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iii) Third normal form (3NF): —

A table is set to be in third normal form if it is in second normal form and there is no transitive dependency between the non-key attributes. In simple words, we can say that it is verified that all non-key domain or attributes are mutually independent for each other.

$$A \leftarrow B$$

$$B \leftarrow C$$

then

$$A \leftarrow C$$

From the diagram, we can say B is dependent on A and again C is dependent on B. ~~on A in di~~

This way, we can say C is also dependent on A directly. It proves C is transitively dependent on A. This is called transitive dependency. This type of dependency should not be there for any ~~attribu~~ non-key attributes.

for eg: —

Employee - table

Emp-ID	Emp-name	Emp-Zip
1001	Ram	801109
1002	Mohan Shyam	801104
1003	Mohan	700023
1004	Sohan	400025

Employee - Zip - table

Emp-ID Emp-Zip	Emp-name Emp-State	Emp-city	Emp-dist
801109	Bihar	Naubatpur	Patna
801104	Bihar	Bikram	Patna
700023	WB	Kolkata	Kolkata
400025	Maharashtra	Mumbai	Satara

1NF → 2NF → 3NF → Boyce-Codd Normal Form
 4NF ← ← ←

Employee - Table

Emp-ID	Emp-name	Emp-zip	Emp-state	Emp-city	Emp-dist
1001	Ram	801109	Bihar	Naubalpur	Patna
1002	Shyam	801104	Bihar	Bikram	Patna
1003	Mohan	700023	WB	Kolkata	Kolkata
1004	Sohan	400025	Maharashtra	Mumbai	Satara

Here,

candidate key — Employee-ID (Emp-ID)

Non-prime attributes — All attributes except emp-ID are non-prime attributes because they are not part of candidate key.

Here, emp-state, emp-city, emp-dist are dependent on emp-zip (Pin-code) and again emp-zip is dependent on emp-ID that makes non-prime attributes such as emp-state, emp-city, emp-dist transitively dependent on key emp-ID. This is against the rule of third normal form. This is against the principle of Third normal form.

To make this table in third normal form it has to be broken into two separate table.