MPI – Algorithm and Partitioning

* Heat Equation:

Note: Due to how clogged up Mamba gets, I’ve reduced the scope of this experiment (Only for strong scaling for - Heat) since I had a feeling I wouldn’t get any outputs otherwise and a smaller sample would just as clearly depict a similar outcome.

I’ve performed Strong scaling on datasets of size 0.2 GB, 1 GB and 2 GB and set the number of iterations to 30

I have used strip partitioning to distribute the matrix.

Q) How to increase communication computation overlap?

I have used asynchronous calls to optimize communication and computation overlap. We are taking only enough data to compute values for 1 time step. We could optimize this by taking inputs for more than one time step. I.e., take and send about 3-4 rows at a time, so that we can compute for multiple time steps at a time instead of computing and communicating for each time step. This way, we would be increasing computation and communication

* Matrix Multiplication:

Q) How to increase communication computation overlap?

We could use non-blocking calls to make communication more independent. However, since we have had to use BARRIER, that would create a bottle neck. We would have to wait until computations synchronize in order to get a reduction of the entire row. We could use the approach followed in the Strassen Matrix multiplication to optimize it since it would need fewer operations.