Faculty of Arts and Sciences *Department of Computer Science*

CMPS 297M – Parallel Computing
Assignment 02
Spring 2013-14

Due Date

March 12th, 5:00 pm

Purpose

The purpose of this assignment is to

1. Implement Question 4 of Assignment 1 using MPI and BSPlib.
2. Measure the scalability of the parallel performance whenever applicable.
3. For each of the questions below:
    a) Run your parallel program in a distributed memory setting. Plot your efficiency for varying input instances, and using the maximum number of processing units you are able to obtain for your jobs.
    b) Run your parallel program in a shared memory setting. Plot your efficiency for varying input instances, and using the maximum number of processing units you are able to obtain for your jobs.

Grade distribution

40% correctness of output, 40% good parallel performance, 20% good programming style.

Question 1 (30%)

Write an MPI program that implements the Parallel-Min algorithm you've developed in Assignment 1:

Minimum finding: determine the index j of the component with the minimum value and subtract this value from every component.

Question 2 (35%)

Write a BSPlib program that implements

Partial summing: compute $y_i = \sum_{j=0}^{i} x_j$ *, for all i. (This problem is an instance of the parallel prefix problem).*

Question 3 (35%)

Write a BSPlib program that implements one version of the Parallel Counting Sort. Make sure to document what version you are using:

Sorting by counting: sort ***x*** *by increasing value and place the result in* ***y****. Each component* x_i *is an integer in the range 0 to k.*