Systems of Equations

For this assignment, you get to write a parallel solution to a system of linear equations. Your program will be called linear.cpp and will work by block column partitioning the matrix and running a pipeline from $p_0$. The vector $b$ can reside on any processor you want, but there should be just one copy of $b$. To promote numeric stability, you should perform partial pivoting by swapping rows.

Your program will take three command-line parameters. The first will be the filename for the input matrix $A$, the second will be the filename for the input column vector $b$ and the last will be the filename to which the output column vector $x$ should be written. The format for $A$ will be just like the previous assignment. The first value will be an integer $n$ giving the height and width of the matrix. The next $n \times n$ values will be doubles giving the contents of the matrix in row major order.

Column vectors (both $b$ and $x$) will be formatted similarly to $A$. The first value will be an integer $n$ giving the height of the vector. The next $n$ values will be doubles giving the contents of the vector from top to bottom.

As in the previous assignment, $p_0$ should perform all file I/O. It should distribute input and collect output from the other processors as necessary. You will have to make sure your implementation is cost optimal with respect to storage.

When you are done, turn in a printout of your code and submit an electronic copy using submit.parallel.