Trademarks

The following are trademarks of the International Business Machines Corporation in the United States and/or other countries.

- CICS®
- DB2®
- Language Environment®
- OS/390®
- z/OS®

* Registered trademarks of IBM Corporation

The following are trademarks or registered trademarks of other companies.

Java and all Java-related trademarks and logos are trademarks of Sun Microsystems, Inc., in the United States and other countries.
Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.
Microsoft, Windows and Windows NT are registered trademarks of Microsoft Corporation.
UNIX is a registered trademark of The Open Group in the United States and other countries.
SET and Secure Electronic Transaction are trademarks owned by SET Secure Electronic Transaction LLC.

* All other products may be trademarks or registered trademarks of their respective companies.

Notes:
Performance is in Internal Throughput Rate (ITR) ratio based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput that any user will experience will vary depending upon considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve throughput improvements equivalent to the performance ratios stated here.
IBM hardware products are manufactured from new parts, or new and serviceable used parts. Regardless, our warranty terms apply.
All customer examples cited or described in this presentation are presented as illustrations of the manner in which some customers have used IBM products and the results they may have achieved. Actual environmental costs and performance characteristics will vary depending on individual customer configurations and conditions.
This publication was produced in the United States. IBM may not offer the products, services or features discussed in this document in other countries, and the information may be subject to change without notice. Consult your local IBM business contact for information on the product or services available in your area.
All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.
Information about non-IBM products is obtained from the manufacturers of those products or their published announcements. IBM has not tested those products and cannot confirm the performance, compatibility, or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.
Prices subject to change without notice. Contact your IBM representative or Business Partner for the most current pricing in your geography.
Agenda

- What is a Run-time Library?
- Why LE?
- LE Terminology
- LE CEL Functions
- Setting Run-time Options
- Appendix
What is a Run-Time Library?

- A Run-time Library works together with the code produced by a compiler to provide functionality for an application
  - Obtain and manage storage
  - Read and write data
  - Perform math calculations

- There are advantages to providing function in a Run-time Library
  - Greatly reduces need for the compilers to generate the code
  - Shields the languages from needing detailed knowledge of the underlying operating system and hardware
  - Greatly reduces the need to recompile and re-link when fixes are required to run-time functions
So, Why Language Environment?

- Since their creation, customers were having trouble getting COBOL and PL/I to play nicely together
  - COBOL and PL/I each designed to be stand-alone, unaware of each other
    - When leaving a COBOL program to return to a PL/I program, the COBOL library might free storage that PL/I still wanted
    - Language-specific Math Libraries produced different results

- Customers at GUIDE and SHARE worked with IBM to design a solution
  - The result: **Language Environment**
Time to make the doughnut…

- Pre-LE environment
  - 4 independent products
  - upward incompatibilities
  - loose adherence to standards
  - purely a customer application enabler

- LE environment
  - 1 product for z/OS (also z/VM and VSE)
  - 100% upward/downward compatibility
  - strict adherence to standards
  - part of the z/OS base
  - exploiters include USS, TCP/IP, BCPii, LOTUS Domino, WebSphere, etc…
Other Advantages

Language Environment not only helped the languages to cooperate with each other, but also allowed member languages to share each other’s features. For example:

- COBOL can use the C and PL/I condition handling infrastructure
- Storage managed in a 'common' fashion
- All languages now access the excellent Fortran library math routines
- “hybrid” languages – Enterprise PL/I
Language Environment for z/VM, z/OS, VSE

Source Code
- PL/I
- COBOL
- C/C++
- Fortran
- Assembler

Compilers
- PL/I
- COBOL
- C/C++
- Fortran
- ASM

Operating Environments
- IMS
- TSO
- Batch
- CICS
- DB2
- UNIX System Services

Operating Systems
- z/OS
- z/VM
- VSE
LE Terminology - Program Management

- **main program** – the routine that causes the LE environment to be initialized
- **routine** either a procedure, function, or subroutine

Equivalent HLL terms:
- COBOL - program
- C/C++ - function
- PL/I - procedure, BEGIN block

- **ILC** – inter-language communication – application contains a mixture of languages, which introduces special issues
  - how the languages' data maps across load module boundaries
  - how conditions are handled
  - how data can be passed and received by each language
LE Terminology - Program Management

- **member language** – a high-level language that is compiled with an LE-supported compiler
- **member event handler** - member-supplied routine that is called at various times as a program runs when a significant event has occurred, or when the environment needs some information that is held by the member
- **LE-Enabled** - Routine that can run with LE run-time, and may also run with previous run-times. Cannot make use of Language Environment callable services.
- **LE-Conforming** - Routine that can run only with the LE run-time library. Can make use of LE callable services.
LE Terminology – Callable Services

- **LE Callable Services** – programmatic way of utilizing LE services
  - AWI - Application Writer Interface
  - CWI - Compiler Writer Interface
  - CEE prefixed – general to all platforms
  - CEE3 prefixed – specific to only z/OS
LE Terminology – Program Model

- **region** - the range of storage the application set runs in
- **process** - set of applications that accomplish a task
- **enclave** - an application - set of modules that accomplish some subtask
- **thread** - dispatchable unit of work that shares storage with others in the enclave
LE Terminology - Program Model

region

process

enclave

main

sub

sub

enclave

main

sub

sub
LE Terminology - MVS 'Model'

- region - address space
- process - application
- enclave - pgm
- main
- sub
- sub
- enclave
- main
- sub
- sub
LE Terminology – Multi-threading 'Model'
CICS Terminology

- **region** - the range of storage the application set runs in
- **transaction** - set of applications that accomplish a task
- **run-unit** - an application - set of modules that accomplish some subtask
LE Terminology - CICS 'Model'

region - Region

process - Transaction (Thread)

enclave - RunUnit

enclave

main

sub

sub

sub
LE CEL Functions

- CEL is a set of common functions and routines used by all member languages of LE
  - Initialization/Termination
  - Storage Management
  - Condition Handling
  - Message Services
  - Date/Time Services
  - Math Functions
- Behavior customizable by the use of Run-time Options
Common LE Functions – Initialization/Termination

- LE code linked with the module begins a bootstrap process to initialize LE
  - initial storage is obtained
  - LE Program Model levels are built
    - active member language specific run-time is initialized via event handler calls
- Control is given to the application code
- Once the application ends and 'returns' to LE
  - The LE environment is terminated via cleanup of Program Model levels
  - System resources obtained during initialization and throughout the execution of the application are cleaned up
Common LE Functions - Storage Management

- LE manages two types of storage for use by the application (and itself):
  - HEAP - used for COBOL WORKING-STORAGE, C malloc, and PL/I ALLOCATE requests
  - STACK - module linkage (save areas), C and PL/I automatic variables, COBOL LOCAL-STORAGE

- Initial storage is obtained with one GETMAIN and managed internal to LE
Common LE Functions - Condition Handling

- **Condition** - Any change to the normal flow of a program
  - a.k.a. exception, interruption
  - Could be detected by hardware or software (ours or yours)

- **Condition Handler** – A routine called by LE to respond to a condition
  - Registered by application using CEEHDLR, or part of a member language semantics, such as PL/I ON statements

- **Condition Handler Response**
  - Resume – after corrective action taken, control returns to a ‘resume cursor’
    - Either back to point of failure, or to a new resume point set by the condition handler
  - Percolate - decline to handle the condition, LE calls next condition handler
  - Promote - change condition meaning and percolate
Common LE Functions - Condition Handling

- Diagnostic Documentation
  - Messages (same as module prefixes)
    - CEE CEE
    - IGZ COBOL
    - IBM PL/I
    - AFH FORTRAN
    - EDC C/C++
  - ABEND Codes
    - User ABENDs U4000-4095 reserved by LE
    - Usually have reason codes to help isolate the problem
  - CEEDUMP and/or system dump
  - Run-time Options Report
  - Run-time Storage Report
Common LE Functions - Message Services

- allows HLLs to 'issue' common messages
- messages written to a common place - LE's MSGFILE
- can be formatted in:
  - Mixed-case American English (ENU)
  - Uppercase American English (UEN)
  - Japanese (JPN)
Common LE Functions – Date/Time Services

- provides a consistent 'answer' when requesting date and time from the running system
- format date and time by country code
- parse date and time values
- convert between different formats (Gregorian, Julian, Asian, etc)
- calculate days between dates, elapsed time
- get local time
- handle 2 year dates as part of Y2K solution
Common LE Functions – Math Services

- derived from FORTRAN math functions
- binary, single floating point, double floating point, IEEE support
- See the LE Programming Reference for a complete list
Run-Time Options

- Allows users to specify how Language Environment behaves when an application runs
  - Performance tuning
  - Error handling characteristics
  - Storage management
  - Production of debugging information
- May be set in many different locations with varying scopes
Setting Run-Time Options

- The default RTOs for applications across all systems
  - **IBM-supplied defaults**
    - Base set of values for Language Environment RTOs
    - Note: RTO ++USERMODs have been eliminated as of V2R1!
  - To set default RTOs for applications on one or more systems
    - **System defaults**
      - Options specified in a PARMLIB member (CEEPRMxx)
      - Options specified with an operator command (SETCEE)
  - To affect applications running within a region
    - **Region Level Overrides** (CEEROPT/CELQROPT)
      - CICS TS, LRR users (e.g. IMS), also Batch
      - Separate module loaded at run-time during region initialization
      - CLER transaction for CICS environment (RTO subset)
Setting Run-Time Options

To provide RTO settings for a specific application:

- **Application Level Overrides** (CEEUOPT/CELQUOPT)
  - CSECT linked with the application
- **Programmer Overrides**
  - #pragma runopts for C/C++
  - PLIXOPT for PL/I

To provide RTO settings for a given run of an application:

- **Program Invocation Overrides**
  - USS shell: export _CEE_RUNOPTS=‘run-time options’
  - In batch, on EXEC card: PARM=
- **DD:CEEOPTS Overrides**
  - Optional data set in which run-time options may be specified
Setting Run-Time Options

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

- For more information on setting run-time options, see Appendix
Key Run-Time Options

• Subtopics

• Tuning
  • Additional Information in SHARE sessions:
    • Look What I Found Under the Bar! (Tue 11:15AM)

• Diagnostics
  • Additional Information in SHARE sessions:
    • Finding Debugging Clues in LE Dumps (Wed 8:30AM)
    • Heap Damage, Get Into the Zone! (Fri 10:00AM)
Key Run-Time Options - Tuning

• ALL31(option)
  • ON For AMODE 31 programs
  • OFF For AMODE 24 programs
    (can be determined dynamically)
Key Run-Time Options - Tuning

• **ANYHEAP**(initial, increment, location, disp)
• **BELOWHEAP**(initial, increment, disp)
• **HEAP**(initial, increment, location, disp, init24, incr24)
  • initial Minimum size of initial heap segment
  • increment Minimum size of additional segments
  • location BELOW (<16MB), ANYWHERE
  • disp KEEP, FREE (action when empty)

• Notes:
  • ANYHEAP/BELOWHEAP used internally by Language Environment
  • HEAP – used for application-related storage
  • COBOL WORKING-STORAGE (for RENT programs)
  • Dynamic storage (C malloc, C++ new, PL/I ALLOCATE)
Key Run-Time Options - Tuning

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

- Notes:
  - Used for Dynamic Save Areas / Stack Frames
  - C/C++ and PL/I local variables, COBOL LOCAL-STORAGE
  - Must use STACK(,,BELOW) when running ALL31(OFF)
Key Run-Time Options - Tuning

• RPTSTG(option)
  • OFF  Storage report not requested
  • ON   Generates a report of stack/heap usage
          • including recommended settings

• Caution:
  • Use only for application tuning. Do not make RPTSTG(ON) system wide default due to significant performance impact.

Consider CICS TS dynamic storage tuning as an alternative.
Key Run-Time Options - Diagnostics

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

• Notes:
  • SYSMDUMP DD card required for system dump
    (unless DYNDUMP is being used)
Key Run-Time Options - Diagnostics

- **DYNDUMP**(hlq,U4039 Behavior,U40xx Behavior)
  - hlq – may be user-specified, or:
    - *USERID | *USERID.hlq
    - *TSOPREFIX | *TSOPREFIX.hlq
  - **U4039 Behavior - with TERMTTHDACT(UADUMP/UAONLY/UATRACE)**
    - NODYNAMIC – Do not create IPCS-readable dump (default)
    - DYNAMIC – Create IPCS-readable dump if no other dump DD name
    - FORCE – Create IPCS-readable dump instead of other dumps
    - BOTH – Create IPCS-readable dump in addition to other dumps
  - **U40xx Behavior – non-U4039 dumps**
    - TDUMP – Create IPCS-readable dump (default)
    - NOTDUMP – Do not create IPCS-readable dump
Key Run-Time Options - Diagnostics

• `HEAPCHK(ON|OFF, frequency, delay, level, call-depth, num-entries, pool-num)`
  • OFF Normal processing
  • ON Checks HEAP structures on get/free
  • frequency How often the HEAP is checked
  • delay Number of get/free before starting
  • level Number of calls to be displayed in Heap Storage Diagnostic Report
  • call-depth Number of calls to be displayed for HEAPPOOLS Serviceability
  • num-entries Number of entries to be recorded in the heap pool trace table for the main user heap
  • pool-num ID of the heap pool to be traced
Key Run-Time Options - Diagnostics

• HEAPCHK(ON|OFF, frequency, delay, level, call-depth, num-entries, pool-num) (continued)
  • Caution:
    • Use only for application tuning/diagnostics.
      Do not make HEAPCHK(ON) system wide default due to serious performance impact.
  • Notes:
    • To generate only Heap Storage Diagnostic Report use, e.g.
      • HEAPCHK(ON,0,0,10,0)
    • To activate only HEAPPOOLS Serviceability use, e.g.
      • HEAPCHK(ON,0,0,0,5)
Key Run-Time Options - Diagnostics

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

- STORAGE(getheap, freeheap, stack, reserve) (continued)

Notes:
- STORAGE(AA,EE,,) useful for debugging
  - When HEAPCHK(ON), free elements are checked to ensure they contain the freeheap value
- STORAGE(00,,,) is equivalent to COBOL WSCLEAR
- STORAGE(,,00,) vs. STORAGE(,,CLEAR,)
  - 00 is very expensive (especially for C/C++)
  - CLEAR sets to binary zeros the unused portion of the initial stack segment just prior to the “main” getting control
Key Run-Time Options - Diagnostics

• TRAP(option)
  • ON, SPIE  Condition handling enabled
  • ON, NOSPIE  Allows user applications to have their own SPIE routine, Language Environment condition handling will take place via the ESTAE
  • OFF  Condition handling disabled, some functionality not available (AVOID)

• Notes:
  • TRAP(ON, SPIE)  highly recommended for normal processing
Key Run-Time Options - Diagnostics

- **RPTOPTS**(option)
  - **OFF** Options report not requested
  - **ON** Generate a report of all current options (upon successful termination)

- **Notes:**
  - Automatically included in CEEDUMP
Other Good sessions

- COBOL V5.2 was Announced! What’s New? Mon 11:15AM
- What’s in the Just Announced Release of PL/I and C/C++ Mon 1:45PM
- Make Your PL/I&C/C++ Code Fly With The Right Compiler Options Tue 10:00AM
- Look What I Found Under the Bar! Tue 11:15AM
- High Level Assembler Bootcamp – Part 1 of 2 Tue 1:45PM
- How to Take Advantage of the COBOL V5 Compiler – Migration Tue 3:15PM
- RACF and REXX – A Marriage Made in Heaven! Tue 4:30PM
- Finding Debugging Clues in LE Dumps Wed 8:30AM
- COBOL V5 User Experience Wed 10:00AM
- Coding in COBOL for Optimum Performance Wed 11:15AM
- Invoking REXX during High Level Assembly via SETCF Wed 1:45PM
- Using REXX for IBM Mainframe Application Development Wed 3:15PM
- High Level Assembler Bootcamp – Part 2 of 2 Wed 4:30PM
- Dinner - LANG Project Rib Joint Expeditionary Force Wed 7:00PM
- Make SOA Possible in z/OS batch COBOL Thu 11:15AM
- Practical Examples of Invoking HLAsm Exits&Why They are Useful Thu 1:45PM
- REXX Language Coding Techniques Thu 3:15PM
- Structured Programming for Assembler Thu 4:30PM
- Micro Focus COBOL and the IBM Mainframe Fri 8:30AM
- Heap Damage, Get Into the Zone! Fri 10:00AM
- COBOL V5 Migration Strategies Fri 11:15AM
Appendix

- Compilers Compatible With LE
- Compilers That Require LE
- The Life of a Module
- Setting Run-time Options
Compilers Compatible with LE

Object modules compiled with the following compilers will run with LE without having to be re-linked or if linked with LE do not need to be recompiled:

- C/370 Versions 1 and 2
- OS/VS COBOL Release 2
- VS COBOL II Release 3 or later
- OS PL/I Version 1 Release 3 (object modules), Version 1 Release 5.1 and Version 2, all releases (load modules)
- VS FORTRAN Versions 1 and 2 (MVS only)
- FORTRAN IV H Extended (MVS only)
- FORTRAN IV G1 (MVS only) for OS/390 VS FORTRAN and FORTRAN IV (in compatibility mode)
Compilers that Require LE

- z/OS XL C/C++
- OS/390 C/C++
- C/C++ Compiler for MVS/ESA(TM)
- AD/Cycle® C/370(TM) Compiler
- VisualAge for Java, Enterprise Edition for OS/390
- Enterprise COBOL for z/OS
- Enterprise COBOL for z/OS and OS/390
- COBOL for OS/390 & VM
- COBOL for MVS & VM (formerly COBOL/370)
- Enterprise PL/I for z/OS
- Enterprise PL/I for z/OS and OS/390
- VisualAge PL/I for OS/390
- PL/I for MVS & VM
- AD/Cycle PL/I for MVS & VM
- VS FORTRAN and FORTRAN IV (in compatibility mode)
The Life of a Module

LE libraries that may get involved:

SCEEMAC, SCEEH.*

SCEELKED, SCEELKEX, SCEEOBJ, SCEECPP, SCEELIB, SCEEBND2

SCEERUN, SCEERUN2, SCEELPA, SCEECICS
Setting Run-Time Options

- System defaults
  - Options may be specified in a PARMLIB member
    - CEEPRMxx
  - Options may be specified with an operator command
    - SETCEE
Setting Run-Time Options

- System defaults (*continued*)
  - Specifying options in PARMLIB member
    - Member name CEEPRMxx
      - Member(s) specified at IPL time using CEE=xx via IEASYSxx or at the system parameters prompt
      - Can by dynamically changed via SET CEE=yy command
  - Options specified in groups

```c
CEEDOPT(ABPERC(NONE) ALL31(ON)
         rptopts(on) )    /* Options report */
CEEDOPT(anyheap(4k,4080,anywhere,free))
CEEDOPT(ALL31(OFF) ) /* Turn off this option */
```
Setting Run-Time Options

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

```
SETCEE ceedopt,rptstg(on),rptopts(on)
```
Setting Run-Time Options

- System defaults (continued)
  - Displaying the system defaults
    - D CEE displays the active members
      
      ```
      d cee
      CEE3744I 17.57.31 DISPLAY
      CEE=(JM)
      ```
    - D CEE,groupname displays the options for a particular group
      
      ```
      d cee,ceedopt
      CEE3745I 17.59.44 DISPLAY CEEDOPT
      CEE=(01)
      LAST WHERE SET OPTION
      -----------------------------------------------
      CEEPRM01       ENVAR("testing=roger","verify=1 2 3")
      CEEPRM01       HEAP(4194304,5242880,ANYWHERE,KEEP,
                          16384,16384)
      CEEPRM01       PROFILE(OFF,"XXX")
      CEEPRM01       RPTOPTS (ON)
      ```
Setting Run-Time Options

Region Level Overrides (CEEROPT)

- CICS TS and LRR users (e.g. IMS) only (pre-z/OS V1.10)
- Batch users (via CEEROPT/CELQROPT CEEPRMxx keyword) (V1.10)
- Separate load module dynamically loaded at run-time during region initialization
  - SCEESAMP(CEEWROPT)
  - Must be found in search order, such as STEPLIB for IMS and batch, or DFHRPL for CICS TS
- Specify only those options you wish to change

```plaintext
CEEROPT  CSECT                                                          00110000
CEEROPT  AMODE ANY                                                      00120000
CEEROPT  RMODE ANY                                                      00130000
CEEXOPT ALL31=((ON),OVR),                                               X00170000
           STORAGE=((00,NONE,NONE,0K),OVR)                                  00210000
END
```
Setting Run-Time Options

- Region Level Overrides (CEEROPT) *(continued)*
  - Certain options can be overridden dynamically in CICS TS region via the CLER transaction
    - ALL31
    - CBLPSHPOP
    - CHECK
    - HEAPZONES
    - INFOMSGFILTER
    - RPTOPTS
    - RPTSTG
    - TERMTHDACT
    - TRAP
Setting Run-Time Options

- Application Level Overrides (CEEUOPT/CELQUOPT)
  - CSECT linked with the application
    - SCEESAMP(CEEWUOPT/CEEWQUOP)
  - Specify only those options you wish to change

```plaintext
CEEUOPT  CSECT                                                          00110000
CEEUOPT  AMODE ANY                                                      00120000
CEEUOPT  RMODE ANY                                                      00130000
CEEXOPT HEAP=(10M,10M,ANYWHERE,FREE),                                 X00180000
            STACK=(1M,1M,ANYWHERE,KEEP)                                  00250000
END
```
Setting Run-Time Options

- Programmer Overrides
  - Compiled into program
    - #pragma runopts for C/C++
      ```
      #pragma runopts(ALL31(ON),ERRCOUNT(0),
                      STACK(2M,1M,ANYWHERE,KEEP),
                      HEAP(1M,500K,ANYWHERE,KEEP))
      ```
  - PLIXOPT for PL/I
    ```
    DCL PLIXOPT CHAR(140) VAR INIT('ALL31(ON)
                      ERRCOUNT(0) STACK(2M,1M,ANYWHERE,KEEP)
                      HEAP(1M,500K,ANYWHERE,KEEP)') STATIC EXTERNAL;
    ```
  - not available for COBOL
  - Internally generates CEEUOPT/CELQUOPT
Setting Run-Time Options

- Program Invocation Overrides
  - In UNIX System Services shell (case sensitive)
    - `export _CEE_RUNOPTS='run-time options'`
  - In batch, on EXEC card
    - COBOL (with CBLOPTS(ON))
      - `PARM='program arguments/run-time options'`
    - C/C++, PL/I, FORTRAN, Language Environment-conforming Assembler
      - `PARM='run-time options/program arguments'`
    - First program must be Language Environment-conforming
    - The slash is required to delineate the run-time options, even when no program arguments.
    - Note that `PARM=` is limited to 100 characters
Setting Run-Time Options

- **DD:CEEOPTS Overrides**
  - Optional data set in which run-time options may be specified
  - Allows up to 3K characters
  - Allows run-time options to be passed to non-Language Environment conforming main routines

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