**SQL Constraints**

1. **What are constraints in SQL? List and explain the different types of constraints.**

In **SQL**, **constraints** are rules applied to columns in a table to **enforce data integrity** and **ensure accuracy and reliability** of the data. They restrict the type of data that can be stored in a column, and they help maintain consistency in the database.

**Types of Constraints in SQL**

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| **Constraint** | **Description** |
| **NOT NULL** | Ensures that a column **cannot have a NULL value**. |
| **UNIQUE** | Ensures that **all values in a column are different**. |
| **PRIMARY KEY** | Uniquely identifies each record in a table; **combines NOT NULL and UNIQUE**. |
| **FOREIGN KEY** | Maintains referential integrity by ensuring that the value in one table **matches a value in another table’s primary key**. |
| **CHECK** | Ensures that **all values in a column satisfy a specific condition**. |
| **DEFAULT** | Assigns a **default value** to a column when no value is specified. |

**2. How do PRIMARY KEY and FOREIGN KEY constraints differ?**

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| **Feature** | **PRIMARY KEY** | **FOREIGN KEY** |
| **Purpose** | Uniquely identifies each record in a table | Links two tables together (ensures referential integrity) |
| **Uniqueness** | Must be **unique** and **not null** | Can have **duplicate** values |
| **Null Values** | **Not allowed** | **Allowed**, unless explicitly restricted |
| **Location** | Defined **within the table** it identifies | Refers to the **primary key** of another table |
| **Constraint Type** | Enforces **entity integrity** | Enforces **referential integrity** |
| **Example Use** | A students table with student\_id as a primary key | An enrollments table referencing student\_id from the students table |

**3. What is the role of NOT NULL and UNIQUE constraints?**

**1. NOT NULL Constraint**

Role:

Ensures that a column cannot have NULL values. This means the column must always have a value when a record is inserted.

Use Case:

Use it when a field is mandatory (e.g., names, IDs, etc.).

**2. UNIQUE Constraint**

Role:

Ensures that all values in a column are different. No two rows can have the same value in that column.

Use Case:

Used when you need a field to have distinct values, like email addresses, usernames, or roll numbers