**Chapter 01**

Basic Definitions

1. Data
2. Database
3. Mini-world
4. Database Management System (DBMS)
5. Database system

Types of Databases and Database Applications

1. Traditional applications:
   1. Numeric and textual databases
2. More recent applications:
   1. Multimedia databases
   2. Geographic Information Systems (GIS)
   3. Biological and genome databases
   4. Data warehouses
   5. Mobile databases
   6. Real-time and active databases

Managing Data

1. File based approach
2. Database approach

DBMS Facilitates (Slide 9-10)

1. Define a particular database in terms of its data types, structures, and constraints.
2. Have secondary storage medium.
3. Manipulating the database is very easy
   1. Querying, generating reports
   2. Modification: Insertions, deletions and updates to its content
   3. Accessing the database through Web applications
4. Able to processing and sharing by a set of users at the same time.
5. Able to protect or secure by not allowing unauthorized users.
6. Presentation and visualization of data is very easy.
7. Maintenance of the database is easy.

Main Characteristics of the Database Approach (Slide 11-)

1. Self-describing nature
   1. stores the description of a particular database (e.g., data structures, types, and constraints)
   2. The description is called meta-data.
      1. <https://www.geeksforgeeks.org/metadata-in-dbms-and-its-types/>
      2. Suppose we say that a data item about a person is 80. This must be defined by noting that it is the person's weight and the unit is kilograms. Therefore, (weight, kilograms) is the metadata about the data is 80. (<https://www.javatpoint.com/what-is-meta-data>). Why we need it? => First, it acts as the glue that links all parts of the data warehouses. Next, it provides information about the contents and structures to the developers. Finally, it opens the doors to the end-users and makes the contents recognizable in their terms.
   3. This allows the DBMS software to work with different database applications.
2. Insulation between programs and data
   1. Called program-data independence.
   2. Allows changing data structures and storage organization without having to change the DBMS access programs.
3. Have Data abstraction:
   1. It is A data model which is used to hide storage details and present the users with a conceptual view of the database.
4. Support of multiple views of the data
5. Sharing of data and multi-user transaction processing:
   1. Allowing a set of concurrent users to retrieve from and to update the database.
   2. Concurrency control within the DBMS guarantees that each transaction is correctly executed or aborted
   3. Recovery subsystem ensures each completed transaction has its effect permanently recorded in the database or if transaction fails then the database rolls back to the last valid state.
6. OLTP (Online Transaction Processing) is a major part of database applications; allows hundreds of concurrent transactions to execute per second.

Advantages of Using the Database Approach

1. Controlling redundancy
2. Sharing of data among multiple users
3. Restricting unauthorized access to data. Only the DBA staff uses privileged commands and facilities.
4. Providing storage structures (e.g., indexes) for efficient query processing.
   1. Library te jemon boi khuje pai ekta address er maddhome.. temon table er moddhe indexing er jonne kono ekta data amra khuje pete parii :)
5. Providing optimization of queries for efficient processing
6. Providing backup and recovery services
7. Providing multiple interfaces
8. Representing complex relationships among data
9. Enforcing integrity constraints on the database (<https://infocenter.sybase.com/help/index.jsp?topic=/com.sybase.infocenter.dc32300.1570/html/sqlug/sqlug300.htm>)

Database Users

1. Actors on the Scene
   1. Those who actually use and control the database content, and those who design, develop and maintain database applications
   2. 4 types
      * + <https://medium.com/@syadeeshani/actors-on-the-scene-3c7cffde7286>
      1. Database Administrator
      2. Database designers
      3. Database Engineers
      4. Database Developers
   3. End-users
      * + <https://www.geeksforgeeks.org/categories-of-end-users-in-dbms/> (Motamoti, 8/10)
        + <https://www.tutorialspoint.com/explain-the-different-categories-of-end-users-in-dbms> (Easy, Good, 9.70/10)
      1. Casual End users
         * These are the users who occasionally access the database but they require different information each time.
         * Example − High level managers who access the data weekly basis.
      2. Naive or Parametric End Users
         * They make up a large section of the end-user population, e.g., mobile app and social media users, constantly update and access the database.
         * Parametric end users spend most of their time in querying and updating the database using standard types of queries. They make up a large section of the end-user population. Example − A bank teller who does this activity for an entire shift of operations.
      3. Sophisticated End Users
         * business analysts, scientists, engineers, others thoroughly familiar with the system capabilities.
         * These users try to learn most of the DBMS facilities in order to achieve their complex requirements.
         * The sophisticated end users access the database to implement their own applications to meet their specific goals. These include business analysts, engineers, scientists which are familiar with the system capabilities. The users interact with the system without writing programs. They submit each query to a query processor.
      4. Standalone Users
         * These are those users whose job is basically to maintain personal databases by using a ready-made program package that provides easy-to-use menu-based or graphics-based interfaces, an example is the user of a tax package that basically stores a variety of personal financial data for tax purposes. These users become very proficient in using a specific software package.
         * The standalone end users maintain their own database by creating one using the ready-made program packages that provide a graphical user interface.
2. Workers Behind the Scene
   1. Those who design and develop the DBMS software and related tools, and the computer systems operators

**Chapter 02**

Normal

**Chapter 03**

[EER Practice Problems]

• Central (w/ Solution) : <https://docs.google.com/document/d/1Ty3bOcpq6FQD4FpyIQ6xi7DyNVFmIoRlzBOQsim4W6s>

• Class Practice Sheet : <https://docs.google.com/document/d/156a1QIul3nlyn1yWgl6UxazUwPMEFhqH/>

• Problems from Elmasri : <https://drive.google.com/file/d/1G1Ijk48n6_4Q4-6sevttlEHCdIbrZIL2/>

• Problems from Connolly : <https://drive.google.com/file/d/1mqbAYfDMGDYsiVFULucMtejUooda110q/>

ER and EER : <https://drive.google.com/drive/folders/1IJET35EOzg30wfXER9zllV9O7g3antAU?usp=sharing>