Computer Netzwerke und verteilte Systeme

Summer Term 2019

https://moodle.informatik.tu-darmstadt.de/course/view.php?id=572

Prof. Dr. Max Mühlhäuser
Leon Böck, M.Sc.
Florian Brandherm, M.Sc.
Julius Willich gennant von Pöllnitz, M.Sc.
Telecooperation Group (TK)
http://www.tk.informatik.tu-darmstadt.de

Exercise 0 – An Introduction

Voluntary Submission:

Via Moodle in your exercise group until April 24th 2019, 9:00 as PDF file.

! Please note, that by submitting your solution to this exercise, you confirm that you are the exclusive author(s) of the respective material. For additional information, we would like to refer you to: https://www.informatik.tu-darmstadt.de/studium_fb20/im_studium/studienbuero/plagiarismus/index.en.jsp

Task 0.1: Sign up in moodle and select tutorium/group

Please head to the Moodle website on
https://moodle.informatik.tu-darmstadt.de/course/view.php?id=572
and sign up for the course.
Select your favorite dates for the tutorium via the “Gruppenauswahl”. You can add yourself and some friends to your preferred timeslots. Deadline: Sunday.

The exercise will be group assignments (groups of 2-3 people), and each exercise (excluding this one) will be graded in order for you to achieve bonus points for the exam!

We will finalize the group assignments on Tuesday, April 23th. After that, a timeslot should be assigned to your group and you can hand in the exercise. Please hand in your solution to this exercise via the Moodle “Abgabe Übung 0”.
Although the first exercise will not be graded, we want to test if Moodle and the group hand-in works properly, and you can familiarize yourself with the process.

The tutoriums will start on Wednesday, April 24th.

Again: EXERCISE 0 WILL NOT BE GRADED!

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Task 0.2: The Pigeon-Based Network (4 P)

Figure 1: Example of a carrier pigeon

A Network of Pigeons has to coordinate a considerable number of carrier pigeon's delivery operations. For data transmission between two computers of independent carrier pigeon delivery services, network infrastructure (cables, routers, etc.) is frequently replaced by specialized carrier pigeons experts (compare figure 1). One of these pigeons transports a USB flash drive with a capacity of 64 GiB, per Trip. The average speed of the pigeons is 97 km/h.
Note: 1 GiB = 1024ˆ3 bytes = 1073741824 bytes.

Using this information, please answer the following questions:

- What is the maximum distance for which the transmission rate of the pigeon-based system is higher than that of a regular data-connection (a cable) with 100 Mibit/s?
- What type of network is enabled by the pigeon-based network (connection-oriented vs. connectionless)? Please justify your answer BRIEFLY.

Task 0.3: Message Sequence Charts (2 P)

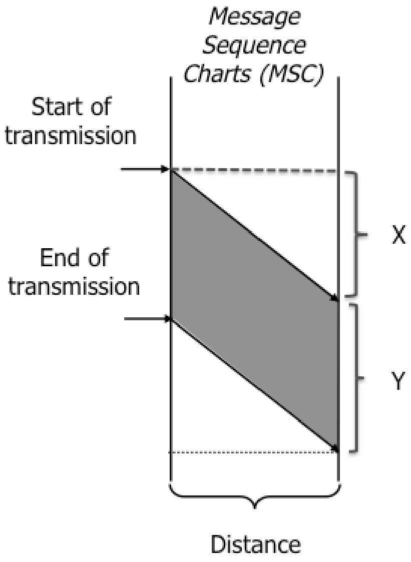

Figure 2: Example MSC

Using the graph from Figure 2, please show how the variables X and Y are computed from the parameters Propagation delay ***d***, Data rate ***r*** and Data size ***p***.

Task 0.4: Basic Principles of Networks (5 P)

Please define BRIEFLY and in your own words the principles of the following 4 concepts:

1. Simplex
2. Half-Duplex
3. Duplex
4. Multiplexing

Please answer the following questions:

1. What is the difference between circuit switching and packet switching?

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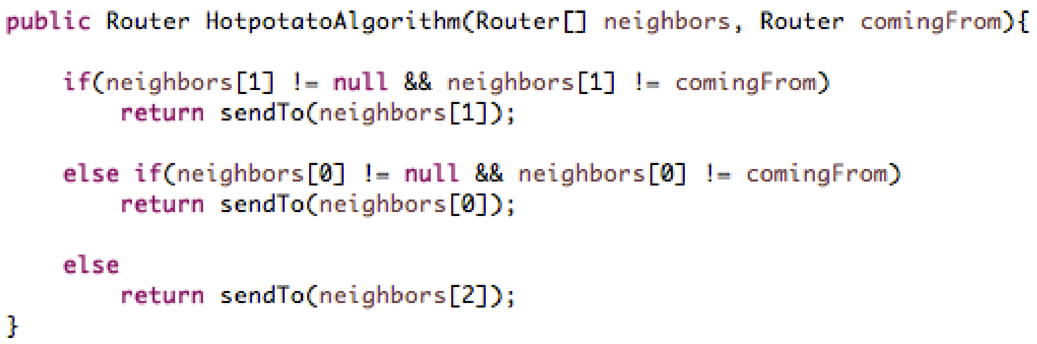
Task 0.5: Hot potato routing (5 P)

1. What is hot potato routing? Explain BRIEFLY in one or two sentences. (1 P)
2. In the following Figure 3 you can see an example of a network with 6 routers. Please write down which route the package takes from 1 to 6 when you use the hot potato routing algorithm.
   Note: The Router array is sorted by descending router ID. (2 P)



```
public Router HotpotatoAlgorithm(Router[] neighbors, Router comingFrom){

    if(neighbors[1] != null && neighbors[1] != comingFrom)
        return sendTo(neighbors[1]);

    else if(neighbors[0] != null && neighbors[0] != comingFrom)
        return sendTo(neighbors[0]);

    else
        return sendTo(neighbors[2]);
}
```

3. Which problem could appear when the hot potato algorithm always sends packages via stateless routing without cost metric? Show also what happens if you send a package from 6 to 1. (2 P)

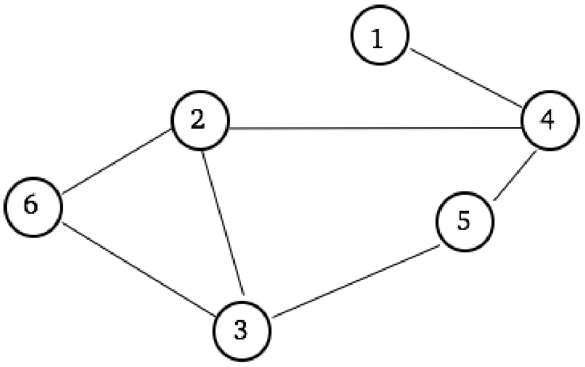


Figure 3: Hot potato routing network