

1 Candy

**What does ACID
stand for?**

2 Candy

**What is the connection
between Atomicity,
Isolation, and Durability
with Concurrency Control,
Logging?**

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WAL, LSN, Undo, Redo, physical, logical, physiological are all important terms for describing logging. What do they stand for?

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- Which transactions will be **UNDONE** if a system crashes, given the following log

BEGIN	BEGIN	WRITE A	WRITE B	COMMIT	
T1	T2	T1	T2	T1	

T2

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- Is the following schedule permitted by strict two-phase locking?

T1	T2	T3
READ A		
		READ A
	WRITE B	
		WRITE C
WRITE B		
COMMIT		
		COMMIT
	COMMIT	

- Is it serializable?

No, T1 would have to wait for lock on B.

3 Candy

- Def: Strict two phase locking: write locks released after commit
Strong strict two phase locking: read and write locks released after commit
- Is the following schedule conflict serializable?

T1	T2
READ A	
	READ A
	WRITE B
WRITE A	
READ C	
COMMIT	
	COMMIT

- Would *strict two-phase* locking permit it? Would *strong strict*?

Strict-two-phase would permit it

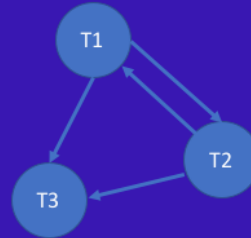
Strong strict would not (write A from T1 has to wait)

Schedule is serializable (outcome is the same as T2 commits before T1) .

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What is the conflict graph for this schedule, and is it serializable?

T1	T2	T3
READ A		
	WRITE A	
	WRITE B	
		READ B
WRITE A		
READ B		
		WRITE B



For an operation pair that conflicts in T1 and T2, the



This is just a variant of the previous problem 4, animations show solution

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Is it possible to have a correct recovery without logging CLRs and using only physical logs records

No as it is impossible to undo operations caused by even normal aborts

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Is this a valid state?
 If not, what do you need to do to correct it?
 What transactions need to be replayed?

LSN	Type	Tid	PrevLSN	Data
1	SOT	1		
2	UP	1	2	A
3	UP	1	3	B
4	CP			
5	SOT	3		
6	UP	1	3	C
7	SOT	2		
8	UP	2	7	D
9	EOT	1	6	
10	UP	3	5	B
11	UP	2	8	A
12	EOT	2	11	
13	UP	3	10	E

DirtyPgTable

pgNo	recLSN
A	11
B	10
C	6
D	8
E	13

Disk

Page	pageLSN
A	11
B	3
C	6
D	?
E	?

Redo UNLESS

- Page is not in dirtyPgTable
- $LSN < recLSN$
- $LSN \leq pageLSN$
- Yes, can be a valid state. Flush happened shortly after checkpoint
- Replay 8, 10, 11, 13