```
-- Introduction to Database Concepts and its Need:
-- A database is a structured collection of data organized for efficient re
-- It serves as a centralized repository for storing and managing data. The
-- the growing volume of data generated by various applications and systems
-- storage, retrieval, and management. Databases facilitate data organizati
-- enabling businesses and organizations to make informed decisions, improv
-- operations.

-- Database Management System (DBMS):
-- A Database Management System (DBMS) is a software system that enables us
-- It provides a set of tools and functionalities to create, manipulate, an
-- data security, concurrency control, data integrity, and backup and recov
-- of DBMS include MySQL, Oracle, Microsoft SQL Server, PostgreSQL, and Mon

-- Relational Data Model:
-- The relational data model organizes data into tables, where each table r
-- represent individual records or instances of that entity. Key concepts i
-- - Domain: Defines the set of possible values for an attribute.
-- - Tuple: A row or record in a table.
-- - Relation: A table that consists of rows and columns.
-- - Candidate Key: An attribute or a set of attributes that uniquely ident
-- - Primary Key: A candidate key chosen to uniquely identify each tuple in
-- - Alternate Key: Candidate keys other than the primary key.

-- Advantages of Using SQL (Structured Query Language):
-- SQL is a standard language used for managing relational databases. It of
-- - Data Definition Language (DDL): Used to define and modify the structur
-- - Data Query Language (DQL): Used to retrieve data from the database.
-- - Data Manipulation Language (DML): Used to manipulate data stored in th
-- - Ease of Use: SQL provides a simple and intuitive syntax for interactin
-- - Portability: SQL is supported by most relational database management s
--   across different platforms.
-- - Scalability: SQL databases can handle large volumes of data and scale
--   or business.
-- - Security: SQL provides features for controlling access to data and ens

-- Introduction to MySQL:
-- MySQL is a popular open-source relational database management system. It
-- performance, and ease of use. MySQL supports a wide range of operating s
-- making it suitable for various applications.

-- Data Types:
-- Data types in MySQL define the type of data that can be stored in a colu
-- include integers, floats, strings, dates, and times.
```

```sql
-- Create a new database named 'mydatabase'
-- This is a comment describing the operation.
CREATE DATABASE mydatabase;

-- Use the newly created database
USE mydatabase;

-- Create a table named 'employees' with columns for employee information
CREATE TABLE employees (
    employee_id INT AUTO_INCREMENT PRIMARY KEY, -- Define a primary key col
    first_name VARCHAR(50), -- Define a column for the first name of the em
    last_name VARCHAR(50), -- Define a column for the last name of the empl
    department VARCHAR(50), -- Define a column for the department of the em
    salary DECIMAL(10,2) -- Define a column for the salary of the employee
);

-- Insert a new record into the 'employees' table
INSERT INTO employees (first_name, last_name, department, salary)
VALUES ('John', 'Doe', 'IT', 50000.00);

-- Insert another record into the 'employees' table
INSERT INTO employees (first_name, last_name, department, salary)
VALUES ('Jane', 'Smith', 'HR', 60000.00);

-- Retrieve all records from the 'employees' table
SELECT * FROM employees;

-- Update the department of an employee with a specific ID
UPDATE employees
SET department = 'Finance'
WHERE employee_id = 1;

-- Delete a record from the 'employees' table based on the last name
DELETE FROM employees
WHERE last_name = 'Smith';

-- Drop the 'employees' table from the database
DROP TABLE employees;

-- Drop the 'mydatabase' database
DROP DATABASE mydatabase;

-- These SQL statements allow users to manipulate the data stored in the da

-- Create a table to store car inventory
CREATE TABLE INVENTORY (
```

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    CarId VARCHAR(5) PRIMARY KEY,
    CarName VARCHAR(50),
    Price DECIMAL(10, 2),
    Model VARCHAR(20),
    YearManufacture INT,
    FuelType VARCHAR(10)
);

-- Insert data into the Inventory table
INSERT INTO INVENTORY (CarId, CarName, Price, Model, YearManufacture, FuelT
VALUES
('D001', 'Car1', 582613.00, 'LXI', 2017, 'Petrol'),
('D002', 'Car1', 673112.00, 'VXI', 2018, 'Petrol'),
('B001', 'Car2', 567031.00, 'Sigma1.2', 2019, 'Petrol'),
('B002', 'Car2', 647858.00, 'Delta1.2', 2018, 'Petrol'),
('E001', 'Car3', 355205.00, '5 STR STD', 2017, 'CNG'),
('E002', 'Car3', 654914.00, 'CARE', 2018, 'CNG'),
('S001', 'Car4', 514000.00, 'LXI', 2017, 'Petrol'),
('S002', 'Car4', 614000.00, 'VXI', 2018, 'Petrol');

SELECT * FROM INVENTORY;

CREATE TABLE EMPLOYEE (
    EmpID VARCHAR(5) PRIMARY KEY,
    EmpName VARCHAR(50),
    DOB DATE,
    DOJ DATE,
    Designation VARCHAR(50),
    Salary INT
);

INSERT INTO EMPLOYEE (EmpID, EmpName, DOB, DOJ, Designation, Salary)
VALUES
('E001', 'Rushil', '1994-07-10', '2017-12-12', 'Salesman', 25550),
('E002', 'Sanjay', '1990-03-12', '2016-06-05', 'Salesman', 33100),
('E003', 'Zohar', '1975-08-30', '1999-01-08', 'Peon', 20000),
('E004', 'Arpit', '1989-06-06', '2010-12-02', 'Salesman', 39100),
('E006', 'Sanjucta', '1985-11-03', '2012-07-01', 'Receptionist', 27350),
('E007', 'Mayank', '1993-04-03', '2017-01-01', 'Salesman', 27352),
('E010', 'Rajkumar', '1987-02-26', '2013-10-23', 'Salesman', 31111);

SELECT * FROM EMPLOYEE;

CREATE TABLE CUSTOMER (
    CustId VARCHAR(5) PRIMARY KEY,
    CustName VARCHAR(50),
```

```
    CustAdd VARCHAR(100),
    Phone VARCHAR(15),
    Email VARCHAR(50)
);

INSERT INTO CUSTOMER (CustId, CustName, CustAdd, Phone, Email)
VALUES
('C0001', 'AmitSaha', 'L-10, Pitampura', '4564587852', 'amitsaha2@gmail.com
('C0002', 'Rehnuma', 'J-12, SAKET', '5527688761', 'rehnuma@hotmail.com'),
('C0003', 'CharviNayyar', '10/9, FF, Rohini', '6811635425', 'charvi123@yahc
('C0004', 'Gurpreet', 'A-10/2, SF, MayurVihar', '3511056125', 'gur_singh@ya

SELECT * FROM CUSTOMER;

CREATE TABLE SALE (
    InvoiceNo VARCHAR(10),
    CarId VARCHAR(5),
    CustId VARCHAR(5),
    SaleDate DATE,
    PaymentMode VARCHAR(20),
    EmpID VARCHAR(5),
    SalePrice DECIMAL(10,2),
    Commission DECIMAL(10,2)
);

INSERT INTO SALE (InvoiceNo, CarId, CustId, SaleDate, PaymentMode, EmpID, S
('I00001', 'D001', 'C0001', '2019-01-24', 'Credit Card', 'E004', 613247.00,
('I00002', 'S001', 'C0002', '2018-12-12', 'Online', 'E001', 590321.00, 7083
('I00003', 'S002', 'C0004', '2019-01-25', 'Cheque', 'E010', 604000.00, 7248
('I00004', 'D002', 'C0001', '2018-10-15', 'Bank Finance', 'E007', 659982.00
('I00005', 'E001', 'C0003', '2018-12-20', 'Credit Card', 'E002', 369310.00,
('I00006', 'S002', 'C0002', '2019-01-30', 'Bank Finance', 'E007', 620214.00

SELECT * FROM SALE;

CREATE TABLE UNIFORM (
    Ucode INT PRIMARY KEY,
    Uname VARCHAR(50),
    Ucolor VARCHAR(20)
);

INSERT INTO UNIFORM (Ucode, Uname, Ucolor) VALUES
(1, 'Shirt', 'White'),
(2, 'Pant', 'Grey'),
(3, 'Tie', 'Blue');
```

```sql
SELECT * FROM UNIFORM;

CREATE TABLE COST (
    Ucode INT,
    Size VARCHAR(2),
    Price INT,
    FOREIGN KEY (Ucode) REFERENCES UNIFORM(Ucode)
);

INSERT INTO COST (Ucode, Size, Price) VALUES
(1, 'L', 580),
(1, 'M', 500),
(2, 'L', 890),
(2, 'M', 810);

SELECT * FROM COST;

/* Math functions */

-- 1) POWER(X,Y) or POW(X,Y)
-- Calculates X to the power Y

SELECT POWER(2,3);

-- 2) ROUND(N,D)
-- Rounds off number N to D number of decimal places.
-- Note: If D=0, then it rounds off the number to the nearest integer.

SELECT ROUND(2912.564, 1);
SELECT ROUND(12/100*Price,1) "GST" FROM INVENTORY;

-- 3) MOD(A,B)
-- Returns the remainder after dividing number A by number B.

SELECT MOD(21, 2);

/* Text functions */

-- 1) UCASE(string) or UPPER(string)
-- Converts string into uppercase

SELECT UCASE('Informatics Practices');

-- 2) LCASE(string) or LOWER(string)
-- Converts string into lowercase
```

```sql
SELECT LCASE('COMPUTER SCIENCE');

-- 3) MID(string,start,length)
-- Extracts substring from string starting from start position with given l

SELECT MID('Innovative thinking',5,9);

-- 4) LENGTH(string)
-- Returns the length of the string.

SELECT LENGTH('Artificial Intelligence');

-- 5) LEFT(string, number_of_chars)
-- Returns the leftmost characters from the string.

SELECT LEFT('OpenAI is amazing', 5);

-- 6) RIGHT(string, number_of_chars)
-- Returns the rightmost characters from the string.

SELECT RIGHT('Natural Language Processing', 10);

-- 7) INSTR(string, substring)
-- Returns the position of the first occurrence of a substring in a string.

SELECT INSTR('Database Management Systems', 'age');

-- 8) TRIM(string)
-- Removes leading and trailing spaces from the string.

SELECT TRIM('    Hello, World    ');

/* Date and Time functions */

-- 1) NOW()
-- Returns the current date and time.

SELECT NOW();

-- 2) DATE()
-- Returns the current date.

SELECT DATE();

-- 3) MONTH(date)
-- Returns the month from the given date.
```

```sql
SELECT MONTH('2024-01-31');

-- 4) MONTHNAME(date)
-- Returns the name of the month from the given date.

SELECT MONTHNAME('2024-01-31');

-- 5) YEAR(date)
-- Returns the year from the given date.

SELECT YEAR('2024-01-31');

-- 6) DAY(date)
-- Returns the day of the month from the given date.

SELECT DAY('2024-01-31');

-- 7) DAYNAME(date)
-- Returns the name of the day from the given date.

SELECT DAYNAME('2024-01-31');

/* Aggregate functions */

-- 1) MAX()
-- Returns the maximum value in a set.

SELECT MAX(Price) FROM INVENTORY;

-- 2) MIN()
-- Returns the minimum value in a set.

SELECT MIN(Price) FROM INVENTORY;

-- 3) AVG()
-- Returns the average value in a set.

SELECT AVG(Price) FROM INVENTORY;

-- 4) SUM()
-- Returns the sum of all the values in a set.

SELECT SUM(Price) FROM INVENTORY;

-- 5) COUNT()
```

```sql
-- Returns the number of rows in a set.

SELECT COUNT(*) FROM INVENTORY;

/* Manipulation Data functions */

-- 1) GROUP BY
-- Groups rows that have the same values into summary rows

SELECT CarName, COUNT(*) FROM INVENTORY GROUP BY CarName;

-- 2) HAVING
-- Specifies search conditions to filter groups

SELECT CarName, COUNT(*) FROM INVENTORY GROUP BY CarName HAVING COUNT(*) >

-- 3) ORDER BY
-- Sorts the result set in ascending or descending order

SELECT * FROM INVENTORY ORDER BY Price DESC;

/* Joining Data functions */

-- 1) INNER JOIN
-- Retrieves records that have matching values in both tables

SELECT * FROM SALE INNER JOIN CUSTOMER ON SALE.CustId = CUSTOMER.CustId;

-- 2) NATURAL JOIN
-- Performs a join by implicitly matching the columns with the same name in

SELECT * FROM SALE NATURAL JOIN CUSTOMER;
```

Output:

```
+-------+---------+-----------+-----------+-----------------+----------+
| CarId | CarName | Price     | Model     | YearManufacture | FuelType |
+-------+---------+-----------+-----------+-----------------+----------+
| B001  | Car2    | 567031.00 | Sigma1.2  |            2019 | Petrol   |
| B002  | Car2    | 647858.00 | Delta1.2  |            2018 | Petrol   |
| D001  | Car1    | 582613.00 | LXI       |            2017 | Petrol   |
| D002  | Car1    | 673112.00 | VXI       |            2018 | Petrol   |
| E001  | Car3    | 355205.00 | 5 STR STD |            2017 | CNG      |
| E002  | Car3    | 654914.00 | CARE      |            2018 | CNG      |
| S001  | Car4    | 514000.00 | LXI       |            2017 | Petrol   |
| S002  | Car4    | 614000.00 | VXI       |            2018 | Petrol   |
```

EmpID	EmpName	DOB	DOJ	Designation	Salary
E001	Rushil	1994-07-10	2017-12-12	Salesman	25550
E002	Sanjay	1990-03-12	2016-06-05	Salesman	33100
E003	Zohar	1975-08-30	1999-01-08	Peon	20000
E004	Arpit	1989-06-06	2010-12-02	Salesman	39100
E006	Sanjucta	1985-11-03	2012-07-01	Receptionist	27350
E007	Mayank	1993-04-03	2017-01-01	Salesman	27352
E010	Rajkumar	1987-02-26	2013-10-23	Salesman	31111

CustId	CustName	CustAdd	Phone	Email
C0001	AmitSaha	L-10, Pitampura	4564587852	amitsaha2@g
C0002	Rehnuma	J-12, SAKET	5527688761	rehnuma@hot
C0003	CharviNayyar	10/9, FF, Rohini	6811635425	charvi123@y
C0004	Gurpreet	A-10/2, SF, MayurVihar	3511056125	gur_singh@y

InvoiceNo	CarId	CustId	SaleDate	PaymentMode	EmpID	SalePric
I00001	D001	C0001	2019-01-24	Credit Card	E004	613247.0
I00002	S001	C0002	2018-12-12	Online	E001	590321.0
I00003	S002	C0004	2019-01-25	Cheque	E010	604000.0
I00004	D002	C0001	2018-10-15	Bank Finance	E007	659982.0
I00005	E001	C0003	2018-12-20	Credit Card	E002	369310.0
I00006	S002	C0002	2019-01-30	Bank Finance	E007	620214.0

Ucode	Uname	Ucolor
1	Shirt	White
2	Pant	Grey
3	Tie	Blue

Ucode	Size	Price
1	L	580
1	M	500
2	L	890
2	M	810

```
| POWER(2,3) |
+------------+
|          8 |
+------------+
+--------------------+
| ROUND(2912.564, 1) |
+--------------------+
|             2912.6 |
+--------------------+
+---------+
| GST     |
+---------+
| 68043.7 |
| 77743.0 |
| 69913.6 |
| 80773.4 |
| 42624.6 |
| 78589.7 |
| 61680.0 |
| 73680.0 |
+---------+
+------------+
| MOD(21, 2) |
+------------+
|          1 |
+------------+
+--------------------------------+
| UCASE('Informatics Practices') |
+--------------------------------+
| INFORMATICS PRACTICES          |
+--------------------------------+
+--------------------------------+
| LOWER('Informatics Practices') |
+--------------------------------+
| informatics practices          |
+--------------------------------+
+--------------------------+
| MID('Informatics', 3, 4) |
+--------------------------+
| form                     |
+--------------------------+
+----------------------------+
| SUBSTRING('Informatics', 7) |
+----------------------------+
| atics                      |
+----------------------------+
```

```
+----------------------+
| LENGTH("Informatics") |
+----------------------+
|                   11 |
+----------------------+
+---------------------+
| LEFT("Computer", 4) |
+---------------------+
| Comp                |
+---------------------+
+---------------------+
| RIGHT("SCIENCE", 3) |
+---------------------+
| NCE                 |
+---------------------+
+---------------------------+
| INSTR("Informatics", "ma") |
+---------------------------+
|                          6 |
+---------------------------+
+------------------+-------------------------+
| LENGTH(" DELHI") | LENGTH(LTRIM(" DELHI")) |
+------------------+-------------------------+
|                6 |                       5 |
+------------------+-------------------------+
+----------------+----------------------+
| LENGTH("PEN ") | LENGTH(RTRIM("PEN ")) |
+----------------+----------------------+
|              4 |                    3 |
+----------------+----------------------+
+-------------------+-------------------------+
| LENGTH(" MADAM ") | LENGTH(TRIM(" MADAM ")) |
+-------------------+-------------------------+
|                 7 |                       5 |
+-------------------+-------------------------+
+-------------------------+
| TRIM(".com" FROM Email) |
+-------------------------+
| amitsaha2@gmail         |
| rehnuma@hotmail         |
| charvi123@yahoo         |
| gur_singh@yahoo         |
+-------------------------+
+--------------------+
| NOW()              |
+--------------------+
```

```
| 2024-03-31 15:06:22 |
+---------------------+
+-------------+
| DATE(NOW()) |
+-------------+
| 2024-03-31  |
+-------------+
+--------------+
| MONTH(NOW()) |
+--------------+
|            3 |
+--------------+
+-------------------------+
| MONTHNAME("2003-11-28") |
+-------------------------+
| November                |
+-------------------------+
+--------------------+
| YEAR("2003-10-03") |
+--------------------+
|               2003 |
+--------------------+
+-------------------+
| DAY("2003-03-24") |
+-------------------+
|                24 |
+-------------------+
+-----------------------+
| DAYNAME("2019-07-11") |
+-----------------------+
| Thursday              |
+-----------------------+
+--------------+----------+----------------+-----------+
| DAYNAME(DOJ) | DAY(DOJ) | MONTHNAME(DOJ) | YEAR(DOJ) |
+--------------+----------+----------------+-----------+
| Tuesday      |       12 | December       |      2017 |
| Friday       |        8 | January        |      1999 |
| Thursday     |        2 | December       |      2010 |
| Wednesday    |       23 | October        |      2013 |
+--------------+----------+----------------+-----------+
+------------+
| MAX(Price) |
+------------+
|  673112.00 |
+------------+
```

```
| MIN(Price) |
+------------+
|  355205.00 |
+------------+
+---------------+
| AVG(Price)    |
+---------------+
| 576091.625000 |
+---------------+
+---------------+
| AVG(Price)    |
+---------------+
| 548306.500000 |
+---------------+
+------------+
| SUM(Price) |
+------------+
| 4608733.00 |
+------------+
+-----------------+
| COUNT(CarName) |
+-----------------+
|               8 |
+-----------------+
+-----------------------+
| COUNT(DISTINCT Model) |
+-----------------------+
|                     6 |
+-----------------------+
+----------+
| COUNT(*) |
+----------+
|        8 |
+----------+
+----------+
| COUNT(*) |
+----------+
|        2 |
+----------+
+--------+----------------+
| CustID | Number of Cars |
+--------+----------------+
| C0001  |              2 |
| C0002  |              2 |
| C0004  |              1 |
| C0003  |              1 |
```

```
+--------+----------------+
+--------+----------+
| CustID | COUNT(*) |
+--------+----------+
| C0001  |        2 |
| C0002  |        2 |
+--------+----------+
+--------------+--------------------+
| PaymentMode  | COUNT(PaymentMode) |
+--------------+--------------------+
| Bank Finance |                  2 |
| Cheque       |                  1 |
| Credit Card  |                  2 |
| Online       |                  1 |
+--------------+--------------------+
+-------+-------+--------+-------+------+-------+
| Ucode | Uname | Ucolor | Ucode | Size | Price |
+-------+-------+--------+-------+------+-------+
|     1 | Shirt | White  |     1 | L    |   580 |
|     1 | Shirt | White  |     1 | M    |   500 |
|     2 | Pant  | Grey   |     2 | L    |   890 |
|     2 | Pant  | Grey   |     2 | M    |   810 |
+-------+-------+--------+-------+------+-------+
+-------+-------+--------+-------+------+-------+
| Ucode | Uname | Ucolor | Ucode | Size | Price |
+-------+-------+--------+-------+------+-------+
|     1 | Shirt | White  |     1 | L    |   580 |
|     1 | Shirt | White  |     1 | M    |   500 |
|     2 | Pant  | Grey   |     2 | L    |   890 |
|     2 | Pant  | Grey   |     2 | M    |   810 |
+-------+-------+--------+-------+------+-------+
+-------+-------+--------+------+-------+
| Ucode | Uname | Ucolor | Size | Price |
+-------+-------+--------+------+-------+
|     1 | Shirt | White  | L    |   580 |
|     1 | Shirt | White  | M    |   500 |
|     2 | Pant  | Grey   | L    |   890 |
|     2 | Pant  | Grey   | M    |   810 |
+-------+-------+--------+------+-------+
```