

Course Name: **A Level (1st Sem)**

Subject : **Introduction to DBMS**

Topic: **DB Normalization – Exercise Practice on 3NF (Part 8)**

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Database Normalization – Exercise Practice on 3NF

Suppose a following relations schema:

Employee

emp_id	emp_name	emp_zip	dept_id	dept_name	dept_location
e101	Rakesh Kumar	273010	d001	IT	GF-20
e102	Rakesh	211008	d001	IT	GF-20
e103	Shyam Verma	345001	d003	Electronics	GF-22
e104	Saloni Sharma	239801	d004	Accounts	FF-21
e106	Shyama	870401			
			d005	Admin	GF-204

Identify functional dependencies in above table and find out that relation is in 3NF or not?
If not decompose it in 3NF.

(A department can have many employees, but an employee is associated with one department).

Solution:

The following FDs are identified based on the value and descriptions given about table:

emp_id → emp_name, emp_zip, dept_id

dept_id → dept_name, dept_location

Since emp_id uniquely identifies each record in the table, and the closure of emp_id also has all the attributes of table.

So, **emp_id is the candidate key** in table.

Prime attributes – {emp_id}

Non prime attributes – {emp_name, emp_zip, dept_id, dept_name, dept_location}

The table is in 1NF because each attribute in the table have atomic (single) value.

The table is also in 2NF because it has not any partial dependency. (no non prime attribute is dependent on the proper subset of candidate key)

But, the table is not following the rules of 3NF because of functional dependency

dept_id $\rightarrow$ dept_name, dept_location

[Non prime attribute {dept_id} is determining another non prime attributes {dept_name, dept_location}, it is the case of transitive dependency.]

Therefore, to normalize above table in 3NF, it needs to be divided into two tables:

employee (emp_id, emp_name, dept_id)

department (dept_id, dept_name, dept_location)

The FD which has transitive dependency, the separate table is created for it to remove the transitive dependency.

Now both tables employee and department are following the rules of 3NF.

Exercise:

1. Suppose R (A B C) and set of FDs

$F : \{ A \rightarrow B, B \rightarrow C \}$

The above table is normalized up to 3NF or not? If not, decompose it in 3NF.

