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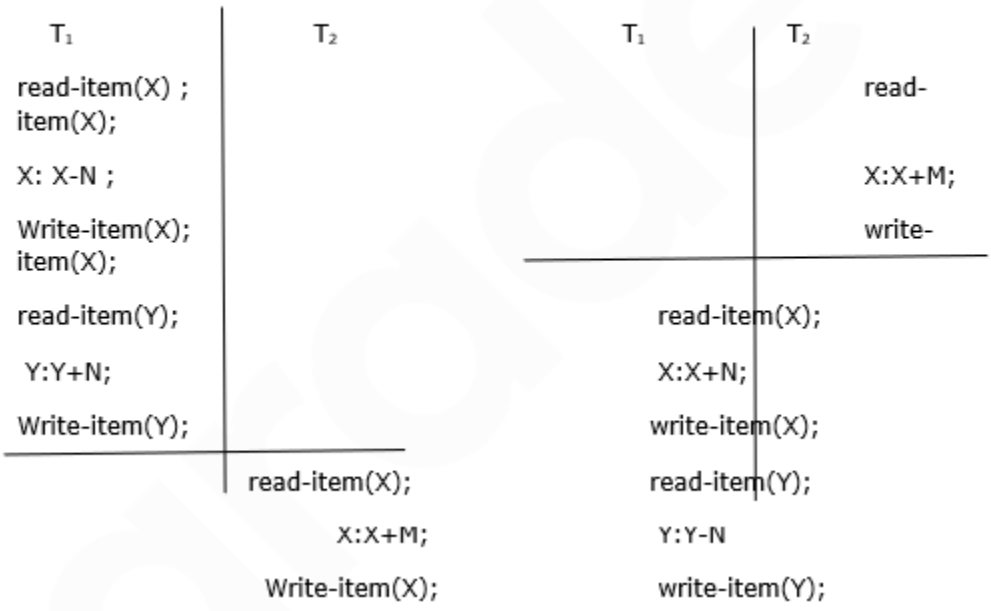
Normalization for Relational Database Part-5

Content :-
1. Serializability
2. Type of Schedules
3. Conflict Serializability
4. View Serializability

When several transactions are executing concurrently then the order of execution of various instructions is known as a schedule .
For identifying which schedules are connected when transaction executions have interleaved their operations in the schedule then the concept of serializability of schedule is used .

Types of Schedules
1. Serial Schedules
2. Non-serial Schedules
3. Conflict Schedules
4. View Schedules

Serial Schedule :-



Schedule A Schedule B
To schedule A and B are called serial schedule if the operations of each transaction are executed consecutively , without any interleaved operations from the other transaction . In serial schedule, entire transaction are performed in the serial other T_1 and then T_2 or T_2 and then T_1 .

Non-Serial Schedule :-

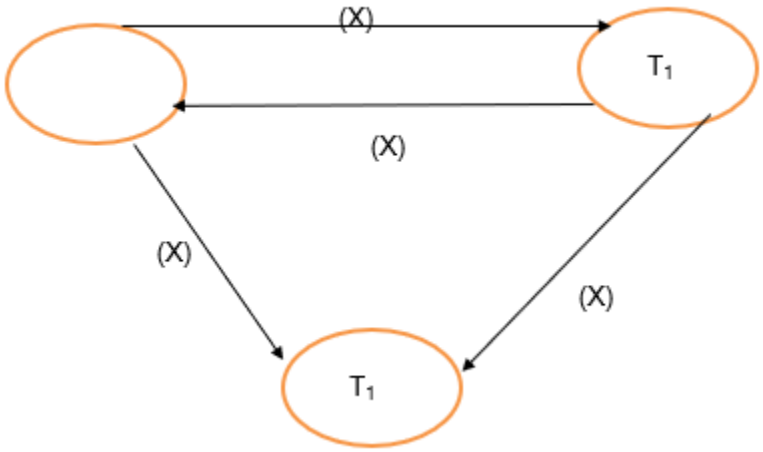
T_1	T_2
read-item(A)	
	read-item(A)
	write-item(A)
write-item(A)	

Conflict Schedule :- The graph which contains no cycle is **called conflict serialization schedules.**
If the precedence graph for S has a cycle , then the schedule S is not a conflict serializable.
"if graph contain no cycle then the schedule is conflict serializable"

Testing of Serializability :
For testing of serializability the simple and efficient method is to construct a directed graph , called a precedence graph of S.
G= (V,E)
All the transactions participating in the schedule are denoted by the set of vertices. The set of edges consists of all edges $T_i \rightarrow T_j$ of which one of three conditions holds:
1. T_i executes write(Q) before T_j executes read(Q)
2. T_i executes read(Q) before T_j executes write(Q)
3. T_i executes write(Q) before T_j executes write(Q)

Example :-

T_1	T_2	T_3
Read(X)		
	Write(X)	
Write(X)		
		Write(X)



Since the graph contains a cycle . Hence it is not conflict serializable.

Conflict Serializability :- Consider a schedule S in which there are two consecutive instructions I_i and I_j of the transaction T_i and T_j respectively (i=j).
Now we identify three rules that show that if two operations in a schedule satisfy all these three condition then operations are said to be conflict :
1. They belong to the different transaction
2. They access the same ite
3. Atleast one of the operation is a write-item.

Thus, only in the case where both I_i and I_j are read instructions does the relative order is their execution does not matter.
We say that I_i and I_j conflict if they are operations by transactions on the same data item and at least one of these instructions is a write operation
If schedule S can be transferred into a schedule S' by a series of swap of non-conflicting instructions , we say that S and S' are conflict equivalent .
The concept of conflict equivalence leads to the concept of conflict serializability. We say that a schedule S is conflict serializability if it is conflict equivalent to a serial schedule .

View Serializability :- consider two schedule S_1 and S_2 where same set of instructions participate in both schedules . The schedule S and S are said to be view equivalent if the following conditions are met :
1. For each data item X , if transaction T_1 reads the initial value of X in the schedule S_1 , the transaction T_1 must in schedule S_2 also read the initial value of X.
2. For each data item X, if transaction T_1 executes read(A) in schedule S_1 and the value was produced by transaction T_j (if any) , then transaction T_i must in schedule S_2 also read the value of X was produced by transaction T_j .
3. For each data item X , the transaction (if any) that performs that final write(X) operation in schedule S_1 must perform the final write(X) operation schedule S_2 .

The concept of view equivalence leads to the concept of view serializability. We say that schedule S is view serializabilty if it is view equivalence to a serial schedule.
Every conflict-serializability schedule is also view serializiable but there are view serializable schedule that are not conflict serializable.

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