University of Texas at Dallas—Department of Computer Science
CS 6380.001 Distributed Computing—Fall 2020
Project 2 –part 2- Description

Extend the simulator you developed in Project 1 to simulate asynchronous networks. The message transmission time for each link for each message is to be randomly chosen using a uniform distribution in the range 1 to 12 "time units." All links are bidirectional and FIFO. (FIFO: If I send two messages m1 and then m2 to you, then you receive m1 first and then m2.)

Implement the Asynchronous BellmanFord algorithm for shortest paths. Compute the total number of messages sent for the run and output the result. The result should be in the form of the tree: Each process knows its parent and a list of its children.
Your output file should have n lines, one line for each process's tree-info.

Line i of your output will have the following:

i w p c1 c2 …
w is the weight of the shortest path from the root to i; p is i's parent, c1 c2 … are the children of i of the tree.

Your program will read in the following information in this order from an input file called connectivity.txt:

The first line has two integers n, and x, where n represents the total number of processes (in the system) and x (between 1 and n) is the root of the shortest paths tree to be built.

Next, there are n lines, line 2, line 3, …, line n+1 and each line has n numbers (all are positive, except when there is -1, then that link does not exist). Line i represents the (connectivity and) edge weight of the links incident on process (vertex) with index i-1. Note that lines 2 to n+1 represent a symmetric matrix of edge weights.

For example if n is 5 and line 3 has
3 0 4 -1 6

then this line represents the edge weights of links incident on vertex 2: Vertex 2 is connected to 1 (link cost 3), to 3 (link cost 4), NOT connected to 4 (because of -1) and to 5 (link cost 6).

Upload one tar file containing your source code, a README file that tells us how to compile and run, the sample input file (input.dat) and the result of running your program (script file output) on your sample input file.

Due date: Nov 30, 2020 11:55 pm