Lab Activity : 12

SQL JOIN Operations in Database Management

This lab activity aims to help students understand and practice SQL JOIN operations in a relational database management system. Students will learn how to combine data from multiple tables using different types of JOINs: INNER JOIN, LEFT JOIN, RIGHT JOIN, and FULL OUTER JOIN.

Database Schema:

The database consists of two tables: `Students` and `Courses`.

1. **Students Table**

Column Name	Data Type	Description
student_id	INT	Primary key, unique ID
name	VARCHAR	Name of the student
course_id	INT	Foreign key to Courses

2. **Courses Table**

Column Name	Data Type	Description
course_id	INT	Primary key, unique ID
course_name	VARCHAR	Name of the course

Sample Data:

Students Table

student_id	name	course_id
1	Alice	101
2	Bob	102
3	Charlie	NULL
4	David	103
5	Eve	101

Courses Table

course_id	course_name
101	Database Systems
102	Data Structures
103	Operating Systems
104	Computer Networks

Lab Tasks:

1. **Task 1: INNER JOIN**
    - **Objective:** Retrieve the list of students along with the courses they are enrolled in.

```
SELECT Students.name, Courses.course_name

FROM Students

INNER JOIN Courses ON Students.course_id = Courses.course_id;
```

Task 2: LEFT JOIN

- **Objective:** Retrieve the list of all students, including those who are not enrolled in any course.

```
SELECT Students.name, Courses.course_name

FROM Students

LEFT JOIN Courses ON Students.course_id = Courses.course_id;
```

Task 3: RIGHT JOIN

- **Objective:** Retrieve the list of all courses, including those that have no students enrolled.

```
SELECT Students.name, Courses.course_name

FROM Students

RIGHT JOIN Courses ON Students.course_id = Courses.course_id;
```

Task 4: FULL OUTER JOIN

- **Objective:** Retrieve a list of all students and all courses, including students without courses and courses without students.

```
SELECT Students.name, Courses.course_name

FROM Students

FULL OUTER JOIN Courses ON Students.course_id = Courses.course_id;
```

Additional Challenge:

- **Objective:** Retrieve a list of students who are not enrolled in any course.

```
SELECT Students.name

FROM Students

LEFT JOIN Courses ON Students.course_id = Courses.course_id

WHERE Courses.course_name IS NULL;
```