8-04-2020 Computer Science (2nd year)

Subject - 'DBMS'

4th Normal form

for a table to satisfy the fourth Normal form, it should satisfy the following two condition.

1) It should be in the Boyce-Codd Normal form.
2) And the table should not have any multi valued Dependency.

Multi valued Dependency

A table is said to have multi-valued Dependency if the following condition are true.

1) For a dependency $A \rightarrow B$ if for a single value of A, multiple value of B exists. then the table may have multi-valued dependency.

2) Also, a table should have at least 3 columns for it to have a multi valued dependency.

3) And, for a relation R(A, B, C), if there is a multi valued dependency between, A and B, then B and C should be Independent of each other.

If all these condition are true for any relation (table), it is said to have multi valued dependency.

Example

Below we have a college enrolement table with columns S_id, course and hobby.

S-Id	course	hobby
1	Science	Cricket
1	maths	Hockey
2	C++	Cricket
2	Php	Hockey

As you can see in the table above, student with S-Id 1 has opted for two courses Science and maths, and has two hobbies Cricket and Hockey.

you must be thinking what problem this can lead to, right.

well the two records for student with S-id 1 will give rise to two more records as shown below, because for one student, two hobbies exists, hence along with both the courses, these hobbies should be specified

S-Id	Course	Hobby
1	Science	Cricket
1	Math	Hockey
1	Science	Hockey
1	Maths	Cricket

And, in the table above, there is no relationship between the columns Course and Hobby. There are Independent of each others. So, there is multivalued dependency which lead to un-necessary repetition of data and other anomalies as well.

How to Satisfy 4th Normal form?

To make the above relation satisfy the 4th normal form, we can decompose the table into 2 tables.

Course opted table:

S-Id	Course
1	Science
1	Maths
2	C++
2	Php

and Hobbies table

S-Id	Hobby
1	Cricket
1	Hockey
2	Cricket
2	Hockey

Now this relation satisfies the fourth normal form.

A table can also have functional dependency along with multi-valued dependency, ~~the~~ In that case, the functionally dependent columns are moved in a seperate table and the multi valued dependent column are move to seperate tables.

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