116 lines (98 sloc) | 3.07 KB

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/*
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Class: CPSC 122, Section 2
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Assignment: Project 1
Description:
    1. Develop a program that generates the first n prime numbers, where n is a positive i
    gotten from the command line
    2. Display the numbers on the console in c columns, where c is a positive integer gott
    the command line
    3. Includes simple error for checking n and c
*/

#include <iostream> // for cout, endl;
#include <iomanip> // uses setw()
#include <cstdlib> // uses stroul
#include <cstring>
#include <cmath> // to use sqrt()

using namespace std;

#define FIRST_PRIME 2

static bool test1 = false;


/*
        Description: Determines whether input integer is prime
        Input: integer whose primality is to be judged
```

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30      Returns: true if num is prime, false otherwise
31  */
32  bool isPrime(int num)
33  {
34      bool ret = true;
35      static int primeNumbers[1000] = {0};
36      static int index = 0;
37
38      int sqRoot = sqrt(num);
39      int i;
40      for ( i = 0; i < index; i++)
41      {
42          if ( ( primeNumbers[i] <= sqRoot ) &&
43               ( 0 == num % primeNumbers[i] ) )
44          {
45              ret = false;
46              break;
47          }
48      }
49
50      if ( ret )
51      {
52          primeNumbers[index++] = num;
53      }
54
55      return ret;
56  }
57
58  /*
59      Description: Loops over all necessary candidate primes, invoking isPrime on each,
60                      displaying in column fashion those that are prime
61      Input:      integer, totalPrimes, indicating the number of primes to display; integer
62                      cols, indicating over how many columns the primes are to be displayed
63  */
64  void display(int totalPrimes, int numCols)
65  {
66      int numPrimes = 0;
67      int col = 0;
68
69      int num = FIRST_PRIME;
70
71      cout << endl;
72
73      while (numPrimes < totalPrimes)
74      {
75          if ( isPrime(num) )
76          {
77              numPrimes++;
78              if ( !test1 )
```

```
79              {
80                  cout << setw(6) << num; // sets width of 6 between each number
81                  col++;
82                  if ( col == numCols )
83                  {
84                      cout << endl;
85                      col = 0;
86                  }
87              }
88          }
89          num++; // adds 1 to num
90      }
91
92      cout << endl;
93  }
94
95  int main(int argc, char* argv[])
96  {
97      int numPrimes = 0;
98      int numCols = 0;
99
100     numPrimes = strtoul(argv[1], NULL, 10); // convert string to unsigned long integer
101     numCols = strtoul(argv[2], NULL, 10); // convert string to unsigned long integer
102
103     // to check the parameters of the ./a.out numPrimes numCols to make sure there in the
104     if ( (numPrimes < 0) || (numPrimes > 1000) || (numCols < 0) || (numCols > 60) )
105     {
106         cout << "Invalid. Please try again." << endl;
107         exit (1);
108     }
109
110     // display the results on the screen
111     cout << "============================================================" << endl;
112     cout << "Displaying " << numPrimes << " prime numbers in " << numCols << " columns." <
113     cout << "============================================================";
114     display(numPrimes, numCols);
115     cout << "============================================================" << endl;
116 }
```