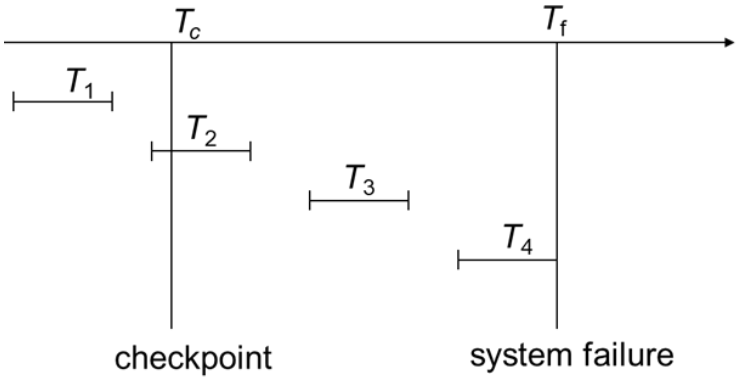
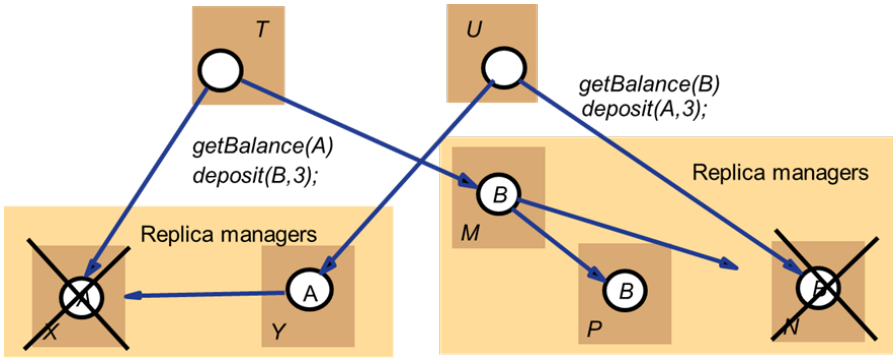
# Exercise 9

1. In the following figure the first vertical line Tc denotes the point where checkpointing was done and the second on the right, Tf, is where a system crash occurs. Please discuss what would change if the checkpointing was done right at the beginning of each transaction instead of the following case in the figure.




2. Discuss how timestamp strategy differs in concurrency control w.r.t its original form in distributed transactions.

3. Given the two following transactions T and U that run on replica managers X, Y, M, P, and N, we have seen in class a simple version of the Available Copies strategy that would not work. First review the problem that would occur if X and N were to crash during execution. Then state the solution that we have discussed in class. Last but not least, discuss what would happen under the final solution, if rather than X and N becoming unavailable we have the following scenario: If Y were to become unavailable during the execution and right after U accessed A at Y, but X and N do not fail, rest of the assumptions of this scenario is the same as we discussed in class.




4. Assume a two-phase commit involves a coordinator and three participants, P1, P2 and P3. What would happen in the following scenarios?

   - Scenario 1: The coordinator crashed after receiving a 'yes' vote from all participants.
   - Scenario 2: P1 and P2 voted yes and P3 voted no.
   - Scenario 3: P2 crashed when it was about to send a vote message to the coordinator.