CS484 Project Proposal

Group Member:
He Xiao, Stefan Dao, Keda Ruan

Project Description:
The Carnegie Mellon Problem Based Benchmark Suite (PBBS) has numerous parallel implementations of well-known sequential code, including sorting, BFS on trees, k-NN, and more. We propose to parallelize the Floyd-Warshall algorithm that computes all-pairs shortest path to add to the CMU PBSS. The Floyd-Warshall algorithm has numerous real world application and would make a fine addition to the benchmarks.

The project is proposed to have following phases:
1. Implement the sequential code for the algorithm
2. Study and discuss the parallel implementation of the Floyd-Warshall algorithm as detailed in "Parallelizing the Floyd-Warshall Algorithm on Modern Multicore Platforms: Lessons Learned"
3. Implement possible optimizations for the algorithm using OpenMP and MPI and compare the results against the sequential version as well as other parallel implementations

We expect to have multiple different strategies to implement the parallel code.

We propose to use the data in "Problem Based Benchmark Suite" as test data, as well as the data generated by ourselves or found on the Internet. The PBSS provides code for us to accurately time our algorithm implementations.

Project Goal:
The expected output of the project is to have correct result for the Floyd-Warshall algorithm while obtaining observable speedup compared existing parallel versions of the algorithm.

Reference:
Problem Based Benchmark Suite, access by http://www.cs.cmu.edu/~pbbs/index.html

Parallelizing the Floyd-Warshall Algorithm on Modern Multicore Platforms: Lessons Learned, access by https://people.cs.kuleuven.be/~george.karachalias/papers/floyd-warshall.pdf