

Homework 5

Due October 11, 2024

50 pts

Problem 1:

The Google new TrueTime API exposes clock uncertainty (up to $\Delta = 10$ ms) in comparisons of time-stamps. When a transaction with time-stamp τ arrives at a server, the server waits until time $\tau + \Delta + \delta_{\text{trans}}$ where δ_{trans} is the maximum transmission time in order to make sure that no transaction with a previous timestamp arrives. This guarantees that the scenario where a transaction with timestamp τ is executed only to have a transaction with timestamp $\tau_0 < \tau$ arrives.

- (a) If transactions can be rolled back, what is a better way to deal with this problem.
- (b) What should be done in the original protocol when a transaction with time stamp τ_1 arrives such that neither $\tau < \tau_1$ nor $\tau_1 < \tau$. Obviously, the two transactions need to be rejected. But how can we avoid an almost immediate repetition?

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Problem 2:

We saw in class how gossiping can be used to calculate the average of values at a set of peers. Assume a set of 1000 peers with values. Create histograms (Spreadsheet or Matplotlib.pyplot / Seaborn) of the values after 2500, 5000, 7500, and 10,000 gossip exchange. Use simulation.