“Heaven's Light is Our Guide”

Rajshahi University of Engineering & Technology

Department of Electrical and Computer Engineering

Course Code: ECE- 2216

Course Title: Data Base Systems Sessional

Lab Report No: 02

Submitted By	**Submitted To**
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Date of Submission: October 01, 2024

2.1 Experiment No: 02

2.2 Name of the Experiment:

Retrieving data or performing operations on a database using MySQL commands.

2.3 Theory:

SQL is a powerful tool for managing and interacting with relational databases. It allows users to perform a variety of tasks, including fetching, inserting, updating, and removing data. SQL is essential for querying databases, offering a consistent way to work with structured information. Queries in SQL range from simple data retrieval to more advanced tasks like filtering, grouping, and aggregating. The language is categorized into several parts, such as Data Query Language (DQL), Data Manipulation Language (DML), Data Definition Language (DDL), and Data Control Language (DCL), which together provide full control over database operations.

One of SQL's major advantages is its ability to execute complex data operations with simple commands. Core commands like SELECT, UPDATE, INSERT, and DELETE allow direct data manipulation, while advanced features like JOIN, GROUP BY, HAVING, and ORDER BY help efficiently filter and structure data. Aggregate functions like SUM(), AVG(), and COUNT() offer valuable insights from datasets. SQL also supports subqueries and conditional logic, enabling deeper analysis. This flexibility makes SQL a key tool in areas such as business intelligence, web development, and scientific research.

2.4 Objectives:

a. Understanding Aggregate Functions

b. Exploring Subqueries and Their Applications

2.5 Tasks:

Students Table

student_id	student_name	age	GPA	department	year_of_admission	fees_paid	credits_earned	enrollment_status
1	Eleven	21	3.8	Engineering	2021	10000	120	active
2	Dustin	22	3.9	Science	2020	9000	110	active
3	Will	19	3.4	Business	2022	8500	95	active
4	Mike	23	3.7	Science	2021	9500	115	inactive
5	Max	20	3.5	Engineering	2020	12000	130	active
6	Eddie	22	4.0	Arts	2019	8000	140	active
7	Billy	24	2.9	Engineering	2022	5000	60	active
8	Alexei	25	3.2	Business	2018	7500	100	inactive
9	Steve	21	3.8	Science	2021	10500	120	active
10	Robin	20	3.6	Engineering	2022	11000	125	active
11	Lucas	18	2.7	Engineering	2023	4000	50	active
12	Nancy	23	3.9	Business	2019	9500	135	active

Task:

1. Find students who are older than 20 and have a GPA above the average GPA of all students
2. Find the top 5 students with the highest fees paid, ordered by GPA (in descending order) as a tiebreaker
3. List students who belong to the "Engineering" department, have a GPA greater than 3.5, and are enrolled after 2020
4. Find students who are not active (i.e., enrollment_status = 'inactive') and have not paid any fees (fees_paid = 0)
5. Calculate the total fees paid and average GPA for each department, but only for departments with more than 10 students

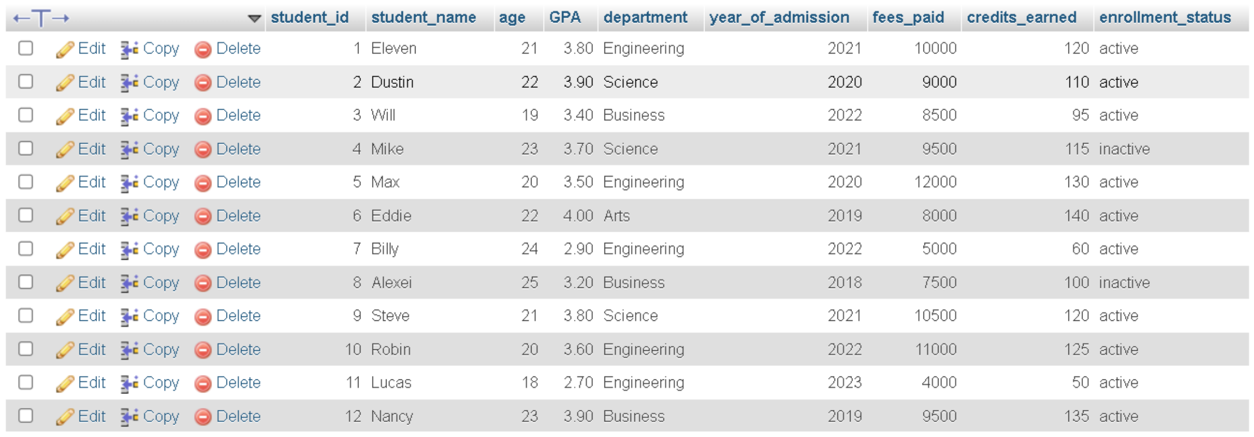
2.6 Query and Output:

Creating a New Table and Inserting data:

```
CREATE TABLE Students (
    student_id INT PRIMARY KEY,
    student_name VARCHAR(50),
    age INT,
    GPA DECIMAL(3, 2),
    department VARCHAR(50),
    year_of_admission INT,
    fees_paid INT,
    credits_earned INT,
    enrollment_status VARCHAR(20)
);

INSERT INTO Students (student_id, student_name, age, GPA, department, year_of_admission,
fees_paid, credits_earned, enrollment_status)
VALUES
(1, 'Eleven', 21, 3.8, 'Engineering', 2021, 10000, 120, 'active'),
(2, 'Dustin', 22, 3.9, 'Science', 2020, 9000, 110, 'active'),
(3, 'Will', 19, 3.4, 'Business', 2022, 8500, 95, 'active'),
(4, 'Mike', 23, 3.7, 'Science', 2021, 9500, 115, 'inactive'),
(5, 'Max', 20, 3.5, 'Engineering', 2020, 12000, 130, 'active'),
(6, 'Eddie', 22, 4.0, 'Arts', 2019, 8000, 140, 'active'),
(7, 'Billy', 24, 2.9, 'Engineering', 2022, 5000, 60, 'active'),
(8, 'Alexei', 25, 3.2, 'Business', 2018, 7500, 100, 'inactive'),
(9, 'Steve', 21, 3.8, 'Science', 2021, 10500, 120, 'active'),
(10, 'Robin', 20, 3.6, 'Engineering', 2022, 11000, 125, 'active'),
(11, 'Lucas', 18, 2.7, 'Engineering', 2023, 4000, 50, 'active'),
(12, 'Nancy', 23, 3.9, 'Business', 2019, 9500, 135, 'active');
```

Output:



	student_id	student_name	age	GPA	department	year_of_admission	fees_paid	credits_earned	enrollment_status
Edit Copy Delete	1	Eleven	21	3.80	Engineering	2021	10000	120	active
Edit Copy Delete	2	Dustin	22	3.90	Science	2020	9000	110	active
Edit Copy Delete	3	Will	19	3.40	Business	2022	8500	95	active
Edit Copy Delete	4	Mike	23	3.70	Science	2021	9500	115	inactive
Edit Copy Delete	5	Max	20	3.50	Engineering	2020	12000	130	active
Edit Copy Delete	6	Eddie	22	4.00	Arts	2019	8000	140	active
Edit Copy Delete	7	Billy	24	2.90	Engineering	2022	5000	60	active
Edit Copy Delete	8	Alexei	25	3.20	Business	2018	7500	100	inactive
Edit Copy Delete	9	Steve	21	3.80	Science	2021	10500	120	active
Edit Copy Delete	10	Robin	20	3.60	Engineering	2022	11000	125	active
Edit Copy Delete	11	Lucas	18	2.70	Engineering	2023	4000	50	active
Edit Copy Delete	12	Nancy	23	3.90	Business	2019	9500	135	active

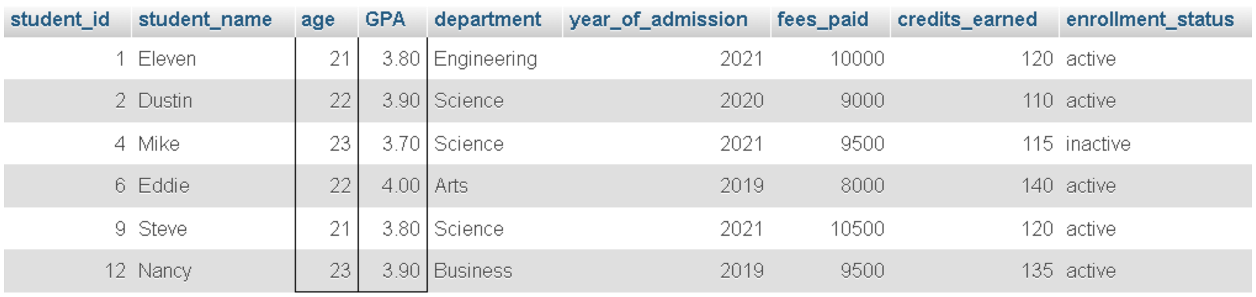
Task 1:

Find students who are older than 20 and have a GPA above the average GPA of all students.

Query:

```
SELECT * FROM Students
WHERE age > 20
AND GPA > (SELECT AVG(GPA) FROM Students);
```

Output:



student_id	student_name	age	GPA	department	year_of_admission	fees_paid	credits_earned	enrollment_status
1	Eleven	21	3.80	Engineering	2021	10000	120	active
2	Dustin	22	3.90	Science	2020	9000	110	active
4	Mike	23	3.70	Science	2021	9500	115	inactive
6	Eddie	22	4.00	Arts	2019	8000	140	active
9	Steve	21	3.80	Science	2021	10500	120	active
12	Nancy	23	3.90	Business	2019	9500	135	active

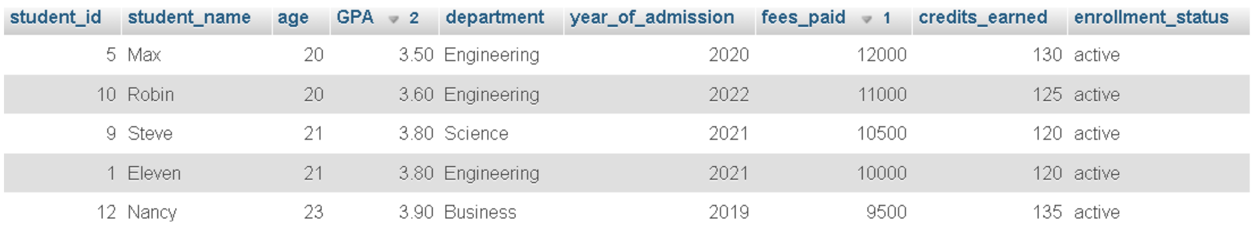
Task 2:

Find the top 5 students with the highest fees paid, ordered by GPA (descending order) as a tiebreaker.

Query:

```
SELECT * FROM Students
ORDER BY fees_paid DESC, GPA DESC
LIMIT 5;
```

Output:



student_id	student_name	age	GPA ▾ 2	department	year_of_admission	fees_paid ▾ 1	credits_earned	enrollment_status
5	Max	20	3.50	Engineering	2020	12000	130	active
10	Robin	20	3.60	Engineering	2022	11000	125	active
9	Steve	21	3.80	Science	2021	10500	120	active
1	Eleven	21	3.80	Engineering	2021	10000	120	active
12	Nancy	23	3.90	Business	2019	9500	135	active

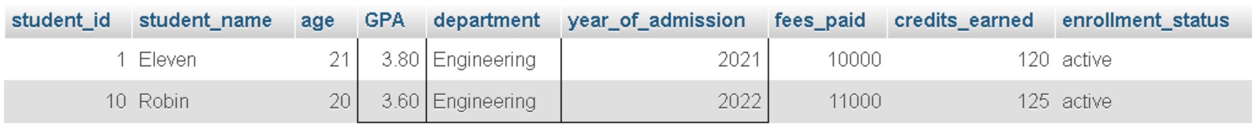
Task 3:

List students in the "Engineering" department with GPA > 3.5 and enrolled after 2020.

Query:

```
SELECT * FROM Students
WHERE department = 'Engineering'
AND GPA > 3.5
AND year_of_admission > 2020;
```

Output:



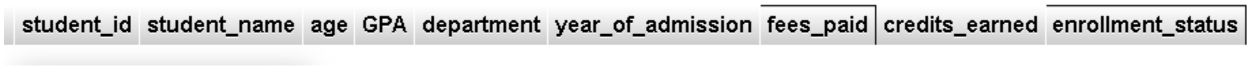
student_id	student_name	age	GPA	department	year_of_admission	fees_paid	credits_earned	enrollment_status
1	Eleven	21	3.80	Engineering	2021	10000	120	active
10	Robin	20	3.60	Engineering	2022	11000	125	active

Task 4:

Find students who are not active and have not paid any fees.

```
SELECT * FROM Students
WHERE enrollment_status = 'inactive'
AND fees_paid = 0;
```

Output:



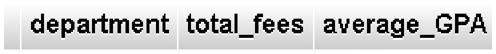
student_id	student_name	age	GPA	department	year_of_admission	fees_paid	credits_earned	enrollment_status

Task 5:

Calculate total fees paid and average GPA for each department, only for departments with more than 10 students.

```
SELECT department, SUM(fees_paid) AS total_fees, AVG(GPA) AS average_GPA
FROM Students GROUP BY department
HAVING COUNT(student_id) > 10;
```

Output:



department	total_fees	average_GPA