

A CICS View of IBM Debug Tool for z/OS and OS/390: User Experience

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<http://nersp.nerdc.ufl.edu/~sftware/share101/s1039.pdf>

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Abstract



The speaker will share his experience with integrating and using IBM Debug Tool for z/OS and OS/390 3.1 in a CICS TS 2.2 environment.

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Topics

- Introduction
- MVS Debuggers Discussion
- IBM Debug Tool (DT) Overview
- DT and CICS Integration
- DT "Issues"
- Summary and Q&A
- Appendix and Additional Information

Northeast Regional

Data



Center



Introduction

- UFCNS, the University of Florida Computing and Networking Services (formerly known as NERDC), is the primary data center at the Gainesville, Florida campus.
- Currently utilizing an IBM 9672-R36/R46, with z/OS 1.2 (1.4 being tested) and CICS TS 2.2, with ~15 CICS regions and ~1M+ transactions/day.



Introduction

- Desire to consolidate local MVS debugger suite of products.
- Cost and product support issues, etc.
- Need debugger support for batch, TSO, CICS, DB2 stored procedures, Unix System Services, STCs, SVCs, system exits, COBOL, Assembler, C/C++, Java, etc.

MVS Debuggers Discussion



- Currently Installed:
 - TSO TEST
 - ✓ Included with TSO
 - Cole Software XDC
 - ✓ Assembler only
 - IBM Debug Tool V3.1.0
 - Advantage CA-InterTest for CICS V6.1
 - ✓ Assembler, COBOL, and PL/1 only



MVS (CICS) Debuggers

- Currently Installed:
 - CEDF (CICS Execution Diagnostic Facility)
 - ✓ Included with CICS for testing application programs.
 - ✓ Invoke CEDF for programs initiated at a terminal.
 - ✓ Use CEDX for non-terminal transactions.
 - ✓ Allows intercepts at program initiation, at each CICS and DB2 command, and at program termination.
 - ✓ Use CEDF,termid,ON,I with IBM Debug Tool.

MVS Debuggers



- Other options?:
 - Compuware Xpediter
 - Gary Bergman Associates Advanced Debugging System (ADS) for CICS
 - Macro4 Tracemaster
 - MacKinney Systems CICS Track
 - Viasoft SmartTest
 - Others?



IBM Debug Tool Overview

- IBM Debug Tool for z/OS and OS/390 V3.1 (ALET 202-194).
- "...is IBM's interactive source-level debugging tool for compiled applications. It is a program testing and analysis aid that helps you examine, monitor, and control the execution of application programs written in C/C++, COBOL, PL/I, High Performance Java (HPJ), or Assembler (by using the disassembly view) on a z/OS or OS/390 system."

Debug Tool Overview

- Can be ordered as feature of compiler or stand-alone product.
- Interfaces with LE - uses documented LE debugging interface (see IBM pub. SA22-7568).
- Supports compiled (LE run-time) languages.
- "Limited" support for non-LE enabled compilers: OS/VS COBOL, VS COBOL II, Assembler

Debug Tool Overview

- Source Level Debugging
- Mixed-Language Applications Debugging
- Dynamic Patching
- Dynamic Breakpoint Setting
- Single-step Debugging
- Program Frequency Counting
- Program Information Gathering
- Session Logging
- General Testing



Supported Environments

- MVS (z/OS, OS/390)
- VM
- VSE
- CICS (and IMS)
- Batch, TSO
- DB2 (including Stored Procedures)
- Unix System Services
- Other (WebSphere, etc.)



Debug Tool CICS Integration (RTFM)



- Customization Guide
 - "Adding support for debugging CICS applications" section.
- User's Guide
 - Contains info. about how to debug in CICS.
- Reference and Messages
- Commands Summary
- Coverage Utility User's Guide and Messages (Part of the "DT Utilities and Advanced Functions")



Debug Tool CICS Integration



- Define DT resources to the CICS CSD.
 - 'prefix.SEQASAMP(EQACCSO)'
- Modify CICS run JCL.
 - Include DT SEQAMOD library in DFHRPL concatenation (and LE run-time library if not already included).
- Include EQA00DYN and EQA00HFS from DT SEQAMOD in the STEPLIB concatenation, if SEQAMOD is not in LINKLIST.

What is the next release of CICS TS after 2.2?



From prefix.SEQASAMP(EQACCSD), supplied with recent DT 3.1 maintenance, for input to CICS supplied DFHCSDUP utility program:

```
* Program: EQA00E63 - CICS Global User Exit for CICS TS 2.3 (6.3) *
*           MUST run EXECKEY(CICS)                               *
```

```
DEFINE PROGRAM(EQA00E63)
  GROUP(EQA)
  LANG(ASSEM)
  DATALOC(ANY)
  CEDF(NO)
  EXECKEY(CICS)
```



Debug Tool CICS Integration

- "Ensure that no DD cards exist for CINSPIN, CINSPLS, CINSPOT, or IGZDBGIN."
- "For any terminal that Debug Tool uses to display a debugging session, verify that the CICS TYPETERM definition for that terminal specifies a minimum value of 4096 for the RECEIVESIZE parameter or sets the BUILDCHAIN parameter to YES."
- "Verify that users are able to execute the CDT# transaction."

Debug Tool CICS Integration

- "If you are running your CICS programs in a distributed environment, the DTCN transaction name must be defined the same across all local and remote systems. If the DTCN transaction name is changed or if a DTCN transaction is duplicated and given a different name, the name must be changed on all systems."

Debug Tool User Interfaces and Invocation Options



- Text (3270 based)
- Graphical (GUI based), VisualAge/WebSphere Enterprise Developer
- Batch (background)
- Interactive (foreground)
- Interactive/Batch (VAD/WSED or Remote MFI)



Debug Tool DTCN Screenshot



```
x3270-2 nermvs_ssl
File Options
DTCN Debug Tool CICS Control - Primary Menu NERCTSTI
Select the combination of resources to debug (see Help for more information)

Terminal Id ==> $A01
Transaction Id ==>
Program Id(s) ==> ==> ==> ==>
                ==> ==> ==> ==>
User Id ==>
NetName ==>

Select type and ID of debug display device

Session Type ==> MFI MFI, TCP, WSD
Port Number ==> TCP Port
Display Id ==> $A01

Generated String: TEST(ALL, '*', PROMPT, 'MFI%'$A01; '*')
Repository String: No string currently saved in repository

PF1=HELP 2=GHELP 3=EXIT 4=SAVE 6=DELETE 7=SHOW 9=OPTIONS
TEDVI062 :00,0 005/023
```



Debug Tool Monitor/Source/Log "Windows"



```
x3270-2 nermvs_ssl
File Options
COBOL LOCATION: DCNESW00 ;> 880,1
Command ==>
Scroll ==> PAGE
MONITOR ---+---1---+---2---+---3---+---4---+---5---+---6 LINE: 0 OF 0
***** TOP OF MONITOR *****
***** BOTTOM OF MONITOR *****

SOURCE: DCNESW00 -1---+---2---+---3---+---4---+---5--- LINE: 866 OF 867
880 Call 'DFHEI1' using by content x'0e0800000700001000f0f0f6
881 - '404040' end-call,
***** BOTTOM OF SOURCE *****

LOG 0---+---1---+---2---+---3---+---4---+---5---+---6- LINE: 1 OF 3
***** TOP OF LOG *****
0001 IBM Debug Tool Version 3 Release 1 Mod 0
0002 07/17/2003 10:50:27 AM
0003 5655-H32 and 5655-J18; (C) Copyright IBM Corp. 1992, 2002
PF 1: ? 2: STEP 3: QUIT 4: LIST 5: FIND 6: AT/CLEAR
PF 7: UP 8: DOWN 9: GO 10: ZOOM 11: ZOOM LOG 12: RETRIEVE
TEDVI062 : 05.8 002/015
```



Debug Tool Source Display



```
x3270-2 nermvs_ssl
File Options
COBOL LOCATION: DCNESW00 ;> 880,1
Command ==> Scroll ==> PAGE
SOURCE: DCNESW00 -1-----2-----3-----4-----5--- LINE: 849 OF 867
863 MOVE WS-GEN-ERROR-MSG TO WS-MESSAGE-AREA,
864
865 9800-SEND-MESSAGE,
866
867 *EXEC CICS SEND
868 * FROM(WS-MESSAGE-AREA)
869 * ERASE
870 *END-EXEC,
871 Move length of WS-MESSAGE-AREA to dfhb0020
872 Call 'DFHEI1' using by content x'040430000700000081000040
873 - '00f0f0f6f9f2404040' by content x'0000' by content x'0000
874 reference WS-MESSAGE-AREA by reference dfhb0020 end-call
875
876 9900-RETURN-TO-CICS,
877
878 *EXEC CICS RETURN
879 *END-EXEC,
880 Call 'DFHEI1' using by content x'0e0800000700001000f0f0f6
881 - '404040' end-call,
PF 1: ? 2: STEP 3: QUIT 4: LIST 5: FIND 6: AT/CLEAR
PF 7: UP 8: DOWN 9: GO 10: ZOOM 11: ZOOM LOG 12: RETRIEVE
TEDVI062 :?:00,0 002/015
```



Debug Tool Data Sets



- See "User's Guide" manual.
 - Data Sets used by Debug Tool section.
 - ✓ COBOL, C/C++, PL/I source listing considerations.
- Preferences File: INSPREF
- Commands File: INSPIN
- Log File: INSPLOG
- Save File: INSPSAFE

DT Sample JCL using SYSDEBUG

```
//*  
//* ENTERPRISE COBOL WITH DEBUG TOOL IN CICS  
/*  
//COBOLE EXEC DFHYITVL,  
//      COBPARM='TEST(NONE,SYM,SEPARATE)',  
//      CPYLIB1='Z.COPYLIB',  
//      SUBLIB1='Z.SUBLIB',  
//      LIBRARY='Z.LOADLIB',  
//      PROGRAM=XXXXXXXXX  
//TRN.SYSIN DD DSN=Z.SOURCE(XXXXXXXXX),DISP=SHR  
//COB.SYSDEBUG DD DSN=Z.SYSDEBUG(XXXXXXXXX),DISP=OLD
```

Debug Tool Version Display



```
x3270-2 nermvs_ssl
File Options
Disassem LOCATION: DCNESD00
Command ==>
Scroll ==> PAGE
LOG 0-----+-----1-----+-----2-----+-----3-----+-----4-----+-----5-----+-----6- LINE; 1 OF 9
***** TOP OF LOG *****
0001 IBM Debug Tool Version 3 Release 1 Mod 0
0002 07/17/2003 4:29:12 PM
0003 5655-H32 and 5655-J18; (C) Copyright IBM Corp. 1992, 2002
0004 Source or Listing data is not available, or the CU was not compiled with
0005 the correct compile options.
0006 CALL %VER ;
0007 IBM Debug Tool Version 3 Release 1 Mod 0
0008 2003/06/07 10:49:00 Level;V3R1 PTF 6
0009 5655-H32 and 5655-J18; (C) Copyright IBM Corp. 1992, 2002
***** BOTTOM OF LOG *****

PF 1: ?      2: STEP    3: QUIT    4: LIST    5: FIND    6: AT/CLEAR
PF 7: UP     8: DOWN   9: GO     10: ZOOM   11: ZOOM LOG 12: RETRIEVE

TEDVI09L  :?:00.0 002/015
```



Debug Tool Disassembly Display



```

x3270-2 nermvs_ssl
File Options
Disassem LOCATION: DCNESD00
Command ==>
SOURCE: DCNESD00 -1-----2-----3-----4-----5----- LINE: 1 OF 5691
B8C 107E18EC 05EF BALR R14,R15
B8E 107E18EE 50F0 D078 ST R15,120(,R13)
B92 107E18F2 BF28 D089 ICM R2,8,137(R13)
B96 107E18F6 0420 SPM R2
B98 107E18F8 58B0 C038 L R11,56(,R12)
B9C 107E18FC 47F0 B338 BC 15,824(,R11)
BA0 107E1900 D231 93F0 909B MVC 1008(50,R9),155(R9)
BA6 107E1906 D21C 9422 C008 MVC 1058(29,R9),8(R12)
BAC 107E190C D216 9A70 A189 MVC 2672(23,R9),393(R10)
BB2 107E1912 9240 9A87 MVI 2695(R9),64
BB6 107E1916 D234 9A88 9A87 MVC 2696(53,R9),2695(R9)
BBC 107E191C 4120 9A70 LA R2,2672(,R9)
BC0 107E1920 5020 D250 ST R2,592(,R13)
BC4 107E1924 4120 9A68 LA R2,2664(,R9)
BC8 107E1928 5020 D254 ST R2,596(,R13)
BCC 107E192C 4120 9A68 LA R2,2664(,R9)
BD0 107E1930 5020 D258 ST R2,600(,R13)
BD4 107E1934 4120 93F0 LA R2,1008(,R9)
BD8 107E1938 5020 D25C ST R2,604(,R13)
PF 1: ? 2: STEP 3: QUIT 4: LIST 5: FIND 6: AT/CLEAR
PF 7: UP 8: DOWN 9: GO 10: ZOOM 11: ZOOM LOG 12: RETRIEVE
TEDVI09L ??:00.0 002/015
    
```



Some Debug Tool Commands

- **CALL %VER;**
 - To display the DT version.
- **SET DYNDEBUG ON**
 - To set dynamic debugging on.
- **SET DISASSEMBLY ON**
 - To set disassembly on.
 - ✓ **Very** handy.

Debug Tool "Issues"



- Debugging profiles are not saved in a repository - they are currently "dynamic" - only available until CICS reload.
- "Limited" support for Assembler and/or LE compiled language requirement limits usefulness of product. Our site is ~50% COBOL and ~50% non-LE Assembler in CICS.
- "Rollup" PTFs for product service/features is not preferred. Current level is PTF #6 (APAR PQ73643 - PTF UQ77541 available 03/06/13).



Debug Tool "Issues"

- Frequent ASRA 0C4 abends during CICS DT sessions.
- Open IBM APAR PQ74770 looks like an exact match - APAR is being tracked. It was last updated 03/06/02, and has a blank 'Current Target Date'. Recently updated for PL/1 - probably not applicable at our site - time to open a PMR :-).
- We started testing DT in CICS at rollup PTF #4, and have installed PTF #5 and PTF #6 (so far).

Debug Tool "Issues"

- Operational procedures will need to be reviewed/alterd for interactive batch debugging causing "wait states".

Summary



- DT may assist in MVS debugger consolidation.
- DT supports all languages and environments we need, although better Assembler support is desired/required.
- DT is being tightly integrated into CICS.
- DT is being continually serviced/enhanced by IBM.
- DT "issues" being addressed by IBM?

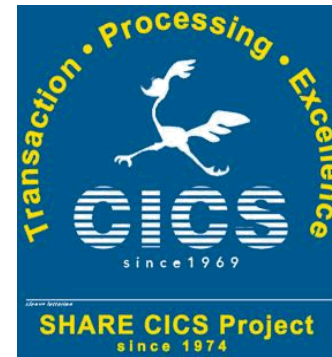


Appendix: Web Resources



- SHARE CICS Project

- <http://www.share.org/cics>



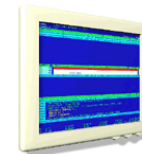
- IBM CICS (Host Transaction Processing)

- <http://www.ibm.com/cics>



- IBM Debug Tool

- <http://www.ibm.com/servers/eservers/zseries/dt>



Presentation Information

- Slackware Linux 9.0
 - <http://www.slackware.com/>
- OpenOffice 1.0.1
 - <http://www.openoffice.org/>
 - Installed TrueType fonts and module "freetype" for use by XFree86.
- SHARE Speaker Presentation Template
 - <http://www.share.org/speakerchair>
 - ✓ Used "Powerpoint" template

