Concurrent Systems

In a proposed, next-generation banking system a number of transactions are to be scheduled to run concurrently:

- Debit \((D)\) transactions to make payments from customer accounts to a credit card company.
- Interest \((I)\) transactions to add daily interest to customer account balances.
- Transfer \((T)\) transactions which first check whether the source account contains sufficient funds then either abort or continue the transfer from source to destination accounts. Customer \(x\) is running a \(T\) to transfer £1000 from \(A\) to \(B\). Customer \(y\) is running a \(T\) to transfer £200 from \(B\) to \(A\).

(a) Discuss the potential for interference between any of these transactions. [7 marks]

(b) Demonstrate the effect of concurrency control based on strict two-phase locking in relation to the discussion in \((a)\). [8 marks]

(c) Comment on the scope of concurrency control in relation to the discussion in \((a)\). [5 marks]

[Hint: you may assume that operations on bank account objects, such as debit, credit and add-interest are atomic.]