

EXPERIMENT 1

Create a table with constraints

1. **NOT NULL Constraint:** NOT NULL ensures that no NULL values are allowed in the columns.
2. **UNIQUE Constraint:** UNIQUE ensures all values in columns are different (no duplicates allowed).
3. **PRIMARY KEY Constraint:** PRIMARY KEY uniquely identifies each row and implies NOT NULL + UNIQUE.
4. **FOREIGN KEY Constraint:** A FOREIGN KEY is a column (or set of columns) in one table that references the primary key in another table to enforce referential integrity.
5. **CHECK Constraint:** CHECK enforces logical rules (e.g., quantity must be between 1 and 999).
6. **DEFAULT Constraint:** DEFAULT automatically sets a value if none is given (e.g., today's date).
7. **CREATE INDEX Constraint:** INDEX improves query performance on large tables, especially for searching/sorting.

Source code:

```
CREATE TABLE departments (
    dept_id INT PRIMARY KEY,
    dept_name VARCHAR(100) UNIQUE NOT NULL);
```

Source code:

```
CREATE TABLE employees (
    emp_id INT PRIMARY KEY,
    first_name VARCHAR(50) NOT NULL,
    last_name VARCHAR(50) NOT NULL,
    email VARCHAR(100) UNIQUE NOT NULL,
    hire_date DATE DEFAULT CURRENT_DATE,
    salary DECIMAL(10,2) CHECK (salary >= 30000),
    dept_id INT, CONSTRAINT fk_department FOREIGN KEY (dept_id)
        REFERENCES departments(dept_id));
```

Source code:

```
CREATE INDEX idx_lastname ON employees(last_name);
```

EXPERIMENT 2

Implementation of SQL Commands

1. **Insert values with a single entry:** Adds one row of data into a table using the INSERT INTO statement.
2. **Insert values with multiple entries:** Adds multiple rows at once using a single INSERT INTO statement with multiple value sets.
3. **ALTER Table Structure:** Modifies the structure of an existing table, such as adding or removing columns.
4. **VIEW Table structure:** Displays the schema of a table using commands like DESCRIBE or SHOW COLUMNS.
5. **UPDATE table:** Changes existing data in one or more rows using the UPDATE statement with a WHERE clause.
6. **DELETE Rows in table:** Removes specific rows from a table using the DELETE FROM statement with a WHERE clause.
7. **DROP table:** Permanently deletes an entire table and all its data from the database.

Source code:

```
CREATE TABLE products (
    product_id INT PRIMARY KEY,
    product_name VARCHAR(100) NOT NULL,
    price DECIMAL(10, 2) NOT NULL,
    quantity INT NOT NULL);
INSERT INTO products (product_id, product_name, price, quantity)
VALUES (101, 'Wireless Mouse', 25.99, 100);
INSERT INTO products (product_id, product_name, price, quantity) VALUES
(102, 'USB Keyboard', 19.99, 150);
INSERT INTO products (product_id, product_name, price, quantity) VALUES
(103, 'HDMI Cable', 9.99, 200);
INSERT INTO products (product_id, product_name, price, quantity) VALUES
(104, 'Laptop Stand', 34.50, 75);
INSERT ALL
    INTO products (product_id, product_name, price, quantity) VALUES
    (201, 'Gaming Mouse', 45.99, 80)
    INTO products (product_id, product_name, price, quantity) VALUES
    (202, 'Mechanical Keyboard', 89.99, 60)
    INTO products (product_id, product_name, price, quantity) VALUES
    (203, 'Webcam HD', 59.49, 120)
SELECT * FROM dual;
```

Source code:

```
ALTER TABLE products  
ADD category VARCHAR2(50);
```

Source code:

```
ALTER TABLE products  
REBNAME COLUMN quantity TO stock_available;
```

Source code:

```
ALTER TABLE products  
DROP COLUMN CATEGORY;
```

Source code:

```
CREATE VIEW product_summary AS  
SELECT products_id,product_name,price  
FROM products  
WHERE price > 50;
```

Source code:

```
UPDATE products  
SET price=100  
WHERE product_id=101;
```

Source code:

```
DELETE FROM products  
WHERE products_id=103;
```

Source code:

```
DROP TABLE products;
```

EXPERIMENT 3

Aggregate Function

1. **MIN()**: Returns the smallest value in a column.
2. **MAX()**: Returns the largest value in a column.
3. **COUNT()**: Returns the number of rows that match a specified condition.
4. **SUM()**: Calculates the total sum of a numeric column.
5. **AVG()**: Computes the average value of a numeric column.

SourceCode:

```
CREATE TABLE fruits (
    product_id INT PRIMARY KEY,
    product_name VARCHAR2(100) NOT NULL,
    price NUMBER(10,2) NOT NULL,
    quantity INT NOT NULL);
INSERT INTO fruits (product_id, product_name, price, quantity) VALUES
(101, 'Apple', 0.99, 100);
INSERT INTO fruits (product_id, product_name, price, quantity) VALUES
(102, 'Banana', 0.59, 150);
INSERT INTO fruits (product_id, product_name, price, quantity) VALUES
(103, 'Orange', 1.25, 200);
INSERT INTO fruits (product_id, product_name, price, quantity) VALUES
(104, 'Mango', 2.50, 75);
INSERT INTO fruits (product_id, product_name, price, quantity) VALUES
(201, 'Grapes', 3.00, 80);
INSERT INTO fruits (product_id, product_name, price, quantity) VALUES
(202, 'Pineapple', 2.99, 60);
INSERT INTO fruits (product_id, product_name, price, quantity) VALUES
(203, 'Watermelon', 5.49, 120);
SELECT COUNT(*) AS total_fruits
FROM fruits;
```

SourceCode:

```
SELECT SUM(quantity) AS total_quantity
FROM fruits;
```

SourceCode:

```
SELECT AVG(price) AS avg_price
FROM fruits;
```

SourceCode:

```
SELECT MAX(price) AS max_price,  
MIN(price) AS min_price  
FROM fruits;
```

EXPERIMENT 4

1. **GROUP BY:** Organizes rows into groups based on one or more columns, often used with aggregate functions.
2. **ORDER BY:** Sorts the result set of a query by one or more columns in ascending (ASC) or descending (DESC) order.

Source code:

```
CREATE TABLE sales (
    sale_id INT PRIMARY KEY,
    product_name VARCHAR2(100) NOT NULL,
    category VARCHAR2(50),
    quantity_sold INT NOT NULL,
    sale_amount NUMBER(10,2) NOT NULL);
INSERT INTO sales (sale_id, product_name, category,
    quantity_sold, sale_amount) VALUES (1, 'Apple', 'Fruit', 50, 49.50);
INSERT INTO sales (sale_id, product_name, category,
    quantity_sold, sale_amount) VALUES (2, 'Banana', 'Fruit', 30, 17.70);
INSERT INTO sales (sale_id, product_name, category,
    quantity_sold, sale_amount) VALUES (3, 'Orange', 'Fruit', 40, 50.00);
INSERT INTO sales (sale_id, product_name, category,
    quantity_sold, sale_amount) VALUES (4, 'Mango', 'Fruit', 20, 50.00);
INSERT INTO sales (sale_id, product_name, category,
    quantity_sold, sale_amount) VALUES (5, 'Soap', 'Grocery', 15, 45.00);
INSERT INTO sales (sale_id, product_name, category,
    quantity_sold, sale_amount) VALUES (6, 'Shampoo', 'Grocery', 10,
    60.00);
INSERT INTO sales (sale_id, product_name, category,
    quantity_sold, sale_amount) VALUES (7, 'Notebook', 'Stationery', 25,
    75.00);
INSERT INTO sales (sale_id, product_name, category,
    quantity_sold, sale_amount) VALUES (8, 'Pen', 'Stationery', 50,
    25.00);
```

Source code:

```
SELECT category, SUM(quantity_sold) AS total_quantity, SUM(sale_amount) AS
total_sales
FROM sales GROUP BY category;
```

Source code:

```
SELECT product_name, category, quantity_sold, sale_amount  
FROM sales  
ORDER BY sale_amount DESC;
```

Source code:

```
SELECT product_name, category, quantity_sold, sale_amount  
FROM sales  
ORDER BY category ASC, sale_amount DESC;
```

Source code:

```
SELECT category, SUM(quantity_sold) AS total_quantity, SUM(sale_amount) AS  
total_sales  
FROM sales  
GROUP BY category  
ORDER BY total_sales DESC;
```

EXPERIMENT 5

1. **Ascending: ASC** sorts query results from lowest to highest.
2. **Descending: DESC** sorts from highest to lowest based on the specified column.

Source code:

```
CREATE TABLE planets (
    planet_id INT PRIMARY KEY,
    planet_name VARCHAR2(50) NOT NULL,
    distance_from_sun NUMBER(10,2),
    diameter NUMBER(10,2));
INSERT INTO planets (planet_id, planet_name, distance_from_sun,
diameter) VALUES (1, 'Mercury', 57.9, 4879);
INSERT INTO planets (planet_id, planet_name, distance_from_sun,
diameter) VALUES (2, 'Venus', 108.2, 12104);
INSERT INTO planets (planet_id, planet_name, distance_from_sun,
diameter) VALUES (3, 'Earth', 149.6, 12756);
INSERT INTO planets (planet_id, planet_name, distance_from_sun,
diameter) VALUES (4, 'Mars', 227.9, 6792);
INSERT INTO planets (planet_id, planet_name, distance_from_sun,
diameter) VALUES (5, 'Jupiter', 778.3, 142984);
INSERT INTO planets (planet_id, planet_name, distance_from_sun,
diameter) VALUES (6, 'Saturn', 1427.0, 120536);
INSERT INTO planets (planet_id, planet_name, distance_from_sun,
diameter) VALUES (7, 'Uranus', 2871.0, 51118);
INSERT INTO planets (planet_id, planet_name, distance_from_sun,
diameter) VALUES (8, 'Neptune', 4497.1, 49528);
```

Source code:

```
Select * from planets;
SELECT planet_name, distance_from_sun, diameter
FROM planets
ORDER BY distance_from_sun ASC;
```

Source code:

```
SELECT planet_name, distance_from_sun, diameter
FROM planets
ORDER BY diameter DESC;
```

EXPERIMENT 6

SQL Operators

1. **LIKE**: Filters results based on pattern matching using `%` (any characters) and `_` (single character).
2. **BETWEEN**: Checks if a value lies within a specified inclusive range.
3. **OR**: Returns results if **any** of the given conditions are true. **Source code:**

```
CREATE TABLE Suppliers(SupplierID INT PRIMARY KEY,SupplierName  
VARCHAR(100) NOT NULL,City VARCHAR(50));  
CREATE SEQUENCE Suppliers_seq START WITH 1 INCREMENT BY 1;  
CREATE OR REPLACE TRIGGER Suppliers_on_insert  
BEFORE INSERT ON Suppliers  
FOR EACH ROW  
BEGIN  
    SELECT Suppliers_seq.nextval  
    INTO :new.SupplierID  
    FROM dual;  
END;  
CREATE TABLE Products (ProductID INT PRIMARY KEY,ProductName  
VARCHAR(100) NOT NULL,Category VARCHAR(50),Price NUMBER(10,  
2),StockQuantity INT,SupplierID INT,FOREIGN KEY(SupplierID) REFERENCES  
Suppliers(SupplierID));  
CREATE SEQUENCE Products_seq  
START WITH 1  
INCREMENT BY 1;  
CREATE OR REPLACE TRIGGER Products_on_insert  
BEFORE INSERT ON Products  
FOR EACH ROW  
BEGIN  
    SELECT Products_seq.nextval  
    INTO :new.ProductID  
    FROM dual;  
END;  
INSERT INTO Suppliers (SupplierName, City) VALUES ('ToolMaster Pro', 'New  
York');  
INSERT INTO Suppliers (SupplierName, City) VALUES ('Eastern Lumber  
Co.', 'Boston');  
INSERT INTO Suppliers (SupplierName, City) VALUES ('Quick Fasteners'
```

Ltd.', 'Miami');

INSERT INTO Suppliers (SupplierName, City) VALUES ('PowerHouse Electric', 'Chicago');

INSERT INTO Suppliers (SupplierName, City) VALUES ('The Metal Works', 'Seattle');

INSERT INTO Suppliers (SupplierName, City) VALUES ('Apex Safety Gear', 'Dallas');

INSERT INTO Suppliers (SupplierName, City) VALUES ('Prime Plumbing Supply', 'Phoenix');

INSERT INTO Suppliers (SupplierName, City) VALUES ('Global Adhesives', 'Denver');

INSERT INTO Suppliers (SupplierName, City) VALUES ('Brick & Mortar Co.', 'Atlanta');

INSERT INTO Suppliers (SupplierName, City) VALUES ('Precision Measuring', 'Houston');

INSERT INTO Suppliers (SupplierName, City) VALUES ('Super Wrench Group', 'New York');

INSERT INTO Suppliers (SupplierName, City) VALUES ('Cedar Creek Wood', 'Boston');

INSERT INTO Suppliers (SupplierName, City) VALUES ('Volta Electrical', 'Miami');

INSERT INTO Suppliers (SupplierName, City) VALUES ('Ironclad Hardware', 'Chicago');

INSERT INTO Suppliers (SupplierName, City) VALUES ('AquaFlow Plumbing', 'Seattle');

INSERT INTO Suppliers (SupplierName, City) VALUES ('SureGrip Fasteners', 'Dallas');

INSERT INTO Suppliers (SupplierName, City) VALUES ('Bright Light Solutions', 'Phoenix');

INSERT INTO Suppliers (SupplierName, City) VALUES ('Durable Paint Co.', 'Denver');

INSERT INTO Suppliers (SupplierName, City) VALUES ('Contractor Essentials', 'Atlanta');

INSERT INTO Suppliers (SupplierName, City) VALUES ('Home Fix Depot', 'Houston');

INSERT INTO Products (ProductName, Category, Price, StockQuantity, SupplierID) VALUES ('Hammer Pro Titanium', 'Tool', 39.99, 150, 1); INSERT INTO Products (ProductName, Category, Price, StockQuantity, SupplierID) VALUES ('1/4 inch Hex Bolts', 'Fastener', 5.25, 500, 3);

INSERT INTO Products (ProductName, Category, Price, StockQuantity, SupplierID) VALUES ('LED Flood Light', 'Electrical', 48.50, 120, 4); INSERT INTO

```
Products (ProductName, Category, Price, StockQuantity, SupplierID) VALUES
('Red Cedar 4x4 Post', 'Wood', 18.75, 80, 12); INSERT INTO Products
(ProductName, Category, Price, StockQuantity, SupplierID) VALUES
('Adjustable Wrench 12"', 'Tool', 22.00, 120, 11); INSERT INTO Products
(ProductName, Category, Price, StockQuantity, SupplierID) VALUES ('Hex Head
Screws Zinc', 'Fastener', 6.00, 450, 16); INSERT INTO Products (ProductName,
Category, Price, StockQuantity, SupplierID) VALUES ('Copper Wire Spool 12g',
'Electrical', 75.99, 100, 13); INSERT INTO Products (ProductName, Category,
Price, StockQuantity, SupplierID) VALUES ('Oak Plywood 3/4"', 'Wood', 65.00, 50,
12); INSERT INTO Products (ProductName, Category, Price, StockQuantity,
SupplierID) VALUES ('Drill Bit Set (50pcs)', 'Tool', 59.99, 80, 1); INSERT INTO
Products (ProductName, Category, Price, StockQuantity, SupplierID) VALUES
('Masonry Nails (Bulk)', 'Fastener', 12.50, 600, 3); INSERT INTO Products
(ProductName, Category, Price, StockQuantity, SupplierID) VALUES ('White
Outlet Cover', 'Electrical', 2.99, 750, 13); INSERT INTO Products (ProductName,
Category, Price, StockQuantity, SupplierID) VALUES ('Pressure Treated Pine',
'Wood', 6.80, 200, 5); INSERT INTO Products (ProductName, Category, Price,
StockQuantity, SupplierID) VALUES ('Safety Goggles Anti-Fog', 'Safety', 10.99,
250, 6); INSERT INTO Products (ProductName, Category, Price, StockQuantity,
SupplierID) VALUES ('Aluminum Sheet Metal', 'Metal', 88.00, 40, 5); INSERT
INTO Products (ProductName, Category, Price, StockQuantity, SupplierID)
VALUES ('Magnetic Screwdriver Set', 'Tool', 14.50, 180, 11); INSERT INTO Products
(ProductName, Category, Price, StockQuantity, SupplierID) VALUES ('Teflon
Tape 1/2"', 'Plumbing', 1.99, 900, 7); INSERT INTO Products (ProductName,
Category, Price, StockQuantity, SupplierID) VALUES ('PVC Pipe Connector 1"',
'Plumbing', 4.50, 320, 15); INSERT INTO Products (ProductName, Category,
Price, StockQuantity, SupplierID) VALUES ('Heavy Duty Glue Stick', 'Adhesive',
3.75, 400, 8); INSERT INTO Products (ProductName, Category, Price,
StockQuantity, SupplierID) VALUES ('Laser Measure Pro 60m', 'Measuring',
120.00, 30, 10); INSERT INTO Products (ProductName, Category, Price,
StockQuantity, SupplierID) VALUES ('Galvanized Steel Pipe', 'Plumbing', 55.00,
60, 15); SELECT ProductName, Price, Category FROM Products WHERE
ProductName LIKE '%Pro%';
SELECT ProductName, Price FROM Products WHERE Price BETWEEN 10.00
AND 50.00;
SELECT SupplierName, City FROM Suppliers WHERE City = 'New York' OR City
= 'Chicago';
```

EXPERIMENT 7

SQL Joins

1. **INNER JOIN:** Returns rows with matching values in both tables.
2. **LEFT JOIN:** Returns all rows from the left table and matched rows from the right.
3. **RIGHT JOIN:** Returns all rows from the right table and matched rows from the left.
4. **OUTER JOIN:** Returns all rows when there is a match in one of the tables.
5. **LEFT JOIN excluding INNER JOIN:** Returns unmatched rows from the left table only.
6. **RIGHT JOIN excluding INNER JOIN:** Returns unmatched rows from the right table only.
7. **OUTER JOIN excluding INNER JOIN:** Returns unmatched rows from both tables.

Source code:

```
SELECT P.ProductName, S.SupplierName FROM Products P INNER JOIN Suppliers S ON P.SupplierID = S.SupplierID;
```

Source code:

```
SELECT P.ProductName, S.SupplierName FROM Products P LEFT JOIN Suppliers S ON P.SupplierID = S.SupplierID;
```

Source code:

```
SELECT P.ProductName, S.SupplierName, S.City FROM Products P RIGHT JOIN Suppliers S ON P.SupplierID = S.SupplierID;
```

Source code:

```
SELECT P.ProductName, S.SupplierName, S.City FROM Products P LEFT JOIN Suppliers S ON P.SupplierID = S.SupplierID UNION ALL SELECT P.ProductName, S.SupplierName, S.City FROM Products P RIGHT JOIN Suppliers S ON P.SupplierID = S.SupplierID WHERE P.SupplierID IS NULL;
```

Source code:

```
SELECT P.ProductName, S.SupplierName FROM Products P LEFT JOIN
```

```
Suppliers S ON P.SupplierID = S.SupplierID WHERE S.SupplierID IS NULL;  
SELECT S.SupplierName, S.City, P.ProductName FROM Products P RIGHT  
JOIN Suppliers S ON P.SupplierID = S.SupplierID WHERE P.SupplierID IS  
NULL;
```

Source code:

```
SELECT P.ProductName, S.SupplierName, S.City FROM Products P LEFT JOIN  
Suppliers S ON P.SupplierID = S.SupplierID WHERE S.SupplierID IS NULL  
UNION ALL SELECT P.ProductName, S.SupplierName, S.City FROM Products P  
RIGHT JOIN Suppliers S ON P.SupplierID = S.SupplierID WHERE P.SupplierID  
IS NULL;
```

EXPERIMENT 8

Normal Forms

1. **1NF (First Normal Form)**: Eliminates repeating groups; ensures atomic values in each column.
2. **2NF (Second Normal Form)**: Removes partial dependencies; every non-key attribute fully depends on the primary key.
3. **3NF**: Non-key columns depend only on the whole primary key — not on other non-key columns.

Source code:1NF

```
CREATE TABLE student_1nf (
    student_id INT,
    student_name VARCHAR(50),
    subject VARCHAR(50));
INSERT INTO student_1nf VALUES (1, 'Alice', 'Math');
INSERT INTO student_1nf VALUES (1, 'Alice', 'Science');
INSERT INTO student_1nf VALUES (2, 'Bob', 'English');
INSERT INTO student_1nf VALUES (2, 'Bob', 'History');
SELECT * FROM student_1nf;
```

Source code:2NF:

```
CREATE TABLE Students2 (
    student_id INT PRIMARY KEY,
    student_name VARCHAR2(50));
CREATE TABLE Courses2 (
    course_id INT PRIMARY KEY,
    course_name VARCHAR2(50),
    instructor_name VARCHAR2(50));
CREATE TABLE Enrollments2 (
    student_id INT,
    course_id INT,
    PRIMARY KEY (student_id, course_id),
    FOREIGN KEY (student_id) REFERENCES
    Students2(student_id), FOREIGN KEY (course_id) REFERENCES
    Courses2(course_id)); INSERT INTO Students2 VALUES (1, 'Alice');
INSERT INTO Students2 VALUES (2, 'Bob');
INSERT INTO Students2 VALUES (3, 'Charlie');
INSERT INTO Courses2 VALUES (101, 'Database Systems', 'Dr. Smith');
```

```

INSERT INTO Courses2 VALUES (102, 'Operating Systems', 'Prof.
Brown'); INSERT INTO Courses2 VALUES (103, 'Networks', 'Dr. Green');
INSERT INTO Enrollments2 VALUES (1, 101);
INSERT INTO Enrollments2 VALUES (1, 102);
INSERT INTO Enrollments2 VALUES (2, 103);
INSERT INTO Enrollments2 VALUES (3, 101);
COMMIT;
SELECT
    s.student_id,
    s.student_name,
    c.course_id,
    c.course_name,
    c.instructor_name
FROM Enrollments2 e
JOIN Students2 s ON e.student_id = s.student_id
JOIN Courses2 c ON e.course_id = c.course_id
ORDER BY s.student_id, c.course_id;

```

Source code: 3NF

```

CREATE TABLE Students3 (
    student_id INT PRIMARY KEY,
    student_name VARCHAR2(50));
CREATE TABLE Instructors3 (
    instructor_id INT PRIMARY KEY,
    instructor_name VARCHAR2(50));
CREATE TABLE Courses3 (
    course_id INT PRIMARY KEY,
    course_name VARCHAR2(50),
    instructor_id INT,
    FOREIGN KEY (instructor_id) REFERENCES
Instructors3(instructor_id)); CREATE TABLE Enrollments3 (
    student_id INT,
    course_id INT,
    PRIMARY KEY (student_id, course_id),
    FOREIGN KEY (student_id) REFERENCES
Students3(student_id), FOREIGN KEY (course_id) REFERENCES
Courses3(course_id)); INSERT INTO Students3 VALUES (1, 'Alice');
INSERT INTO Students3 VALUES (2, 'Bob');
INSERT INTO Students3 VALUES (3, 'Charlie');
INSERT INTO Instructors3 VALUES (201, 'Dr. Smith');
INSERT INTO Instructors3 VALUES (202, 'Prof. Brown');
INSERT INTO Instructors3 VALUES (203, 'Dr. Green');

```

```
INSERT INTO Courses3 VALUES (101, 'Database Systems', 201);
INSERT INTO Courses3 VALUES (102, 'Operating Systems',
202); INSERT INTO Courses3 VALUES (103, 'Networks', 203);
INSERT INTO Enrollments3 VALUES (1, 101);
INSERT INTO Enrollments3 VALUES (1, 102);
INSERT INTO Enrollments3 VALUES (2, 103);
INSERT INTO Enrollments3 VALUES (3, 101);
COMMIT;
SELECT
    s.student_id,
    s.student_name,
    c.course_id,
    c.course_name,
    i.instructor_name
FROM Enrollments3 e
JOIN Students3 s ON e.student_id = s.student_id
JOIN Courses3 c ON e.course_id = c.course_id
JOIN Instructors3 i ON c.instructor_id = i.instructor_id
ORDER BY s.student_id, c.course_id;
```

EXPERIMENT 9

Nested Queries: A query within another SQL query, used to perform intermediate filtering or calculations.

Source code:

```
CREATE TABLE department ( dept_id INT PRIMARY KEY, dept_name  
VARCHAR(50));  
CREATE SEQUENCE dept_seq START WITH 1 INCREMENT BY  
1; CREATE OR REPLACE TRIGGER dept_on_insert  
BEFORE INSERT ON department  
FOR EACH ROW  
BEGIN  
SELECT dept_seq.nextval INTO :new.dept_id FROM dual;  
END;  
CREATE TABLE employee (emp_id INT PRIMARY KEY,emp_name  
VARCHAR(50),salary NUMBER(10,2), dept_id INT, FOREIGN KEY (dept_id)  
REFERENCES department(dept_id));  
CREATE SEQUENCE emp_seq START WITH 1 INCREMENT BY 1;  
CREATE OR REPLACE TRIGGER emp_on_insert  
BEFORE INSERT ON employee  
FOR EACH ROW  
BEGIN  
SELECT emp_seq.nextval INTO :new.emp_id FROM dual;  
END;  
INSERT INTO employee (emp_name, salary, dept_id) VALUES ('Alice', 50000,  
(SELECT dept_id FROM department WHERE dept_name = 'HR'));  
INSERT  
INTO employee (emp_name, salary, dept_id) VALUES ('Bob', 60000, (SELECT  
dept_id FROM department WHERE dept_name = 'HR'));  
INSERT INTO  
employee (emp_name, salary, dept_id) VALUES ('Charlie', 55000, (SELECT  
dept_id FROM department WHERE dept_name = 'HR'));  
INSERT INTO  
employee (emp_name, salary, dept_id) VALUES ('David', 80000, (SELECT  
dept_id FROM department WHERE dept_name = 'IT'));  
INSERT INTO  
employee (emp_name, salary, dept_id) VALUES ('Eve', 90000, (SELECT  
dept_id FROM department WHERE dept_name = 'IT'));  
INSERT INTO  
employee (emp_name, salary, dept_id) VALUES ('Frank', 85000, (SELECT  
dept_id FROM department WHERE dept_name = 'IT'));  
INSERT INTO  
employee (emp_name, salary, dept_id) VALUES ('Grace', 70000, (SELECT  
dept_id FROM department WHERE dept_name = 'Finance'));
```

```
INSERT INTO employee (emp_name, salary, dept_id) VALUES ('Hannah',  
75000, (SELECT dept_id FROM department WHERE dept_name = 'Finance'));  
INSERT INTO employee (emp_name, salary, dept_id) VALUES ('Irene', 45000,  
(SELECT dept_id FROM department WHERE dept_name = 'HR')); INSERT  
INTO employee (emp_name, salary, dept_id) VALUES ('Jack', 100000, (SELECT  
dept_id FROM department WHERE dept_name = 'IT')); INSERT INTO  
employee (emp_name, salary, dept_id) VALUES ('Kelly', 68000, (SELECT  
dept_id FROM department WHERE dept_name = 'Finance')); INSERT INTO  
employee (emp_name, salary, dept_id) VALUES ('Liam', 62000, (SELECT  
dept_id FROM department WHERE dept_name = 'HR')); INSERT INTO  
employee (emp_name, salary, dept_id) VALUES ('Mia', 95000, (SELECT  
dept_id FROM department WHERE dept_name = 'IT')); COMMIT;  
SELECT emp_name, salary, dept_id  
FROM employee  
WHERE salary > ALL (  
    SELECT salary  
    FROM employee e_hr  
    WHERE e_hr.dept_id = (  
        SELECT dept_id FROM department WHERE dept_name = 'HR'));  
SELECT emp_name, salary  
FROM employee  
WHERE dept_id NOT IN (  
    SELECT dept_id  
    FROM department  
    WHERE dept_name = 'IT');  
SELECT e.emp_name, e.salary, d_avg.Finance_Avg_Salary  
FROM employee e  
CROSS JOIN (  
    SELECT AVG(salary) AS Finance_Avg_Salary  
    FROM employee  
    WHERE dept_id = (SELECT dept_id FROM department WHERE dept_name  
= 'Finance')) d_avg;
```

EXPERIMENT 10

SQL WILD CARD CHARACTERS

1. %: Represents **zero or more characters** in a string.
2. _: Represents **exactly one character**.

Source code:

```
CREATE TABLE Employees_WC (
    emp_id INT PRIMARY KEY,
    emp_name VARCHAR2(50),
    department VARCHAR2(50));
INSERT INTO Employees_WC VALUES (1, 'Alice Johnson', 'HR');
INSERT INTO Employees_WC VALUES (2, 'Bob Smith', 'Finance');
INSERT INTO Employees_WC VALUES (3, 'Charlie Brown', 'IT');
INSERT INTO Employees_WC VALUES (4, 'Alicia Keys', 'HR');
INSERT INTO Employees_WC VALUES (5, 'Albert King', 'Sales');
INSERT INTO Employees_WC VALUES (6, 'Bobby Ray', 'Finance');
COMMIT;
SELECT * FROM Employees_WC
WHERE emp_name LIKE 'Al%';
SELECT * FROM Employees_WC
WHERE emp_name LIKE '%son';
SELECT * FROM Employees_WC
WHERE emp_name LIKE '%ob%';
SELECT * FROM Employees_WC
WHERE emp_name LIKE '_l%';
SELECT * FROM Employees_WC
WHERE department LIKE 'F%';
```

EXPERIMENT 11

SELECT with Comparison Operator: Retrieves rows that meet specific conditions using operators like =, >, <, >=, <=, <>.

Source code:

```
SELECT SupplierName, City FROM Suppliers WHERE SupplierID = 5; SELECT  
SupplierName, SupplierID FROM Suppliers WHERE SupplierID > 15; SELECT  
SupplierName, SupplierID FROM Suppliers WHERE SupplierID < 4; SELECT  
SupplierName, SupplierID FROM Suppliers WHERE SupplierID >= 10; SELECT  
SupplierName, SupplierID FROM Suppliers WHERE SupplierID <= 6; SELECT  
SupplierName, City FROM Suppliers WHERE City <> 'New York';
```

EXPERIMENT 12

Working on Local Host XAMPP Server

1. **Server Variables in XAMPP:** Provide environment and request details via PHP's `$_SERVER` array.

OUTPUT:

Login Information

User name: Use text field

Host name: Local

Password: Strength: Strong

Re-type:

Authentication plugin: Native MySQL authentication

Generate password: KzvBWPTyETaoC.3m

Database for user account

Create database with same name and grant all privileges.
 Grant all privileges on wildcard name (username_%).

Global privileges Check all

Note: MySQL privilege names are expressed in English.

Data

SELECT
 INSERT
 UPDATE
 DELETE
 FILE

Structure

CREATE
 ALTER
 INDEX
 DROP
 CREATE TEMPORARY TABLES
 SHOW VIEW
 CREATE ROUTINE
 ALTER ROUTINE
 EXECUTE
 CREATE VIEW
 EVENT
 TRIGGER

Administration

GRANT
 SUPER
 PROCESS
 RELOAD
 SHUTDOWN
 SHOW DATABASES
 LOCK TABLES
 REFERENCES
 REPLICATION CLIENT
 REPLICATION SLAVE
 CREATE USER

Resource limits

Note: Setting these options to 0 (zero) removes the limit.

MAX QUERIES PER HOUR:

MAX UPDATES PER HOUR:

MAX CONNECTIONS PER HOUR:

MAX USER CONNECTIONS:

SSL

REQUIRE NONE
 REQUIRE SSL
 REQUIRE X509
 SPECIFIED

REQUIRE CIPHER:

REQUIRE ISSUER:

REQUIRE SUBJECT:

2. Hierarchical User Access in XAMPP: Assign different privileges to MySQL users to control database access levels.

OUTPUT:

You have added a new user.

```
CREATE USER '11239A066'@'localhost' IDENTIFIED WITH mysql_native_password BY '''';GRANT ALL PRIVILEGES ON *.* TO '11239A066'@'localhost' WITH GRANT OPTION;ALTER USER '11239A066'@'localhost' REQUIRE NONE WITH MAX_QUERIES_PER_HOUR 0 MAX_CONNECTIONS_PER_HOUR 0 MAX_UPDATES_PER_HOUR 0 MAX_USER_CONNECTIONS 0;CREATE DATABASE IF NOT EXISTS '11239A066';GRANT ALL PRIVILEGES ON '11239A066'.* TO '11239A066'@'localhost' WITH ALL PRIVILEGES ON '11239A066'._T_* TO '11239A066'@'localhost';
```

Edit inline Edit Create PHP code Global Database Change password Login Information

Edit privileges: User account '11239A066'@'localhost'

Note: MySQL privilege names are expressed in English.

Data Structure Administration Resource limits

SELECT INSERT UPDATE DELETE CREATE ALTER INDEX DROP CREATE TEMPORARY TABLES SHOW VIEW CREATE ROUTINE ALTER ROUTINE EXECUTE CREATE VIEW EVENT TRIGGER GRANT SUPER REPLICATION SLAVE REPLICATION CLIENT CREATE USER

MAX QUERIES PER HOUR 0 MAX UPDATES PER HOUR 0 MAX CONNECTIONS PER HOUR 0 MAX USER CONNECTIONS 0

REQUIRE SSL REQUIRE X509 SPECIFIED ID

SSL
REQUIRE_CIPHER:
REQUIRE_ISSUER:
REQUIRE_SUBJECT:

Update user privileges