# COSC 462 Fall 2024 : Programming Assignment 3

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

Generate a $128 \times 128$ matrix $A$ and a $128 \times 1$ 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 2D partitioning parallel algorithm to compute $y = A \cdot x$ using:

  (a) a $2 \times 2$ array of processors

  (b) a $4 \times 4$ array of processors

  (c) a $8 \times 8$ array of processors

  (d) a $16 \times 16$ 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.