

Problem 3:

What is database normalization and how does it help with managing information stored in a relational database table? State if the following table is normalized, and if not, convert it to First, Second, and Third normal forms. Also provide an explanation of each of the forms and what changes did you make to convert the original/previous table to the current state.

Employee ID	Employee Name	Projects	Department ID	Location
1	Niranjan	Website, SIERRA	D-1	Urbana
2	Ethan	SSET, LUI	D-2	Champaign
3	Fabian	LUI, REF	D-2	Champaign

Database normalization is a process that simplifies the relational database. It enhances the efficiency of stored data and manipulation. Also, it helps reduce the data aberrant when updating databases and makes it easier to maintain the database. Normalization totally has several steps:

1NF(First Normal Form):

1. Each table cell only has one value
2. Delete duplicate columns and rows

First Normal Form remove repeated columns or rows into separate rows and make sure each table cell only has one single value.

2NF(Second Normal Form):

1. Delete partial dependency and make the primary key a single column.

Second Normal Form removes partial dependency, the primary key is not composed of two or more attributes, and all the attributes are fully functionally dependent on the primary key.

3NF(Third Normal Form)

1. Delete transitive functional dependency

Third Normal Form will delete transitive functional dependency, making all the attributes only have relations with the candidate key. All the attributes except the primary key are isolated with each other and not transitively dependent on the primary key.

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1NF(First Normal Form):

Employee ID	Employee Name	Projects	Department ID	Location
1	Niranjan	Website	D-1	Urbana
1	Niranjan	SIERRA	D-1	Urbana
2	Ethan	SSET	D-2	Champaign
2	Ethan	LUI	D-2	Champaign
3	Fabian	LUI	D-2	Champaign
3	Fabian	REF	D-2	Champaign

Because it has multiple values in the Projects column, for the First Normal Form, we need to separate them into single rows.

2NF(Second Normal Form):

3NF(Third Normal Form):