

Lab Experiment 2

To Demonstrate the Application of Scalar and Aggregate Functions in SQL

Objectives

- To understand and apply scalar functions in SQL.
- To understand and apply aggregate functions in SQL.
- To perform calculations on single and multiple rows of a database table.

Introduction to SQL Scalar and Aggregate Functions

SQL functions are built-in operations used to manipulate data. Functions can be categorized into:

1. **Scalar Functions:** Operate on a single value and return a single value.
2. **Aggregate Functions:** Perform calculations on a set of values and return a single result.

Scalar Functions in SQL

Scalar functions return a single value based on the input.

Common Scalar Functions:

- **UPPER()** – Converts a string to uppercase.
- **LOWER()** – Converts a string to lowercase.
- **LENGTH()** – Returns the length of a string.
- **ROUND()** – Rounds a numeric value.
- **SQRT()** – Returns the square root of a number.
- **NOW()** – Returns the current system date and time.

Example:

```
SELECT UPPER('sql tutorial') AS UpperCaseText;
```

```
SELECT LENGTH('database') AS StringLength;
```

```
SELECT ROUND(123.456, 2) AS RoundedValue;
```

Aggregate Functions in SQL

Aggregate functions operate on multiple rows and return a single value.

Common Aggregate Functions:

- **COUNT()** – Returns the number of rows.
- **SUM()** – Returns the total sum of a numeric column.
- **AVG()** – Returns the average value.
- **MAX()** – Returns the maximum value.
- **MIN()** – Returns the minimum value.

Example:

```
SELECT COUNT(*) AS TotalRecords FROM Students;
```

```
SELECT AVG(Salary) AS AverageSalary FROM Employees;
```

```
SELECT MAX(Age) AS MaxAge FROM Users;
```

Lab Tasks

Task 1: Creating a Sample Table and Inserting Data

1. Create a table named Employees with the following columns:

- Emp_ID (INT, PRIMARY KEY)
- Name (VARCHAR)
- Department (VARCHAR)
- Salary (DECIMAL)

2. Insert the following data into the table:

```
INSERT INTO Employees (Emp_ID, Name, Department, Salary) VALUES  
(1, 'Alice', 'HR', 50000),  
(2, 'Bob', 'IT', 60000),  
(3, 'Charlie', 'Finance', 55000),  
(4, 'David', 'IT', 65000),  
(5, 'Emma', 'HR', 52000);
```

Task 2: Applying Scalar Functions

1. Convert employee names to uppercase.
2. Calculate the length of employee names.

```
SELECT Name, UPPER(Name) AS UpperCaseName, LENGTH(Name) AS  
NameLength FROM Employees;
```

Task 3: Applying Aggregate Functions

1. Find the total number of employees.
2. Calculate the average salary of employees.
3. Determine the highest and lowest salary.

```
SELECT COUNT(*) AS TotalEmployees FROM Employees;
```

SELECT AVG(Salary) AS AverageSalary FROM Employees;

SELECT MAX(Salary) AS HighestSalary, MIN(Salary) AS LowestSalary FROM Employees;

Task 4: Filtering Data with Aggregate Functions

Find the total salary of employees in the IT department.

SELECT SUM(Salary) AS TotalITSalary FROM Employees WHERE Department = 'IT';

Rubric for Lab Assessment

Criteria	Excellent (4)	Good (3)	Average (2)	Needs Improvement (1)
Completion	All tasks completed accurately	Most tasks completed correctly	Partial completion	Tasks not completed
Understanding	Clear understanding of concepts	Moderate understanding	Some understanding	Lacks understanding
Query Execution	Queries executed successfully	Minor errors in execution	Several errors	Queries not executed correctly
Presentation of Results	Well-presented results	Mostly correct results	Partial results shown	Incorrect or missing results

Instructor Signature: _____

Date: _____