Jaypee Institute of Information Technology

Database Systems & Web (15B11CI312)

Tutorial (Transaction Management)

Q.1 Which of the following schedules is (conflict) serializable? For each serializable schedule, determine the equivalent serial schedules.

a. r1(X); r3(X); w1(X); r2(X); w3(X);

b. r1(X); r3(X); w3(X); w1(X); r2(X);

c. r3(X); r2(X); w3(X); r1(X); w1(X);

d. r3(X); r2(X); r1(X); w3(X); w1(X);

Q.2 Consider schedules S3, S4, and S5 below. Determine whether each schedule is strict, cascadeless, recoverable, or nonrecoverable.

S3: r1 (X); r2 (Z); r1 (Z); r3 (X); r3 (Y); w1 (X); c1; w3 (Y); c3; r2 (Y); w2 (Z); w2 (Y); c2;

S4: r1 (X); r2 (Z); r1 (Z); r3 (X); r3 (Y); w1 (X); w3 (Y); r2 (Y); w2 (Z); w2 (Y); c1; c2; c3;

S5: r1 (X); r2 (Z); r3 (X); r1 (Z); r2 (Y); r3 (Y); w1 (X); c1; w2 (Z); w3 (Y); w2 (Y); c3; c2;

Q.3. Consider the following sequences of actions, listed in the order they are submitted to the DBMS:

Sequence S1: T1:R(X), T2:W(X), T2:W(Y), T3:W(Y), T1:W(Y), T1:Commit, T2:Commit, T3:Commit
Sequence S2: T1:R(X), T2:W(Y), T2:W(X), T3:W(Y), T1:W(Y), T1:Commit, T2:Commit, T3:Commit

For each sequence and for each of the following concurrency control mechanisms, describe how the concurrency control mechanism handles the sequence. Assume that the timestamp of transaction Ti is i. For lock-based concurrency control mechanisms, add lock and unlock requests to the above sequence of actions as per the locking protocol. The DBMS processes actions in the order shown. If a transaction is blocked, assume that all of its actions are queued until it is resumed; the DBMS continues with the next action (according to the listed sequence) of an unblocked transaction.

1. Strict 2PL with timestamps used for deadlock prevention.

2. Strict 2PL with deadlock detection. (Show the waits-for graph if a deadlock cycle develops.)

3. Conservative (and strict, i.e., with locks held until end-of-transaction) 2PL.