**Assignment:- 02**

1. Explain normalization and what we are achieving by using the normalization in the database?
2. Explain normal forms. Difference between normalization and normal forms
3. Types of normal forms
4. Explain every level of normal forms
5. How the normal form helps to reduce the redundancy
6. What are the primary key and foreign keys? Give an example
7. Explain key attributes, non-key attributes, functional dependency, FFD
8. What is denormalization
9. What is the difference between normalization and de-normalization?
10. Advantages of using normalization and denormalization

Answers:

1. Explain normalization and what we are achieving by using the normalization in the database?

Database normalization is the process of restructuring a relational database in accordance with a series of so-called normal forms in order to reduce the data redundancy and improve data integrity.

1. Explain normal forms. Difference between normalization and normal forms

The stage at which a table is organized is known as its normal form (or a stage of normalization). There are three stages of normal forms are known as first normal form (or 1NF), second normal form (or 2NF), and third normal form (or 3NF).

Normalization divides the larger table into smaller and links them using relationships. The normal form is used to reduce redundancy from the database table.

1. Types of normal forms

There are different normal forms as in first normal form (or 1NF), second normal form (or 2NF), and third normal form (or 3NF), BCNF (Boyce-Codd Normal Form), 4NF,5NF.

1. Explain every level of normal forms
2. 1NF – The first normal form requires that a table satisfies the conditions as in rows & columns are not ordered, duplicates available, row-column intersections always have a unique value.
3. 2NF – An entity is in a 2NF if all of its attributes depend on the whole primary key, values of different columns have dependency on other columns, table must be in 1NF & all non-key columns of the tables must depend on primary key, partial dependencies are removed and placed in separate table.
4. 3NF – We should eliminate the fields in a table that don’t depend on the key, non-Primary key columns shouldn’t depend on the other Non-Primary key columns, there is no transitive functional dependency.
5. BCNF (Boyce-Codd Normal Form) – Even when a DB is in 3NF,still there would be anomalies resulted if it has more than 1 candidate key, it is also referred to as 3.5NF.
6. 4NF – If no DB table instance contains 2 or more independent and multivalued data describing relevant entity, then it is in 4NF.
7. 5NF – A table is in the 5NF only if it is 4NF & it can’t be decomposed into any number of smaller tables without loss of data.
8. How the normal form helps to reduce the redundancy

Normalization helps to reduce redundancy and complexity by examining new data types used in the table. It is helpful to divide the large database table into smaller tables and link them using relationship. It avoids duplicate data or no repeating groups into a table.

1. What are the primary key and foreign keys? Give an example

Primary key is used to uniquely identify a row and A table can have only have one primary key.

Foreign key is used to connect two tables or maintain the relationship between them and A table can have multiple foreign keys.

Example - In the student table, we store the details of students and the courses they have enrolled in. And in the department table, we store all the details of the department. Here the courseID acts as the Primary key for the department table whereas it acts as the Foreign key in the student table.

1. Explain key attributes, non-key attributes, functional dependency, FFD

Key Attributes - As the name suggests key attribute will uniquely identify the entities.

Non-key attributes - non-key attributes would not be able to uniquely identify the entities.

Functional dependency – It is a relationship that exists between two attributes. It typically exists between the primary key and non-key attribute within a table. The left side of FD is known as a determinant, the right side of the production is known as a dependent.

FFD – Fully Functional Dependency - An attribute is fully functional dependent on another attribute, if it is Functionally Dependent on that attribute and not on any of its proper subset. For example, an attribute Q is fully functional dependent on another attribute P, if it is Functionally Dependent on P and not on any of the proper subset of P.

1. What is denormalization

Denormalization is a type of reverse engineering process that can apply to retrieve the data in the shortest time possible.

1. What is the difference between normalization and de-normalization

Normalization - > a) A Schema design to store non-redundant & consistent data.

b) Data integrity is maintained

c) Little to no redundant data

d) Many tables

e) Optimizes for storage of data

De-normalization -> a) A schema that combines data so that accessing data(querying) is fast.

b) Data integrity is not maintained

c) Redundant data is common

d) fewer tables

e) Excessive data, storage is less optimal

1. Advantages of using normalization and denormalization

Advantages of Normalization:

* Reduces redundant data.
* Provides data consistency within the database.
* More flexible database design.
* Higher database security.
* Better and quicker execution.
* Greater overall database organization

Advantages of De-normalization:

* Minimizing the need for joins.
* Reducing the number of tables.
* Queries to be retrieved can be simpler.
* Less likely to have bugs.
* Precomputing derived values.
* Reducing the number of relations.
* Reducing the number of foreign keys in relation.