CSCI 415: Networking and Parallel Computation

Assignment #1: Multi-threading

Deadline: Thursday, February 20 at 11:59PM

The objectives of this assignment is to familiarize the student with the steps involved in designing a parallel program using Multithreading.

1 Description

In this assignment you will write a multi-threading program (in C++) that makes friends recommendation in a graph. Multiple graphs are attached to the assignment (toyGraph.txt, toyGraph1.txt, graphV5000.txt, graphV10000.txt, and graphV15000.txt).

Approach: For each node in the graph, your program should output k recommendations. Nodes that are already connected to the node should not be in the recommendation. The recommendation is based on the number of common friends a given node has with other nodes. The k recommended nodes should be the nodes with the largest number of common friends with the given node.

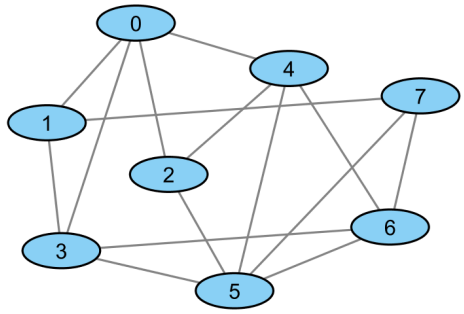

Figure 1: Example Graph

Example 1: In Figure 1, node 0 share three common neighbors with node 5, two common neighbors with node 6 and one common neighbor with node

7. For $k = 2$, the recommendation for node 0 should be 5 and 6. For node 2, node 3 has two common neighbors and node 6 also has two common neighbors, node 1 and 7 have one common neighbor each. The recommendations for node 2 should be 3 and 6.

1.1 Sample Code:

Sample Code: You will find a sample C++ code for reading the graph and representing it in an adjacency matrix. Reading the graph and reporting the results should be done in the main thread.
Data Structure: You can store the graph in an adjacency matrix or a list of adjacency lists.

2 What to turn in:

Submission: You should submit your code along with a readme file (.txt,.docx, or .pdf) explaining how to run the program and showing plots of your results. In your readme file, report the running time for the single thread (serial) and the speedup for various number of threads, $\{2, 4, 6, 8, 10, 12, 14, 16\}$, on each of the three large graphs.

Your submission file should be named in the following format, useridAssigment1.zip, .tar, or .tgz. Late submission will get a 10% penalty for every late day.