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 perfornm"
    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:

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

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

subtraction_2:

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

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

multiplication_3:

    printn
    print "Enter Your First Number --> "
    call scan_num
    mov firstnumber,cx
    printn
    print "Enter Your Second Number --> "
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```
    call scan_num
    mov secondnumber,cx
    mov ax,firstnumber
    mul cx
    printn
    print "The Final Result after multiplication of Number1 * Number2 = "
    call print_num
    mov result,ax
    jmp MainMenu

division_4:

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

Square_5:


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

```
Cube_6:

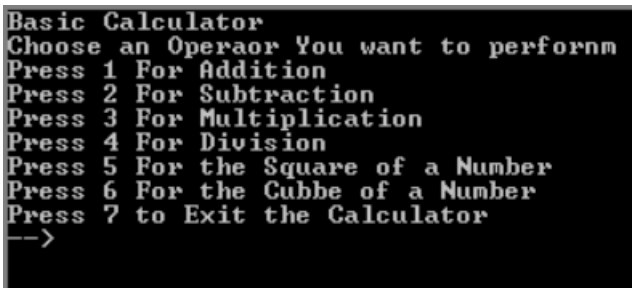
    printn
    print "Enter the Number Whose Cube You Want to FInd--> "
    call scan_num
    mov firstnumber,cx
    mov ax,firstnumber
    mul cx
    mul cx
    printn
    print "The Final Result after Cube of Number = "
    call print_num
    mov result,ax
    jmp MainMenu

exit_7:
main endp

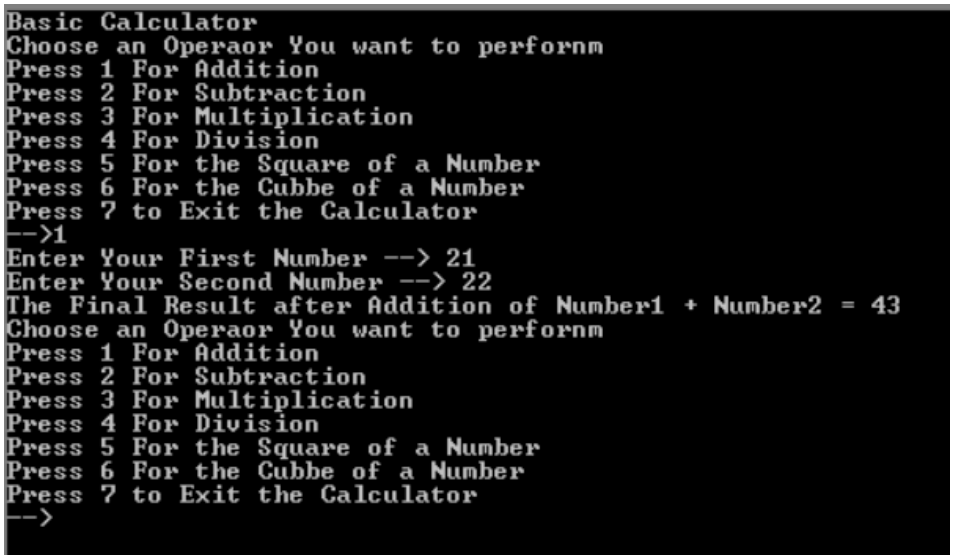
DEFINE_SCAN_NUM
DEFINE_PRINT_NUM
DEFINE_PRINT_NUM_UNS
```

Debugging-Test-run:

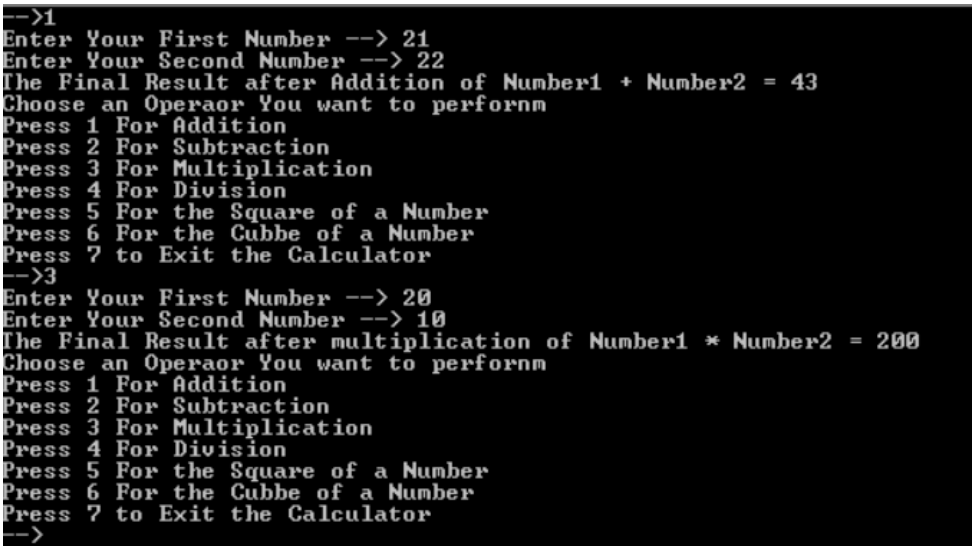
When the User Runs the program a main menu will be displayed as below



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.



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.



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.