z/VSE installation library for more information.

Any un-handled program exceptions experienced by the active “Exit\_mod” will cause the application to terminate.

To activate a created HLL exit routine using the attention routine commands, the following console command would set the supplied sample CELHLLXT as an active user exit :

```
s cee,ceetrace=(exit_mod=celhllxt)
```



## **CEETRACE LE z/VSE Run-Time Option Requirements**

For the CEETRACE feature to function correctly, the following LE/VSE run-time options need to be set :

- Trap                    ON,MAX                    (ON,MIN is accepted but not recommended)
- Abtermenc            ABEND                    (RETCODE is accepted but not recommended)
- Storage               00,NONE,00,32K        (BATCH recommendation)  
                             00,NONE,CLEAR,0K    (Minimum required under CICS)  
                             00,NONE,00,0K        (recommended under CICS)

## **CEETRACE Feature Restrictions**

- There is **NO NATIONAL LANGUAGE SUPPORT** for the CEETRACE feature. All CEETRACE messages both printed and console are available in English only.
- CEETRACE supports only the LE z/VSE run-time (1.4.8 or above) library at execution time.
- Both BATCH and CICS environments are supported with the following restrictions -
  1. DOS/VS COBOL or VS/COBOL II compiled subroutines link edit with LE/VSE are not supported for tracing but will be tolerated. Main programs will cause CEETRACE to be deactivated.
  2. DOS/VS COBOL or VS/COBOL II sub or main programs link edited with a non-LE/VSE runtime are not supported nor tolerated.
  3. LE-enabled Assembler is not supported but is tolerated. LE HLLs invoked via the CEEFETCH macro from LE-enabled assembler that conform to the CEETRACE requirements on Pg 11 are supported.
  4. DOS/PL1, RPG, C/370 and System Programmer /C are not supported nor tolerated.
  5. Non-LE enabled assembler is not supported but will be tolerated so long as standard S/390 linkage conventions are followed.
  6. When using PL/1 for VSE or C/VSE as a “main” program the C/VSE or PL/1 for VSE program must be compiled with at least TEST(ALL,SYM). Subroutines can be a mix of TEST and NOTEST.
  7. CEETRACE and Debug Tool for VSE cannot be used at the same time in the same LE enclave. Except for the PL/1 Multi-Tasking exception noted on Pg 17.
  8. Use of the LE/VSE run-time option TRAP(OFF) is not supported.
  9. CEETRACE feature output reports and messages are NOT supported as programming interfaces and may be changed at any time.
  10. The CEETRACE feature uses an installation-wide LE z/VSE High Level Language exit (CEE5BINT) to perform its functions. If your environment already makes use of this exit point (or a statically linked version) then it cannot be used in conjunction with the CEETRACE feature.
  11. Calling CEE5ABD with timing = 0 (no cleanup processing) will cause the CEETRACE feature exit not to be called. Resulting in no CEETRACE execution report.
  12. Using a registered condition handler, or language provided handlers, will result in no CEETRACE report when any conditions handled by the user handler are “resumed”. However, the user condition handler can call the CEETRACE reporting tool (CEL4RPRT) to generate a CEETRACE program execution report.
  13. C/VSE applications need to be compiled with the OPT(0) compiler option as well as the other requirements (see Pg 11) for CEETRACE to be able to produce a statement execution report.
  14. COBOL run-time issued user abends resulting from I/O errors do not invoke the LE abnormal termination exit so no CEETRACE report will be automatically produced in these situations.

## **CEETRACE and Pre-Initialised Run-Time Environments**

- CEETRACE can be used with any supported LE/VSE applications invoked via CEEPIPL.
- The LE z/VSE supplied ILBDSET0 is supported when correctly compiled (see pg 11) COBOL/VSE programs are executed in the environment. Mixed non-LE assembler and/or other HLLs with COBOL, are not supported by CEETRACE in this environment.
- IGZERRE is supported for correctly compiled (see pg 11) COBOL/VSE programs if using the LE z/VSE 1.4.8 (or above) supplied IGZERRE module. Previous versions of IGZERRE are not supported and may cause CEETRACE to be deactivated if used. Mixed non-LE assembler and/or other HLLs are also not supported by CEETRACE in this environment.

## ***CEETRACE and CICS Considerations***

CEETRACE and EXEC CICS LINK or EXEC CICS XCTL calls to correctly compiled applications are supported. When COBOL/VSE applications are the target of EXEC CICS LINK calls and the execution report is produced after an EXEC CICS RETURN (or GOBACK) from the LINK'ed to program the side-file and source code information may no longer be available. An appropriate message will be displayed in the execution trace report.

Any CEETRACE report produced under CICS for a transaction that involves the execution of EXEC CICS LINK or XCTL target programs will only include executed programs within the singularly active LE-enclave at the time the report was produced.

Even if the TIMER option is set to “ON”, no CPU time information will be reported in CICS CEETRACEabend reports.

If there is an active Stack Frame Zero (LE z/VSE run-time option USRHDLR) user condition handler active in the CICS system, CEETRACE will not be able to produce any statement execution history reports unless the user condition handler always returns to LE via the CEETERM macro. Any use of an EXEC CICS RETURN call by the user condition handler when completing execution will circumvent CEETRACE reporting.

## ***CEETRACE use with Database and SORT Product Considerations***

If TRAP(ON,MIN) is set when using DL/1, DB2 or SORT with CEETRACE the program execution report may not be produced if the database or sort product took control of any application failures. This can be as a result of LE's abnormal termination exit not being called so as to ensure any required database back-out processing is performed. It is recommended that TRAP(ON,MAX) be used instead.

## ***CEETRACE and PL/1 Multi-Tasking Applications***

PL/1 multitasking applications (eg those PL/1 “main” programs compiled with the “task” option) are supported by CEETRACE. Individual execution report(s) will be produced for each individual task enabled for CEETRACE use. A single execution report cannot be combined over multiple PL/1 tasks.

If the parent task terminates before any underlying child task(s) complete, the CEETRACE report may not be produced for those child task(s). It is the programmers responsibility to ensure correct synchronisation of parent/child task(s) and that correct task termination is performed. That is parent tasks wait for termination of any subordinate child task(s) before terminating themselves.

## ***CEETRACE Auto Report Feature Options***

### ***(CEETRACE V1.2.0 / z/VSE 5.1 and above only)***

This feature allows the specification of an entry point name and statement number at which to automatically produce an execution history report. An execution report can also be produced after a specified number of statements, within any number of CEETRACE enabled applications, has been executed.

For example -

If you have an PL/1 VSE application which has a procedure entry point of “subt2” and you want a program execution statement report to be automatically produced when statement number 413 within “subt2” is executed, you would set the following CEETRACE options using the attention routine (operator console) commands :

```
s cee,ceetrace=(auto_rprt_epn=subt2)
s cee,ceetrace=(auto_rprt=s413)
```

#### **Please note!**

When using the attention routine over-ride commands for the auto report feature as in the previous example, the auto\_rprt\_epn over-ride must be issued prior to any auto\_rprt options set that use the “s” prefix. This is to ensure that when a specific statement number is to be used as a trigger for an execution report that the entry point name containing that statement number is specified first.

To produce an program execution statement report every time after a total of 6,531 statements have been executed within a CEETRACE enabled application, you would set the following options using the attention routine :

```
s cee,ceetrace=(auto_rprt_epn=off)
s cee,ceetrace=(auto_rprt=r6531)
```

Note – In all instances the program execution statement report produced will be the complete current trace table. If a small repeat number is used or the application is in a tight and/or long loop this can result in duplicate trace table entries being reported multiple times.

The auto\_rprt\_epn option can accept a maximum of 12 characters for an entry point name. See z/VSE Systems Control Statements under “PHASE” for acceptable entry-point names. The auto\_rprt option can accept a statement or repeat number no greater than 65535.

The above auto report feature options can also be specified in the CEETRACE.INI file.

For the automatic reporting facility to work the application must be enabled for use with CEETRACE and be executed in a CEETRACE enabled (included or not excluded) partition.

To turn off any auto\_rprt settings, you set both “auto\_rprt\_epn” and “auto\_rprt” to the value “off” or “no” using the attention routine operator commands.

#### **CEETRACE V1.2.1 with PTF UI28683 or above :**

Whenever one auto report option is set to “off” or “no” using the attention routine operator commands the other option will automatically be deactivated as well.

## CEETRACE Mini Dump Option (CEETRACE V1.2.0 / z/VSE 5.1 and above only)

A small formatted dump of any associated CIB (condition information block) and Machine State Block can be included in a execution statement history report associated with an unhandled condition by specifying the mini\_dump=yes option. To turn this feature off use the mini\_dump=no option.

Example of a CEETRACE provided mini\_dump :

CEETRACE requested MINI\_DUMP begins.

CIB for : 005D74E0

+000000	CIB_Eye..	CIB	CIB_Back.	00000000	CIB_Frwd.	00000000	CIB_Size.	010C	CIB_Ver..	0009
+000010	CIB_Plat.	00000005	Reserved.	00000000	CIB_Cond.	00030C87	59C3C5C5	00000000	CIB_Mach.	005D75EC
+000028	CIB_OLdc.	00030C87	59C3C5C5	00000000	CIB_Flg1.	00	CIB_Flg2.	00	CIB_Flg3.	00
+000037	CIB_Flg4.	00	CIB_HDsf.	00000000	CIB_HDen.	804B3A00	CIB_HDrs.	00000000	CIB_RMsfsf.	00608160
+000048	CIB_RMpt.	00420AB6	CIB_RSmh.	00451948	Reserved.	00000005	00000000	00000000	00000000	00000000
+000064		00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
+000088		00000000	00000000		CIB_Vsr..	00000000	00000000		CIB_Vsto.	00000000
+00009C	CIB_Vpsa.	00000000	CIB_Mcb..	00000000	CIB_Mrn..	00000000	00000000		CIB_Mflg.	00
+0000AD	Reserved.	000000	CIB_flg5.	40	CIB_flg6.	27	CIB_flg7.	40	CIB_flg8.	00
+0000B4	CIB_ABcd.	00000020	CIB_ABrc.	00000007	CIB_ABnm.		CIB_Pl...	0042008C	CIB_SV2..	00608160
+0000CC	CIB_SV1..	00608160	CIB_Int..	00420AB0	CIB_Qdat.	00000000	CIB_FdBk.	00000000	CIB_Fun..	00000001
+0000E0	CIB_Toke.	00608160	CIB_Mid..	00000005	CIB_Stat.	0000000A	CIB_Rtcc.	00000014	CIB_Ppav.	00000001
+0000F4	CIB_ABte.	CEL4RPRT	CIB_Sdwa.	005FA028						

Machine State: 005D75F4

+000000	MCH_reg0.	AE4BDBF0	MCH_reg1.	004560D4	MCH_reg2.	005A17EC	MCH_reg3.	005FDC38	MCH_reg4.	004200B0
+000014	MCH_reg5.	005FA6B8	MCH_reg6.	00000000	MCH_reg7.	00000000	MCH_reg8.	005A1A70	MCH_reg9.	005FDC30
+000028	MCH_regA.	0042018C	MCH_regB.	00420514	MCH_regC.	0042016C	MCH_regD.	00608160	MCH_regE.	80420AB0
+00003C	MCH_regF.	00000000	MCH_psw..	07DD3400	80420AB6		MCH_ilc..	0006	MCH_intc.	0007
+00004C	MCH_Rsvd.	00000000	MCH_Fltp.	41100000	00000000	4BC57512	27EE0000	4E000000	0002657A	18000000
+00006C		00000000	MCH_Rsvd.	00000000	00000000	00000000	00000000	00000000	00000000	00000000
+00008C		00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
+0000B0		00000000	00000000	00000000	00000000	00000000	00000000	00000000	MCH_Bear.	004C5DD6

CEETRACE requested MINI\_DUMP complete.

For detailed information on the CIB fields shown see the LE z/VSE Debugging and Messages Guide, section “Debugging with the Condition Information Block”.

### Restriction:

A mini\_dump can only be produced if the report destination (see “report” CEETRACE initialization option on Pg 20) specified is JOB or if using LE that the LE z/VSE TERMTHDACT run-time option is not set to the LSTQ option. A mini\_dump will also be suppressed if a LE z/VSE 4083 Abend Trace-back report is produced.

### CEETRACE Initialisation Options

Details for each of the CEETRACE feature options are available in the supplied CEETRACE.Z member or, if after installation, the created CEETRACE.INI librarian member in the LE/VSE installation library.

The following CEETRACE feature options are listed for reference purposes only. See the provided CEETRACE.INI file for more details.

CEETRACE Feature Option	Option Information
ceetrace= <u>on</u>   off	Set status of the CEETRACE feature at LE/VSE attention routine initialization time.
report= <u>LE</u>   JOB*	What destination is to be used for the CEETRACE Program Execution report. <ul style="list-style-type: none"> <li>LE = Use the LE TERMTHDACT runtime option setting</li> <li>JOB = The execution report will be directed to LE's MSGFILE current setting.</li> </ul>
source_code= <u>yes</u>   no*	<b>COBOL/VSE only.</b> Include the display of source code lines in the Program Execution report if a valid SYSDEBUG file is available.
trace_tabsz= <u>52</u>	Number of program statement execution entries to be saved in the wrapping trace table. Can be any value between 10 to 63. WARNING – forcing this value to anything less than 10 or greater than 63 will result in unpredictable errors.
warn_msgs= <u>on</u>   off*	Display or disable any warning messages during CEETRACE execution. Severe or error level messages are always displayed as are all levels of output report messages.
env_validation= <u>off</u>   min   heap   full*	What level, if any, of LE z/VSE environment checking is to be performed at each statement executed. <ul style="list-style-type: none"> <li>off = No validation</li> <li>min = Minimal environment checking</li> <li>heap = Heap storage validation</li> <li>full = Perform all environment checking</li> </ul> Activating this option will have a negative performance impact. See “Environment Validation Processing” for more details.
exclude_part= <u>f1,f3,f7,y1,y2,y3,r1</u> **include_part=	What partitions to exclude or include from CEETRACE. Can be up to 32 (or to column 78) partitions. Wild cards are not permitted. NOTE - include_part and exclude_part options are mutually exclusive.
timer=on   <u>off</u> *	Include CPU consumption time in the CEETRACE Execution report? Will only be displayed if the execution report is in response to a LE/VSE condition occurring. Not available under CICS. Requires SYS JA=YES set at IPL.
**mini_dump=yes   <u>no</u> *	Produce a small formatted dump of the active condition information block and if there is one available, the machine state information.
**auto_rprt=Rnnnn   Snnnn   off*  **auto_rprt_epn=entry point name   off*	Produce an execution history report at Stmt number 'nnnnn' or after R nnnn statements have been executed. See “Auto Report Feature Options” for more details.
**exit_mod=exit_module_name   <u>off</u> *	HLL User exit to be called at certain HLL compiler generated hooks.

**Table 1: CEETRACE Feature Initialisation file Options**

\*Option can be over ridden using the CEETRACE Attention Routine commands.

\*\*Option available in CEETRACE V1.2.0 and above only.

**Notes :**

- Any applications executed that do not use LE z/VSE will not invoke CEETRACE.
- If both “include\_part” and “exclude\_part” are specified the last option found will be processed.

## **CEETRACE Environment Validation Processing**

With z/VSE 5.2 (CEETRACE V1.2.1) a CEETRACE program execution statement report will now be produced whenever a specified environment validation check fails. The produced program execution statement report will specify at which statement in the application program the environment validation check failed. Message CELT060E will also be displayed on the operator console.

Once an environment validation check failure has been detected and the program execution statement report produced the environment validation checking that failed will be disabled for the remaining execution of the application.

There may be occasions when two CEETRACE program execution statement reports are produced for what appears to be the same environment corruption. This can be due to a program execution statement report being produced in response to the defined environment validation failing and then again if a LE z/VSE condition is also raised when LE z/VSE detects the same corruption. This will mainly occur for HEAP overlay failures whenever a subsequent condition (eg CEE0802C ) is raised.

When “heap” (or “all”) validation is set LE may also issue message “CEE3701W Heap damage found by HEAPCHK Run-time option” even though the HEAPCHK run-time option is not enabled. CEETRACE will implicitly activate the LE HEAPCHK option in addition to the internal CEETRACE heap validation processing. This message does not indicate a further error but rather enables more diagnosis information to be reported on the detected HEAP storage corruption.

It is also recommended that if HEAP environment checking is activated that the LE z/VSE HEAPCHK option left to “OFF”. The LE z/VSE HEAP checking and CEETRACE environment HEAP checking should be considered mutually exclusive from an application execution perspective. The CEETRACE HEAP environment checking is much more comprehensive and will also include the LE z/VSE HEAPCHK verification process.

## **CEETRACE Further Information And External References**

The “CEETRACE New Features, Tips and Tricks” document includes detailed information on the use of the HEAP storage corruption and environment validation function to assist with identifying the HEAP storage overlay or corruption HLL program and statement number responsible.

Ref : <http://www.slideshare.net/lezvse/ceetrace-nnew-featurestipsandtricks>

A video tutorial using a COBOL/VSE sample program that specifically causes a HEAP storage overlay and then uses the CEETRACE environment validation feature to identify the program name and statement number that was responsible can be viewed here :

Ref : <http://vimeo.com/69933156>

Tips on CEETRACE uses and new features are also regularly posted on the LE z/VSE Developerworks blog. This can be viewed at the below link :

<https://www.ibm.com/developerworks/community/blogs/lezvse/?lang=en>

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## CEETRACE Fix-Pack Updates

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### ***CEETRACE Fix-Pack Alternative Transfer Method***

Before applying any updates to CEETRACE, please review the accompanying README file for any special information. Below is an alternative method for transferring any CEETRACE fixpack update job to your z/VSE system.

#### **UPDATE APPLY PROCEDURE**

This job can be sent via:

1. FTP to the VSE reader (FIX BIN 80) , or
2. IND\$file (File Transfer) to the reader of the VSE system .... or
3. Over VM.

#### **In case IND\$file is used:**

- a.) IUI dialog "PC FILE TRANSFER" should be entered (fastpath: 386)

- 3 Operations
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The screen displayed here says:

"Please switch to PC mode to initiate a file transfer or press PF3 to quit."

- b.) Then following command should be submitted in the PC command box:

```
send ceetrace.update a:ceetrace (file=rdr binary lrecl=80 nouc
```

a: is the session id (VSE)

#### **In case VM is used:**

The fixtest job should be sent via:

```
send ceetrace.update a:ceetrace update f (lrecl 80
```

a: is session id (VM)

The following commands will then suit for transfer to the VSE machine:

```
SP00L PUN TO vse_machine  
PUN / (NOH
```

On the VSE-side the reader must be started via: S RDR,00C,A

### ***CEETRACE Fix-Pack Updates Download Sites***

For all available updates, to ensure your CEETRACE environment is at the most current level, please regularly check the following link for download-able fixpacks :

<https://www.ibm.com/developerworks/community/blogs/lezvse/?lang=en>

or

<http://www-03.ibm.com/systems/z/os/zvse/downloads/tools.html#ceetrace>

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## CEETRACE Utilities

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### **COBOL/VSE Source Code Extraction Utility**

Supplied with the CEETRACE feature is a COBOL/VSE source code extraction utility. The utility can produce original source code from a COBOL/VSE load module (BATCH or CICS) *that had originally been compiled with the SEPARATE sub-option of the COBOL/VSE compiler TEST option which has a valid and available SYSDEBUG member*. Currently only COBOL routines that have an available load-module (PHASE) are supported. Multiple statically linked COBOL sub-routines that do not have associated load-module cannot be extracted. This COBOL/VSE compiler option combination will produce a SYSDEBUG (side file) member that contains both the symbol table information (for use during run-time dump production) and the compressed source code used to produce the final object code. It is this source code that the extraction utility can reproduce. Use of the extraction utility is by a VSE BATCH job. A single parameter is required that contains the name of the COBOL/VSE load module you wish to extract the source code for using the associated SYSDEBUG member.

Input for the BATCH job requires // LIBDEF PHASE JCL statement for both the load module and the SYSDEBUG member. Alternatively you can specify a // LIBDEF \* to allow searching and loading of both members. The LE/COBOL runtime will perform standard verification on the load module and associated SYSDEBUG member so as to ensure they were created together by the COBOL/VSE compiler.

Output from the utility is in two formats. The extracted source code will be included in the job print output along with the compile options used to produce the specified load module. The source code will also be punched to SYSPCH in 80 byte records. A 2520B2-type punch output device is recommended. COBOL copy statements will be expanded.

Following is some sample JCL to use the utility.

```
* $$ JOB JNM=COBSRCE,CLASS=0,DISP=D
* $$ LST CLASS=A,DISP=D,DEST=*
* $$ PUN CLASS=A,DISP=D,DEST=*
// JOB COBSRCE - Extract COBOL source code from SYSDEBUG Member
// LIBDEF *,SEARCH=(PRD2.SCEEBASE,TEST.LIB)
// EXEC CEL4PLST,SIZE=CEL4PLST,PARM='/COBPROG'
/*
/&
* $$ EOJ
```

Note : If you have a BATCH COBOL SYSDEBUG exit it will be called.

**TEST.LIB** = library containing both the COBOL/VSE load module and the associated SYSDEBUG member. You can add more sub-libraries to the search chain if your SYSDEBUG members and load modules are kept separate.

**COBPROG** = The COBOL/VSE program load module to extract the source code for.

Expanded COBOL “COPY” statements presented between the IDENTIFICATION DIVISION and PROCEDURE DIVISION paragraphs can automatically be commented out by setting the // UPSI 00000100 switch.



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## CEETRACE Feature Messages

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### **CELP – COBOL/VSE Source Code Extraction Utility Messages**

#### **CELP002E Load module compiled with NOTEST.**

Explanation: The load module being requested for source code extraction has not been compiled with the TEST COBOL/VSE compiler option. This is required to produce a corresponding SYSDEBUG member where the programs source code can be extracted from.

System Action: Processing continues

Programmer Response : No source code is extracted.

Operator Response: None

#### **CELP003E Load module compiled with NOSEP.**

Explanation: The requested COBOL/VSE load module has been compiled with the TEST option but the SEP sub-option was not specified. Resulting in no corresponding SYSDEBUG member being available.

System Action: Processing continues

Programmer Response : No source code is extracted.

Operator Response: None

#### **CELP004E Load module not identifiable as COBOL/VSE.**

Explanation: The requested load module has not been compiled with a supported COBOL/VSE compiler.

System Action: Processing continues

Programmer Response : No source code is extracted. Ensure the requested load module is a valid COBOL/VSE compiled module. The entry point of the load module must point to a COBOL/VSE program.

Operator Response: None

#### **CELP005E Unable to continue. No parameter supplied.**

Explanation: This execution of CEL4PLST does not include a valid JCL PARM card specifying the COBOL/VSE load module to extract the source code from.

System Action: Processing continues

Programmer Response : No source code is extracted.

Operator Response: None

#### **CELP006E Load for requested module failed.**

Explanation: The requested COBOL/VSE load module could not be loaded. Ensure the load module is available in the // LIBDEF search chain active, that the partition being used is sufficient in size to load the module and that the appropriate authority has been granted.

System Action: Processing continues

Programmer Response : No source code is extracted.

Operator Response: None

#### **CELP007E Parameter Load module name too long.**

Explanation: The requested COBOL/VSE load module name is greater than the allowed 8 characters.

System Action: Processing continues with no source code produced.

Programmer Response : Correct the COBOL/VSE program load module name and re-run.

Operator Response: None

#### **CELP009E Invalid TGT returned from COBOL program.**

Explanation: The requested COBOL/VSE load module may have been compiled with a prior version of COBOL/VSE that does not support the SYSDEBUG file.

System Action: Processing continues with no source code produced.

Programmer Response : No source code is extracted.

Operator Response: None

#### **CELP010E COBOL Event Handler return code =**

Explanation: The LE/COBOL run-time has returned an error when extracting the source code from the available

SYSDEBUG member.  
System Action: Processing continues with no source code produced.  
Programmer Response : Note the return code returned and contact IBM support for assistance. No source code is extracted.  
Operator Response: None

**CELP011S SYSPCH open has failed. Terminating.**  
Explanation: The open request for the SYSPCH device has failed.  
System Action: Execution is terminated.  
Programmer Response : Ensure SYSPCH is assigned to a valid device – preferably a 2520B2. If device assignment is correct then contact your IBM service center for assistance. No source code is extracted.  
Operator Response: None

### Messages that appear in the output report.

**CELP100E Compiler options unavailable. Load request for service failed.**  
Explanation: When attempting to produce the compiler options report the required service module could not be loaded.  
System Action: Processing continues with no compiler options report produced.  
Programmer Response : Ensure you have a current LE/COBOL run-time release and that the job executing has sufficient authority to load modules from the LE z/VSE installation sub-library.  
Operator Response: None.

**CELP101W Beta COBOL COPY source code statement removal code has been activated.**  
Explanation: The COBOL “COPY” beta code to comment out expanded COPY books found between the IDENTIFICATION DIVISION and PROCEDURE DIVISION paragraphs has been activated.  
System Action: Processing continues.  
Programmer Response : Verify the reproduced source code COPY statements that are expanded have been commented out.  
Operator Response: None.

## CELR – CEETRACE reporting module messages

### CELR003W No entries in Trace Table. Check compile options used.

Explanation: The CEETRACE table is empty. No trace information can be produced.

System Action: Processing continues

Programmer Response : Check that the application in question has been compiled with the required TEST options and a supported compiler version. Verify that the CEETRACE facility is currently active.

Operator Response: None

### CELR004S Trace Table Corrupt. Report failed.

Explanation : The trace table used for reporting on program execution flow as been overlaid or corrupted in some way.

Programmer Response : Contact your systems programmer or IBM service representative. Follow the recommendations on pg 29 "how to report a problem" when reporting this problem.

System Action : A SDUMP is taken of the active partition. Please keep this dump for analysis.

Operator Response: None

### CELR008W A Side-File Request has failed. Source code extraction unavailable. <pgmname>

Explanation : When requesting access to the required SYSDEBUG file a failure occurred.

Response codes :

4	SYSDEBUG file could not be located
8	Storage allocation failure
12 (C)	Storage freeing failure
16 (10)	SYSDEBUG member open failure
20 (14)	SYSDEBUG member close failure
24 (18)	SYSDEBUG member read failure
28 (1C)	Decompression failure
32 (20)	Storage request failed
44 (2C)	SYSDEBUG member verification failed.
48 (30)	Unexpected EOF reached while reading SYSDEBUG
52 (34)	Program no longer available in storage.

Programmer Response: Review the produced CEETRACE report. Displayed at the end of the "STMT SRC" column may be the return code received in hex to match the above response codes.  
Information relating to the problem may also be displayed in the "STMT SRC" column. You may find "Side File or Program is no longer available", "Side File request failed. Insufficient storage." or "Side File unavailable. Verification failed".  
Ensure the side-file used and load module match. Consider recreating the side-file and load module for <pgmname>.

System Action : Processing continues without the use of the SYSDEBUG file. This may result in statement numbers and source code information missing from the CEETRACE report.

Operator Response: None

### CELR009W Unable to locate statement number in SYSDEBUG member.

Explanation : When attempting to locate the source code line for a particular statement number there was no corresponding source code line found.

Programmer Response: Ensure the correct SYSDEBUG member is being used. Re-create the SYSDEBUG member using the compiler TEST(ALL,SYM,SEP) option. Review the produced CEETRACE report and look for any statement numbers missing source code line text. Compare the statement number reported with the compiler output listing to verify  
valid source code is at the indicated statement number. If not, a possible mismatch between the SYSDEBUG member and load module may exist. This message may also be included in the program execution report with the return code received from the LE/COBOL run-time in response to the statement number search.

Ensure the PROGRAM-ID name matches the created SYSDEBUG member name.

If this message persists after verification that the SYSDEBUG member and COBOL load module are consistent then contact your IBM support center for assistance.

System Action: The report continues to be produced without the source code for the missing statement number.

Operator Response: If not already set, use STOR(00,NONE,00,0K) under CICS as either an application over-ride or as a CICS-wide default. CELR can be used to test the change resolves the CELR009W if desired.

<b>CELR013W</b>	<b>Unable to determine LE TERMTHD option. Using job log default.</b>
Explanation :	When attempting to extract the active LE z/VSE enclave's TERMTHDACT run-time option settings, an invalid or indeterminable value was found.
Programmer Response:	Ensure a valid TERMTHDACT destination sub-option is set.
System Action:	The report is produced to the currently default output destination set by MSGFILE.
<b>CELR014E</b>	<b>Request for LSTQ member open has failed with <i>retcode rc</i> and <i>reasoncode rsncode</i>.</b>
Explanation :	When attempting to communicate with VSE/POWER and open a LSTQ member to receive the CEETRACE output report, the open failed with the inserted return code and reason code.
Programmer Response:	Use the displayed return code and reason code information in conjunction with the XPCC return code and reason codes from LE/VSE to determine the failure reported.
System Action:	The creation of the LSTQ member is aborted and the CEETRACE report is written to the LE MSGFILE destination.
Operator Response:	None
<b>CELR015E</b>	<b>Request for LSTQ member put has failed with <i>retcode rc</i> and <i>reasoncode rsncode</i>.</b>
Explanation:	When attempting to communicate with VSE/POWER and write to a LSTQ member with the CEETRACE output report, the write request failed with the inserted return code and reason code.
Programmer Response:	Use the displayed return code and reason code information in conjunction with the XPCC return code and reason codes from LE/VSE to determine the failure reported.
System Action:	The LSTQ member is not created and the report is terminated.
Operator Response:	None
<b>CELR018I</b>	<b>The CEETRACE program execution report has been written to the requested LSTQ member.</b>
Explanation:	The LE TERMTHDACT option specifies LSTQ and the CEETRACE.INI has LE set for the "REPORT" option. This has resulted in the CEETRACE report being written to a VSE/POWER LSTQ member whose name has been constructed from the originating VSE/POWER job name and stored in the class specified in the LE/VSE LSTQ options.
Programmer Response:	None.
System Action:	None.
Operator Response:	None.
<b>CELR019E</b>	<b>Request for LSTQ member END has failed with <i>retcode rc</i> and <i>reasoncode rsncode</i></b>
Explanation:	During the creation of the LSTQ member containing the CEETRACE report, the END request sent to VSE/POWER has failed with the included return code and reason codes.
Programmer Response:	The displayed return code and reason code should be investigated using the VSE/POWER Application Programming guide and the appropriate resolution action taken.
System Action:	The LSTQ member is not created and the report is terminated.
<b>CELR020W</b>	<b>Starting Language Environment for z/VSE CEETRACE report</b>
Explanation:	The CEL4RPRT report generator module has been called due to an application failure.
Programmer Response:	None.
System Action:	A CEETRACE report is produced up to the statement that failed.
Operator Response:	None
<b>CELR021W</b>	<b>Language Environment for z/VSE CEETRACE report complete</b>
Explanation:	The CEETRACE report is complete. This message is also issued if an explicit call to the CEL4RPRT report generator module has been made and then completed.
Programmer Response:	None.
System Action:	A CEETRACE report is produced to the destination specified in the CEETRACE.INI file.
Operator Response:	None

<b>CEL022W</b>	<b>CEETRACE has not been enabled for this application or partition.</b>
Explanation:	The CEL4RPRT report generator module has been called to produce a trace report but the CEETRACE feature is not installed or activated correctly, the application does not meet the requirements for tracing, the partition being used is part of the exclusion list or not listed in the the inclusion list.
Programmer Response:	Ensure the application has been compiled with the correct options, that the CEETRACE feature has been installed correctly, initialized and activated. Also ensure the application is being executed in a partition that is not in the CEETRACE options exclusion list.
System Action:	No CEETRACE report is produced.
Operator Response:	None
<b>CEL024W</b>	<b>CEETRACE table not available. No report can be produced.</b>
Explanation:	The CEL4RPRT report generator module has been called to produce a trace report but the application does has not met the requirements for tracing, the partition used has been excluded or their has been a problem during initialization of the CEETRACE feature for this application.
Programmer Response:	Ensure the application has been compiled with the correct options, that the CEETRACE feature is installed and activated correctly and that there is sufficient available storage in the partition to support the CEETRACE feature. Ensure the partition being executed in is not in the CEETRACE exclude list. Verify LE runtime option TRAP(OFF) is not set. <b>Note</b> This message is issued even of WARN_MSGS=OFF is set if a call (static or dynamic) has been made to the report generator routine (CEL4RPRT) from an application program.
System Action:	No CEETRACE report is produced.
Operator Response:	None
<b>CEL025W</b>	<b>CEETRACE has not been activated. No report is produced.</b>
Explanation:	The CEL4RPRT report generator module has been called to produce a trace report but the CEETRACE feature has not been initialized or activated.
Programmer Response:	Ensure that the CEETRACE feature is installed and activated correctly. Use the D CEE,CEESTAT console command to determined the current CEETRACE feature status.
System Action:	No CEETRACE report is produced.
Operator Response:	None
<b>CEL027W</b>	<b>Message text for the current condition is unavailable.</b>
Explanation:	The CEL4RPRT report generator module has been called to produce a trace report but the LE message text associated with the current condition could not be retrieved.
Programmer Response:	Ensure all the LE message modules are available at run-time and that the job executing has sufficient authority to load them. Check the partition for sufficient available GETVIS storage.
System Action:	No condition information is included in the CEETRACE report produced.
Operator Response:	None
<b>CEL029W</b>	<b>A call to CEL4RPRT was made but the LE Attention Routine Interface is not initialized.</b>
Explanation:	An user application has called the CEETRACE reporting module, CEL4RPRT, but the LE attention routine interface has not been initialized. This is required before the CEETRACE feature can be initialized and used.
Programmer Response:	Ensure that the CEEWARC job has been run since the last IPL and that it run successfully. Use the D CEE,CEESTAT console command to determined the current LE Attention Routine Interface and CEETRACE feature status.
System Action:	No CEETRACE report is produced.
Operator Response:	None
<b>CEL034W</b>	<b>mini_dump requested but not produced due to TERMTHDACT=LSTQ set.</b>
Explanation:	A CEETRACE execution trace report is being produced for a condition when mini_dump=yes has been set in the CEETRACE.INI file. However REPORT=LE is also set and the LE TERMTHDACT run-time option has LSTQ defined as the output destination.
Programmer Response:	None. Warning only. Currently CEETRACE does not support LSTQ as a destination for mini_dump reports. Using any available over-ride for the LE TERMTHDACT run-time option for this application to not specify LSTQ will allow the mini_dump to be produced.
System Action:	No mini_dump is produced.
Operator Response:	None
<b>CEL045E</b>	<b>CEETRACE is currently inactive. No report can be produced.</b>

Explanation : A call to CEL4RPRT has been made when either CEETRACE is not installed or has been deactivated for this partition or application.

Programmer Response : If a CEETRACE program execution report is required ensure that the application has been built to support CEETRACE, that the partition being used for executed is not excluded (or is included) and that the application JCL is not deactivating CEETRACE via the SETPARM..

System Action : The application continues without an execution report being produced.

Operator Response : None.

## CEETRACE Execution Report Messages

These are the messages that may appear in the "Statement Source Code" column of the CEETRACE Execution Report when a problem related to extracting the source code has occurred.

### Side-File or Program is no longer available.

*rc*

Explanation : The side-file or program being reported on is invalid or no longer available in storage.

Programmer Response : Possible values for "rc" are :

-4		Function ignored or not supported by language event handler
0		Function completed successfully by language event handler
16	(10)	Requested SYSDEBUG member not available. Function failed.
32	(20)	Storage request failed
44	(2C)	SYSDEBUG member verification failed.
48	(30)	Unexpected EOF reached while reading SYSDEBUG
52	(34)	Program no longer available in storage.

For return code 16(10) under CICS check the program is still available in storage at the time of the report. If it is then consider recreating the SYSDEBUG member again. For BATCH ensure the SYSDEBUG member for the executing program is available in the active LIBDEF search chain at the time of execution.

For return code 32, increase the available 31-bit GETVIS for the application.

For return codes 44 and 48 consider recreating the SYSDEBUG member again.

Return code 52 indicates the COBOL program has been removed from storage.

System Action : No side-file information is displayed for this program.

Operator Response : None.

### Source\_code=no set or SYSDEBUG unavailable

Explanation : A previously issued message may explain the reason for the SYSDEBUG member being unavailable. The program being traced may not have been compiled with the SEP sub-option of the compiler TEST option.

Programmer Response : Ensure you have Source\_code=yes set in the CEETRACE.INI file if desired or a SYSDEBUG member is available for the COBOL program being traced. Review the previous message and the return-code displayed.

System Action : No source code information is displayed for this program.

Operator Response : None.

### Unable to locate statement number in SYSDEBUG member.

*rc*

Explanation : When attempting to locate the source code line for a particular statement number there was no corresponding source code line found.

Programmer Response: Ensure the correct SYSDEBUG member is being used. Re-create the SYSDEBUG member. Review the produced CEETRACE report and look for any statement numbers missing source code line text. Compare the statement number reported with the compiler output listing to verify valid source code is at the indicated statement number. If not, a possible mismatch between the SYSDEBUG member and load module may exist.

Refer to section "COBOL/VSE Application Source Code Notes" . Also see the return codes listed for message CELR008W for further explanation.

If this message persists after verification that the SYSDEBUG member and COBOL load module are consistent then follow the "How to report a problem" section and then contact

your IBM support center with the problem information for assistance.

System Action: The report continues to be produced without the source code for the missing statement number.

Operator Response: None

## **CELT – CEETRACE Tracing module Messages**

<b>CELT013S</b>	<b>Anchor is corrupt or missing. Terminating.</b>
Explanation:	The CEETRACE anchor area allocated at initialization time has either been overlaid or failed to be created.
Programmer Response:	Collect the SDUMP produced and contact your systems programmer or IBM service representative. Refer to the chapter "How to report a problem" on Pg 38. Ensure the installation process completed without error.
System Action:	CEETRACE is deactivated and is not available for this application.
Operator Response:	None
<b>CELT014S</b>	<b>Language Environment for z/VSE Run-Time option TRAP(OFF) is set. CEETRACE has been deactivated.</b>
Explanation:	The CEETRACE facility requires the TRAP run-time option be set to ON.
Programmer Response:	Set the TRAP run-time option to ON.
System Action:	CEETRACE is deactivated for this application.
Operator Response:	None
<b>CELT018E</b>	<b>Called without a function code. Unable to activate for this module.</b>
Explanation:	The LE z/VSE HLL exit (CEE Bint) has been called with an unknown or unexpected function code. This possibly indicates a logic error, an unsupported version of LE z/VSE is installed or a back-level version of CEETRACE has been installed.
Programmer Response:	Verify you are using the latest version of CEETRACE and a supported level of LE z/VSE. Collect any SDUMP produced and contact your systems programmer or IBM service representative. Refer to the chapter "How to report a problem" on Pg 38 for further information.
System Action:	CEETRACE is not activated for this module.
Operator Response:	None
<b>CELT019W</b>	<b>CEETRACE active when Debug Tool for VSE is present. CEETRACE deactivating.</b>
Explanation:	Debug Tool for VSE and CEETRACE cannot be used together.
Programmer Response:	Deactivate CEETRACE via the AR S CEE,CEETRACE=OFF command or run the application in an excluded partition or not in an included partition.
System Action:	CEETRACE is not activated for this application.
Operator Response:	None
<b>CELT020S</b>	<b>CEETRACE has detected an active CEEBHOOKS routine. CEETRACE is deactivating for this load module.</b>
Explanation:	An active hook routine (such as IBMHOOKS) has been detected. CEETRACE cannot be used in conjunction with any other hook routine exits.
Programmer Response:	Deactivate CEETRACE via the AR S CEE,CEETRACE=OFF command or run the application in an excluded partition or not in an included partition.. Alternatively remove the applications use of CEEBHOOKS.
System Action:	CEETRACE is not activated for this module.
Operator Response:	None
<b>CELT022I</b>	<b>DOS/VS COBOL module has been detected.</b>
Explanation:	A DOS/VS COBOL module has been found to be present in the active load module. CEETRACE does not supported non-LE HLL compilers.
Programmer Response:	None.
System Action:	The DOS/VS COBOL module is not traced. Tracing will resume at the next LE-conforming HLL program encountered that has been compiled with the required compiler options.
Operator Response:	None



<b>CELT023W</b>	<b>LE-assembler detected. Tracing not supported for this module type.</b>
Explanation:	An LE-enabled assembler program has been detected. CEETRACE does not support the tracing of non-HLL LE-compliant modules.
Programmer Response:	None.
System Action:	Tracing of the LE-assembler module is skipped. Tracing will resume at the next correctly compiled HLL LE-compliant module.
Operator Response:	None
<b>CELT024S</b>	<b>Unable to located a valid COBOL TGT. COBOL tracing not activated.</b>
Explanation:	When trying to locate the TGT for this active COBOL program, CEETRACE was not able to find a valid one.
Programmer Response:	Ensure the COBOL program in question has been compiled with an LE-conforming compiler with the correct options. If the problem continues contact your IBM support center for assistance. Refer to the chapter "How to report a problem" on Pg 38.
System Action:	CEETRACE for this COBOL program is not activated.
Operator Response:	None
<b>CELT025S</b>	<b>Unable to locate a valid RUNCOM for this COBOL program. COBOL tracing deactivated.</b>
Explanation:	When trying to locate a RUNCOM for this active COBOL program, CEETRACE was not able to find a valid one.
Programmer Response:	Ensure the COBOL program in question has been compiled with an LE-conforming compiler with the correct options. If the problem continues contact your IBM support center for assistance. Refer to the chapter "How to report a problem" on Pg 38.
System Action:	CEETRACE for this COBOL program is not activated.
Operator Response:	None
<b>CELT026S</b>	<b>Unable to locate a valid THDCOM for this COBOL program. COBOL tracing deactivated.</b>
Explanation:	When trying to locate the THDCOM for this active COBOL program, CEETRACE was not able to find a valid one.
Programmer Response:	Ensure the COBOL program in question has been compiled with an LE-conforming compiler with the correct options. If the problem continues contact your IBM support center for assistance. Refer to the chapter "How to report a problem" on Pg 38.
System Action:	CEETRACE for this COBOL program is not activated.
Operator Response:	None
<b>CELT027W</b>	<b>CEETRACE options area corrupt. Using default values.</b>
Explanation:	The SVA storage area for the CEETRACE run-time options has failed verification.
Programmer Response:	Ensure the CEEWARC job has run successfully and that your options in the CEETRACE.INI file have been set by using the AR command D CEE,CEETRACE. Verify CEETRACE is active by using the D CEE,CEESTAT command.
System Action:	The internal default CEETRACE options are used.
Operator Response:	None
<b>CELT028W</b>	<b>This partition is excluded from CEETRACE. Tracing not activated.</b>
Explanation:	The currently used partition appears in the excluded partitions option in CEETRACE.INI.
Programmer Response:	None.
System Action:	Tracing is not activated.
Operator Response:	None
<b>CELT031S</b>	<b>Language Environment for z/VSE CEETRACE feature has not been initialized. Tracing deactivated.</b>
Explanation:	The CEEWARC job has not been run, has used an older version of LE z/VSE, or has failed to execute successfully.
Programmer Response:	Run the CEEWARC job and verify its successful execution. Ensure the z/VSE 4.3 supplied LE z/VSE run-time library is used. Use of prior version of LE z/VSE on z/VSE 4.3 is not supported. Use the D CEE,CEESTAT command to verify the state of the CEETRACE facility.
System Action:	CEETRACE is not activated for this program.
Operator Response:	None

<b>CELT032S</b>	<b>Insufficient storage to initialize CEETRACE. Tracing has not been activated.</b>
Explanation:	There was insufficient HEAP storage available to initialize the CEETRACE facility.
Programmer Response:	Increase the available HEAP storage or increase the available 31-bit GETVIS area.
System Action:	CEETRACE is not activated.
Operator Response:	None
<b>CELT036S</b>	<b>Unable to find language list. Exiting.</b>
Explanation:	The language list module present in LE-conforming load modules could not be located.
Programmer Response:	Verify the load module in question has been link edited correctly with the LE z/VSE run-time. If it is correctly link edited collect the produced SDUMP and contact your IBM support representative. Refer to the chapter "How to report a problem" on Pg 38.
System Action:	CEETRACE is not activated.
Operator Response:	None
<b>CELT038S</b>	<b>Language list header not found. Exiting.</b>
Explanation:	The language list CSECT was located but did not contain the expected information.
Programmer Response:	Ensure the load module has been correctly link edited with a supported LE z/VSE runtime. If it is correctly link edited collect the produced SDUMP and contact your IBM support representative. Refer to the chapter "How to report a problem" on Pg 38.
System Action:	CEETRACE is not activated.
Operator Response:	None
<b>CELT044W</b>	<b>Unable to initialize LE/VSE heap checker</b>
Explanation:	The specified environment validation checking level requires the LE/VSE heap checker to be initialized. This initialization process has not completed successfully.
Programmer Response:	Ensure sufficient storage is available (anywhere) to support heap checking.
System Action:	Heap Checking is disabled. Any other environment checking requested is still performed.
<b>CELT045W</b>	<b>PL/I Program compiled without TEST(ALL,x) set.</b>
Explanation:	The "main" PL/I VSE program executed was not compiled with the required CEETRACE compile options.
Programmer Response:	If CEETRACE support is required then re-compile at least any "main" PL/I programs with TEST(ALL,SYM). Any fetchable PL/I routines that are to be traced using CEETRACE also need to be compiled with TEST(ALL,SYM).
System Action:	CEETRACE does not trace this or any other introduced PL/I modules.
<b>CELT046E</b>	<b>A corrupt LE z/VSE Environment detected.</b>
Explanation:	During environment validation it was found that one or more LE z/VSE internal control blocks are corrupt or damaged.
Programmer Response:	As the run-time environment is not stable the CEETRACE feature is deactivated. Check any active applications for potential overlays or turn the LE z/VSE HEAPCHK run-time option on. Consider using any compiler available validation features – such as SSRANGE(ON) for COBOL/VSE.
System Action:	CEETRACE is not activated for this application.
<b>CELT047W</b>	<b>This partition has not been included. Tracing not activated.</b>
Explanation:	The include_part option has been used (see CEETRACE.INI file) and the currently used partition is not included in the partition list.
Programmer Response:	If CEETRACE output is required re-run the application in a partition that is included in the include_parts option in CEETRACE.INI. If not then this warning message can be ignored.
System Action:	CEETRACE is not activated for this application in this partition.
<b>CELT048S</b>	<b>A back-level version of LE z/VSE is being used.</b>
Explanation:	The currently available LE z/VSE run-time libraries being used by this application are not at the required level for this version of CEETRACE.
Programmer Response:	Contact your Systems Programmer to either upgrade your z/VSE system to a later version which will upgrade the LE z/VSE level or look at installing an older level of CEETRACE.
System Action:	CEETRACE is not activated for this application.

<b>CELT050W</b>	<b>Fetch of specified EXIT_MOD load module failed.</b>
Explanation :	The PHASE specified in the CEETRACE EXIT_MOD option could not be loaded.
Programmer Response :	Ensure the specified load module exists and that the application being executed has permission and access to the library that the EXIT_MOD phase resides.
System Action :	CEETRACE and the application continues but without the specified exit module being called. EXIT_MOD is disabled for this application execution.
<b>CELT056E</b>	<b>Fetch for CEL4RPRT failed. Auto_rprt disabled.</b>
Explanation :	CEETRACE attempted to load the statement history reporting module but that has failed.
Programmer Response :	Ensure there is sufficient storage available to load the CEL4RPRT.PHASE. That no security restrictions may be causing the load request to fail.
System Action :	The auto_rprt setting is disabled for this application only. No automatic statement execution history reports will be produced.
<b>CELT060E</b>	<b>Environment checking trapped corruption.</b>
Explanation :	CEETRACE env_validation setting has trapped a matching corruption.
Programmer Response :	Review the produced program statement execution report for the program statement that caused the env_validation option specified corruption.
System Action :	A program statement execution report is produced, validation checking is disabled and application processing continues.
<b>CELT061W</b>	<b>CEETRACE SETPARM deactivating tracing.</b>
Explanation :	A SETPARM for "CEETRCE" set to "OFF" was found in the currently active JCL .
Programmer Response :	None.
System Action :	CEETRACE is deactivated until the job stream completes or the CEETRCE SETPARM is found without "OFF" specified.
<b>CELT063W</b>	<b>CEETRACE SETPARM Service failed!</b>
Explanation :	The SETPARM extraction service used by CEETRACE returned an unexpected result.
Programmer Response :	None
System Action :	CEETRACE continues without using the SETPARM service.
<b>CELT066W</b>	<b>CEETRACE Exit_mod is being deactivated.</b>
Explanation :	The current "Exit_mod" module being used is now being deactivated for the rest of the current applications execution.
Programmer Response :	None.
System Action :	The specified "Exit_mod" program has returned a non-zero return-code back to CEETRACE. The defined "Exit_mod" will no-longer be called for the remainder of the current application.
<b>CELT075W</b>	<b>VSCOBOL2 main routine detected. Tracing not supported for this compiler.</b>
Explanation :	The COBOL 'main' routine in this application has been compiled using a version of the VS/COBOL 2 compiler. The code that is produced by this compiler for debugging functions is not supported by CEETRACE.
Programmer Response :	Re-compile/migrate the COBOL application executed that was built using the VS/COBOL2 compiler to COBOL/VSE.
System Action :	Tracing is not performed for this COBOL program.

## **CEL4 – CEETRACE Initialisation and Options processing related messages**

<b>CEL4047E</b>	<b>Unable to open CEETRACE.INI options file. Using defaults.</b>
<b>Explanation</b>	During attention routine initialization the CEETRACE.INI file could not be opened.
<b>Programmer Response</b>	Retain the dump produced and provide to IBM support for analysis. Refer to the chapter "How to report a problem" on Pg 38.
<b>Operator Response</b>	None
<b>System Action</b>	The LE z/VSE CEETRACE feature is activated but using the internal default options only. See the supplied CEETRACE.Z member in the LE z/VSE installation library for a description of the internal default options.
<b>Symbolic Feedback</b>	None
<b>CEL4052I</b>	<b>CEETRACE options reload complete.</b>
<b>Explanation</b>	A request has been made to reload the CEETRACE.INI file options either from initialization or by an operator command request.
<b>Programmer Response</b>	None.
<b>Operator Response</b>	None
<b>System Action</b>	The LE z/VSE CEETRACE feature options have been reloaded.
<b>Symbolic Feedback</b>	None
<b>CEL4053W</b>	<b>Verification of CEETRACE feature failed. CEETRACE has been disabled.</b>
<b>Explanation</b>	During initialization of the CEETRACE feature, the tracing module was not the version or level expected and failed the verification process.
<b>Programmer Response</b>	Verify the correct level of CEETRACE has been installed and that all the required installation steps have been completed successfully.
<b>Operator Response</b>	None
<b>System Action</b>	The LE z/VSE CEETRACE feature is disabled.
<b>Symbolic Feedback</b>	None
<b>CEL4054W</b>	<b>CEETRACE Options processing has issued warnings.</b>
<b>Or</b>	
	<b>CEL4READ has failed. Using defaults.</b>
	<b>Review the job output for more details.</b>
<b>Explanation</b>	When reading the CEETRACE.INI file the options processing module could not complete the options processing successfully.
<b>Programmer Response</b>	Ensure the CEETRACE.INI file is available and that all the options specified have valid values selected. Review the output from the CEEWARC job and correct any warnings or errors reported.
<b>Operator Response</b>	None
<b>System Action</b>	If options processing failed then the CEETRACE.INI file contents are not processed but the defaults are used instead. The CEETRACE feature is activated using these defaults. If warnings were issued then all options are processed but some may have been forced to defaults or inactive. Review the CEEWARC job output for further information.
<b>Symbolic Feedback</b>	None
<b>CEL4055E</b>	<b>Fetch of CEL4READ has failed.</b>
<b>Explanation</b>	When attempting to fetch the CEETRACE.INI processor CEL4READ the fetch could not be completed.
<b>Programmer Response</b>	Ensure the CEL4READ module is present and available for loading by the initialization job CEEWARC. Ensure sufficient partition size to execute CEL4READ. Recommendation if LE/C is not loaded in the SVA is at least 3MB.
<b>Operator Response</b>	None
<b>System Action</b>	The CEETRACE feature is enabled and all options set to their defaults. The CEETRACE.INI file is not processed.
<b>Symbolic Feedback</b>	None

<b>CEL4057W</b>	<b>CEETRACE currently set OFF. Options report taken from CEETRACE.INI</b>
<b>Explanation</b>	The CEETRACE options report has been requested while CEETRACE=OFF is set. The following options report has been taken directly from the contents of the CEETRACE.INI file.
<b>Programmer Response</b>	Set CEETRACE=ON to use the CEETRACE feature.
<b>Operator Response</b>	None.
<b>System Action</b>	The CEETRACE.INI file option settings are reported on.
<b>Symbolic Feedback</b>	None
<b>CEL4058E</b>	<b>CEEBINT module found does not verify. CEETRACE disabled.</b>
<b>Explanation</b>	The CEETRACE LE exit routine, CEEBINT, that has been found and loaded does not contain the required verification signature.
<b>Programmer Response</b>	Ensure CEETRACE has been installed correctly and that the LIBDEF SEARCH chain being used in the problem job includes the correct CEETRACE and LE installation library.
<b>Operator Response</b>	None.
<b>System Action</b>	CEETRACE is not activated.
<b>Symbolic Feedback</b>	None
<b>CEL4061E</b>	<b>Language Environment for z/VSE CEETRACE options are not set.</b>
<b>Explanation</b>	An attention routine command has been issued that is requesting access to or information on the CEETRACE options.
<b>Programmer Response</b>	Ensure CEETRACE has successfully been installed, initialized and activated. Use the D CEE,CEESTAT command to verify the current CEETRACE status.
<b>System Action</b>	The CEETRACE options are not available so the request is not performed.
<b>Symbolic Feedback</b>	None
<b>CEL4063I</b>	<b>Language Environment for z/VSE CEETRACE feature active</b>
<b>Explanation</b>	Informational only message showing the current status of the CEETRACE feature.
<b>Programmer Response</b>	None.
<b>Operator Response</b>	None.
<b>System Action</b>	None.
<b>Symbolic Feedback</b>	None.
<b>CEL4065I</b>	<b>Language Environment for z/VSE CEETRACE feature inactive</b>
<b>Explanation</b>	Informational only message showing the current status of the CEETRACE feature.
<b>Programmer Response</b>	None.
<b>Operator Response</b>	None.
<b>System Action</b>	None.
<b>Symbolic Feedback</b>	None.
<b>CEL4066I</b>	<b>Language Environment for z/VSE CEETRACE feature not installed.</b>
<b>Explanation</b>	Informational only message showing the current status of the CEETRACE feature.
<b>Programmer Response</b>	None.
<b>Operator Response</b>	None.
<b>System Action</b>	None.
<b>Symbolic Feedback</b>	None.
<b>CEL4067I</b>	<b>CEETRACE Current Status is &lt;status information&gt;</b>
<b>Explanation</b>	Informational only message is show the current status of the CEETRACE feature.
<b>Programmer Response</b>	None.
<b>Operator Response</b>	None.
<b>System Action</b>	Possible status information is "Not Installed", "Off" and "On".
<b>Symbolic Feedback</b>	None.

<b>CEL4068I</b>	<b>CEETRACE Over Ride Options Accepted</b>
<b>Explanation</b>	The operator provided CEETRACE options change has been accepted and actioned.
<b>Programmer Response</b>	None.
<b>Operator Response</b>	None.
<b>System Action</b>	The entered CEETRACE option change is performed and will be actioned the next time the CEETRACE feature is used.
<b>Symbolic Feedback</b>	None.
<b>CEL4069W</b>	<b>CEETRACE Keyword or Sub-option is invalid or not Supported</b>
<b>Explanation</b>	The operator entered an invalid CEETRACE sub-option or sub-option over-ride.
<b>Programmer Response</b>	None
<b>Operator Response</b>	Verify the correct option keyword has been entered and that the sub-option supplied is valid. Ensure the CEETRACE option is one allowed to be over-ridden. See pg 16 for CEETRACE options that are eligible for being over-ridden.
<b>System Action</b>	The over ride is ignored
<b>Symbolic Feedback</b>	None.
<b>CEL4074W</b>	<b>auto_rprt_epn set when auto_rprt=rxxxx requested.</b>
<b>Explanation</b>	The operator requested to set auto_rprt to use the repeat statement execution when auto_rprt_epn was not OFF.
<b>Programmer Response</b>	None
<b>Operator Response</b>	Ensure the requested change is desired.
<b>System Action</b>	The over ride is accepted but auto_rprt_epn is set OFF.
<b>Symbolic Feedback</b>	None.
<b>CEL4075W</b>	<b>VSCOBOL2 main routine detected. Tracing not supported for this compiler.</b>
<b>Explanation</b>	A VS/COBOL II compiled module has been detected as executing with CEETRACE. Code generated by this compiler is not supported by CEETRACE.
<b>Programmer Response</b>	Consider converting all VS/COBOL2 programs to COBOL/VSE.
<b>Operator Response</b>	None.
<b>System Action</b>	Tracing is not performed on the VS/COBOL2 compiled code.
<b>Symbolic Feedback</b>	None.
<b>CEL4101E</b>	<b>Executing on an Unsupported LE/VSE Run-Time.</b>
<b>Explanation</b>	While attempting to use the CEETRACE feature, it was found that the executing LE z/VSE level is not at the level required to support the CEETRACE feature being used. A possible mismatch exists between the installed LE z/VSE level and the VSE version being used.
<b>Programmer Response</b>	Check that the correct LE z/VSE level is installed for the executing z/VSE level. The options reports generated by the D CEE,CEEDOPT AR command can be used to determine the currently-active LE z/VSE level. The SIR AR command can be used to determine the currently-active z/VSE level. Pg 5 shows the required LE z/VSE level for CEETRACE support.
<b>System Action</b>	The CEETRACE feature is not activated.
<b>Symbolic Feedback</b>	None

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## How to report a problem

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If you believe you have found a problem with the CEETRACE feature, please check the following items before contacting IBM support :

- Review the list of restrictions on Pg 16 and ensure your application does not violate any of them.
- Review the CEETRACE feature tool system requirements on Pg 6 and verify your environment complies.
- Ensure all the installation steps have been completed successfully (pg 7) and that the CEETRACE status is set to ON (see D CEE,CEESTAT console command report).
- Check that your application has been prepared for use with CEETRACE according to the instructions given on Pg 11.
- De-activate any non-IBM vendor software and try the application again.
- If the problem is related to the CEETRACE feature not generating a program execution report ensure you are not running the application in an excluded partition or if using the “include\_part” option that you are running the application in a partition specified in the inclusion list.
- Issue the console command “S CEE,CEETRACE=(WARN\_MSGS=ON)” followed by “D CEE,CEETRACE” and confirm that WARN\_MSGS=ON. Re-run the application using CEETRACE again. Review all warning messages and correct any as required.
- Ensure there is no application-specific CEEBINT included in the problem application other than the default version supplied with LE z/VSE.

If you still continue to experience problems with the CEETRACE feature then please collect and prepare the following documentation for analysis :

- A complete console log showing all LE z/VSE and CEETRACE messages (including warnings issued from the above instructions).
- Any CEETRACE produced system dumps (SDUMP) or LE z/VSE formatted dumps.
- Any CEETRACE output relevant to the problem.
- A complete and current compile listing and link edit map of the application being used with CEETRACE.
- Detailed information on the applications construction and languages/compiler(s) involved.
- Compiler(s) options used – compile listing showing the options active is sufficient.
- Optionally application source code to re-produce the problem that can be compiled and executed by IBM support staff.
- The console output from the LE z/VSE AR command "D CEE,CEESTAT" and the CEETRACE AR command "D CEE,CEETRACE".
- A list of all non-IBM vendor products active on your system in both the CICS and BATCH environments (eg the output from the SIR VENDOR console command).
- A basic description of the problem being experienced.

Please then send an email to [vsupportLE@de.ibm.com](mailto:vsupportLE@de.ibm.com) describing the problem and you will be provided with instructions on how to transfer the above supporting documentation to the change team for analysis.

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## **Comments and Questions**

All comments or questions on this documentation are welcome. Please send your comments to:  
[vsupportLE@de.ibm.com](mailto:vsupportLE@de.ibm.com)

## **Further Information References**

LEzVSE Blog :  
<https://www.ibm.com/developerworks/community/blogs/lezvse/?lang=en>

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[LE z/VSE Blog](https://www.ibm.com/developerworks/community/blogs/lezvse/?lang=en) (<https://www.ibm.com/developerworks/community/blogs/lezvse/?lang=en>)

