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Assignment - 3

Q-1 Findout whether S_1 is conflict Serializable

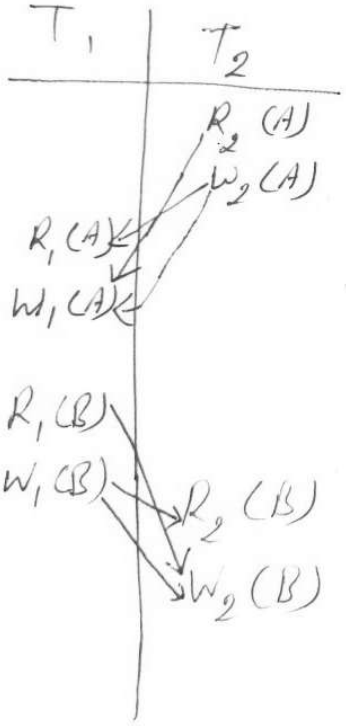
$T_1 - R_1(A), W_1(A), R_1(B), W_1(B)$

$T_2 - R_2(A), W_2(A), R_2(B), W_2(B)$

$S_1 - R_2(A), W_2(A), R_1(A), W_1(A), R_1(B), W_1(B), R_2(B), W_2(B)$

Sol:- A schedule is a process to line-up transactions and execute them one by one.

Let us put the given schedule in the transaction



Rules to identify Conflict

Read → Read no conflicting

Read → Write

Write → Read } Conflicting

Write → Write }

Two operation can be declared as conflicting if

1. They belong to different transaction
2. They operate on the same data items
3. At-Least one of them is write operation

So, Conflicting Pair

$W_2(A), R_1(A)$

$W_2(A), W_1(A)$

$R_2(A), W_1(A)$

$R_1(B), W_2(A)$

$W_1(B), R_2(B)$

$W_1(B), W_2(B)$

Non-Conflicting Pairs

$R_2(A), W_2(A)$

$R_1(B), R_2(A)$

$R_2(A), R_1(A)$

Using these conflicting pair, lets draw the precendence graph.

As, in this precendence graph we observed a cycle between T_1 & T_2 So, that is no conflict Serializable.

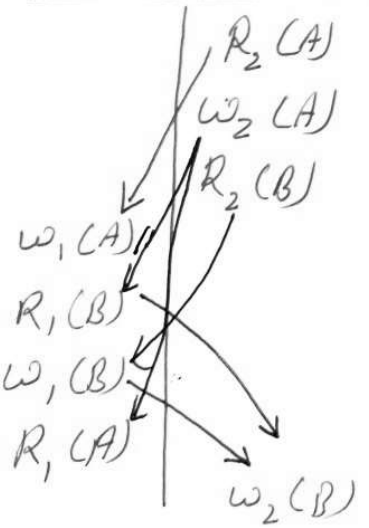
Q.2 Find out both the schedule are conflict Equivalent

S_1 : $R_2(A)$, $W_2(A)$, $R_2(B)$, $W_1(A)$, $R_1(B)$, $W_1(B)$, $R_1(A)$, $W_2(B)$

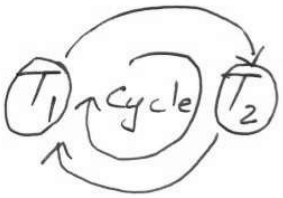
S_2 : $R_2(A)$, $W_2(A)$, $R_2(B)$, $W_2(B)$, $R_1(B)$, $W_1(B)$, $R_1(A)$, $W_1(A)$

Ans To declare the schedules, conflict Equivalent, the following conditions must be followed.

1. Both schedule must form a cyclic Precedence graph
2. Schedule must follow same serializable order
3. One schedule can be transformed to another by swapping non-conflicting operations.

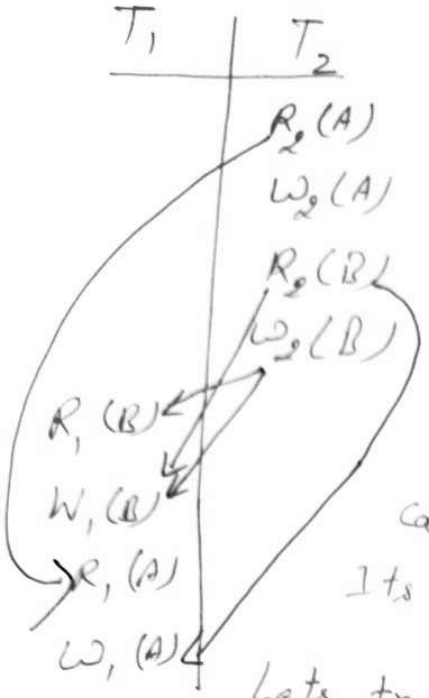


Precendence Graph



In this precedence graph, we observed that there is a cycle, so schedule 'S_1' is not conflicting schedule.

S_2 Schedule Transactions



Precendence Graph

No Cycle

Based on the precendence graph S_2 schedule can be declared as conflict serialable.
Its precondence graph is not cyclic.
Lets try to validate if we can transform S_2 schedule from S_1 Schedule by swapping non-conflicting operation.

S_1 $R_2(A)$ $W_2(A)$ $R_2(B)$ $W_1(B)$ $R_1(B)$ W_1B $R_1(A)$ $W_2(B)$

Swapping $R_1(A)$ $W_2(B)$ — Non-Conflicting

S_{12} $R_2(A)$ $W_2(A)$ $R_2(B)$ $W_1(B)$ $R_1(B)$ $W_1(B)$ $W_2(B)$ $R_1(B)$

non-conflicting

So, when we move again non-conflicting pair, then we may get orignal S_1. Thus a cyclic will form when we keep swapping.

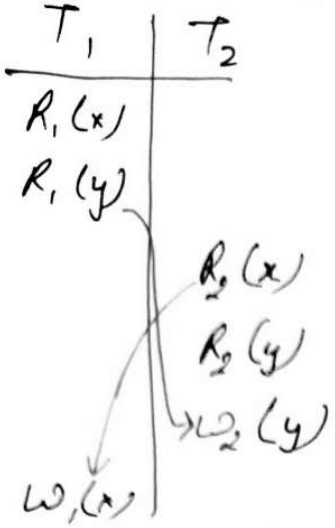
We can not transform S_1 into S_2 by swaping, non-conflicting pair.
Hence S_1 & S_2 schedule are "NOT CONFLICT EQUIVALENT."

Q2 Find if S_1 & S_2 are conflict Serializable schedule.

S_1: $R_1(X)$ $R_1(Y)$ $R_2(X)$ $R_2(Y)$ $W_2(Y)$ $W_1(X)$

S_2: $R_1(X)$ $R_2(X)$ $R_2(Y)$ $W_2(Y)$ $R_1(X)$ $W_1(X)$

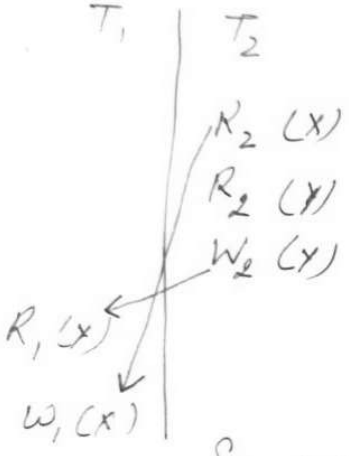
Ans. Let us check the S_1 schedule Transaction



Based on the conflicted transaction we can draw following precendence graph.

In this precendence graph, we observed a cycle. So we can say S_1 is not conflict Serializable.

Now, check for S_2 schedule



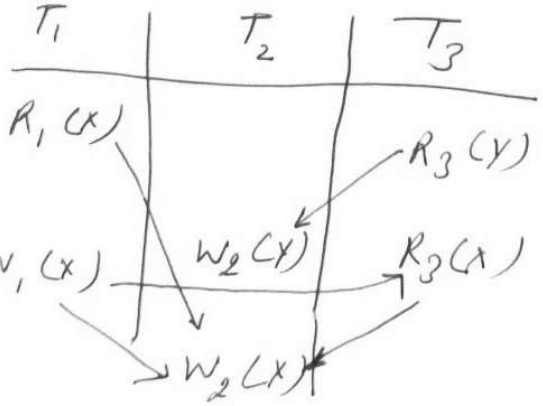
Based on the conflicted transaction, we can draw following precendence graph.

So, we can declare S_2 is conflict Serializable.

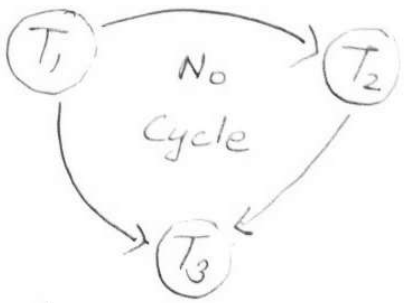
Q4 :- Find Out wheather S_1 is conflict serializable schedule.

S_1 : $R_1(x)$ $R_3(y)$ $W_1(x)$ $W_2(y)$ $R_3(x)$ $W_2(x)$

Ans :-



So, Based on this, we can draw following Precendence Graph



So, there is no cycle. Hence S_1 schedule is conflict serializable acycle.