Computer Organization and Architecture Lab

LAB ASSIGNMENT – 5

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AP22110010386

CSE-F

1. Write an assembly language program to perform division of 8-bit data.

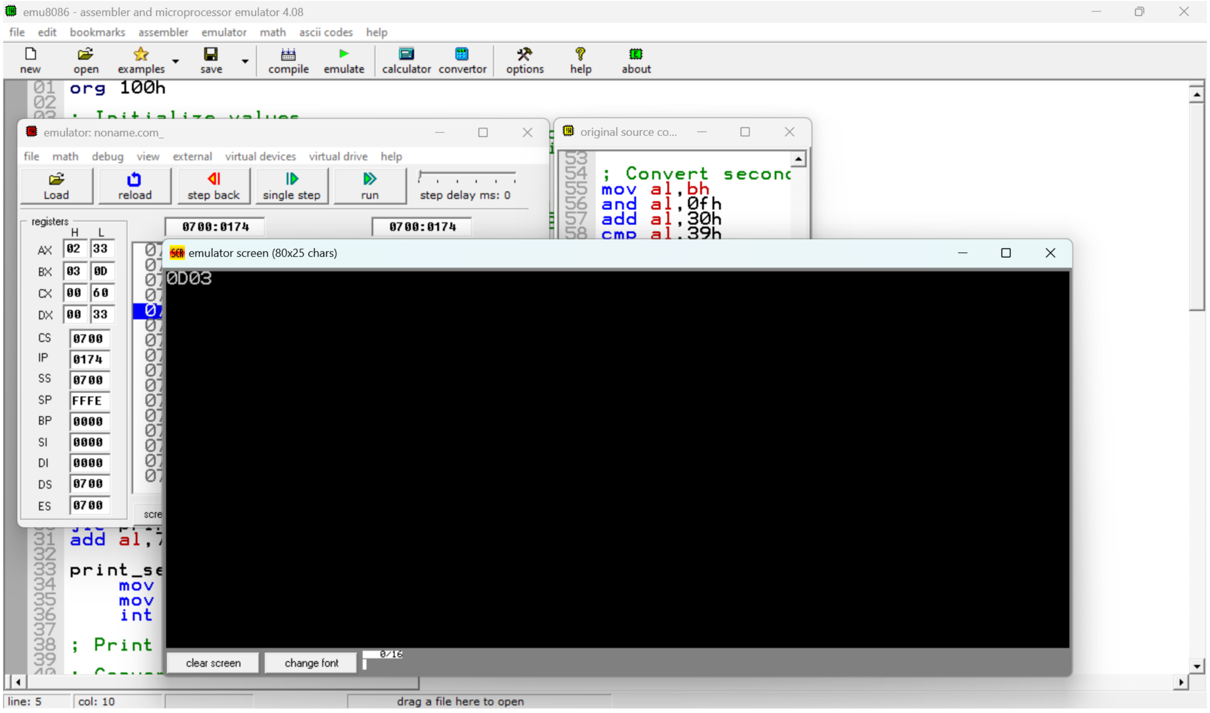
Code:

```
org 100h
mov al,96h
mov bl,10h

; Perform division (AL / BL)
idiv bl          ; AL = quotient, AH = remainder
mov bl,al        ; Store quotient in BL
mov bh,ah        ; Store remainder in BH

; Convert first digit (quotient) to ASCII
and al,0f0h      ; Mask higher nibble of AL
shr al,4         ; Shift right 4 bits to get the first hex digit
add al,30h       ; Convert to ASCII (0-9)
cmp al,39h       ; Check if it's a number or letter (0-9)
jle print_first_digit1
add al,7         ; Convert to ASCII (A-F)

print_first_digit1:
   mov dl,al     ; Move the result to DL (for printing)
   mov ah,02h    ; Print function
```

```
    int 21h       ; Interrupt to print the character

; Convert second digit (quotient) to ASCII
mov al,bl         ; Move the quotient back into AL
and al,0fh        ; Mask the lower nibble of AL
add al,30h        ; Convert to ASCII (0-9)
cmp al,39h        ; Check if it's a number or letter (0-9)
jle print_second_digit1
add al,7          ; Convert to ASCII (A-F)

print_second_digit1:
    mov dl,al     ; Move the result to DL (for printing)
    mov ah,02h    ; Print function
    int 21h       ; Interrupt to print the character
; Print remainder (remainder is in BH)

; Convert first digit (upper nibble of remainder) to ASCII
mov al,bh         ; Move remainder into AL
and al,0f0h       ; Mask the higher nibble
shr al,4          ; Shift right 4 bits to get the first hex digit
add al,30h        ; Convert to ASCII (0-9)
cmp al,39h        ; Check if it's a number or letter (0-9)
jle print_first_rem_digit
add al,7          ; Convert to ASCII (A-F)

print_first_rem_digit:
    mov dl,al     ; Move the result to DL (for printing)
    mov ah,02h    ; Print function
    int 21h       ; Interrupt to print the character
```

```
; Convert second digit (lower nibble of remainder) to ASCII
mov al,bh          ; Move remainder back into AL
and al,0fh         ; Mask the lower nibble
add al,30h         ; Convert to ASCII (0-9)
cmp al,39h         ; Check if it's a number or letter (0-9)
jle print_second_rem_digit
add al,7           ; Convert to ASCII (A-F)

print_second_rem_digit:
    mov dl,al      ; Move the result to DL (for printing)
    mov ah,02h     ; Print function
    int 21h        ; Interrupt to print the character
```

<u>OUTPUT:</u>



emulator screen (80x25 chars)

```
0D03
```

registers

	H	L
AX	02	33
BX	03	0D
CX	00	60
DX	00	33

CS	0700
IP	0174
SS	0700
SP	FFFE
BP	0000
SI	0000
DI	0000
DS	0700
ES	0700

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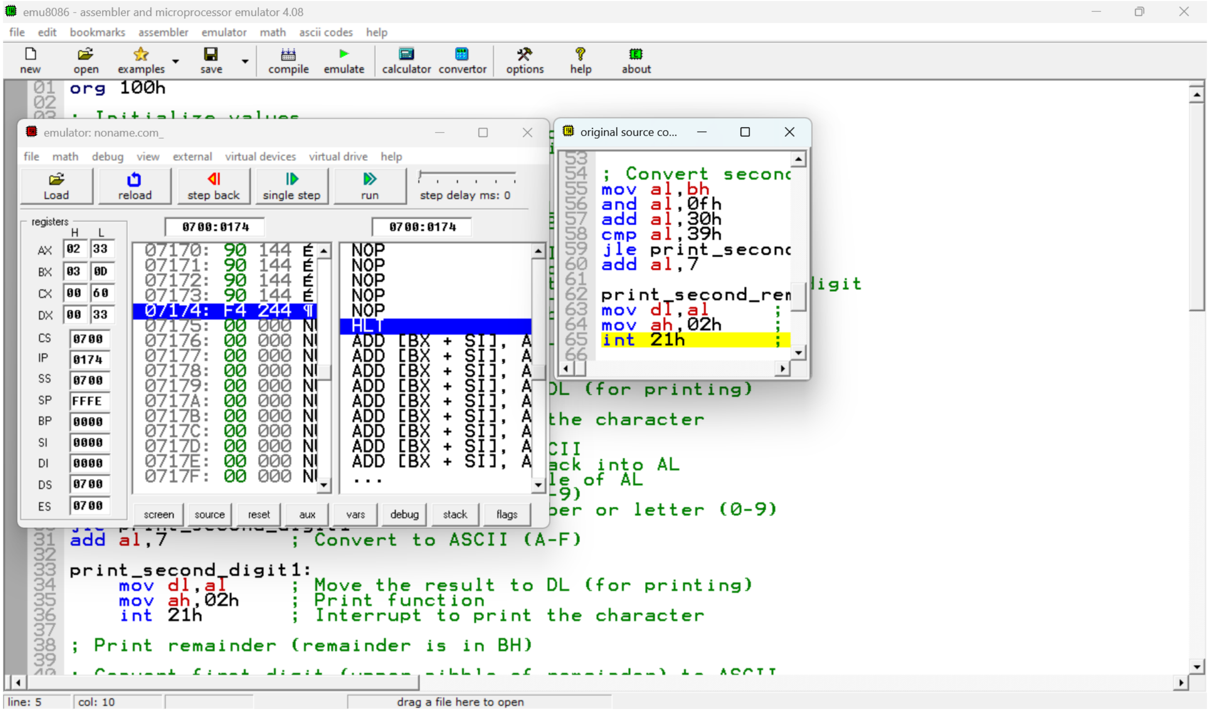
emulator: noname.com_
file math debug view external virtual devices virtual drive help
Load reload step back single step run step delay ms: 0
0700:0174
original source co...
clear screen change font
line: 5 col: 10 drag a file here to open



```
org 100h
```

emulator: noname.com_

```
AX 02 33
BX 03 0D
CX 00 60
DX 00 33
CS 0700
IP 0174
SS 0700
SP FFFE
BP 0000
SI 0000
DI 0000
DS 0700
ES 0700
```

```
0700:0174
07170: 90 144 É
07171: 90 144 É
07172: 90 144 É
07173: 90 144 É
07174: F4 244 ¶
07175: 00 000 NU
07176: 00 000 NU
07177: 00 000 NU
07178: 00 000 NU
07179: 00 000 NU
0717A: 00 000 NU
0717B: 00 000 NU
0717C: 00 000 NU
0717D: 00 000 NU
0717E: 00 000 NU
0717F: 00 000 NU
```

```
0700:0174
NOP
NOP
NOP
NOP
NOP
HLT
ADD [BX + SI], A
ADD [BX + SI], A
ADD [BX + SI], A
ADD [BX + SI], A
ADD [BX + SI], A
ADD [BX + SI], A
ADD [BX + SI], A
ADD [BX + SI], A
...
```

original source co...

```
; Convert seconc
mov al,bh
and al,0fh
add al,30h
cmp al,39h
jle print_seconc
add al,7

print_second_rem
mov dl,al        ;
mov ah,02h       ;
int 21h          ;
```

```
add al,7                ; Convert to ASCII (A-F)

print_second_digit1:
    mov dl,al           ; Move the result to DL (for printing)
    mov ah,02h          ; Print function
    int 21h             ; Interrupt to print the character

; Print remainder (remainder is in BH)
```

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Load reload step back single step run step delay ms: 0
registers H L
screen source reset aux vars debug stack flags
line: 5 col: 10 drag a file here to open

2.Write a program in assembly language to perform division of 16-bit data.

Code:

org 100h

mov ax,2567h

mov bx,1400h

div bx

 mov bx,ax

 mov cx,dx

 mov ah,ch

 and ah,0f0h

 shr ah,4

 add ah,30h

 cmp ah,39h

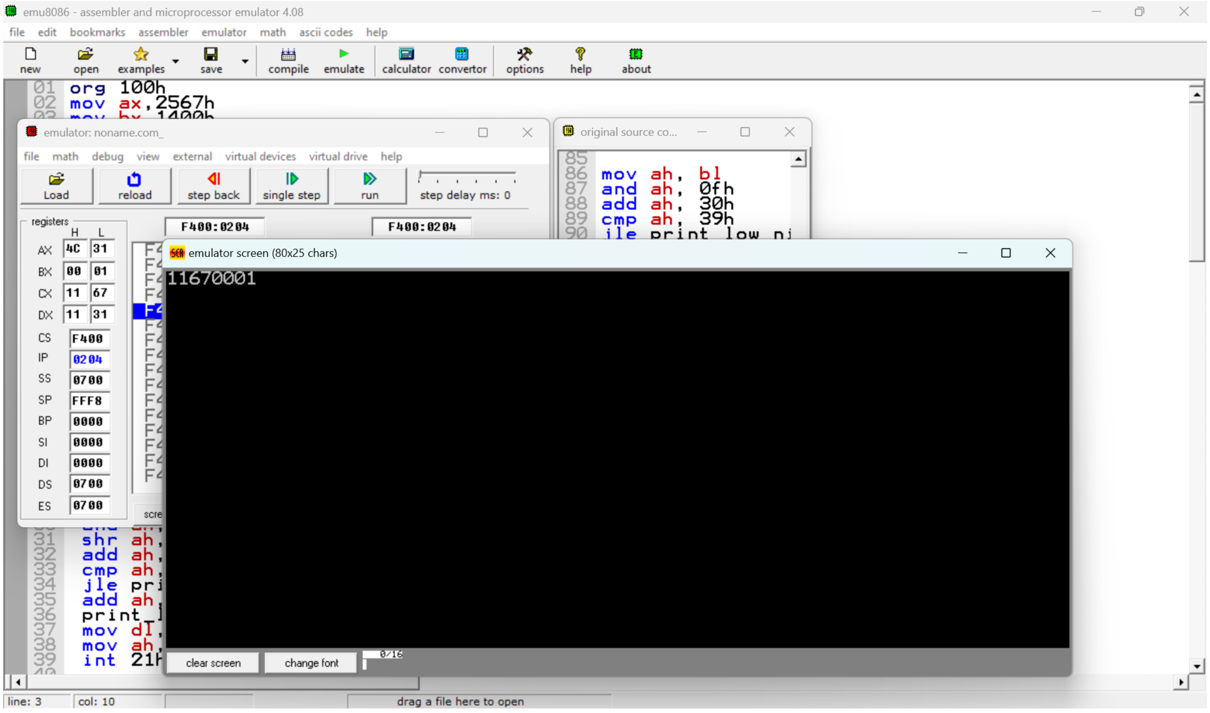
 jle print_high_nibble32

 add ah,7

```
print_high_nibble32:
  mov dl,ah
  mov ah,02h
  int 21h
mov ah,ch
and ah,0fh
add ah,30h
cmp ah,39h
jle print_low_nibble32
add ah,7
print_low_nibble32:
mov dl,ah
mov ah,02h
int 21h

mov ah,cl
and ah,0f0h
shr ah,4
add ah,30h
cmp ah,39h
jle print_low_nibble24
add ah,7
print_low_nibble24:
mov dl,ah
mov ah,02h
int 21h

mov ah,cl
and ah,0fh
```

```
 add ah,30h
 cmp ah,39h
 jle print_high_nibble24:
 add ah,7
 print_high_nibble24:
 mov dl,ah
 mov ah,02h
 int 21h


 mov ah, bh
 shr ah, 4
 add ah, 30h
 cmp ah, 39h
 jle print_high_nibble
 add ah, 7
print_high_nibble:
 mov dl, ah
 mov ah, 02h
 int 21h

 mov ah, bh
 and ah, 0fh
 add ah, 30h
 cmp ah, 39h
 jle print_low_nibble
 add ah, 7
print_low_nibble:
 mov dl, ah
 mov ah, 02h
 int 21h

 mov ah, bl
 shr ah, 4
 add ah, 30h
 cmp ah, 39h
 jle print_high_nibble2
 add ah, 7
print_high_nibble2:
 mov dl, ah
 mov ah, 02h
 int 21h

 mov ah, bl
 and ah, 0fh
 add ah, 30h
 cmp ah, 39h
 jle print_low_nibble2
 add ah, 7
print_low_nibble2:
 mov dl, ah
 mov ah, 02h
 int 21h
 mov ah,4ch
 int 21h
```

Output: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Load reload step back single step run step delay ms: 0
original source co...
emulator screen (80x25 chars)
clear screen change font
line: 3 col: 10 drag a file here to open

```
org 100h
mov ax,2567h
mov bx,1400h
```

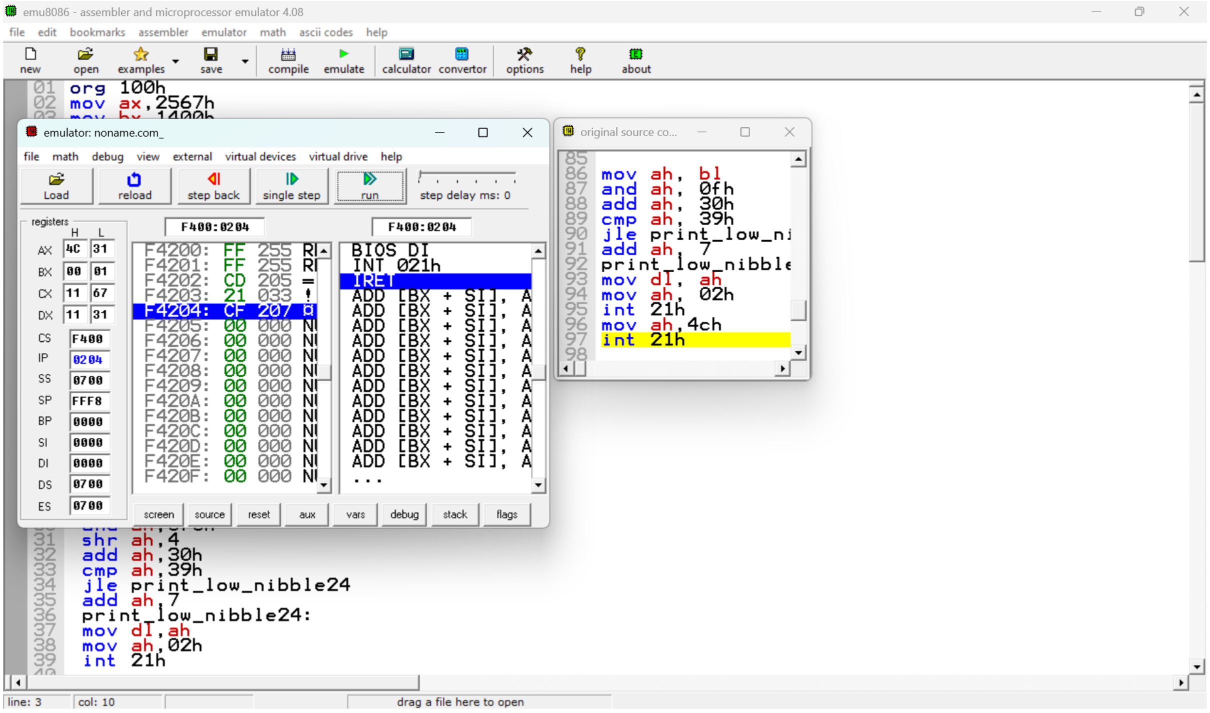
```
shr ah,
add ah,
cmp ah,
jle pri
add ah
print_l
mov dl,
mov ah,
int 21h
```

```
mov ah, bl
and ah, 0fh
add ah, 30h
cmp ah, 39h
jle print_low_ni
```

```
registers
     H   L
AX   4C  31
BX   00  01
CX   11  67
DX   11  31
CS   F400
IP   0204
SS   0700
SP   FFF8
BP   0000
SI   0000
DI   0000
DS   0700
ES   0700
```

F400:0204 F400:0204

```
11670001
```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file math debug view external virtual devices virtual drive help
Load reload step back single step run step delay ms: 0
original source co...
screen source reset aux vars debug stack flags
line: 3 col: 10 drag a file here to open

```
org 100h
mov ax,2567h
mov bx,1400h
```

```
registers
     H   L
AX   4C  31
BX   00  01
CX   11  67
DX   11  31
CS   F400
IP   0204
SS   0700
SP   FFF8
BP   0000
SI   0000
DI   0000
DS   0700
ES   0700
```

F400:0204 F400:0204

```
F4200: FF 255 RI
F4201: FF 255 RI
F4202: CD 205 =
F4203: 21 033 !
F4204: CF 207 ¤
F4205: 00 000 NI
F4206: 00 000 NI
F4207: 00 000 NI
F4208: 00 000 NI
F4209: 00 000 NI
F420A: 00 000 NI
F420B: 00 000 NI
F420C: 00 000 NI
F420D: 00 000 NI
F420E: 00 000 NI
F420F: 00 000 NI
```

```
BIOS DI
INT 021h
IRET
ADD [BX + SI], A
ADD [BX + SI], A
ADD [BX + SI], A
ADD [BX + SI], A
ADD [BX + SI], A
ADD [BX + SI], A
ADD [BX + SI], A
ADD [BX + SI], A
ADD [BX + SI], A
ADD [BX + SI], A
ADD [BX + SI], A
ADD [BX + SI], A
...
```

```
mov ah, bl
and ah, 0fh
add ah, 30h
cmp ah, 39h
jle print_low_ni
add ah, 7
print_low_nibble
mov dl, ah
mov ah, 02h
int 21h
mov ah,4ch
int 21h
```

```
shr ah,4
add ah,30h
cmp ah,39h
jle print_low_nibble24
add ah,7
print_low_nibble24:
mov dl,ah
mov ah,02h
int 21h
```