COSC 462 Fall 2024 : Programming Assignment 3

Date: Nov 3, 2024 **Total Points: 50** **Due: 11:59 PM, Nov 11, 2024**

Generate a 128×128 matrix A and a 128×1 vector x on a single processor. Constrain the values of the elements of A and x to lie within the interval $\{-1, 1\}$.

(i) (5 points) On a single processor core, compute $y = A \cdot x$ and time it.

(ii) (40 points) Implement the row-wise 1D partitioning parallel algorithm to compute $y = A \cdot x$ using:

  (a) a 2×2 array of processors

  (b) a 4×4 array of processors

  (c) a 8×8 array of processors

  (d) a 16×16 array of processors

(iii) (5 points) Time the parallel execution in each case and plot the strong scaling speedup curve for your implementation.

NOTE: Always use MPI_Wtime() to measure times.