**Trivial functional dependency**

A functional dependency X → Y is trivial if Y, the right hand side of the functional dependency, is a subset of X.

E.g.: {Employee ID, Employee Address} → {Employee Address} is trivial, as is {Employee Address} → {Employee Address}.

Another example, the functional dependency "(S#, P#) → S#" is trivial because the set {S#} (for the R.H.S. of the functional dependency) is a subset of (S#, P#} (for the L.H.S. of the functional dependency).

On the other hand, the functional dependency "(S#, P#) → S#, Qty" is NON-trivial because the set **{S#, Qty} is NOT a subset of the attribute set {S#, P#}.**

**BCNF**

A table is said to be in the **BCNF** if and only if it is in the **3NF** and every non-trivial, left-irreducible functional dependency has a candidate key as its determinant.

**Normalize the following table from 1nf to bcnf.**

Given non trivial functional dependencies so to be in bcnf its lhs part should be a candidate key.

Student (roll, semester, program, course, credit, section, grade, gender, hobby, fee, address, age, height)

Non trivial functional dependency: roll-grade, program-course, gender-address, gender- section, hobby-program, program-fee, course-fee, semester-credit, address-section

**Solution:**

Given non-trivial functional dependencies

roll->grade,

program->course

program->fee

gender->address

gender->section**//no use of this since gender->address and address->section**

hobby->program

semester->credit

address->section

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Roll** | **Semester** | **Program** | **Course** | **Credit** | **Section** | **Grade** | **Gender** | **Hobby** | **Fee** | **Address** | **Age** | **Height** |
| 1 | I | BCA | DBMS | 3 | A | 3.14 | M | X | 2000 | Ktm | 20 | 100 |
| 1 | I | BCA | SE | 3 | A | 3.5 | M | X | 2000 | Ktm | 20 | 100 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |

So the given table is in 1NF. But not in second normal form.

Student (roll, semester, program, course, credit, section, grade, gender, hobby, fee, address, age, height)

**Second Normal Form**

Student1 (roll, grade, section, gender, age, height, address)

Student2 (roll, semester, program, course, credit, fee, hobby)

Since the table is in 2NF but not in 3NF as there is a transitive dependencies in table Student2.

**Third Normal form**

Student3 (roll, grade, section, gender, age, height, address)

Student4 (roll, semester, program, fee)

Student5 (semester, course, credit)

Since the table Student3 and Student4 contains non trivial dependencies it is not in BCNF.

**BCNF**

Student6 (roll, age, height, hobby)

Student7 (roll, semester, grade) //roll-> semester, grade so no non trivial

Student8 (roll, gender, address, section) //roll, gender->address, section so no non trivial

Student9 (semester, program, course, credit, fee) // semester, program->course, credit, fee so no non trivial

**Answer may vary with each other.**