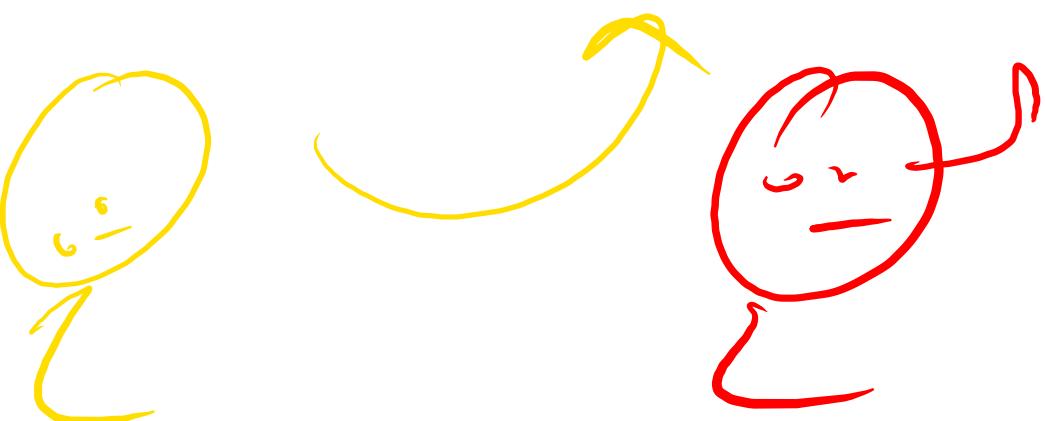


EdTech company record

Std_Id	Std_Name	Std_Batch	Course_Id	Course_Name	Course_instructor
S101	Dhoni	B1	C101	Data Science	Mr Ganguly
S102	Pandya	B1	C102	Big Data	Mr Dev
S103	Kohli	B1	C103	Full Stack	Mr Ishant
S104	Rahul	B1	C104	Back End	Mr John
S105	Rohit	B1	C105	Digital Marketing	Mr Irfan
S106	Bumrah	B1	C106	Data Analysis	Mr Sachin

Students
batch
course
Instructor

X WRONG



why so?

SRP } single responsibility principle

Demormalized Data

Updating

Normalization

Std_Id	Std_Name	Std_Batch	Course_Id	Course_Name	Course_instructor
S101	Dhoni	B1	C101	Data Science	Mr. Visha - Mr. Ganguly
S102	Pandya	B1	C102	Big Data	Mr Dev
S103	Kohli	B1	C103	Full Stack	Mr Ishant
S104	Rahul	B1	C104	Back End	Mr John
S105	Rohit	B1	C105	Digital Marketing	Mr Irfan
S106	Bumrah	B1	C106	Data Analysis	Mr Sachin

Update

nick name

Deletion of records of Mr Ganguly

Insertion anomaly

Updating Anomaly

TOI

Delete

wanted deletion

Deletion Anomaly

Normalization

Process of making things NORMAL

Redundancy

Process of organizing data in order
to avoid redundancy

(FD)

Normalization



1NF



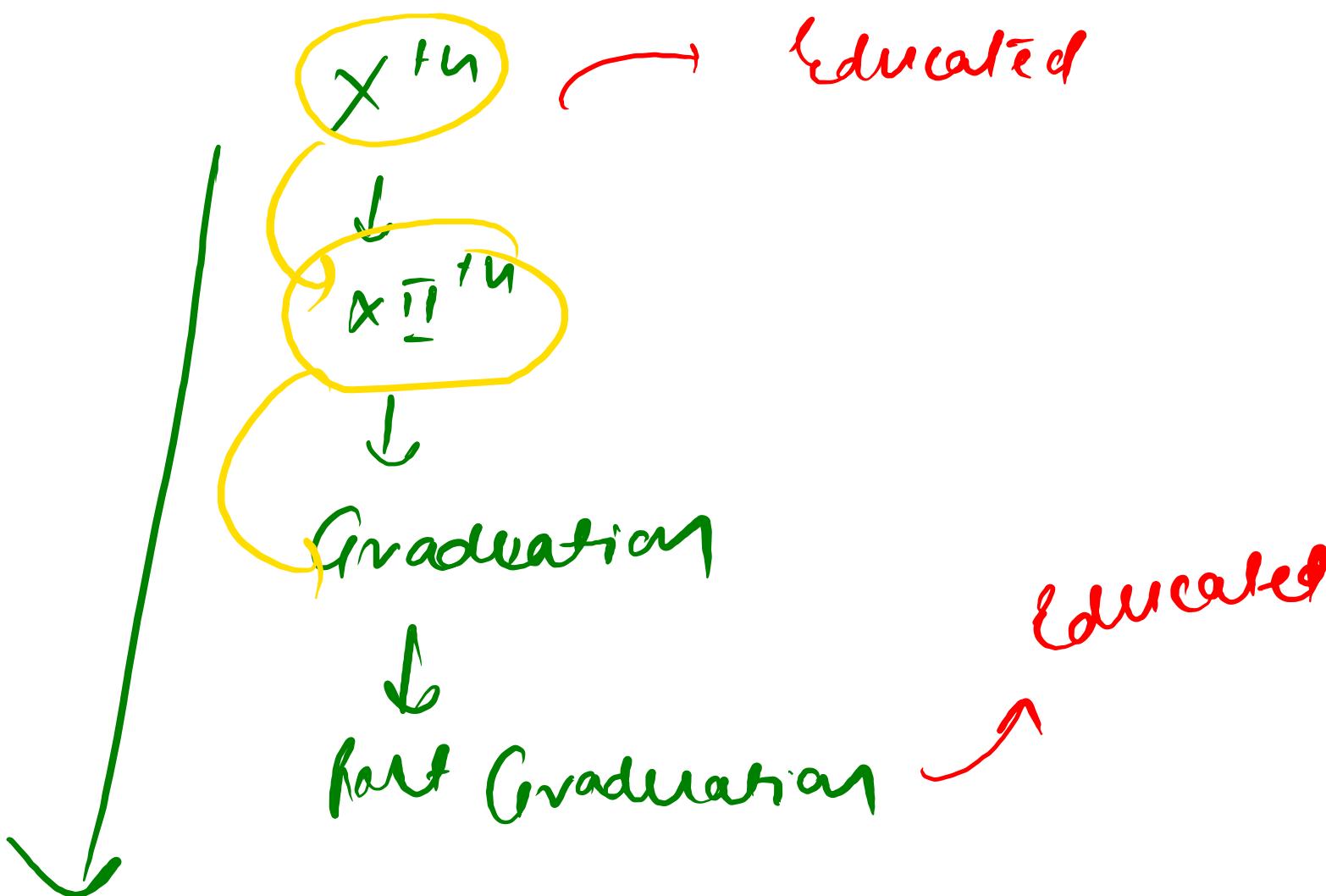
2NF



3NF



BCNF



~~1NF~~} first normal form

and {
① no cell should have multiple values.
② There has to be a PK}

Car rental company

Cust_Id	Cust_Name	Car_Num_Plate	Car_Name	Date_of_trans	Owner_id	Owner_name
13452	Sachin	KA51MK1234	Swift	12/01/2020	O_76	Dev Irfan
13452	Sachin	KA51MK5436	Thar	18/01/2020	O_78	Irfan
45621	Rahul	KA51MK3451	BMW	12/01/2020	O_54	Rohit
45621	Rahul	KA51MK6534	HondaCity	14/01/2020	O_65	Shikhar
		KA51MK3789	Swift	15/01/2020	O_66	Irfan

Each cell has multiple values

X Not in 1st Normal form

↑ Fix this

Car rental

Rent ↑ \$
the car

Customer

Composite Primary Key

Cust_Id	Cust_Name	Car_Num_Plate	Car_Name	Date_of_trans	Owner_id	Owner_name
13452	Sachin	KA51MK1234	Swift	12/01/2020	O_76	Dev
13452	Sachin	KA51MK5436	Thar	18/01/2020	O_78	Irfan
45621	Rahul	KA51MK3421	BMW	12/01/2020	O_54	Rohit
45621	Rahul	KA51MK6534	HondaCity	14/01/2020	O_65	Shikhar
45621	Rahul	KA51MK3789	Swift	15/01/2020	O_86	Irfan

No cell with multiple values

Primary key

* A car can be rented only once in a single day

STNF [car_num_plate , Date_of_trans]

Always unique

Primary composite key

Cust_Id	Cust_Name	Car_Num_Plate	Car_Name	Date_of_trans	Owner_id	Owner_name
13452	Sachin	KA51MK1234	Swift	12/01/2020	O_76	Dev
13452	Sachin	KA51MK5436	Thar	18/01/2020	O_78	Irfan
45621	Rahul	KA51MK3421	BMW	12/01/2020	O_54	Rohit
45621	Rahul	KA51MK6534	HondaCity	14/01/2020	O_65	Shikhar
45621	Rahul	KA51MK3789	Swift	15/01/2020	O_86	Irfan

NF IN 2NF

2NF X

① 1NF
② No partial function dependency

fix this

break the table, and remove all the columns which was partially dependent on primary key

columns removed can form a new table



PK

Car_Num_Plate	Date_of_trans	Cust_Id	Cust_Name
KA51MK1234	12/01/2020	13452	Sachin
KA51MK5436	18/01/2020	13452	Sachin
KA51MK3421	12/01/2020	45621	Rahul
KA51MK6534	14/01/2020	45621	Rahul
KA51MK3789	15/01/2020	45621	Rahul

2NF

Car Details

PK

Car_Num_Plate	Car_Name	Owner_id	Owner_name
KA51MK1234	Swift	O_76	Dev
KA51MK5436	Thar	O_78	Irfan
KA51MK3421	BMW	O_54	Rohit
KA51MK6534	HondaCity	O_65	Shikhar
KA51MK3789	Swift	O_86	Irfan

(2NF)

~~3NF~~

Car_Num_Plate	Date_of_trans	Cust_Id	Cust_Name
KA51MK1234	12/01/2020	13452	Sachin
KA51MK5436	18/01/2020	13452	Sachin
KA51MK3421	12/01/2020	45621	Rahul
KA51MK6534	14/01/2020	45621	Rahul
KA51MK3789	15/01/2020	45621	Rahul

~~3NF~~

Car_Num_Plate	Car_Name	Owner_id	Owner_name
KA51MK1234	Swift	O_76	Dev
KA51MK5436	Thar	O_78	Irfan
KA51MK3421	BMW	O_54	Rohit
KA51MK6534	HondaCity	O_65	Shikhar
KA51MK3789	Swift	O_86	Irfan

2 NF

① 1NF

② No partial
functional
dependency

3NF

① 2NF

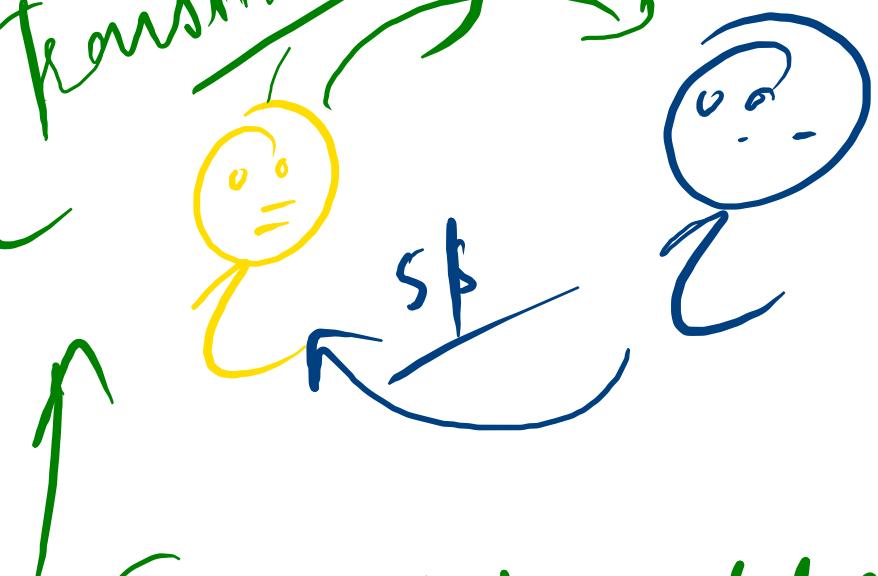
② No transitive
dependency }
+
indirect
dependency }

Indirect dependency
Transitive dependency }

PK direct
dep

Transitive dependency :-

(transitively) Indirect dependency



government
grant }

No TD

Transitive dependency }

What should be done to bring 2NF table to 3NF

① Identify columns that have
transitive dependencies ✓
↓

② Break out those columns to {
create new tables

Car_Num_Plate	Date_of_trans	Cust_Id
KA51MK1234	12/01/2020	13452
KA51MK5436	18/01/2020	13452
KA51MK3421	12/01/2020	45621
KA51MK6534	14/01/2020	45621
KA51MK3789	15/01/2020	45621

3NF

Cust_Id	Cust_Name
13452	Sachin
45621	Rahul



Car_Num_Plate	Car_Name	Owner_id
KA51MK1234	Swift	O_76
KA51MK5436	Thar	O_78
KA51MK3421	BMW	O_54
KA51MK6534	HondaCity	O_65
KA51MK3789	Swift	O_86



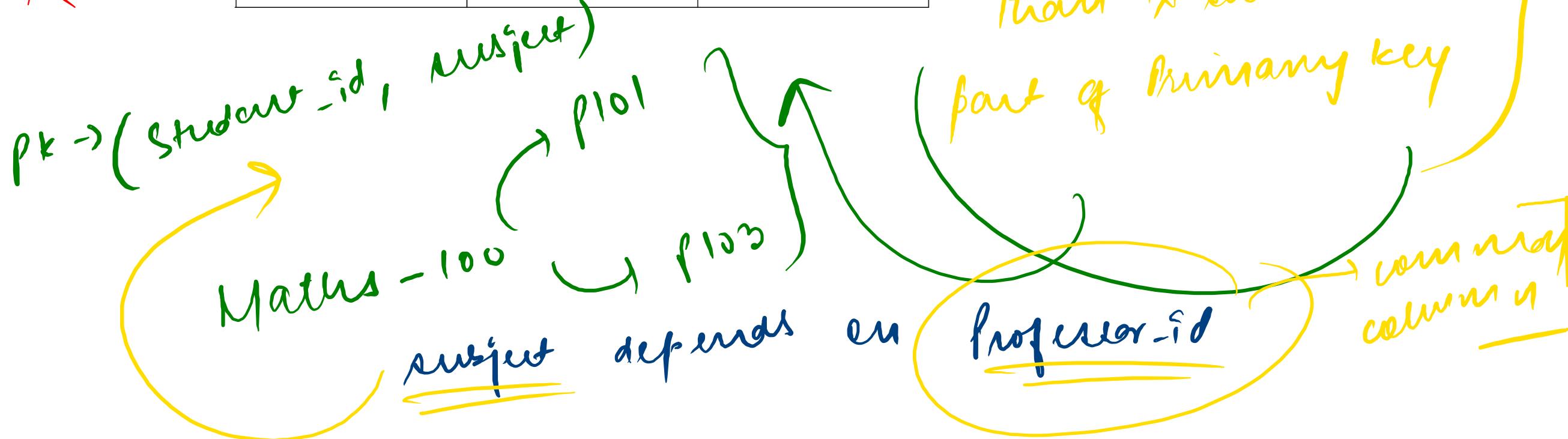

3NF

Owner_id	Owner_name
O_76	Dev
O_78	Irfan
O_54	Rohit
O_65	Shikhar
O_86	Irfan

Boyce Codd Normal Form (BCNF)

~~X BCNF~~

Student_Id	Subject	Professor_Id
S101	Maths-100	P101
S101	CS-101	P102
S102	Maths-100	P103
S102	Civil-101	P104
S103	Electrical-100	P101



① 3NF

✗ ② $x \rightarrow y$

Initial table

Student_Id	Subject	Professor_Id
S101	Maths-100	P101
S101	CS-101	P102
S102	Maths-100	P103
S102	Civil-101	P104
S103	Electrical-100	P101

X ~~BCNF~~ BCNF

Student_Id	Professor_Id
S101	P101
S101	P102
S102	P103
S102	P104
S103	P101

Professor_id → *Subject*

pk

1NF
2NF
3NF

Professor_Id	Subject
P101	Maths-100
P102	CS-101
P103	Maths-100
P104	Civil-101

bcnf