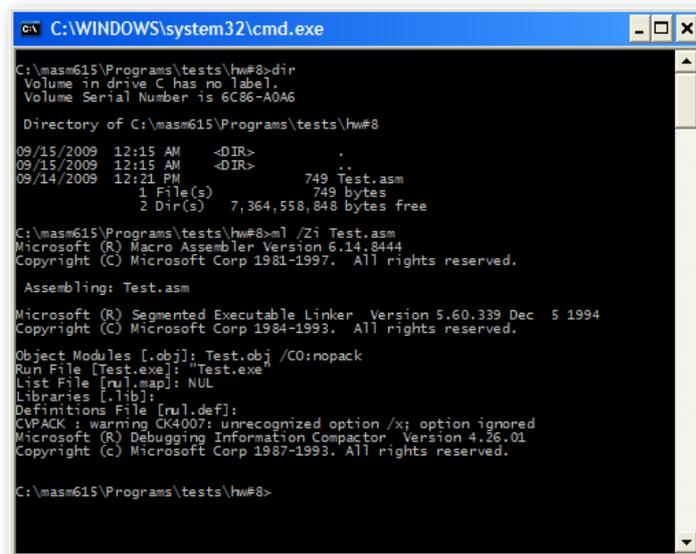


TA: Jade Cheng
ICS 312
Homework Solution #8

Debugger: Running the test program in the CodeView debugger

- 1:** Download the file "Test.asm" from the course site, Debugging notes into your masm615/programs directory. I created a folder called hw#8 and put the "Test.asm" in there. Assemble and link the program with command:

```
ml /Zi Test.asm
```



```
C:\WINDOWS\system32\cmd.exe
C:\masm615\Programs\tests\hw#8-dir
Volume in drive C has no label.
Volume Serial Number is 6C86-A0A6

Directory of C:\masm615\Programs\tests\hw#8
09/15/2009 12:15 AM <DIR>          .
09/15/2009 12:15 AM <DIR>          ..
09/14/2009 12:21 PM             749 Test.asm
               1 File(s)         749 bytes
               2 Dir(s)         7,364,558,848 bytes free

C:\masm615\Programs\tests\hw#8>ml /Zi Test.asm
Microsoft (R) Macro Assembler Version 6.14.8444
Copyright (C) Microsoft Corp 1981-1997. All rights reserved.

Assembling: Test.asm

Microsoft (R) Segmented Executable Linker Version 5.60.339 Dec 5 1994
Copyright (C) Microsoft Corp 1984-1993. All rights reserved.

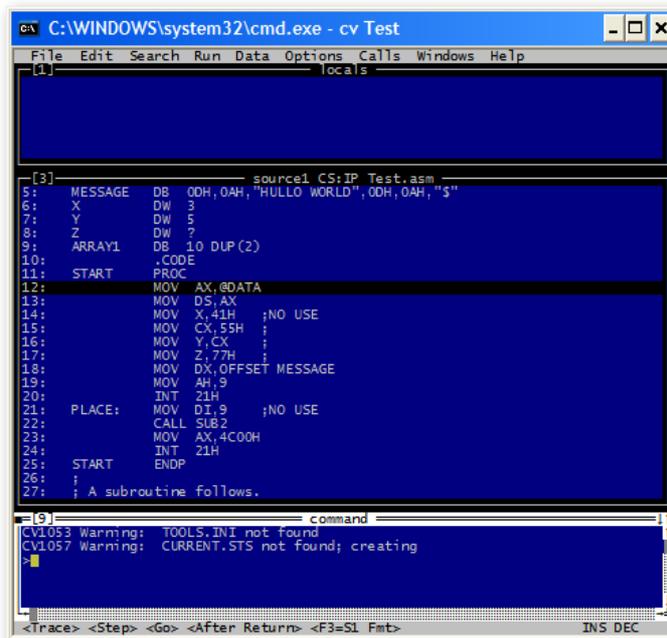
Object Modules [obj]: Test.obj /CO:nopack
Run File [Test.exe]: "Test.exe"
List File [nul,map]: NUL
Libraries [lib]:
Definitions File [nul,def]:
CVPACK : warning CK4007: unrecognized option /x; option ignored
Microsoft (R) Debugging Information Compactor Version 4.26.01
Copyright (c) Microsoft Corp 1987-1993. All rights reserved.

C:\masm615\Programs\tests\hw#8>
```

As the screen shot shown above, I listed my directory with command "dir" and compiled the "Test.asm" with the flag for debugging information.

- 2:** Next, run the program in the CodeView Debugger to trace the program. To run the program in CodeView type in the command:

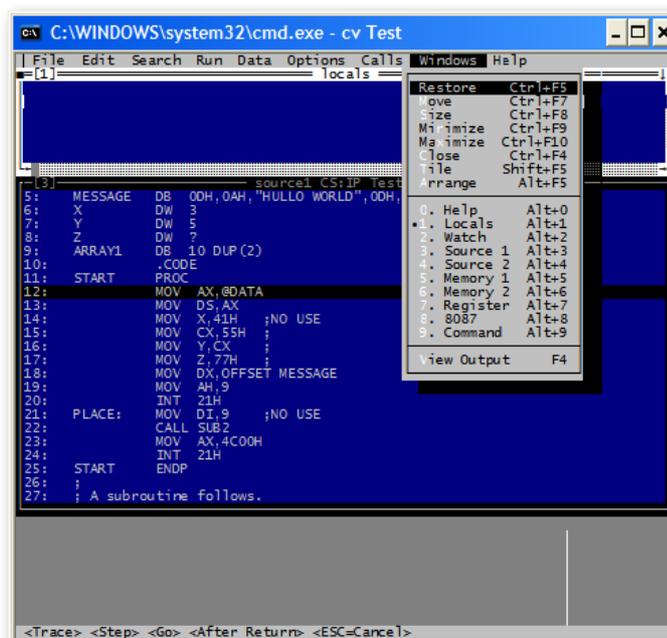
```
cv Test
```



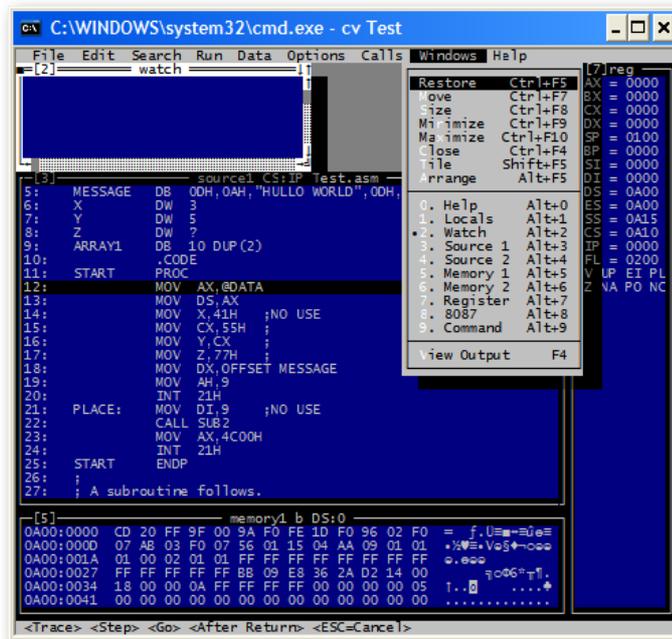
This is the first view I got by executing the command “cv Test”. As we saw, we have three windows. They are locals, source1, and command.

3: In CodeView, arrange the windows as follows:

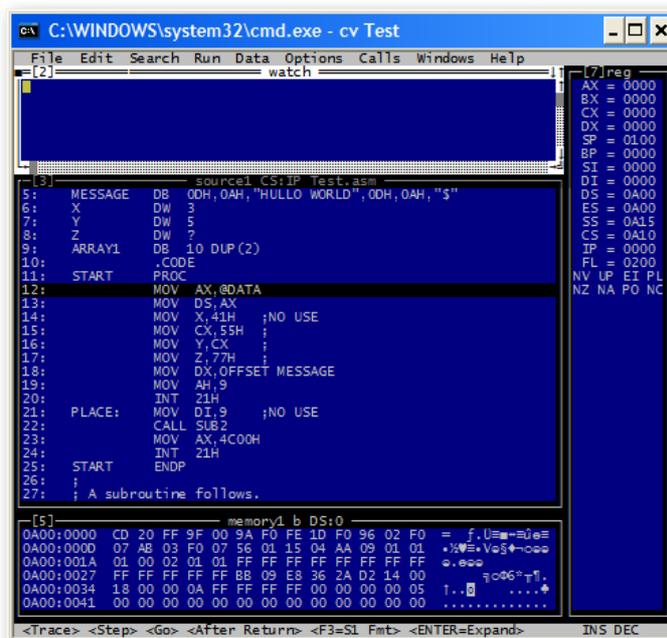
- a. Close the command window by clicking on the upper left corner of the window.



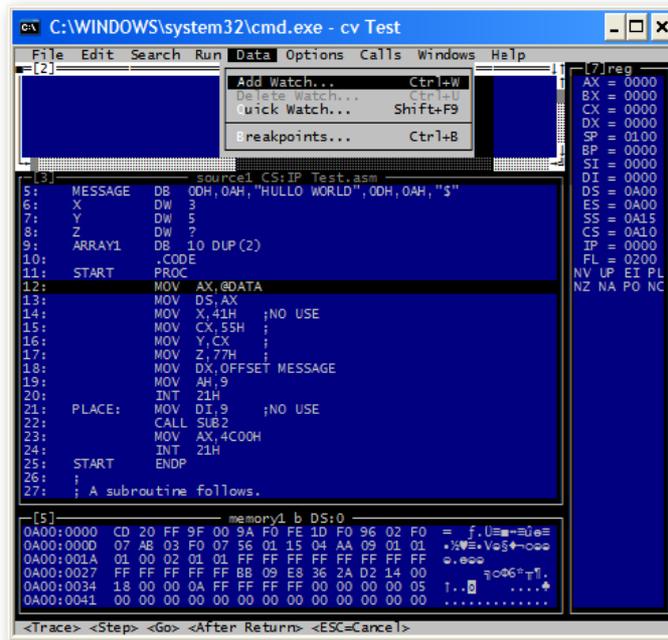
- b. Use the Windows menu to open a Register window and the Memory 1 window. The Watch and Source 1 windows should already be open. If not, use the Windows menu to add and open them.



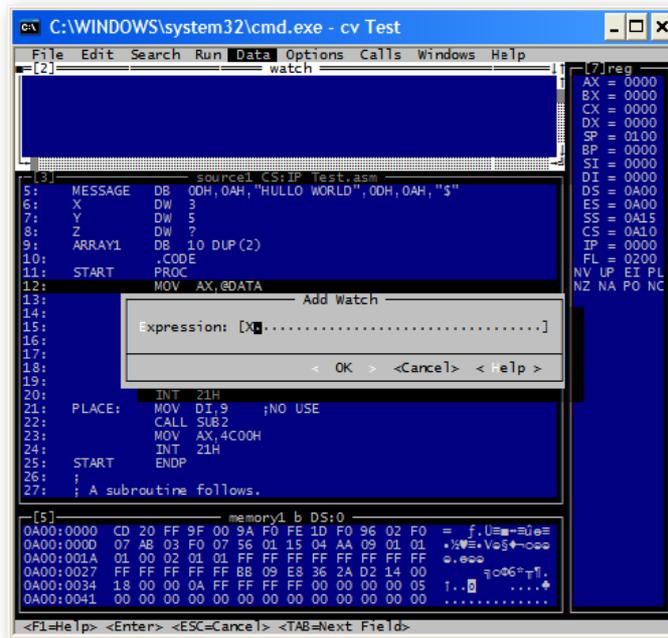
- c. Use the Windows | Arrange command to get an easy to use layout for the debugger windows. (There should be 4 windows open: Watch, Source, Register, and Memory.)



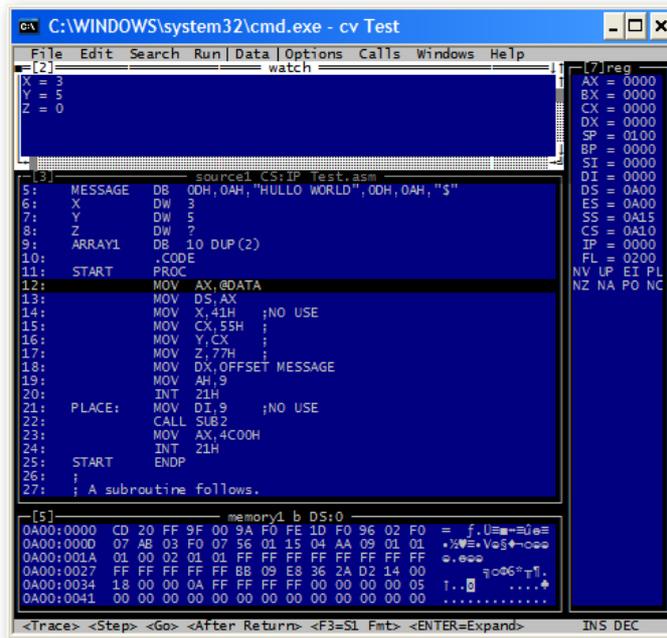
3: Create watches for the variables X, Y, and Z by using the Data | Add Watch command.



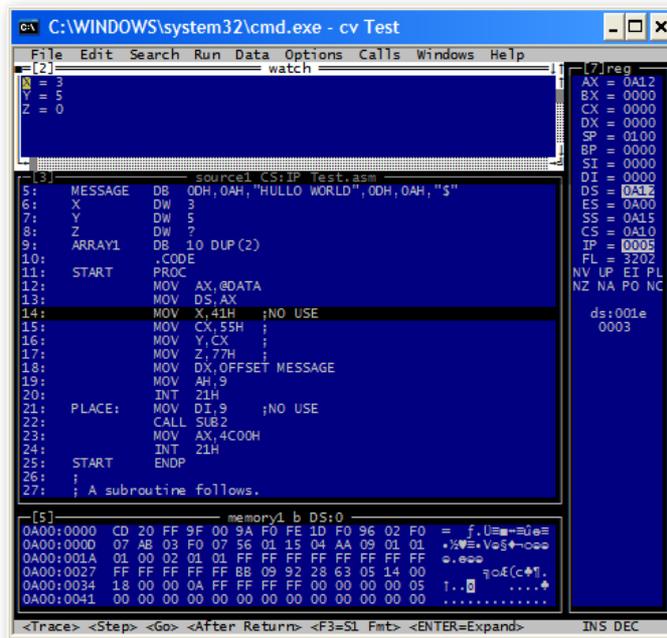
Add one at a time by typing in the Add Watch window:



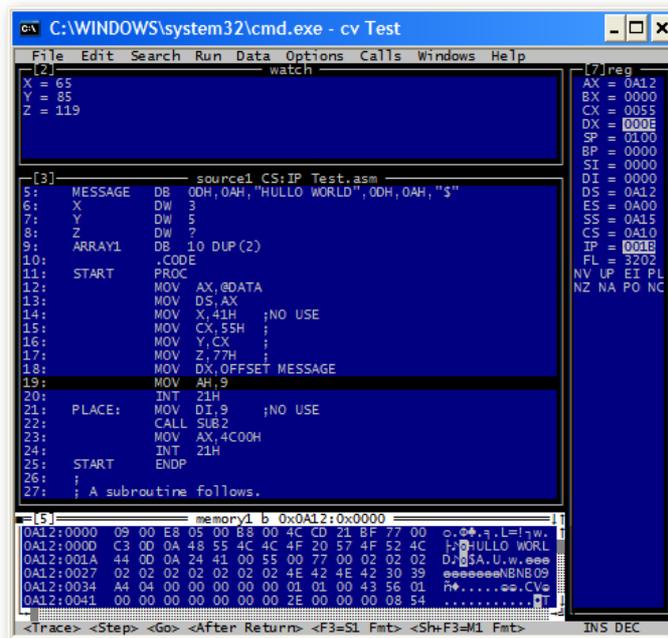
Do it repeatedly to create X, Y, and Z watches. They will show up in the watch panel as the image shown below:



- 4: Use F8 (Trace) to trace the first 2 instructions of the program. This should set a new value in the DS register (in the register window).



As we saw, DS changed from 0A00 to 0A12. At this point the following instructions in the assembly code were executed:



The values of X, Y and Z were updating as the program executes. At this point the following instructions in the assembly code were executed:

```

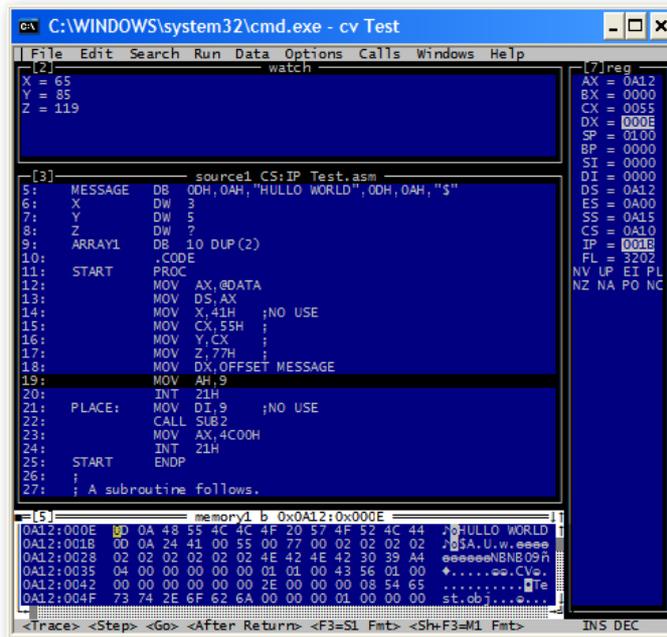
START      PROC
           MOV  AX,@DATA
           MOV  DS,AX
           MOV  X,41H    ;NO USE
           MOV  CX,55H   ;
           MOV  Y,CX     ;
           MOV  Z,77H    ;
           MOV  DX,OFFSET MESSAGE

```

7: Once the instruction

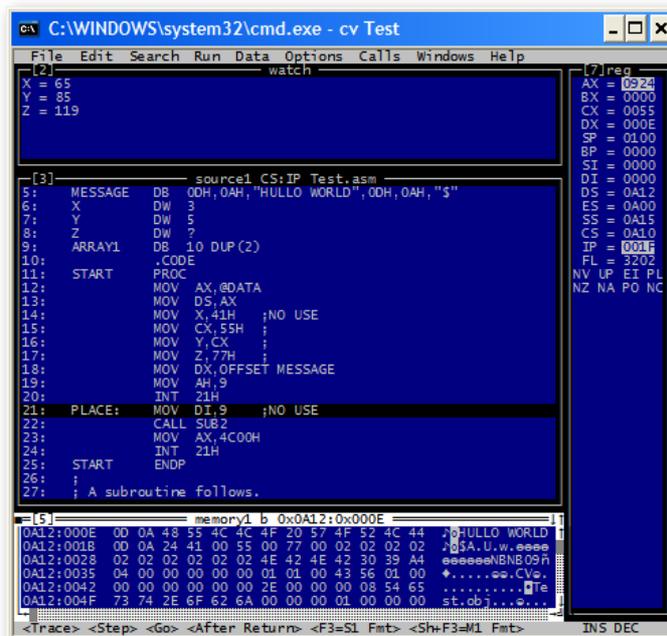
```
MOV DX, OFFSET MESSAGE
```

has been executed (notice the change to DX in the register window), change the offset of the first address given in the Memory window to match the value stored in DX. You should see the message "Hullo World" in ASCII text at the right end of the Memory Window.



The value in offset was 0000. The address contained in DX is 000E. In order to view the contents of the memory space that DX contains, we need to change 0000 to 000E as shown above. After doing that, we can see the message “HULLO WORLD” in ASCII on the right end of the memory window.

8: Continue tracing the program until the INT 21h instruction has been executed.



At this point the following instructions in the assembly code were executed:

```
START                PROC
                    MOV  AX,@DATA
                    MOV  DS,AX
                    MOV  X,41H
                    MOV  CX,55H
                    MOV  Y,CX
                    MOV  Z,77H
                    MOV  DX,OFFSET MESSAGE
                    MOV  AH,9
                    INT  21H
PLACE :             MOV  DI,9
                    CALL SUB2
                    MOV  AX,4C00H
                    INT  21H
START               ENDP
SUB2                PROC
                    MOV  DI,77H ;NO USE
                    RET
SUB2                ENDP
                    END  START
```

Use the F4 key to view the message displayed on the output screen. Then, use F4 to return to the debugger screen.

```

C:\WINDOWS\system32\cmd.exe - cv Test

C:\masm615\Programs\tests\hw#8>dir
Volume in drive C has no label.
Volume Serial Number is 6C86-A0A6

Directory of C:\masm615\Programs\tests\hw#8

09/15/2009 12:15 AM <DIR>      .
09/15/2009 12:15 AM <DIR>      ..
09/14/2009 12:21 PM             749 Test.asm
               1 File(s)        749 bytes
               2 Dir(s)      7,364,558,848 bytes free

C:\masm615\Programs\tests\hw#8>ml /zi Test.asm
Microsoft (R) Macro Assembler Version 6.14.8444
Copyright (C) Microsoft Corp 1981-1997. All rights reserved.

Assembling: Test.asm

Microsoft (R) Segmented Executable Linker Version 5.60.339 Dec  5 1994
Copyright (C) Microsoft Corp 1984-1993. All rights reserved.

Object Modules [*.obj]: Test.obj /CO:nopack
Run File [Test.exe]: "Test.exe"
List File [nul.map]: NUL
Libraries [*.lib]:
Definitions File [nul.def]:
CVPACK: warning CK4007: unrecognized option /x; option ignored
Microsoft (R) Debugging Information Compactor Version 4.26.01
Copyright (C) Microsoft Corp 1987-1993. All rights reserved.

C:\masm615\Programs\tests\hw#8>cv Test

HULLO WORLD

```

We can see that the print-to-screen command has executed successfully.

- 9: Continue tracing the program using F8, including the subroutine, until the program ends.

```

C:\WINDOWS\system32\cmd.exe - cv Test

File Edit Search Run Data Options Calls Windows Help

[2] watch
X = 65
Y = 85
Z = 119

[3] source1 CS:IP Test.asm
23: MOV AX,4C00H
24: INT 21H
25: START ENDP
26: ;
27: ; A subroutine follows.
28: ;
29: SUB2 PROC
30: MOV DI,77H ;NO USE
31: RET
32: SUB2 ENDP
33:

[7] reg
AX = 4C00
BX = 0000
CX = 0055
DX = 000E
SP = 0100
BP = 0000
SI = 0000
DI = 0077
DS = 0A12
ES = 0A00
SS = 0A15
CS = 0A10
IP = 002E
FL = 3202
NV UP EI PL
NZ NA PO NC

[5] memory1 b 0x0A12:0x000E
0A12:000E 00 0A 48 55 4C 4C 4F 20 57 4F 52 4C 44 00 HULLO WORLD
0A12:0018 00 0A 24 41 00 55 00 77 00 02 02 02 02 02 SA,U.w.ese
0A12:0028 02 02 02 02 02 02 4E 42 4E 42 30 39 A4 eeeeeNBNS09n
0A12:0035 04 00 00 00 00 00 01 01 00 43 56 01 00 +.....e.CVe.
0A12:0042 00 00 00 00 00 2E 00 00 00 08 54 65 .....eTe
0A12:004F 73 74 2E 6F 62 6A 00 00 00 01 00 00 00 st.obj...e...

<Trace> <Step> <Go> <After Return> <F3=S1 Fmt> <Sh-F3=M1 Fmt> INS DEC

```

Click Enter and you are all done!