

Paper Name: Database Management Systems

Topic: View Serializability

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View Serializability

View Serializability is a process to find out that a given Non Serial schedule is view serializable or not. For this we need to check whether the given Non serial schedule is **View Equivalent** to its serial schedule. Let us take the example of the following **Non Serial Schedule S**:

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

To Find View Equivalency :

Step 1 : Write its corresponding Serial Schedules. Since the abovementioned schedule has two participating transactions, so there would be two possible serial schedules S1 and S2:

SCHEDULE S1

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

SCHEDULE S2

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

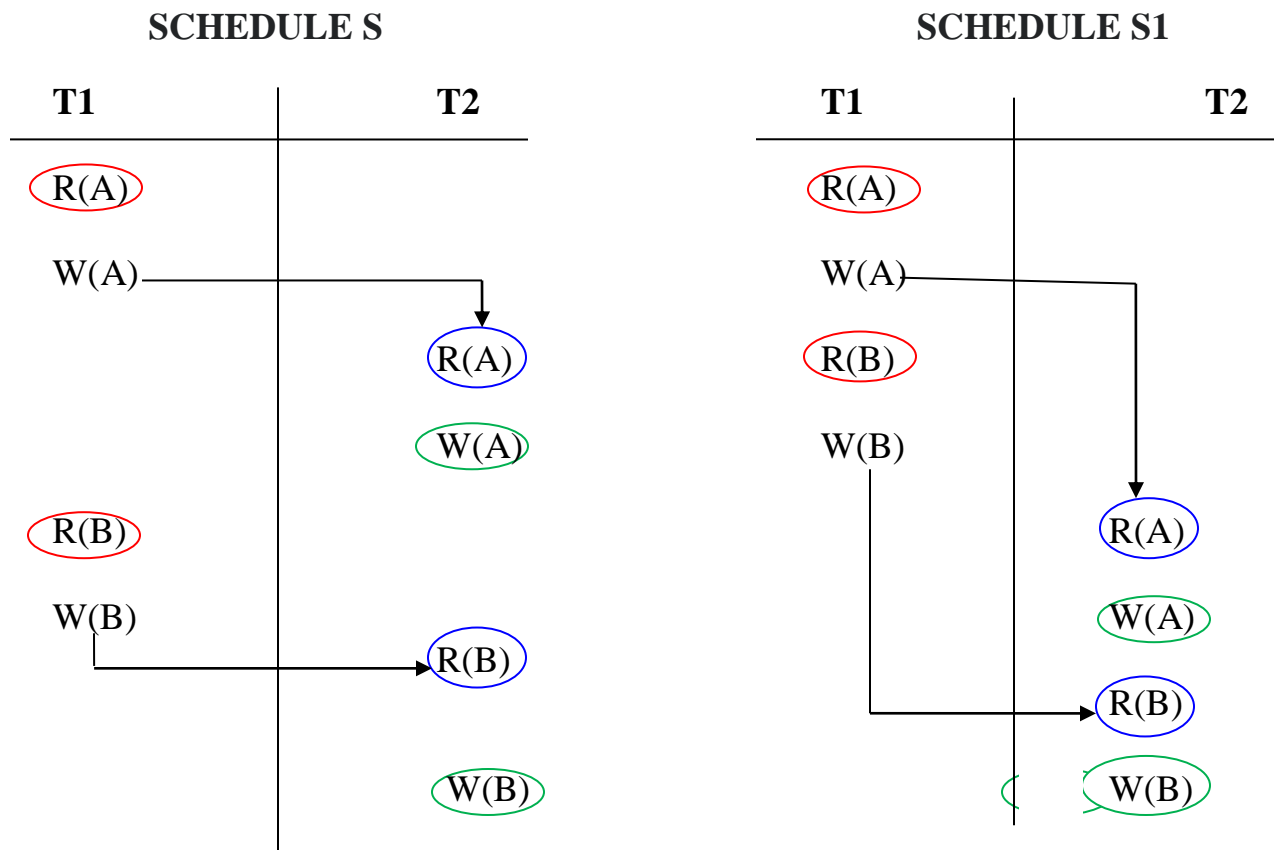
STEP 2: Now we will check the following mentioned conditions in the Non serial schedule S and its Serial counterpart Schedules one by one i.e. first we will check the following conditions in Non serial schedule S and Serial Schedule S1. If both the schedules satisfy all three following conditions, we can say that the two schedules S and S1 are View equivalent.

1. **Initial Read:** Initial read of each data item in transactions must match in both schedules. For example, if transaction T1 reads a data item A before transaction T2 in schedule S then in schedule S1, T1 should read A before T2. Initial read means the first read operation on a data item, for example, a data item A can be read multiple times in a schedule but the first read operation on A is called the initial read.

2. **Final Write:** Final write operations on each data item must match in both the schedules. For example, a data item A is last written by Transaction T1 in schedule S then in S1, the last write operation on A should be performed by the transaction T1.

3. **Update Read:** If in schedule S, the transaction T1 is reading a data item updated by T2 then in schedule S1, T1 should read the value after the write operation of T2 on same data item. For example, In schedule S, T1 performs a read operation on X after the write operation on X by T2 then in S1, T1 should read the X after T2 performs write on X.

Explanation : Let us refer to the Schedule S and Schedule S1. We see that there are two data items A and B being used by the participating transactions in the schedule S and S1.



Let us check the three conditions of view serializability:

a. Initial Read

In the above figure RED circle denotes Initial Read.

In schedule S, transaction T1 first reads the data item A. In S1 also transaction T1 first reads the data item A.

Let us check for B. In schedule S, transaction T1 first reads the data item B. In S1 also the first read operation on B is performed by T1.

We checked for both data items A & B and the **initial read** condition is satisfied in S & S1.

b. Final Write

In the above figure GREEN circle denotes Final Write.

In schedule S, the final write operation on A is done by transaction T2. In S1 also transaction T2 performs the final write on A.

Let us check for B. In schedule S, the final write operation on B is done by transaction T2. In schedule S1, final write on B is done by T2.

We checked for both data items A & B and the **final write** condition is satisfied in S & S1.

c. Update Read

In the above figure BLUE circle denotes Inermediate read,i.e. a data item which is read by one transaction that has been updated by other transaction.

In S, transaction T2 reads the value of A, that was written by T1. In S1, the same transaction T2 reads the A after it is written by T1.

In S, transaction T2 reads the value of B, written by T1. In S1, the same transaction T2 reads the value of B after it is updated by T1.

The update read condition is also satisfied for both the schedules.

Result: Since all the three conditions that checks whether the two schedules are view equivalent are satisfied in this example, which means S and S1 are view equivalent. Also, as we know that the schedule S1 is the serial equivalent of Non serial schedule of S, thus we can say that the schedule S is view serializable schedule.

Note :- In the above example we checked the view equivalency of Non serial schedule S with the serial schedule S1 and found that they were view equivalent. So we said that Schedule S is View Serializable.

What would have happened if they were not view equivalent?

Then we have to check the view equivalency of the Non Serial schedule S with Serial schedule S2 and then decide about the serializability of Schedule S.