ACSC-400 Operating Systems

Spring 2023

Group Assignment 3

Due – Monday, February 27, 2023, at 11:59pm EST

The main aim of this programming assignment is to practice multithreading in C. This assignment will be graded out of 30.

Assignment Requirements:

Given two lists of numbers:

X = {374656575, 197565, 37464657, 47655, 2847462, 235, 45763568, 4756, 98476456, 736454, 72648, 99999999, 345465, 13847456, 3746465, 58474785, 3746, 8743646, 777777, 9011003, 765346, 35364, 163545464, 87465357} (24 numbers)

Y = {123456780, 123456781, 123456782, ……., 123456878, 123456879} (100 numbers)

A. Write a multithreaded C program to find and print all Greatest Common Divisor (GCD) between different numbers from both lists, gcd(X_i, Y_j), with values greater than 100. The list X must be equally divided among multiple threads in which each thread will work to find all GCDs with values greater than 100 in its assigned part. the greatest common divisor of two or more integers, which are not all zero, is the largest positive integer that divides each of the integers, see https://en.wikipedia.org/wiki/Greatest_common_divisor. You can use a brute force algorithm or any other algorithms to find GCDs.

B. Measure how long your program will take to find the required result using 1, 2, 3, 4, and 8 threads. In addition, measure how long each thread will take to finish from its assigned part. Each thread must report all found GCDs greater than 100 and their count in its assigned part.

   The found GCDs should be printed like below:

   Thread 1: gcd(47655, 123456808) = 353
   Thread 1: gcd(47655, 123456825) = 135
   Thread 2: gcd(235, 123456780) = 235

C. Write a short report that lists the found GCDs with greater than 100 and discusses the results found in B. Discusses the reasons of these results. In addition, you need to add to your report the specifications of the computer you used for this assignment. Please note that you need to take the average time of multiple runs for each experiment to have accurate measurements.

Submission Instructions:

Name your final source file ACSC400_Assignment3_GroupNumber.c and your report ACSC400_Report3_GroupNumber.docx. Please replace the Number part with your group number. Submit these files to the right D2L Dropbox named “Assignment 3 Dropbox” by the due date and time.