

1. What is a Primary Key?

- A Primary Key is a column (or a set of columns) in a table that uniquely identifies each record (row) in that table.
- It cannot contain NULL values and must be unique.
- Each table can have only one primary key (but it can consist of multiple columns → composite primary key).

Example:

```
CREATE TABLE Students (  
    StudentID INT PRIMARY KEY,  
    Name VARCHAR(50),  
    Age INT  
);
```

Here, StudentID is the Primary Key, uniquely identifying each student.

2. What is a Foreign Key? Why is a Foreign Key Needed?

- A Foreign Key is a column (or a set of columns) in one table that refers to the Primary Key of another table.
- It creates a relationship between two tables.
- Helps maintain referential integrity → ensures that the value in the foreign key column must exist in the referenced primary key column.

Foreign Key is Needed:

- To link related data across tables.
- To avoid invalid data (e.g., you cannot enroll in a non-existent course).
- To maintain data integrity and consistency.
- Enables relational database design → makes data organized, reduces redundancy, and supports normalization.

Example:

```
CREATE TABLE Courses (  
    CourseID INT PRIMARY KEY,  
    CourseName VARCHAR(50)  
);
```

```
CREATE TABLE Enrollments (  
    EnrollmentID INT PRIMARY KEY,  
    StudentID INT,
```

CourseID INT,

FOREIGN KEY (CourseID) REFERENCES Courses(CourseID)

);

Here:

- CourseID in Courses is the Primary Key.
- CourseID in Enrollments is a Foreign Key that references it.
- This ensures that an enrollment can only be made for a course that actually exists.