

Metro State University of Denver, Department of Mathematics and Computer Science  
CS 3700-001: Computer Networks, Spring 2013, Dr. Weiyang Zhu

Homework 9, Due Date: 10:00am 04/11/2013, Submission: Upload source code (.java) files to Blackboard

Write a program to build up the forwarding table at **router  $V_1$**  using the Dijkstra's algorithm.

- The routers in the network are labeled as  $V_1, V_2, V_3, \dots$ , etc
- Your routing program needs to
  1. Display a prompt message to ask the user to input the total number of routers,  $n$ , in the network. Validate  $n$  to make sure that it is greater than or equal to 2.
  2. Display three prompt messages to ask the user to input the link cost between a pair of routers as below:  
The index of one router:  
The index of the other router:  
Link cost between these two routers:  
where the first and the second inputs need to be validated to be between 1 and  $n$ , the third input needs to be validated to be positive. Keep asking for the same input for invalid cases.
  3. Display a prompt message to ask the User whether to input more links. If yes, repeat step 2. Otherwise, go to the next step.
  4. Implement the Dijkstra's algorithm to build up the shortest-path tree rooted at source router  $V_1$ . As the intermediate results, at the end of **Initialization** and each iteration of the **Loop**, display  
The set  $N'$   
The set  $Y'$   
 $D(i)$  for each  $i$  between 2 and  $n$   
 $p(i)$  for each  $i$  between 2 and  $n$
  5. Use the shortest-path tree resulted from the Dijkstra's algorithm to build up the forwarding table for router  $V_1$ . Display the forwarding table in the following format:

Destination	Link
$V_2$	$(V_1, \dots)$
$V_3$	$(V_1, \dots)$
$\dots$	
$V_n$	$(V_1, \dots)$