8 bit Arithmetic Operations

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Aim:

To perform arithmetic operations on two 8 bit numbers.

Procedure:

- Mount masm folder to a drive on DOSBOX.
- Go to mounted drive.
- Save 8086 program with the extension **".asm"** in the same folder using the command **"edit"**.
- Assemble the **.asm** file using the command **"masm filename.asm"**.
- Link the assmebled **.obj** file using the command **"link filename.obj"**.
- Debug the executable file **.exe** with the **"debug filename.exe"** command.
  - The unassembled code can be viewed by the command **"u"**.
  - Use the command **"d segment:offset"** to view the contents of memory locations from the specified segment:offset address.
  - Use command **"e segment:offset"** to change the values in memory.
  - Execute the program using command **"g"**.
  - The command **"q"** exits from the debug session.

Algorithm:

1. Begin.
2. Declare data and code segments.
3. Declare variables for operands, and results in the data segment.
4. Start code segment.
5. Set an offset if preferred.
6. Load contents of the data segment into the DS register through the AX register.
7. Load contents of the operand(s) on to AL and/or BL register(s).
8. Perform required operation, add, sub, mul or div, on the operands.
9. If a carry/overflow occurs, store it.
10. Store results in respective registers.
11. Request Interrupt to terminate.
12. End code segment.
13. End.

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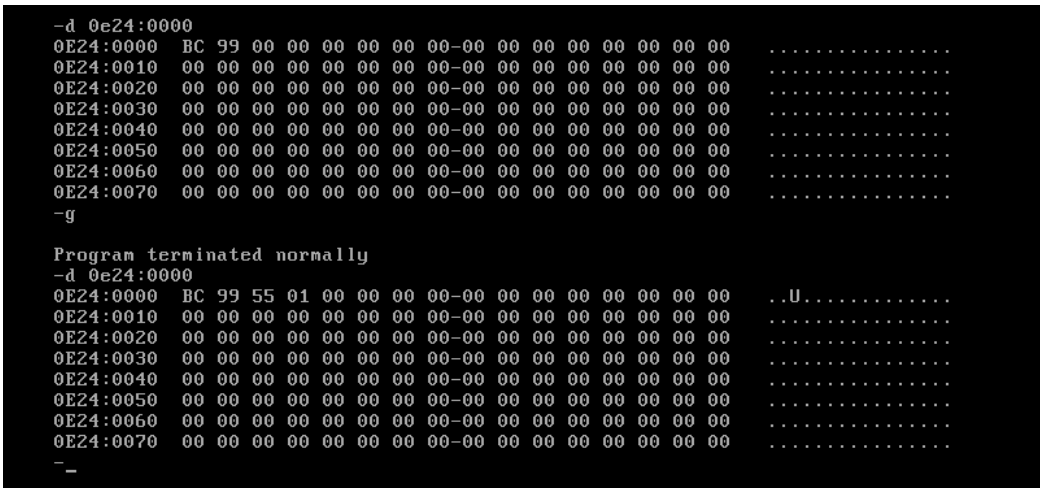
8 Bit Addition

Program:

Program	**Comments**
assume cs:code,ds:data	Declare code and data segments
data segment	Declare operands in data segment
opr1 db 11h	Set opr1 to hex value 11
opr2 db 99h	Set opr2 to hex value 99
result db 00H	Set result to hex value 00
carry db 00H	Set carry to hex value 00
data ends	End of data segment
code segment	
org 0100h	
start: mov ax,data	Move data segment contents to AX register
mov ds,ax	Move data in AX register to DS register
mov ah,opr1	Move contents of opr1 to AH register
mov bh,opr2	Move contents of opr2 to BH register
mov ch,00h	Move hex value 00 to CH register
add ah,bh	AH = AH + BH
jnc here	Jump to the label here, if there is no carry
inc ch	Increment value of CH if there is a carry
here: mov result,ah	Move contents of AH register to result
mov carry,ch	Move contents of CH register to carry
mov ah,4ch	
int 21h	Request interrupt routine
code ends	
end start	

Input and Output:

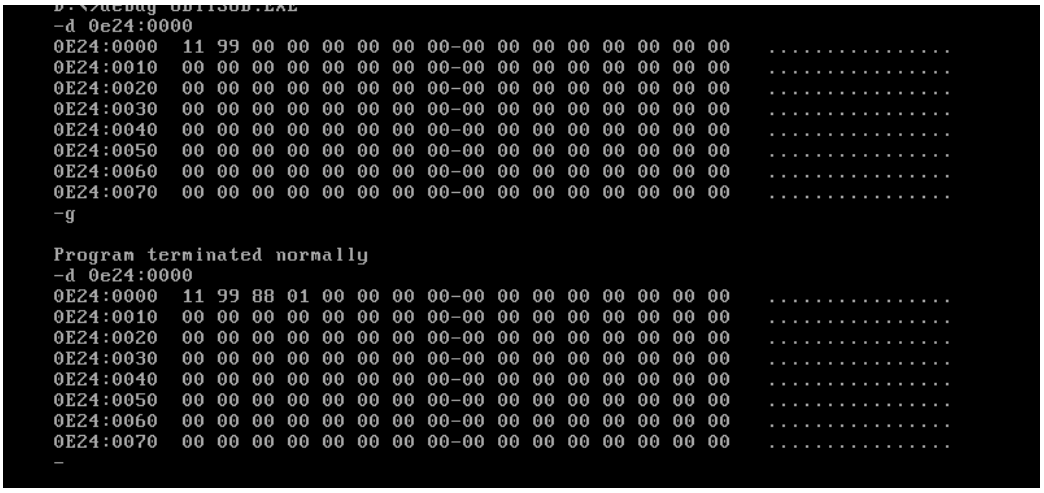


8 Bit Subtraction

Program:

Program	**Comments**
assume cs:code,ds:data	Declare code and data segments
data segment	Declare operands in data segment
opr1 db 11h	Set opr1 to hex value 11
opr2 db 99h	Set opr2 to hex value 99
result db 00H	Set result to hex value 00
carry db 00H	Set carry to hex value 00
data ends	End of data segment
code segment	
org 0100h	
start: mov ax,data	Move data segment contents to AX register
mov ds,ax	Move data in AX register to DS register
mov ah,opr1	Move contents of opr1 to AH register
mov bh,opr2	Move contents of opr2 to BH register
mov ch,00h	Move hex value 00 to CH register
sub ah,bh	AH = AH - BH
jnc here	Jump to the label here, if there is no carry
inc ch	Increment value of CH if there is a carry
neg ah	Negate the contents of the AH register
here: mov result,ah	Move contents of AH register to result
mov carry,ch	Move contents of CH register to carry
mov ah,4ch	
int 21h	Request interrupt routine
code ends	
end start	

Input and Output:

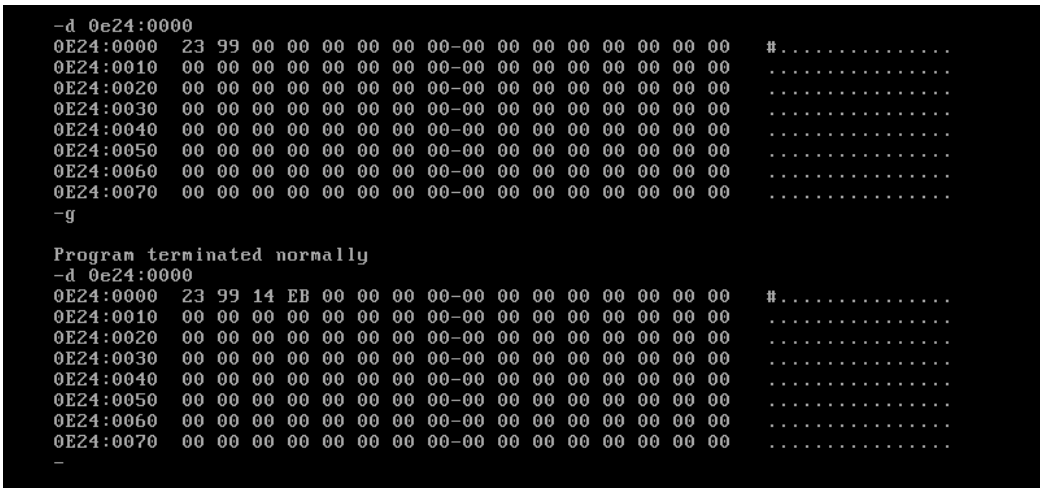


8 Bit Multiplication

Program:

Program	**Comments**
assume cs:code,ds:data	Declare code and data segments
data segment	Declare operands in data segment
opr1 db 11h	Set opr1 to hex value 11
opr2 db 99h	Set opr2 to hex value 99
resulth db 00H	Set resulth to hex value 00
resultl db 00H	Set resultl to hex value 00
data ends	End of data segment
code segment	
org 0100h	
start: mov ax,data	Move data segment contents to AX register
mov ds,ax	Move data in AX register to DS register
mov al,opr1	Move contents of opr1 to AL register
mov ah, 00H	Move hex value 00 to AH register
mov bh,opr2	Move contents of opr2 to BH register
mul bh	AX = AL * BH
here: mov resulth,ah	Move contents of AH register to resulth
mov resultl,al	Move contents of AL register to resultl
mov ah,4ch	
int 21h	Request interrupt routine
code ends	
end start	

Input and Output:

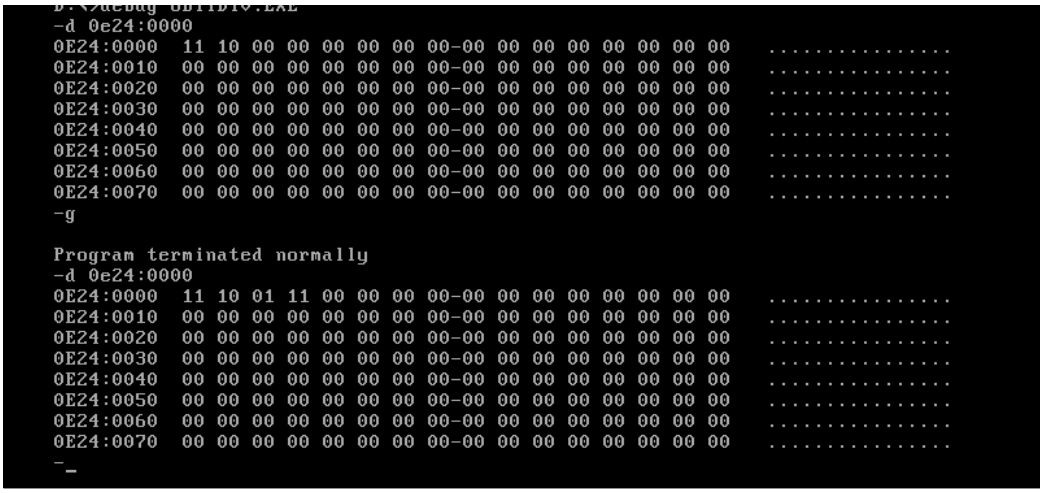


8 Bit Division

Program:

Program	**Comments**
assume cs:code,ds:data	Declare code and data segments
data segment	Declare operands in data segment
opr1 db 11h	Set opr1 to hex value 11
opr2 db 99h	Set opr2 to hex value 99
resultq db 00H	Set resultq to hex value 00
resultr db 00H	Set resultr to hex value 00
data ends	End of data segment
code segment	
org 0100h	
start: mov ax,data	Move data segment contents to AX register
mov ds,ax	Move data in AX register to DS register
mov al,opr1	Move contents of opr1 to AL register
mov ah, 00H	Move hex value 00 to AH register
mov bh,opr2	Move contents of opr2 to BH register
div bh	AX = AL / BH
here: mov resultq,ah	Move contents of AH register to resulth
mov resultr,al	Move contents of AL register to resultl
mov ah,4ch	
int 21h	Request interrupt routine
code ends	
end start	

Input and Output:



Result:

The 8086 programs were written to perform 8-bit arithmetic operations, and the results observed.