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# Transactions

- Transactions

- Properties - ACID

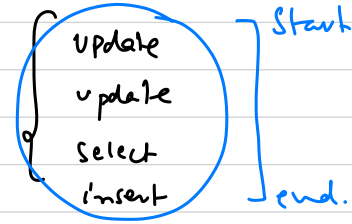
- Commit & Rollback [Code]

- Transaction Isolation Levels

- ↳ Read Uncommitted
- ↳ Read Committed
- ↳ Repeatable Read
- ↳ Serializable

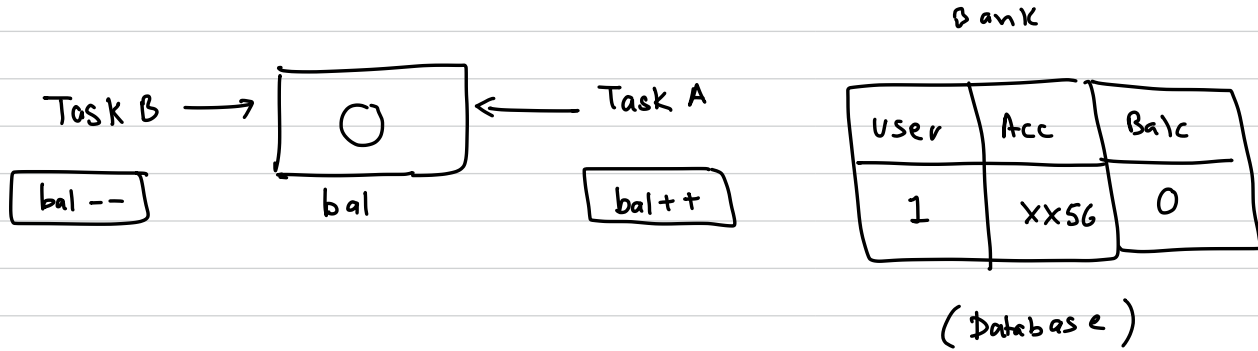
- Deadlocks

Today  
=

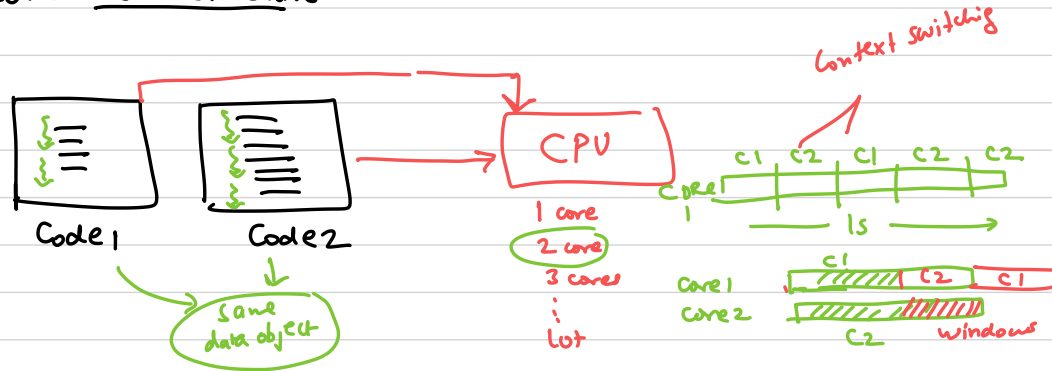


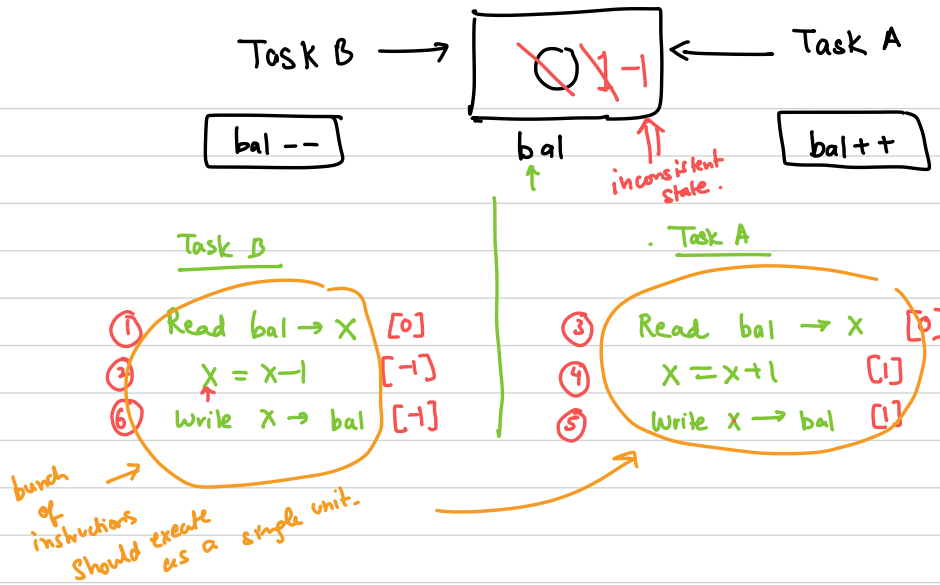
commit  
≡  
Problems commit:-

lost updates  
Dirty Reads  
phantom reads



## Concurrent Execution





Transaction: set of database operations logically grouped together to perform task.

- ↳ solve the problem of inconsistent state
- ↳ Complete operation might not execute some times.

# Money Transfer



Total → 225

Before After

	300	225
A	100	50
B	100	25
Shop	100	150

transfer Money (A, Shop, 50)

Debit

- 1 Read A → bal 100
- 2 bal → bal - 50 50
- 3 Write bal → A 50

Credit

- 4 Read Shop → X 100
- 5 X → X + 50 150
- 6 write X → Shop

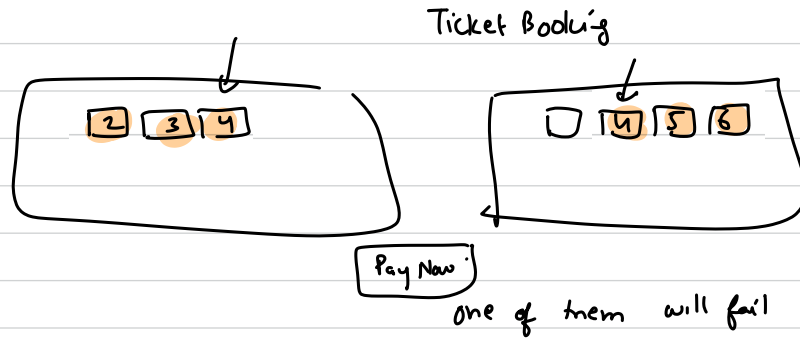
10ms

transfer Money (B, Shop, 75)

- 5 Read B → bal 100
- 6 bal → bal - 75 25
- 7 Write bal → B 25
- 8 Read Shop → X 100
- 9 X → X + 75 175
- 10 write X → Shop

Blocked (should wait)

10ms 20ms



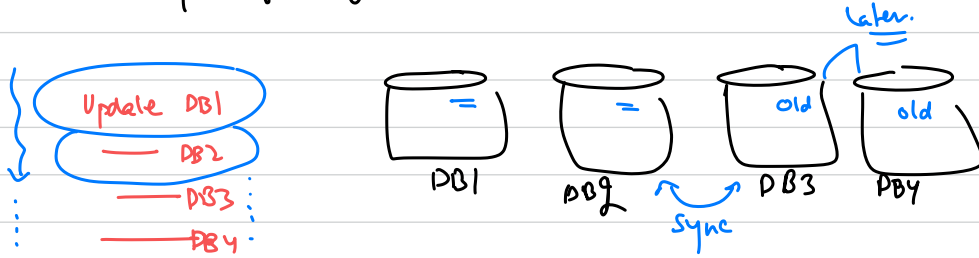
ACID

Expectations from a Transaction.

- ① Atomicity
- ② Consistency
- ③ Isolation
- ④ Durability

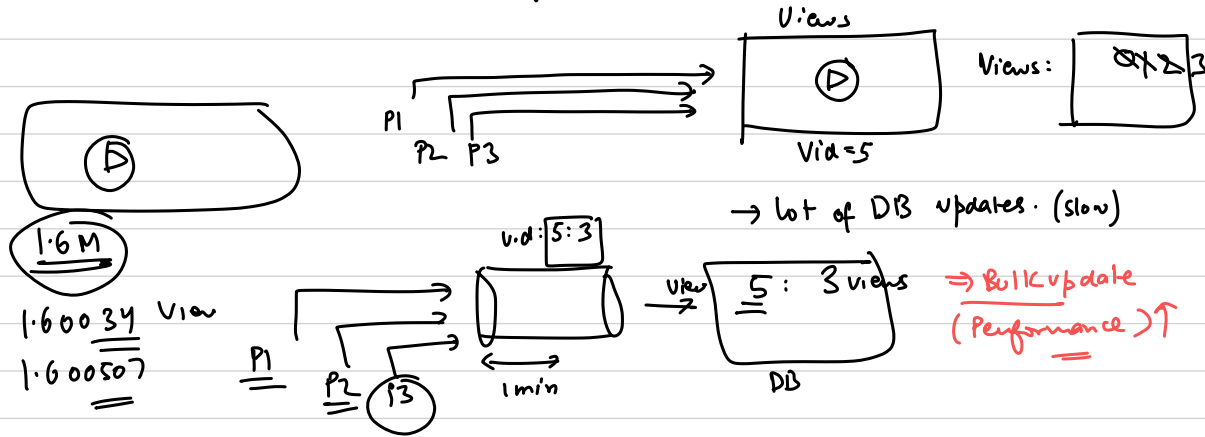
(1) Atomicity → To the outside the transn should appear as a single ~~entity~~ operation  
→ All instructions are executed or nothing has happened.

Update your google account profile pic



## (2) Consistency

→ logical correctness of data..



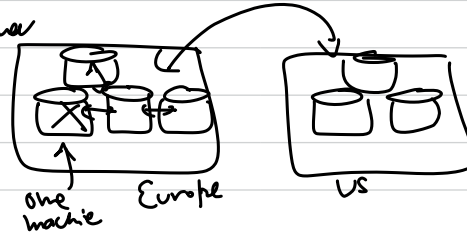
### (3) Isolation

Means one transaction shouldn't affect another  
Transaction running at same time on the same DB  
in a wrong way.

4 Transaction isolation levels

### (4) Durability

↳ should persist in DB forever





Relaxed

1)  $\Rightarrow$  Read Uncommitted (Today)

2)  $\Rightarrow$  Read Committed -----  $\rightarrow$  PostgreSQL default

3)  $\Rightarrow$  Repeatable Read  $\rightarrow$  MySQL Default

4)  $\Rightarrow$  Serializable

Strict



Fast

but lead to inconsistency

DIRTY Read is a problem in Read Uncommitted.

S1

A  $\xrightarrow{\pm 10}$  B

debit

Roll Back

Read A  $\rightarrow$  X (2000)  
 $X = X - 10$  (1990)  
 Write ~~X~~  $\rightarrow$  A (1990)

credit

fails

S2 (RUC)

B  $\xrightarrow{\pm 100}$  19

A = 2000  
 B = 2000

debit

Read B  $\rightarrow$  X (2000)  
 $X = X - 100$  (1900)  
 Write ~~B~~  $\rightarrow$  B (1900)

credit

Read A  $\rightarrow$  X (1990)  
 $X = X + 100$  (2090)  
 Write X  $\rightarrow$  A

Successful.