Lab 8

Sparse Matrix Distribution (MPI)

The goal of this project is to distribute a large sparse matrix across a set of processes via MPI. We will perform a 1-D decomposition of the matrix, i.e., each process will receive a subset of the rows of the matrix. To ensure good load balance during subsequent computations, we will not evenly distribute the rows of the matrix, but rather its non-zeros. Each process should receive roughly the same number of non-zeros, but rows cannot be split between processes.

In your program, the process with rank 0 will be responsible for reading the matrix and sending it to all the processes. However, we cannot assume that the matrix can be fully read in the memory of the rank 0 process. Therefore, it will need to read in the matrix one section at a time and send it to the process the section belongs to. After the distribution is complete, your code will verify that the total number of rows and the total number of non-zeros across all processes matches the statistics of the input matrix.

Deliverable: Provide lab08.*cpp* which implements the requested functionality. Stub functions have been provided as a guide for your implementation. Compile and execute your code on the WAVE HPC using 2x8 processes (2 nodes, 8 processes per node). The input file for the program can be found at `/WAVE/projects/CSEN-145-Fa24/david/yelp/yelp.train.clu`. All processes should collaborate in the distribution. Provide the log output of your program execution.