IBM Education Assistance for z/OS V2R1

Item: Symbol Resolution Tracing
Element/Component: Binder

Agenda

- Trademarks

- Presentation Objectives

- Overview

- Usage & Invocation

- Appendix

Trademarks

- See url http://www.ibm.com/legal/copytrade.shtml for a list of trademarks.

Session Objectives

- SYMTRACE is a new binder option.

- We will discuss:

  - Purpose

  - Syntax

  - Output

Overview

- The most common problem encountered during binding is unresolved symbols. A unresolved symbol is a reference for which the binder was not able to find a definition. Sometimes finding the root cause is difficult for complex modules containing many input parts, using autocall and being re-bound numerous times.

- Problem Statement / Need Addressed
  - The underlying reason for an unresolved symbols can be difficult to determine

- Solution
  - Use the new binder SYMTRACE option when you get an unresolved symbol error

- Benefit / Value
  - Simplifies the task of determining why a particular symbol did not get resolved, or resolved but not to the desired place

Usage & Invocation

- SYMTRACE is a new binder parameter

  - The option value is the name of a symbol which can be

    - An entry point (label), external reference or part (pseudo-register)
      - *Not* a section or class

    - Private name ($PRIVxxxxxx)

  - It can be used any place a binder parameter can be specified

    - JCL PARM=
    - SETOPT control statement
    - UNIX ld command -b *option*
    - UNIX c89 command *but only uppercase!*

      - *Can circumvent this by using SETOPT in a file*

Usage & Invocation

- SYMTRACE will produce only INFORMATIONAL messages about the symbol being traced

    - Only one symbol name can be specified with each SYMTRACE option

    - SYMTRACE follows the usual binder option conventions:

        - If SYMTRACE specified more than one the last specification is used

        - If the SYMTRACE symbol name is mixed case you must either:
            - Have previously specified the option CASE=MIXED
            - Enclose the symbol name in single quotes

- UNIX commands require either -V or MSGLEVEL=0 as the default is to not display INFORMATIONAL messages

Usage & Invocation

- There are 12 new messages that can be produced by SYMTRACE

- Each is prefixed by **SYMTRACE:** (following the message ID) for easy identification

- There are 4 categories:

  - IMPORT (DLL)

  - Reference found

  - Definition found
    - Origination information available

  - AUTOCALL

Usage & Invocation – Messages ...

- Attempting to IMPORT the symbol (IEW2336I and IEW2337I are from IMPORT control statements):

  - IEW2336I SYMTRACE: SYMBOL *symbol* OF TYPE *symbol-type* IS EXPECTED TO BE IMPORTED FROM DLL *dllname*.

  - IEW2337I SYMTRACE: SYMBOL *symbol* OF TYPE *symbol-type* CAN NOT BE IMPORTED FROM DLL *dllname* BECAUSE THE VALUE OF OPTION DYNAM IS NO.

  - IEW2423I SYMTRACE: SYMBOL *symbol* OF TYPE *symbol-type* WILL BE IMPORTED FROM DLL *dllname*.

  - IEW2424I SYMTRACE: SYMBOL *symbol* OF TYPE *symbol-type* CAN NOT BE IMPORTED BECAUSE THE BINDING SCOPE OF ONE OR MORE REFERENCES TO THIS SYMBOL IS NOT IMPORT-EXPORT.

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Usage & Invocation – Messages ...

- A reference to the symbol is found:

  - IEW2417I SYMTRACE: SYMBOL *symbol* IS REFERENCED IN SECTION *sectname* IN MEMBER *memname* IN THE DATA SET IDENTIFIED BY DDNAME *ddname* WITH CONCATENATION NUMBER number FOR DATA SET NAME *dsname*. [NAME SPACE = name-space]

  - IEW2418I SYMTRACE: SYMBOL *symbol* IS REFERENCED IN SECTION *sectname* IN MEMBER *archive-file-member-name* IN THE UNIX FILE *pathname*. [NAME SPACE = *name-space*]

    - *archive-file-member-name* is **NULL** if the UNIX file is not an archive library member

Usage & Invocation – Messages ...

- A definition of the the symbol is found:

  - IEW2419I SYMTRACE: SYMBOL *symbol* IS DEFINED IN SECTION *sectname* IN MEMBER *memname* IN THE DATA SET IDENTIFIED BY DDNAME *ddname* WITH CONCATENATION NUMBER number FOR DATA SET NAME *dsname*. [NAME SPACE = name-space]

  - IEW2420I SYMTRACE: SYMBOL *symbol* IS DEFINED IN SECTION *sectname* IN MEMBER *archive-file-member-name* IN THE UNIX FILE *pathname*. [NAME SPACE = *name-space*]

    - *archive-file-member-name* is **NULL** if the UNIX file is not an archive library member

Usage & Invocation – Messages ...

- A definition is found and binding from object module or program object level COMPAT(ZOSV1R5) or higher, then origination information is maintained. These then follow IEW2419I or IEW2420I:

  - IEW2421I SYMTRACE: SYMBOL *symbol* DEFINITION ORIGINALLY CAME FROM MEMBER *memname* IN THE DATA SET *dsname*. [NAME SPACE = *name-space*]

  - IEW2422I SYMTRACE: SYMBOL *symbol* DEFINITION ORIGINALLY CAME FROM MEMBER *archive-file-member-name* IN THE UNIX FILE *pathname*. [NAME SPACE = *name-space*]

    - *archive-file-member-name* is **NULL** if the UNIX file is not an archive library member

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Usage & Invocation – Messages ...

- Attempting to AUTOCALL symbol:

  - IEW2546I SYMBOL *symbol* IS BEING SEARCHED FOR IN THE DATA SET IDENTIFIED BY DDNAME *ddname*.

  - IEW2547I SYMTRACE: SYMBOL *symbol* IS BEING SEARCHED FOR IN PATH *pathname*.

Usage & Invocation

- Sample JCL showing multiple SYMTRACEs in a single binder invocation

```
//BIND1     EXEC PGM=IEWL,PARM='CASE=MIXED')
//SYSLIN DD *
  SETOPT PARM(SYMTRACE('abc')) * for next INCLUDE(s)
  INCLUDE OBJ11
  SETOPT PARM(SYMTRACE('def')) * for next INCLUDE(s)
  INCLUDE OBJ12
 NAME MYMOD1
  SETOPT PARM(SYMTRACE('ghi')) * for next INCLUDE(s)
  INCLUDE OBJ21
  SETOPT PARM(SYMTRACE(''))    * turn off for rest
  INCLUDE OBJ22
 NAME MYMOD2
```

Appendix

- z/OS MVS Program Management: User's Guide and Reference – SA22-7643

  - 6.2 Binder options

  - SYMTRACE will be listed in the LIST output of SYSPRINT under the PROCESSING OPTIONS

    - If the symbol name does not fit on a single line it might be truncated

- z/OS V1R13.0 MVS System Messages, Vol 8 (IEF-IGD) – SA22-7638

  - 10.3 IEW2001 - 2999