Databases II
2019-11-28

Exercise 1

We have the following two transactions:
T_1: R(A)W(A)
T_2: R(B)W(B)
S: $R_1(A)R_2(B)W_1(A)W_2(B)$

Is S serializable?
Answer: Yes, since $R_2(B)$ and $W_1(A)$ are non-conflicting actions therefore their order can be changed without affecting the state of the database.
S': $R_1(A)\mathbf{W_1(A)R_2(B)}W_2(B)$

Exercise 2

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 S conflict-serializable with swaps of non-conflicting pairs of actions?

1. $R_1(A)W_1(A)R_2(A)\underline{W_2(A)R_1(B)}W_1(B)R_2(B)W_2(B)$
2. $R_1(A)W_1(A)R_2(A)R_1(B)\underline{W_2(A)W_1(B)}R_2(B)W_2(B)$
3. $R_1(A)W_1(A)\underline{R_2(A)R_1(B)}W_1(B)W_2(A)R_2(B)W_2(B)$
4. $R_1(A)W_1(A)R_1(B)\underline{R_2(A)W_1(B)}W_2(A)R_2(B)W_2(B)$
5. $R_1(A)W_1(A)R_1(B)W_1(B)R_2(A)W_2(A)R_2(B)W_2(B)$

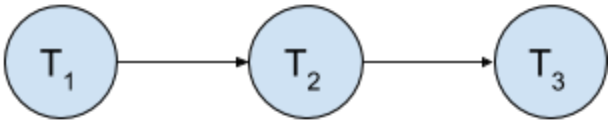
Exercise 3

What are the precedence graphs for the following schedules? Are they conflict-serializable?

S1: $R_2(A)R_1(B)W_2(A)R_3(A)W_1(B)W_3(A)R_2(B)W_2(B)$
S2: $R_2(A)R_1(B)W_2(A)R_2(B)R_3(A)W_1(B)W_3(A)W_2(B)$

1) $R_2(A)R_1(B)W_2(A)R_3(A)W_1(B)W_3(A)R_2(B)W_2(B)$

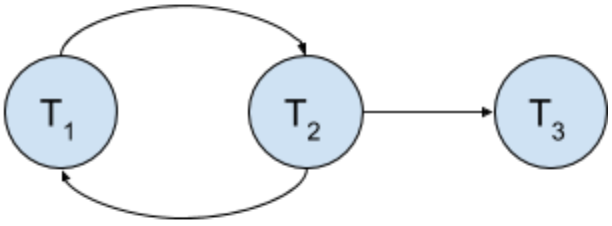
T_1	T_2	T_3
	$R_2(A)$	
$R_1(B)$		
	$W_2(A)$	
		$R_3(A)$
$W_1(B)$		
		$W_3(A)$
	$R_2(B)$	
	$W_2(B)$	



The precedence graph is acyclic, therefore it is conflict-serializable.

2) $R_2(A)R_1(B)W_2(A)R_2(B)R_3(A)W_1(B)W_3(A)W_2(B)$

T_1	T_2	T_3
	$R_2(A)$	
$R_1(B)$		
	$W_2(A)$	
	$R_2(B)$	
		$R_3(A)$
$W_1(B)$		
		$W_3(A)$
	$W_2(B)$	



The precedence graph is cyclic, therefore it is not conflict-serializable.