University of Puerto Rico – Río Piedras
Department of Computer Science
Midterm Exam - Part II
CCOM 5060 - Parallel Processing
Prof. Edusmildo Orozco
March 29, 2012
Due date: Tuesday, April 3 before 2:30pm

Team Work: Two members
Version 2-3

Name:_____ ID:_____ Grade:_____

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Part II: (100 points) Design and Programming problem.

Instructions: Select one of the listed problems bellow and provide:

a. (**15 points**) A pseudocode describing the algorithm.
b. (**5 points**) A data or task dependency graph, whichever is applicable
c. (**10 points**) A separate text file called readme.txt which contains all instructions to compile and run your program.
d. (**50 points**) A running program in MPI-C/C++.
e. (**10 points**) Documentation inside your program explaining each part of the code.
f. (**5 points**) Table of running times with different number of processors (2-16 recommended).
g. (**5 points**) Table of Speedups with different number of processors (2-16 recommended).
h. Prepare a zip folder containing all files, except executable code and send it to edusmildo.orozco@gmail.com by the stablished date.

For the coding part, you can use your knuth.uprrp.edu account or your own machine with MPI installed in it. Also, you can use all material from the course as well as from any other reliable, legal and ethical source* (i.e., www.citutor.org, books, etc). The use of the Rocks Cluster is exclusive for running programs that are ready for production.

Each item a - h must reflect the contribution of both team members. Accordingly, each team-member is accountable for the final score. Any conflict should be informed prior to the submission date.

*Please exercise the Ethics code prevailing at the UPR regarding academic honesty.

1. The gap between consecutive prime numbers 2 and 3 is only 1, while the gap between consecutive prime numbers 7 and 11 is 4. Write a parallel program to determine, for all integers less than 10'000,000, the largest gap between a pair of consecutive prime numbers. *Note: you don't have access to a list of prime numbers.*

2. A small college wishes to assign unique identification numbers to all of its present and future students. The administration is thinking of using a eight-digit identifier, but is not sure that there will be enough combinations, given various constraints that have been placed on what is considered to be an "acceptable" identifier. Write a parallel program to count the number of different eight-digits combinations of the numerals 0-9, given the following constraints:

   a. The first digit may not be a 0.
   b. Two consecutive digits may not be the same.
   c. The sum of the digits may not be 7, 11, or 13.