



西北工业大学
NORTHWESTERN POLYTECHNICAL UNIVERSITY

程序设计挑战式课程设计

极限挑战

挑战，不是为着征服自然，而是为着突破自我，超越自我
生命有极限，思想无极限，高度有极限，境界无极限

作业名称: **Multi-Functional Calculator(1stAssignment)**

学 院: **Computer Science**

班 级: **2ND YEAR, 2019**

学 号: **2019380141**

姓 名: **ABID ALI**

团队组成: **ONLY ME**

(Job name/College/ Class/ student ID/Name/Team composition)

西北工业大学

2021 年 6 月 9 日

Please fill in the following ten items, align the form by page (insert blank lines), and do not delete any parts.

1. Problem and background (describe the problem to be solved by the program or the application background)

Here is a project I created called the “Calculator”. It is complete and totally error-free. This project is focused on creating a calculator which can do some mathematical operation. This program the Simple Calculator project was created in C. Such as addition, division, multiplication, division, power function, logarithmic function and some trigonometric function.

2. Development tools (list the development tools used and third-party development libraries)

OS: Windows 10
Editor: Code::Blocks

3. Main functions (specify the functions of the program)

```
#include<stdio.h>
#include<conio.h>
#include<math.h>
#include<stdlib.h>

#define KEY "Enter the calculator Operation you want to do:"

void addition();
void subtraction();
void multiplication();
void division();
void modulus();
void power();
int factorial();
void sinop();
void cosop();
void tanop();
void logop();
void calculator_operations();

int main()
{
```

```

int X=1;
char Calc_oprn;

calculator_operations();

while(X)
{
    printf("\n");
    printf("%s : ", KEY);

    Calc_oprn=getche();

    switch(Calc_oprn)
    {
        case '+': addition();
                    break;

        case '-': subtraction();
                    break;

        case '*': multiplication();
                    break;

        case '/': division();
                    break;

        case '?': modulus();
                    break;

        case '!': factorial();
                    break;

        case '^': power();
                    break;

        case 'r': sqrtop();
                    break;

        case 's': sinop();
                    break;

        case 'c': cosop();
                    break;
    }
}

```

```

        case 't': tanop();
                break;

        case 'L':
        case 'l': logop();
                break;

        case 'H':
        case 'h': calculator_operations();
                break;

        case 'Q':
        case 'q': exit(0);
                break;

        case 'C': system("cls");
                calculator_operations();
                break;

        default : system("cls");

        printf("\n*****You have entered unavailable option");
        printf("*****\n");
        printf("\n*****Please Enter any one of below available ");
        printf("options*****\n");
                calculator_operations();
        }
    }
}

```

Here we can see that, I use many headers file to complete my project for calculato. I use int, void, char, float , *#define* and double for assign all the elements perfectly that's called the main function with header's file.

4. Design content (describe in detail the principle and method of solving the problem, algorithm, data structure, etc.)

Problem Statement:

Write a program to build a simple Calculator using C which can perform the following operations:

- 1.Addition
- 2.Subtraction
- 3.Multiplication
- 4.Division
- 5.Modulus
- 6.Power
- 7.Factorial

In this c programming code, the user is prompted to choose the operations (i.e. addition, subtraction etc.) to be performed and then prompted to key in the values which are used to perform the operations. Then, the result will be shown as output to the user.

Approach:

In my program I used `#include<stdio.h>`, `#include<conio.h>`, `#include<math.h>`, `#include<stdlib.h>`, `#define KEY "Enter the calculator Operation you want to do:"` as preprocessor commands.

I used a lot of functions in my program. Some functions are library function, say for example `scanf()`, `prints()`, `getche()`, `exit(0)`, `system()` etc. and some functions i defined according to my need. For example i defined `addition()` function for calculating algebraic addition between the numbers given by the user. Similarly I defined `subtraction()` function for calculating subtraction between the numbers, i defined `multiplication()` function for calculating multiplication between numbers, i defined `division()` function for calculating algebraic division between the numbers, i defined `modulus()` function for calculating modulus between the numbers, , i defined `factorial()` function for calculating factorial of a number, and one more function i defined name `calculator_operations()` which shows instruction on the console for the user.

As concern of parameter, I did not use any parameter in my defined functions.

So all of my defined function is void type function except `factorial()` function.

I used X, n, total, k, number, a, b, c, d, I, fact, mul as integer variable, Calc_oprn as Char variable,

and a, d, num, p as double variable. There are a lot of statements I used like while, for, switch, break etc.

 "D:\C programming code\2019380141ABID2\bin\Debug\2019380141ABID2.exe"

```

Welcome to C calculator

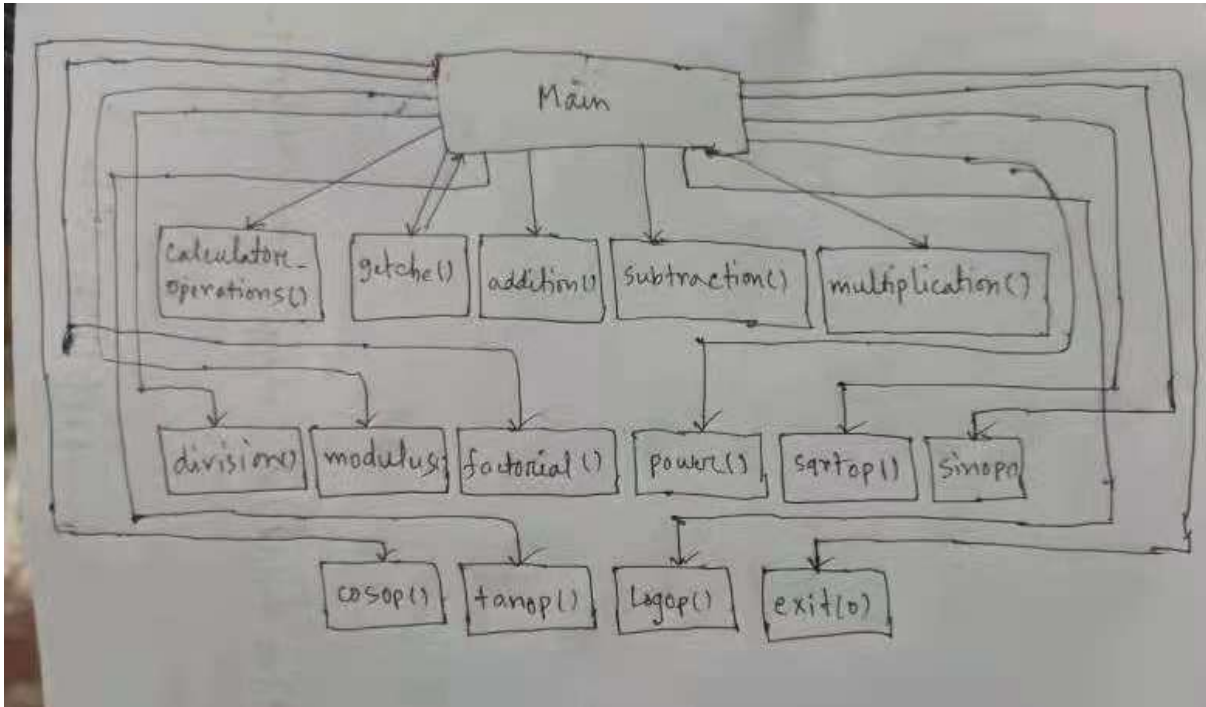
***** Press 'Q' or 'q' to quit the program *****
***** Press 'H' or 'h' to display below options *****

Enter 'C' to clear the screen and display available option

Enter + symbol for Addition
Enter - symbol for Subtraction
Enter * symbol for Multiplication
Enter / symbol for Division
Enter ? symbol for Modulus
Enter ^ symbol for Power
Enter ! symbol for Factorial
Enter r symbol for Sqrt
Enter s for trigonometric sin operation
Enter c for trigonometric cos operation
Enter t for trigonometric tan operation
Enter L or l for logarithmic operation

Enter the calculator Operation you want to do: :
    
```

Data Structure:



5. Program file and project name (mark all file names, project names and their descriptions in the program)

Program file: main.c: Here all the source are typed in.

project name: 2019380141ABID1(main.c, 2019380141ABID1.cbp): It's the debugging folder and all the project files are attached.

6. Function module (prototype declaration and description of each function in the program)

The source code for Simple calculator is relatively coded simply and easy to understand. I have divided this C mini project into many functions, most of which are related to different managing student data . Listed below are some of the more important functions which may help you understand the project better.

calculator_operations() : I used printing algorithm like printf() function here.

1) addition() : In this function I used a while loop statement. In while loop the

algorithm I used is if k is less than n then input a number from user. Then assign sum of total and number in the total variable and increment by 1 of k variable each times of the loop. If k is greater than n then the while loops terminate.

2. subtraction() : In this function I used int data type and did some arithmetic operations.

3. multiplication() : In this function I used int data type and did some arithmetic operations.

4. division() : In this function I used int data type and did some arithmetic operations.

5. modulus() : In this function I used int data type and did some arithmetic operations.

6. power() : In this function I used double data type and did some arithmetic operations by calling pow() function.

7. factorial() : In this function I used int data type and followed selection algorithm. Even I used for loop statement. In for loop the algorithm I used is, for i=1 to num; the multiplication of fact and i assigned to fact variable each times of the loop continues. Here i had incremented by 1 each times until the loop terminate.

.

7. Instructions for use (small manual for running the program)

1. For running this project program we need to create a console application project.
2. After creating the project we need to add our code in the main.c file

3. After adding our source code we will debug the file and run it one by one and check our program it is working or not.

4. After that we can tap on build and run button for running the program.

5. It will appear on the console about how to input operator for addition, subtraction, multiplication, division, power, factorial and so on. Based on the instruction first you have to choose which arithmetic operation you want to do just like in calculator. After inputting the symbol of your desired arithmetic operator you have to input the numbers. If the numbers more than one than press space after inputting each number and if you input, all numbers than just press enter to calculate the result. If program ask you to input first number then just input the number and press enter. After each calculation the program will ask for input new operator to calculate again. If you want to calculate again then just follow previous instruction and if you don't want to calculate then just press 'q' or 'Q' to quite the program.

8. Summary of program development (a brief description of the gains and thoughts of writing this homework)


To prepare this assignment I have to study basic content of the c programming and I have completed my basic level on c programming language. Furthermore, I have to study more on details through internet which really helped me to gain more knowledge about c programming and the topics which I need to use to complete this assignment like selection algorithm, for loop, while loop and most importantly I have learned deeply about functions and its classification from internet. Even I have learned how to code arithmetic operations, logical operation by c programming language through internet which really inspired me to build up c calculator project highly.

Finally, I have done in this report.

9. Run the screenshot (attach the screenshot of the program running, at least one, the more detailed the screenshot, the higher the score)

In Windows, grab the current active window: Alt + Print Screen, grab the full screen: Print Screen. Or use Hyper Snap and other software (Baidu search).

Prompt Screen: Available function

 Simple Calculator

Multi-Function Calculator
Northwestern Polytechnical University
Created by-ABID ALI

Welcome to C calculator

***** Press 'Q' or 'q' to quit the program *****

***** Press 'H' or 'h' to display below options *****

Enter 'C' to clear the screen and display available option

Enter + symbol for Addition

Enter - symbol for Subtraction

Enter * symbol for Multiplication

Enter / symbol for Division

Enter ? symbol for Modulus

Enter ^ symbol for Power

Enter ! symbol for Factorial

Enter r symbol for Sqrt

Enter s for trigonometric sin operation

Enter c for trigonometric cos operation

Enter t for trigonometric tan operation

Enter L or l for logarithmic operation

Enter the calculator Operation you want to do: :

Addition function:

Enter the calculator Operation you want to do: : +

Enter the number of elements you want to add:2

Please enter 2 numbers one by one:

1

2

Sum of 2 numbers = 3

Substraction function:

Enter the calculator Operation you want to do: : -

Please enter first number : 34

Please enter second number : 5

34 - 5 = 29

Enter the calculator Operation you want to do: :

Division function:

```
Enter the calculator Operation you want to do: : /  
Please enter first number : 7  
Please enter second number : 5
```

```
Division of entered numbers=1.40
```

```
Enter the calculator Operation you want to do: :
```

Fraction function:

```
Enter the calculator Operation you want to do: : !  
Enter a number to find factorial : 8
```

```
Factorial of entered number 8 is:40320
```

```
Enter the calculator Operation you want to do: :  
_____
```

Square root function:

```
Factorial of entered number 8 is:40320
```

```
Enter the calculator Operation you want to do: : r  
Enter a value to find sqrt : 9  
The value of sqrt(9.000000) : 3.000000
```

```
Enter the calculator Operation you want to do: :  
_____
```

Some Trigonometric function:

```
Enter the calculator Operation you want to do: : t  
Enter a value to find tan :  
65  
The value of tan(65.000000) : 2.144507
```

```
Enter the calculator Operation you want to do: :  
_____
```

Fig:Tangent function

Logarithmic function:

```
Enter the calculator Operation you want to do: : 1
Enter a value of x to find log(x) base 10 : 8
The value of log(8.000000) : 0.903090
```

```
Enter the calculator Operation you want to do: :
```

Pressing “H” or “h” shows available function:

```
Enter the calculator Operation you want to do: : h
Welcome to C calculator

***** Press 'Q' or 'q' to quit the program *****
***** Press 'H' or 'h' to display below options *****

Enter 'C' to clear the screen and display available option

Enter + symbol for Addition
Enter - symbol for Subtraction
Enter * symbol for Multiplication
Enter / symbol for Division
Enter ? symbol for Modulus
Enter ^ symbol for Power
Enter ! symbol for Factorial
Enter r symbol for Sqrt
Enter s for trigonometric sin operation
Enter c for trigonometric cos operation
Enter t for trigonometric tan operation
Enter L or l for logarithmic operation

Enter the calculator Operation you want to do: : _
```

Pressing “Q”or “q” quit function :

```
Enter the calculator Operation you want to do: : h
Welcome to C calculator

***** Press 'Q' or 'q' to quit the program *****
***** Press 'H' or 'h' to display below options *****

Enter 'C' to clear the screen and display available option

Enter + symbol for Addition
Enter - symbol for Subtraction
Enter * symbol for Multiplication
Enter / symbol for Division
Enter ? symbol for Modulus
Enter ^ symbol for Power
Enter ! symbol for Factorial
Enter r symbol for Sqrt
Enter s for trigonometric sin operation
Enter c for trigonometric cos operation
Enter t for trigonometric tan operation
Enter L or l for logarithmic operation

Enter the calculator Operation you want to do: : _
```

10. Source program (attach the program source code, if there are multiple files, mark the file name)



main.c



2019380141ABID2.cb
p

I have attached 3 files.

- 1) 2019380141_ABID ALI(1).pdf
- 2) 2019380141ABID1.cbp
- 3) main.c

Acknowledgement

I complete this assignment by myself by using online videos and different books discussing about C and C++ It was very useful and helpful for me to increase knowledge for solving complex problem.