Fachbereich Wirtschaftswissenschaften
Institut für Wirtschaftsinformatik
Professur für Mobile Business & Multilateral Security

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Exercise
Business Informatics 2 (PWIN)
Winter Term 2023

Exercise III:
Layer-based Communication, Wired and Wireless Communications

The InstaMatch scenario is required in order to solve some of the exercises. It can be found in exercise 1.

Exercise 1: Layer-based communication models

a) What is the reason for the development of layer-based communications?
b) How does layer-based communication work in principle?

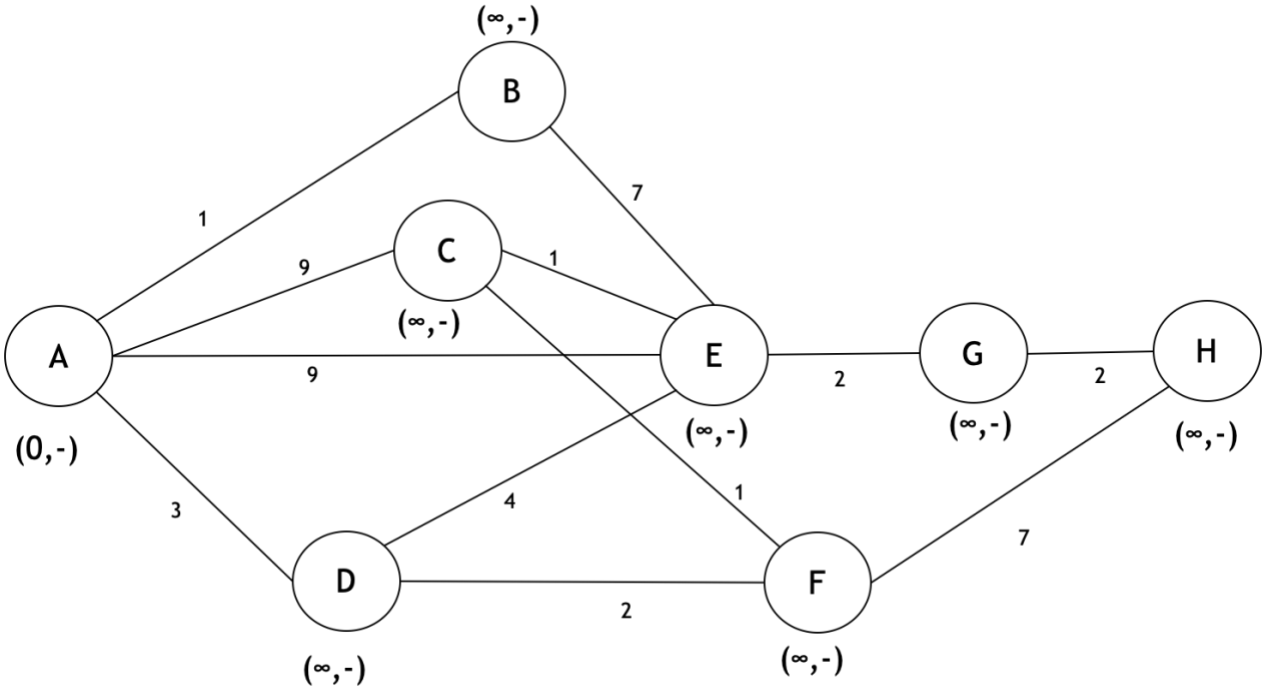
Exercise 2: OSI reference model

a) The OSI model is a layer model originally proposed by the International Standards Organization (ISO). But what does OSI stand for? Which layers does the OSI reference model contain?
b) Briefly explain the information flow in the OSI reference model when a user of InstaMatch sends a message to another user who is not in the same network.
c) The MAC address plays an important role in the Data Link Layer. What is it and who assigns it to what?

Exercise 3: Network Layer in OSI reference model

a) The main task of the Network Layer is *routing*. Please explain what it is and how the routing algorithm Dijkstra works?
b) Assume when using the InstaMatch service, a text message to a dating partner has to be passed through various systems before it reaches its destination. Since it is critical to reach the recipient in time, calculate the shortest path (from person “a” to person “z”) based on the *Dijkstra algorithm.*

   Please note that lower case letters denote *system vertices* and numbers the *milliseconds* it takes for a message to travel between two vertices.



Exercise 4: Wireless communication

a) Please name the main mobile voice and communication services (1G to 5G).
b) Please describe how cell-based communication works. What are advantages? What are disadvantages?
c) GSM is one example of communication services relying on cell-based communication. Please explain the main components.