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# CALCULATOR

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## Project Report



**Instructor: Madam Madiha Tahir**  
**Course: Computer Organization and Assembly**  
**Language**  
**Class: BsCs01-B**



## Submitted By

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## Title:

“A Basic Calculator”

## Objective:

The purpose of this project is to apply Assembly Language concepts and knowledge to the project. That is what we have learnt thus far, and in this project, we will use the principles of distinct Instructions. Also, using the emulator EMU8086, to grasp how Assembly Language instructions and code function.

## Theory:

The code we wrote can perform some of the most fundamental calculator functions, such as addition, subtraction, multiplication, and division of any two numbers, as well as return the Square and Cube of a given number. The User will be asked which operator he wants to choose first in the Main Menu, and then the program will ask him to Enter the Numbers. After the User enters the Numbers, the Operator User Choose will be applied to the Numbers, and after printing the result the user will be back in the Main Menu, The program will run until the User chooses the option to exit.

## Implementation:

We used the Jump and Comparison commands, as well as other basic Assembly Language commands like MOV, ADD, MUL, DIV, and so on, to implement this code.

When the user enters his choice, it will be compared, and then we will jump to the Destinated function, where the operations will be performed. After the completion of a specific function, we will jump back to the main menu, and then we will start from step one again. The program will only exit if the user enters the choice to exit it, otherwise we can perform operations as long as we want.

Start:

Choose an Operator or exit

- If Exit  
    Jump Exit
- If operator
  - Do Addition  
        Jump Start
  - Do Subtraction  
        Jump Start
  - Do Multiplication  
        Jump Start
  - Do Division  
        Jump Start
  - Do Square  
        Jump Start
  - Do Cube  
        Jump Start

Exit:

Endp

```
include emu8086.inc
org 100h
```

```
.data
firstnumber dw ?
secondnumber dw ?
choice dw ?
result dw ?
```

```
.code
main proc
```

```
    print "Basic Calculator"
```

```
    MainMenu:
```

```
    printn
    print "Choose an Operaor You want to performn"
    printn
    print "Press 1 For Addition"
    printn
    print "Press 2 For Subtraction"
    printn
    print "Press 3 For Multiplication"
    printn
    print "Press 4 For Division"
    printn
    print "Press 5 For the Square of a Number"
    printn
    print "Press 6 For the Cubbe of a Number"
    printn
    print "Press 7 to Exit the Calculator "
    printn
    print "-->"
    call scan_num
```

;uing cmp (compare) statement we will compare the given input  
;then we will jump to the specific function using jump (je) Statement

```
    cmp cx,1
    je addition_1
```

```
    cmp cx,2
    je subtraction_2
```

```
    cmp cx,3
    je multiplication_3
```

```
    cmp cx,4
    je division_4
```

```
    cmp cx,5
    je Square_5
```

```
cmp cx,6
je Cube_6
```

```
cmp cx,7
je exit_7
```

addition\_1:

```
println
print "Enter Your First Number --> "
call scan_num
mov firstnumber,cx
println
print "Enter Your Second Number --> "
call scan_num
mov secondnumber,cx

add cx,firstnumber
mov ax,cx
println
print "The Final Result after Addition of Number1 + Number2 = "
call print_num
mov result,ax
jmp MainMenu
```

subtraction\_2:

```
println
print "Enter Your First Number --> "
call scan_num
mov firstnumber,cx
println
print "Enter Your Second Number --> "
call scan_num
mov secondnumber ,cx

sub firstnumber,cx
mov ax,firstnumber
println
print "The Final Result after Subtraction of Number1 - Number2 = "
call print_num
mov result,ax
jmp MainMenu
```

multiplication\_3:

```
println
print "Enter Your First Number --> "
call scan_num
mov firstnumber,cx
println
print "Enter Your Second Number --> "
```

```
call scan_num
mov secondnumber,cx
mov ax,firstnumber
mul cx
println
print "The Final Result after multiplication of Number1 * Number2 = "
call print_num
mov result,ax
jmp MainMenu
```

division\_4:

```
println
print "Enter Your First Number --> "
call scan_num
mov firstnumber,cx
println
print "Enter Your Second Number -->"
call scan_num
mov secondnumber,cx
mov ax,firstnumber
div cx
println
print "The Final Result after Division of Number1\Number2 = "
call print_num
mov result,ax
jmp MainMenu
```

Square\_5:

```
println
print "Enter the Number Whose Square You Want to Find--> "
call scan_num
mov firstnumber,cx
mov ax,firstnumber
mul cx
println
print "The Final Result after Square of Number = "
call print_num
mov result,ax
jmp MainMenu
```

Cube\_6:

```
    printn
    print "Enter the Number Whose Cube You Want to FInd--> "
    call scan_num
    mov firstnumber,cx
    mov ax,firstnumber
    mul cx
    mul cx
    printn
    print "The Final Result after Cube of Number = "
    call print_num
    mov result,ax
    jmp MainMenu
```

exit\_7:  
main endp

```
DEFINE_SCAN_NUM
DEFINE_PRINT_NUM
DEFINE_PRINT_NUM_UN$
```

## Debugging-Test-run:

When the User Runs the program a main menu will be displayed as below

```
Basic Calculator
Choose an Operaor You want to perform
Press 1 For Addition
Press 2 For Subtraction
Press 3 For Multiplication
Press 4 For Division
Press 5 For the Square of a Number
Press 6 For the Cubbe of a Number
Press 7 to Exit the Calculator
-->
```

The User will now input the operation which he wants to perform like in the below picture we are going to do Addition as we input 1 then the program will ask the user to input two number then add them and print the result.

```
Basic Calculator
Choose an Operaor You want to perform
Press 1 For Addition
Press 2 For Subtraction
Press 3 For Multiplication
Press 4 For Division
Press 5 For the Square of a Number
Press 6 For the Cubbe of a Number
Press 7 to Exit the Calculator
-->1
Enter Your First Number --> 21
Enter Your Second Number --> 22
The Final Result after Addition of Number1 + Number2 = 43
Choose an Operaor You want to perform
Press 1 For Addition
Press 2 For Subtraction
Press 3 For Multiplication
Press 4 For Division
Press 5 For the Square of a Number
Press 6 For the Cubbe of a Number
Press 7 to Exit the Calculator
-->
```

As we show above when we input 1 the program will do the addition and now we input 3 and the program will do the multiplication of two number Entered by the user.

```
-->1
Enter Your First Number --> 21
Enter Your Second Number --> 22
The Final Result after Addition of Number1 + Number2 = 43
Choose an Operaor You want to perform
Press 1 For Addition
Press 2 For Subtraction
Press 3 For Multiplication
Press 4 For Division
Press 5 For the Square of a Number
Press 6 For the Cubbe of a Number
Press 7 to Exit the Calculator
-->3
Enter Your First Number --> 20
Enter Your Second Number --> 10
The Final Result after multiplication of Number1 * Number2 = 200
Choose an Operaor You want to perform
Press 1 For Addition
Press 2 For Subtraction
Press 3 For Multiplication
Press 4 For Division
Press 5 For the Square of a Number
Press 6 For the Cubbe of a Number
Press 7 to Exit the Calculator
-->
```

After Each Operation the program will jump to the main menu and ask the user if he want to do any operation when the user enter the input as 7 the program will be exit as shown below. And the emulator will be halted.

