SQL DAY 19 and DAY 20

Database Concepts & Setup

1. Define what a database is and give two real-world examples (not from the notes).

A **MySQL database** is a container that holds tables, views, stored procedures, and other database objects. It allows users to store, retrieve, and manipulate data using SQL commands.

1. **Hospital Patient Management System**

- Stores patient records, medical history, prescriptions, and appointment schedules.
- Doctors and nurses can access and update patient information in real time.
- Helps in managing billing, lab results, and treatment plans.

2. **E-Commerce Website (like Amazon)**

- Maintains product listings, customer profiles, order history, and payment details.
- Tracks inventory levels and shipping status.
- Supports personalized recommendations and targeted marketing.

Would you like to see how these databases might be structured with tables and relationships?

2. List three differences between relational and non-relational databases.
1. Data Structure

Feature	Relational Database	Non-Relational Database
Structure	Uses tables with rows and columns	Uses flexible formats like JSON, key-value, documents, or graphs
Schema	Fixed schema (predefined structure)	Dynamic schema (schema-less or flexible)
Example	MySQL, PostgreSQL	MongoDB, Cassandra, Redis

2. **Relationships and Joins**

Feature	Relational Database	Non-Relational Database
Relationships	Supports complex joins and foreign keys	Typically avoids joins; uses embedding or linking
Data	Enforced through constraints and	Often denormalized for performance

Feature	Relational Database	Non-Relational Database
Integrity	normalization	

 3. **Scalability**

Feature	Relational Database	Non-Relational Database
Scalability	Vertically scalable (scale-up: more CPU/RAM)	Horizontally scalable (scale-out: more servers)
Best For	Structured data with strong consistency	Large volumes of unstructured or semi-structured data

3. Name two advantages of using a DBMS

1. **Data Integrity and Accuracy**

- A DBMS ensures that data is consistent, accurate, and reliable through constraints, validation rules, and transaction management.
- For example, it prevents duplicate entries or invalid data types (like entering text in a numeric field).

☐ 2. **Data Security and Access Control**

- DBMSs allow administrators to define user roles and permissions, ensuring that only authorized users can access or modify specific data.
- This is crucial for protecting sensitive information in systems like banking, healthcare, or education.

4. List three popular RDBMS and two popular NoSQL databases

Relational Database Management Systems (RDBMS)

These use structured tables and SQL for data management.

1. **MySQL** – Widely used open-source RDBMS, especially for web applications.
2. **PostgreSQL** – Advanced open-source RDBMS known for standards compliance and extensibility.
3. **Oracle Database** – Enterprise-grade RDBMS with powerful performance and security features.

NoSQL Databases

These are designed for flexible, scalable storage of unstructured or semi-structured data.

1. **MongoDB** – Document-based NoSQL database that stores data in JSON-like format.
2. **Cassandra** – Highly scalable, distributed NoSQL database optimized for handling large volumes of data across many servers.

5. Install MySQL, PostgreSQL, or SQLite on your system and confirm the installation.

C:\Users\DELL>"C:\Program Files\MySQL\MySQL Server 8.0\bin\mysql.exe" -u root -p

Enter password: ********

Welcome to the MySQL monitor. Commands end with ; or \g.

Your MySQL connection id is 13

Server version: 8.0.42 MySQL Community Server – GPL

6. Start your SQL server and log in using a command-line tool.

```
mysql> SHOW TABLES;

+------------------+

| Tables_in_testdb |

+------------------+

| sample           |

+------------------+
```