



American International University- Bangladesh (AIUB)

Department of Computer Science

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Lab Assignment-2

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**COMPUTER ORGANIZATION AND
ARCHITECTURE**

Section: B

Course Teacher:

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Lab Tasks

Lab Tasks :3



Write a program that prompts the user to enter a character, and on subsequent lines prints its ASCII code in binary, and the number of 1 bit in its ASCII code. Hint: Use 2 Procedures **MAIN** and **TASK**

Sample execution:

TYPE A CHARACTER: A

THE ASCII CODE OF A IN BINARY IS: 01000001

THE NUMBER OF 1 BITS IS: 2

Answer:

```
01 .model small
02 .stack 100h
03 .data
04 msg1 db "Type a Char: $"
05 msg2 db 0dh,0ah,"ASCII Code in Binary is: $"
06 msg3 db 0dh,0ah,"Number of 1 bits: $"
07 .code
08 main proc
09     mov ax,0data
10     mov ds,ax ;initialize ds
11     lea dx,msg1
12     mov ah,9
13     int 21h
14     mov ah,1 ;read a char
15     int 21h
16     xor bx,bx ;clear bx
17     mov bl,al
18     lea dx,msg2
19     mov ah,9
20     int 21h
21     xor bh,bh ;clear bh
22     mov cx,8 ;initialize loop counter
23     mov ah,2
24     call task ;calling procedure
25
26
27
28 task:
29     rol bl,1 ;rotate left
30     jnc one ;jump if cf=0
31     inc bh
32     mov dl,31h ;set dl=0
33     jmp print
34
35 one:
36     mov dl,31h
37     dec dl
38     print:
39     int 21h
40     loop task
41
42
43     lea dx,msg3
44     mov ah,9
45     int 21h
46
47     or bh,'0' ;convert the counter to ascii
48     mov dl,bh ;set dl to counter value
49     mov ah,2
50     int 21h
51
52     mov ah,4ch
53     int 21h
54     main endp
55
56 end main
57
58
```

emulator screen (80x25 chars)

```
Type a Char: A
ASCII Code in Binary is: 01000001
Number of 1 bits: 2
```

emulator: test.exe

registers	H	L
AX	AC	32
BX	32	41
CX	00	00
DX	00	32
CS	F400	
IP	0204	
SP	0710	
BP	00F8	
SI	0000	
DI	0000	
DS	0720	
ES	0700	

screen source reset aux vars debug stack flags

Lab Tasks

Lab Tasks :4



Write a program that gives the following output in DOS. Hint: Use 2 Procedures **MAIN** and **TASK**

Welcome User!!
Please User Enter Letter 1:
J
Please User Enter Letter 2:
F
Please User Enter Letter 3:
K
Output:
J
F
K

Answer:

```
01 .model small
02 .stack 100h
03 .data
04 msg1 db "Welcome User!!"
05 msg2 db 0dh,0ah,"Enter Letter 1: $"
06 msg3 db 0dh,0ah,"Enter Letter 2: $"
07 msg4 db 0dh,0ah,"Enter Letter 3: $"
08 msg5 db 0dh,0ah,"Output: ",0dh,0ah,"$"
09
10 int 21h
11 db '$'
12 db '$'
13 db '$'
14
15 .code
16 main proc
17     mov ax,@data
18     mov ds,ax ;initialize ds
19     ;display msg1
20     lea dx,msg1
21     mov ah,9
22     int 21h
23     ;display msg2
24     lea dx,msg2
25     mov ah,9
26     int 21h
27     mov ah,1
28     int 21h ;store the value on 11
29     ;display msg3
30     lea dx,msg3
31     mov ah,9
32     int 21h
33     mov ah,1
34     int 21h ;store the value on 12
35     ;display msg4
36     lea dx,msg4
37     mov ah,9
38     int 21h
39     mov ah,1
40     int 21h ;store the value on 13
41     call task
42
43 task:
44     ;for output
45     lea dx,msg5
46     mov ah,9
47     int 21h
48
49     ;output letter1
50     mov dl,11
51     mov ah,2
52     int 21h
53     mov dl,0dh
54     int 21h
55     mov dl,0ah
56     int 21h
57     ;output letter2
58     mov dl,12
59     mov ah,2
60     int 21h
61     mov dl,0dh
62     int 21h
63     mov dl,0ah
64     int 21h
65
66     ;output letter3
67     mov dl,13
68     mov ah,2
69     int 21h
70     mov dl,0dh
71     int 21h
72     mov dl,0ah
73     int 21h
74
```

Lab Tasks

Lab Tasks :5



Write a program that gives the following output in DOS. Hint: Use 2 Procedures **MAIN** and **TASK**

Welcome To My Calculator!!
Please User Enter A Hex Digit (A-F):
A
In Decimal it is: **10**
Thank You for using my Calculator
Have a good day

Answer:

```
01 .model small
02 .stack 100h
03 .data
04 msg db 0ah,0dh,"Welcome to My Calculator!!"
05 msg1 db 0ah,0dh,"Please User Enter A Hex Digit (A-F): $"
06 msg2 db 0ah,0dh,"In Decimal it is: $"
07 msg3 db 0ah,0dh,"Thank You for using my Calculator",'$',0dh,0ah
08 msg4 db 0ah,0dh,"Have a good day $"
09 .code
10 main proc
11     mov ax,0data
12     mov ds,ax
13     lea dx,msg
14     mov ah,9
15     int 21h
16     lea dx,msg1
17     mov ah,9
18     int 21h
19     mov ah,1
20     int 21h
21     mov bl,al
22     jmp task
23 task:
24     cmp bl,'9';if greater jmp to hex
25     ja hex
26     jb num
27     je num
28     hex:
29     lea dx,msg2
30     mov ah,9
31     int 21h
32     mov dl,49d ;ASCII value of 1
33     mov ah,2
34     int 21h
35     sub bl,17d ;17 lesser value what was given
36     mov dl,bl
37     mov ah,2
38     int 21h
39     jmp exit
40     num:
41     lea dx,msg3
42     mov ah,9
43     int 21h
44     lea dx,msg4
45     mov ah,9
46     int 21h
47     exit:
48     lea dx,msg3
49     mov ah,9
50     int 21h
51     lea dx,msg4
52     mov ah,9
53     int 21h
54     lea dx,msg4
55     mov ah,9
56     int 21h
57     exit
58
```

Lab Tasks

Lab Tasks :8



Write a program that gives the following output in DOS. Hint: Use 2 Procedures **MAIN** and **TASK**

Welcome To My Calculator!!

Please User Enter Digit 1:

5

Please User Enter Digit 2:

2

Output:

3

Thank You for using my Calculator

Answer:

The screenshot displays the emu8086 interface with three main windows:

- Assembly Code Window:** Shows the assembly code for a program that calculates the sum of two digits. It includes a `MAIN` procedure and two sub-procedures, `TASK1` and `TASK2`, each responsible for prompting the user for a digit and reading it from the keyboard.
- Registers Window:** Displays the state of the 8086 registers. The `AX` register contains the value `4C24`, and the `IP` register contains `0204`.
- Emulator Screen Window:** Shows the output of the program as it runs in a DOS-like environment. The output matches the expected results: "Welcome To My Calculator!!", prompts for two digits (5 and 2), and displays the final output "3".

A blue arrow points from the bottom right towards the text "Rest of Code Part".