

CS 4320, Question 2

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1. (a) X2(B) S2(A) R2(A) U2(A) S1(A) W1(A) UCommit1(A) W2(B) S2(A)
R2(A) U2(A) UCommit2(B)

(b) Yes. The transaction using S2PL(SX) (eg T1) acquires all its locks before it begins its first read and only releases it after it commits. This means that the transaction T1 holds the locks of the objects that it reads at least until after it has finished its final read. Other transactions hence are unable to make any changes to the objects read by T1, while T1 is in the process of its transaction. Therefore, the data that T1 reads is guaranteed to be unmodified by other transactions, and hence sees no unrepeatable reads.

(c) No. Since 2PL(SX) + S(X) still uses the 2-phase locking protocol, it must obtain all its read locks in the first phase and release it all in the second phase. This means that T must be holding onto its read locks from the period before it reads the object and until it carries out its final read on the object. Hence, other transactions cannot make any modifications on the object during this time, which implies that T sees no unrepeatable reads since the data read will be the same.

2.
 1. Doesn't abort
 2. Doesn't abort
 3. Aborts
 4. Doesn't abort
 5. Aborts (T3)
 6. Doesn't abort