

National University of Computer and Emerging Sciences, Lahore Campus



Course:
Program:
Instructor:

Database Systems
BS(Computer Science)
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Practice Problem:

Transactions - **SOLUTION**

Q1. Determine whether each schedule is strict, cascadeless, recoverable, or non-recoverable. Provide proper reason.

S1: r1(X); w1(X); r1(Y); w1(Y); r2(X); C1; w2(X); C2.

S2: r1(X); r2(X); w1(X); r1(Y); w1(Y); w2(X); C1; C2.

S3: r1(X); r2(X); w1(X); r1(Y); w1(Y); C1; w2(X); C2.

S4: r2(X); r1(X); w2(X); C2; w1(X); r1(Y); w1(Y); C1.

S5: r1(X); w1(X); r1(Y); w1(Y); r2(X); w2(X); C2; C1.

ANSWER:

S1: r1(X); w1(X); r1(Y); w1(Y); r2(X); C1; w2(X); C2; RECOVERABLE

S2: r1(X); r2(X); w1(X); r1(Y); w1(Y); w2(X); C1; C2; CASCADELESS

S3: r1(X); r2(X); w1(X); r1(Y); w1(Y); C1; w2(X); C2; STRICT

S4: r2(X); r1(X); w2(X); C2; w1(X); r1(Y); w1(Y); C1; STRICT

S5: r1(X); w1(X); r1(Y); w1(Y); r2(X); w2(X); C2; C1; NON RECOVERABLE

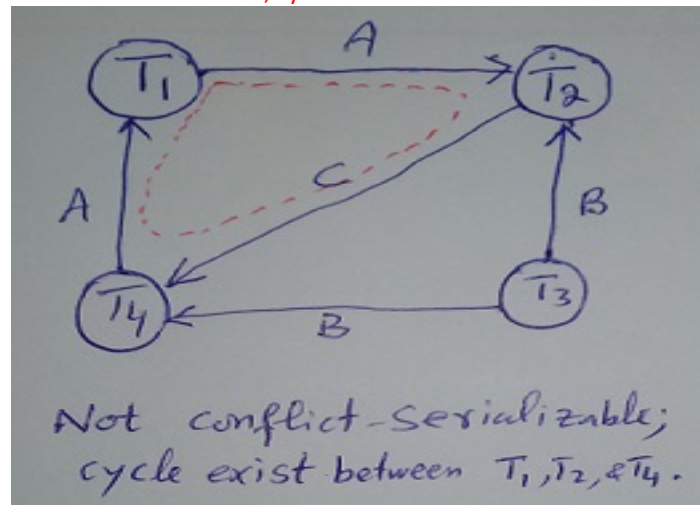
Q2. Consider the following schedule of four transactions T1, T2, T3, and T4.

S: r1(A); r4(A); w1(A); w3(B); r2(A); r2(B); w2(C); r4(B); r4(C); r2(D); r3(E).

Draw the serializability (precedence) graph for this schedule. State whether this schedule is (conflict) serializable or not. If the schedule is serializable, write down the equivalent serial schedule(s) otherwise explain why it is not.

ANSWER:

Not conflict serializable; cycle exist $T_1 \rightarrow T_2 \rightarrow T_4 \rightarrow T_1$

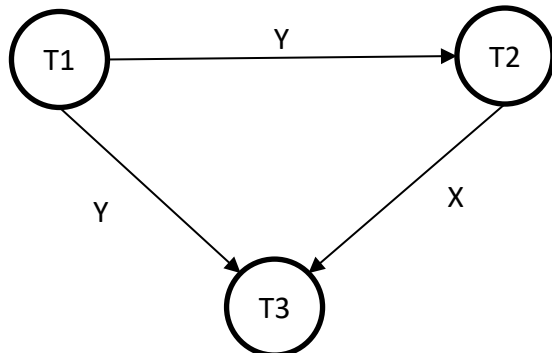


Q3. Consider the following classes of schedules: conflict-serializable, view-serializable, strict, cascadeless, recoverable and non-recoverable. For a schedule $S: r_2(X); w_3(X); w_1(Y); r_2(Y); r_2(Z); r_3(Y); c_3; c_2; r_1(Z); c_1$, state which of the preceding classes it belongs to. Give proper reason. The actions are listed in the order they are scheduled. Also draw the serializability (precedence) graph for this schedule. If the schedule is conflict-serializable, write down the equivalent serial schedule(s) otherwise explain why it is not.

ANSWER:

$S: r_2(X), w_3(X), w_1(Y), r_2(Y), r_2(Z), r_3(Y), c_3, c_2, r_1(Z), c_1$.

It is conflict-serializable and equivalent serial schedule is $T1 \rightarrow T2 \rightarrow T3$. It is also view serializable and non-recoverable as $T2/T3$ read the value of Y which is updated by $T1$ and $T3/T2$ commit before $T1$.



Q4. Given these transactions find the following schedules (if possible):

$T1: r_1(A); r_1(B); w_1(B); w_1(A); c_1;$

$T2: r_2(B); w_2(B); c_2;$

$T3: r_3(B); w_3(B); B=B+2; w_3(B); c_3;$

a) A recoverable schedule with cascade-rollback and lost update problem.

b) A cascade-free but not strict schedule.

ANSWER: a)

$r_1(A);$ $r_1(B);$ $w_1(B);$ $w_1(A);$ $c_1;$	$r_2(B);$ $w_2(B);$ c_2	$r_3(B);$ $w_3(B);$ $B=B+2; w_3(B);$ c_3
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b)

$r_1(A);$ $r_1(B);$ $w_1(B);$ $w_1(A);$ $c_1;$	$r_2(B);$ $w_2(B);$ c_2	$r_3(B);$ $w_3(B);$ $B=B+2; w_3(B);$ c_3
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