EE1003 Introduction to Computer I
Programming Assignment 3: Big Number Calculator
(Due:2020/12/28 23:59)

Introduction

In C++ language, we know that a long int variable only has 32 bits (4bytes). Even using "unsigned" can only represents the maximum value of 2^{32}- 1. How do we present a number whose value is greater than 2^{32}– 1? The answer is Big Number. This homework asks you to write a program to compute three operations (addition, subtraction and multiplication) between two big numbers. The maximum number of digits for each big number is 50 (this means you need a 100-digit big number for the product of a multiplication operation). This is a good time to practice programming because we all know how to compute the addition of two numbers by hands. And this time we just want you to do the computation using a programming language C++.

Problem Specification:

You have to implement a calculator which you can choose the function. 0 for exit, 1 for addition, 2 for subtraction, and 3 for multiplication for big numbers up to 50 digits. The program will show the prompt "1.Addition 2.Subtraction 3.Multiplication 0.Exit". If you input the wrong number, the program will show "Error! Please try again ". After you choose the function, the program will show the prompt to guide the user to enter two numbers and output the result after calculation. The calculator will repeat until you input 0. The program will show "Good bye" and end the program. The calculator has to follow the four arithmetic rules. No parentheses will appear at input.

Sample input/output:

```
----Welcome to big number calculator----
Please choose the function
1.Addition
2.Subtraction
3.Multiplication
0.Exit
-------------------------
1
----Now for Addition----
Enter the number
a=11112222333344445555
b=55554444333322221111
Result:66666666666666666666
----Welcome to big number calculator----
Please choose the function
1.Addition
2.Subtraction
3.Multiplication
0.Exit
-------------------------
5
Error! Please try again
```

---Welcome to big number calculator----

```
Please choose the function
1.Addition
2.Subtraction
3.Multiplication
0.Exit
-------------------------
0
Good bye!
```

Requirements:

You have to submit a source code named as StudID_PA3.cpp and a report named StudID_PA3_report.pdf (in pdf format). In your report, you have to describe 1) The data structure you used for this homewrok; 2) The hardness of this assignment and how you overcome it; 3) Bonus function(s) you implement if any.

Your program will be judged with Code::Blocks 20.03 and GNU GCC Compiler.

The grading is as follows:

(1) Correctness of your code 50%
(2) Readability of your code 10%
(3) The report 10%
(4) Demo session 30%
(5) Bonus (at most) 20%

BE SURE to follow the naming rule mentioned above. Otherwise, your program will be not graded.

Bonus:

You are asked to write a big number calculator for hexadecimal numbers. All the requirements are the same for the decimal-based calculator.

Note:

1. Please submit your assignment on time. Otherwise, the penalty rule will apply:
   Within 3 day delay: 20% off
   More than 3 days: 0 point
2. You have to attend a demo session (the time will be announced later).
3. If you have questions, please E-mail me.