Course Name: **A Level (1st Sem)** Subject : **Introduction to DBMS**

Topic: **DB Normalization – Exercise Practices on BCNF (Part 11)** Date: **28-May-2020**

Database Normalization – Exercise Practices on BCNF

Suppose a following relational schema R:

stu_id	subject	prof	prof_id
s101	Python	Sumit Sharma	p1
s101	Java	R. Chauhan	p2
s102	Python	Punit	p3
s103	C#	Simmi	p4
s104	Python	Sumit Sharma	p1

- One student can enrol multiple subjects.
- For each subject, a professor is assigned.
- There can be multiple professor teaching same subjects.

Identify functional dependency in above relation and check out this table is in BCNF or not? if not, decompose it in BCNF.

Solution:

Based on the descriptions and value given, following functional dependencies have been identified:

prof_id → prof, subject

stud_id, subject → prof, prof_id

There are two candidate key in above table i.e.

1. **(stud_id, subject)**
2. **(stud_id, prof_id)**

(stud_id subject)$^+$ = stud_id, subject, prof, prof_id

(stud_id prof_id)$^+$ = stud_id, subject, prof, prof_id

Closure of these two has all the attributes of R.

Prime attributes: stud_id, subject, prof_id

Non prime attributes: prof

The functional dependency **prof_id** → **prof**, **subject** is not following rule of BCNF because **prof_id** is not candidate key.

Therefore table needs to be decomposed into:

R1 (prof_id, prof, subject)

R2 (stu_id, prof_id)

Now R1, R2 are normalized into BCNF.

See how data redundancy has been removed by decomposing it into BCNF

R1

prof_id	prof	subject
p1	Sumit Sharma	Python
p2	R. Chauhan	Java
p3	Punit	Python
p4	Simmi	C#

R2

stu_id	prof_id
s101	p1
s101	p2
s102	p3
s103	p4
s104	p1

Exercise:

Suppose R (A B C D E F) and set of FDs

F : { A → BCD,
BC → DE,
B → D,
D → A}

Do following:

1. Compute B^+.
2. Find candidate key.
3. Compute canonical cover.
4. Give 3NF decomposition
5. Give BCNF decomposition.