

Exercises

(Course: Database Management Systems)

Chapter 4

Introduction to Transaction Processing Concepts and Theory

1. Exercise 21.22 in the text book (“Fundamentals of Database Systems- 6th Edition”, Elmasri et al.)

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

- $r_1(X); r_3(X); w_1(X); r_2(X); w_3(X);$
- $r_1(X); r_3(X); w_3(X); w_1(X); r_2(X);$
- $r_3(X); r_2(X); w_3(X); r_1(X); w_1(X);$
- $r_3(X); r_2(X); r_1(X); w_3(X); w_1(X);$

2. Exercise 21.23 in the text book (“Fundamentals of Database Systems- 6th Edition”, Elmasri et al.)

Consider the three transactions T_1 , T_2 , and T_3 , and the schedules S_1 and S_2 given below. Draw the serializability (precedence) graphs for S_1 and S_2 , and state whether each schedule is serializable or not. If a schedule is serializable, write down the equivalent serial schedule(s).

$T_1: r_1(X); r_1(Z); w_1(X);$

$T_2: r_2(Z); r_2(Y); w_2(Z); w_2(Y);$

$T_3: r_3(X); r_3(Y); w_3(Y);$

$S_1: r_1(X); r_2(Z); r_1(Z); r_3(X); r_3(Y); w_1(X); w_3(Y); r_2(Y); w_2(Z); w_2(Y);$

$S_2: r_1(X); r_2(Z); r_3(X); r_1(Z); r_2(Y); r_3(Y); w_1(X); w_2(Z); w_3(Y); w_2(Y);$

3. Given two following transactions:

$T_1: r_1(A); w_1(A); r_1(B); w_1(B);$

$T_2: r_2(A); w_2(A); r_2(B); w_2(B);$

Prove that the schedule:

$S: r_1(A); w_1(A); r_2(A); w_2(A); r_1(B); w_1(B); r_2(B); w_2(B);$

is conflict-serializable. (Hint: reordering the nonconflicting operations in S until we form the equivalent serial schedule)

4. Consider the three transactions T_1 , T_2 , and T_3 , and the schedules S_1 and S_2 given below. Draw the serializability graph for S_1 and S_2 , and state whether each schedule is conflict-serializable or not. If a schedule is conflict-serializable, write down the equivalent serial schedule.

$T_1: r_1(B); w_1(B);$

$T_2: r_2(A); w_2(A); r_2(B); w_2(B);$

$T_3: r_3(A); w_3(A);$

$S_1: r_2(A); r_1(B); w_2(A); r_3(A); w_1(B); w_3(A); r_2(B); w_2(B);$

$S_2: r_2(A); r_1(B); w_2(A); r_2(B); r_3(A); w_1(B); w_3(A); w_2(B);$