### ****Data Integrity Constraints****

**Data integrity constraints are rules applied to database tables to ensure the accuracy and reliability of the data stored in a database. These constraints ensure that the data entered into a table adheres to specific rules and remains consistent throughout its lifecycle. Below are the main types of data integrity constraints:**

**1. Unique Constraint**

**Ensures that all values in a column or group of columns are distinct.**

**Prevents duplicate values in the specified columns.**

**Example: A column for email addresses must ensure no two rows have the same email.**

**SQL Syntax Example:**

**CREATE TABLE Students (**

**StudentID INT UNIQUE,**

**Name VARCHAR(50)**

**);**

**2. Check Constraint**

**Ensures that the values in a column meet a specified condition.**

**Enforces domain integrity by restricting the range or format of values.**

**Example: A column for age should only allow values greater than 0.**

**SQL Syntax Example:**

**CREATE TABLE Employees (**

**EmployeeID INT,**

**Age INT CHECK (Age > 0)**

**);**

**3. Not Null Constraint**

**Ensures that a column cannot have a NULL value.**

**Ensures mandatory data entry for critical columns.**

**Example: A column for primary keys should not allow NULL values.**

**SQL Syntax Example:**

**CREATE TABLE Orders (**

**OrderID INT NOT NULL,**

**ProductName VARCHAR(50)**

**);**

**Referential Integrity Constraints**

**Referential integrity constraints ensure that relationships between tables remain consistent. These constraints maintain the logical links between tables, typically through the use of foreign keys.**

**1. Foreign Key Constraint**

**Establishes a link between the columns of two tables.**

**Ensures that the value in a column (child table) matches a value in the referenced column (parent table).**

**SQL Syntax Example:**

**CREATE TABLE Orders (**

**OrderID INT,**

**CustomerID INT,**

**FOREIGN KEY (CustomerID) REFERENCES Customers(CustomerID)**

**);**

**2. Delete Rule**

**Defines the behavior when a referenced row in the parent table is deleted.**

**Options include:**

**CASCADE: Deletes all related rows in the child table.**

**SET NULL: Sets the foreign key in the child table to NULL.**

**RESTRICT: Prevents deletion if there are related rows in the child table.**

**SQL Syntax Example:**

**CREATE TABLE Orders (**

**OrderID INT,**

**CustomerID INT,**

**FOREIGN KEY (CustomerID) REFERENCES Customers(CustomerID)**

**ON DELETE CASCADE**

**);**

**3. Update Rule**

**Defines the behavior when a referenced row in the parent table is updated.**

**Options include:**

**CASCADE: Updates all related rows in the child table.**

**SET NULL: Sets the foreign key in the child table to NULL.**

**RESTRICT: Prevents updates if there are related rows in the child table.**