Experiment No. 5: Matrix operations

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REG.NO: 185001058

A. AIM:

Program for performing matrix addition.

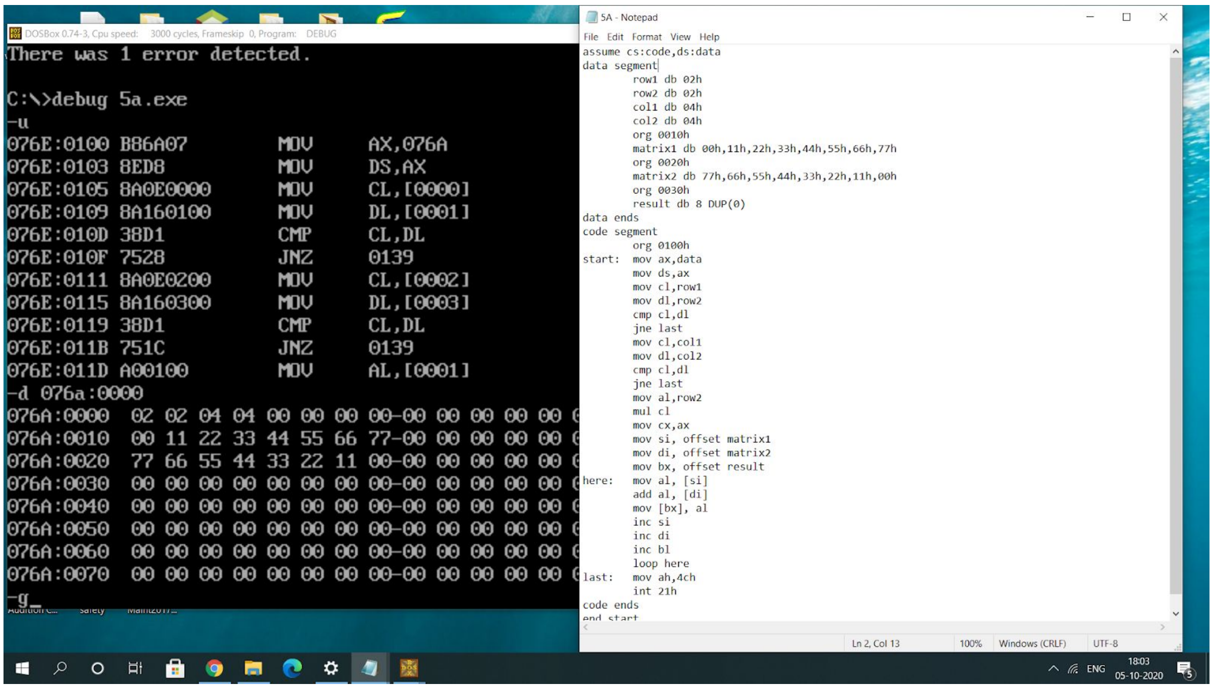
ALGORITHM:

- Initialize the data segment.
- Move data segment address to ds
- Load row1 to cl, row2 to dl.
- Compare cl and dl and terminate if not equal.
- Load col1 to cl, col2 to dl.
- Compare cl and dl and terminate if not equal.
- Move row2 to al.
- Multiply al with cl and move ax to cx.
- Move offset of matrix1 to si, matrix2 to di, result to bx
- Loop here:
  - Move contents pointed by si to al and add al and contents pointed by di.
  - Move al to result matrix
  - Increment si,di,bl
- Terminate the program

PROGRAM:

PROGRAM	**COMMENTS**
mov ax,data	Load data segment to ds
mov ds,ax	
mov cl,row1	Load row1 value to cl
mov dl,row2	Load row2 value to dl
cmp cl,dl	Compare cl and dl
jne last	Jump to last if not equal
mov cl,col1	Load col1 value to cl
mov dl,col2	Load col2 value to dl
cmp cl,dl	Compare cl and dl
jne last	Jump to last if not equal
mov al,row2	Load row2 value to al
mul cl	Multiply al with cl
mov cx,ax	Load value of ax to cx
mov si, offset matrix1	Load offset of matrix1 to si
mov di, offset matrix2	Load offset of matrix2 to di
mov bx, offset result	Load offset of result to bx
Here:	cx register indicates the loop count
mov al, [si]	Load contents pointed by si to al
add al, [di]	Add all with contents pointed by di
mov [bx], al	Load al to result matrix
inc si	Increment si
inc di	Increment di
inc bl	Increment bl
loop here	
last:	
mov ah,4ch	Terminate the program
int 21h	

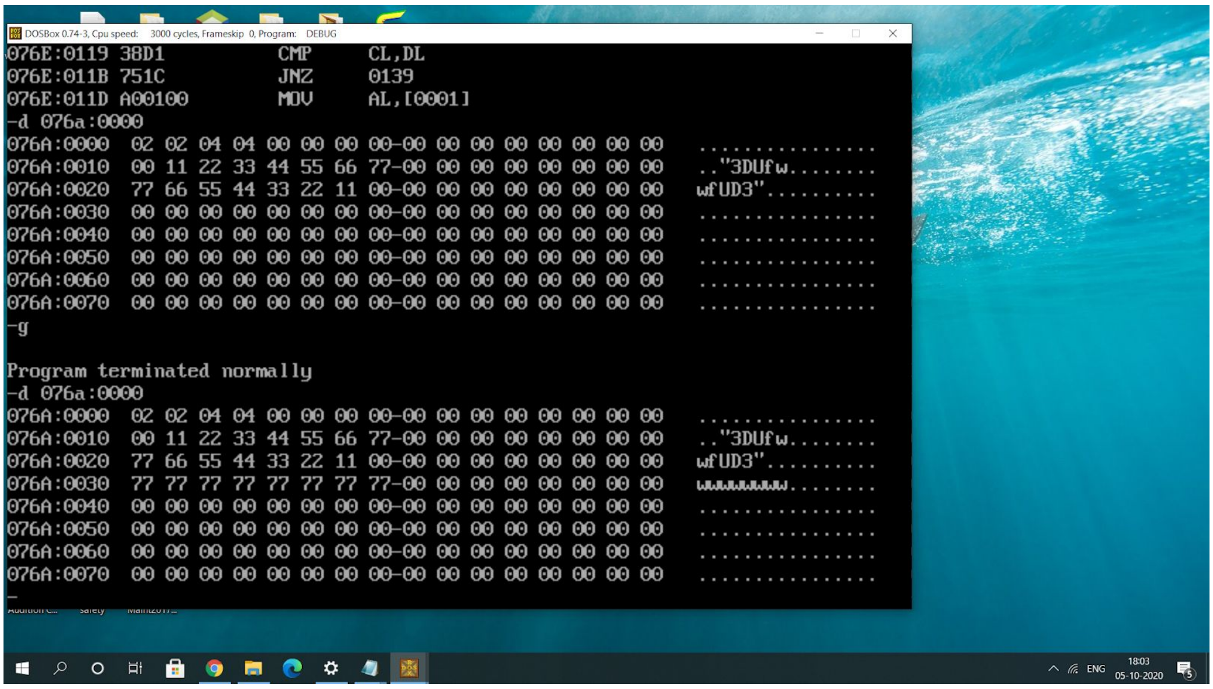
UNASSEMBLED CODE:



```
There was 1 error detected.

C:\>debug 5a.exe
-u
076E:0100 B86A07        MOV     AX,076A
076E:0103 8ED8          MOV     DS,AX
076E:0105 8A0E0000      MOV     CL,[0000]
076E:0109 8A160100      MOV     DL,[0001]
076E:010D 38D1          CMP     CL,DL
076E:010F 7528          JNZ     0139
076E:0111 8A0E0200      MOV     CL,[0002]
076E:0115 8A160300      MOV     DL,[0003]
076E:0119 38D1          CMP     CL,DL
076E:011B 751C          JNZ     0139
076E:011D A00100        MOV     AL,[0001]
-d 076a:0000
076A:0000  02 02 04 04 00 00 00 00-00 00 00 00 00
076A:0010  00 11 22 33 44 55 66 77-00 00 00 00 00
076A:0020  77 66 55 44 33 22 11 00-00 00 00 00 00
076A:0030  00 00 00 00 00 00 00 00-00 00 00 00 00
076A:0040  00 00 00 00 00 00 00 00-00 00 00 00 00
076A:0050  00 00 00 00 00 00 00 00-00 00 00 00 00
076A:0060  00 00 00 00 00 00 00 00-00 00 00 00 00
076A:0070  00 00 00 00 00 00 00 00-00 00 00 00 00
-g_
```

```
assume cs:code,ds:data
data segment
        row1 db 02h
        row2 db 02h
        col1 db 04h
        col2 db 04h
        org 0010h
        matrix1 db 00h,11h,22h,33h,44h,55h,66h,77h
        org 0020h
        matrix2 db 77h,66h,55h,44h,33h,22h,11h,00h
        org 0030h
        result db 8 DUP(0)
data ends
code segment
        org 0100h
start:  mov ax,data
        mov ds,ax
        mov cl,row1
        mov dl,row2
        cmp cl,dl
        jne last
        mov cl,col1
        mov dl,col2
        cmp cl,dl
        jne last
        mov al,row2
        mul cl
        mov cx,ax
        mov si, offset matrix1
        mov di, offset matrix2
        mov bx, offset result
here:   mov al, [si]
        add al, [di]
        mov [bx], al
        inc si
        inc di
        inc bl
        loop here
last:   mov ah,4ch
        int 21h
code ends
end start
```

SAMPLE INPUT/OUTPUT:



```
076E:0119 38D1          CMP     CL,DL
076E:011B 751C          JNZ     0139
076E:011D A00100        MOV     AL,[0001]
-d 076a:0000
076A:0000  02 02 04 04 00 00 00 00-00 00 00 00 00 00 00 00   ................
076A:0010  00 11 22 33 44 55 66 77-00 00 00 00 00 00 00 00   .."3DUfw........
076A:0020  77 66 55 44 33 22 11 00-00 00 00 00 00 00 00 00   wfUD3"..........
076A:0030  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
076A:0040  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
076A:0050  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
076A:0060  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
076A:0070  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
-g

Program terminated normally
-d 076a:0000
076A:0000  02 02 04 04 00 00 00 00-00 00 00 00 00 00 00 00   ................
076A:0010  00 11 22 33 44 55 66 77-00 00 00 00 00 00 00 00   .."3DUfw........
076A:0020  77 66 55 44 33 22 11 00-00 00 00 00 00 00 00 00   wfUD3"..........
076A:0030  77 77 77 77 77 77 77 77-00 00 00 00 00 00 00 00   wwwwwwww........
076A:0040  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
076A:0050  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
076A:0060  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
076A:0070  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
-
```

RESULT:

Thus addition of two matrices has been performed.

B. AIM:

Program for performing matrix subtraction.

ALGORITHM:

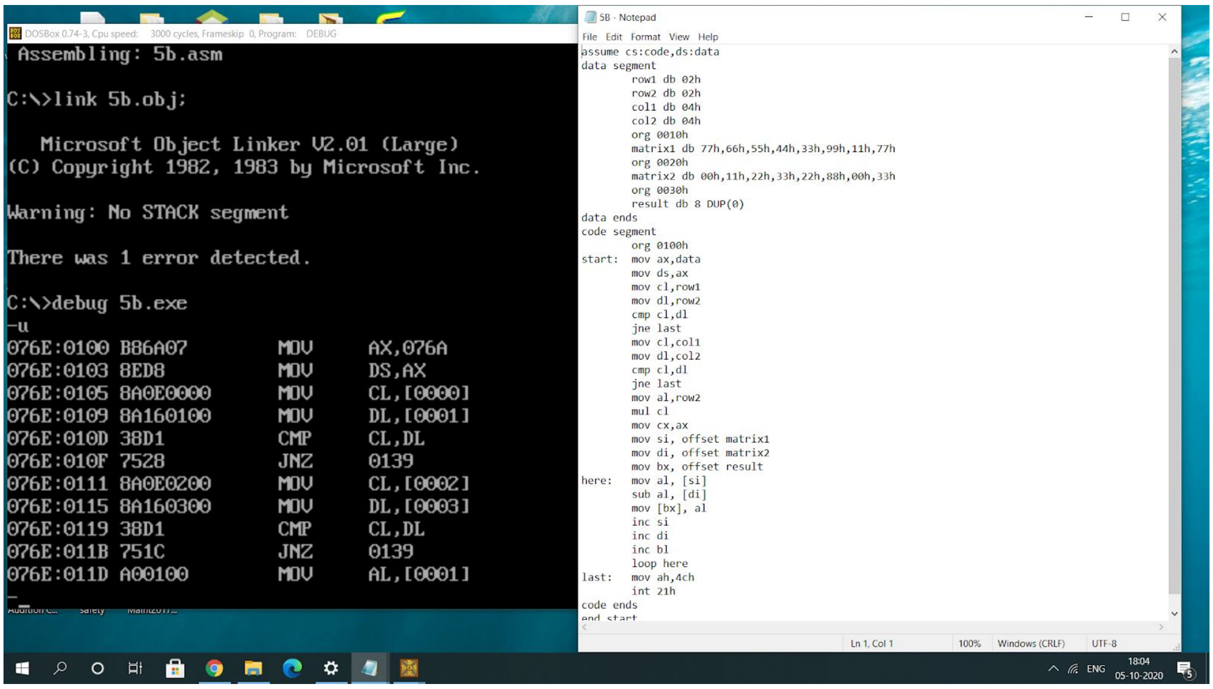
- Initialize the data segment.
- Move data segment address to ds
- Load row1 to cl, row2 to dl.
- Compare cl and dl and terminate if not equal.
- Load col1 to cl, col2 to dl.
- Compare cl and dl and terminate if not equal.
- Move row2 to al.
- Multiply al with cl and move ax to cx.
- Move offset of matrix1 to si, matrix2 to di, result to bx
- Loop here:
    - Move contents pointed by si to al and subtract al and contents pointed by di from al.
    - Move al to result matrix
    - Increment si,di,bl
- Terminate the program

PROGRAM:

PROGRAM	**COMMENTS**
mov ax,data mov ds,ax mov cl,row1 mov dl,row2 cmp cl,dl jne last mov cl,col1 mov dl,col2 cmp cl,dl jne last mov al,row2 mul cl mov cx,ax mov si, offset matrix1 mov di, offset matrix2 mov bx, offset result	Load data segment to ds Load row1 value to cl Load row2 value to dl Compare cl and dl Jump to last if not equal Load col1 value to cl Load col2 value to dl Compare cl and dl Jump to last if not equal Load row2 value to al Multiply al with cl Load value of ax to cx Load offset of matrix1 to si Load offset of matrix2 to di Load offset of result to bx

Here: mov al, [si] add al, [di] mov [bx], al inc si inc di inc bl loop here	cx register indicates the loop count Load contents pointed by si to al Add all with contents pointed by di Load al to result matrix Increment si Increment di Increment bl
last: mov ah,4ch int 21h	Terminate the program

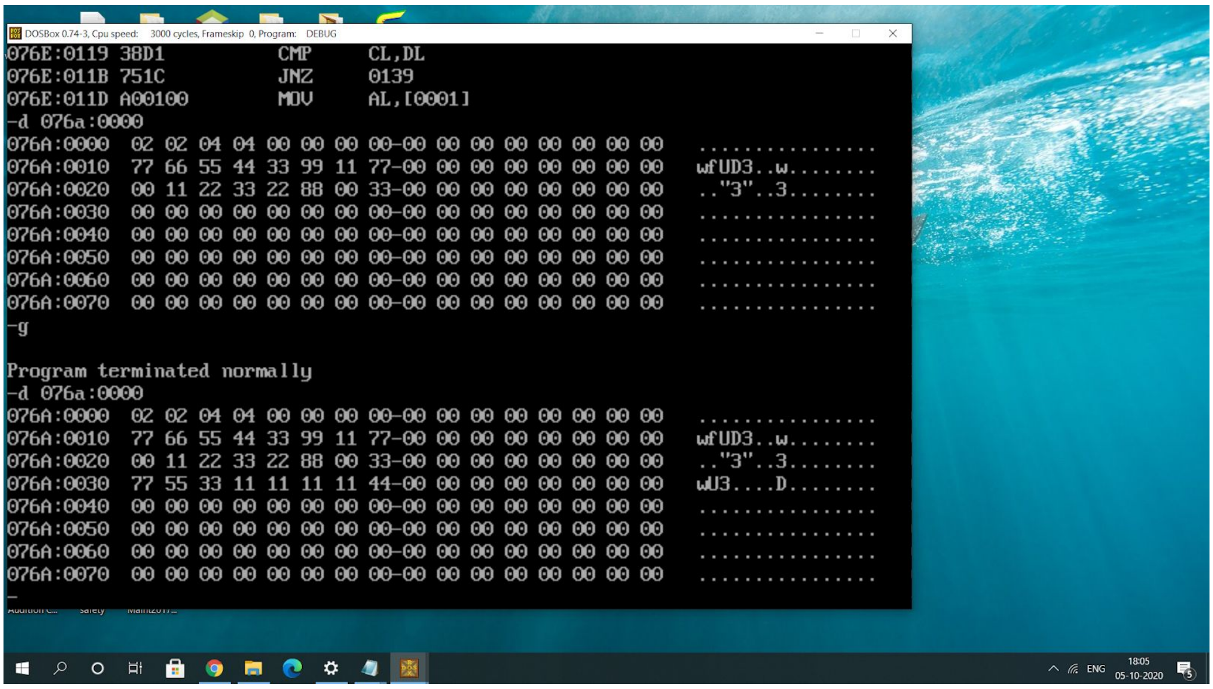
UNASSEMBLED CODE:



```
Assembling: 5b.asm

C:\>link 5b.obj;

   Microsoft Object Linker V2.01 (Large)
(C) Copyright 1982, 1983 by Microsoft Inc.

Warning: No STACK segment

There was 1 error detected.

C:\>debug 5b.exe
-u
076E:0100 B86A07        MOV     AX,076A
076E:0103 8ED8          MOV     DS,AX
076E:0105 8A0E0000      MOV     CL,[0000]
076E:0109 8A160100      MOV     DL,[0001]
076E:010D 38D1          CMP     CL,DL
076E:010F 7528          JNZ     0139
076E:0111 8A0E0200      MOV     CL,[0002]
076E:0115 8A160300      MOV     DL,[0003]
076E:0119 38D1          CMP     CL,DL
076E:011B 751C          JNZ     0139
076E:011D A00100        MOV     AL,[0001]
-
```

```
assume cs:code,ds:data
data segment
        row1 db 02h
        row2 db 02h
        col1 db 04h
        col2 db 04h
        org 0010h
        matrix1 db 77h,66h,55h,44h,33h,99h,11h,77h
        org 0020h
        matrix2 db 00h,11h,22h,33h,22h,88h,00h,33h
        org 0030h
        result db 8 DUP(0)
data ends
code segment
        org 0100h
start:  mov ax,data
        mov ds,ax
        mov cl,row1
        mov dl,row2
        cmp cl,dl
        jne last
        mov cl,col1
        mov dl,col2
        cmp cl,dl
        jne last
        mov al,row2
        mul cl
        mov cx,ax
        mov si, offset matrix1
        mov di, offset matrix2
        mov bx, offset result
here:   mov al, [si]
        sub al, [di]
        mov [bx], al
        inc si
        inc di
        inc bl
        loop here
last:   mov ah,4ch
        int 21h
code ends
end start
```

SAMPLE INPUT/OUTPUT



```
076E:0119 38D1          CMP     CL,DL
076E:011B 751C          JNZ     0139
076E:011D A00100        MOV     AL,[0001]
-d 076a:0000
076A:0000  02 02 04 04 00 00 00 00-00 00 00 00 00 00 00 00   ................
076A:0010  77 66 55 44 33 99 11 77-00 00 00 00 00 00 00 00   wfUD3..w........
076A:0020  00 11 22 33 22 88 00 33-00 00 00 00 00 00 00 00   .."3"..3........
076A:0030  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
076A:0040  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
076A:0050  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
076A:0060  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
076A:0070  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
-g

Program terminated normally
-d 076a:0000
076A:0000  02 02 04 04 00 00 00 00-00 00 00 00 00 00 00 00   ................
076A:0010  77 66 55 44 33 99 11 77-00 00 00 00 00 00 00 00   wfUD3..w........
076A:0020  00 11 22 33 22 88 00 33-00 00 00 00 00 00 00 00   .."3"..3........
076A:0030  77 55 33 11 11 11 11 44-00 00 00 00 00 00 00 00   wU3....D........
076A:0040  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
076A:0050  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
076A:0060  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
076A:0070  00 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
-
```

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: DEBUG
ENG
18:05
05-10-2020

RESULT:

Thus subtraction of two matrices has been performed.