TECHNISCHE UNIVERSITÄT DARMSTADT

TK1: Distributed Systems - Programming & Algorithms

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

Create a client/server application in Java which calculates the time difference between the system clocks of both client and server. Use the NTP time synchronization protocol (cf. NTP slide set, by mid of week you find it in TK1-3.2-DistAlgo-Synchronization, p. 13 et seqq.) over a TCP connection. Create a *timeserver* and a *timeclient*. You can use the skeleton code provided in file *Prak5 NTP – Skeleton*. Consider the following points:

- The server uses threads (1 thread per connection)
- 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 500 ms between two measurements. Display the time difference o_i with minimal d_i as solution at the end.
- Assume an artificial offset of 1000 ms for the server. In addition, implement a random delay between 10 ms and 100 ms 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).

Grading:

- Basic Requirements: Working ANT Script
- Measurement with code possible (10 points)
- Ten measurements are executed (5 points)
- Artificial offset is considered (5 points)