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

Topic: **DB Normalization – BCNF (Part 10)** Date: **27-May-2020**

Database Normalization – BCNF

BCNF

It stands for Boyce - Codd Normal Form. BCNF is stricter than 3NF; it is also referred as 3.5NF.

A relation is said to be in BCNF if and only if for every non-trivial functional dependency α → β:

- **α must be a super key.**

In most of the cases, database is normalized in its best if it satisfies the rules of third normal form, but there would be anomalies and redundancy in database even if the table is in 3NF if it has more than one candidate key. This type of anomalies is covered in BCNF.

Suppose a relational schema R (A B C) and set of functional dependency

F: AB → C

C → B

There are two candidate key in above table i.e. AB and AC.

$(AB)^+$ = ABC

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Closure of AB has all the attributes of R, and closure of AC also has all the attributes of R**.**

Prime attributes: A B C

Non prime attributes: NIL

The table is in 2NF because there is **no partial dependency**.

The table is in 3NF because there is **no transitive dependency**.

But C → B functional dependency is not following rule of BCNF because C is not candidate key. AB → C

Therefore table needs to be decomposed into

R1 (C B)

R2 (A C)

R1 (C B) since C → B, and R2 (A C), C is common and C is kept in second table to create relationship among tables.

Now R1, R2 are normalized into BCNF.

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

R(A B C)

A	B	C
a	1	x
b	2	y
c	2	z
c	3	w
d	3	w
e	3	w

R2 (A C)

A	C
a	x
b	y
c	z
c	w
d	w
e	w

R1(C B)

C	B
x	1
y	2
z	2
w	3

Exercise:

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

   F : { A → BCD,

   BC → AD,

   D → B}

Is above table normalized up to BCNF or not? If not, decompose it in BCNF.