

# Computer Organisation & Architecture Assignment No. 1

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Batch: C3

Roll No: 199

## Problem Statement:

Write an ALP for 64 bit Arithmetic operations and display the result. Accept the numbers from the user.

## Source Code:

```
%macro WRITE 02
mov rax,01
mov rdi,01
mov rsi,%1
mov rdx,%2
syscall
%endmacro

%macro READ 02
mov rax,00
mov rdi,00
mov rsi,%1
mov rdx,%2
syscall
%endmacro

section .data
menu db "1. Addition Of Numbers",10
db "2. Subtraction of Numbers",10
db "3. Multiplication of Numbers",10
db "4. Division of Numbers",10
db "5. Exit",10
db "Enter your choice: ",10
menulen equ $-menu

msg1 db "Enter two numbers: ",10
```

```
len1 equ $-msg1
msg2 db "The addition of Numbers is: ",10
len2 equ $-msg2
msg3 db "The subtraction of Numbers is: ",10
len3 equ $-msg3
msg4 db "The multiplication of Numbers is: ",10
len4 equ $-msg4
msg5 db "The Quotient of Division is: ",10
len5 equ $-msg5
msg6 db "The Remainder of Division is: ",10
len6 equ $-msg6
msg7 db "Wrong choice: ",10
len7 equ $-msg7
msg8 db "",10
len8 equ $-msg8
```

```
section .bss
a resq 1
b resq 1
c resq 1
d resq 1
char_buff resb 17
actl resq 1
choice resb 02
```

```
section .text
global _start
_start:
WRITE msg1,len1
READ char_buff,17
call accept
mov[a],rbx
READ char_buff,17
call accept
mov[b],rbx
```

```
printmenu:
WRITE msg8,len8
WRITE menu,menulen
READ choice,02
cmp byte[choice],31H
je addition
cmp byte[choice],32H
je subtraction
cmp byte[choice],33H
```

```
je multiplication
cmp byte[choice],34H
je division
cmp byte[choice],35H
je exitcode
```

```
WRITE msg7,len7
jmp printmenu
```

```
addition:
mov rax,[a]
add rax,[b]
mov [c],rax
WRITE msg2,len2
mov rbx,[c]
call display
jmp printmenu
```

```
subtraction:
mov rax,[a]
sub rax,[b]
mov [c],rax
WRITE msg3,len3
mov rbx,[c]
call display
jmp printmenu
```

```
multiplication:
mov rax,qword[a]
mul qword[b]
mov [c],rdx
mov [d],rax
WRITE msg4,len4
mov rbx,[c]
call display
mov rbx,[d]
call display
jmp printmenu
```

```
division:
mov rdx,00
mov rax,qword[a]
div qword[b]
mov [c],rax
mov [d],rdx
```

```
WRITE msg5,len5
mov rbx,[c]
call display
WRITE msg6,len6
mov rbx,[d]
call display
jmp printmenu
exitcode:
mov rax,60
mov rsi,00
syscall
```

```
accept: dec rax
mov [actl],rax
mov rbx,00
mov rsi,char_buff
```

```
up:shl rbx,04H
mov rdx,00H
mov dl,byte[rsi]
cmp dl,39H
jbe sub30
sub dl,07H
```

```
sub30:sub dl,30H
add rbx,rdx
inc rsi
dec qword[actl]
jnz up
ret
display:mov rcx,16
mov rsi,char_buff
```

```
above:rol rbx,04H
mov dl,bl
and dl,0FH
cmp dl,09H
jbe add30
add dl,07H
```

```
add30:add dl,30H
mov byte[rsi],dl
inc rsi
dec rcx
jnz above
```

**WRITE char\_buff,16**  
**Ret**



## Output Screen:

```
akash@akash-VirtualBox:~$ nasm -f elf64 ass1.asm
akash@akash-VirtualBox:~$ ls
ass1.asm  Desktop  Downloads  Pictures  snap  Videos
ass1.o    Documents Music      Public    Templates
akash@akash-VirtualBox:~$ ld -o run ass1.asm
ass1.asm: file not recognized: file format not recognized
akash@akash-VirtualBox:~$ ld -o run ass1.o
akash@akash-VirtualBox:~$ ./run
Enter two numbers:
59
25
1. Addition Of Numbers
2. Subtraction of Numbers
3. Multiplication of Numbers
4. Division of Numbers
5. Exit
Enter your choice:
1
The addition of Numbers is:
0000000000000007E
1. Addition Of Numbers
2. Subtraction of Numbers
3. Multiplication of Numbers
4. Division of Numbers
5. Exit
Enter your choice:
2
The subtraction of Numbers is:
00000000000000034
1. Addition of Numbers
2. Subtraction of Numbers
3. Multiplication of Numbers
4. Division of Numbers
5. Exit
Enter your choice:
3
The multiplication of Numbers is:
00000000000000000000000000000000CDD
1. Addition of Numbers
2. Subtraction of Numbers
```

The screenshot captures a Windows 11 desktop environment where a virtual machine (VM) titled "Ubuntu [Running] - Oracle VM VirtualBox" is active. The primary focus is the terminal window, which runs a C++ application designed to perform basic arithmetic operations based on user input.

**Terminal Content:**

```

5. Exit
Enter your choice:
1
The addition of Numbers is:
00000000000007E
1. Addition Of Numbers
2. Subtraction of Numbers
3. Multiplication of Numbers
4. Division of Numbers
5. Exit
Enter your choice:
2
The subtraction of Numbers is:
00000000000003d
1. Addition of Numbers
2. Subtraction of Numbers
3. Multiplication of Numbers
4. Division of Numbers
5. Exit
Enter your choice:
3
The multiplication of Numberis:
000000000000000000000000000000CDD
1. Addition of Numbers
2. Subtraction of Numbers
3. Multiplication of Numbers
4. Division of Numbers
5. Exit
Enter your choice:
4
The Quotient of Division is:
000000000000002The Remainder of Division is:
000000000000000F
1. Addition of Numbers
2. Subtraction of Numbers
3. Multiplication of Numbers
4. Division of Numbers
5. Exit
Enter your choice:
5
akash@akash-VirtualBox: $

```

The application uses a loop to repeatedly present a menu of options (Addition, Subtraction, Multiplication, Division, or Exit) until the user chooses to exit. Each operation is performed using integer arithmetic, and the results are displayed in hexadecimal format. The terminal interface includes standard Ubuntu icons on the left and system status indicators at the bottom right, such as the time (9:32 PM) and date (4/24/2023).