CS & IT ENGINEERING

Database Management System

Transaction & Concurrency Control

DPP – 03 Discussion Notes

By- Vijay Agarwal sir

01 Question

02 Discussion

Q.1

[NAT]

Consider the following schedule

S: $w_1(X); w_1(Y); r_2(X); w_2(Y); r_3(X); w_3(Y)$

8 Ans

How many schedules are conflict equivalent to given schedule (S)

8 Ans ?

Case I

(i) $w_1(x)\ r_3(x)\ r_2(x)\ w_1(y)\ w_2(y)\ w_3(y)$

(ii) $w_1(x)\ r_2(x)\ r_3(x)\ w_1(y)\ w_2(y)\ w_3(y)$

(iii) $w_1(x)\ r_2(x)\ w_1(y)\ r_3(x)\ w_2(y)\ w_3(y)$

(iv) $w_1(x)\ r_2(x)\ w_1(y)\ w_2(y)\ r_3(x)\ w_3(y)$

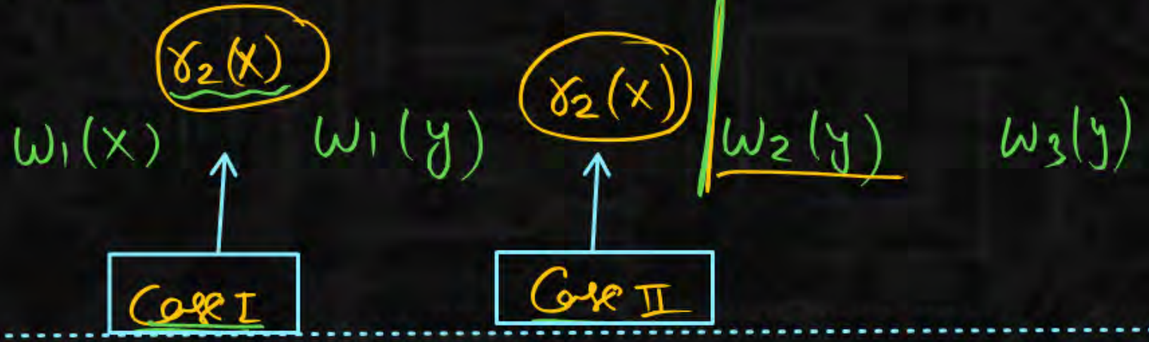
Case I ⇒ 4

Case II ⇒ 4

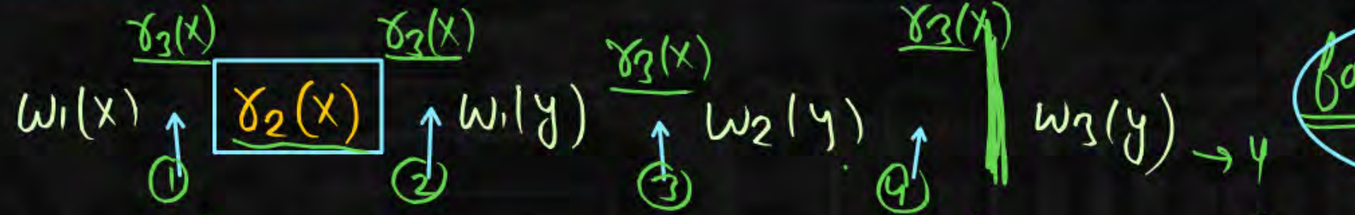
8 Ans

Soln

$r_2(x)$



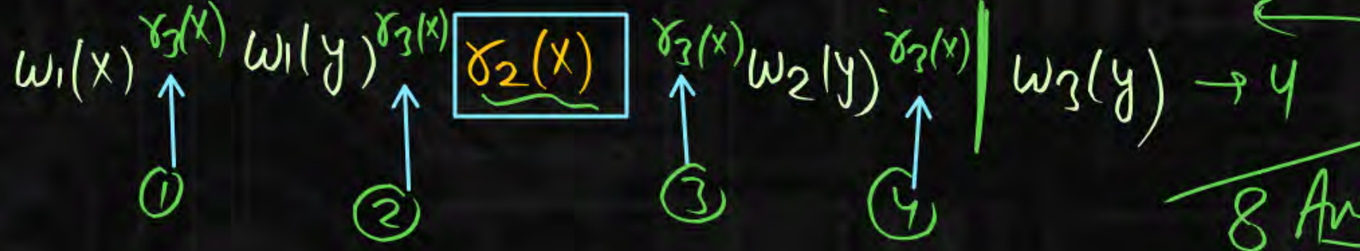
Case I



for $r_3(x)$

Case II

Now for $r_3(x)$



8 Ans

Q.2 Consider the following schedule [NAT]

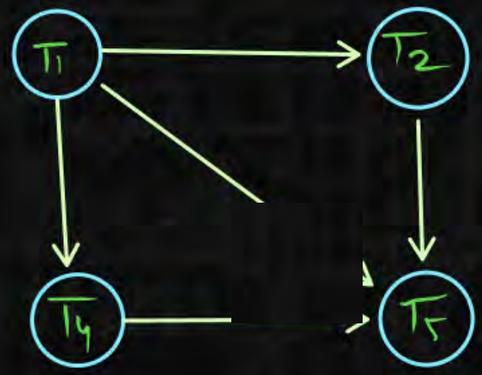
$S = r_1(P); r_3(S); w_1(Q); r_2(Q)\ r_4(Q),$

$w_2(R)\ r_5(R); w_4(T); r_5(T); w_5(Q)$

How many serial schedules conflict equal to schedules(S)?

10. Ans

10 Ans



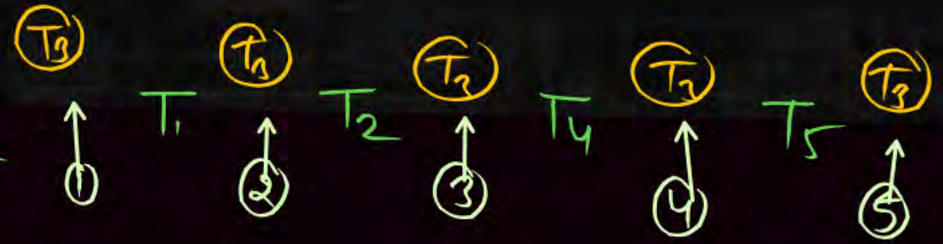
Case I T_1 T_2 T_4 T_5

(or)

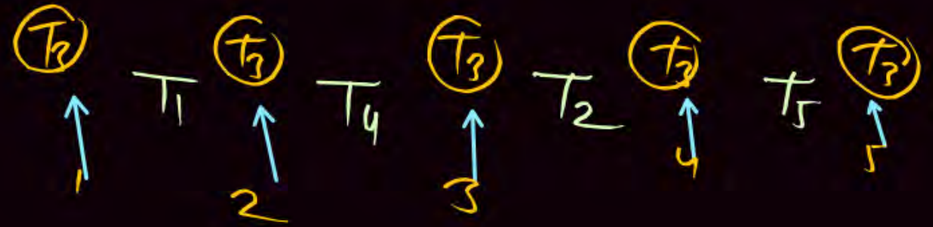
Case II T_1 T_4 T_2 T_5

for T_3

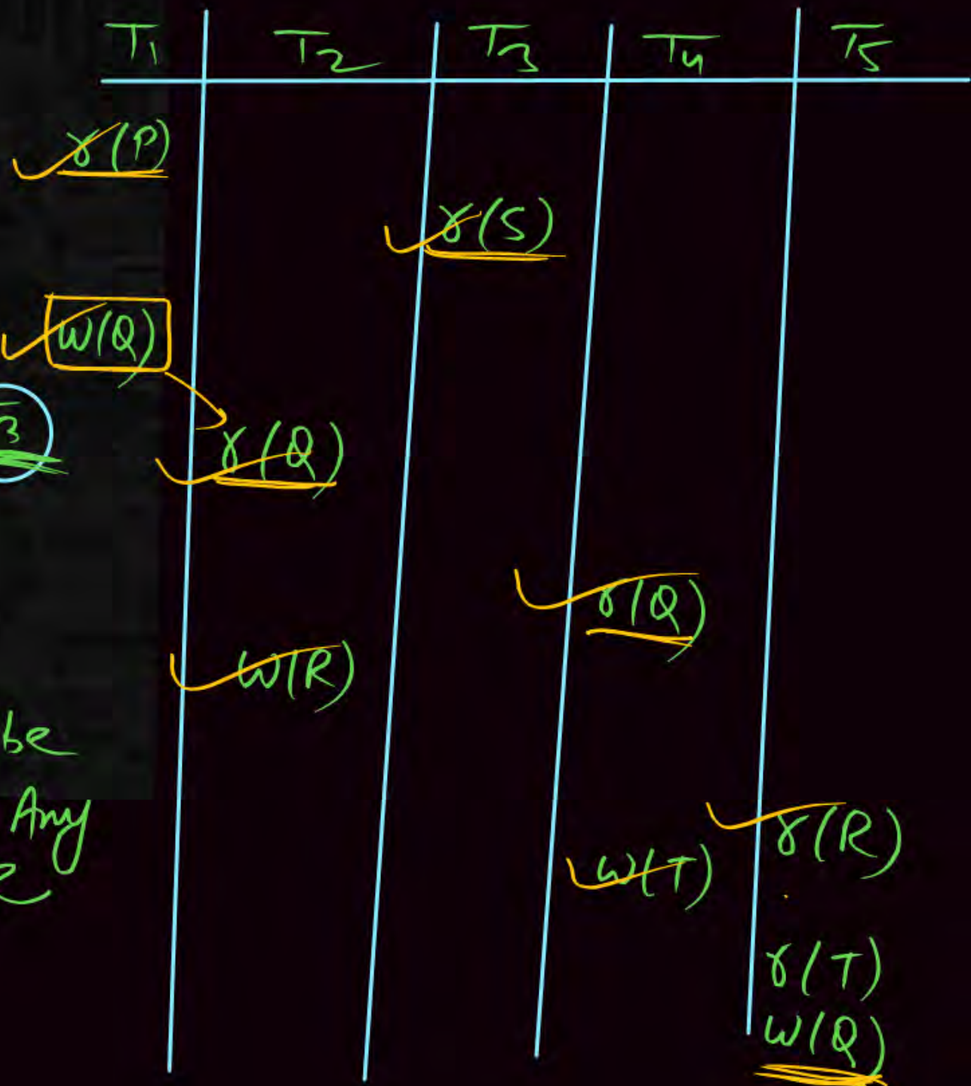
(S) ⇐ Case I



(S) ⇐ Case II

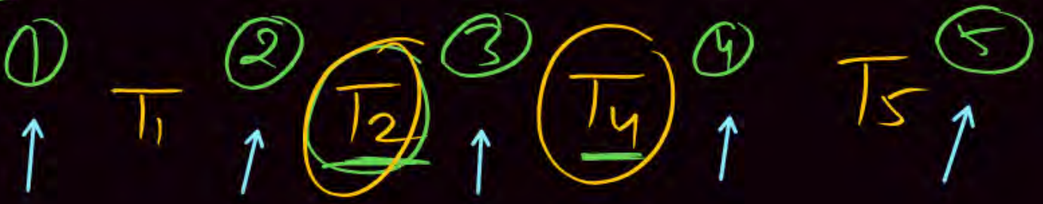


T_3 can be Placed Any where



Case I

box T_3



(i) T_3 T_1 T_2 T_4 T_5

(ii) T_1 T_3 T_2 T_4 T_5

(iii) T_1 T_2 T_3 T_4 T_5

(iv) T_1 T_2 T_4 T_3 T_5

(v) T_1 T_2 T_4 T_5 T_3

5

5+5 = 10

Box I

Case II

(i) T_3 T_1 T_4 T_2 T_5

(ii) T_1 T_3 T_4 T_2 T_5

(iii) T_1 T_4 T_3 T_2 T_5

(iv) T_1 T_4 T_2 T_3 T_5

(v) T_1 T_4 T_2 T_5 T_3

5

Q.3 Consider the following schedule [NAT]

$S = r_1(P); r_3(S); w_1(Q); r_2(Q)\ r_4(Q), w_2(R);$

$r_5(R); w_4(T); r_5(T); w_5(Q)$

10 Ans

How many serial schedules view equal to schedule(S)_____?

$T_1 \to T_5$

$T_1 \to T_2$

$T_1 \to T_4$

$T_2 \to T_5$

$T_4 \to T_5$

T_1 T_2 & T_4 T_5

① Initial Read

Data P : T_1
Item S : T_3

② Final Write

Q : $T_5 \Rightarrow T_1 \to T_5$

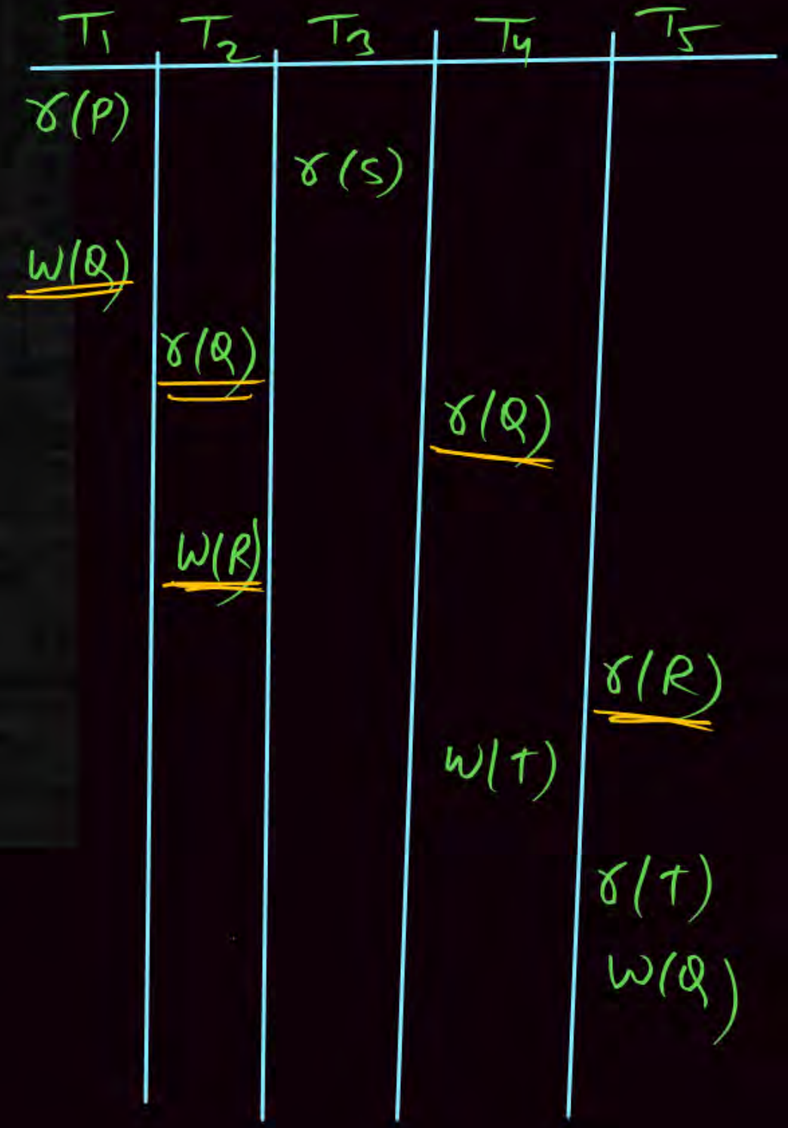
③ UPDATED Read

Q: $w_4(Q) - r_2(Q)$: $T_1 \to T_2$

$w_1(Q) - r_4(Q)$: $T_1 \to T_4$

R $w_2(R) - r_5(R)$ $T_2 \to T_5$

T: $w_4(T) - r_5(T)$ $T_4 \to T_5$



Case I T_1 T_2 T_4 T_5

Case II T_1 T_4 T_2 T_5

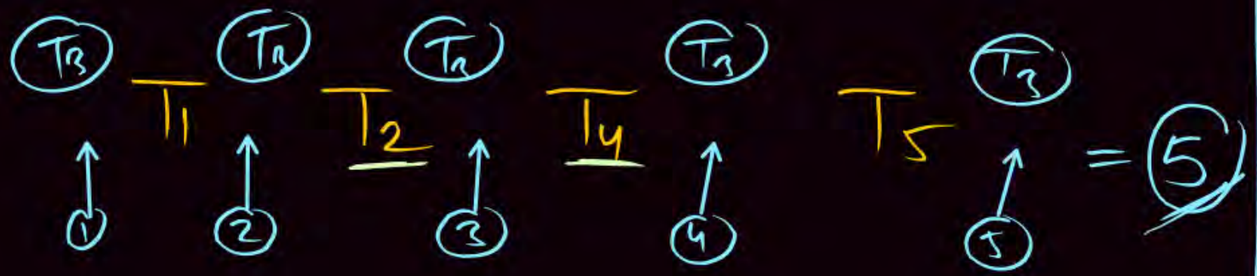
T_2 & T_4 T_3

Case I

1. T_3 T_1 T_2 T_4 T_5
2. T_1 T_3 T_2 T_4 T_5
3. T_1 T_2 T_3 T_4 T_5
4. T_1 T_2 T_4 T_3 T_5
5. T_1 T_2 T_4 T_5 T_3

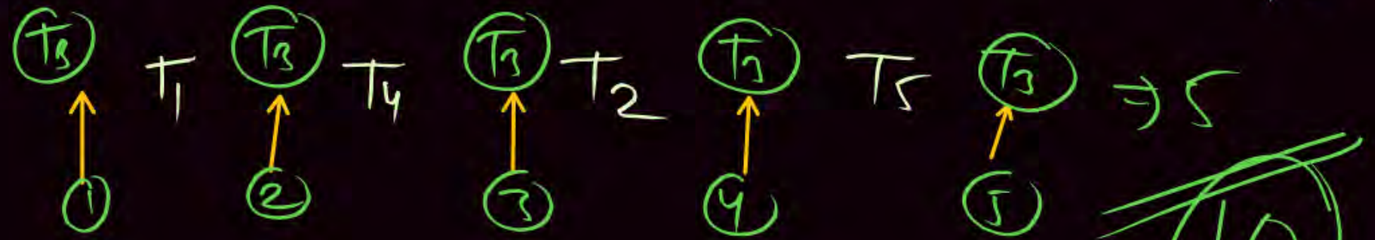
T_3

Case I



$= 5$

Case II

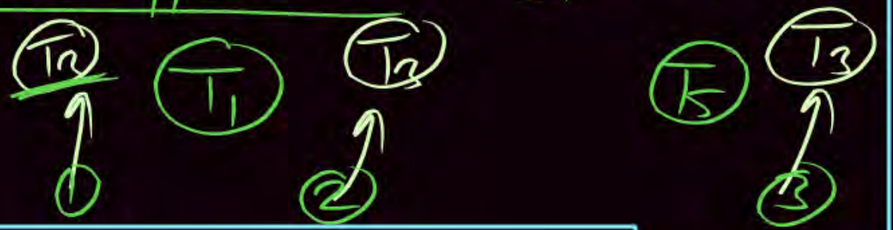


$\Rightarrow 5$

10

Another Approach

Starts from T_3



Case I T_3 T_1 T_5

Case II T_1 · T_3 · T_5

Case III T_1, T_5 T_3

for T_2 & T_4 — T_2 T_4

Case I × T_3 × T_1 ↑ T_5 ×

T_3 T_1 T_2 T_4 T_5

T_3 T_1 T_4 T_2 T_5

} 2 Way

$T_1 \to T_2$
$T_1 \to T_4$
$T_2 \to T_5$, $T_4 \to T_5$

T_2 T_4 T_3

Case II (T_2 T_4) After T_1 & Before T_5

T_1 ① T_3 ② T_5

1
- T_1 (T_2 T_4) T_3 T_5
- T_1 (T_4 T_2) T_3 T_5

2
- T_1 T_3 (T_2 T_4) T_5
- T_1 T_3 (T_4 T_2) T_5

Separately
- T_1 T_2 T_3 T_4 T_5
- T_1 T_4 T_3 T_2 T_5

} 6

for T_2 T_4 ⇒ Placed Abtd T_1 & Before T_5.

Case II

(T_2 T_4)

T_1 _ T_5 T_3

T_1 T_2 T_4 T_5 T_3

T_1 T_4 T_2 T_5 T_3] ②

Case I : 2

Case II : 6

Case III : 2

To Ans

Q.4 [MCQ]

Consider the following transactions

T_1: $r_1(P)$; $w_1(P)$; $r_1(Q)$; $w_1(Q)$ = 4

T_2: $r_2(P)$; $r_2(Q)$ = 2

T_3: $w_3(P)$; $w_3(Q)$ = 2

How many concurrent schedules between T_1, T_2 and T_3 transactions _____?

$T_1 \to n_1$
$T_2 \to n_2$
$T_3 \to n_3$

Total # Concurrent Schedule $= \frac{(n_1+n_2+n_3)!}{(n_1)!\,(n_2)!\,(n_3)!}$

$\frac{(4+2+2)!}{(4!)(2!)(2!)}$

$\Rightarrow \frac{8!}{4! \times 2 \times 2}$

$\Rightarrow \frac{8 \times 7 \times 6 \times 5 \times 4!}{4! \times 2 \times 2}$

$= 420$

A. 400

B. 410

C. 420

D. None

Ans (C)

Q.5

How many views equivalent serial schedules are possible for the given schedules below ___ (2) Ans

[NAT]

S: $w_1(P)\ r_2(P)\ w_3(P)\ r_4(P) w_5(P)\ r_6(P)$

$T_1\ T_2$ $T_3\ T_4$ final write

$W_1(P)\ R_2(P)$ $W_3(P)\ R_4(P)$ $W_5(P)\ R_6(P)$

fixed

$W_3(P)\ R_4(P)$ $W_1(P)\ R_2(P)$ $W_5(P) - R_6(P)$

① Final Write

P: T_5

② UPDATED Read

$W_1(P) - R_2(P)$: $T_1 \to T_2$

$W_3(P) - R_4(P)$ $T_3 \to T_4$

$W_5(P) - R_6(P)$ $T_5 \to T_6$

$T_1\ T_2$ $T_3\ T_4$ $T_5\ T_6$

$T_3\ T_4$ $T_1\ T_2$ $T_5\ T_6$

Ans 2

T_1	T_2	T_3	T_4	T_5	T_6
W(P)					
	R(P)				
		W(P)			
			R(P)		
				W(P)	
					R(P)

Q.6

The goal of concurrency control on database system is to [MCQ]

A. Only allow concurrent execution of transaction that correspond to serial execution of some of the transactions.

B. Allow only transactions that don't access common relationship to run concurrently.

C. Execute transactions serially.

D. None of the above.

m! Serial Schedule

m is # of Transaction

Serializable Schedule

Ans (a)

Q.7

What problem can occur when a DBMS executes multiple transactions concurrently? [MCQ]

A. Lost update problem.

B. Dirty read problem. (WR)

C. Incorrect summary problem.

D. All of the above.

Ans (D)

Problem due to Concurrent execution

① WR / Uncommitted Read / Dirty Read

② RW / Unrepeatable Read

③ WW / Lost Update Problem

④ Phantom Tuple Problem

⑤ Incorrect Summary Problem

Q.8

[MCQ]

Consider the following statements

S_1: Every view serializable schedule is conflict serializable.

S_2: Some view serializable schedules are conflict serializable.

False ← S_1

True ← S_2

A. Only S_1 is true.

B. Only S_2 is true

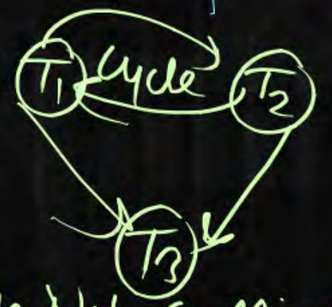
C. Both S_1 & S_2 are true

D. Neither S_1 nor S_2 is true

Ans (B).

S_1

T_1	T_2	T_3
R(A)		
	W(A)	
W(A)		
		W(A)

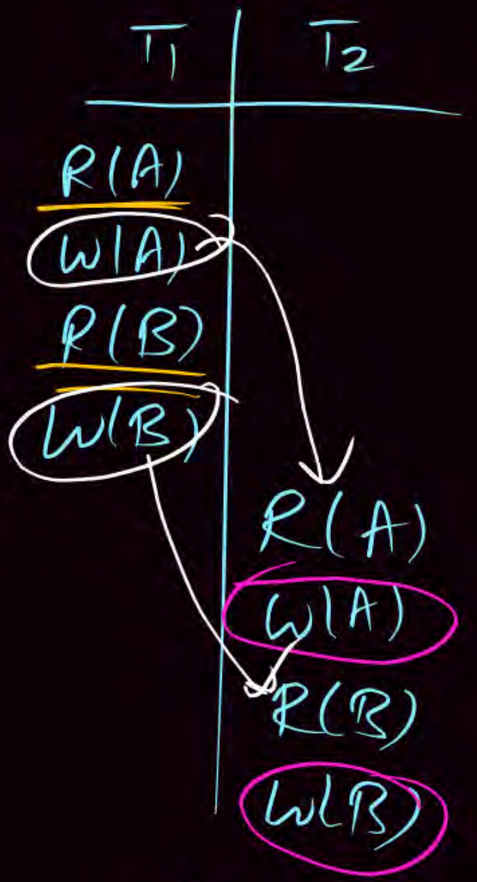


Cycle Not Conflict But View Serializable

T_1	T_2	T_3
R(A)		
W(A)		
	W(A)	
		W(A)

① Initial Read
② final write
③ write-Read

Conflict serializable



$\langle T_1\ T_2 \rangle$

① Initial Read

② final write

③ Updated Read
(Write - Read)

View serializable

$\langle T_1\ T_2 \rangle$
& Conflict serializable.

Q.9 Consider the following schedule involving two transactions

[MCQ]

S_1: $r_1(A); r_2(A); w_2(A); r_3(A); w_1(A); w_2(B); r_3(B), c_2, w_3(A); c_1, c_3$

S_2: $r_2(A); r_1(A); w_1(A); w_2(A); [illegible]; r_3(A); w_3(A), r_2(B); c_1, c_3; c_2$

Which one of the following statements is TRUE?

A. S_1 is recoverable and S_2 is not recoverable.

B. S_1 is not recoverable and S_2 is recoverable.

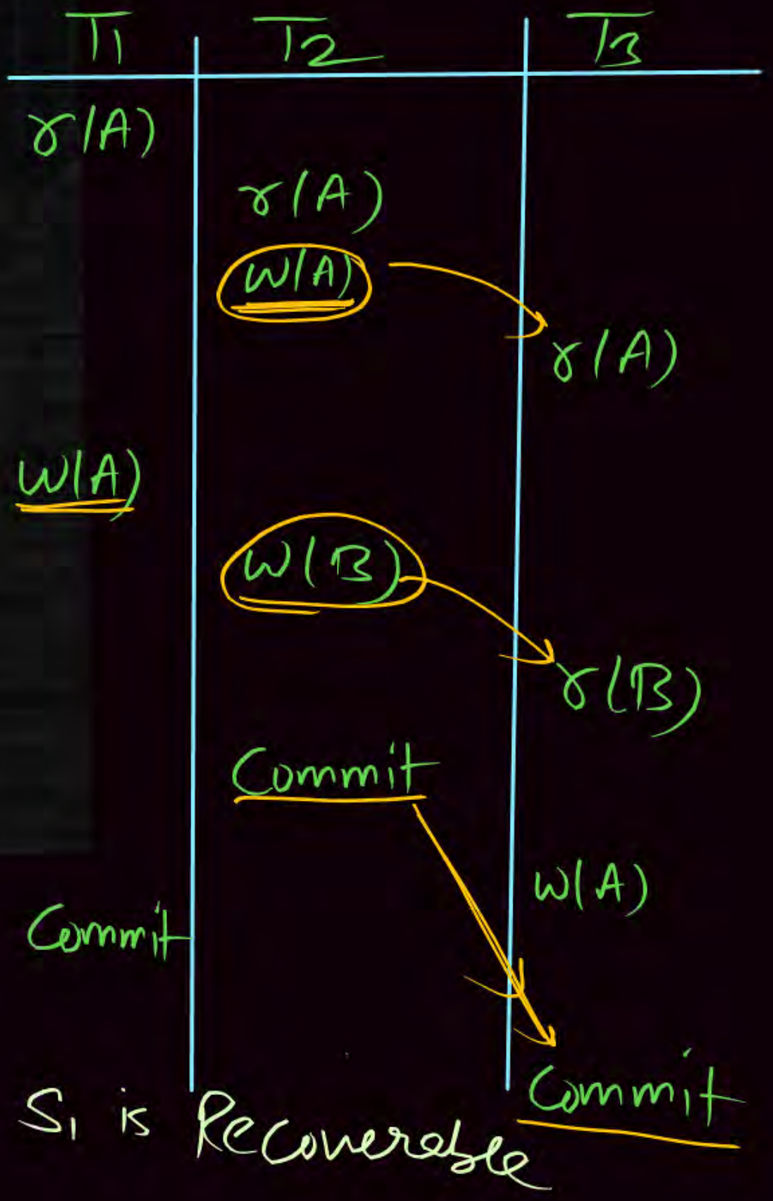
C. Both S_1 and S_2 are recoverable.

D. Both S_1 and S_2 are not recoverable.

Ans(a)

T_1	T_2
W(Q)	
	R(Q)
CIR	
	→ Commit

S_1 is Recoverable



Q.9

Consider the following schedule involving two transactions

[MCQ]

S_1: $r_1(A); r_2(A); w_2(A); r_3(A); w_1(A); w_2(B); r_3(B), c_2, w_3(A); c_1, c_3$

S_2: $r_2(A); r_1(A); w_1(A); w_2(A); [illegible]; r_3(A); w_3(A), r_2(B); c_1, c_3; c_2$

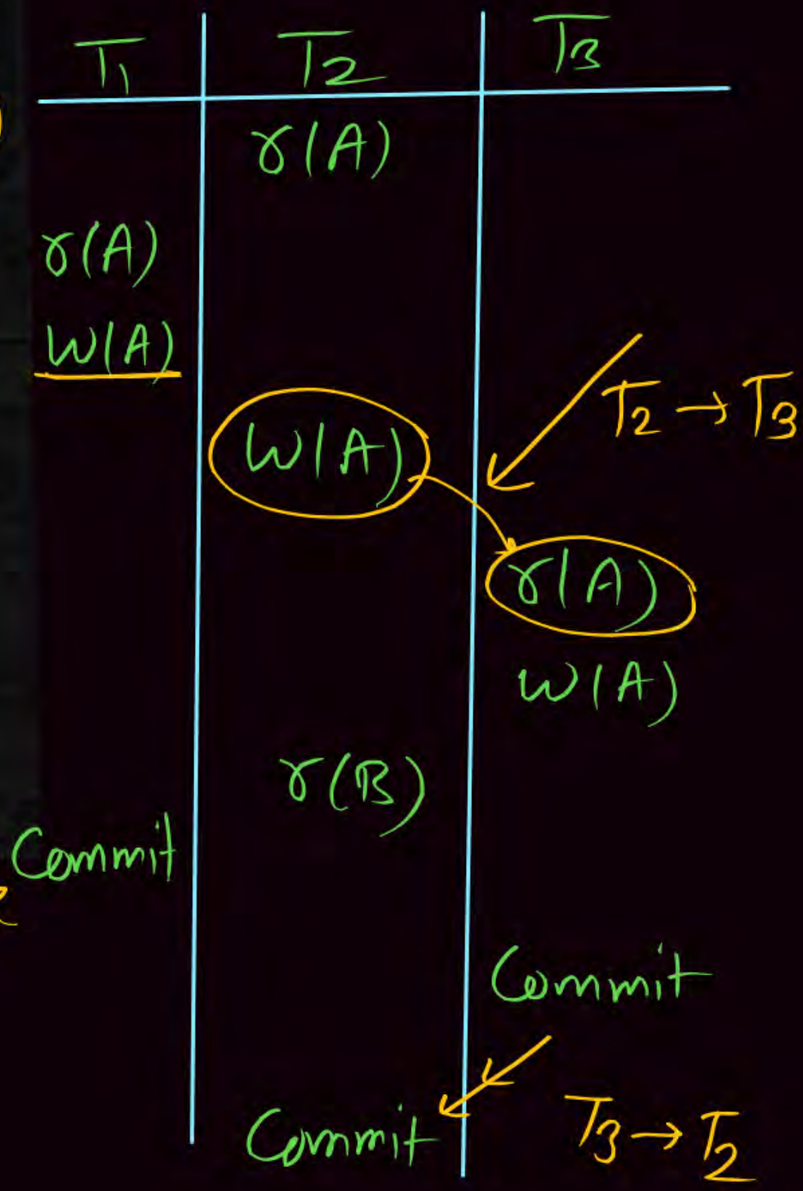
Which one of the following statements is TRUE?

A. S_1 is recoverable and S_2 is not recoverable.

B. S_1 is not recoverable and S_2 is recoverable.

C. Both S_1 and S_2 are recoverable.

D. Both S_1 and S_2 are not recoverable.



S2 is Not Recoverable

Q.10 Consider the following schedule: **[MCQ]**

S: $r_1(A); r_2(C); w_1(A); r_3(A)\ r_2(B); w_2(B), w_3(A); r_3(B); r_2(A)$

for the schedule S given above two orderings of commits (c_i) operations are specified.

I. $c_1; c_3; c_2$ **II.** $c_1; c_2; c_3$

Which of the above ordering ensures recoverability of schedule S?

A. Only I

B. Both I and II

C. Only II

D. None of these

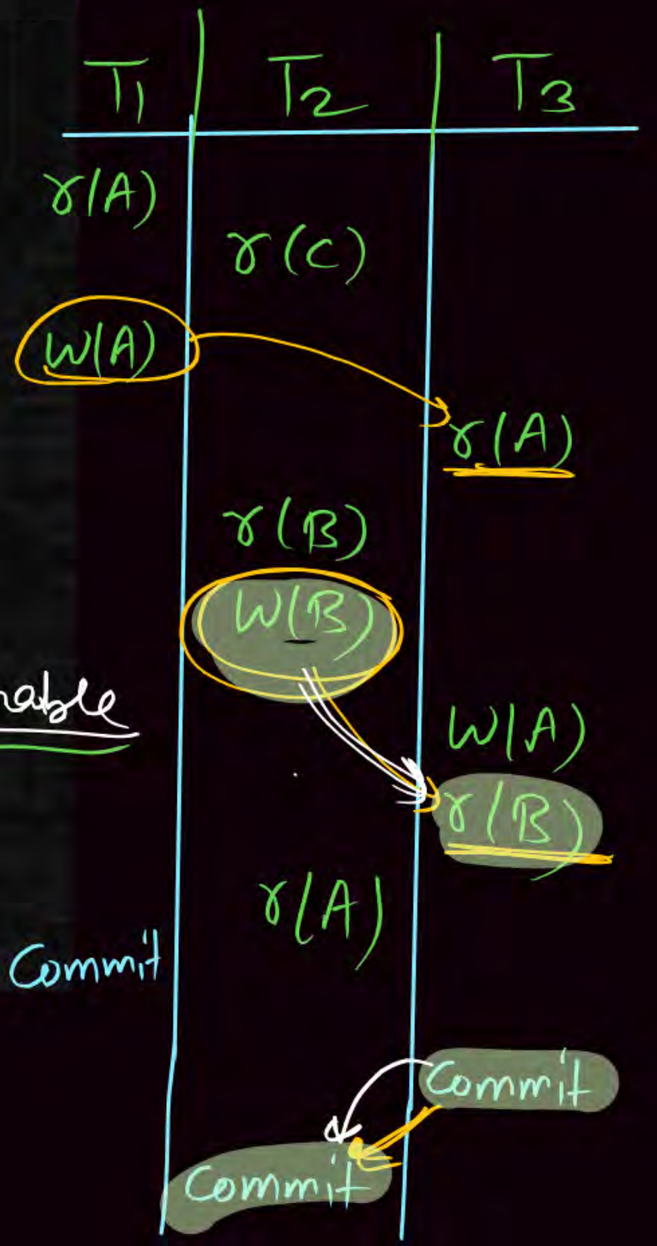
Ans (D)

I $c_1\ c_3\ c_2$

Not Recoverable

T_1	T_2
W(A)	
	R(A)
C/R	
	Commit

Recoverable



Q.10 Consider the following schedule: **[MCQ]**

S: $r_1(A); r_2(C); w_1(A); r_3(A)\ r_2(B); w_2(B), w_3(A); r_3(B); r_2(A)$

for the schedule S given above two orderings of commits (c_i) operations are specified.

I. $c_1; c_3; c_2$ **II.** $c_1; c_2; c_3$

Which of the above ordering ensures recoverability of schedule S?

(II) $c_1\ c_2\ c_3$

⇓

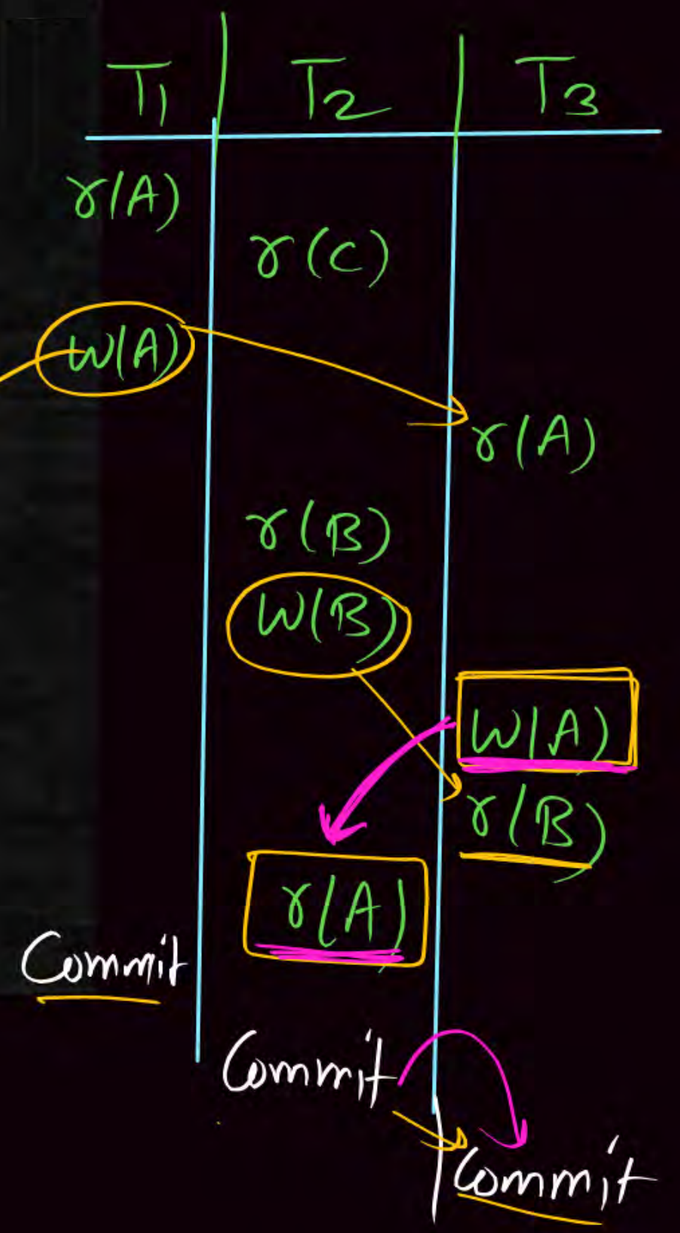
Not Recoverable

A. Only I

B. Both I and II

C. Only II

D. None of these



Q.11

[MCQ]

Consider the following partial schedule 'S' involving two transaction T_1 and T_2

Suppose that the transaction T_1 fails immediately after time instance 8.

Which one of the following is correct?

S_1: Schedule S is non recoverable and cannot ensure transaction atomicity

S_2: Only T_2 should be aborted and then restarted to ensure truncation atomicity

Time	T_1	T_2
t_0	read(P);	
t_1	write(P);	
t_2		read(R);
t_3		write(R);
t_4		read(Q);
t_5		write(Q);
t_6		read(P);
t_7		commit;
t_8	read(Q);	

Not Recoverable

A. Only S_1 is true

B. Only S_2 is true

C. Both S_1 and S_2 are true

D. Both S_1 and S_2 are false

Ans (a).


THANK YOU GW
SOLDIERS !