

Lab Report#2

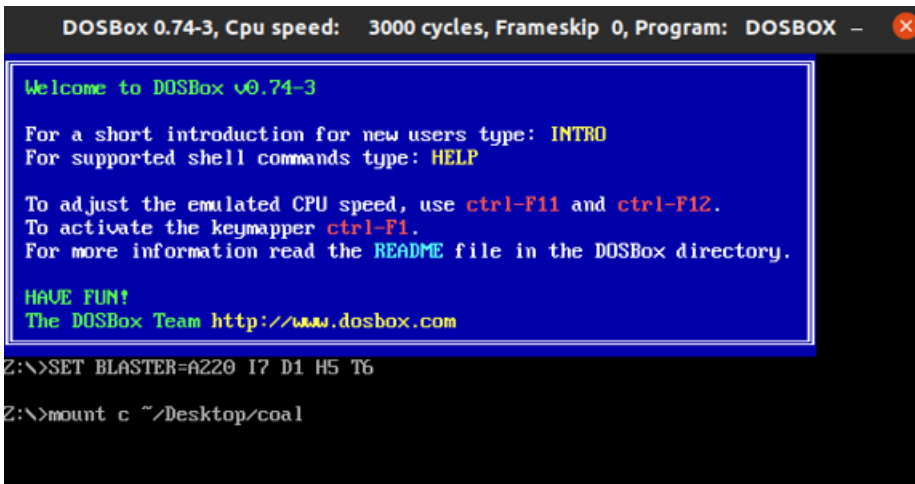
Saad Ahmad

(20P-0051)

1. First, we install dosbox on our system.
2. To install dosbox on ubuntu type the following
sudo apt install dosbox

```
(base) ayyzenn@Saadii:~$ sudo apt install dosbox
Reading package lists... Done
Building dependency tree
Reading state information... Done
dosbox is already the newest version (0.74-3-1build1).
0 to upgrade, 0 to newly install, 0 to remove and 0 not to upgrade.
(base) ayyzenn@Saadii:~$
```

3. After that run the dosbox.
4. Then we will mount the directory containing **nasm** and **Advance free debugger(afd)**.
5. To mount the directory, type the following command
c {path of the nasm}



DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: DOSBOX

Welcome to DOSBox v0.74-3

For a short introduction for new users type: **INTRO**
For supported shell commands type: **HELP**

To adjust the emulated CPU speed, use **ctrl-F11** and **ctrl-F12**.
To activate the keymapper **ctrl-F1**.
For more information read the **README** file in the DOSBox directory.

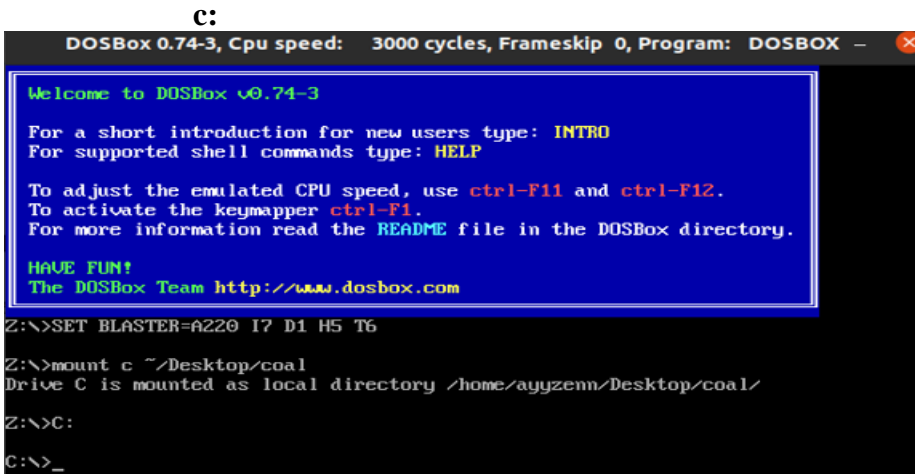
HAVE FUN!
The DOSBox Team <http://www.dosbox.com>

Z:\>SET BLASTER=A220 I7 D1 H5 T6

Z:\>mount c ~/Desktop/coal

6. Now open the virtual directory where we mounted nasm:

C:



DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: DOSBOX

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For a short introduction for new users type: **INTRO**
For supported shell commands type: **HELP**

To adjust the emulated CPU speed, use **ctrl-F11** and **ctrl-F12**.
To activate the keymapper **ctrl-F1**.
For more information read the **README** file in the DOSBox directory.

HAVE FUN!
The DOSBox Team <http://www.dosbox.com>

Z:\>SET BLASTER=A220 I7 D1 H5 T6

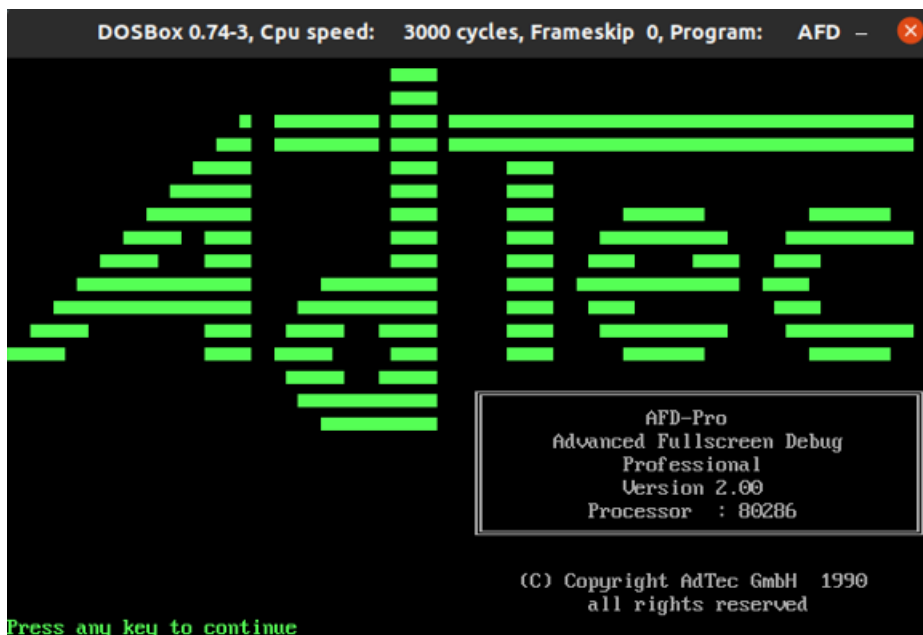
Z:\>mount c ~/Desktop/coal
Drive C is mounted as local directory /home/ayyzenn/Desktop/coal/

Z:\>C:
C:\>_

7. Now we will check whether the directory is successfully mounted or not so for that type
dir

```
DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: DOSBOX -
C02-02  ASM          404 23-09-2021 14:41
C02-03  ASM          282 23-09-2021 14:41
C02-04  ASM          360 23-09-2021 14:41
C02-05  ASM          327 23-09-2021 14:41
HISTORY TXT        2,672 07-04-1999 15:43
LAB     ASM          102 06-10-2021 15:17
LAB     COM           26 06-10-2021 15:37
LAB     LST          594 06-10-2021 15:37
NASM    EXE       259,638 12-09-2003 10:36
NDISASM EXE       128,460 12-09-2003 10:36
RSX     EXE       111,900 19-02-1999 15:45
RSXNT   DLL        80,896 19-02-1999 15:46
RTN     ASM          1,038 06-11-1998 15:15
RTN     RC           402 06-11-1998 15:16
RTN     RES          384 06-11-1998 15:13
SETUP   TXT           99 05-10-2021 14:42
TCOFF   ASM          591 16-11-1998 10:11
TEST    ASM          508 26-10-1998 10:12
TEST    COM           18 24-09-2021 22:41
TEST    LST        1,216 24-09-2021 22:39
TEST    OBJ           405 26-10-1998 10:12
  29 File(s)          909,268 Bytes.
   3 Dir(s)        262,111,744 Bytes free.
C:\>
```

8. Now we will check our debugger so for that type
afd



9. now let's run our first code so for that type
nasm{filename}.asm -o {output filename}.com

```
DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: DOSBOX -
LAB    COM      26 06-10-2021 15:37
LAB    LST      594 06-10-2021 15:37
NASM    EXE    259,638 12-09-2003 10:36
NDISASM EXE    128,460 12-09-2003 10:36
RSX     EXE    111,900 19-02-1999 15:45
RSXNT   DLL     80,896 19-02-1999 15:46
RTN     ASM     1,038 06-11-1998 15:15
RTN     RC      402 06-11-1998 15:16
RTN     RES     384 06-11-1998 15:13
SETUP   TXT      99 05-10-2021 14:42
TCOFF   ASM     591 16-11-1998 10:11
TEST    ASM     508 26-10-1998 10:12
TEST    COM      18 24-09-2021 22:41
TEST    LST     1,216 24-09-2021 22:39
TEST    OBJ      405 26-10-1998 10:12
  29 File(s)      909,268 Bytes.
   3 Dir(s)      262,111,744 Bytes free.

C:\>afd

AFD-Pro is done

C:\>nasm c01-01.com -o c01-01.com

C:\>
```

10. Now we will run our debugger so run the following command
afd {filename}.com

```
DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: DOSBOX -
LAB    COM      26 06-10-2021 15:37
LAB    LST      594 06-10-2021 15:37
NASM    EXE    259,638 12-09-2003 10:36
NDISASM EXE    128,460 12-09-2003 10:36
RSX     EXE    111,900 19-02-1999 15:45
RSXNT   DLL     80,896 19-02-1999 15:46
RTN     ASM     1,038 06-11-1998 15:15
RTN     RC      402 06-11-1998 15:16
RTN     RES     384 06-11-1998 15:13
SETUP   TXT      99 05-10-2021 14:42
TCOFF   ASM     591 16-11-1998 10:11
TEST    ASM     508 26-10-1998 10:12
TEST    COM      18 24-09-2021 22:41
TEST    LST     1,216 24-09-2021 22:39
TEST    OBJ      405 26-10-1998 10:12
  29 File(s)      909,268 Bytes.
   3 Dir(s)      262,111,744 Bytes free.

C:\>afd

AFD-Pro is done

C:\>nasm c01-01.com -o c01-01.com

C:\>AFD C01-01.COM_
```

Sample codes

Code#1

```
[org 0x0100]

mov ax, 10
mov bx, 5

sub ax, bx

mov ax, 0x4c00
int 0x21
```

Output:

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD

AX 0000 SI 0000 CS 19F5 IP 0100 Stack +0 0000 Flags 7202

BX 0000 DI 0000 DS 19F5 +2 20CD

CX 0000 BP 0000 ES 19F5 HS 19F5 +4 9FFF OF DF IF SF ZF AF PF CF

DX 0000 SP FFFE SS 19F5 FS 19F5 +6 EA00 0 0 1 0 0 0 0 0

CMD >

0100 B80A00 MOV AX,000A

0103 BB0500 MOV BX,0005

0106 29D8 SUB AX,BX

0108 B8004C MOV AX,4C00

010B CD21 INT 21

010D C3 RET

010E 89D0 MOV AX,DX

0110 89DA MOV DX,BX

1 0 1 2 3 4 5 6 7

DS:0000 CD 20 FF 9F 00 EA F0 FE

DS:0008 AD DE 1B 05 C5 06 00 00

DS:0010 18 01 10 01 18 01 92 01

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 EB 19 C0 11

DS:0030 A2 01 14 00 18 00 F5 19

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

2 0 1 2 3 4 5 6 7 8 9 A B C D E F

DS:0000 CD 20 FF 9F 00 EA F0 FE AD DE 1B 05 C5 06 00 00 = f.Ω■ i|.†...

DS:0010 18 01 10 01 18 01 92 01 01 01 01 00 02 FF FF FFft.

DS:0020 FF FF FF FF FF FF FF FF FF FF FF FF EB 19 C0 11 δ.L.

DS:0030 A2 01 14 00 18 00 F5 19 FF FF FF FF 00 00 00 00 6.....J.

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

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD

AX 000A SI 0000 CS 19F5 IP 0103 Stack +0 0000 Flags 7200

BX 0000 DI 0000 DS 19F5 +2 20CD

CX 000D BP 0000 ES 19F5 HS 19F5 +4 9FFF OF DF IF SF ZF AF PF CF

DX 0000 SP FF FE SS 19F5 FS 19F5 +6 EA00 0 0 1 0 0 0 0 0

CMD >

0100 BB0A00 MOV AX,000A

0103 BB0500 MOV BX,0005

0106 29D8 SUB AX,BX

0108 B8004C MOV AX,4C00

010B CD21 INT 21

010D C3 RET

010E 89D0 MOV AX,DX

0110 89DA MOV DX,BX

0112 EB04 JMP 0118

1

DS:0000 CD 20 FF 9F 00 EA F0 FE

DS:0008 AD DE 1B 05 C5 06 00 00

DS:0010 18 01 10 01 18 01 92 01

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 EB 19 C0 11

DS:0030 A2 01 14 00 18 00 F5 19

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

2

DS:0000 CD 20 FF 9F 00 EA F0 FE AD DE 1B 05 C5 06 00 00

DS:0010 18 01 10 01 18 01 92 01 01 01 01 00 02 FF FF FF

DS:0020 FF FF FF FF FF FF FF FF FF FF FF FF EB 19 C0 11

DS:0030 A2 01 14 00 18 00 F5 19 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

= f.Ω=

↓|..†...

.....f.

δ. L.

ó.....J.

.....

1 Step

2 ProcStep

3 Retrieve

4 Help ON

5 BRK Menu

6

7 up

8 dn

9 lc

10 ri

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD

AX 000A SI 0000 CS 19F5 IP 0106 Stack +0 0000 Flags 7200

BX 0005 DI 0000 DS 19F5 +2 20CD

CX 000D BP 0000 ES 19F5 HS 19F5 +4 9FFF OF DF IF SF ZF AF PF CF

DX 0000 SP FF FE SS 19F5 FS 19F5 +6 EA00 0 0 1 0 0 0 0 0

CMD >

0103 BB0500 MOV BX,0005

0106 29D8 SUB AX,BX

0108 B8004C MOV AX,4C00

010B CD21 INT 21

010D C3 RET

010E 89D0 MOV AX,DX

0110 89DA MOV DX,BX

0112 EB04 JMP 0118

0114 31D2 XOR DX,DX

1

DS:0000 CD 20 FF 9F 00 EA F0 FE

DS:0008 AD DE 1B 05 C5 06 00 00

DS:0010 18 01 10 01 18 01 92 01

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 EB 19 C0 11

DS:0030 A2 01 14 00 18 00 F5 19

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

2

DS:0000 CD 20 FF 9F 00 EA F0 FE AD DE 1B 05 C5 06 00 00

DS:0010 18 01 10 01 18 01 92 01 01 01 01 00 02 FF FF FF

DS:0020 FF FF FF FF FF FF FF FF FF FF FF FF EB 19 C0 11

DS:0030 A2 01 14 00 18 00 F5 19 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

= f.Ω=

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δ. L.

ó.....J.

.....

1 Step

2 ProcStep

3 Retrieve

4 Help ON

5 BRK Menu

6

7 up

8 dn

9 lc

10 ri

Code#2

```
[org 0x0100]

mov ax , 0
mov ax , 5
add ax , 2
add ax , 6

mov bx , ax
mov ax , 0x4c00
int 0x21
```

Output:

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD -

AX 0000 SI 0000 CS 19F5 IP 0100 Stack +0 0000 Flags 7202
BX 0000 DI 0000 DS 19F5 +2 20CD
CX 0013 BP 0000 ES 19F5 HS 19F5 +4 9FFF OF DF IF SF ZF AF PF CF
DX 0000 SP FFFE SS 19F5 FS 19F5 +6 EA00 0 0 1 0 0 0 0 0

CMD >

0100 B80000 MOV AX,0000
0103 B80500 MOV AX,0005
0106 050200 ADD AX,0002
0109 050600 ADD AX,0006
010C 89C3 MOV BX,AX
010E B8004C MOV AX,4C00
0111 CD21 INT 21
0113 0431 ADD AL,31

DS:0000 CD 20 FF 9F 00 EA F0 FE
DS:0008 AD DE 1B 05 C5 06 00 00
DS:0010 18 01 10 01 18 01 92 01
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 EB 19 C0 11
DS:0030 A2 01 14 00 18 00 F5 19
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

2

0 1 2 3 4 5 6 7 8 9 A B C D E F

DS:0000 CD 20 FF 9F 00 EA F0 FE AD DE 1B 05 C5 06 00 00 = f.Ω≡ i |..†...
DS:0010 18 01 10 01 18 01 92 01 01 01 01 00 02 FF FF FFf.
DS:0020 FF FF FF FF FF FF FF FF FF FF FF FF EB 19 C0 11 δ.†.
DS:0030 A2 01 14 00 18 00 F5 19 FF FF FF FF 00 00 00 00 6.....J.
DS:0040 05 00 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

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD

AX 0000	SI 0000	CS 19F5	IP 0103	Stack +0 0000	Flags 7200
BX 0000	DI 0000	DS 19F5		+2 20CD	
CX 0013	BP 0000	ES 19F5	HS 19F5	+4 9FFF	OF DF IF SF ZF AF PF CF
DX 0000	SP FFFE	SS 19F5	FS 19F5	+6 EA00	0 0 1 0 0 0 0 0

CMD >

0100 B80000	MOV	AX,0000
0103 B80500	MOV	AX,0005
0106 050200	ADD	AX,0002
0109 050600	ADD	AX,0006
010C 89C3	MOV	BX,AX
010E B8004C	MOV	AX,4C00
0111 CD21	INT	21
0113 0431	ADD	AL,31
0115 D2	DB	D2

	0	1	2	3	4	5	6	7	
DS:0000	CD	20	FF	9F	00	EA	F0	FE	
DS:0008	AD	DE	1B	05	C5	06	00	00	
DS:0010	18	01	10	01	18	01	92	01	
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	EB	19	C0	11	
DS:0030	A2	01	14	00	18	00	F5	19	
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	

2	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
DS:0000	CD	20	FF	9F	00	EA	F0	FE	AD	DE	1B	05	C5	06	00	00	= f.Ω≡ i|.+....
DS:0010	18	01	10	01	18	01	92	01	01	01	01	00	02	FF	FF	FF	.....ff.
DS:0020	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	EB	19	C0	11	δ.ℓ.
DS:0030	A2	01	14	00	18	00	F5	19	FF	FF	FF	FF	00	00	00	00	6.....J.
DS:0040	05	00	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

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD

AX 0005	SI 0000	CS 19F5	IP 0106	Stack +0 0000	Flags 7200
BX 0000	DI 0000	DS 19F5		+2 20CD	
CX 0013	BP 0000	ES 19F5	HS 19F5	+4 9FFF	OF DF IF SF ZF AF PF CF
DX 0000	SP FFFE	SS 19F5	FS 19F5	+6 EA00	0 0 1 0 0 0 0 0

CMD >

0103 B80500	MOV	AX,0005
0106 050200	ADD	AX,0002
0109 050600	ADD	AX,0006
010C 89C3	MOV	BX,AX
010E B8004C	MOV	AX,4C00
0111 CD21	INT	21
0113 0431	ADD	AL,31
0115 D2	DB	D2
0116 31C0	XOR	AX,AX

	0	1	2	3	4	5	6	7	
DS:0000	CD	20	FF	9F	00	EA	F0	FE	
DS:0008	AD	DE	1B	05	C5	06	00	00	
DS:0010	18	01	10	01	18	01	92	01	
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	EB	19	C0	11	
DS:0030	A2	01	14	00	18	00	F5	19	
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	

2	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
DS:0000	CD	20	FF	9F	00	EA	F0	FE	AD	DE	1B	05	C5	06	00	00	= f.Ω≡ i|.+....
DS:0010	18	01	10	01	18	01	92	01	01	01	01	00	02	FF	FF	FF	.....ff.
DS:0020	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	EB	19	C0	11	δ.ℓ.
DS:0030	A2	01	14	00	18	00	F5	19	FF	FF	FF	FF	00	00	00	00	6.....J.
DS:0040	05	00	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

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD

AX 0007	SI 0000	CS 19F5	IP 0109	Stack +0 0000	Flags 7200
BX 0000	DI 0000	DS 19F5		+2 20CD	
CX 0013	BP 0000	ES 19F5	HS 19F5	+4 9FFF	OF DF IF SF ZF AF PF CF
DX 0000	SP FFFE	SS 19F5	FS 19F5	+6 EA00	0 0 1 0 0 0 0 0

CMD >				1	0	1	2	3	4	5	6	7
0106 050200	ADD	AX,0002	DS:0000	CD	20	FF	9F	00	EA	F0	FE	
0109 050600	ADD	AX,0006	DS:0008	AD	DE	1B	05	C5	06	00	00	
010C 89C3	MOV	BX,AX	DS:0010	18	01	10	01	18	01	92	01	
010E B8004C	MOV	AX,4C00	DS:0018	01	01	01	00	02	FF	FF	FF	
0111 CD21	INT	21	DS:0020	FF	FF	FF	FF	FF	FF	FF	FF	
0113 0431	ADD	AL,31	DS:0028	FF	FF	FF	FF	EB	19	C0	11	
0115 D2	DB	D2	DS:0030	A2	01	14	00	18	00	F5	19	
0116 31C0	XOR	AX,AX	DS:0038	FF	FF	FF	FF	00	00	00	00	
0118 8956E4	MOV	[BP-1C],DX	DS:0040	05	00	00	00	00	00	00	00	
			DS:0048	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
DS:0000	CD	20	FF	9F	00	EA	F0	FE	AD	DE	1B	05	C5	06	00	00
DS:0010	18	01	10	01	18	01	92	01	01	01	01	00	02	FF	FF	FF
DS:0020	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	EB	19	C0	11
DS:0030	A2	01	14	00	18	00	F5	19	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	00

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

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD

AX 000D	SI 0000	CS 19F5	IP 010C	Stack +0 0000	Flags 7200
BX 0000	DI 0000	DS 19F5		+2 20CD	
CX 0013	BP 0000	ES 19F5	HS 19F5	+4 9FFF	OF DF IF SF ZF AF PF CF
DX 0000	SP FFFE	SS 19F5	FS 19F5	+6 EA00	0 0 1 0 0 0 0 0

CMD >				1	0	1	2	3	4	5	6	7
0109 050600	ADD	AX,0006	DS:0000	CD	20	FF	9F	00	EA	F0	FE	
010C 89C3	MOV	BX,AX	DS:0008	AD	DE	1B	05	C5	06	00	00	
010E B8004C	MOV	AX,4C00	DS:0010	18	01	10	01	18	01	92	01	
0111 CD21	INT	21	DS:0018	01	01	01	00	02	FF	FF	FF	
0113 0431	ADD	AL,31	DS:0020	FF	FF	FF	FF	FF	FF	FF	FF	
0115 D2	DB	D2	DS:0028	FF	FF	FF	FF	EB	19	C0	11	
0116 31C0	XOR	AX,AX	DS:0030	A2	01	14	00	18	00	F5	19	
0118 8956E4	MOV	[BP-1C],DX	DS:0038	FF	FF	FF	FF	00	00	00	00	
011B 8946E6	MOV	[BP-1A],AX	DS:0040	05	00	00	00	00	00	00	00	
			DS:0048	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
DS:0000	CD	20	FF	9F	00	EA	F0	FE	AD	DE	1B	05	C5	06	00	00
DS:0010	18	01	10	01	18	01	92	01	01	01	01	00	02	FF	FF	FF
DS:0020	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	EB	19	C0	11
DS:0030	A2	01	14	00	18	00	F5	19	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	00

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

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD

AX 0000 SI 0000 CS 19F5 IP 010E Stack +0 0000 Flags 7200

BX 0000 DI 0000 DS 19F5 +2 20CD

CX 0013 BP 0000 ES 19F5 HS 19F5 +4 9FFF 0F DF IF SF ZF AF PF CF

DX 0000 SP FFFE SS 19F5 FS 19F5 +6 EA00 0 0 1 0 0 0 0 0

CMD >

010C 89C3 MOV BX,AX

010E B8004C MOV AX,4C00

0111 CD21 INT 21

0113 0431 ADD AL,31

0115 D2 DB D2

0116 31C0 XOR AX,AX

0118 8956E4 MOV [BP-1C],DX

011B 8946E6 MOV [BP-1A],AX

011E C746F60000 MOV [BP-0A],0000

1

0 1 2 3 4 5 6 7

DS:0000 CD 20 FF 9F 00 EA F0 FE

DS:0008 AD DE 1B 05 C5 06 00 00

DS:0010 18 01 10 01 18 01 92 01

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 EB 19 C0 11

DS:0030 A2 01 14 00 18 00 F5 19

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

2

0 1 2 3 4 5 6 7 8 9 A B C D E F

DS:0000 CD 20 FF 9F 00 EA F0 FE AD DE 1B 05 C5 06 00 00

DS:0010 18 01 10 01 18 01 92 01 01 01 01 00 02 FF FF FF

DS:0020 FF FF FF FF FF FF FF FF FF FF FF FF EB 19 C0 11

DS:0030 A2 01 14 00 18 00 F5 19 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

2 ProcStep

3 Retrieve

4 Help ON

5 BRK Menu

6

7 up

8 dn

9 le

10 ri

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD

AX 4C00 SI 0000 CS 19F5 IP 0111 Stack +0 0000 Flags 7200

BX 0000 DI 0000 DS 19F5 +2 20CD

CX 0013 BP 0000 ES 19F5 HS 19F5 +4 9FFF 0F DF IF SF ZF AF PF CF

DX 0000 SP FFFE SS 19F5 FS 19F5 +6 EA00 0 0 1 0 0 0 0 0

CMD >

010E B8004C MOV AX,4C00

0111 CD21 INT 21

0113 0431 ADD AL,31

0115 D2 DB D2

0116 31C0 XOR AX,AX

0118 8956E4 MOV [BP-1C],DX

011B 8946E6 MOV [BP-1A],AX

011E C746F60000 MOV [BP-0A],0000

0123 8B46F6 MOV AX,[BP-0A]

1

0 1 2 3 4 5 6 7

DS:0000 CD 20 FF 9F 00 EA F0 FE

DS:0008 AD DE 1B 05 C5 06 00 00

DS:0010 18 01 10 01 18 01 92 01

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 EB 19 C0 11

DS:0030 A2 01 14 00 18 00 F5 19

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

2

0 1 2 3 4 5 6 7 8 9 A B C D E F

DS:0000 CD 20 FF 9F 00 EA F0 FE AD DE 1B 05 C5 06 00 00

DS:0010 18 01 10 01 18 01 92 01 01 01 01 00 02 FF FF FF

DS:0020 FF FF FF FF FF FF FF FF FF FF FF FF EB 19 C0 11

DS:0030 A2 01 14 00 18 00 F5 19 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

2 ProcStep

3 Retrieve

4 Help ON

5 BRK Menu

6

7 up

8 dn

9 le

10 ri

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD

AX 4C00 SI 0000 CS F000 IP 14A0 Stack +0 42BD Flags 7000
BX 0000 DI 0000 DS 19F5 +2 06C5
CX 0013 BP 0000 ES 19F5 HS 19F5 +4 7000 OF DF IF SF ZF AF PF CF
DX 0000 SP FFF2 SS 19F5 FS 19F5 +6 0113 0 0 0 0 0 0 0 0

CMD >

0111 CD21 INT 21
14A0 FB STI
14A1 FE DB FE
14A2 3825 CMP [DI],AH
14A4 00CF ADD BH,CL
14A6 CB RET Far
14A7 51 PUSH CX
14A8 B94001 MOV CX,0140
14AB E2FE LOOP 14AB

1

DS:0000 CD 20 FF 9F 00 EA F0 FE
DS:0008 AD DE 1B 05 C5 06 00 00
DS:0010 18 01 10 01 18 01 92 01
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 EB 19 C0 11
DS:0030 A2 01 14 00 18 00 F5 19
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

2

DS:0000 CD 20 FF 9F 00 EA F0 FE AD DE 1B 05 C5 06 00 00
DS:0010 18 01 10 01 18 01 92 01 01 01 01 00 02 FF FF FF
DS:0020 FF FF FF FF FF FF FF FF FF FF FF FF EB 19 C0 11
DS:0030 A2 01 14 00 18 00 F5 19 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

= f.Ω≡ i|.+. ...
.....ff.
δ.ι.
6.....J.
.....

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

Code#3

```

[org 0x0100]

mov ax , 0

mov ax , 5
mov bx , 10

mov cx , ax
mov ax , bx
mov bx , cx

mov ax , 0x4c00
int 0x21

```

Output:

```
DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD -
AX 0000 SI 0000 CS 19F5 IP 0103 Stack +0 0000 Flags 7200
BX 0000 DI 0000 DS 19F5 +2 20CD
CX 0014 BP 0000 ES 19F5 HS 19F5 +4 9FFF OF DF IF SF ZF AF PF CF
DX 0000 SP FFFE SS 19F5 FS 19F5 +6 EA00 0 0 1 0 0 0 0 0

CMD >
0100 B80000 MOV AX,0000
0103 B80500 MOV AX,0005
0106 BB0A00 MOV BX,000A
0109 89C1 MOV CX,AX
010B 89D8 MOV AX,BX
010D 89CB MOV BX,CX
010F B804C MOV AX,4C00
0112 CD21 INT 21
0114 31D2 XOR DX,DX

DS:0000 CD 20 FF 9F 00 EA F0 FE
DS:0008 AD DE 1B 05 C5 06 00 00
DS:0010 18 01 10 01 18 01 92 01
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 EB 19 C0 11
DS:0030 A2 01 14 00 18 00 F5 19
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

2 0 1 2 3 4 5 6 7 8 9 A B C D E F
DS:0000 CD 20 FF 9F 00 EA F0 FE AD DE 1B 05 C5 06 00 00 = f.Ω≡ i |..†...
DS:0010 18 01 10 01 18 01 92 01 01 01 01 00 02 FF FF FF .....fl. ....
DS:0020 FF FF FF FF FF FF FF FF FF FF FF FF EB 19 C0 11 δ.L.
DS:0030 A2 01 14 00 18 00 F5 19 FF FF FF FF 00 00 00 00 6.....J. ....
DS:0040 05 00 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
```

```
DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD -
AX 0005 SI 0000 CS 19F5 IP 0106 Stack +0 0000 Flags 7200
BX 0000 DI 0000 DS 19F5 +2 20CD
CX 0014 BP 0000 ES 19F5 HS 19F5 +4 9FFF OF DF IF SF ZF AF PF CF
DX 0000 SP FFFE SS 19F5 FS 19F5 +6 EA00 0 0 1 0 0 0 0 0

CMD >
0103 B80500 MOV AX,0005
0106 BB0A00 MOV BX,000A
0109 89C1 MOV CX,AX
010B 89D8 MOV AX,BX
010D 89CB MOV BX,CX
010F B804C MOV AX,4C00
0112 CD21 INT 21
0114 31D2 XOR DX,DX
0116 31C0 XOR AX,AX

DS:0000 CD 20 FF 9F 00 EA F0 FE
DS:0008 AD DE 1B 05 C5 06 00 00
DS:0010 18 01 10 01 18 01 92 01
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 EB 19 C0 11
DS:0030 A2 01 14 00 18 00 F5 19
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

2 0 1 2 3 4 5 6 7 8 9 A B C D E F
DS:0000 CD 20 FF 9F 00 EA F0 FE AD DE 1B 05 C5 06 00 00 = f.Ω≡ i |..†...
DS:0010 18 01 10 01 18 01 92 01 01 01 01 00 02 FF FF FF .....fl. ....
DS:0020 FF FF FF FF FF FF FF FF FF FF FF FF EB 19 C0 11 δ.L.
DS:0030 A2 01 14 00 18 00 F5 19 FF FF FF FF 00 00 00 00 6.....J. ....
DS:0040 05 00 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
```

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD

AX 0005	SI 0000	CS 19F5	IP 0109	Stack +0 0000	Flags 7200
BX 000A	DI 0000	DS 19F5		+2 20CD	
CX 0014	BP 0000	ES 19F5	HS 19F5	+4 9FFF	OF DF IF SF ZF AF PF CF
DX 0000	SP FFFE	SS 19F5	FS 19F5	+6 EA00	0 0 1 0 0 0 0 0

CMD >

0106 BB0A00	MOV	BX,000A	DS:0000	CD 20 FF 9F 00 EA F0 FE
0109 89C1	MOV	CX,AX	DS:0008	AD DE 1B 05 C5 06 00 00
010B 89D8	MOV	AX,BX	DS:0010	18 01 10 01 18 01 92 01
010D 89CB	MOV	BX,CX	DS:0018	01 01 01 00 02 FF FF FF
010F B8004C	MOV	AX,4C00	DS:0020	FF FF FF FF FF FF FF FF
0112 CD21	INT	21	DS:0028	FF FF FF FF EB 19 C0 11
0114 31D2	XOR	DX,DX	DS:0030	A2 01 14 00 18 00 F5 19
0116 31C0	XOR	AX,AX	DS:0038	FF FF FF FF 00 00 00 00
0118 8956E4	MOV	[BP-1C],DX	DS:0040	05 00 00 00 00 00 00 00
			DS:0048	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	
DS:0000	CD	20	FF	9F	00	EA	F0	FE	AD	DE	1B	05	C5	06	00	00	= f.Ω≡ i|.+....
DS:0010	18	01	10	01	18	01	92	01	01	01	01	00	02	FF	FF	FF	.....ff.
DS:0020	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	EB	19	C0	11	.....δ.ℓ.
DS:0030	A2	01	14	00	18	00	F5	19	FF	FF	FF	FF	00	00	00	00	6.....J.
DS:0040	05	00	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

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD

AX 0005	SI 0000	CS 19F5	IP 010B	Stack +0 0000	Flags 7200
BX 000A	DI 0000	DS 19F5		+2 20CD	
CX 0005	BP 0000	ES 19F5	HS 19F5	+4 9FFF	OF DF IF SF ZF AF PF CF
DX 0000	SP FFFE	SS 19F5	FS 19F5	+6 EA00	0 0 1 0 0 0 0 0

CMD >

0109 89C1	MOV	CX,AX	DS:0000	CD 20 FF 9F 00 EA F0 FE
010B 89D8	MOV	AX,BX	DS:0008	AD DE 1B 05 C5 06 00 00
010D 89CB	MOV	BX,CX	DS:0010	18 01 10 01 18 01 92 01
010F B8004C	MOV	AX,4C00	DS:0018	01 01 01 00 02 FF FF FF
0112 CD21	INT	21	DS:0020	FF FF FF FF FF FF FF FF
0114 31D2	XOR	DX,DX	DS:0028	FF FF FF FF EB 19 C0 11
0116 31C0	XOR	AX,AX	DS:0030	A2 01 14 00 18 00 F5 19
0118 8956E4	MOV	[BP-1C],DX	DS:0038	FF FF FF FF 00 00 00 00
011B 8946E6	MOV	[BP-1A],AX	DS:0040	05 00 00 00 00 00 00 00
			DS:0048	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	
DS:0000	CD	20	FF	9F	00	EA	F0	FE	AD	DE	1B	05	C5	06	00	00	= f.Ω≡ i|.+....
DS:0010	18	01	10	01	18	01	92	01	01	01	01	00	02	FF	FF	FF	.....ff.
DS:0020	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	EB	19	C0	11	.....δ.ℓ.
DS:0030	A2	01	14	00	18	00	F5	19	FF	FF	FF	FF	00	00	00	00	6.....J.
DS:0040	05	00	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

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD

AX 000A SI 0000 CS 19F5 IP 010D Stack +0 0000 Flags 7200

BX 000A DI 0000 DS 19F5 +2 20CD

CX 0005 BP 0000 ES 19F5 HS 19F5 +4 9FFF OF DF IF SF ZF AF PF CF

DX 0000 SP FFFE SS 19F5 FS 19F5 +6 EA00 0 0 1 0 0 0 0 0

CMD >

010B 89D8 MOV AX,BX

010D 89CB MOV BX,CX

010F B8004C MOV AX,4C00

0112 CD21 INT 21

0114 31D2 XDR DX,DX

0116 31C0 XDR AX,AX

0118 8956E4 MOV [BP-1C],DX

011B 8946E6 MOV [BP-1A],AX

011E C746F60000 MOV [BP-0A],0000

0 1 2 3 4 5 6 7

DS:0000 CD 20 FF 9F 00 EA F0 FE

DS:0008 AD DE 1B 05 C5 06 00 00

DS:0010 18 01 10 01 18 01 92 01

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 EB 19 C0 11

DS:0030 A2 01 14 00 18 00 F5 19

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

0 1 2 3 4 5 6 7 8 9 A B C D E F

DS:0000 CD 20 FF 9F 00 EA F0 FE AD DE 1B 05 C5 06 00 00 = f.Ω= i|.+....

DS:0010 18 01 10 01 18 01 92 01 01 01 01 00 02 FF FF FFfl.

DS:0020 FF FF FF FF FF FF FF FF FF FF FF FF EB 19 C0 11δ.ℓ.

DS:0030 A2 01 14 00 18 00 F5 19 FF FF FF FF 00 00 00 00 6.....J.

DS:0040 05 00 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

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD

AX 000A SI 0000 CS 19F5 IP 010F Stack +0 0000 Flags 7200

BX 0005 DI 0000 DS 19F5 +2 20CD

CX 0005 BP 0000 ES 19F5 HS 19F5 +4 9FFF OF DF IF SF ZF AF PF CF

DX 0000 SP FFFE SS 19F5 FS 19F5 +6 EA00 0 0 1 0 0 0 0 0

CMD >

010D 89CB MOV BX,CX

010F B8004C MOV AX,4C00

0112 CD21 INT 21

0114 31D2 XDR DX,DX

0116 31C0 XDR AX,AX

0118 8956E4 MOV [BP-1C],DX

011B 8946E6 MOV [BP-1A],AX

011E C746F60000 MOV [BP-0A],0000

0123 8B46F6 MOV AX,[BP-0A]

0 1 2 3 4 5 6 7

DS:0000 CD 20 FF 9F 00 EA F0 FE

DS:0008 AD DE 1B 05 C5 06 00 00

DS:0010 18 01 10 01 18 01 92 01

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 EB 19 C0 11

DS:0030 A2 01 14 00 18 00 F5 19

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

0 1 2 3 4 5 6 7 8 9 A B C D E F

DS:0000 CD 20 FF 9F 00 EA F0 FE AD DE 1B 05 C5 06 00 00 = f.Ω= i|.+....

DS:0010 18 01 10 01 18 01 92 01 01 01 01 00 02 FF FF FFfl.

DS:0020 FF FF FF FF FF FF FF FF FF FF FF FF EB 19 C0 11δ.ℓ.

DS:0030 A2 01 14 00 18 00 F5 19 FF FF FF FF 00 00 00 00 6.....J.

DS:0040 05 00 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

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD

AX 4C00	SI 0000	CS 19F5	IP 0112	Stack +0 0000	Flags 7200
BX 0005	DI 0000	DS 19F5		+2 20CD	
CX 0005	BP 0000	ES 19F5	HS 19F5	+4 9FFF	OF DF IF SF ZF AF PF CF
DX 0000	SP FFFE	SS 19F5	FS 19F5	+6 EA00	0 0 1 0 0 0 0

CMD >

010F B8004C	MOV	AX,4C00	DS:0000	CD 20 FF 9F 00 EA F0 FE
0112 CD21	INT	21	DS:0008	AD DE 1B 05 C5 06 00 00
0114 31D2	XOR	DX,DX	DS:0010	18 01 10 01 18 01 92 01
0116 31C0	XOR	AX,AX	DS:0018	01 01 01 00 02 FF FF FF
0118 8956E4	MOV	[BP-1C],DX	DS:0020	FF FF FF FF FF FF FF FF
011B 8946E6	MOV	[BP-1A],AX	DS:0028	FF FF FF FF EB 19 C0 11
011E C746F60000	MOV	[BP-0A],0000	DS:0030	A2 01 14 00 18 00 F5 19
0123 8B46F6	MOV	AX,[BP-0A]	DS:0038	FF FF FF FF 00 00 00 00
0126 D1E0	SHL	AX,1	DS:0040	05 00 00 00 00 00 00 00
			DS:0048	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	
DS:0000	CD	20	FF	9F	00	EA	F0	FE	AD	DE	1B	05	C5	06	00	00	= f.Ω■ i |.+....
DS:0010	18	01	10	01	18	01	92	01	01	01	01	00	02	FF	FF	FF	.....fl.
DS:0020	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	EB	19	C0	11	.....δ.L.
DS:0030	A2	01	14	00	18	00	F5	19	FF	FF	FF	FF	00	00	00	00	6.....J.
DS:0040	05	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....

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

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: AFD

AX 4C00	SI 0000	CS F000	IP 14A0	Stack +0 42BD	Flags 7000
BX 0005	DI 0000	DS 19F5		+2 06C5	
CX 0005	BP 0000	ES 19F5	HS 19F5	+4 7000	OF DF IF SF ZF AF PF CF
DX 0000	SP FFF2	SS 19F5	FS 19F5	+6 0114	0 0 0 0 0 0 0

CMD >

0112 CD21	INT	21	DS:0000	CD 20 FF 9F 00 EA F0 FE
14A0 FB	STI		DS:0008	AD DE 1B 05 C5 06 00 00
14A1 FE	DB	FE	DS:0010	18 01 10 01 18 01 92 01
14A2 3825	CMP	[DI],AH	DS:0018	01 01 01 00 02 FF FF FF
14A4 00CF	ADD	BH,CL	DS:0020	FF FF FF FF FF FF FF FF
14A6 CB	RET	Far	DS:0028	FF FF FF FF EB 19 C0 11
14A7 51	PUSH	CX	DS:0030	A2 01 14 00 18 00 F5 19
14A8 B94001	MOV	CX,0140	DS:0038	FF FF FF FF 00 00 00 00
14AB E2FE	LOOP	14AB	DS:0040	05 00 00 00 00 00 00 00
			DS:0048	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	
DS:0000	CD	20	FF	9F	00	EA	F0	FE	AD	DE	1B	05	C5	06	00	00	= f.Ω■ i |.+....
DS:0010	18	01	10	01	18	01	92	01	01	01	01	00	02	FF	FF	FF	.....fl.
DS:0020	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	EB	19	C0	11	.....δ.L.
DS:0030	A2	01	14	00	18	00	F5	19	FF	FF	FF	FF	00	00	00	00	6.....J.
DS:0040	05	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....

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