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Faculty of Exact Sciences
Department of computer science
Level: 2 LMD
Module: Database

Lab Work n° 3

Objective of the Practical Work:

The goal of this practical session is to develop a strong understanding and hands-on experience with SQL **joins** and **aggregation functions**. By the end of this session, students will be able to:

- Understand the different types of SQL **joins** (INNER JOIN, LEFT JOIN, RIGHT JOIN, FULL JOIN) and when to use them
- Apply **joins** to combine data from multiple tables based on related columns
- Utilize **aggregation functions** (such as COUNT(), SUM(), AVG(), MIN(), MAX()) to perform calculations on groups of data
- Write complex SQL queries that incorporate both **joins** and **aggregation functions** to retrieve meaningful insights from databases

Practical Work description

Consider the following two relations:

- **employee**(employee_id, salary, department_id)
- **Department**(department_id, department_name)

Where **employee_id** is the primary key for the employee relation, and **department_id** is the primary key for the Department relation.

1. Create these two relations, noting that employee_id is of type INT, salary is of type DECIMAL(10, 2), department_id is of type INT, and department_name is of type VARCHAR(100)."
2. Insert sample data into these two tables:

- **Department table:**
  (1, 'Sales'), (2, 'Marketing'), (3, 'Engineering'), (4, 'Human Resources');
- **Employee table:**
  (101, 50000.00, 1),(102, 60000.00, 1), (103, 70000.00, 2), (104, 75000.00, 2), (105, 80000.00, 3), (106, 85000.00, 3), (107, 45000.00, 4), (108, 48000.00, 4);

3. Retrieve employee details (employee_id, first_name, and salary)
4. Retrieve employee details (employee_id, first_name, and salary) and sorts the result by salary in descending order (highest salary first).
5. Returns only the rows where there is a match in both tables.

6. Returns all rows from the left table (employee), and the matched rows from the right table (department). If there is no match, NULL values will be returned for the right table.
7. Returns all rows from the right table (department), and the matched rows from the left table (employee). If there is no match, NULL values will be returned for the left table.
8. Returns the Cartesian product of both tables, i.e., every row from the left table is combined with every row from the right table.
9. returns the total number of employees in the employee table.
10. Calculates the total sum of the salary column in the employee table.
11. Calculate the average salary of all employees in the employee table.
12. Retrieve the lowest salary in the employee table.
13. **R**etrieve the highest salary in the employee table.
14. Determine the total number of employees in each department
15. Calculates the average salary for each department, including only those where the average salary exceeds 60,000