

# Database Management System

## Transaction & Concurrency Control

DPP 02

## [MCQ]

1. Consider the following schedule S of transaction  $T_1$ ,  $T_2$  and  $T_3$ .

**S:**  $r_1(x); r_2(x); r_3(y); w_1(x); r_2(z); r_2(y); w_2(y); w_1(z);$

Which one of the schedule below is the correct serialization of the above.

- (a)  $T_2 \rightarrow T_1 \rightarrow T_3$
- (b)  $T_3 \rightarrow T_2 \rightarrow T_1$
- (c)  $T_3 \rightarrow T_1 \rightarrow T_2$
- (d)  $T_2 \rightarrow T_3 \rightarrow T_1$

## [MCQ]

2. Consider the transactions  $T_1$ ,  $T_2$  and  $T_3$  and the schedules  $S_1$  and  $S_2$  given below.

**$T_1$ :**  $r_1(A); r_1(C); w_1(A); w_1(C)$

**$T_2$ :**  $r_2(B); r_2(C); w_2(C)$

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

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

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

Which one of the following statements about the schedule is TRUE?

- (a) Only  $S_1$  is conflict serializable.
- (b) Only  $S_2$  is conflict serializable.
- (c) Both  $S_1$  and  $S_2$  are conflict serializable.
- (d) Neither  $S_1$  nor  $S_2$  is conflict serializable.

## [MCQ]

3. Which of the following schedule is view serializable but not conflict serializable.

- (a)  $r_1(P); r_2(P); w_1(P); r_2(Q)$
- (b)  $r_1(P); w_1(P); r_2(P); w_2(Q)$
- (c)  $w_1(P); w_2(P); w_1(P); w_2(P); w_1(P)$
- (d) None of these.

## [MCQ]

4. Consider the following transactions  $T_1$  and  $T_2$ :

$T_1$	$T_2$
Read(A);	Read(A);
Update $A = A + 100$ ;	
	Update $A = A - 50$ ;
Write(A);	
	Write(A);

The above transaction has \_\_\_\_\_.

- (a) Lost update problem
- (b) Dirty read problem
- (c) Unrepeatable read problem
- (d) Incorrect summary problem

## [MCQ]

5. Consider the following schedule.

Time	$T_1$	$T_2$
$t_0$	Read Item(A);	
$t_1$		Read Item(A);
$t_2$		$A = A + X$ ;
$t_3$		Write Item(A);
$t_4$	Read Item(A);	

Which of the following concurrency problem exists in the above given schedule?

- (a) Dirty read
- (b) Unrepeatable read
- (c) Lost update
- (d) Both a and b

## [MCQ]

6. \_\_\_\_\_ Problem occurs when a transaction reads data from a database, then another transaction reads the same database data, and this particular data is deleted by an operation of the first transaction.

- (a) Dirty read
- (b) Unrepeatable read problem
- (c) Phantom read
- (d) Lost update problem

**[MCQ]**

7. Consider a schedule S:

$r_1(x), r_2(y), w_2(x), w_3(z), r_4(z), r_3(x), w_3(y), r_4(x), w_4(y)$

Choose the correct statements for the above schedule S.

- (a) The schedule S is not serializable.
- (b) The schedule S is conflict serializable with schedule S as  $T_1 \rightarrow T_2 \rightarrow T_3 \rightarrow T_4$ .
- (c) The schedule S is not view serializable.
- (d) None of the above.

**[MCQ]**

8. Consider the below schedule.

**S:**  $r_1(A), r_2(B), w_2(A), r_3(A), w_1(B), w_3(A)$

choose the correct statement from the following.

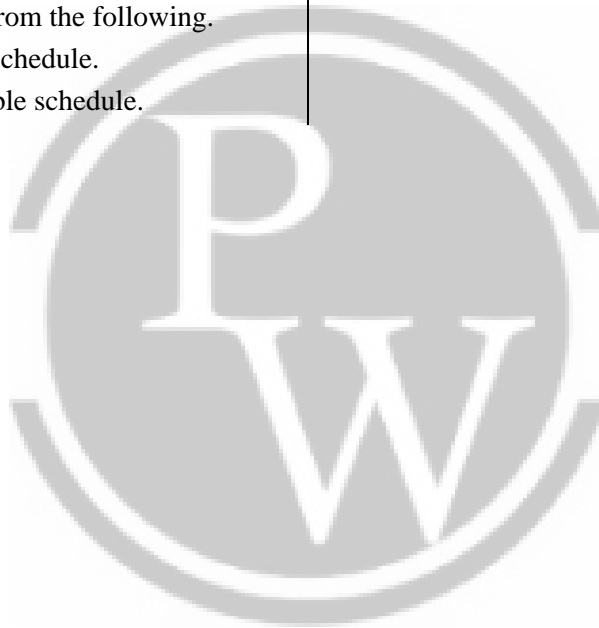
- (a) S is conflict serializable schedule.
- (b) S is not conflict serializable schedule.

- (c) S may or may not be view serializable schedule.
- (d) None of these

**[MSQ]**

9. Choose the correct statements from the following.

- (a) To test view serializability we make use of precedence graph
- (b) To test conflict serializability we make use of precedence graph.
- (c) If there exists no blind write and the schedule is not conflict serializable then we can conclude that it is not view serializable.
- (d) All of the above.



## Answer Key

1. (b)
2. (a)
3. (c)
4. (a)
5. (b)

6. (c)
7. (b)
8. (b)
9. (b, c)

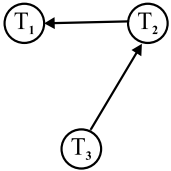


## Hints & Solutions

1. (b)

Conflict operation are

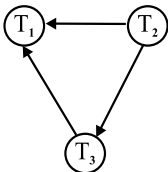
$R_2(X); W_1(X); R_3(Y); W_2(Y), R_2(Z); W_1(Z)$



From precedence graph, the correct serialization order is  $T_3 \rightarrow T_2 \rightarrow T_1$

2. (a)

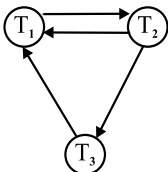
**S<sub>1</sub>:**  $r_1(A); r_3(B); r_3(A); r_2(B); r_2(C); w_3(B); w_2(C); r_1(C); w_1(A); w_1(C)$



As there is no cycle in precedence graph

$\therefore S_1$  is conflict serializable.

**S<sub>2</sub>:**  $r_1(A); r_3(B); r_2(B); r_3(A); r_1(C); r_2(C); w_3(B); w_1(A); w_2(C); w_1(C)$

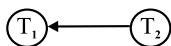


There exists a cycle hence it is not conflict serializable.

Hence,  $S_1$  is conflict serializable but  $S_2$  is not conflict serializable.

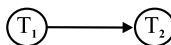
3. (c)

**A : False**



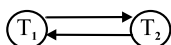
It is conflict serializable, hence it is also view serializable.

**B : False**



It is conflict serializable, hence it is also view serializable.

**C : True**



It is not conflict serializable, hence checking for view serializable.

T <sub>1</sub>	T <sub>2</sub>
W1(P)	
	W2(P)
W1(P)	
	W2(P)
W1(P)	

We check for order of read in view serializability. In order  $T_2 \rightarrow T_1$ , the schedule is view serializable.

4. (a)

The Transaction  $T_1$  first reads data A from the database then transaction  $T_2$  reads the same data from the database. Then  $T_1$  Performs an operation to add 100 to A. Then transaction  $T_2$  Performs an operation to subtract 50 from the data read by  $T_2$ . i.e., A.  $T_1$  performs a write operation to save the value of A according to changes made to  $T_1$ . Then  $T_2$  performs a write operation to update the value of A again in the DB. This situation causes changes to A made by  $T_1$  to be lost because  $T_2$  overwrites A again after  $T_1$  update A. you could also say that the update of  $T_1$  is lost.

Hence a is correct option.

5. (b)

In above schedule,  $T_1$  reads value of A and then again reads the value of A. The 1<sup>st</sup> value of A is different from other value in 2<sup>nd</sup> read.

Hence this is called unrepeatable read.

6. (c)

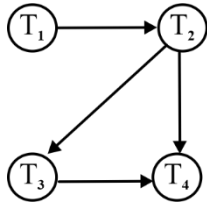
The phantom read problem arises when a transaction reads a variable once but when it tries to read the same variable again which was already deleted by other transaction, this problem known as phantom read problem.

7. (b)

T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>
r(x)	r(y) w(x)	w(z)	r(z)
		r(x) w(y)	r(x) w(y)

for conflict serializability, we check precedence graph.

Conflict serial schedule  $\Rightarrow T_1 \rightarrow T_2 \rightarrow T_3 \rightarrow T_4$

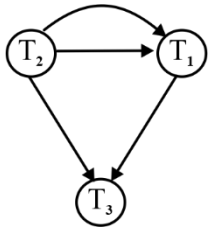


No cycle in precedence graph, therefore it is serializable

8. (b)

	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>
r(A)		r(B)	
w(B)		W(A)	
			r(A) w(A)

Precedence graph.



Cycle in the precedence graph, therefore not conflict serializable.

9. (b, c)

For checking conflict serializability we make use of precedence graph. For checking view serializability we check for 3 conditions.

1. Initial read
2. Updated read
3. Final write

If a schedule is not conflict serializable and there exists no blind write then we can conclude the schedule is not view serializable too.



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