**Introduction to DBMS**

1.Introduction to SQL

**• Lab 1: Create a new database named school\_db and a table called students with the following columns: student\_id, student\_name, age, class, and address.**

[create](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-database.html) [database](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-database.html) school\_db;

use school\_db;

[CREATE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-table.html) [TABLE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-table.html) students (student\_id int PRIMARY KEY,student\_name varchar(50),age int,class varchar(10),address varchar(100));

**• Lab 2: Insert five records into the students table and retrieve all records using the SELECT statement**

use school\_db;

[insert](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/insert.html) into students [values](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/miscellaneous-functions.html%23function_values)(1,"Hetvi Solanki",14,8,"amd");

[insert](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/insert.html) into students [values](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/miscellaneous-functions.html%23function_values)(2,"Anjali Panchal",17,10,"surat");

[insert](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/insert.html) into students [values](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/miscellaneous-functions.html%23function_values)(3,"Harshil Panchal",18,12,"vadodara");

[insert](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/insert.html) into students [values](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/miscellaneous-functions.html%23function_values)(4,"Dishali Shah",16,11,"rajkot");

[insert](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/insert.html) into students [values](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/miscellaneous-functions.html%23function_values)(5,"Payal Parmar",15,9,"vapi");

[SELECT](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/select.html) \* from students;

2. SQL Syntax

**• Lab 1: Write SQL queries to retrieve specific columns (student\_name and age) from the students table.**

use school\_db;

[SELECT](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/select.html) student\_name, age from students;

**• Lab 2: Write SQL queries to retrieve all students whose age is greater than 10.**

use school\_db;

[SELECT](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/select.html) \* from students where age > 10;

3. SQL Constraints

• Lab 1: Create a table teachers with the following columns: teacher\_id (Primary Key), teacher\_name (NOT NULL), subject (NOT NULL), and email (UNIQUE).

use school\_db;

[CREATE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-table.html) [TABLE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-table.html) teachers (teacher\_id int PRIMARY KEY, teacher\_name varchar(50) [NOT](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/logical-operators.html%23operator_not) NULL,subject varchar(30) [NOT](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/logical-operators.html%23operator_not) null,email varchar(100) UNIQUE);

• Lab 2: Implement a FOREIGN KEY constraint to relate the teacher\_id from the teachers table with the student

use school\_db;

ALTER TABLE students ADD teacher\_id int;

use school\_db;

ALTER TABLE students

ADD CONSTRAINT fk\_teacher

FOREIGN KEY (teacher\_id)

REFERENCES teachers(teacher\_id);

use school\_db;

[ALTER](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/alter-table.html) [TABLE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/alter-table.html) students ADD teacher\_id int;

[ALTER](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/alter-table.html) [TABLE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/alter-table.html) students ADD CONSTRAINT fk\_teacher FOREIGN KEY (teacher\_id) REFERENCES teachers(teacher\_id);

4.MainSQLCommandsandSub-commands(DDL)

• Lab 1: Create a table courses with columns: course\_id , course\_name, and course\_credits . set the course\_id as the primary key.

[CREATE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-table.html) [TABLE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-table.html) courses (course\_id int PRIMARY KEY,course\_name varchar(100),course\_credits int);

**• Lab 2: Use the CREATE command to create a database university\_db.**

[CREATE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-database.html) [DATABASE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-database.html) university\_db;

5.ALTER Command

• Lab 1: Modify the courses table by adding a columncourse\_duration using the ALTER command.

[alter](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/alter-table.html) [table](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/alter-table.html) courses add course\_duration varchar(50);

• Lab 2: Drop the course\_creditscolumn from the courses table.

[alter](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/alter-table.html) [table](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/alter-table.html) courses drop column course\_credits;

6. DROP Command

• Lab 1: Drop the teachers table fromthe school\_db database.

use school\_db;

[drop](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/drop-table.html) [table](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/drop-table.html) students;

• Lab 2: Drop the students table fromthe school\_db database and verify that the table has been removed.

use school\_db;

[drop](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/drop-table.html) [table](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/drop-table.html) teachers;

7. Data Manipulation Language (DML)

• Lab 1: Insert three records into the courses table using the INSERT command.

[insert](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/insert.html) into courses [values](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/miscellaneous-functions.html%23function_values)(101, "Mathematics", "6 months");

[insert](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/insert.html) into courses [values](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/miscellaneous-functions.html%23function_values)(102, "Computer Science", "1 year");

[insert](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/insert.html) into courses [values](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/miscellaneous-functions.html%23function_values)(103, "Physics", "9 months");

• Lab 2: Update the course duration of a specific course using the UPDATE command

[update](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/update.html) courses [set](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/set.html) course\_duration = '18 months' where course\_id = 102;

• Lab 3: Delete a course with a specific course\_id from the courses table using the DELETE command.

[delete](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/delete.html) from courses where course\_id = 103;

8. Data Query Language (DQL)

• Lab 1: Retrieve all courses from the courses table using the SELECT statement.

[select](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/select.html) \* from courses;

• Lab 2: Sort the courses based on course\_duration in descending order using ORDER BY.

[select](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/select.html) \* from courses ORDER BY course\_duration DESC;

• Lab 3: Limit the results of the SELECT query to show only the top two courses using LIMIT.

[select](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/select.html) \* from courses limit 2;

9. Data Control Language (DCL)

Lab 1: Create two newusers user1 and user2 and grantuser 1 permission to SELECT from the courses table.

CREATE USER 'user1'@'localhost' IDENTIFIED BY 'password1';

CREATE USER 'user2'@'localhost' IDENTIFIED BY 'password2';

GRANT [SELECT](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/select.html) ON school\_db.courses TO 'user1'@'localhost';

• Lab 2: Revoke the INSERT permission from user1 and give it to user2.

revoke [insert](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/insert.html) ON school\_db.courses FROM 'user1'@'localhost';

GRANT [INSERT](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/insert.html) ON school\_db.courses TO 'user2'@'localhost';

10.Transaction Control Language(TCL)

• Lab 1: Insert a few rows into the courses table and use COMMIT to save the changes.

START TRANSACTION;

[insert](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/insert.html) into courses [values](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/miscellaneous-functions.html%23function_values)(103, 'Maths', '6 months');

[insert](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/insert.html) into courses [values](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/miscellaneous-functions.html%23function_values)(104, 'Science', '5 months');

COMMIT;

• Lab 2: Insert additional rows, then use ROLLBACK to undo the last insert operation.

START TRANSACTION;

[insert](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/insert.html) into courses [values](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/miscellaneous-functions.html%23function_values)(105, 'gujarati', '6 months');

[insert](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/insert.html) into courses [values](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/miscellaneous-functions.html%23function_values)(106, 'hindi', '5 months');

ROLLBACK;

• Lab 3: Create a SAVEPOINT before updating the courses table ,and use it to rollback specific changes.

[DESCRIBE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/describe.html) courses;

[ALTER](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/alter-table.html) [TABLE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/alter-table.html) courses ADD COLUMN credits int;

[UPDATE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/update.html) courses [SET](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/set.html) credits = 5 WHERE course\_id = 101;

START TRANSACTION;

SAVEPOINT before\_update;

[UPDATE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/update.html) courses [SET](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/set.html) credits = 5 WHERE course\_id = 101;

ROLLBACK TO SAVEPOINT before\_update;

COMMIT;

11. SQL Joins

• Lab 1: Create two tables : departments and employees. Performan INNER JOIN to display employees along with their respective departments.

[CREATE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-table.html) [TABLE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-table.html) departments (dept\_id int PRIMARY KEY,dept\_name varchar(50));

[CREATE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-table.html) [TABLE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-table.html) employees (emp\_id int PRIMARY KEY,emp\_name varchar(50),dept\_id int,FOREIGN KEY (dept\_id) REFERENCES departments(dept\_id));

[insert](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/insert.html) into departments [values](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/miscellaneous-functions.html%23function_values) (1, 'HR'), (2, 'IT'), (3, 'Finance');

[insert](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/insert.html) into employees [values](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/miscellaneous-functions.html%23function_values) (101, 'Alice', 1), (102, 'Bob', 2), (103, 'Charlie', 2);

[select](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/select.html) e.emp\_name, d.dept\_name FROM employees e INNER JOIN departments d ON e.dept\_id = d.dept\_id;

• Lab2: Use a LEFT JOIN to show all departments ,even those without employees.

[select](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/select.html) d.dept\_name, e.emp\_name FROM departments d [LEFT](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/string-functions.html%23function_left) JOIN employees e ON d.dept\_id = e.dept\_id;

12.SQL Group By

• Lab 1: Group employees by department and count the number of employees in each department using GROUP BY.

[select](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/select.html) d.dept\_name, [COUNT](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/aggregate-functions.html%23function_count)(e.emp\_id) AS employee\_count FROM departments d [LEFT](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/string-functions.html%23function_left) JOIN employees e ON d.dept\_id = e.dept\_id GROUP BY d.dept\_name;

• Lab 2: Use the AVGaggregate function to find the average salary of employees in each department

[ALTER](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/alter-table.html) [TABLE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/alter-table.html) employees ADD COLUMN salary DECIMAL(10, 2);

[UPDATE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/update.html) employees [SET](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/set.html) salary = 50000 WHERE emp\_id = 101;

[UPDATE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/update.html) employees [SET](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/set.html) salary = 60000 WHERE emp\_id = 102;

[UPDATE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/update.html) employees [SET](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/set.html) salary = 55000 WHERE emp\_id = 103;

[select](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/select.html) d.dept\_name, [AVG](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/aggregate-functions.html%23function_avg)(e.salary) AS avg\_salary FROM departments d [LEFT](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/string-functions.html%23function_left) JOIN employees e ON d.dept\_id = e.dept\_id GROUP BY d.dept\_name;

13. SQL Stored Procedure

• Lab 1: Write a stored procedure to retrieve all employees from the employees table based on department.

[create](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-procedure.html) [PROCEDURE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-procedure.html) GetEmployeesByDepartment([IN](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/comparison-operators.html%23function_in) deptName VARCHAR(50)) BEGIN [SELECT](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/select.html) e.emp\_id, e.emp\_name, d.dept\_name FROM employees e JOIN departments d ON e.dept\_id = d.dept\_id WHERE d.dept\_name = deptName; END;

[CALL](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/call.html) GetEmployeesByDepartment('IT');

• Lab 2: Write a stored procedure that accepts course\_id as input and returns the course details.

[CREATE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-table.html) [TABLE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-table.html) courses (course\_id int PRIMARY KEY,course\_name varchar(100),credits int);

[create](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-procedure.html) [PROCEDURE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-procedure.html) GetCourseDetails([IN](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/comparison-operators.html%23function_in) input\_course\_id int) BEGIN [select](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/select.html) \* FROM courses WHERE course\_id = input\_course\_id; END;

[CALL](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/call.html) GetCourseDetails(101);

14. SQL View

• Lab 1: Create a view to showall employees along with their department names.

[create](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-view.html) [view](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-view.html) employee\_department\_view AS [select](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/select.html) e.emp\_id, e.emp\_name, e.salary, d.dept\_name FROM employees e JOIN departments d ON e.dept\_id = d.dept\_id;

[select](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/select.html) \* FROM employee\_department\_view;

• Lab 2: Modify the view to exclude employees whose salaries are below $50,000.

[drop](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/drop-view.html) [view](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/drop-view.html) [IF](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/control-flow-functions.html%23function_if) EXISTS employee\_department\_view;

[create](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-view.html) [view](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-view.html) employee\_department\_view AS [select](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/select.html) e.emp\_id, e.emp\_name, e.salary, d.dept\_name FROM employees e join departments d ON e.dept\_id = d.dept\_id where e.salary >= 50000;

15. SQL Triggers

• Lab 1: Create a trigger to automatically log changes to the employees table when a new employee is added.

[create](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-table.html) [table](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-table.html) employee\_log (log\_id int AUTO\_INCREMENT PRIMARY KEY,emp\_id int, emp\_name varchar(50),action\_type varchar(20),action\_time timestamp [default](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/miscellaneous-functions.html%23function_default) [CURRENT\_TIMESTAMP](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/date-and-time-functions.html%23function_current_timestamp));

[drop](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/drop-trigger.html) [TRIGGER](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/drop-trigger.html) [IF](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/control-flow-functions.html%23function_if) EXISTS after\_employee\_insert;

[CREATE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-trigger.html) [TRIGGER](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-trigger.html) after\_employee\_insert AFTER [INSERT](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/insert.html) ON employees FOR EACH ROW BEGIN [INSERT](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/insert.html) INTO employee\_log (emp\_id, emp\_name, action\_type) [VALUES](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/miscellaneous-functions.html%23function_values) (NEW.emp\_id, NEW.emp\_name, 'INSERT'); END;

• Lab 2: Create a trigger to update the last\_modified timestamp whenever an employee record is updated.

[alter](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/alter-table.html) [table](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/alter-table.html) employees add column last\_modified TIMESTAMP [DEFAULT](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/miscellaneous-functions.html%23function_default) [CURRENT\_TIMESTAMP](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/date-and-time-functions.html%23function_current_timestamp) ON [UPDATE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/update.html) [CURRENT\_TIMESTAMP](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/date-and-time-functions.html%23function_current_timestamp);

16. Introduction to PL/SQL

• Lab 1: Write a PL/SQL block to print the total number of employees from the employees table.

[create](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-procedure.html) [PROCEDURE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-procedure.html) GetTotalEmployees() BEGIN [DECLARE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/declare.html%23declare) total\_employees INT; [select](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/select.html) [COUNT](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/aggregate-functions.html%23function_count)(\*) INTO total\_employees FROM employees; [select](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/select.html) CONCAT('Total number of employees: ', total\_employees) AS result; END;

[CALL](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/call.html) GetTotalEmployees();

• Lab 2: Create a PL/SQL block that calculates the total sales from an orders table.

[create](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-table.html) [table](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-table.html) orders (order\_id INT PRIMARY KEY,order\_amount DECIMAL(10, 2));

[insert](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/insert.html) into orders (order\_id, order\_amount) [VALUES](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/miscellaneous-functions.html%23function_values) (1, 150.00), (2, 230.50), (3, 120.75);

[DROP](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/drop-procedure.html) [PROCEDURE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/drop-procedure.html) [IF](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/control-flow-functions.html%23function_if) EXISTS GetTotalSales;

[CREATE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-procedure.html) [PROCEDURE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-procedure.html) GetTotalSales() BEGIN [DECLARE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/declare.html%23declare) total\_sales DECIMAL(10, 2); [SELECT](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/select.html) [SUM](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/aggregate-functions.html%23function_sum)(order\_amount) INTO total\_sales FROM orders; [SELECT](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/select.html) CONCAT('Total sales: $', total\_sales) AS result; END;

[CALL](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/call.html) GetTotalSales();

17. PL/SQL Control Structures

• Lab 1: Write a PL/SQL block using an IF-THEN condition to check the department of an employee.

[DROP](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/drop-procedure.html) [PROCEDURE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/drop-procedure.html) [IF](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/control-flow-functions.html%23function_if) EXISTS CheckEmployeeDepartment;

[CREATE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-procedure.html) [PROCEDURE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/create-procedure.html) CheckEmployeeDepartment([IN](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/comparison-operators.html%23function_in) empId INT)

BEGIN

[DECLARE](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/declare.html%23declare) emp\_dept VARCHAR(50);

[SELECT](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/select.html) d.dept\_name INTO emp\_dept FROM employees e JOIN departments d ON e.dept\_id = d.dept\_id WHERE e.emp\_id = empId;

[IF](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/control-flow-functions.html%23function_if) emp\_dept = 'HR' THEN [SELECT](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/select.html) 'Employee is in HR Department' AS result;

 ELSE

[SELECT](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/select.html) CONCAT('Employee is in ', emp\_dept, ' Department') AS result;

 END [IF](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/control-flow-functions.html%23function_if);

 END;

[CALL](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/call.html) CheckEmployeeDepartment(101);

19. Rollback and Commit Savepoint

• Lab 1: Perform a transaction where you create a savepoint, insert records, then rollback to the savepoint.

START TRANSACTION;

[INSERT](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/insert.html) INTO employees (emp\_id, emp\_name, salary, dept\_id) [VALUES](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/miscellaneous-functions.html%23function_values) (201, 'Alice', 60000, 1);

SAVEPOINT after\_first\_insert;

[INSERT](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/insert.html) INTO employees (emp\_id, emp\_name, salary, dept\_id) [VALUES](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/miscellaneous-functions.html%23function_values) (202, 'Bob', 55000, 2);

ROLLBACK TO after\_first\_insert;

COMMIT;

• Lab 2: Commit part of a transaction after using a savepoint and then rollback the remaining changes.

[INSERT](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/insert.html) INTO departments (dept\_id, dept\_name) [VALUES](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/miscellaneous-functions.html%23function_values) (4, 'Marketing');

[INSERT](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/insert.html) INTO employees (emp\_id, emp\_name, salary, dept\_id) [VALUES](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/8.0/en/miscellaneous-functions.html%23function_values) (204, 'Diana', 48000, 4);