

ComS 425: Homework # 3 (Part II) — 40 points

Due Feb. 15, 2007, in class

1. (30 points) Write an MPI program that implements matrix-vector multiplication based on “check-board” block decomposition of the matrix. The program should read the matrix and the vector from an input file and print the answer to standard output. The names of the files containing the matrix and the vector should be specified as command line arguments. (Hint: In a check-board block decomposition, the processes form a virtual grid, and the matrix is divided into two-dimensional blocks aligning with that grid. Assume the p processors form a grid with r rows and c columns. The vectors are block-decomposed among processors in the first column of the process grid.)

Run your program on **hpc-class** for matrix dimensions $n = 2^k$, $k = 8, 10, 12$ on number of processors $p = 1, 4, 8, 16$. Each element of the matrix is defined as $a_{ij} = (i + j) * k$ and is a double precision number. Take $b_i = k/i$, also as double precision number.

Submit the following items:

- (a) listing of your program;
- (b) your batch script;
- (c) timing of your program for all the values n and p ;
- (d) the value of $\sum_i^n c_i$.

Send me by email the source file of your program.