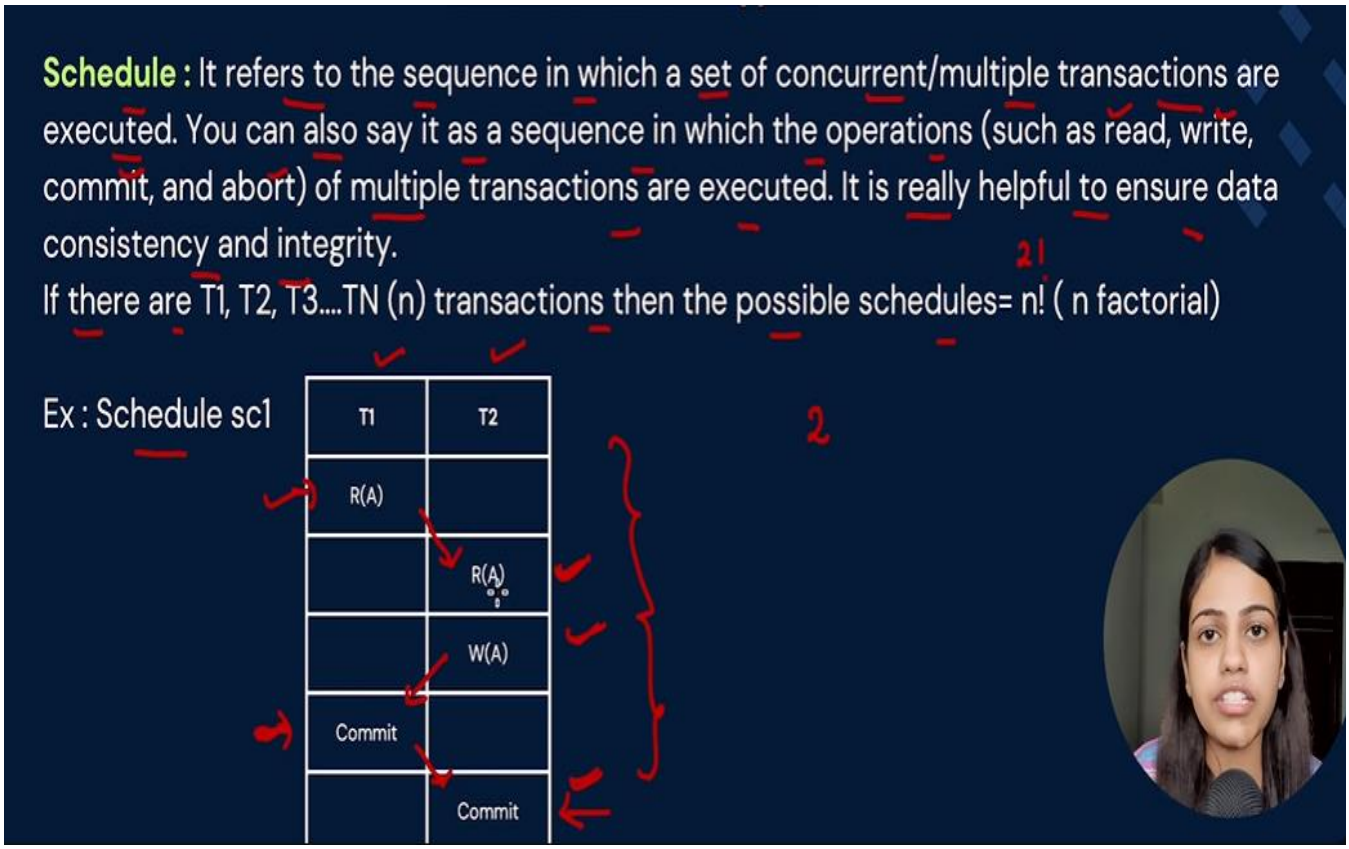
Schedule



- **Incomplete Schedule:** An incomplete schedule is one where not all transactions have reached their final state of either commit or abort.
- **Complete Schedule:** A complete schedule is one where all the transactions in the schedule have either committed or aborted.

Types of Schedule

1. Serial Schedule:

1.Serial Schedule : A serial schedule is one where transactions are executed one after another. We can say it like if there are two transactions T1 and T2, T1 should commit to completeion before T2 starts.

T1	T2
R(A)	
W(A)	
Commit	
	R(B)
	W(B)
	Commit

Example : T1->T2
T1:Read(A)
T1:Write(A)
T1:COMMIT(T1)
T2:Read(B)
T2:Write(B)
T2:COMMIT(T2)

T2 starts only after T1 is completed/ commited.

Serial Schedule

Advantages :

1. It follows the ACID properties. Transactions are isolated from each other.
2. It maintains consistency.

Challenges:

1. Since there is poor throughput(no of transactions completed per unit time) and memory utilisation, this is not suggested as it can be can be inefficient.
2. Since wait time is high, less no of transactions are completed.

2. Non-Serial/Concurrent Schedule:

2. Non-Serial/Concurrent Schedule : A non-serial schedule is one where multiple transactions can execute simultaneously(operations of multiple transactions are alternate/interleaved executions). We can say it like if there are two transactions T1 and T2, T2 doesn't need to wait for T1 to commit, it can start at any point.

Example : T1 ,T2, T3

T1	T2	T3
R(A)		
	R(A)	
		R(B)
	W(A)	
COMMIT		
		COMMIT

T2 didn't waited for T1 to commit

Non-Serial Schedule

Advantages :

1. Better resource utilization
2. Wait time is not involved. One transaction doesn't needs to wait for the running one to finish.
3. Throughput(no of transactions completed per unit time) is high

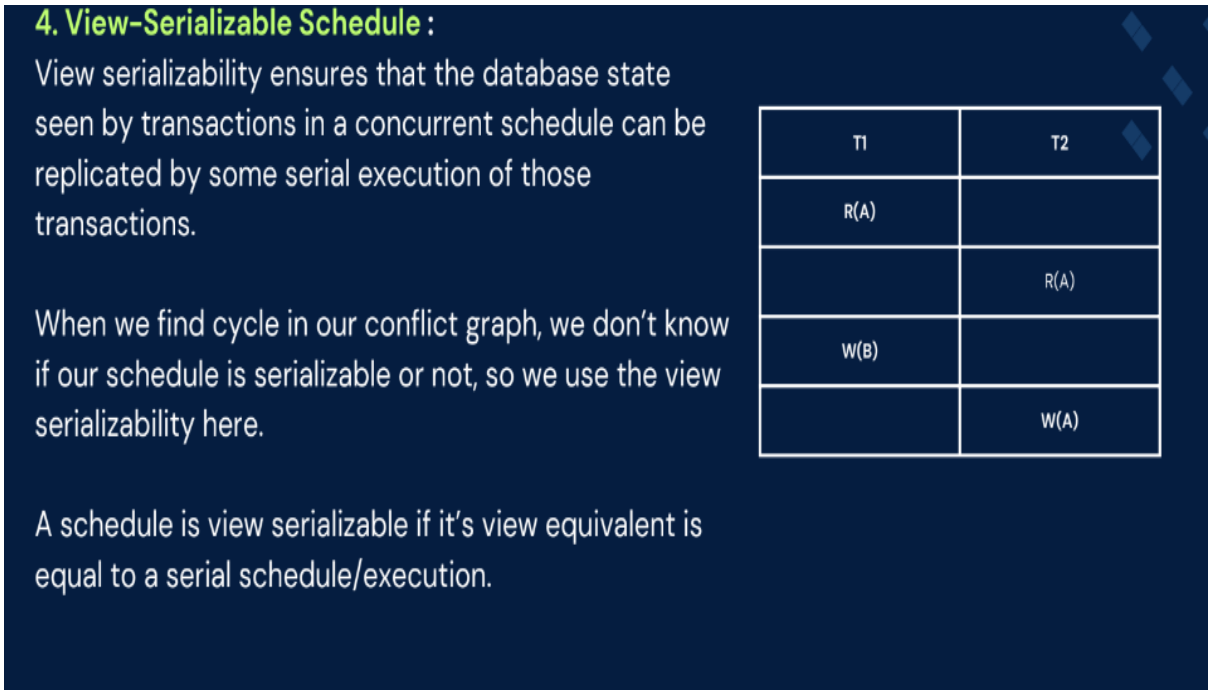
Challenges:

1. Consistentcy issue may arise because of non-serial execution. It requires robust concurrency control mechanisms to ensure data consistency and integrity.
2. We can use Serializability and Concurrency Control Mechanisms to ensure consistency.

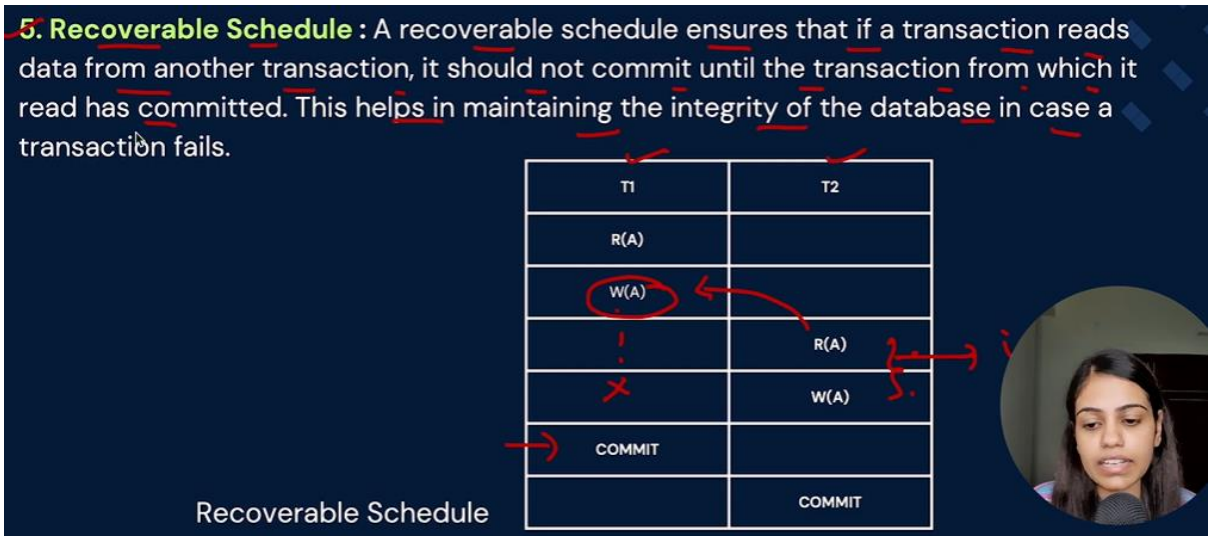
3. Conflict-Serializable Schedule:

If the schedule can be rearranged (without violating any dependencies) to form a serial schedule, then it is conflict serializable. It's a type of Serializability.

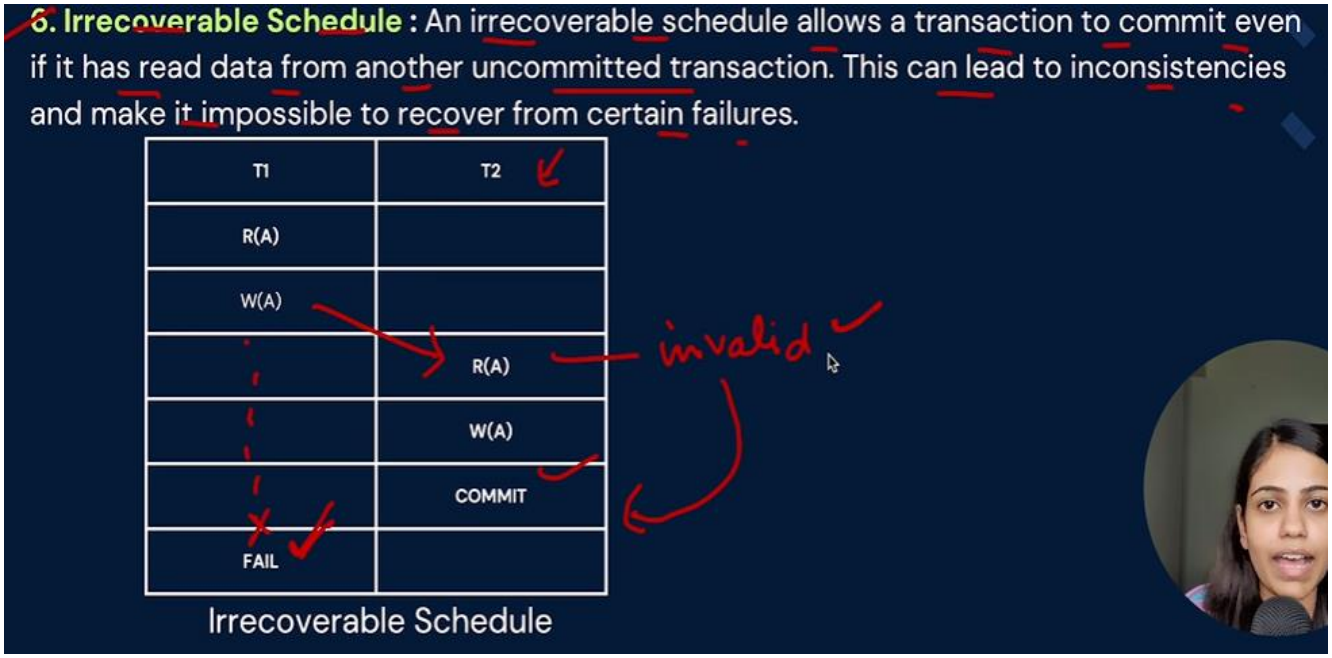
4. View-Serializable Schedule:



5. Recoverable Schedule:

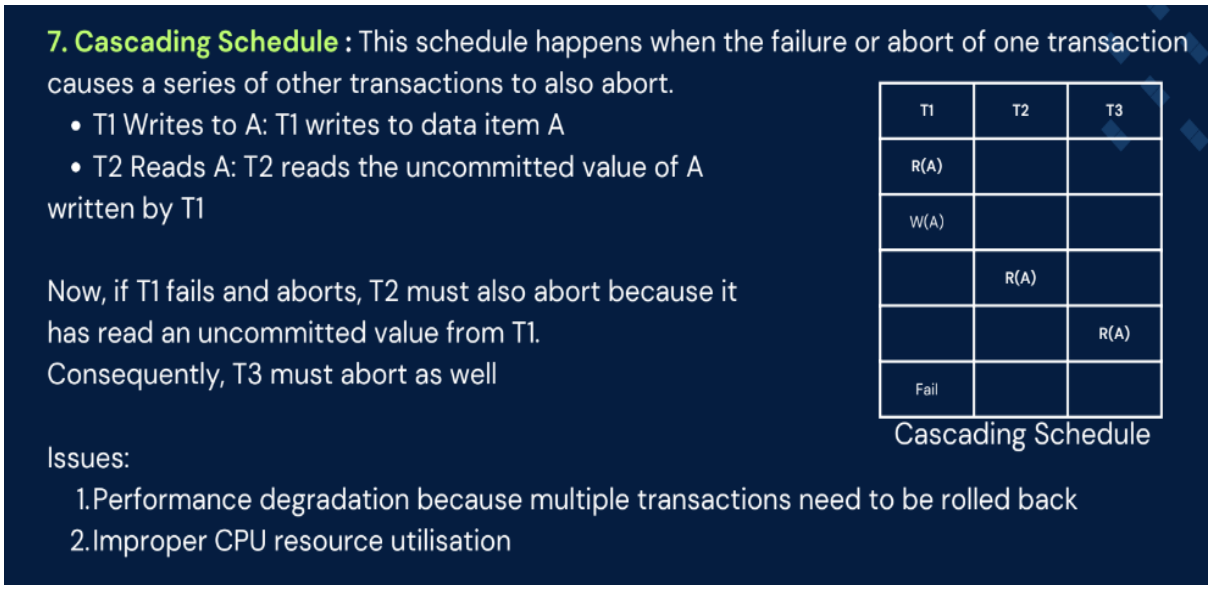


6. Irrecoverable Schedule:

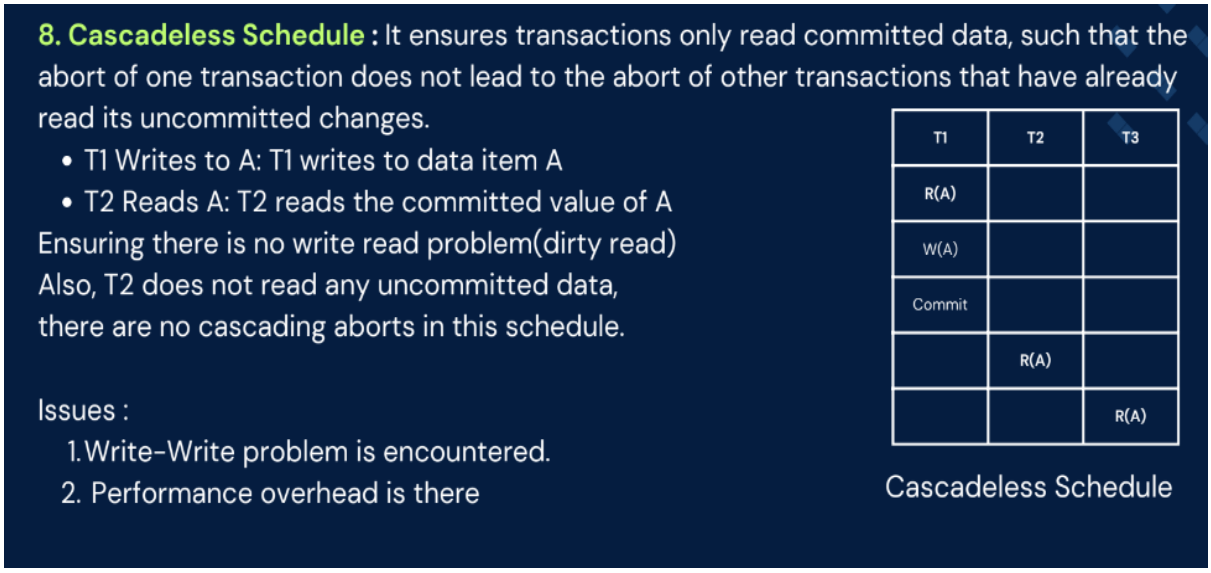


Inconsistency because if T1 make A = 10 from A = 5, then T2 comes and reads A = 10 and perform the its transaction, but when T1 fails after that. So, it rollbacks to A=5. But T2 worked on A=10 which is inconsistent data.

7. **Cascading Schedule:**



8. **Cascade-less Schedule:**

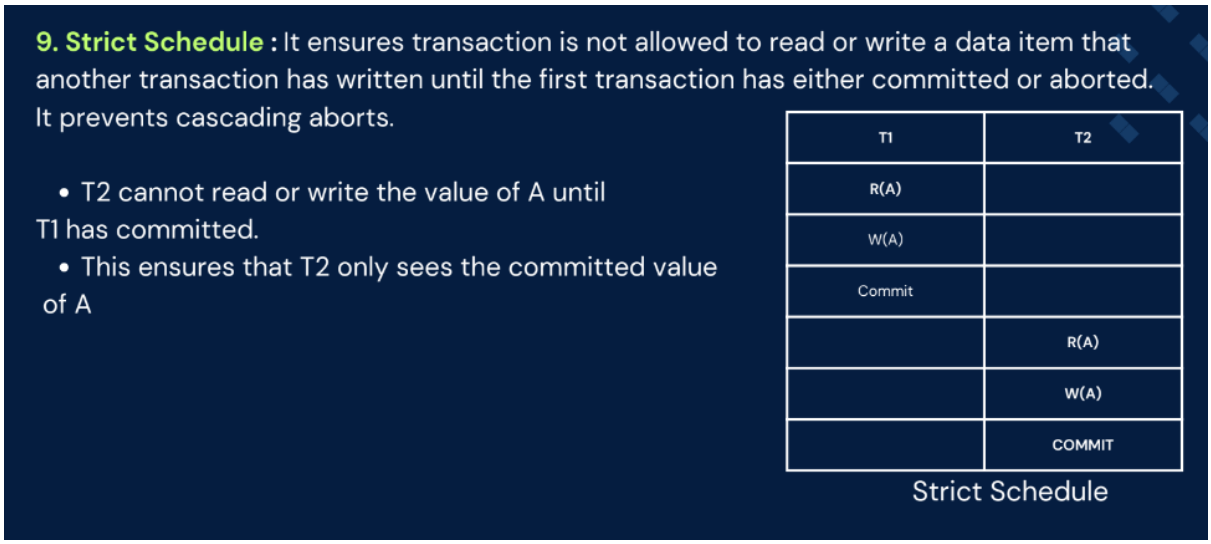


T2 waits for T1 to commit for reading A value.

It caused Write-Write problem as T1 write A to 20 from A = 10, but does not commit instead rollbacks later, but T2 reads A= 20 (made by T1) in between which leads to inconsistent data, as there is no wait for write for committed data.

Performance overhead as T2 need to wait for T1 to complete before reading A value.

9. **Strict Schedule:**



Write-write problem is resolved. Make the most consistent schedule.

Concurrent VS Parallel Schedule

For	Concurrent	Parallel
Defination	Concurrent scheduling manages multiple tasks at the same time. Tasks can overlap in their execution periods but do not run exactly simultaneously.	Parallel scheduling runs multiple tasks simultaneously using multiple cores or processors. Each task is executed on a separate core or processor at the same time.
Execution	Achieved on a single-core processor through context switching, where the CPU rapidly alternates between tasks, creating the illusion of simultaneous execution.	Requires a multi-core processor or multiple processors, with each core/processor handling a different task concurrently.
Example	Multi-threading on a single-core CPU, where threads take turns using the CPU.	Multi-threading on a multi-core CPU, where threads run concurrently on different cores.