


Normalization

→ It is the process of determining how much redundancy ^{is} exist in a table & it gives us techniques to reduce it.

- 1NF
 - 2NF
 - 3NF
 - BCNF
- 

first normal form → 1NF

→ any attribute must only contain atomic values.
↓
(indivisible)

DSA → Data Structure
& Algo

s-id	s-name	s-courses
1	Sarthak	DBMS, OS, DSA, SE
2	Sanket	DSA, SE

N x M



S-id	S-name	S-courses
1	Sarthak	DBMS
1	Sarthak	OS
1	Sarthak	DSA
2	Sanket	DSA
⋮	⋮	⋮

S-id → S-name
S-id, S-courses → S-name

Second Normal form - 2NF →

→ The table should not have partial dependencies.
and the table should be already 1NF

S-id	C-name	<u>total marks</u>
1	<u>DSA</u>	500
2	<u>OS</u>	100
1	OS	100
3	OS	100
2	DSA	500

↙
2

Student

S-id	S-name
1	Sanket
2	Sanku

PK

Course

C-id	C-name
1	OS
2	DSA
3	DBMS

PK

Student-course-mark

S-id	C-id	mark	id
1	1	100	1
2	1	95	2
1	3	99	3
2	2	85	4

FK

FK

joins

PK

C-id, S-id → mark

~~Ex~~

→

e-id	e-name	e-age	p-id	e-addr
1	Abc	21	11	a-1
2	def	21	12	a-2
3	ghi	21	13	a-3
2	def	21	14	a-2
3	ghi	21	12	a-3

project id

$e \rightarrow p$
 $p \rightarrow e$

→ NM

$e-id \rightarrow e-name$
 $(e-id, p-id) \rightarrow e-name$

RHS should be completely dependent on LHS, not just part of it

emp

e-id	e-name

$O(n)$

project

p-id	p-name

$O(m)$

emp - proj - join

e-id	p-id
1	1
2	1
3	1
2	2

$O(nm)$

Query

2

3 course colun

S-id	S-name	DSA	CS	DBMS	SE
1	Leen	20	30	40	
2	Sam	10	<u>NULL</u>	30	

X ←
10s

10s

NULL

Third Normal form \rightarrow 3NF

\hookrightarrow The table should be in 2NF

\hookrightarrow It should not have transitive dependency

e-id	e-name	e-zip	e-state	e-phn
1	abc	12345	SI'	—
2	def	12345	SI'	—

State

s-id	state-no
1	
2	
3	
4	
5	

e-id	e-name	e-phn	zip

\hookrightarrow

zip	state-id
110023	1
100089	1

	A	B	C	D	E	F	G	H	I	J	K	
1	Customer ID	Item	Shipping address	News Letter	Supplier	Supplier phone	total order price					
2	A	XBOX	35, Rohini, delhi	XBOX	MS	123	250					
3	B	PS5	24, Hoodi, Banglore	PS	Sony	456	300					
4	C	XBOX, PS5	12, Amanora, Pune	XBOX, PS	Wholesale	789	450					
5	D	PS5	34, Varansi, UP	PS	Sony	456	300					
6												
7												
8												
9												
10	Customer ID	Item	Shipping address	News Letter	Supplied	Supplier phn	item price					
11	A	XBOX	35, Rohini, delhi	XBOX	MS	123	250					
12	B	PS5	24, Hoodi, Banglore	ps5	Sony	456	300					
13	C	XBOX	12, Amanora, Pune	xbox	Wholesale	789	250					
14	C	PS5	12, Amanora, Pune	ps5	Wholesale	789	200					
15	D	Ps5	34, Varansi, UP	ps5	Sony	456	300					
16												
17												
18												
19	Customer Table			Items				Supplier				
20	Customer id	shipping address		Name	Newsletter	item_id		s_id	s_name			
21	A	35, Rohini, delhi		XBOX	XBOX	1		1	ms			
22	B	24, Hoodi, Banglore		PS5	PS5	2		2	sony			
23								3	wholesale			
24	Customer_item_join / order											
25	c_id	item_id		ITEMS_SUPPLIER_JOIN								
26	A	1		Item_id	s_id	price						
27	B	2		1	1	250						
28	C	1		2	2	300						
29	C	2		1	3	250						