

# How to use AFD Debugger

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## How to open the .com in AFD

There are two ways to open the .com in the AFD debugger.

- On command prompt type command **afd filename.com**

E.g. if we want to open ex01.com in the AFD we will give command as



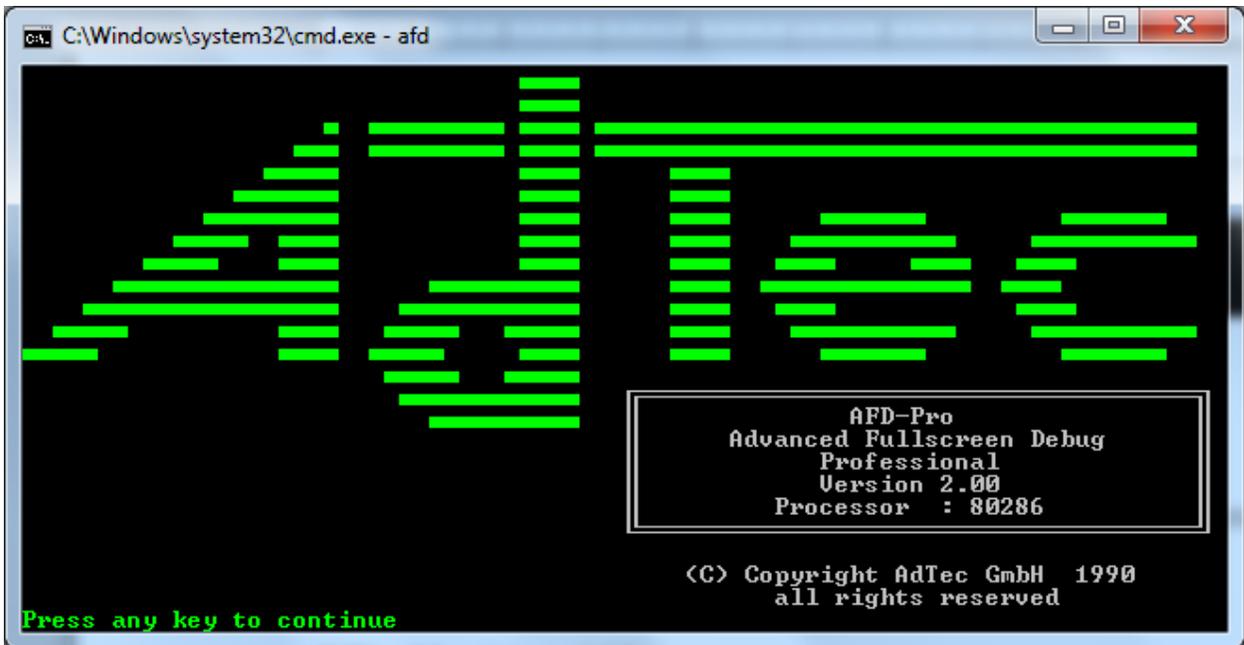
```
C:\Windows\system32\cmd.exe
Y:\CS401\nasm>afd ex01.com
```

- 2<sup>nd</sup> method is just open AFD with command **afd**



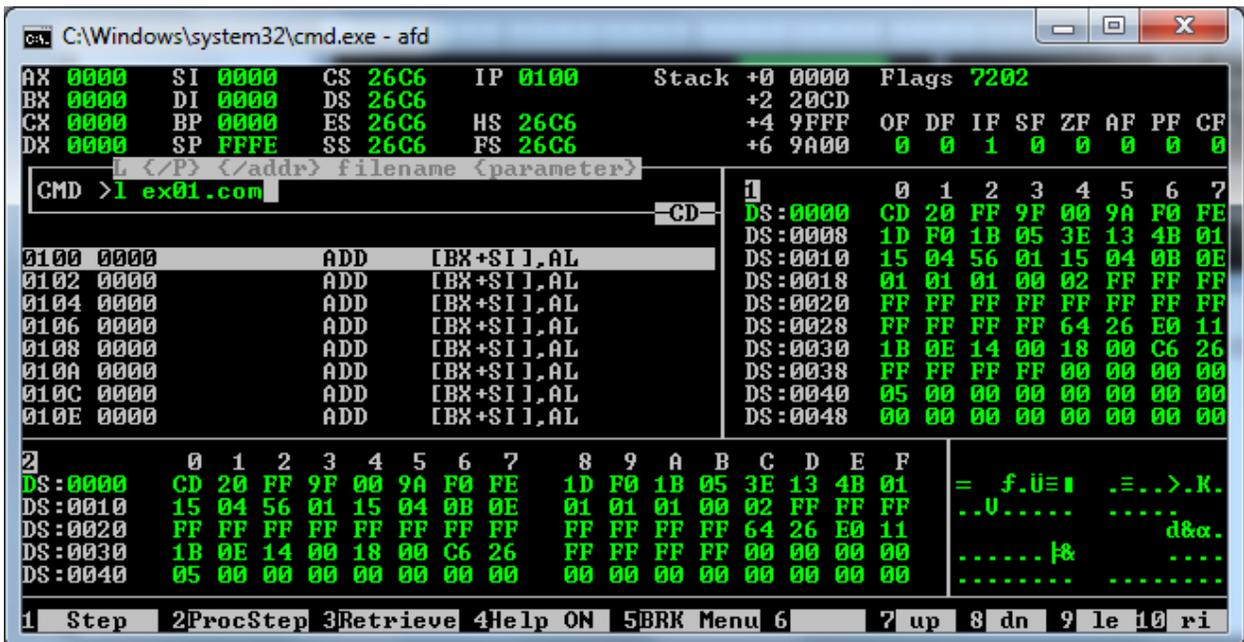
```
C:\Windows\system32\cmd.exe
Y:\CS401\nasm>afd_
```

Once you are in the AFD

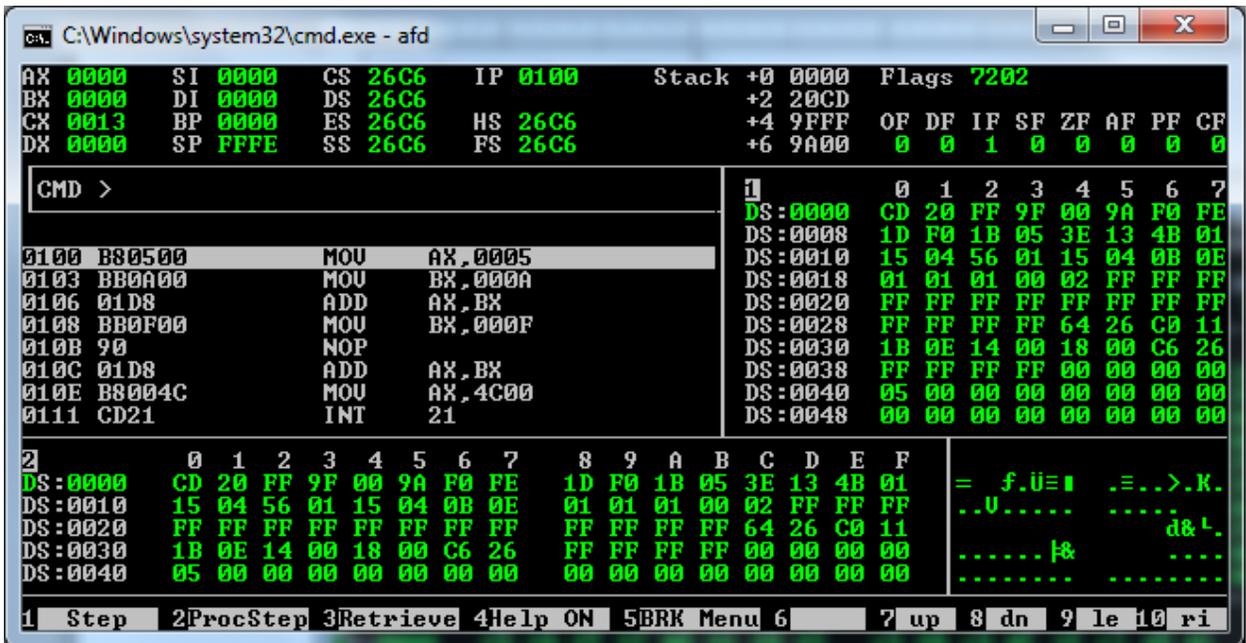


Press spacebar to skip the intro screen and give command **L filename.com**

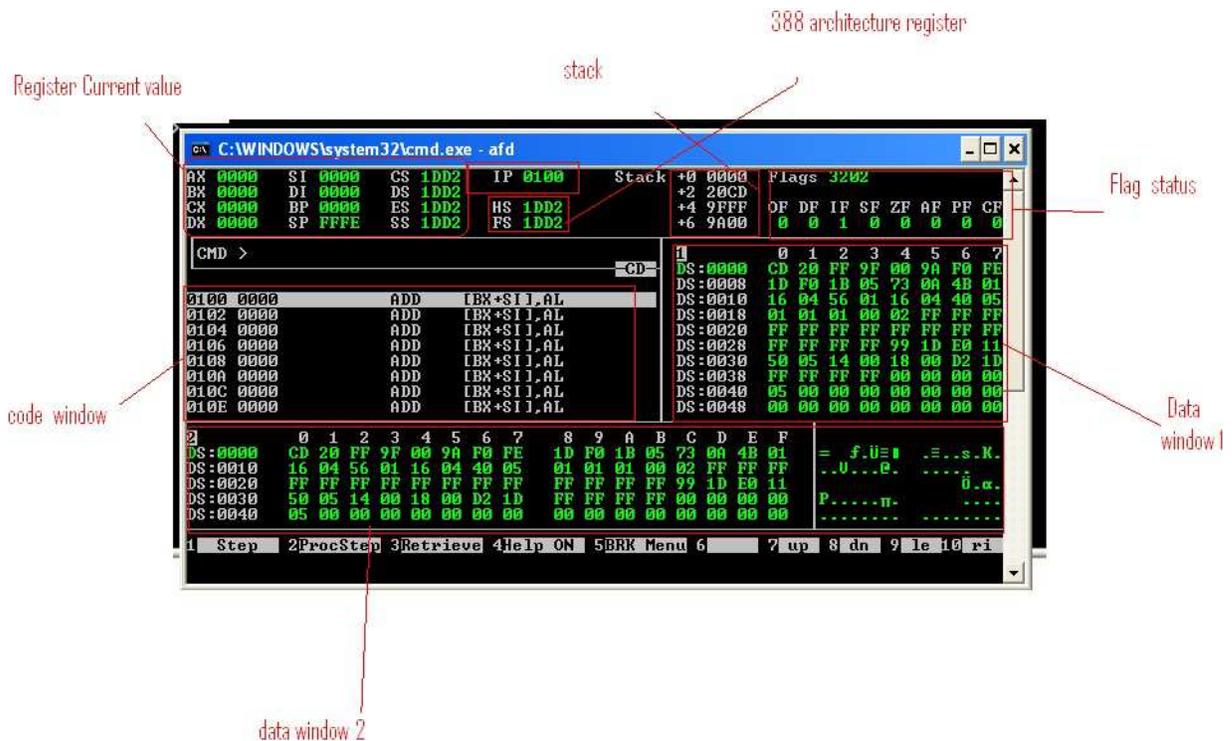
E.g. if we want to open ex01.com in the AFD we will give command as **-l ex01.com**



ex01.com will be loaded



## Parts of the AFD Screen



Executing the code line by line

## To move between various parts of AFD

To Move between memory/data window 1, registers and command prompt press F7 or F8, to go to and come back from data window 2 press F9

## To load contents of Memory

```
CMD> M1 DS : 100
```

the above mentioned command will display the contents of memory location at offset address "0x0100" in memory window 1 (the address of the location where normally your first variable is stored, if your first variable is a word then moving two bytes ahead will display the contents of next variable e.g. M1 DS:102)

The screenshot shows the AFD interface with the following components:

- Registers:** AX 0000, SI 0000, CS 26C6, IP 0100, Stack +0 0000, Flags 7202; BX 0000, DI 0000, DS 26C6; CX 0013, BP 0000, ES 26C6, HS 26C6; DX 0000, SP FFFE, SS 26C6, FS 26C6.
- Command Prompt:** M1 addr : seg reg: CMD >m1 ds:0100
- Disassembly:** 0100 B80500 MOV AX,0005; 0103 BB0A00 MOV BX,000A; 0106 01D8 ADD AX,BX; 0108 BB0F00 MOV BX,000F; 010B 90 NOP; 010C 01D8 ADD AX,BX; 010E B8004C MOV AX,4C00; 0111 CD21 INT 21
- Memory Dump:** DS:0000 CD 20 FF 9F 00 9A F0 FE; DS:0008 1D F0 1B 05 3E 13 4B 01; DS:0010 15 04 56 01 15 04 0B 0E; DS:0018 01 01 01 00 02 FF FF FF; DS:0020 FF FF FF FF FF FF FF FF; DS:0028 FF FF FF FF 64 26 C0 11; DS:0030 1B 0E 14 00 18 00 C6 26; DS:0038 FF FF FF FF 00 00 00 00; DS:0040 05 00 00 00 00 00 00 00; DS:0048 00 00 00 00 00 00 00 00
- Hex Dump:** DS:0000 CD 20 FF 9F 00 9A F0 FE; DS:0010 15 04 56 01 15 04 0B 0E; DS:0020 FF FF FF FF FF FF FF FF; DS:0030 1B 0E 14 00 18 00 C6 26; DS:0040 05 00 00 00 00 00 00 00
- Navigation:** 1 Step, 2 ProcStep, 3 Retrieve, 4 Help ON, 5 BRK Menu, 6, 7 up, 8 dn, 9 le, 10 ri

```

C:\Windows\system32\cmd.exe - afd
AX 0000 SI 0000 CS 26C6 IP 0100 Stack +0 0000 Flags 7202
BX 0000 DI 0000 DS 26C6 +2 20CD
CX 0013 BP 0000 ES 26C6 HS 26C6 +4 9FFF OF DF IF SF ZF AF PF CF
DX 0000 SP FFPE SS 26C6 FS 26C6 +6 9A00 0 0 1 0 0 0 0 0

CMD >

0100 B80500 MOU AX,0005 DS:0100 B8 05 00 BB 0A 00 01 D8
0103 BB0A00 MOU BX,000A DS:0108 BB 0F 00 90 01 D8 B8 00
0106 01D8 ADD AX,BX DS:0110 4C CD 21 00 00 00 00 00
0108 BB0F00 MOU BX,000F DS:0118 00 00 00 00 00 00 00 00
010B 90 NOP DS:0120 00 00 00 00 00 00 00 00
010C 01D8 ADD AX,BX DS:0128 00 00 00 00 00 00 00 00
010E B8004C MOU AX,4C00 DS:0130 00 00 00 00 00 00 00 00
0111 CD21 INT 21 DS:0138 00 00 00 00 00 00 00 00
DS:0140 00 00 00 00 00 00 00 00
DS:0148 00 00 00 00 00 00 00 00

2 0 1 2 3 4 5 6 7 8 9 A B C D E F = f.Ü≡| .≡...>.K.
DS:0000 CD 20 FF 9F 00 9A F0 FE 1D F0 1B 05 3E 13 4B 01 ..U..... d&L.
DS:0010 15 04 56 01 15 04 0B 0E 01 01 01 00 02 FF FF FF .....|&.....
DS:0020 FF 64 26 C0 11
DS:0030 1B 0E 14 00 18 00 C6 26 FF FF FF FF 00 00 00 00
DS:0040 05 00 00 00 00 00 00 00 00 00 00 00 00 00 00
1 Step 2ProcStep 3Retrieve 4Help ON 5BRK Menu 6 7 up 8 dn 9 le 10 ri

```

Similarly to display data contents in memory window 2 use the following command

CMD> M2 DS : 100

```

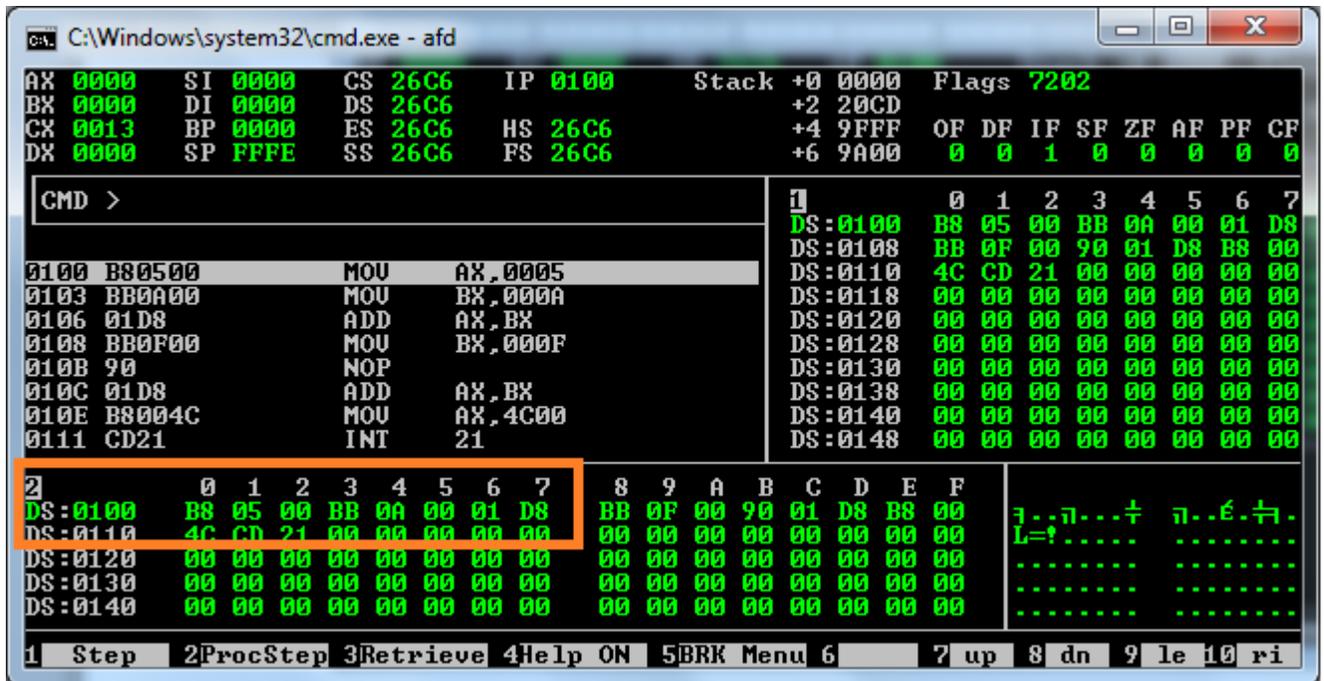
C:\Windows\system32\cmd.exe - afd
AX 0000 SI 0000 CS 26C6 IP 0100 Stack +0 0000 Flags 7202
BX 0000 DI 0000 DS 26C6 +2 20CD
CX 0013 BP 0000 ES 26C6 HS 26C6 +4 9FFF OF DF IF SF ZF AF PF CF
DX 0000 SP FFPE SS 26C6 FS 26C6 +6 9A00 0 0 1 0 0 0 0 0

M2 </A> addr i seq_req
CMD >m2 DS:0100

0100 B80500 MOU AX,0005 DS:0100 B8 05 00 BB 0A 00 01 D8
0103 BB0A00 MOU BX,000A DS:0108 BB 0F 00 90 01 D8 B8 00
0106 01D8 ADD AX,BX DS:0110 4C CD 21 00 00 00 00 00
0108 BB0F00 MOU BX,000F DS:0118 00 00 00 00 00 00 00 00
010B 90 NOP DS:0120 00 00 00 00 00 00 00 00
010C 01D8 ADD AX,BX DS:0128 00 00 00 00 00 00 00 00
010E B8004C MOU AX,4C00 DS:0130 00 00 00 00 00 00 00 00
0111 CD21 INT 21 DS:0138 00 00 00 00 00 00 00 00
DS:0140 00 00 00 00 00 00 00 00
DS:0148 00 00 00 00 00 00 00 00

2 0 1 2 3 4 5 6 7 8 9 A B C D E F = f.Ü≡| .≡...>.K.
DS:0000 CD 20 FF 9F 00 9A F0 FE 1D F0 1B 05 3E 13 4B 01 ..U..... d&L.
DS:0010 15 04 56 01 15 04 0B 0E 01 01 01 00 02 FF FF FF .....|&.....
DS:0020 FF 64 26 C0 11
DS:0030 1B 0E 14 00 18 00 C6 26 FF FF FF FF 00 00 00 00
DS:0040 05 00 00 00 00 00 00 00 00 00 00 00 00 00 00
1 Step 2ProcStep 3Retrieve 4Help ON 5BRK Menu 6 7 up 8 dn 9 le 10 ri

```



## Changing the Values of registers

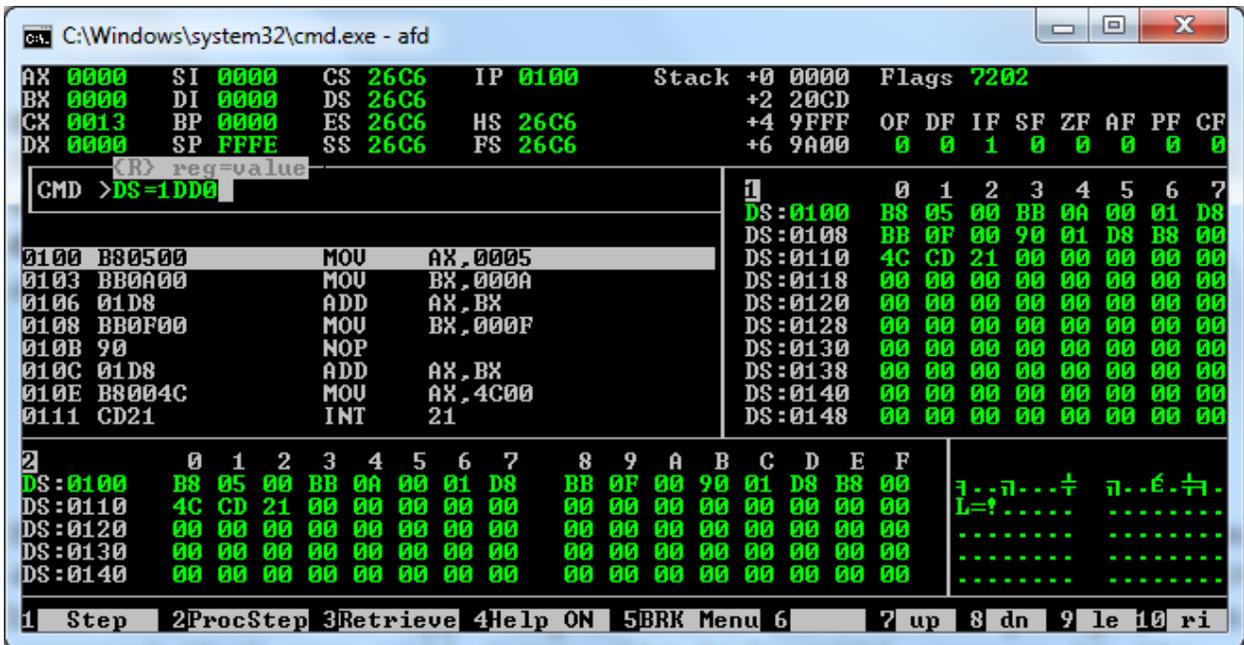
If you want to change the values of the registers directly in the debugger then here is the command:

**register=value**

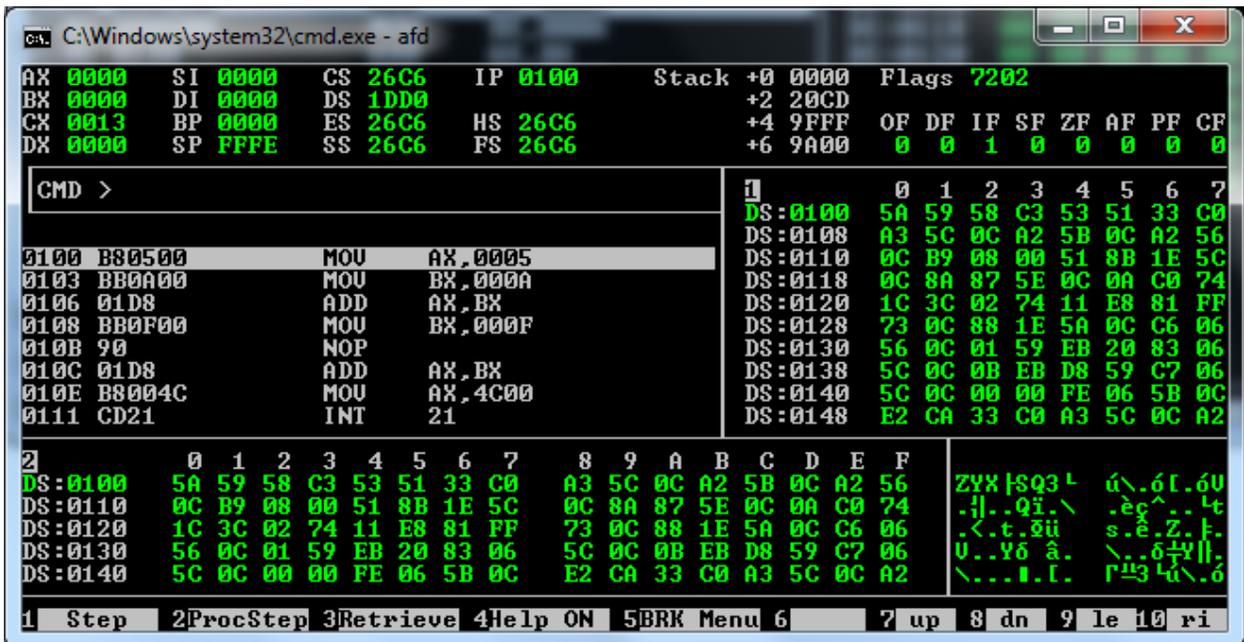
For example, you want to set 1DD0 in DS register, you will write like this:

**ds=1DD0**

and press Enter.



You can see the above command as changed the value of the register.



Or there is also another way, you can move between these different windows (register window, memory window etc.) by pressing F8 or F9 keys in the debugger and then typing the value in the respective window at desired location.

## Changing content of memory

To change the contents of the memory, Press F8 or F9 to go to memory area 1 or memory area 2

```

C:\Windows\system32\cmd.exe - afd
AX 0000 SI 0000 CS 26C6 IP 0100 Stack +0 0000 Flags 7202
BX 0000 DI 0000 DS 1DD0          +2 20CD
CX 0013 BP 0000 ES 26C6 HS 26C6   +4 9FFF OF DF IF SF ZF AF PF CF
DX 0000 SP FFFE SS 26C6 FS 26C6   +6 9A00  0 0 1 0 0 0 0 0

CMD >
0100 B80500 MOU AX,0005
0103 BB0A00 MOU BX,000A
0106 01D8   ADD AX,BX
0108 BB0F00 MOU BX,000F
010B 90     NOP
010C 01D8   ADD AX,BX
010E B8004C MOU AX,4C00
0111 CD21   INT 21

01 0 1 2 3 4 5 6 7 8 9 A B C D E F
DS:0100 5A 59 58 C3 53 51 33 C0 A3 5C 0C A2 5B 0C A2 56 ZYX|SQ3| á\,óL,óU
DS:0110 0C B9 08 00 51 8B 1E 5C 0C 8A 87 5E 0C 0A C0 74 .|. .Qi.\ .èç^.. ^t
DS:0120 1C 3C 02 74 11 E8 81 FF 73 0C 88 1E 5A 0C C6 06 <.t.üü s.è.Z. f.
DS:0130 56 0C 01 59 EB 20 83 06 5C 0C 0B EB D8 59 C7 06 U..Yó â. \..óY||.
DS:0140 5C 0C 00 00 FE 06 5B 0C E2 CA 33 C0 A3 5C 0C A2 \...|.L. Γ²³Lú\,ó

1 Step 2ProcStep 3Retrieve 4Help ON 5BRK Menu 6 7 up 8 dn 9 le 10 ri
  
```

Go to the desired location with arrow keys and type the new value

```

C:\Windows\system32\cmd.exe - afd
AX 0000 SI 0000 CS 26C6 IP 0100 Stack +0 0000 Flags 7202
BX 0000 DI 0000 DS 1DD0          +2 20CD
CX 0013 BP 0000 ES 26C6 HS 26C6   +4 9FFF OF DF IF SF ZF AF PF CF
DX 0000 SP FFFE SS 26C6 FS 26C6   +6 9A00  0 0 1 0 0 0 0 0

CMD >
0100 B80500 MOU AX,0005
0103 BB0A00 MOU BX,000A
0106 01D8   ADD AX,BX
0108 BB0F00 MOU BX,000F
010B 90     NOP
010C 01D8   ADD AX,BX
010E B8004C MOU AX,4C00
0111 CD21   INT 21

01 0 1 2 3 4 5 6 7 8 9 A B C D E F
DS:0100 5A 59 90 C3 53 51 33 C0 A3 5C 0C A2 5B 0C A2 56 ZYÉ|SQ3| á\,óL,óU
DS:0110 0C B9 08 00 51 8B 1E 5C 0C 8A 87 5E 0C 0A C0 74 .|. .Qi.\ .èç^.. ^t
DS:0120 1C 3C 02 74 11 E8 81 FF 73 0C 88 1E 5A 0C C6 06 <.t.üü s.è.Z. f.
DS:0130 56 0C 01 59 EB 20 83 06 5C 0C 0B EB D8 59 C7 06 U..Yó â. \..óY||.
DS:0140 5C 0C 00 00 FE 06 5B 0C E2 CA 33 C0 A3 5C 0C A2 \...|.L. Γ²³Lú\,ó

1 Step 2ProcStep 3Retrieve 4Help ON 5BRK Menu 6 7 up 8 dn 9 le 10 ri
  
```

After typing the new value press enter. Value will be changed accordingly

```

C:\Windows\system32\cmd.exe - afd
AX 0000 SI 0000 CS 26C6 IP 0100 Stack +0 0000 Flags 7202
BX 0000 DI 0000 DS 1DD0 +2 20CD
CX 0013 BP 0000 ES 26C6 HS 26C6 +4 9FFF OF DF IF SF ZF AF PF CF
DX 0000 SP FFFE SS 26C6 FS 26C6 +6 9A00 0 0 1 0 0 0 0 0

CMD >|
| 0 1 2 3 4 5 6 7
DS:0100 90 59 90 C3 53 51 33 C0
DS:0108 A3 5C 0C A2 5B 0C A2 56
DS:0110 0C B9 08 00 51 8B 1E 5C
DS:0118 0C 8A 87 5E 0C 0A C0 74
DS:0120 1C 3C 02 74 11 E8 81 FF
DS:0128 73 0C 88 1E 5A 0C C6 06
DS:0130 56 0C 01 59 EB 20 83 06
DS:0138 5C 0C 0B EB D8 59 C7 06
DS:0140 5C 0C 00 00 FE 06 5B 0C
DS:0148 E2 CA 33 C0 A3 5C 0C A2

2 0 1 2 3 4 5 6 7 8 9 A B C D E F
DS:0100 90 59 90 C3 53 51 33 C0 A3 5C 0C A2 5B 0C A2 56
DS:0110 0C B9 08 00 51 8B 1E 5C 0C 8A 87 5E 0C 0A C0 74
DS:0120 1C 3C 02 74 11 E8 81 FF 73 0C 88 1E 5A 0C C6 06
DS:0130 56 0C 01 59 EB 20 83 06 5C 0C 0B EB D8 59 C7 06
DS:0140 5C 0C 00 00 FE 06 5B 0C E2 CA 33 C0 A3 5C 0C A2

1 Step 2ProcStep 3Retrieve 4Help ON 5BRK Menu 6 7 up 8 dn 9 le 10 ri

```

## Help Window

For help press **F4** at CMD, the help window will be appeared at the bottom now either press **PageUP/PageDown** keys to move back and forth or type any command at command prompt, the command that you will type, and its help will appear in the help window.

```

C:\Windows\system32\cmd.exe - afd
AX 0000 SI 0000 CS 26C6 IP 0100 Stack +0 0000 Flags 7202
BX 0000 DI 0000 DS 1DD0 +2 20CD
CX 0013 BP 0000 ES 26C6 HS 26C6 +4 9FFF OF DF IF SF ZF AF PF CF
DX 0000 SP FFFE SS 26C6 FS 26C6 +6 9A00 0 0 1 0 0 0 0 0

CMD >|
| 0 1 2 3 4 5 6 7
DS:0100 5A 59 58 C3 53 51 33 C0
DS:0108 A3 5C 0C A2 5B 0C A2 56
DS:0110 0C B9 08 00 51 8B 1E 5C
DS:0118 0C 8A 87 5E 0C 0A C0 74
DS:0120 1C 3C 02 74 11 E8 81 FF
DS:0128 73 0C 88 1E 5A 0C C6 06
DS:0130 56 0C 01 59 EB 20 83 06
DS:0138 5C 0C 0B EB D8 59 C7 06
DS:0140 5C 0C 00 00 FE 06 5B 0C
DS:0148 E2 CA 33 C0 A3 5C 0C A2

? {x}= expression
Evaluate and display an arithmetic expression. With ? %= .. displays in
decimal.

Browse in text using PgUp/PgDn
1 Step 2ProcStep 3Retrieve 4Help OFF 5BRK Menu 6 7 up 8 dn 9 le 10 ri

```

## **To exit AFD**

Finally use **quit** command to exit from the shell.

On DOS command prompt type **cls** and press Enter to clear the screen