



**TK1: Distributed Systems -
Programming & Algorithms**

**6. Programming Assignment
Submission Date: 09.02.2014**

Prof. Dr. Max Mühlhäuser
Dr. Immanuel Schweizer

Dr. Benedikt Schmidt
Dipl.-Wirtsch.-Inform. Axel Schulz

TELEKOOPERATION
Fachbereich Informatik
Hochschulstr. 10
64289 Darmstadt

By handing in a solution you confirm that you are the exclusive author(s) of all the materials. Additional information can be found here: <http://www.informatik.tu-darmstadt.de/de/studierende/studium-alt/plagiarismus/>

Task 1 'Snapshot'-Algorithm by Chandy and Lamport (20P)

Implement a distributed account system with three different accounts. The system shall allow for determining its global state by utilizing the **'Snapshot'-algorithm by Chandy and Lamport**. The overall system is initialized with a random amount of money and with three accounts. The **accounts** are to be implemented as **separate processes**. Furthermore, they randomly send messages to each other: each message contains a random amount of money but **must not** lead to a negative account balance.

Implement a specific **FIFO** queue for each communication channel to simulate the communication delays. The queue thus delays the message delivery. For this purpose, you will need a specific thread, which sends the first element of the queue after having slept for a random amount of time. The communication shall be carried out through **UDP sockets**.

The money transactions shall be visualized in a GUI in a separate process. The GUI shall also allow starting the simulation. The GUI needs to implement **three buttons** (cf. Figure 1), enabling the sending of a **marker message** to one of the three processes manually. Sending the message then starts the **'Snapshot'-algorithm**. The result of the algorithm shall then be output in an **info** panel.



Summary:

- Account system with three processes
- Random account movement without negative account balance
- GUI with info panel (text area) and three buttons.
- Clicking on each button starts the 'Snapshot'-Algorithm
- The result is shown in the info panel
- Every account movement is shown in the info window

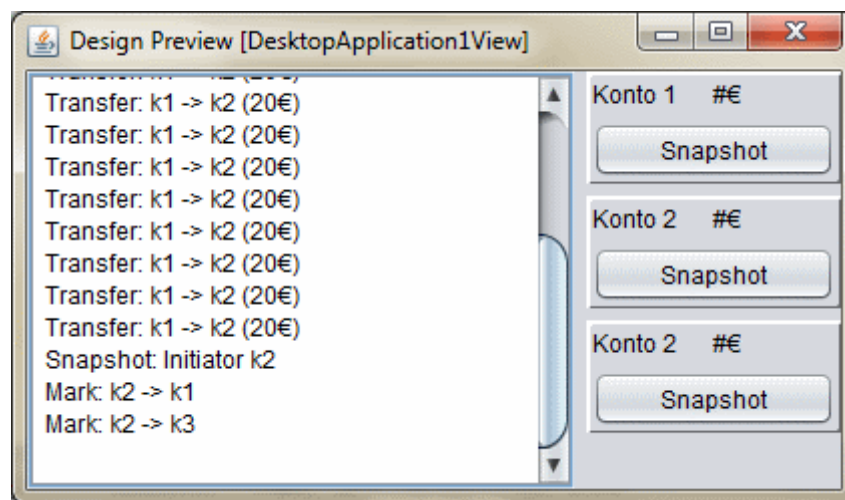


Figure 1: Screenshot of the GUI, which is to be implemented