DBMS - 5

Friday, 31 July 2020 8:53 PM

Transaction & ACID properties

Transactions → A transaction is the execution of a sequence of one or more operations (eg SQL queries) on a database to perform some high level func.

Ex → Move $100 from Aditya's to Sagar's acc.
- → Check if Aditya has $100
- → Deduct $100 from aditya's acc.
- → Add $100 to sagar's acc.

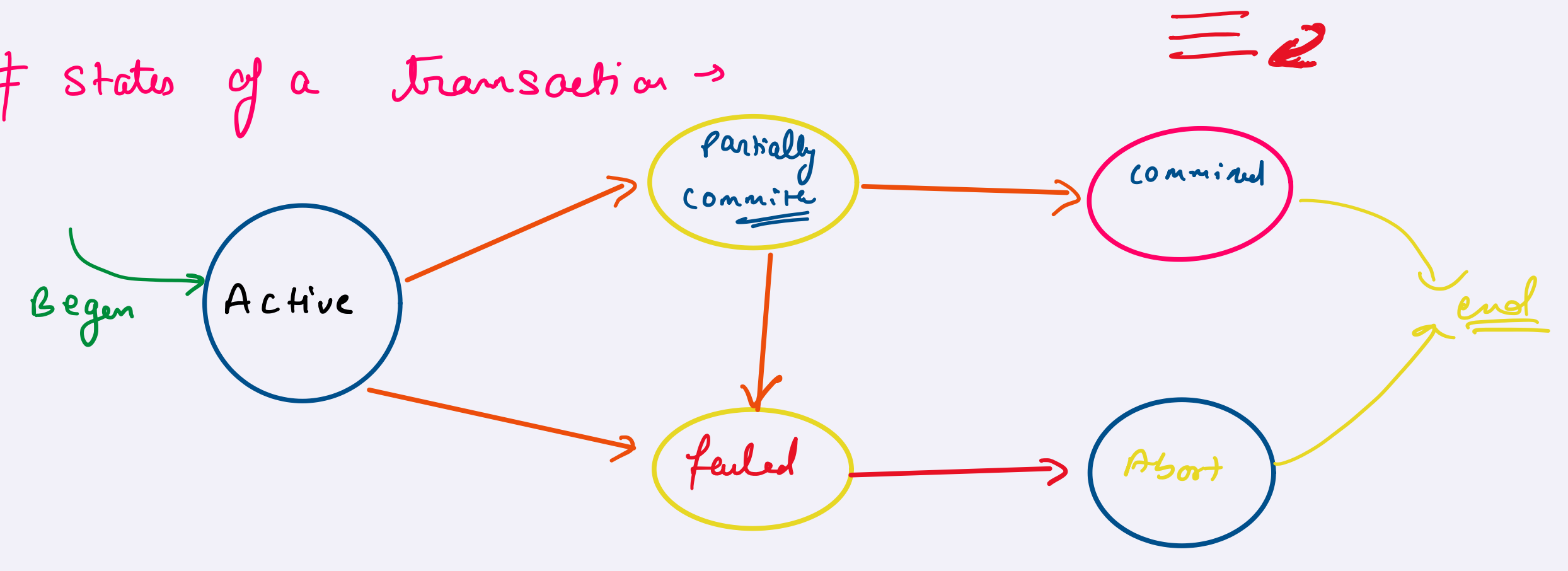
} One complete transaction

Q → why do we care ???

formal definition → A sequence of read and write operations (R(A) , W(B), - - - -) are considered as transaction.

Begin, Commit, DB Opr

States of a transaction →



ACID → correctness criteria for a DBMS.
- A : Atomicity
- C : Consistency
- I : isolation
- D : Durability

* Atomicity → It says that for executing a txn there will be only 2 possible outcomes
1. Commit after completing all actions
2. Abort after executing some action

→ Mechanism generally DBMS uses for atomicity.
1. Logging — log all actions → memory & disk
2. Shadow Paging → makes copies.

Consistency → The "world" represented by the db should be logically correct.
- → Database consistency
- → txn consistency

ISOLATION

Example

A → Guhan → $1000
B → Priyanka → $1000
→ 2000 → $2120

- T_1 → Guhan —$100→ Priyanka
- T_2 → credit both acc with 6% interest

T_1	T_2
Begin	Begin
A = A - 100	A = A * 1.06
B = B + 100	B = B * 1.06
COMMIT	COMMIT

Serially

T_1	T_2
Begin	
A = A - 100	
B = B + 100	
Commit	
	Begin
	A = A * 1.06
	B = B * 1.06
	Commit

A = 954
B = 1166
→ 2120

OR

T_1	T_2
	Begin
	A = A * 1.06
	B = B * 1.06
	Commit
Begin	
A = A - 100	
B = B + 100	
Commit	

A = 960
B = 1160
→ 2120

T_1	T_2
Begin	
A = A - 100	
	Begin
	A = A * 1.06
B = B + 100	
Commit	
	B = B * 1.06
	Commit

A = 954
B = 1166 → 2120

} equivalent serial

T_1	T_2
Begin	
A = A - 100	
	Begin
	A = A * 1.06
	B = B * 1.06
	Commit
B = B + 100	
Commit	

A = 954
B = 1160 → $2114

$6 → loss

(R - R) ✗

(R - W, W - W, W - R) → conflicting operations

Durability → All of the changes of committed transaction should be persisted

Q → Design DB of Quora

- → users → email, name, auth details
- → a user can post questions (title desc)
- → a user can answer any questions given (desc)
- → a user can drop comments on any answer or any comment.
- → Any user can follow any user
- → There can be topics to which question belongs
- → A user can follow topics
- → A user can like a question / answer / comment
- → notifications

answer (S3)

user
- email
- name
- encrypted pass
- phone
- avatar-link
- uid
- bio
- created at
- updated-at

question
- q-id
- title
- desc
- created-at
- update-at
- user-id

answer
- a-id
- u-id
- content
- ques-id
- create-at
- update at

topic
- t-id
- name
- desc
- create-at
- update-at

comment
- c-id
- content
- update-at
- create-at
- commentable-type
- commentable-id
- u-id

follow
- f-id
- c-at, u-at
- followable-type
- followable-id
- user-id

question_topic

q-id	t-id

likes
- l-id
- user-id
- c-at, u-at
- likeable-type
- likeable id