

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

Answer: Normalization is a process of reducing a larger table into smaller table in order to remove the redundancy and anomaly by identifying their functional dependency.

What we achieve by using the normalization?

Normalization avoids duplicate data or no repeating groups into a table.

2. Explain normal forms? Difference between normalization and normal forms?

Answer: A table without redundancy and anomaly is said to be a normal form.

Difference between normalization and normal forms

Normalization divides the larger table into smaller and links them using relationships.

The normal form is used to reduce redundancy from the database table

3. Types of normal forms

- Answer:
- First Normal Form (1 NF)
- Second Normal Form (2 NF)
- Third Normal Form (3 NF)
- Boyce Codd Normal Form or Fourth Normal Form (BCNF or 4 NF)

4. Explain every level of normal forms

Answer:

First Normal Form(1 NF)

First Normal Form: This NF will not allow multiple values in a cell and will be done till the cell can't be further divided. It also removes repeated groups in the table.

A table is in 1 NF if:

1. There are only Single Valued Attributes.
2. Attribute Domain does not change.
3. There is a unique name for every Attribute/Column.
4. The order in which data is stored does not matter.

A database design is considered as bad if it is not even in the First Normal Form (1NF).

- **Second Normal Form (2 NF)**

This is applicable if the table is in 1NF. This says table should not have the partial dependencies.

- **Third Normal Form (3 NF)**

This is applicable if the table is in 2NF. This will remove the redundancies from the table. It also removes the non-useful data from table.

- **Boyce Codd Normal Form:** This is the advanced version of 3NF, this is also known as 3.5 NF.

5. How the normal form helps to reduce the redundancy

Answer: 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.

6. What is primary key and foreign key? Give an example

Primary key:

Primary key is a constraint which is used to assign to a column to identify a record uniquely from the table.

Characteristics of primary key:

- We can have only one primary key in a table.
- It cannot accept repeated or duplicated values.
- It cannot accept null values.
- It is a combination of unique and not null.

- Primary key is not mandatory but recommended to have one in table.

Foreign key:

It is constraint which is used to establish the connection between two tables.

Characteristics of foreign key:

- We can have 'n' no. of foreign keys in a table.
- It can accept repeated or duplicated values.
- It can accept null values.
- It is not a combination of unique and not null.

It is present in child table but actually belongs to parent table.

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

Answer:

key-attributes:

An attribute which is used to identify a record uniquely from the table is called key attribute.

Non-key attributes:

All the attributes except key attributes are referred as Non-key attributes.

Functional Dependency:

The functional dependency is a relationship that exists between two attributes. It typically exists between the primary key and non-key attribute within a table.

Let us consider the relation 'R' with two attributes 'X' and 'Y' respectively. In which attributes 'X' determines attributes 'Y'.

In other words, 'Y' is dependent on 'X'. There exists functional dependency.

$X \rightarrow Y$, Y is dependent on X

8. What is denormalization

Answer: Denormalization is a database optimization technique in which we add redundant data to one or more tables. This can help us avoid costly joins in a relational database. Note that denormalization does not mean 'reversing normalization' or 'not to normalize'. It is an optimization technique that is applied after normalization.

9. Difference between normalization and de-normalization?

Answer:

Normalization is the technique of dividing the data into multiple tables to reduce data redundancy and inconsistency and to achieve data integrity.

On the other hand

Denormalization is the technique of combining the data into a single table to make data retrieval faster.

10. Advantages of using normalization and denormalization.

Answer:

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

Denormalization

- 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