Introduction to Databases

Database – Shared collection of logically related data

Database management system (DBMS) – A software system that enables users to define, create, maintain, and control access to the database.

* Advantages – control of data redundancy, data consistency, more information from the same amount of data, sharing of data, improved security
* Disadvantages – complex, size, cost of DBMS, additional hardware costs, greater impact of a failure

Database application – a program that interacts with the database at some point in its execution

Database system – collection of application programs that interact with the database along with the DBMS and the database itself

File-based system - A collection of application programs that perform services for the end-users, such as the production of reports. Each program defines and manages its own data.

* Advantages: good for small number of items and only have to store and retrieve
* Disadvantages: Separation and isolation of data, duplication of data, incompatible fire formats, data dependence

File – collection of records, which contain logically related data

System catalog – description of the data

Data abstraction – change the internal definition of an object without affecting the users of the object, provided that the external definition remains the same

Entity – distinct object (a person, place, thing, concept, or event) in the organization that is to be represented in the database.

Attribute – a property that describes some aspect of the object that we wish to record.

Relationship – an association between entities

-six entities (the rectangles): Branch, Staff, PropertyForRent, Client, PrivateOwner, and

Lease;

-seven relationships (the names adjacent to the lines): Has, Offers, Oversees, Views,

Owns, LeasedBy, and Holds;

-six attributes, one for each entity: branchNo, staffNo, propertyNo, clientNo, ownerNo, and

leaseNo.

Data Definition Language (DDL) – allows users to specify the data types and structures and the constraints on the data to be stored in the database

Data Manipulation Language (DML) - allows users to insert, update, delete, and retrieve data from the database, usually

Five major components in the DBMS Environment

1. Hardware – can range from a single personal computer to a single mainframe or a network of computers
2. Software – the software component comprises the DBMS software itself and the application programs, together with the operating system, including network software if the DBMS is being used over a network
3. Data – Most important component of the DBMS environment perhaps, certainly from the end-users’ point of view
4. Procedures – instructions and rules that govern the design and use of the database
5. People – the people involved with the system

Paradigm shift – think of the data first and the application second.

Data Administrator (DA) - responsible for the management of the data resource, including database planning; development and maintenance of standards, policies and procedures; and conceptual/logical database design.

Database Administrator (DBA) - responsible for the physical realization of the database, including physical database design and implementation, security and integrity control, maintenance of the operational system, and ensuring satisfactory performance of the applications for users.

Logical Database Designer - concerned with identifying the data (that is, the entities and attributes), the relationships between the data, and the constraints on the data that is to be stored in the database.

Physical Database Designer - decides how the logical database design is to be physically realized. mapping the logical database design into a set of tables and integrity constraints, selecting specific storage structures and access methods for the data to achieve good performance;

Application Developers – implementing the application programs that provide the required functionality for the end-users

End users – naïve users who are typically unaware of the DBMS and sophisticated users who are familiar with the structure of the database