CS-542 Project

Finding out network topology

- **Due date: Thursday, Dec. 10, 10 am**

1. Algorithm overview

Consider a network of six routers whose topology is defined by the following matrix:

	R1	R2	R3	R4	R5	R6
R1		3				
R2	4		6			
R3				7		
R4					11	
R5						9
R6		8	5			

The source nodes are given in the leftmost column, the destination nodes are specified in the top row. An element of this matrix is a cost of a link directly connecting two corresponding nodes. The links are unidirectional so, e.g. the cost of a link R1R2=3 differs from a cost of a link R2R1=4. A blank entry means that there is no direct link between the corresponding nodes.

Initially (let's denote this by the n=0 iteration) each router has access only to the local topological information, i.e. knows only the direct neighboring router(s), and the cost(s) of the corresponding incoming or outgoing connecting link(s). In each subsequent *n+1st* iteration the routers update their topological databases with the results of the previous *n*-th iteration received from the neighboring routers. This updating process is terminated when the topology of the entire network is known. Then it can be used to optimize traffic routing in the network.

2. Requirements

The following problems should be solved for the given network:

- (1) Propose a format of the network topology update message exchanged between the neighboring routers.
- (2) Propose a metric quantifying efficiency of the network topology update process in subsequent iteration steps.
- (3) Write a program simulating the network topology update process.

- (4) How to identify the final iteration of the network topology update process? What is the termination criterion implemented in your simulation program?

3. **Project report guidelines and grading policy**

1. (10%) The format of the update message (see Problem (1) in Section 2)

2. (10%) The metric of the update process (see Problem (2) in Section 2)

3. (5%) Detailed description (e.g. block diagram) of your simulation algorithm (see Problem (3) in Section 2)

4. (10%) Explain the termination criterion (see Problem (4) in Section 2).

5. (5%) Inline documented source code (attach the file and include its printout in the project report).

6. (30%) Present the simulation results of all the subsequent update iterations starting with n=0 for the router R1. Present the metric (see item (2)) as a function of the iteration number.

7. (30%) Present the results specified in item (6) above for the router R6.

4. Submission guidelines

- Due date: Thursday, Dec. 10, 10 am
- It is the end of the semester so late submissions will NOT be accepted.
- Weight of this project is 20%.
- Max. 3 students/team.
- Only one submission per team. Do NOT submit multiple copies of your project. It's very confusing.
- Your submission should consist of two items ONLY: your project report (with a printout of your source code) and a file with the source code of your program. Do NOT submit 100 documents/files/attachments. Such submissions will be disregarded.
- Please put down your names (LAST, FIRST, MIDDLE - THE ORDER DOES MATTER), and student IDs on the front page of your project report.
- Please submit a hard copy of your project report, a printout of your source code and a CD with your source code directly to me or put your submission into my mailbox in the CS Dept. office.