CSCI 39571/77300

Spring 2022

Final Project

Final Project: Implementing Distance Vector Routing on a Network

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Deliverables Due: May 25th via Blackboard

1. Goal & Example

In this project, we will execute Bellman–Ford algorithm find the shortest path using the same topology as Lab #3. Bellman–Ford algorithm is the core of any Distant Vector (DV) protocol. You will have to write a code using any programming language in your comfort zone.

Note: *First thing first, please read and understand how Bellman–Ford algorithm works. There are many examples on the Internet and YouTube that can help you.*

E.g., run Bellman–Ford algorithm on this graph (source **S**):

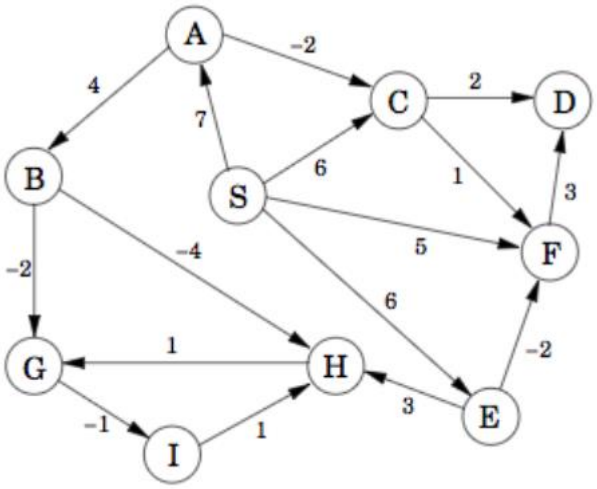

Figure 1.

The output should be a matrix like below:

	Iteration						
Node	0	1	2	3	4	5	6
S	0	0	0	0	0	0	0
A	∞	7	7	7	7	7	7
B	∞	∞	11	11	11	11	11
C	∞	6	5	5	5	5	5
D	∞	∞	8	7	7	7	7
E	∞	6	6	6	6	6	6
F	∞	5	4	4	4	4	4
G	∞	∞	∞	9	8	8	8
H	∞	∞	9	7	7	7	7
I	∞	∞	∞	∞	8	7	7

Table 1.

Note: *Theoretically, the algorithm produces 9 iterations for 10 vertices (nodes). However, from iteration 5 onward the outcome will remain the same.*

As I said, your code also has to keep track of the intermediate nodes. E.g., the shortest path from **S** to **I** is thru **A – B – H – G** and the length of that path is 7 (as in the table above).

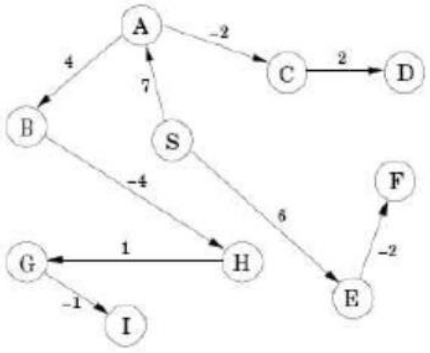

Figure 2.

2. Experiment Setup

Reserve the experiment using provided RSpec file on Blackboard. We now have a topology with six nodes (Fig. 2).

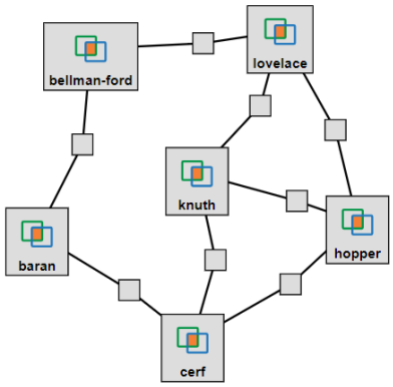

Figure 2.

In this project, you have to design a user interface that prompts user to enter a source node and a destination node (source node and destination node can be any nodes) and output the mtr result from that source to destination using Bellman–Ford algorithm.

What to turn in?

Your code and project report. In the report:

- Picture of marking each network interface as being part of the shortest path tree if they are on a "pink" link, and not part of the shortest path tree if they are on a "grey" link. Please refer to Lab#3.
- Screenshots of your three inputs (i.e., three pairs of source-destination) and their outputs.
- Some explanations for each screenshot or picture.
- Instruction of how to execute the code. Please be specific, e.g., how to get the input or the command to compile/run the code, etc. If I can't run the codes, your grade might be affected.