Q3. What are the primary keys and foreign keys in a relational database, and how do they establish relationships between tables?

In a relational database, primary keys and foreign keys are used to establish relationships between tables. These relationships help maintain the integrity of the data and ensure consistency across the database. Here's an overview of primary keys and foreign keys:

Primary Key:

* A primary key is a unique identifier for a record in a table.
* It must contain unique values and cannot have NULL (empty) values.
* Every table in a relational database must have a primary key.
* It enforces entity integrity, ensuring that each record in a table can be uniquely identified.
* Commonly, primary keys are created using one or more columns in a table.

Example:

CREATE TABLE Students (

StudentID INT PRIMARY KEY,

FirstName VARCHAR(50),

LastName VARCHAR(50)

);

Foreign Key:

* A foreign key is a column or a set of columns in a table that refers to the primary key of another table.
* It establishes a link between two tables, creating a relationship.
* The table with the foreign key is called the referencing table, and the table with the primary key being referenced is called the referenced table.
* It enforces referential integrity, ensuring that relationships between tables are valid.

Example:

CREATE TABLE Courses (

CourseID INT PRIMARY KEY,

CourseName VARCHAR(50)

);

CREATE TABLE Enrollments (

EnrollmentID INT PRIMARY KEY,

StudentID INT,

CourseID INT,

FOREIGN KEY (StudentID) REFERENCES Students(StudentID),

FOREIGN KEY (CourseID) REFERENCES Courses(CourseID)

);

In the example above, the Enrollments table has two foreign keys (StudentID and CourseID) that reference the Students and Courses tables, respectively. This establishes a relationship between the tables, indicating that each enrollment must be associated with an existing student and course.

In summary, primary keys uniquely identify records within a table, while foreign keys establish relationships between tables by linking the primary key of one table to a column in another table. This structure helps maintain data integrity and ensures that relationships between tables are well-defined.