Assembly Language Program using MASM assembler and AFD debugger

By:- Assignwise

Install MASM assembler and AFD debugger and write an assembly language program to compare the first and last two digits of your NUID- For example, if the NUID is AB123456789,then the first and last two digits are 12 and 89 respectively.

While comparing, if the first two digits are less than the last two digits,then subtract the first value from the second otherwise perform their addition. At the end,store the result(subtraction or addition) in memory.

Requirements:

Save your complete NUID in memeory using Base Register Indirect+ Offset addressing mode(if last digit of your NUID is odd) or Indexed Register+ Offset addressing mode(if last digit of your NUID is even).

Note:

Make it sure to use your own NUID otherwise zero marks will be awarded. Moreover, you must store the first and last two digits in memory separately.

Note: Submission must be a Pdf file with screenshots or relevant output/diagram on ms-teams.

Document Requirements:

Cover Page

Paper White A4 paper

Typeface Myriad Pro

Font size 12

Font style Regular

Font color Black

Spacing 1.5

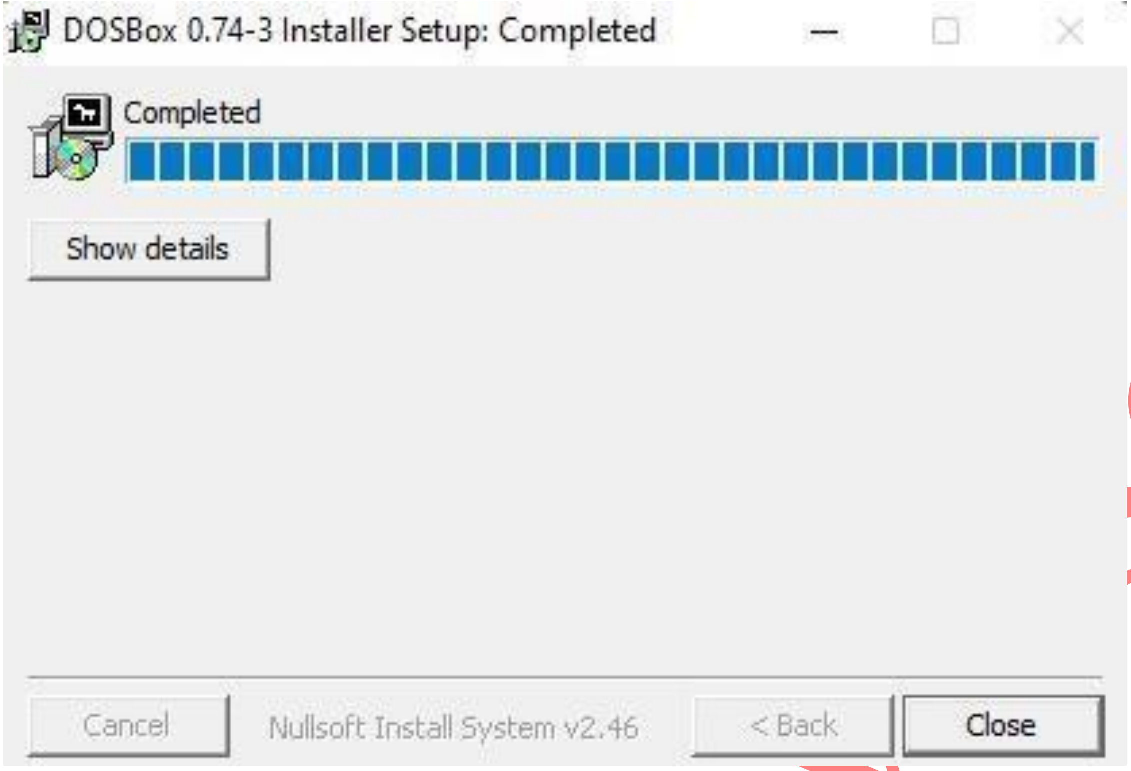
Alignment Justified

Page numbering Centre

First Page Topic at the Top-centre (Font: Myriad Pro, 12, Bold)

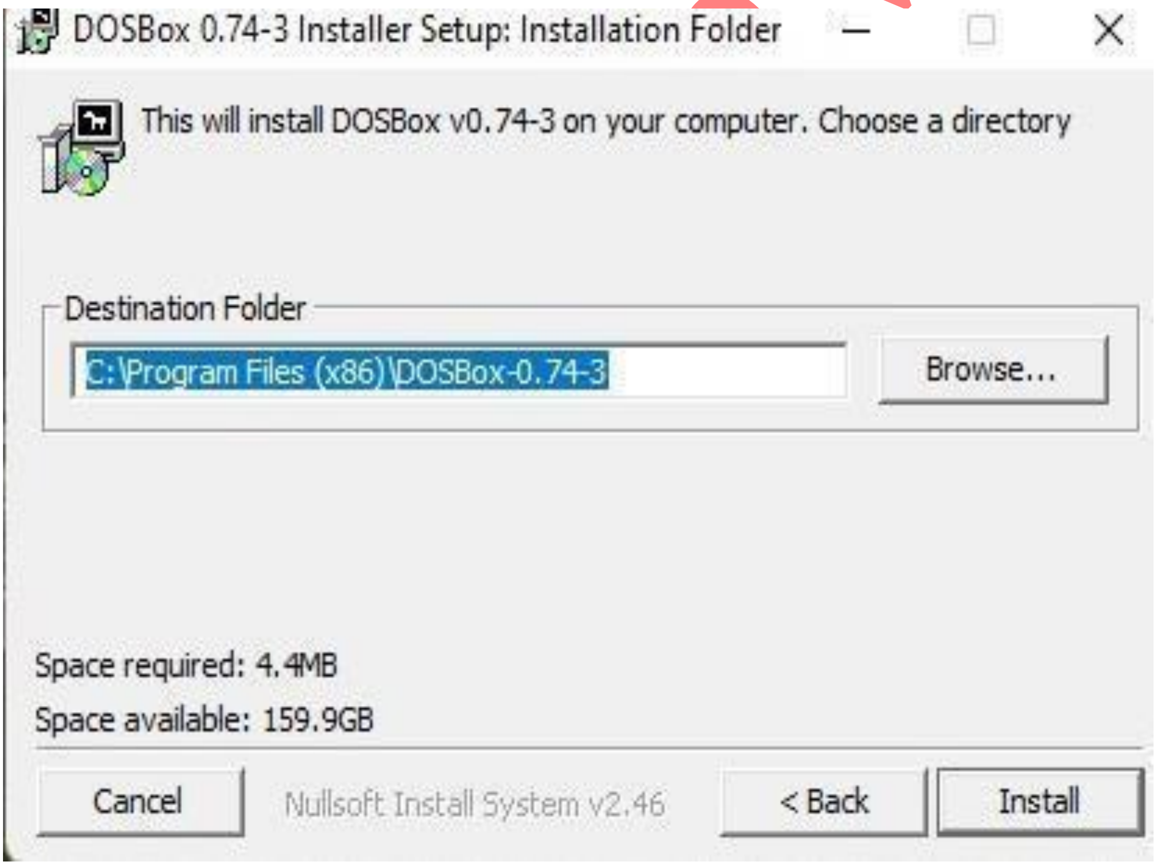
Diagrams With Caption

Screenshot Output



DOSBox 0.74-3 Installer Setup: Completed

Completed



DOSBox 0.74-3 Installer Setup: Installation Folder

This will install DOSBox v0.74-3 on your computer. Choose a directory

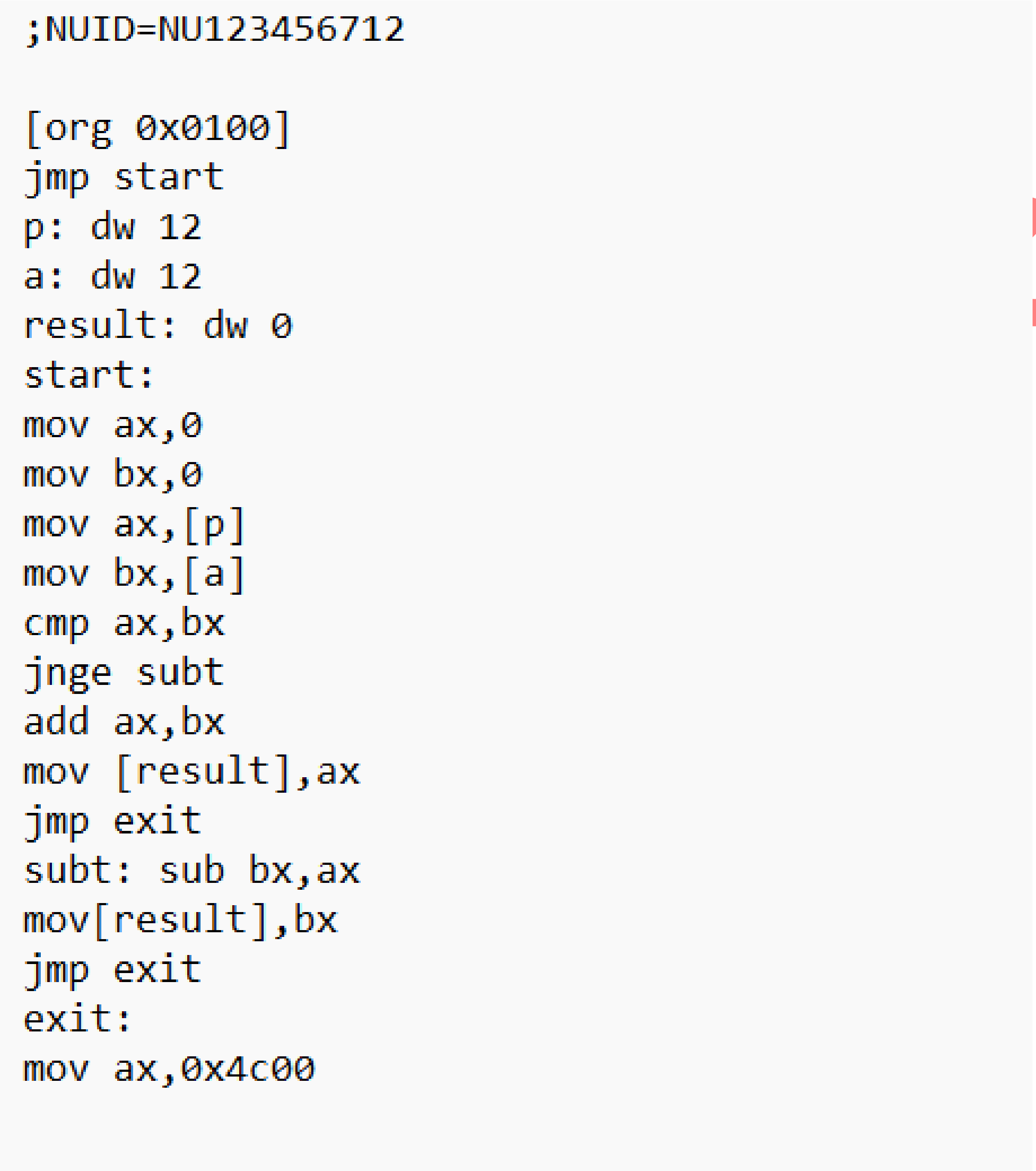
Destination Folder

C:\Program Files (x86)\DOSBox-0.74-3

Space required: 4.4MB

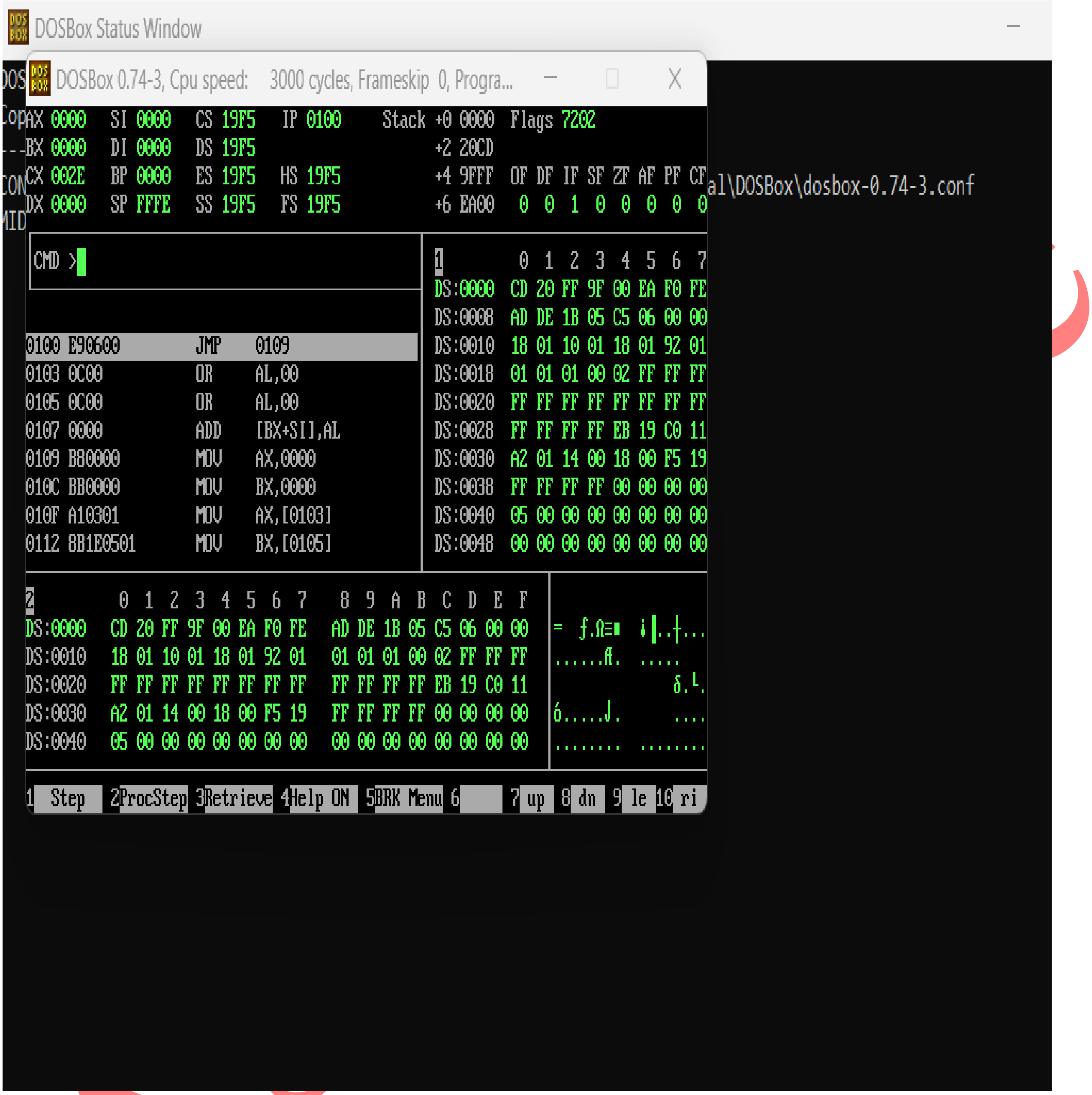
Space available: 159.9GB

Task 1



```
;NUID=NU123456712

[org 0x0100]
jmp start
p: dw 12
a: dw 12
result: dw 0
start:
mov ax,0
mov bx,0
mov ax,[p]
mov bx,[a]
cmp ax,bx
jnge subt
add ax,bx
mov [result],ax
jmp exit
subt: sub bx,ax
mov[result],bx
jmp exit
exit:
mov ax,0x4c00
```

Task 2

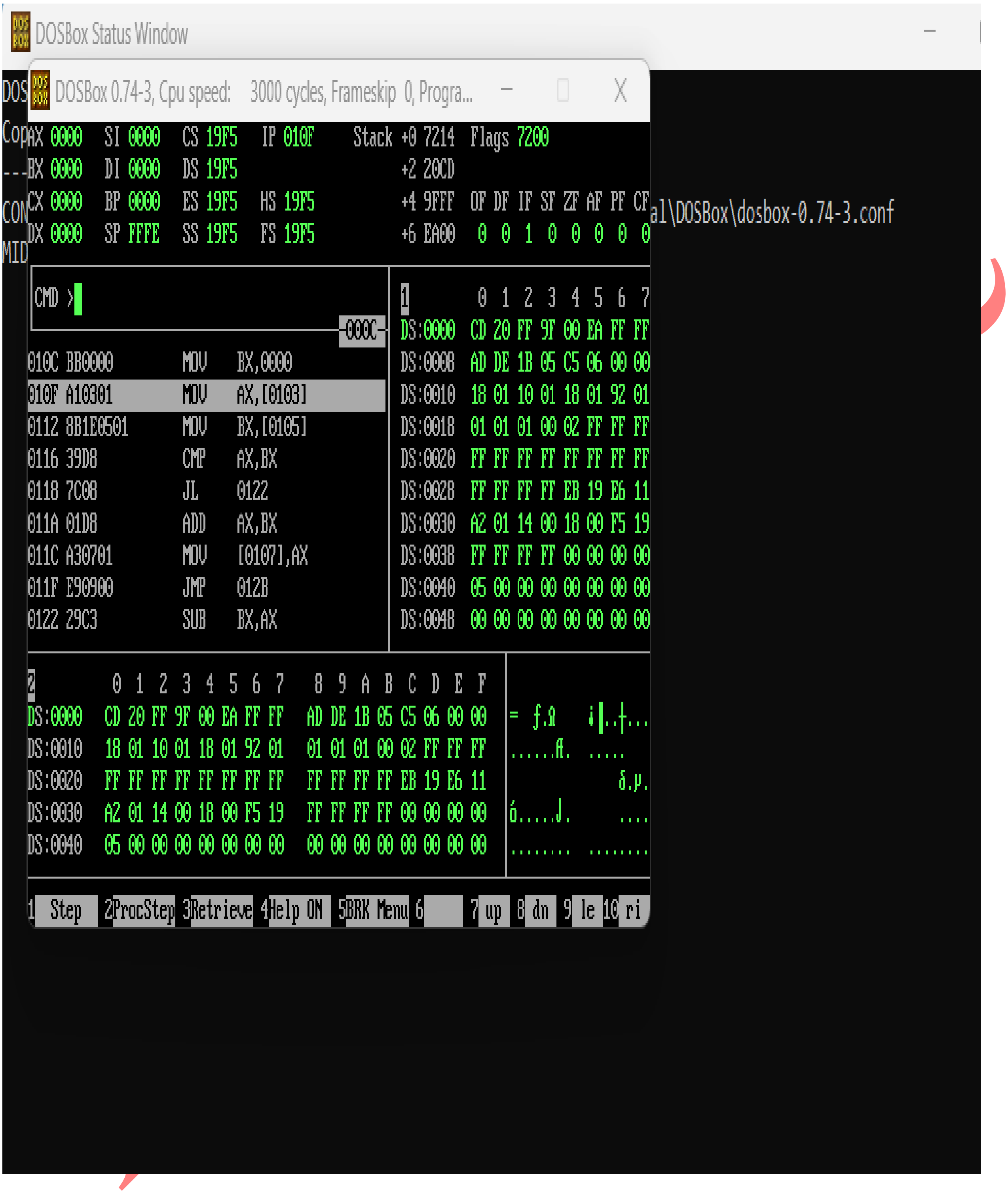


DOSBox Status Window

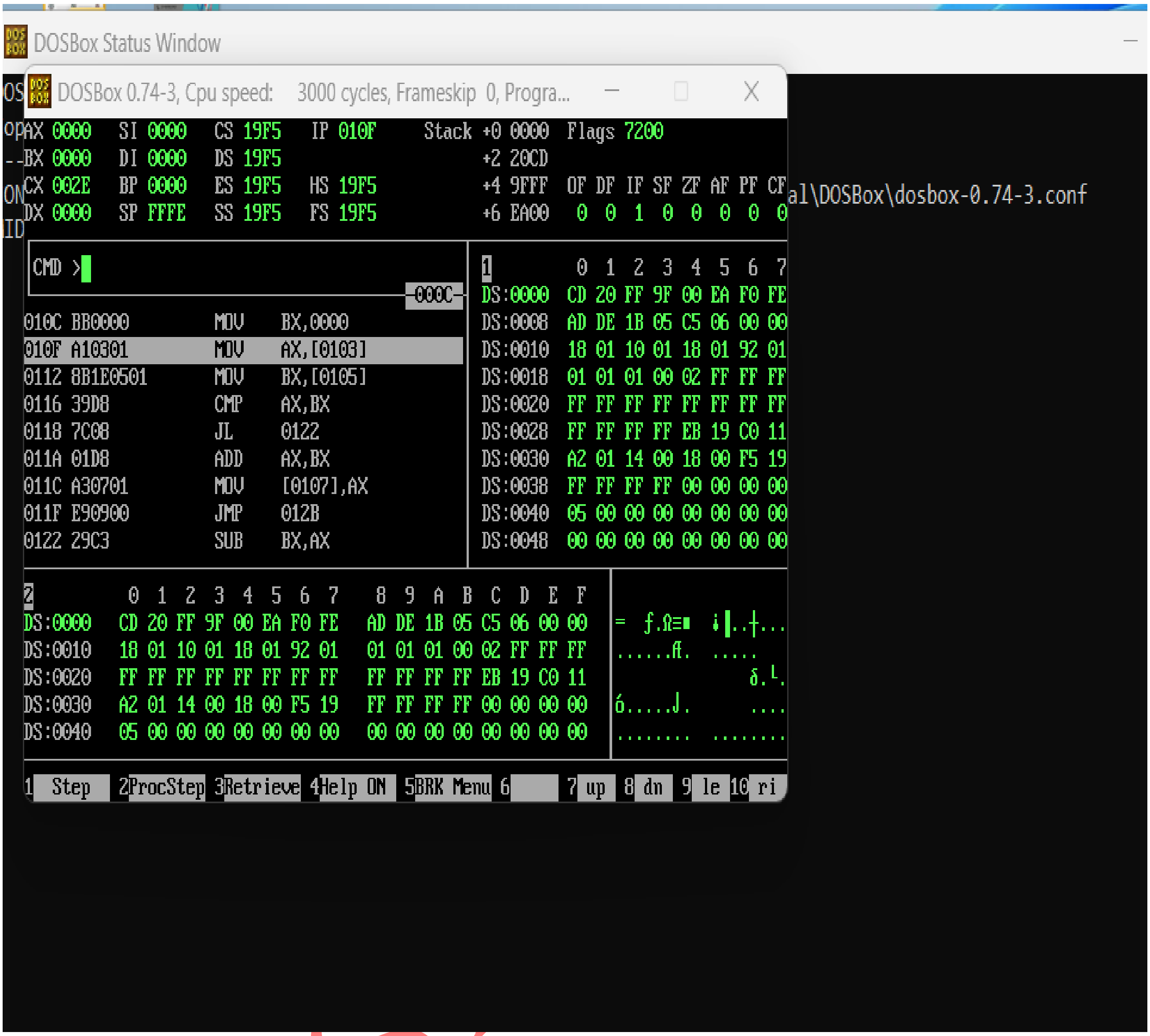
DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Progra...

```
DOS
Cop AX 0000   SI 0000   CS 19F5   IP 0100      Stack +0 0000  Flags 7202
--- BX 0000   DI 0000   DS 19F5                      +2 20CD
CON CX 002E   BP 0000   ES 19F5   HS 19F5            +4 9FFF   OF DF IF SF ZF AF PF CF al\DOSBox\dosbox-0.74-3.conf
    DX 0000   SP FFFE   SS 19F5   FS 19F5            +6 EA00    0  0  1  0  0  0  0  0
MID
 CMD >                                          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
0100 E90600         JMP     0109                DS:0010  18 01 10 01 18 01 92 01
0103 0C00           OR      AL,00               DS:0018  01 01 01 00 02 FF FF FF
0105 0C00           OR      AL,00               DS:0020  FF FF FF FF FF FF FF FF
0107 0000           ADD     [BX+SI],AL          DS:0028  FF FF FF FF EB 19 C0 11
0109 B80000         MOV     AX,0000             DS:0030  A2 01 14 00 18 00 F5 19
010C BB0000         MOV     BX,0000             DS:0038  FF FF FF FF 00 00 00 00
010F A10301         MOV     AX,[0103]           DS:0040  05 00 00 00 00 00 00 00
0112 8B1E0501       MOV     BX,[0105]           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  = ƒ.Ω≡▪ ¡▌..┼...
DS:0010   18 01 10 01 18 01 92 01  01 01 01 00 02 FF FF FF  ......Æ. .....
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  ó.....⌡.     ....
DS:0040   05 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00  ........ ........
```

Task 3

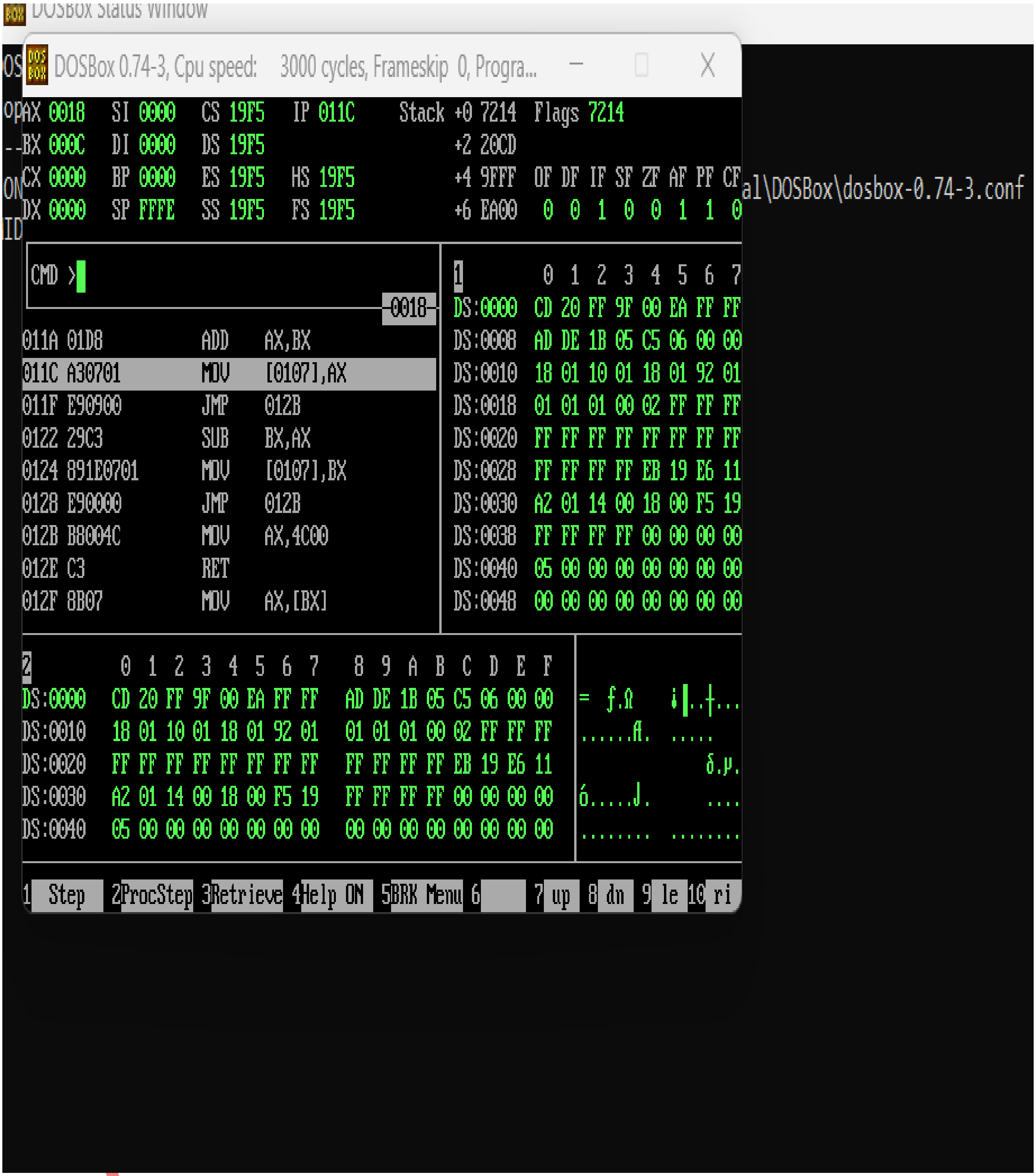


```
DOSBox Status Window
DOSBox 0.74-3, Cpu speed:   3000 cycles, Frameskip  0, Progra...

AX 0000  SI 0000  CS 19F5  IP 010F    Stack +0 7214  Flags 7200
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

al\DOSBox\dosbox-0.74-3.conf

CMD >
                                  000C
010C BB0000        MOV    BX,0000        1        0  1  2  3  4  5  6  7
010F A10301        MOV    AX,[0103]      DS:0000  CD 20 FF 9F 00 EA FF FF
0112 8B1E0501      MOV    BX,[0105]      DS:0008  AD DE 1B 05 C5 06 00 00
0116 39D8          CMP    AX,BX          DS:0010  18 01 10 01 18 01 92 01
0118 7C08          JL     0122           DS:0018  01 01 01 00 02 FF FF FF
011A 01D8          ADD    AX,BX          DS:0020  FF FF FF FF FF FF FF FF
011C A30701        MOV    [0107],AX      DS:0028  FF FF FF FF EB 19 E6 11
011F E90900        JMP    012B           DS:0030  A2 01 14 00 18 00 F5 19
0122 29C3          SUB    BX,AX          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 FF FF  AD DE 1B 05 C5 06 00 00   = ƒ.Ω    ¡|..┼...
DS:0010   18 01 10 01 18 01 92 01  01 01 01 00 02 FF FF FF   ......Æ.  .....
DS:0020   FF FF FF FF FF FF FF FF  FF FF FF FF EB 19 E6 11             δ.µ.
DS:0030   A2 01 14 00 18 00 F5 19  FF FF FF FF 00 00 00 00   ó.....⌡.      ....
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 Status Window
DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Progra...

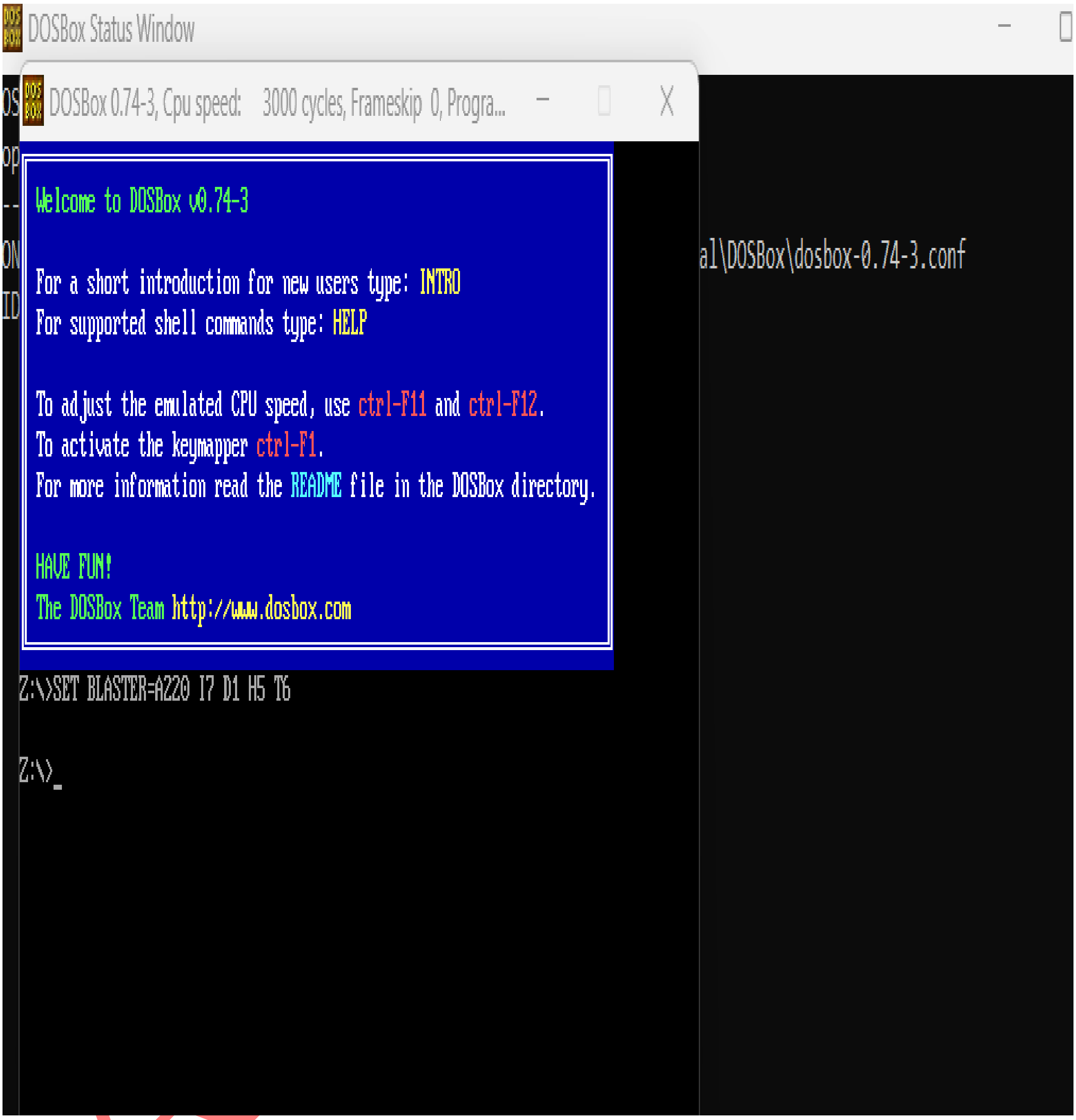
```
OS
opAX 0000   SI 0000   CS 19F5   IP 010F      Stack +0 0000  Flags 7200
--BX 0000   DI 0000   DS 19F5                      +2 20CD
ONCX 002E   BP 0000   ES 19F5   HS 19F5        +4 9FFF   OF DF IF SF ZF AF PF CFal\DOSBox\dosbox-0.74-3.conf
IDDX 0000   SP FFFE   SS 19F5   FS 19F5        +6 EA00    0  0  1  0  0  0  0  0

 CMD >                                          1          0  1  2  3  4  5  6  7
                                         -000C-  DS:0000  CD 20 FF 9F 00 EA F0 FE
010C BB0000          MOV    BX,0000             DS:0008  AD DE 1B 05 C5 06 00 00
010F A10301          MOV    AX,[0103]           DS:0010  18 01 10 01 18 01 92 01
0112 8B1E0501        MOV    BX,[0105]           DS:0018  01 01 01 00 02 FF FF FF
0116 39D8            CMP    AX,BX               DS:0020  FF FF FF FF FF FF FF FF
0118 7C08            JL     0122                DS:0028  FF FF FF FF EB 19 C0 11
011A 01D8            ADD    AX,BX               DS:0030  A2 01 14 00 18 00 F5 19
011C A30701          MOV    [0107],AX           DS:0038  FF FF FF FF 00 00 00 00
011F E90900          JMP    012B                DS:0040  05 00 00 00 00 00 00 00
0122 29C3            SUB    BX,AX               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   =  ƒ.Ω≡▪  ¡▌..┼...
DS:0010    18 01 10 01 18 01 92 01   01 01 01 00 02 FF FF FF   ......Æ.  .....
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   ó.....⌡.      ....
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 Status Window
DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Progra...
OS
op
--
ON
ID
al\DOSBox\dosbox-0.74-3.conf

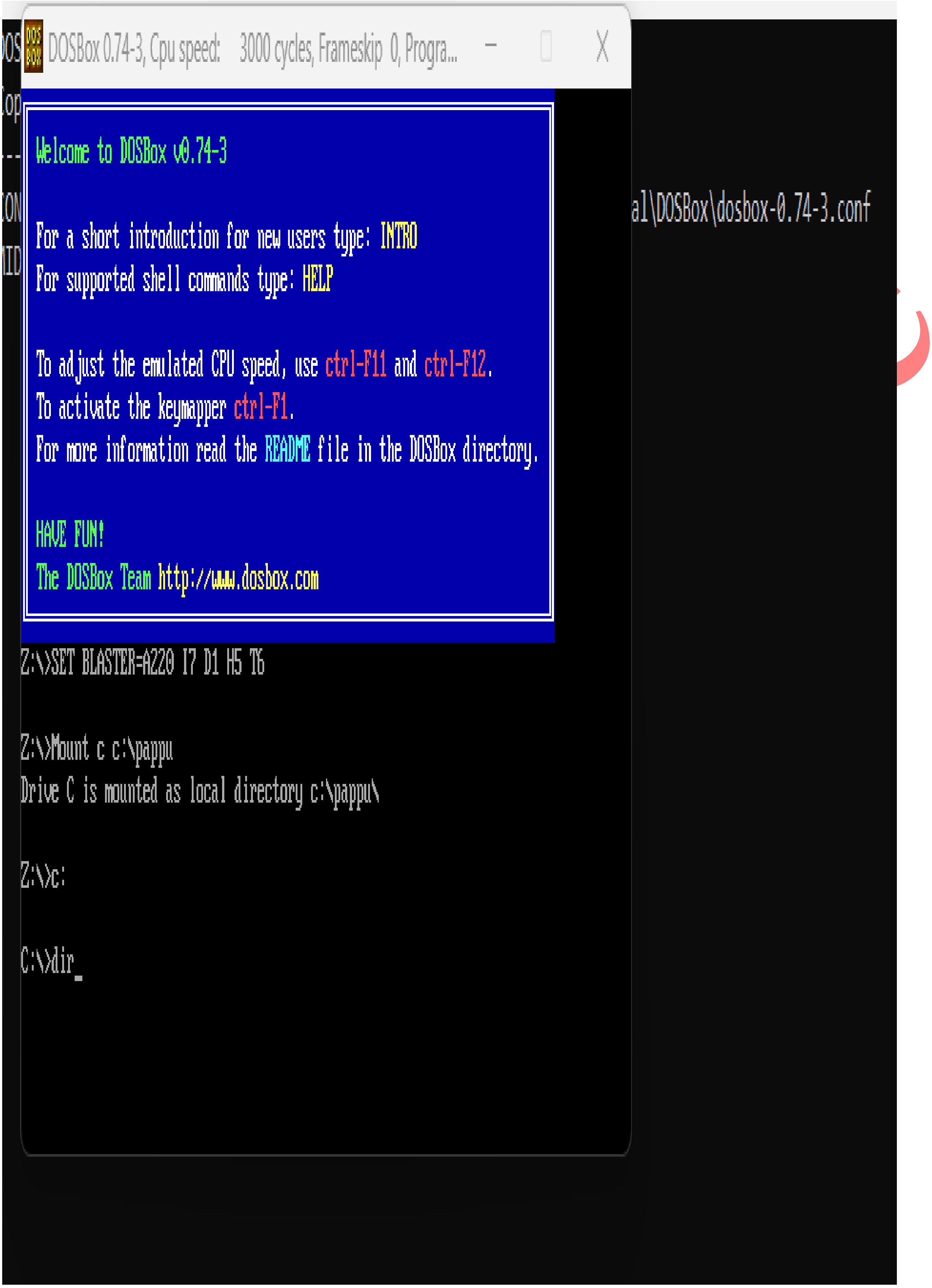
```
AX 0018   SI 0000   CS 19F5   IP 011C      Stack +0 7214  Flags 7214
BX 000C   DI 0000   DS 19F5                      +2 20CD
CX 0000   BP 0000   ES 19F5   HS 19F5           +4 9FFF  OF DF IF SF ZF AF PF CF
DX 0000   SP FFFE   SS 19F5   FS 19F5           +6 EA00   0  0  1  0  0  1  1  0

 CMD >                                      1        0  1  2  3  4  5  6  7
                                -0018-      DS:0000  CD 20 FF 9F 00 EA FF FF
011A 01D8          ADD    AX,BX             DS:0008  AD DE 1B 05 C5 06 00 00
011C A30701        MOV    [0107],AX         DS:0010  18 01 10 01 18 01 92 01
011F E90900        JMP    012B              DS:0018  01 01 01 00 02 FF FF FF
0122 29C3          SUB    BX,AX             DS:0020  FF FF FF FF FF FF FF FF
0124 891E0701      MOV    [0107],BX         DS:0028  FF FF FF FF EB 19 E6 11
0128 E90000        JMP    012B              DS:0030  A2 01 14 00 18 00 F5 19
012B B8004C        MOV    AX,4C00           DS:0038  FF FF FF FF 00 00 00 00
012E C3            RET                      DS:0040  05 00 00 00 00 00 00 00
012F 8B07          MOV    AX,[BX]           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 FF FF  AD DE 1B 05 C5 06 00 00   =  ƒ.Ω    ¡▌..┼...
DS:0010  18 01 10 01 18 01 92 01  01 01 01 00 02 FF FF FF   ......Å.  .....
DS:0020  FF FF FF FF FF FF FF FF  FF FF FF FF EB 19 E6 11             δ.µ.
DS:0030  A2 01 14 00 18 00 F5 19  FF FF FF FF 00 00 00 00   ó.....╜.      ....
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

Task 4


DOSBox Status Window
DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Progra...
al\DOSBox\dosbox-0.74-3.conf

```
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:\>_
```


DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Progra...

```
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.
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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 c:\pappu
Drive C is mounted as local directory c:\pappu\

Z:\>c:

C:\>dir_
```
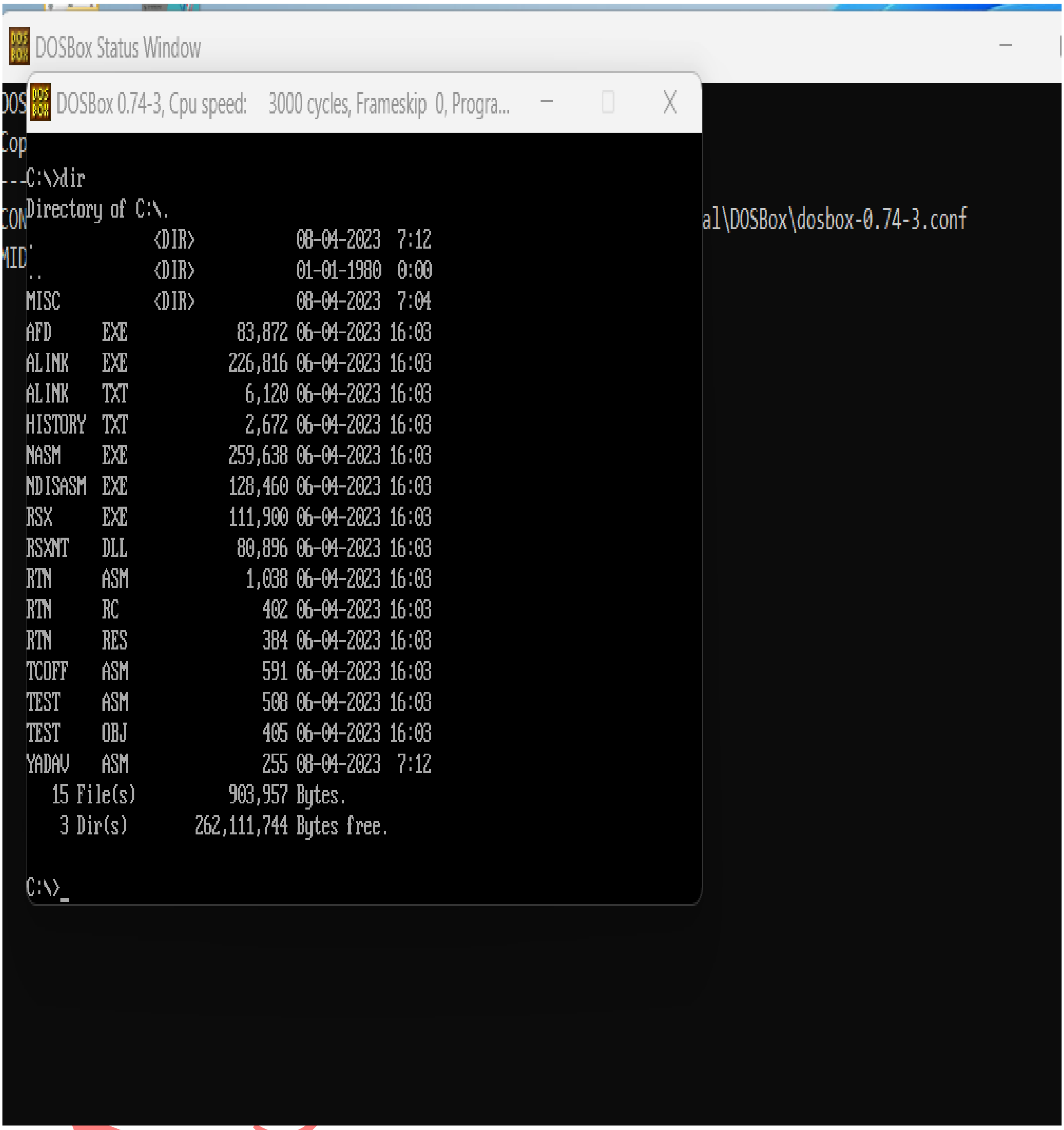
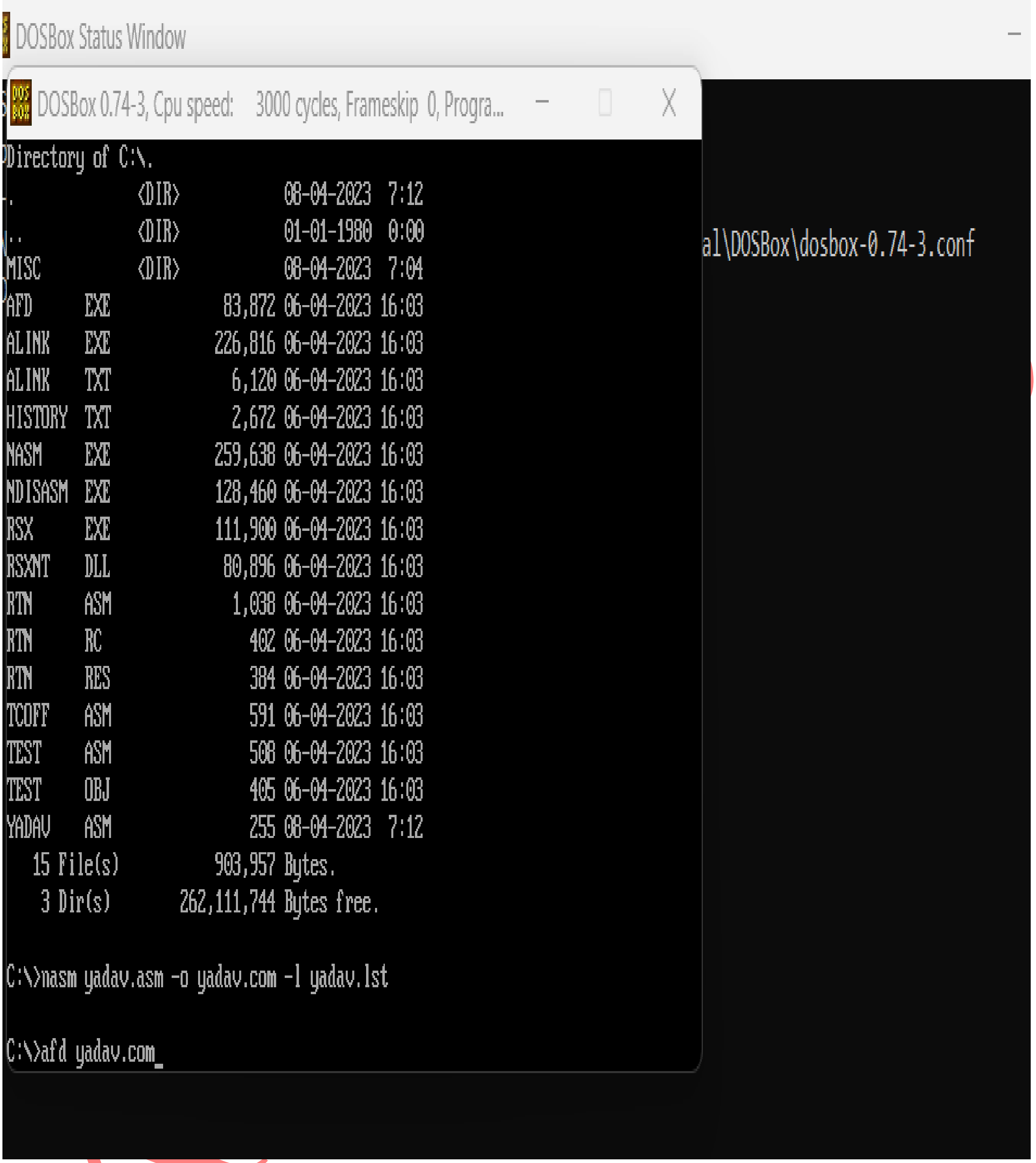

```
al\DOSBox\dosbox-0.74-3.conf
```


DOSBox Status Window
DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Progra...
DOS
Cop

CON
MID
al\DOSBox\dosbox-0.74-3.conf

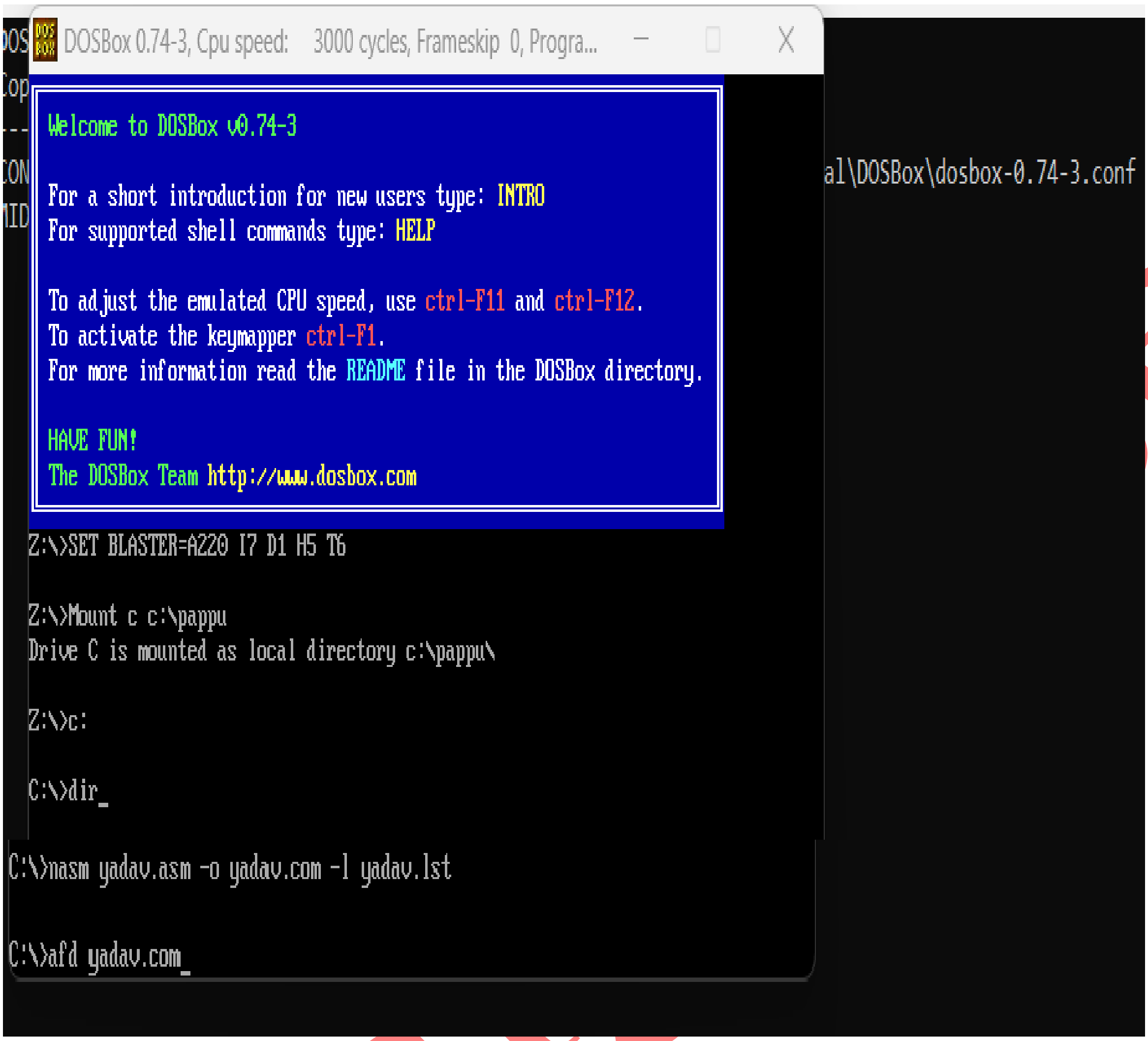
```
C:\>dir
Directory of C:\.
.               <DIR>            08-04-2023  7:12
..              <DIR>            01-01-1980  0:00
MISC            <DIR>            08-04-2023  7:04
AFD      EXE             83,872 06-04-2023 16:03
ALINK    EXE            226,816 06-04-2023 16:03
ALINK    TXT              6,120 06-04-2023 16:03
HISTORY  TXT              2,672 06-04-2023 16:03
NASM     EXE            259,638 06-04-2023 16:03
NDISASM  EXE            128,460 06-04-2023 16:03
RSX      EXE            111,900 06-04-2023 16:03
RSXNT    DLL             80,896 06-04-2023 16:03
RTN      ASM              1,038 06-04-2023 16:03
RTN      RC                 402 06-04-2023 16:03
RTN      RES                384 06-04-2023 16:03
TCOFF    ASM                591 06-04-2023 16:03
TEST     ASM                508 06-04-2023 16:03
TEST     OBJ                405 06-04-2023 16:03
YADAV    ASM                255 08-04-2023  7:12
   15 File(s)           903,957 Bytes.
    3 Dir(s)        262,111,744 Bytes free.

C:\>_
```


DOSBox Status Window
DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Progra...

```
al\DOSBox\dosbox-0.74-3.conf
```

```
Directory of C:\.
.              <DIR>            08-04-2023  7:12
..             <DIR>            01-01-1980  0:00
MISC           <DIR>            08-04-2023  7:04
AFD      EXE            83,872 06-04-2023 16:03
ALINK    EXE           226,816 06-04-2023 16:03
ALINK    TXT             6,120 06-04-2023 16:03
HISTORY  TXT             2,672 06-04-2023 16:03
NASM     EXE           259,638 06-04-2023 16:03
NDISASM  EXE           128,460 06-04-2023 16:03
RSX      EXE           111,900 06-04-2023 16:03
RSXNT    DLL            80,896 06-04-2023 16:03
RTN      ASM             1,038 06-04-2023 16:03
RTN      RC                402 06-04-2023 16:03
RTN      RES               384 06-04-2023 16:03
TCOFF    ASM               591 06-04-2023 16:03
TEST     ASM               508 06-04-2023 16:03
TEST     OBJ               405 06-04-2023 16:03
YADAV    ASM               255 08-04-2023  7:12
   15 File(s)          903,957 Bytes.
    3 Dir(s)       262,111,744 Bytes free.

C:\>nasm yadav.asm -o yadav.com -l yadav.lst

C:\>afd yadav.com_
```

Task 5


DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Progra...

```
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 c:\pappu
Drive C is mounted as local directory c:\pappu\

Z:\>c:

C:\>dir_
```

```
al\DOSBox\dosbox-0.74-3.conf
```

```
C:\>nasm yadav.asm -o yadav.com -l yadav.lst

C:\>afd yadav.com_
```

Conclusion

In this programming report, I compared the first and second digits of the NUID NU123456712 in order to perform a certain operation. The numbers were 12, and when I compared them, I saw that the last two digits were 12. I followed the instructions and subtracted the first amount from the second since the first two numbers were less than the last two digits. Through this simple task, I was able to exercise my programming skills and develop my problem-solving ability.

Additionally, I studied the concept of opcode, addressing models, addressing formats, and subroutines in great detail. Opcode is the code for the instruction used to perform the operation by the CPU. Addressing models outline the memory access methods used by the CPU. The three different addressing models are indirect addressing, direct addressing, and instantaneous addressing. Addressing formats are used in the instruction to communicate the data. There are two different types of addressing formats: operand and opcode. Subroutines are also used to break up large programs into manageable, more manageable pieces.

The process of writing this report has enhanced my research methods and abilities. My research and examination of the various programming concepts have helped me to have a better understanding of the topics covered in this report. I've also improved my capacity to communicate ideas clearly and coherently, which is an essential skill in any field.

Finally, producing this programming report allowed me the chance to put my programming knowledge to work to accomplish a certain goal. It has also improved my understanding of programming concepts like subroutines, opcode, addressing models, and addressing formats. Finally, writing this report has improved my research methods, research skills, and ability to organize and concisely convey facts.

References

1. University Slides (Online)
   (April 6, 2023)

2. Youtube(Online)
   https://youtu.be/punYQ03UU_k
   https://youtu.be/F-btuGnVrfI
   (April 6, 2023)

Marking schema

Marking Criteria	**Allocated Marks**	**Marks Given**
Question		
Task-1: Assembly language program for above question Code written in Word.	20 marks	
Task-2: Screenshot of AFD debugger at the start of program	10 marks	
Task-3: Screenshot of AFD debugger showing the final value in memory.	10 marks	
Task-4: Screenshot of all primary steps while installing MASM assembler.	10 marks	
Task-5: Screenshot of all primary steps while installing AFD debugger.	10 marks	
Task-6 References	5 marks	
Task-7 Conclusion	5 marks	
Total Marks (70)		
Comments:		