SQL DEVELOPER
TASK - 2

Task 2: Advanced Queries with Joins and Filtering

Objective

Analyze relationships between multiple tables and use SQL joins and filtering techniques to extract meaningful insights from the data.

Project Steps

Step 1: Database Setup

Tables to Create

1. **Students:**

    - Already created in Task 1.
    - Contains student details such as `student_id`, `name`, and `email`.

2. **Courses:**

    - **Fields:**
        - `course_id`: Primary Key.
        - `course_name`: Name of the course.
        - `course_description`: Optional field for details.

3. **Enrolments:**

    - **Fields:**
        - `enrolment_id`: Primary Key.
        - `student_id`: Foreign Key referencing the `Students` table.
        - `course_id`: Foreign Key referencing the `Courses` table.
        - `enrolment_date`: Date of enrolment.

Step 2: Tasks to Perform

Task 1: List all students and the courses they are enrolled in.

- Use an INNER JOIN to combine `Students`, `Courses`, and `Enrolments` tables.
- Select the student name and course name for all enrolled students.

Task 2: Find the number of students enrolled in each course.

- Use a LEFT JOIN between `Courses` and `Enrolments`.
- Use `GROUP BY` to group results by `course_id` and `course_name`.
- Use `COUNT(student_id)` to calculate the number of enrolled students.
- Ensure courses with no enrolments are included in the results.

Task 3: List students who have enrolled in more than one course.

- Use the `Enrolments` table.
- Group data by `student_id`.
- Use `COUNT(course_id)` to calculate the number of courses per student.
- Use the `HAVING` clause to filter students with enrolments greater than 1.

Task 4: Find courses with no enrolled students.

- Use a LEFT JOIN between `Courses` and `Enrolments`.
- Use `WHERE enrolment_id IS NULL` to filter courses with no enrolments.

Deliverables

1. **SQL Queries**

   - Include queries for each task.
   - Ensure proper formatting and comments explaining the logic.
2. **Screenshots of Results**

   - Run each query in your database environment.
   - Take screenshots of the query results for documentation.
3. **Report Explanation**

   - Describe the purpose of each query.
   - Explain the output and how it addresses the task objectives.
   - Summarize key findings.

How to Execute

1. Create Tables and Insert Data

- Use SQL commands to create `Courses` and `Enrolments` tables.
- Insert sample data into these tables for testing purposes.

2. Run Queries Sequentially

- Execute each query one by one.
- Verify the output for correctness and accuracy.

3. Validate Results

- Cross-check the results with the inserted data to ensure correctness.

4. Document Findings

- Save the query outputs as screenshots.
- Include detailed explanations for each query and insights from the results.

General Guidelines

1. Ensure proper database indexing for Foreign Keys to optimize join operations.
2. Use aliases for table names in queries to improve readability.
3. **Validate data types during table creation** (e.g., `INT` for IDs, `VARCHAR` for text fields).
4. Test queries with edge cases (e.g., no enrolments, students enrolled in multiple courses).

Expected Outcomes

- A comprehensive report showcasing the relationships between students, courses, and enrolments.
- Visual proof (screenshots) of the queries and their outputs.
- Actionable insights for further analysis or improvements in data management.

Deadline Compliance

- **Restriction**: **Submit the project within 7 days** from the start date.

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- **Reason**: Meeting deadlines is crucial in the real-world software development environment. This restriction helps students practice **time management** and **task prioritization**. In professional settings, tight deadlines are often the norm, and learning to meet them without compromising quality is an essential skill.
- **Learning Outcome**: Students will learn to manage their time effectively, complete projects under pressure, and **deliver results on time**, which are all important skills in the workplace.