











#### z390 Portable Mainframe Assembler and Emulator

Don Higgins don@higgins.net
Automated Software Tools Corporation

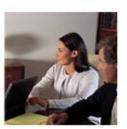
February 12, 2007 2845













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### **Z390**

## ASM



#### z390 Presentation

- Overview
- Macro Processor
- Assembler and Linker
- Emulator
- Hello World Demo
- Questions and Answers



#### z390 Overview

- z390 Open Source Java Project
- Execute HLASM compatible macro code
- Assemble HLASM compatible programs
- Link object code into z390 load modules
- Execute load modules on any J2SE platform



#### z390 Open Source Project

- z390 project www.z390.org downloads
- InstallShield for Windows and file image for Linux
- Java source and z390.jar executable
- Documentation included and also available online
- Demos and regression tests included
- Submit problem and enhancement requests online
- Join z390 project email group for update notices



#### z390 Macro Processor

- Expands macro code into BAL source code
- Extensions to AREAD and PUNCH for file I/O
- Library with MVS compatible common macros
- Extendable parser for EXEC CICS and EXEC SQL
- Extendable SOA application generator using TCP/IP
- Option to run assembler as parallel task



#### z390 Assembler and Linker

- Assemble expanded BAL source into object code
- Supports assembly of all opcodes in latest POP
- Link multiple object files into load module
- Options to set AMODE and RMODE
- Options for listing and trace files



#### **z**390 Emulator (1 OF 2)

- Execute z390 load modules on any J2SE platform
- Execute all problem state instructions
- z390 macro generated SVC support includes:
  - GETMAIN, FREEMAIN, LINK, LOAD, DELETE
  - WTO, WTOR, TGET, TPUT, TIME, ESPIE, ESTAE
  - OPEN, CLOSE, GET, PUT, READ, WRITE, CHECK
- Options for interactive TEST and TRACE debugging



#### **z390** Emulator (2 of 2)

- CMDPROC macro and svc for multi-tasking
- CTD and CFD macros to convert HFP, BFP, and DFP
- TN3270 screen I/O using TGET, TPUT
- TCPIO macro and svc to support TCP/IP sockets
- 3 GHZ Intel processor can execute over 2 MIPS
- See online benchmark report with timings



#### z390 Hello World Demo

- To install and run z390 demo on Windows XP:
- Download and install J2RE 5.0+
- Download and install z390 v1.3
- Double click on z390 icon to start GUI interface
- Enter the command: ASMLG DEMO\DEMO
- Enter: notepad demo\demo.log to view log file



#### Hello World Demo source file (MLC)

- DEMO SUBENTRY
- WTO 'HELLO WORLD'
- SUBEXIT
- END



#### Hello World Demo source BAL

- DEMO CSECT
- .....
- BRAS 1,\*+(WTO#2\_EOT-\*+1)/2\*2
- DC AL2(WTO#2\_EOT-\*,0),C'HELLO WORLD'
- WTO#2\_EOT EQU \*
- SVC 35
- END



#### Hello World Assembler Listing (PRN)

•

00005A A715000A
 27 BRAS

00005E 000F0000C8C5D3D3 28 DC

00006D 00006D 29 WTO#2\_EOT EQU \*

• 00006E 0A23 30 SVC 35

•

END



#### Hello World hex object file (OBJ)

- .ESD ESD=0001 LOC=00000000 LEN=00000088 TYPE=CST NAME=DEMO
- . . . .
- .TXT ESD=0001 LOC=00000050 LEN=10 50F0D00850D0F00418DFA715000A000F
- .TXT ESD=0001 LOC=00000060 LEN=0D 0000C8C5D3D3D640E6D6D9D3C4
- .TXT ESD=0001 LOC=0000006E LEN=10 0A2341F0000058D0D004980CD01458E0
- ..... (Note this format requires option OBJHEX)



#### Hello World Linker Listing (LST)

- LZ390I V1.3.00a Current Date 01/16/07 Time 19:16:00
- LZ390l program = demo\demo.OBJ
- LZ390l options = bal objhex nolistcall
- LZ390I ESD=DEMO LOC=00000000 LEN=00000088



#### **Hello World Execution Log**

- EZ390I V1.3.00a Current Date 01/16/07 Time 19:16:00
- EZ390I program = demo
- EZ390l options = bal objhex nolistcall
- HELLO WORLD
- EZ390I Stats total instructions = 13
- EZ390I Stats current date 01/16/07 time 19:16:00



#### Hello World Execution Trace file (TRE)

- ,,,,,,,
- 800FFFD2 0 A715000A BRAS R1=00002300 S2(000FFFE6)=0A23 SVC
- 800FFFE6 0 0A23 SVC I1=23 WTO R1=ADDR(AL2(LEN),AL2(FLAGS),C'MSG')
- EZ390I HELLO WORLD
- 800FFFE8 0 41F00000 LA RF=00000000
   S2(0000000)

• • • • • • •



#### **Hello World Interactive TEST log**

- test cmd: g svc
- test break on g svc
- 800FFFE6 0 0A23 SVC I1=23 WTO R1=ADDR(AL2(LEN),AL2(FLAGS),C'MSG')
- test enter command or h for help
- test cmd: g
- HELLO WORLD



#### **z390 Questions and Answers**

- What is the primary use of z390?
- Why is z390 open source?
- How is the Java source maintained?
- What are the minimum requirements?
- What limitations are there?
- Who is using z390?



#### **Trademark Acknowledgements**

- IBM Corporation z/OS, HLASM, CICS
- Microsoft Windows XP and 2000
- Sun Microsystems J2SE, J2RE













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# **Z390 ASM**