Unit 1

Syllabus:

UNIT-I (15 hrs) Basics of DBMS: Database Concept, Characteristics and architecture of DBMS, Database users, 3-tier architecture of DBMS-its advantages over 2-tier, Introduction of Parallel, Distributed Databases, Mobile databases and Cloud databases. Data independence. Physical data organization, Indexing-introduction and types of indexing.

## Characteristics of database:

1. **Real-World Entity**: DBMS represents real-world entities and their relationships, making it easier to model complex data structures. For example, a student database might include entities like students, courses, and instructors.

2. **Self-Describing Nature**: A DBMS contains not only the database itself but also metadata, which is data about data. This metadata describes the structure of the database, making it self-explanatory and easily understandable.

3. **Atomicity of Operations (ACID Properties):** DBMS ensures that all operations (transactions) are atomic, consistent, isolated, and durable. which maintains data integrity and reliability.

4. **Concurrent Access:** Multiple users can access and modify the database simultaneously without affecting each other's work. This is crucial for systems like banking or airline reservations.

5. **Data Integrity:** DBMS enforces data integrity constraints to ensure the accuracy and consistency of data. For example, it can enforce rules like unique IDs for each student.

6**. Security:** DBMS provides security features to protect data from unauthorized access. This includes user authentication, access controls, and encryption.

7**. Data Abstraction and Independence:** DBMS provides a level of abstraction between the physical storage of data and the logical view of the data. This means changes in the database structure do not affect the application programs.

8**. Support for Multiple Views**: DBMS allows different users to have different views of the database according to their needs. For example, a student might see their grades, while an instructor sees the grades of all students.

## Types of Database Users:

In a Database Management System (DBMS), there are several types of users, each with distinct roles and responsibilities. Here are the main categories:

1**. Database Administrators (DBA):**

- **Role**: DBAs are responsible for managing the overall database system. They define the schema, control access, ensure data integrity, and handle backup and recovery.

- **Responsibilities**: Creating user accounts, setting permissions, monitoring performance, and maintaining security.

2. **Database Designers**:

- **Role**: They design the structure of the database, including tables, indexes, views, and constraints.

- **Responsibilities**: Ensuring the database meets the needs of all user groups and is optimized for performance.

**3. System Analysts**:

- **Role**: They analyze the requirements of end users and ensure that the database system meets these needs.

- **Responsibilities**: Bridging the gap between users and developers, and ensuring the system's functionality aligns with user requirements.

4. **Application Programmers**:

- **Role**: Also known as back-end developers, they write the code for applications that interact with the database.

- **Responsibilities**: Developing and maintaining application programs, ensuring efficient data retrieval and manipulation.

5. **Naive/Parametric Users**:

- **Role**: These are end users who interact with the database through predefined applications without needing to understand the underlying database structure.

- **Responsibilities**: Performing routine tasks like data entry and retrieval using user-friendly interfaces.

6. **Sophisticated Users**:

- **Role**: These users are familiar with the database and can write their own queries to retrieve data.

- **Responsibilities**: Conducting complex data analysis and generating reports.

7. **Casual Users**:

- **Role**: These users occasionally interact with the database, often for specific queries or reports.

- **Responsibilities**: Accessing data as needed, typically through query languages like SQL.

Each type of user plays a crucial role in the efficient operation and management of a DBMS, ensuring that data is accurately stored, retrieved, and maintained.