Lab 9. Transaction Management

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Question 1A: One technique is locking, a form of optimistic and pessimistic concurrency. In the context of pessimistic concurrency, locking is used in a pre-emptive way to limit the simultaenity of transaction execution. The locks indicate which transactions are allowed to access which data at a certain time. However in optimistic concurrency, locks are used instead to detect conflicts during transaction execution that need to be resolved before transaction commit. For example, a transaction ran into a dirty read error. Another technique is timestamping where timestamps are attributes with read and write transactions and makes it possible so that transactions can be executed in the appropriate order

Question 1B:

time	John	Martha
t1	Read amount $1000	Read amount
t2	Amount - 200	Amount - 300
t3	Write amount	Write amount
t4	End transaction	End transaction

Question 1C: It is not serializable because the precedence graph contains a cycle.

Serial Schedule 1: T1 -> T2 -> T3 -> T4

John and Marsha's experience: Both read X, then John withdraws $200 and Marsha withdraws $300. John then updates the balance to $800, followed by Marsha updating the balance to $700.

Serial Schedule 3: T1 -> T2 -> T4 -> T3

John and Marsha's experience: John reads X, followed by both reading X. Then, John updates the balance to $800, and finally, Marsha updates the balance to $700. This could lead to inconsistencies if Marsha's update is not based on the latest balance.

Question 2A:

time	Serial	
t1	Begin	
t2	Update CourseGrade	
t3	Set Total Score	
t4	Update Exam	
t5	Set MidtermExam Score	
t6	Update Exam	
t7	Set FinalExam Score	
t8	End	
t9		Begin
t10		Update CourseGrade
t11		Set Total Score
t12		Update Exam
t13		Set MidtermExam Score
t14		Update Exam
t15		Set FinalExam Score
t16		End

Question 2B:

time	Serializable	
t1	Begin	
t2	Update CourseGrade	
t3	Set Total Score	
t4	Update Exam	
t5	Set MidtermExam Score	
t6		Begin
t7		Update CourseGrade
t8		Set Total Score
t9		Update Exam
t10		Set MidtermExam Score
t11		Update Exam
t12		Set FinalExam Score
t13		End
t14	Update Exam	
t15	Set FinalExam Score	
t16	End	