CS-344

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DOUBT SESSION

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Ques:1 If schema R is in 3NF and it has **no non-key** attributes.Prove or disprove that it is in BCNF

Ans: For FD X-->A,
We know that A is a part of some key (because there in no non-key attribute in R),which implies it is in 3NF.

But for BCNF :-
1) A should be subset of X (NOT necessary)
2) or X must be a Super Key (Which is also not necessary)
Hence,it need **not be necessary** that the given schema R is in **BCNF.**

Ques:2 If schema R is in 2NF and it has **no non-key** attributes.Prove or disprove that it is in 3NF.

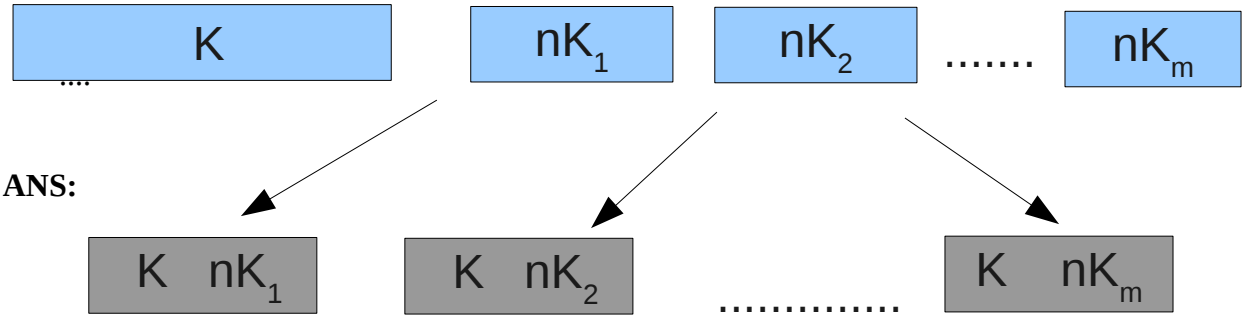
Ans: For X-->A
since it is in 2NF,that means X is not a proper subset of key and moreover since there in no non-key attribute,this implies X is a **Super Key**.
Therefore,it is in **both BCNF and 3NF**.

Ques:3 If the schema R is in 1NF with **no non-key** attributes,then?

Ans: For X-->A,following points holds:
1)Atleast in 2 NF
2)Also in 3NF
3)Not necessarily in BCNF

Ques:4 The following relational schema is in 2NF,convert it to BCNF in single level of decomposition.

where K is the Key for non-key attributes $nK_1 \ldots\ldots nK_m$.



$K \rightarrow nK_1$ because K is a KEY(because nk_1 is a subset of K).
$nK_1 \rightarrow K$ is **FALSE,** because it will make nK_1 a candidate Key.

It is **lossless decompostion** because intersection of all relations schema nK_1 ,.... nK_m will be K which is a Key for all nK_1 ,.... nK_m

NOTE: If $nK_1 \rightarrow nK_2$
the dependency preservation doesn't necessarily holds

It is in BCNF as $k \rightarrow nK_1$,where K is a Key.

Other important points discussed were:-
The problem of obtaining a lossless-join, dependency-preserving decomposition into 3NF relations,

Let R be a relation with a set F of FDs that is a minimal cover, and let R1 , R2 , . . . , Rn be a lossless-join decomposition of R. For $1 \leq i \leq n$,suppose that each Ri is in 3NF and let Fi denote the projection of F onto the attributes of Ri . Do the following:

Identify the set N of dependencies in F that are not preserved, that is, not included in the closure of the union of Fi s.

For each FD $X \rightarrow A$ in N , create a relation schema XA and add it to the decomposition of R.

Obviously, every dependency in F is preserved if we replace R by the Ri s plus the schemas of the form XA added in this step. The Ri s are given to be in 3NF. We can show that each of the schemas XA is in 3NF as follows: **Since $X \rightarrow A$ is in the minimal cover F, $Y \rightarrow A$ does not hold for any Y that is a strict subset of X**. Therefore, X is a key for XA. Further, if any other dependencies hold over XA, the right side can involve only attributes in X because A is a single attribute (because $X \rightarrow A$ is an FD in a minimal cover). Since X is a key for XA, none of these additional dependencies causes a violation of 3NF (although they might cause a violation of BCNF).