Assignment 8 – Testing I/O Instructions

Introduction :

I/O Instructions

Input from Port (in, ins):

in transfers a byte, word, or long from the immediate port into the byte, word, or long memory address pointed to by the AL, AX, or EAX register, respectively.

The second form of the in instruction transfers a byte, word, or long from a port (0 to 65535), specified in the DX register, into the byte, word, or long memory address pointed to by the AL, AX, or EAX register, respectively.When an 8-bit port is specified, the upper-eight bits of the port address will be 0.

The ins instruction transfers a string from a port specified in the DX register to the memory byte or word pointed to by the ES:destination index. Load the desired port number into the DX register and the desired destination address into the DI or EDI index register before executing the ins instruction. After a transfer occurs, the destination-index register is automatically incremented or decremented as determined by the value of the direction flag (DF). The index register is incremented if DF = 0 (DF cleared by a cld instruction); it is decremented if DF = 1 (DF set by a std instruction). The increment or decrement count is 1 for a byte transfer, 2 for a word, and 4 for a long. Use the rep prefix with the ins instruction for a block transfer of CX bytes or words.

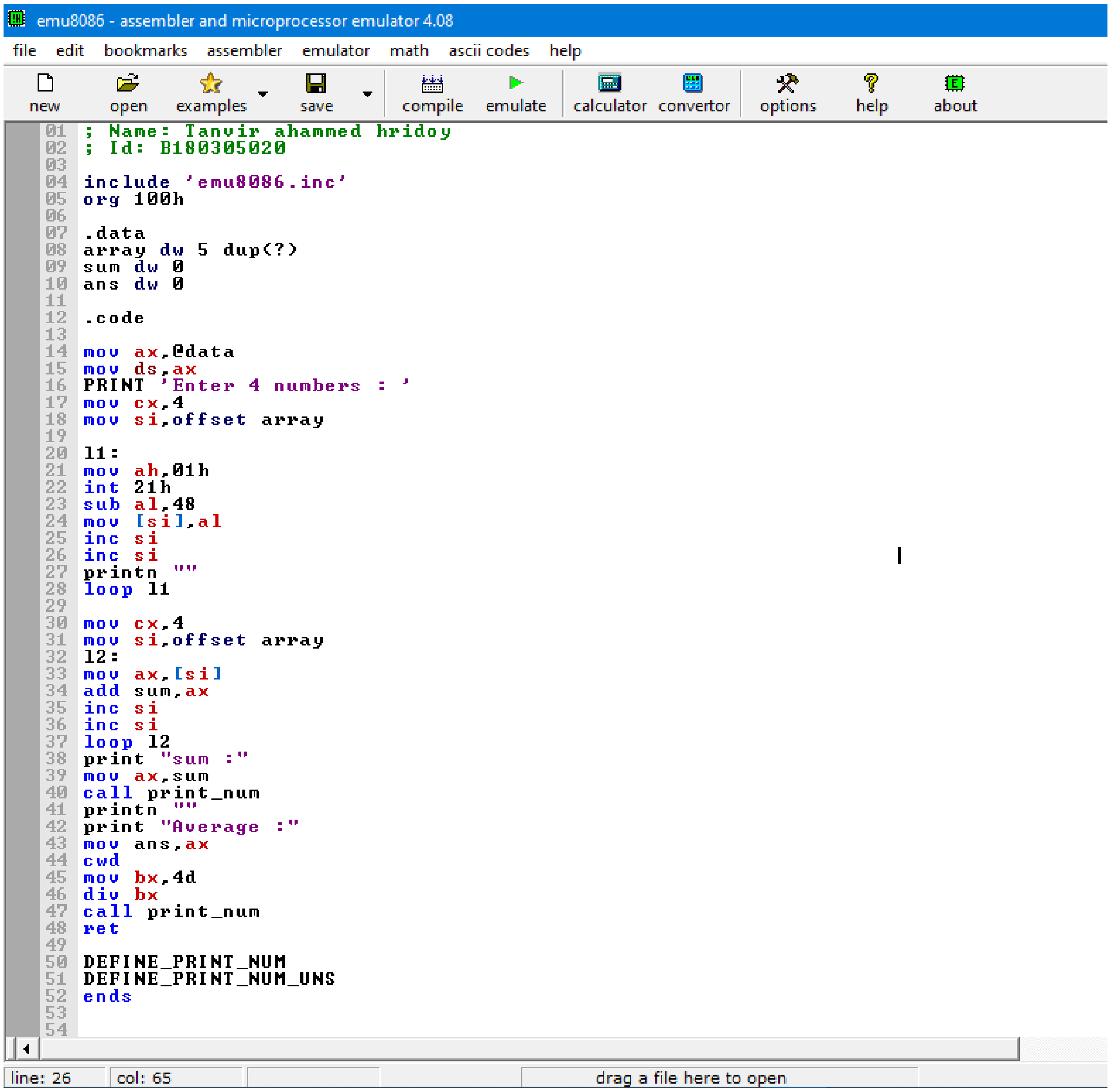
Output from Port (out, outs):

Transfers a byte, word, or long from the memory address pointed to by the content of the AL, AX, or EAX register to the immediate 8-, 16-, or 32-bit port address.

The second form of the out instruction transfers a byte, word, or long from the AL, AX, or EAX registers respectively to a port (0 to 65535), specified by the DX register.

The outs instruction transfers a string from the memory byte or word pointed to by the ES:source index to the port addressed in the DX register. Load the desired port number into the DX register and the desired source address into the SI or ESI index register before executing the outs instruction. After a transfer occurs, the destination-index register is automatically incremented or decremented as determined by the value of the direction flag (DF). The index register is incremented if DF = 0 (DF cleared by a cld instruction); it is decremented if DF = 1 (DF set by a std instruction). The increment or decrement count is 1 for a byte transfer, 2 for a word, and 4 for a long. Use the rep prefix with the outs instruction for a block transfer of CX bytes or words.

Code :


emu8086 - assembler and microprocessor emulator 4.08
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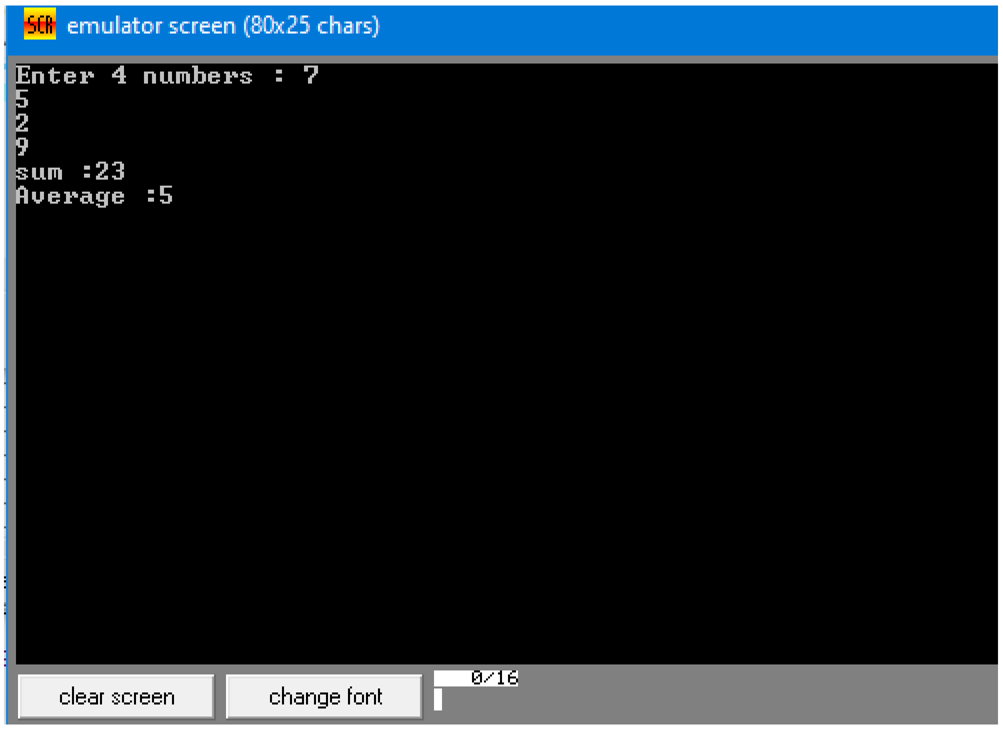
line: 26 col: 65 drag a file here to open

```
; Name: Tanvir ahammed hridoy
; Id: B180305020

include 'emu8086.inc'
org 100h

.data
array dw 5 dup(?)
sum dw 0
ans dw 0

.code

mov ax,@data
mov ds,ax
PRINT 'Enter 4 numbers : '
mov cx,4
mov si,offset array

l1:
mov ah,01h
int 21h
sub al,48
mov [si],al
inc si
inc si
printn ""
loop l1

mov cx,4
mov si,offset array
l2:
mov ax,[si]
add sum,ax
inc si
inc si
loop l2
print "sum :"
mov ax,sum
call print_num
printn ""
print "Average :"
mov ans,ax
cwd
mov bx,4d
div bx
call print_num
ret

DEFINE_PRINT_NUM
DEFINE_PRINT_NUM_UNS
ends
```

Input/Output :



```
Enter 4 numbers : 7
5
2
9
sum :23
Average :5
```

Conclusion :

Input/Output (I/O) instructions are used to input data from peripherals, output data to peripherals, or read/write input/output controls. Early computers used special hardware to handle I/O devices. The trend in modern computers is to map I/O devices in memory, allowing the direct use of any instruction that operates on memory for handling I/O.

References :

https://youtu.be/lZN-xkvBZ9U