CS51501 Spring 2016
Homework set # 4

due at 11:59 pm on Thursday Match. 31, 2016

The Spike algorithm

Implement the Spike algorithm in Chapter 5.2.1 to solve $\boldsymbol{A}\mathbf{x} = \mathbf{b}$, where $\boldsymbol{A}$ is a banded matrix, on a cluster of multicore nodes. Your code should be implemented using the MPI/OpenMP programming paradigm, and be tested on eight nodes of the MC cluster.

Notes

0.1 Storage

Storing a banded matrix in dense mtx format will consume a lot of memory needlessly. So TA stores it as a sparse matrix in the coordinate format. After you read the matrix from the mtx file, you should store it properly. See band storage on https://software.intel.com/en-us/node/520871. Please do not store the matrix as a 2-dimensional array of order n.

0.2 Bandwidth

You should get the maximum bandwidth based on the matrix $\boldsymbol{A}$ you read. Please follow the method TA discussed in HW2.

0.3 LU factorization with partial pivoting

LU factorization with partial pivoting is needed for each diagonal block. Please read the Intel MKL manual and choose the proper functions or subroutines.

Submission

turnin –c cs51501 –p HW4 your_folder_name
Your submission should include the following files:
1. The source code.
2. A Readme file or a Makefile, which includes all the compiling commands.

Please **do not** include the test cases in your submission.