TECHNISCHE UNIVERSITÄT DARMSTADT

TK1: Distributed Systems - Programming & Algorithms

4. Programming Assignment
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Task 1 Time synchronization using NTP (20P)

Develop a Java-based client/server application that calculates the time difference between the system clocks of both client and server. Use the NTP time synchronization protocol (cf. NTP slide set, which will be provided soon) over a TCP connection. Create a *timeserver* and a *timeclient*. You can use the skeleton code provided in the file "Prak4 NTP – Skeleton." Consider the following points:

- The client automatically starts the measurements after it got started.
- The server uses threads (1 thread per connection).
- In each measurement, calculate and display the values o_i and d_i, as shown in the lecture.
- The measurement is to be carried out ten times. Wait 300ms between two measurements.
- Finally, the client prints the selected time difference and the corresponding accuracy of the approximation.
- Assume an artificial offset of 1200ms for the server. In addition, implement a random delay between 10ms and 100ms on server and client side to simulate the communication more realistically (this is the case, when both client and server are started on the same computer).
- You do not need to provide a graphical user interface.