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Homework 4

Part1

Question 1.

a)

T1				R(X)		R(Y)	W(X)
T2	R(X)	R(Y)	W(X)		W(Y)		

R(X) in T1 causes a write-read conflict (read uncommitted data modified by T2)

b)

T1			R(X)	R(Y)	W(X)		
T2	R(X)	R(Y)				W(X)	W(Y)

W(X) in T1 causes a read-write conflict (unrepeatable read on data X)

c)

T1			R(X)	R(Y)	W(X)		
T2	R(X)	R(Y)				W(X)	W(Y)

W(X) in T2 causes a write-write conflict (uncommitted data was overwritten by T2)

d)
With the help of Strict 2PL:

write-read conflict can be prevented because once T2 is holding the exclusive lock on X, T1 cannot request a shared lock on X. Thus, T1 would have to wait until T2 was done.

read-write conflict can be prevented because once T2 is holding the shared lock on X, T1 cannot request an exclusive lock on X. Thus, T1 would have to wait until T2 was done.

write-write conflict can be prevented because once T1 is holding the exclusive lock on X, T2 cannot request an exclusive lock on X. Thus, T2 would have to wait until T1 was done.

Question 2.

a)

Because the transaction is simply inserting a new row in the table Catalog (No data overwritten), we do not need any lock to protect existing rows. Thus, I would use READ UNCOMMITTED.

b)

Because we are updating an existing row in the table Catalog, we would need an exclusive

lock on that row. Thus, I would use READ COMMITTED.

3.

Because we are using an aggregate function to count the total number, we would need to protect the table Catalog from any insertion or deletion, I would need to use SERIALIZABLE.

4.

Because we are using an aggregate function to find the lowest price, we would need to protect the table Catalog from any insertion or deletion, I would need to use SERIALIZABLE.

Part2

Question 1.

a) It is not conflict serializable and not view serializable.

b) It is both conflict-serializable and view-serializable.

c) It is both conflict-serializable and view-serializable.

d) It is not conflict serializable and not view serializable.

e) It is not conflict serializable, but it is view serializable.

Question 2:

a) Recoverable and serializable:

T1	W(A)	W(B)	C			
T2				W(A)	R(B)	C

b) Recoverable and not serializable

T1	W(A)	W(B)			C	
T2			W(A)	R(B)		C

c) Not recoverable and serializable

T1	W(A)	W(B)				C
T2			W(A)	R(B)	C	

Part3

Question 1.

LSN	LOG	PrevLSN	undonextLSN
00	update: T1 writes P2		
10	update: T1 writes P1	00	00
20	update: T2 writes P5		
30	update: T3 writes P3		
40	T3 commit	30	Not a update log record
50	update: T2 writes P5	20	20
60	update: T2 writes P5	50	50
70	T2 abort	60	Not a update log record

Question 2.

First, restore P3 to the before-image stored in LSN60.

Second, restore P5 to before-image stored in LSN50.

Third, restore P5 to before-image stored in LSN20.

Question 3.

LSN	PrevLSN	undonextLSN	transID	pageID	type
80	70	50	T2	P5	CLR
90	80	20	T2	P5	CLR
100	90		T2	P5	CLR
110	100		T2		END