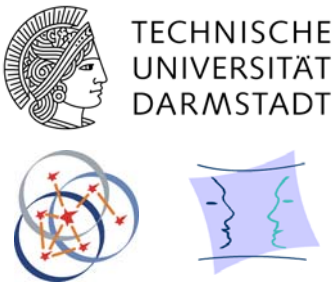
Introduction Net Centric Systems

Summer Term 2011

http://www.p2p.tu-darmstadt.de/teaching/summer-term-2011/ncs-net-centric-systems/



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Exercise 1 – Graph Theory

Submission:
From 2/5/2011 to 6/5/2011 in your exercise group or until 6/5/2011, 18:00 in moodle (as pdf file).

Task 1.1: Dijkstra's Shortest Path Algorithm (14 P.)

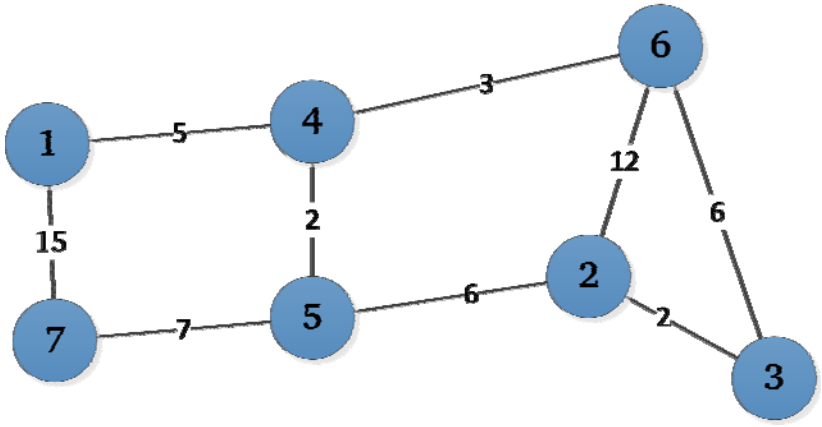

Figure 1: Example of an undirected graph used for the tasks 1.1 and 1.2

Using the undirected graph from Figure 1, please:

a) Calculate the shortest paths from vertex 7 to the other vertices. Please use "Dijkstra's Shortest Path Algorithm". Your calculations have to be comprehensible (use a table). (7 P.)

b) Write down all shortest paths from vertex 7 to the other vertices. (7 P.)

Task 1.2: Kruskal's Algorithm (10 P.)

Using the undirected graph from Figure 1, please:

a) Calculate the shortest spanning tree of the graph depicted in Figure 1 using "Kruskal's Algorithm". Your calculations have to be comprehensible (use a table). (7 P.)

b) Draw the resulting shortest spanning tree calculate the length of this spanning tree. (3 P.)

Task 1.3: Prim's Algorithm (14 P.)

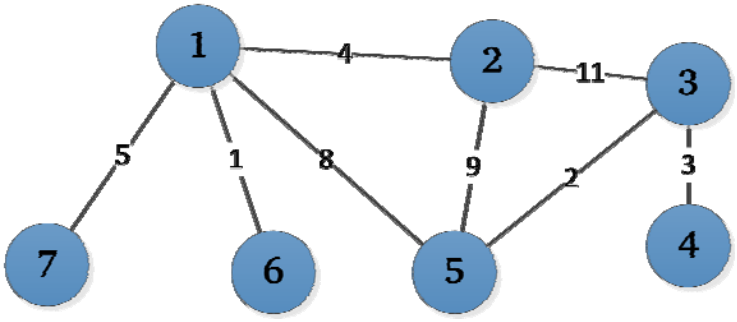

Figure 2: Example for an undirected graph, used for task 1.3

Using the graph from Figure 2, please:

a) Create the shortest spanning tree using "Prim's Algorithm". Draw the graphs and tables for every intermediate step. (12 P.)

b) Compare "Prim's Algorithm" with "Kruskal's Algorithm":

   I. What is the main difference between these two algorithms? (1 P.)

   II. How are cycles avoided in the "Prim's Algorithm"? (1 P.)