Experiment No 1: 8-bit Arithmetic Operations

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1. AIM:

Program for adding 2, 8-bit numbers.

PROCEDURE FOR EXECUTING MASM:

- Run Dosbox and mount the masm folder to a drive in dosbox
- Goto the mounted drive (“Drive:”)
- Save the 8086 program with extension .asm in the same folder using command “edit” in Dosbox.
- Next, assemble it using the command “masm filename.asm”
- Link the file using the command “link filename.obj;”
- Debug the file to execute and analyse the memory contents, “debug filename.exe”.
- Now use command “u” to display the unassembled code.
- Use command “d segment:offset” to see the content of memory locations starting from segment:offset address
- Execute using the command “g” and check the outputs by repeating the previous step.
- Use command “e segment:offset” to edit the variables.
- Command “q” to exit from debug and command “exit” from command prompt to close dosbox.

ALGORITHM:

- Initialize the data segment
- Move data segment address to ds
- Load operand-1 to ah and operand-2 to bh
- Load 00h to ch register for carry
- Add ah and bh
- If there is no carry being generated, goto here segment else, increment ch by 1
- In here segment,
    - Load ah to result
    - Load ch to carry
    - Terminate the program

PROGRAM:

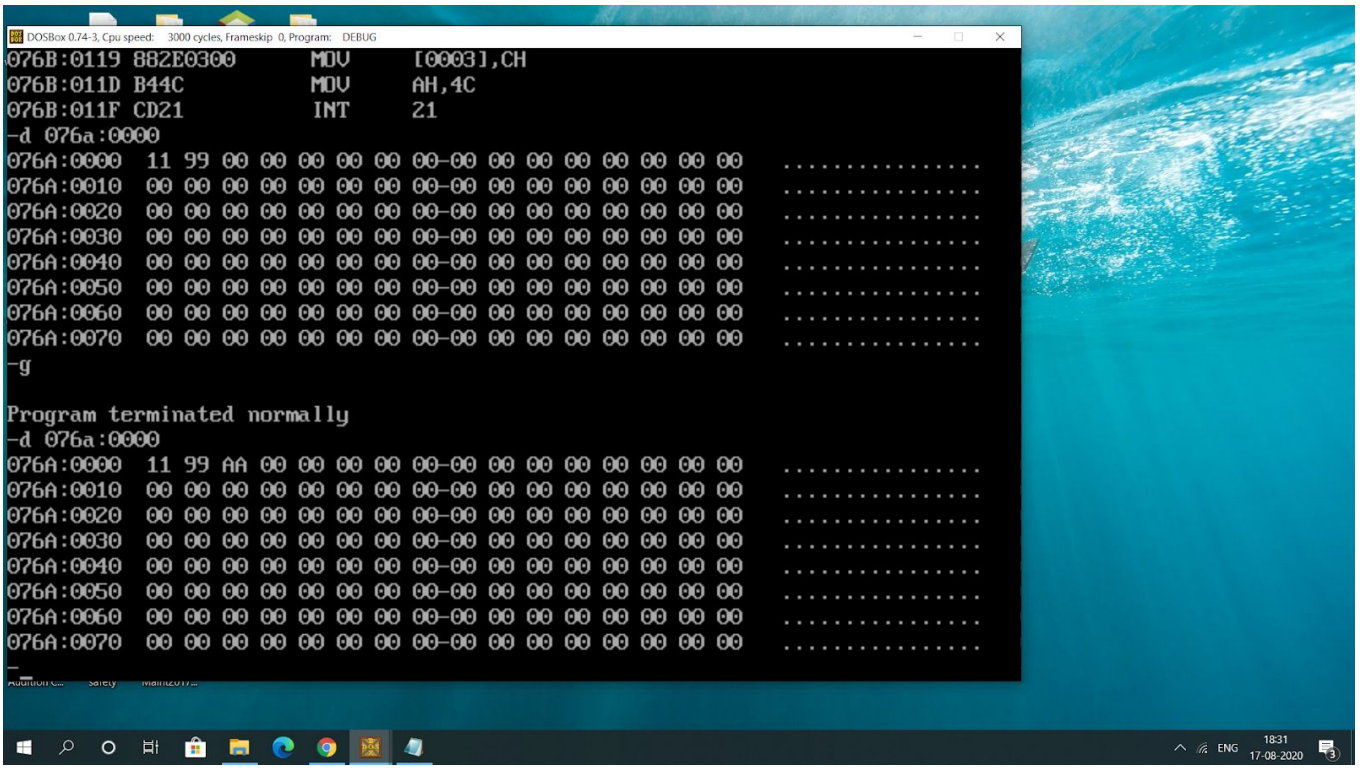
PROGRAM	COMMENTS

Start:
mov ax,data
mov ds,ax
	Transferring address of data segment to ds

mov ah,opr1	Value of opr1 is loaded to ah
mov bh,opr2	Value of opr2 is loaded to bh
mov ch,00h	Initializing the value of ch
add ah,bh	ah=ah+bh
jnc here	Jump to “here” segment if no carry is generated
inc ch	Increments ch by 1
Here: mov result,ah	Load register value of ah to result
mov carry,ch	Load ch value to carry
mov ah,4ch int 21h	Termination of execution
code ends	Ending the segment with the segment name

SAMPLE INPUT/OUTPUT:

(ah=11 ; bh=99)



RESULT:

The addition of 2, 8-bit numbers is thus shown.

2. AIM:

Program for subtracting 2, 8-bit numbers.

PROCEDURE FOR EXECUTING MASM:

- Run Dosbox and mount the masm folder to a drive in dosbox
- Goto the mounted drive (“Drive:”)
- Save the 8086 program with extension .asm in the same folder using command “edit” in Dosbox.
- Next, assemble it using the command “masm filename.asm”
- Link the file using the command “link filename.obj;”
- Debug the file to execute and analyse the memory contents, “debug filename.exe”.
- Now use command “u” to display the unassembled code.
- Use command “d segment:offset” to see the content of memory locations starting from segment:offset address
- Execute using the command “g” and check the outputs by repeating the previous step.
- Use command “e segment:offset” to edit the variables.
- Command “q” to exit from debug and command “exit” from command prompt to close dosbox.

ALGORITHM:

- Initialize the data segment
- Move data segment address to ds
- Load operand-1 to ah and operand-2 to bh
- Load 00h to ch register
- Subtract ah and bh
- If ah is greater than bh, goto here segment else, increment ch by 1 and find the 2’s complement of ah
- In here segment,
    - Load ah to result
    - Load ch to carry
    - Terminate the program

PROGRAM:

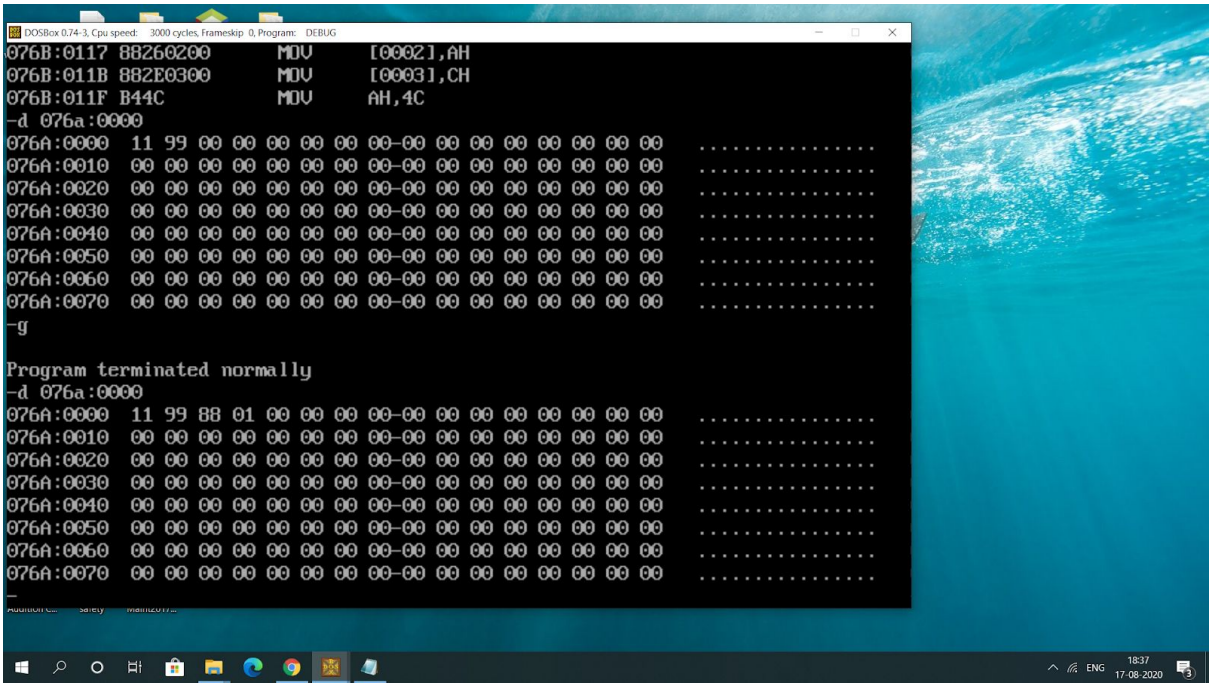
PROGRAM	COMMENTS

Start:
mov ax,data
mov ds,ax
	Transferring address of data segment to ds

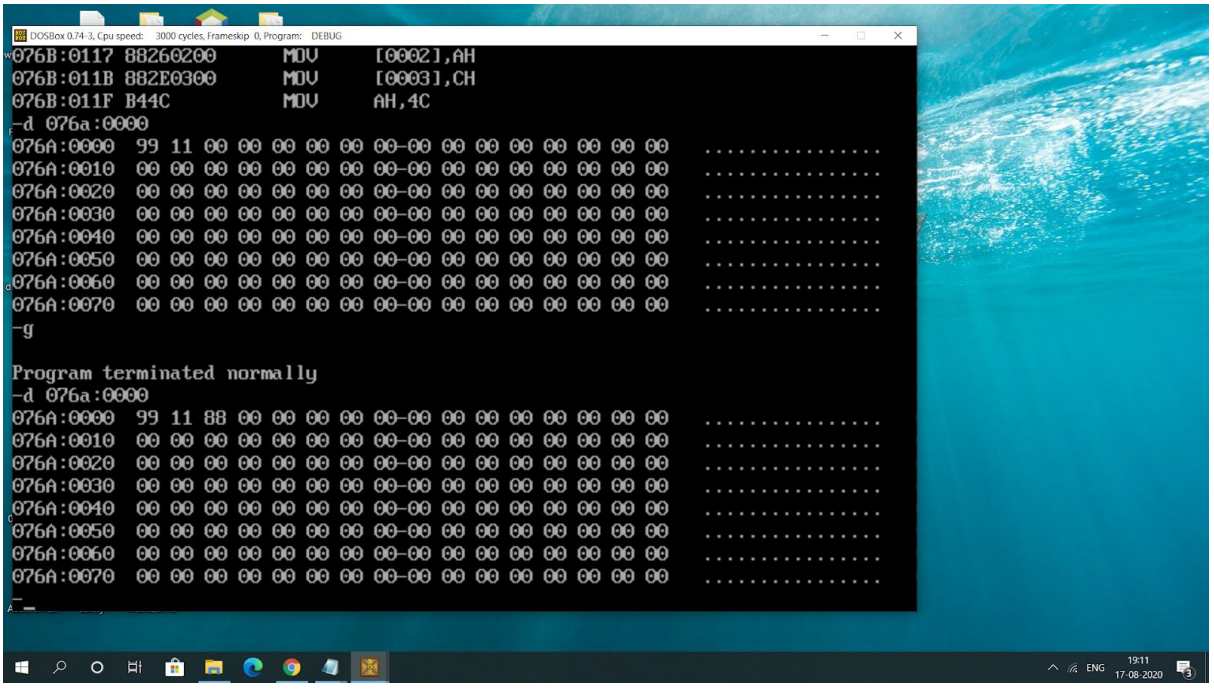
mov ah,opr1	Value of opr1 is loaded to ah
mov bh,opr2	Value of opr2 is loaded to bh
mov ch,00h	Initializing the value of ch
sub ah,bh	ah=ah-bh
jnc here	Jump to “here” segment if ah>bh
inc ch	Increments ch by 1
neg ah	2’s complement of ah
Here: mov result,ah	Load register value of ah to result
mov carry,ch	Load ch value to carry
mov ah,4ch int 21h	Termination of execution
code ends	Ending the segment with the segment name

SAMPLE INPUT/OUTPUT

ah=11; bh=99 (ah<bh)



ah=99 bh=11 (ah>bh)



RESULT:

The subtraction of 2, 8-bit numbers is thus shown.

3. AIM:

Program for multiplication of 2, 8-bit numbers.

PROCEDURE FOR EXECUTING MASM:

- Run Dosbox and mount the masm folder to a drive in dosbox
- Goto the mounted drive (“Drive:”)
- Save the 8086 program with extension .asm in the same folder using command “edit” in Dosbox.
- Next, assemble it using the command “masm filename.asm”
- Link the file using the command “link filename.obj;”
- Debug the file to execute and analyse the memory contents, “debug filename.exe”.
- Now use command “u” to display the unassembled code.
- Use command “d segment:offset” to see the content of memory locations starting from segment:offset address
- Execute using the command “g” and check the outputs by repeating the previous step.
- Use command “e segment:offset” to edit the variables.
- Command “q” to exit from debug and command “exit” from command prompt to close dosbox.

ALGORITHM:

- Initialize the data segment
- Move data segment address to ds
- Load operand-1 to al and operand-2 to bl
- Multiply bl (ax=al x bl)
- Load ax to result
- Terminate the program

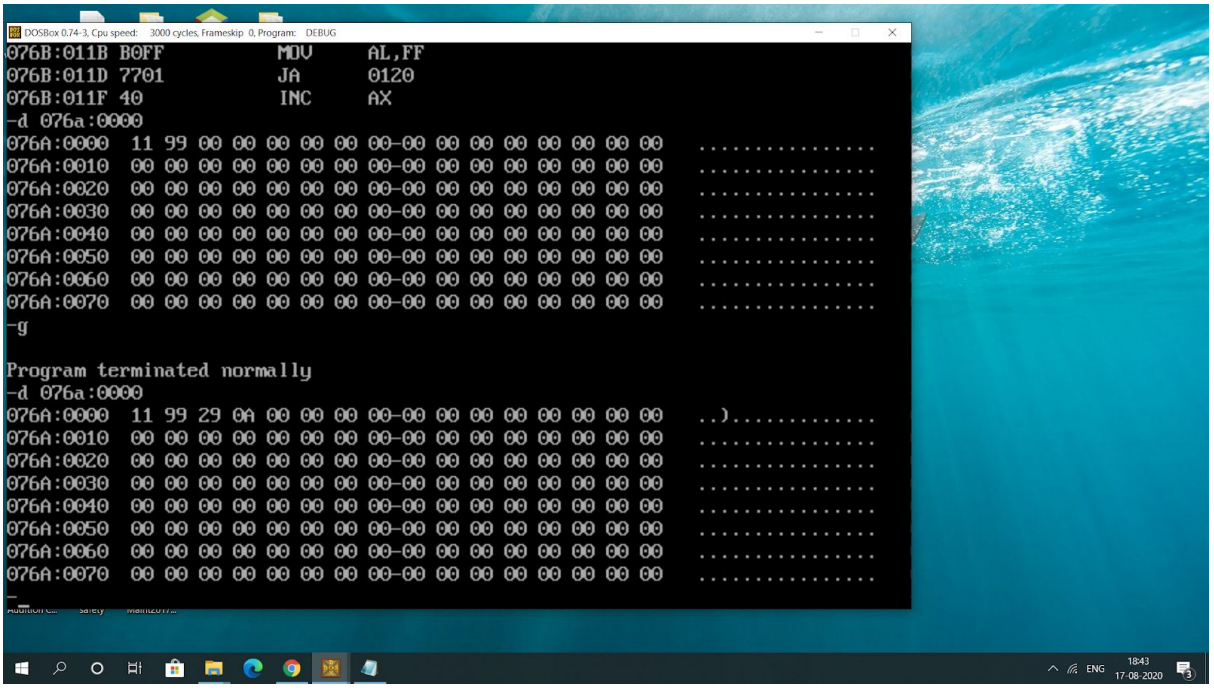
PROGRAM:

PROGRAM	COMMENTS

Start:
mov ax,data
mov ds,ax
	Transferring address of data segment to ds

mov al,opr1	Value of opr1 is loaded to al
mov bl,opr2	Value of opr2 is loaded to bl
mul bl	ax=al x bl
mov result,ax	Load register value of ax to result
mov ah,4ch int 21h	Termination of execution
code ends	Ending the segment with the segment name

SAMPLE INPUT/OUTPUT (al=11 ; bl=99)



RESULT:

The multiplication of 2, 8-bit numbers is thus shown.

4. AIM:

Program for division of 2, 8-bit numbers.

PROCEDURE FOR EXECUTING MASM:

- Run Dosbox and mount the masm folder to a drive in dosbox
- Goto the mounted drive (“Drive:”)
- Save the 8086 program with extension .asm in the same folder using command “edit” in Dosbox.
- Next, assemble it using the command “masm filename.asm”
- Link the file using the command “link filename.obj;”
- Debug the file to execute and analyse the memory contents, “debug filename.exe”.
- Now use command “u” to display the unassembled code.
- Use command “d segment:offset” to see the content of memory locations starting from segment:offset address
- Execute using the command “g” and check the outputs by repeating the previous step.
- Use command “e segment:offset” to edit the variables.
- Command “q” to exit from debug and command “exit” from command prompt to close dosbox.

ALGORITHM:

- Initialize the data segment
- Move data segment address to ds
- Load ah with 00
- Load operand-1 to ax and operand-2 to bl
- Divide bl (al=ax / bl ; remainder in ah)
- Load al to result
- Load ah to rem (remainder)
- Terminate the program

PROGRAM:

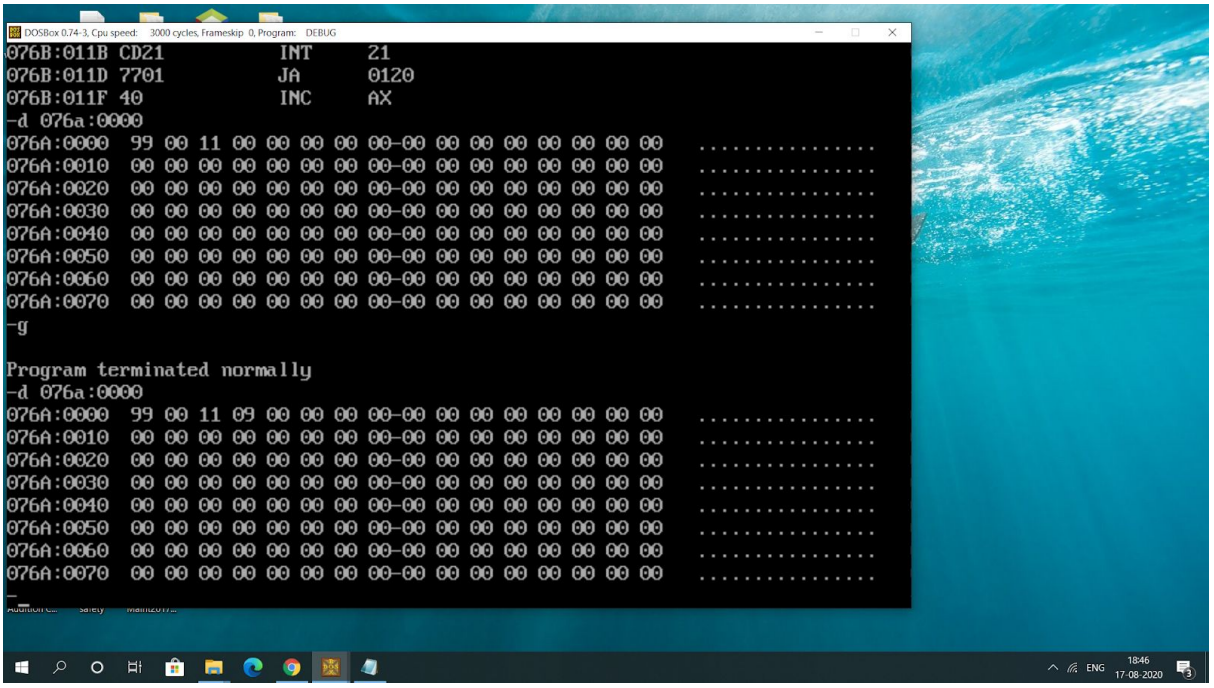
PROGRAM	COMMENTS

Start:
mov ax,data
mov ds,ax
	Transferring address of data segment to ds

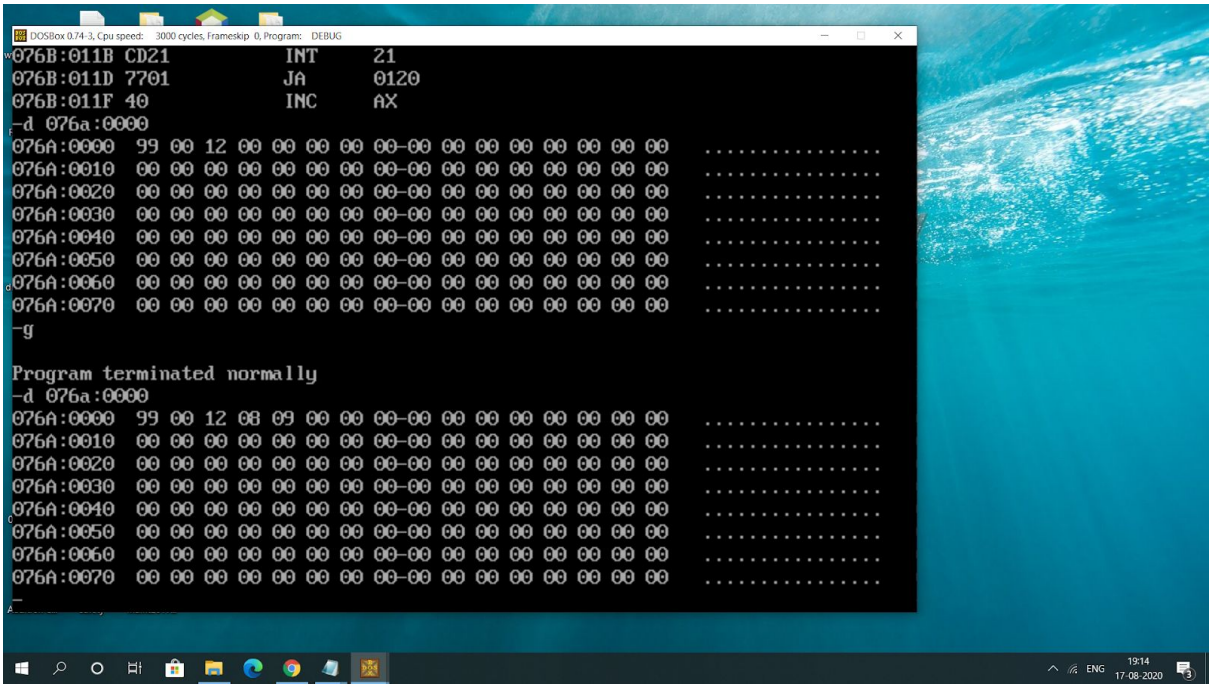
mov ah,00	Register ah is loaded with 00
mov ax,opr1	Value of opr1 is loaded to ax
mov bl,opr2	Value of opr2 is loaded to bl
div bl	al = ax / bl
mov result,al	Load register value of al to result
mov rem,ah	Load register value of ah to rem
mov ah,4ch int 21h	Termination of execution
code ends	Ending the segment with the segment name

SAMPLE INPUT/OUTPUT

(ax=99 ; bl=11)



(ax=99 ; bl=12)



RESULT:

The division of 2, 8-bit numbers is thus shown.