SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

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Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

COURSE NAME : 19CS402 - DATABASE MANAGEMENT SYSTEMS

II YEAR / III SEMESTER
5NF

4NF

- A relation will be in 4NF if it is in Boyce Codd normal form and has no multi-valued dependency.

- For a dependency A → B, if for a single value of A, multiple values of B exists, then the relation will be a multi-valued dependency.

Example

STUDENT

STU_ID	COURSE	HOBBY
21	Computer	Dancing
21	Math	Singing
34	Chemistry	Dancing
74	Biology	Cricket
59	Physics	Hockey

The given STUDENT table is in 3NF, but the COURSE and HOBBY are two independent entity. Hence, there is no relationship between COURSE and HOBBY.

In the STUDENT relation, a student with STU_ID, **21** contains two courses, **Computer** and **Math** and two hobbies, **Dancing** and **Singing**. So there is a Multi-valued dependency on STU_ID, which leads to unnecessary repetition of data.

So to make the above table into 4NF, we can decompose it into two tables:

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- So to make the above table into 4NF, we can decompose it into two tables:

STUDENT_COURSE

STU_ID	COURSE
21	Computer
21	Math
34	Chemistry
74	Biology
59	Physics

STUDENT_HOBBY

STU_ID	HOBBY
21	Dancing
21	Singing
34	Dancing
74	Cricket
59	Hockey

Fifth Normal Form (5NF)

- The 5NF (Fifth Normal Form) is also known as project-join normal form. A relation is in Fifth Normal Form (5NF), if it is in 4NF, and won't have lossless decomposition into smaller tables.

- You can also consider that a relation is in 5NF, if the candidate key implies every join dependency in it.

Example

The below relation violates the Fifth Normal Form (5NF) of Normalization −

<Employee>

EmpName	EmpSkills	EmpJob (Assigned Work)
David	Java	E145
John	JavaScript	E146
Jamie	jQuery	E146
Emma	Java	E147

The above relation can be decomposed into the following three tables; therefore, it is not in 5NF −

<EmployeeSkills>

EmpName	EmpSkills
David	Java
John	JavaScript
Jamie	jQuery
Emma	Java

The following is the <EmployeeJob> relation that displays the jobs assigned to each employee −

<EmployeeJob>

EmpName	EmpJob
David	E145
John	E146
Jamie	E146
Emma	E147

Here is the skills that are related to the assigned jobs −

<JobSkills>

EmpSkills	EmpJob
Java	E145
JavaScript	E146
jQuery	E146
Java	E147

Our Join Dependency −

{(EmpName, EmpSkills), (EmpName, EmpJob), (EmpSkills, EmpJob)}

The above relations have join dependency, so they are not in 5NF. That would mean that a join relation of the above three relations is equal to our original relation <Employee>.