Programming Assignment #1: Prime Checker

(due 23:59, Oct 7th, 2020)

Introduction:

RSA is one of the first practicable public-key cryptosystems and is widely used for secure data transmission. In such cryptosystems, primes play an important role. Hence, how to efficiently separate the primes from the composite numbers is a critical job in today's internet world.

Objective:

In this programming assignment, you are asked to write a C++ program to perform prime checker through a defined integer interval, and then return the number of primes within the interval.

Provided files:

(1) ***main.cpp***: it checks the answer of *PrimeChecker()* and can be modified for debugging.

(2) ***PrimeChecker.cpp*** & ***PrimeChecker.h***: these are the program files you need to implement. The function *PrimeChecker()* receives two unsigned long integer a and b, and returns the number of primes within the integer interval [a,b].

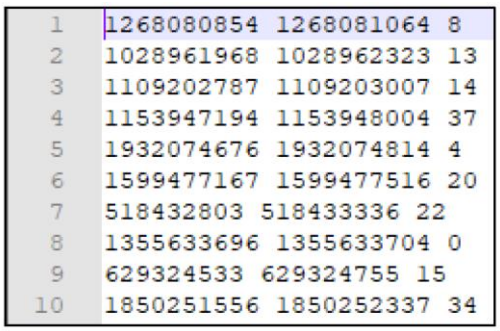
(3) ***example***: this is an exemplary input test case, which can be used to test your program. It can be modified if you want to change it.

Implementation Details:

a	b	Prime numbers within the interval [a,b]	Number of primes
2	7	2,3,5,7	4
1355633696	1355633704	n/a	0

The numbers **a** and **b** are the input integers of the function ***PrimeChecker()***, and the **number of primes** are the golden answers that should be returned by the function.
The number returned by ***PrimeChecker()*** will then be used in ***main()*** to check if it is the correct answer.

The input file will look like this:



```
1268080854 1268081064 8
1028961968 1028962323 13
1109202787 1109203007 14
1153947194 1153948004 37
1932074676 1932074814 4
1599477167 1599477516 20
518432803 518433336 22
1355633696 1355633704 0
629324533 629324755 15
1850251556 1850252337 34
```

There are 1000 test patterns in the example case. The first and the second numbers are input a and input b (ex. 1268080865 and 1268081064), and the last number is the golden answer (ex. 8).

*Note that the minimum and maximum of the input numbers are 0 and 2^{32}-1 (4294967295) respectively. (4294967295 is the maximum number of unsigned long integer in UNIX/Linux).

Language:

C or C++.

Platform:

You may develop your software on UNIX/Linux.

Compile: $ g++ main.cpp PrimeChecker.cpp

Execution: $ ./a.out

Submission:

Please compress the following files into a zip file and name it by your ***name and student ID***. For example, **"HW1_0850232_李嘉運.zip"**. Then upload the compressed file to the new E3 website by the deadline (Oct 7th,2020).

(1) PrimeChecker.h

(2) PrimeChecker.cpp

Grading policy:

(1) Example case correctness (60%)

(2) Hidden case correctness (10%)

(3) Hidden case ranking (30%, ranked by run time)