Normalisation & Transactions

Saturday, 20 April 2024 3:47 PM

① 1 NF

Use 1

- name
- email
- ph-no Dit : ×, ×

Roll_no	Name	Course	Subject	Dept	Hod
1	Ram	B.Tech	Database	CS	Mr. Kumar
2	Mukesh	Mtech	Ai	AI	Mr. Ashutosh

② route | date | Y.O.P | ×

Email : (M) multi

Roll_no	Name	Course	Email
1	Ram	B.Tech	DBMS
1	Ram	B.Tech	Database

2 NF

- partial dependency

student_id	Course_id	Course_name
1	Math-101	Math

A → B

C - key : S-id, C-id

course_id : C-id → course

table 1: student_id | course_id

table 2: C-id | course

3 NF

- transitive dependency

Exam table

student_id → subject

subject → exam-type (max. marks)

S-id	Sub-id	marks-obtained	Exam-type	Total-marks
1	CS-101	90	Final	100
2	CS-102	70	M.Term	100
3	CS-103	85	Quiz	10
1	Math-101	30	—	—

(SK) Total marks → Total-marks

candidate keys: {s-id, sub-id, Exam-type}

A → B

C → B

Exam-type	Total marks

s-id | subid | marks-obtained | Exam-type

4 NF / BCNF :

- A → B, A must be a superkey

Enrollment table

student_id	Subject	Prof
—	—	—

stid 1 : * subject

subject 1 : * prof

prof 1 : course

table 1: student_id | subject

table 2: subject | prof

Customer_Order_table

cust_id	cust_name	product_id	product_detail	product_category
1	A	41	TV	Electronics
2	B	52	Shampoo	Hygiene
3	C	67	Jeans	Clothing

① 1 NF

product_id → product_detail

product_id → product_category

product_id | product_name

CK : c_id | o_id

customer id, name

product id, detail, category

order c_id, o_id

Example

Customer

Cid	Name	DOB	street	city	state	zip
1001						

Customer

id, Name, DOB, street, city, state, zip

(1001)

name → zip → city

1 city : * zip code

1 zip code : * street

Transactions

(100)

Mobik (100)

① read balance from DB

② deduct balance

③ persist

set1

Paibhavi (100)

① read balance

② add money

③ save

set2

M: 100

V: 100

0	100
200	100
200	200
100	200

txn : 0

step 1

2

3

n

Properties of txn

ACID

① Atomicity

ⓐ Commit :

ⓑ Abort :

② Consistency ( )

(ⓐ be transit happen from one stable state to another)

③ Isolation

High level deadlock

Mobik

Paibhavi

Mobik

K → Mobik

ⓐ Transactional

t=0 t=t₁ t₂

t₂ - t₁

① txn takes : 200 ms

read balance ( ) = 100

- update bal in memory
- write balance (0)

100 |-

10 ms

Locks

① database level lock

② table level lock

③ row level lock

user, Accounts

t₁ < t₂

t₁ < t₂₃

(accounts)

④ Durability (→)

↳ persisted on disk (→) t₁ < t₂

disk & Hdd

Storage

States of txn

Step 1 → 10

Mobik

read ( )

update ( )

save ( )

committed

Paibhavi

partially committed

Active

Base: No SQL

ACID: SQL

failed

Abort

End

DB

A: 100

B: 1000

C: 500

balance

(-500)

A: 500 → 600

B: 1000 → 500

C: 500 → 500

A → B 50 t=0, t=5 txn1

B → C 500 t=10, t=15 txn2

−	+
+	−
×	/
/	×

T1 → HDD → T2

replicat^n

Indexing

- faster reads
- makes writes slow

search-key	Data pointer
s-id	s-name	zip-code

Table 1

1	
2	
3	
4	
5	

PK :

zip-code	city

Table 2

[1, 2, 3, 4 - - - n]

Index table

zip-code	Data ref
110075	#ff22 - -
110073	# - -
110035	adds3

log^n

- search : O(1) hashmaps

age = 30

range : (age > 60) : O(n)

B-Tree (log n)

(log n)

Complexity