

CSL2020 - Assignment 3

Q1:

Sam is a network engineer *[a technology professional who has the necessary skills to plan, implement and oversee the computer networks that support in-house voice, data, video and wireless network services.]*, for one of his clients, he is not sure how are the data packets are coming through, they should be following the fastest path, He asked you to develop a software which will be used to calculate the fastest path which should be taken by data packets between his client router and a given server.

For each router, you would be given the list of connected routers/clients/servers and the average connection time.

The router for the client is represented with **RC**, other routers are represented as **R[N]**, where N is a positive integer. Servers are represented using **S[N]** where N is an integer.

NOTE:

1. Traffic can flow through routers only.
2. Test cases are not very large.
3. No two test cases of equal time exist for a given server

Sample Input:

```
6
RC R1 10
R1 S1 2
R1 S2 10
RC R2 11
R2 S2 10
R2 S3 5
S1
S2
S3
S1
T
```

Sample Output:

```
12 RC R1 S1
20 RC R1 S2
16 RC R2 S3
12 RC R1 S1
```

Explanation

6 [Number of edges in the network]

Network

RC R1 10

R1 S1 2

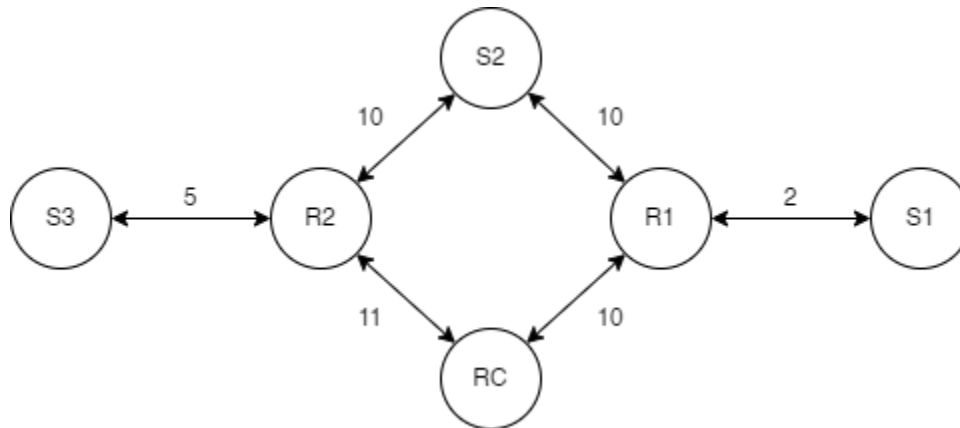
R1 S2 10

RC R2 11

R2 S2 10

R2 S3 5

Network Visualized



S1 [From RC to S1 fastest path, RC-R1 then R1-S1, total time 12, hence, 12 RC R1 S1]

S2 [From RC to S2 fastest path, RC-R1 then R1-S2, total time 20, hence, 20 RC R1 S2]

S3 [From RC to S3 fastest path, RC-R1 then R1-S2, total time 16, hence, 20 RC R1 S3]

S1 [Same as the first S1]

T [Terminates the code]

Q2:

“Arrange number” is a popular puzzle game, with the following rules:

1. The game board has blocks with numbers on it. Also, there is a single “hole” that can be used for moving the blocks
2. The objective of the game is to order the numbers using the “hole” for temporary movement.
3. In a move, you can only move a block adjacent to a hole.

Given a board as an Input you need to find the minimum number of steps to solve the board.

0: Represents the hole

Input

3

1 2 3
4 5 6
7 0 8

Output

1

Explanation

3 [Size of the board]

We can order numbers only in 1 move by moving 8 to the hole.

Note:

1. The size of the board would always be from 3 to 10, inclusive
2. Board would always be solvable
3. It is mandatory to use a tree-based search algorithm

Enjoy arranging puzzles at: <https://www.mathsisfun.com/games/arrange.html> [On the website you can move a complete row or column in one move, however for this problem you need to move block by block]