

# CS 245 Database Systems Principles – Summer 2001

## Assignment 6

- Due Date: Monday August 13<sup>th</sup> 2001, 5 pm.
  - Submission through
    - Box Placed outside Gates 412.
    - Email solution to [masood@cs.stanford.edu](mailto:masood@cs.stanford.edu) (only pdf, ps or plain text files).
    - SITN homework delivery.
  - The deadline is hard, No Late days.
  - Do not forget to write your Leland Ids at the start of your solution.
  - State all assumptions.
  - Email questions to [cs245-staff@lists.stanford.edu](mailto:cs245-staff@lists.stanford.edu)
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### Problem 1 (10 points)

Consider the following schedule:

$S = w_3(E) \ r_1(D) \ w_2(C) \ w_3(A) \ r_1(E) \ w_1(B) \ r_1(B) \ w_2(E) \ r_4(A) \ w_4(C)$

- a) Draw the precedence graph.
- b) Is this schedule conflict serializable? If not, explain why not. If so, give the equivalent serial schedule.

### Problem 2 (10 points)

Consider the following two transactions:

$T1 = r_1(A) \ r_1(B) \ w_1(A) \ w_1(B) \ w_1(C)$

$T2 = r_2(A) \ r_2(B) \ w_2(B) \ w_2(A)$

- a) Give five different examples of conflict serializable schedules for T1 and T2 that are not serial.
- b) Give one example of a schedule for T1 and T2 that is not conflict serializable.

### Problem 3 (32 points)



(5) is strict

- a) w1(C) r2(A) w2(A) r1(A) w1(A) C1 C2
- b) w1(C) r2(A) w2(A) r1(A) w1(A) C2 C1
- c) w1(C) r2(A) w2(A) C2 r1(A) w1(A) C1
- d) w1(C) r2(A) r1(A) w2(A) w1(A) C2 C1
- e) w2(C) r2(A) w2(A) w1(C) C2 r1(A) C1

### Problem 5 (20 points)

In the following sequences of events, we use  $R_i(X)$  to mean “transaction  $T_i$  starts, and its read set is the list of the database elements  $X$ .” Also,  $V_i$  means “ $T_i$  attempts to validate,” and  $W_i(X)$  means that “ $T_i$  finishes, and its write set was  $X$ .” State what happens when each sequence is processed by a validation-based scheduler. In particular, for each  $V_j$  action, indicate if the validation is successful or not.

- a)  $R_1(B,C); R_2(A, C); R_3(C); V_1; V_2; V_3; W_1(A); W_2(C); W_3(B);$
- b)  $R_1(B,C); R_2(A, C); V_1; W_1(A); R_3(A); V_2; V_3; W_2(C); W_3(B);$

### Problem 6 (3 points)

True or false:

- a) Deadlocks can occur with validation scheduling.
- b) In validation scheduling, one equivalent serial order of a schedule is the order in which the transactions are validated.
- c) In a two-phase locking scheduler, one equivalent serial order of a schedule is the order of the “shrink” points of transactions (the “shrink” point of a transaction is the first time the transaction releases a lock).