Pw Skills

Database Assignment:

Q1. Database is a storage system where we can store multiple data. To perform a CRUD (Create, Read, Update and Delete) we need database.

Example for Database is Oracle.

Q2. Short note on File Base Storage System:

File Base storage system is of data storing system where we store the data in the form of file, which are organized within directories or Folders. Here each file contains a collection of related data, and users interact.

The major challenges of a File Based storage system is:

1. Data Redundancy
2. Security.
3. Difficult in Data Retrieval.
4. Data inconsistency.

Q3. DBMS stands for Database Management System use to store the data in systematic and organized from. A Database Management System (DBMS) is software that enables users to define, create, maintain, and control access to databases. It provides an interface between users or application programs and the database itself, allowing for efficient storage, retrieval, and manipulation of data.

We need DBMS for

1. concurrency control,
2. Data integrity and consistency.

Q4. File-based storage systems faced challenges including data redundancy, isolation, inefficient retrieval, integrity/security risks, and scalability/maintenance issues. These shortcomings were mitigated by Database Management Systems (DBMS). DBMS centralizes data storage, reducing redundancy and ensuring consistency. It facilitates data integration, enabling seamless sharing and retrieval across applications. Robust querying capabilities enhance data access efficiency. DBMS enforces integrity constraints and security measures, safeguarding data against corruption and unauthorized access. Moreover, DBMS offers scalability features, efficiently managing growing data volumes, and streamlining maintenance tasks. Overall, DBMS addressed the limitations of file-based systems, providing a structured, secure, and scalable solution for data management needs in organizations.

Q5.

1. Based on Data Model:
- Relational Databases: Organize data into tables with relationships between them.
- NoSQL Databases: Handle unstructured or rapidly changing data, including document-oriented, key-value, column-family, and graph databases.

2. Based on Usage:
- Operational Databases: Support day-to-day transactional operations.
- Analytical Databases: Optimize querying and analysis of large datasets for decision-making.

3. Based on Structure:
- Structured Databases: Organize data into tables with predefined schemas.
- Semi-Structured Databases: Offer flexibility in data representation, such as XML or JSON databases.
- Unstructured Databases: Store data without a predefined structure, including text documents and multimedia files.

4. Based on Access Method:

- Centralized Databases: Store data in a single location for access from various locations.
- Distributed Databases: Distribute data across multiple locations for faster access and fault tolerance.

5. Based on Deployment:

- On-Premises Databases: Installed and operated on an organization's premises.
- Cloud Databases: Hosted and managed by cloud service providers for scalability and reduced maintenance.

6. Based on Functionality:

- Transactional Databases: Optimize for supporting transactional operations with ACID properties.
- Data Warehouses: Store and analyse historical data for business intelligence and decision-making.

Q6. Data modelling is essential for designing efficient and effective database systems. Its significance lies in providing a clear and organized representation of data structure, relationships, and constraints, ensuring accuracy and integrity. Firstly, it enhances communication among stakeholders by visually illustrating database requirements and expectations. Secondly, it ensures structural integrity by defining tables, columns, keys, and relationships, minimizing redundancy and inconsistency in data storage. Thirdly, data modelling supports scalability and flexibility, allowing databases to adapt to changing business needs and accommodate future growth. Additionally, it facilitates efficient development by providing a blueprint for database implementation, enabling developers to write optimized queries and build applications seamlessly. There are three main types of data modelling: conceptual, logical, and physical, each serving a specific purpose in capturing business requirements, translating them into a database design, and optimizing the database for performance and usability.

Q7. Three-schema architecture, also known as ANSI/SPARC architecture, comprises three levels of abstraction: the external schema, conceptual schema, and internal schema.

1. External Schema (View Level): Represents how data is viewed by individual users or applications. Each user has their own external schema, tailored to their specific requirements, providing a personalized view of the data.

- Advantages: Enhances data security by limiting access to only relevant data, improves user productivity by providing customized views, and facilitates data independence, allowing changes to be made at the conceptual level without affecting external schemas.

2. Conceptual Schema (Conceptual Level): Represents the entire database from a logical perspective, independent of any physical implementation. It defines the structure, relationships, and constraints of the data in a technology-independent manner.

- Advantages: Promotes data independence by separating logical structure from physical storage, facilitates database design and management by providing a clear and comprehensive overview, and supports database integration by serving as a common reference point for multiple external schemas.

3. Internal Schema (Internal Level): Represents the physical storage and organization of data within the database. It describes how data is stored on storage devices such as disks and how it is accessed and manipulated by the DBMS.

- Advantages: Optimizes database performance by defining efficient storage structures and access methods, ensures data security and integrity through physical-level controls, and allows for fine-tuning of database performance based on hardware capabilities and constraints.