In SQL Server, **constraints** are rules enforced on data in tables to maintain data integrity and accuracy. Constraints ensure that the data entered into a table follows specific rules and prevent invalid data entry.

**Types of Constraints in SQL Server:**

1. **PRIMARY KEY**
   * Ensures that a column (or combination of columns) has unique values and does not allow NULL values.
   * A table can have only one **Primary Key**.
   * Example:

CREATE TABLE Students (

StudentID INT PRIMARY KEY,

Name NVARCHAR(100) NOT NULL

);

1. **FOREIGN KEY**
   * Establishes a relationship between two tables.
   * Ensures that values in a column match values in the referenced table.
   * Example:

CREATE TABLE Orders (

OrderID INT PRIMARY KEY,

CustomerID INT,

FOREIGN KEY (CustomerID) REFERENCES Customers(CustomerID)

);

1. **UNIQUE**
   * Ensures that values in a column (or combination of columns) are unique across all rows.
   * Unlike Primary Key, it allows NULL values (but only one per column).
   * Example:

CREATE TABLE Employees (

EmployeeID INT PRIMARY KEY,

Email NVARCHAR(255) UNIQUE

);

1. **CHECK**
   * Ensures that values in a column satisfy a specific condition.
   * Example:

CREATE TABLE Products (

ProductID INT PRIMARY KEY,

Price DECIMAL(10,2) CHECK (Price > 0)

);

1. **NOT NULL**
   * Ensures that a column cannot store NULL values.
   * Example:

CREATE TABLE Customers (

CustomerID INT PRIMARY KEY,

Name NVARCHAR(100) NOT NULL

);

1. **DEFAULT**
   * Assigns a default value to a column when no value is specified.
   * Example:

CREATE TABLE Orders (

OrderID INT PRIMARY KEY,

OrderDate DATETIME DEFAULT GETDATE()

);

**Adding Constraints to Existing Tables:**

* **Add a Primary Key**

ALTER TABLE Students ADD CONSTRAINT PK\_Student PRIMARY KEY (StudentID);

* **Add a Foreign Key**

ALTER TABLE Orders ADD CONSTRAINT FK\_Order\_Customer FOREIGN KEY (CustomerID) REFERENCES Customers(CustomerID);

* **Add a Unique Constraint**

ALTER TABLE Employees ADD CONSTRAINT UQ\_Employee\_Email UNIQUE (Email);

* **Add a Check Constraint**

ALTER TABLE Products ADD CONSTRAINT CHK\_Product\_Price CHECK (Price > 0);

* **Add a Default Constraint**

ALTER TABLE Orders ADD CONSTRAINT DF\_Order\_Date DEFAULT GETDATE() FOR OrderDate;

**Removing Constraints:**

* **Drop a Primary Key**

ALTER TABLE Students DROP CONSTRAINT PK\_Student;

* **Drop a Foreign Key**

ALTER TABLE Orders DROP CONSTRAINT FK\_Order\_Customer;

* **Drop a Unique Constraint**

ALTER TABLE Employees DROP CONSTRAINT UQ\_Employee\_Email;

* **Drop a Check Constraint**

ALTER TABLE Products DROP CONSTRAINT CHK\_Product\_Price;

* **Drop a Default Constraint**

ALTER TABLE Orders DROP CONSTRAINT DF\_Order\_Date;