

Welcome for the course database

management system. Today.

In this module we will see transaction

management with respect to that is

log based concurrency control with

respect to the transaction management.

So in this module we will see two

phase locking protocol drawbacks.

Of log based protocol strict

to phase locking protocol and

rigorous to phase locking protocol.

So at the end of the session

you will be able to explain two

phase locking protocol drawbacks

of two phase locking protocol.

We will be able to explain strict

to phase locking protocol and

rigorous 2 phase locking protocols.

So first we will see what

is log based protocol.

So in this type of protocol

any transaction cannot read.

Or write the data until it

acquires appropriate lock on it.

So first any transaction have to

acquire the lock and then only it

can go for further transactions.

Further operations.

There are two types of lock

which can be acquired,

shared lock and the exclusive lock.

So first we'll see what is shared.

Lock in shared logs,

new locks on the data item may be acquired,

but none can be released.

It can be shared between the

transaction because when the

transaction holds a lock then it can't

update the data on the data item.

Next lock that we have is the

exclusive lock in this exclusive lock.

The data item can be both can

read as well as can write the

right on the certain transaction.

This log is exclusive and in the log

multiple transaction do not modify

at the same data simultaneously,

so transaction with two phase

locking protocol is set to follow

the two phase locking protocol.

In which the locking and unlocking

can be done in two phases.

First phase is the growing phase,

second phase is the shrinking phase.

So in the growing phase new locks

on the data items may be acquired,

but none can be released,

and in the shrinking phase a

transaction may release the locks,

but may not obtain any of the new locks.

So there are two phases with respect

to this two phase locking protocol.

The protocol ensures serializability

in the two phase locking protocols.

So here at the end,

at the result we have serial schedules.

Serializability is being acquired.

The transaction acquires log as

needed in the growing phase.

Once the transaction releases the lock,

it enters into the shrinking phase and

it cannot issue anymore lock requests.

OK,

so here we have the example

of two phase locking protocol.

In the example we can see.

There are two transactions

in the Figure 1 schedule.

One we have two transactions T1 and

T2 transaction in the T1 transaction.

First shared log is being put

on the data item A.

After the lock has been put.

We are the transaction is reading

the data item A.

After that the shared log is

being put on the data item B.

After that reading the data

item B and displaying the

result that is certain modifications.

A+B is being done and that result is

being displayed after this unlock phase.

That is shrinking phase unlock the

data item and unlock the data item B,

so this transaction T1 is working

in the two phase locking protocol.

Since initially it works in the growing

phase, that is all the locks are being

acquired in the initial phase and then

the locks are being released in the

shrinking phase in the next transaction,

that is transaction T2 first.

The shared log is being applied

on the data item A.

Reading the data item A and unlocking

the data item a similarly after that,

locking the data item be reading

the data item B.

Unlocking the data item.

We end at the last displaying AB

that is the modification result.

So this transaction T2 does not

occur in two phase locking,

that is two people,

two phase locking protocol.

Since it does not work as accordingly

as growing phase first locking and

at the last thinking it occurs as

it has acquired the lock 1st and

then again unlock again lock unlock.

So this is how the transaction T2 works.

But it is not according to the two

people that is 2. Base locking protocol.

Next we have the drawbacks of

two phase locking protocol.

2 phase Locking does not ensure

freedom from deadlock.

There can be deadlock which

might acquire in the two people.

That is two phase locking protocol.

For example here in this example there

are two transactions in the Figure 2

that which is scheduled in deadlock.

There are two transaction T3 and T4.

So in T3 transaction.

We have log XB that is exclusive lock

is being applied on data item B.

After that we are reading the data

item be certain modifications is

being done that is B equal to be 50

so modifications is being done and

new value of B is being found out.

After that we are writing the data item B.

After writing the data,

item B next transaction that is

T4 starts in the T4 transaction

shared log has been applied and

then reading the data item.

So here the read of data

item is being applied.

After that we log the transaction

T4 locks the data item.

Be shared lock has been applied

on the data item B,

but here in the T4 transaction it

is not happening that unlocking

of A is not being occurred.

Unlocking of A is not being done since

unlocking is not done after this transaction.

T3 is again wants to lock the data

item since T3 has not unlocked

B and T4 has not unlock.

There can be deadlock which might occur,

so from this example transaction

T3 have locked the data item B

and T4 have locked the data item,

but both the transaction data

items have not been unlocked.

There T3 is waiting for the data item

B and T4 is waiting for data item.

Therefore there is a deadlock

which occurred over here.

So both the transaction are waiting

for each other of the data items.

2nd drawback that might occur

is 2 phase in the two phase

locking is cascading rollback.

So from this transaction we have 3

transactions over here T5, T6 and T7.

So in the T5 transaction we can see locking

of A has been done reading the data item.

A locking of B reading the

data item B write a unlock.

After this T6 starts certain transactions.

I've been done.

Certain operations have been done the read A,

so whichever the data item in the

transaction T5 that is written a

write A is being done that same

on that same data item read is  
being performed so that value has  
been read by the transaction T6.

After that the same value in  
this transaction T6 whatever  
modifications are being done,  
same value is being read in T7.

After this entire process.

55 fails, 55 is failing.

If the failure of T5 happens,

the read A,

which is done by transaction T7

will also fail and this will

lead to cascading rollback.

So from this figure each transaction  
observes the two phase locking protocol,

but the failure of teefey after

read a step of T7 leads to

cascading rollback of T6 and T7.

Next we have is the strict

2 phase locking protocol.

The first phase of strict OPL is

similar to two people in this phase.

After acquiring all the locks,

the transaction continues

to execute normally.

The only difference between two planned

the strict 2 PLZ that strict topl

does not release a lock after using it.

Strict toepel waits until the whole

transaction to commit and then it

releases all the lock at the time.

Strict to pull does not have

shrinking phase of the lock release.

This protocol does not have

cascading abort S topl does second

protocol that we have is rigorous.

2 Pearl Rigorous 2 phase locking protocol.

Rigorous 2 phase locking is even

stricter to peer to face locking

protocols since all the locks have

been held in committee or till

the commit or abort operation.

This protocol requires that in addition

to the lock being in two phase,

all the exclusive and the shared locks

held by the transaction be released

until after the transaction commits.

In this protocol,

transaction can be serialized.

Same order in which they commit,

so it guarantees that starvation

will not occur,

and also it guarantees that deadlock

will not occur with respect to this

rigorous 2 phase locking protocol.

OK,

so from this module we have seen in log

based protocol any transaction cannot

read or write the data item until

it acquires any appropriate lock on it.

There are two types of locks

that can be acquired,

shared lock and exclusive lock.

A transaction is set to be in two phase locking in which locking and unlocking can be done in 2 phases.

The transaction acquires lock as needed in the growing phase.

Once the transaction releases the lock, it enters into the shrinking phase and it cannot issue anymore locks.

Two phase locking does not ensure freedom from deadlock so that these advantages of the two phase locking is cascading.

Rollback strict 2 phase locking waits until the whole transaction to commit and then it releases all the locks at the time.

Strict 2 phase locking protocol does not have any cascading as like two phase locking does.

With respect to rigorous 2 phase locking, it is even more stricter than two phase locking since all the locks are held till commit or abort.

Rigorous 2 phase locking guarantees that

deadlock in the starvation will not occur.

These are the references.

Thank you.