

# Concurrency Control

- Concurrency control is nothing but executing multiple transaction at a time.
- Why we required concurrency control in database?
  1. Suppose we take SBI ATM machine example we withdraw a money One after the another (without concurrency)
  2. Another example is : if you accessing Tatkal Ticket at a particular time, so many people accessing the Tatkal Ticket at a same time and accessing the same portal

# Advantages

1. Waiting time will be decrease
2. Response time will be decrease
3. Resource utilization will be increase
4. Efficiency will be increase

Due to this advantages of concurrency control

It can say that: simultaneously execution of transactions a shared database can create several data integrity of consistency problem

# Three main problems are facing in concurrency control

1. Reading uncommitted data
2. Unrepeatable or inconsistent retrievals
3. Lost update

See the problems

## 1. Reading uncommitted data ( conflict WR, dirty read )

Example : lets consider two transaction T1 and T2 in this transaction. Now suppose value of A is 5 then perform the set of operation Read and Write and is uncommitted data or conflict WR and dirty read

A= 5  
A= A+1  
A= 6

Failed , it remain unchanged  
and Rollback

T1	T2
R(A) → 5	
W(A) → 6	
	R(A) → 6
	Commit
R(B)	
W(B)	
Abort	

Dirty Read stored in local buffer  
the value is 6

T2 read a value which is not  
committed

## 1. Un Repeatable data ( conflict WR )

Example : lets consider two transaction T1 and T2 in this transaction. Now suppose value of A is 10 then perform the set of operation Read and Write and is Unrepeatable data or conflict RW

Suppose A = 10  
A = A+5;  
W(A) = 15

T1	T2
R(A) → 10	
	R(A) → 10
W(A)	
	R(A) → 15
Committed	

Confusion arise  
in T2, So it  
unrepeatable  
Read data

## . Lost Update ( conflict WW )

Example : lets consider two transaction T1 and T2 in this transaction. Now suppose value of A is 10 then perform the set of operation Read and Write lost update WW Conflict

Suppose A = 10

A = A+1;

W(A) = 11

T1	T2
R(A)	
W(A)	
	W(A)
	Committed
Committed	

Blind Write is  
W(A) is 60

## Concurrency Control Techniques

- It is process of managing simultaneously execution of transaction in shared database
- Example : SBI ATM —————> Access SBI database
- Purpose of concurrent control:
  1. To enforce isolation
  2. To preserve database consistency
  3. To Resolve conflict ( i.e RW, WR, WW )

### Techniques of concurrency control

1. Lock based protocol
2. Time stamp based
3. Optimistic
4. Multiversion

# 1. Lock based protocol ( locking the operation )

- A lock guarantees exclusive use of data items to a current transaction

1. Access data item ( by lock Acquire )
2. After completion of transaction ( Release lock )

Types of lock :

**Shared lock ( Lock S )** : Transaction can Read data items values

**Exclusive lock ( Lock X )** : Transaction can both Read and Write data item values

Example : How the lock will work

T1	T2
Lock – X (B)	<b>Exclusive lock Read and write operation</b>
R(B)	
B-50;	
W(B)	
Unlock (B)	
	Lock – S (B)
	R(B)
	Unlock (B)

**Note : Any number of transaction can hold shared lock, but exclusive lock can be hold only by one transaction at a time**

**Shared lock only Read operation**

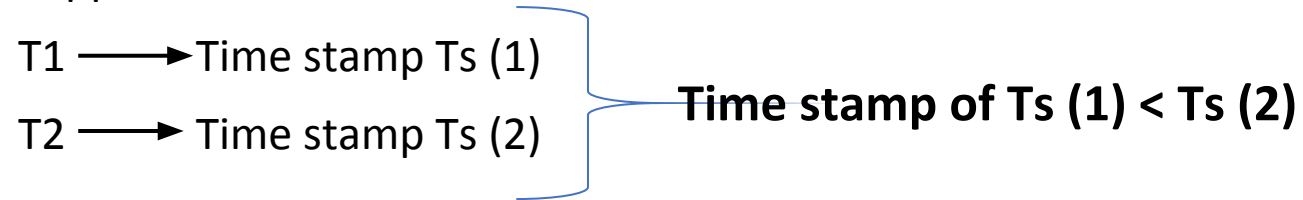


## 2. Time stamp method

- A Unique identifier created by DBMS that indicates relative starting time of a transaction.

1. System clock : At a time transaction started.
2. Logical counter : is incremented after a new time stamp has been assign to transaction

Suppose :



Time stamp Values :

R = Read time stamp (A) : Largest time stamp of any transaction that executed Read successfully.

W = Write time stamp (A) : Largest time stamp of any transaction that executed write successfully.

Example : lets consider 4 Transaction and their values is 10, 20, 30, 40.

Values	10	20	30	40
Transaction	T1	T2	T3	T4
	R1 (A)			
	W1 (A)			
			R3 (A)	
		R2 (A)		
				W4 (A)

Read Time stamp	Write Time stamp
RTs (A) = 0	WTs = 0
Update T1 = 10; 0 < 10	Update T1 = 10; 0 < 10
Update T3 = 30; 10 < 30;	Update T4 = 40; 10 < 40
Update T2 = 20 30 < 20	
<b>So the RTs ( A) = 30</b>	<b>So, WTs (W) = 40</b>