

COEN 146 – Winter 2019 – Lab 5

Routing

Pre Lab – Week 8, Bring a pseudo-code in paper, give to the TA (10%)

Final Lab – Week 10, demo in the lab and upload by midnight on Friday (90%)

If you demo and submit in week 9, you will get extra credit!

This project consists of building the code to run the link-state algorithm in a router.
Assume the topology has N routers.

The following information will be available:

- Router ID, which is its index into the tables below, is given at the command line.
- Number of nodes, N, in the topology will be given by the command line.
- Table with costs, NxN, will be obtained from file1 (name given at the command line).
- Table with machines, names, IP addresses, and port numbers, Nx3, will be obtained from file2 (name given at the command line).

Your main data will be:

- Neighbor cost table – contains the cost from every node to every node, initially obtained from file1.
- Least cost array – obtained with the link state algorithm.

Your code will have 3 threads:

- Thread 1 loops forever. It receives messages from other nodes and updates the neighbor cost table. When receiving a new cost c from x to neighbor y, it should update the cost in both costs: x to y and y to x.
- Thread 2 reads a new change from the keyboard every 10 seconds, updates the neighbor cost table, and sends messages to the other nodes using UDP. It finishes 30 seconds after executing 2 changes. You may execute this part in the main thread.
- Thread 3 loops forever. It sleeps for a random number of seconds (10-20), run the algorithm to update the least costs. After the algorithm executes it outputs the current least costs.

You will need a mutex lock to synchronize the access to the neighbor cost table.

The messages between the routers will have 3 integers:

<Routers' ID><neighbor ID><new cost>

The input for Thread 2, will have two integers:

<neighbor><space><new cost><new line>

The table with costs will look like this if N = 3:

| | | |
|-----------------------|-----------------------|-----------------------|
| $\langle 0,0 \rangle$ | $\langle 0,1 \rangle$ | $\langle 0,2 \rangle$ |
| $\langle 1,0 \rangle$ | $\langle 1,1 \rangle$ | $\langle 1,2 \rangle$ |
| $\langle 2,0 \rangle$ | $\langle 2,1 \rangle$ | $\langle 2,2 \rangle$ |

where $\langle i,j \rangle$ represents the cost between node i and node j . If $\langle i,j \rangle$ is equal to infinite (defined as 10,000), nodes i and j are not neighbors.

The table with machines will look like this, if $N = 3$.

$\langle \text{machine0} \rangle \langle \text{IP0} \rangle \langle \text{port} \rangle$

$\langle \text{machine1} \rangle \langle \text{IP1} \rangle \langle \text{port} \rangle$

$\langle \text{machine2} \rangle \langle \text{IP2} \rangle \langle \text{port} \rangle$