

## **Chapter 1 – Objectives**

- Common uses of database systems.
- The problems with the file-based approach
- Meaning of the term database.
- Meaning of the term Database Management System (DBMS).
- Components of the DBMS environment.
- Typical functions of a DBMS.
- Advantages of DBMSs.

## **Examples of Database Systems**

- Purchases from the supermarket
- Purchases using your credit card
- Booking a holiday at the travel agents
- Using the local library
- Renting a video
- Using the Internet

## **File-based Approach**

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.

### **File**

A file is simply a collection of records, which contains logically related data.

## **Limitations of the File-based Approach**

- Duplication of data
- Data dependence
- Incompatible File Formats
- Fixed Queries/ Proliferation of application programs

## **Database Approach**

- Arose because:
  - Definition of data was embedded in application programs, rather than being stored separately and independently.

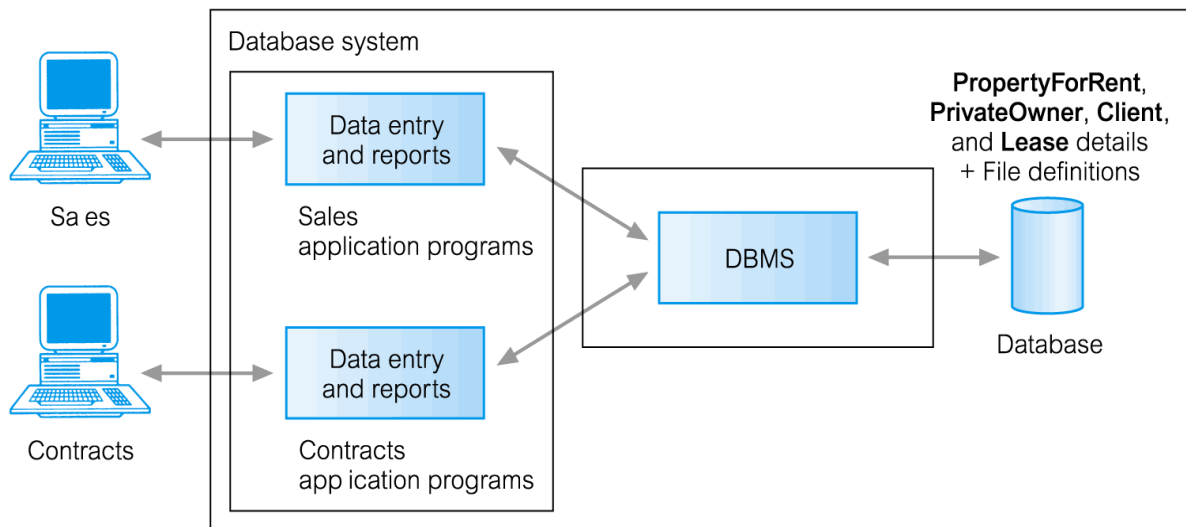
- No control over access and manipulation of data beyond that imposed by application programs.
- Result:
  - the database and Database Management System (DBMS).

### Database

- Shared collection of logically related data (and a description of this data), designed to meet the information needs of an organization.
  - Shared collection – can be used simultaneously by many departments and users.
  - Logically related data- comprises entities, attributes, and relationships of an organization's information.
  - Description of the data – System catalog (metadata) provides description of data to enable program–data independence.

### Database Management System (DBMS)

- A software system that enables users to define, create, maintain, and control access to the database.
- (Database) application program: a computer program that interacts with database by issuing an appropriate request (SQL statement) to the DBMS.



**PropertyForRent** (propertyNo, street, city, postcode, type, rooms, rent, ownerNo)

**PrivateOwner** (ownerNo, fName, lName, address, telNo)

**Client** (clientNo, fName, lName, address, telNo, prefType, maxRent)

**Lease** (leaseNo, propertyNo, clientNo, paymentMethod, deposit, paid, rentStart, rentFinish)

### Database Approach

- Data definition language (DDL).
  - Permits specification of data types, structures and any data constraints.
  - All specifications are stored in the database.

- Data manipulation language (DML).
  - General enquiry facility (query language) of the data.
- Controlled access to database may include:
  - a security system
  - an integrity system
  - a concurrency control system
  - a recovery control system
  - a user-accessible catalog.

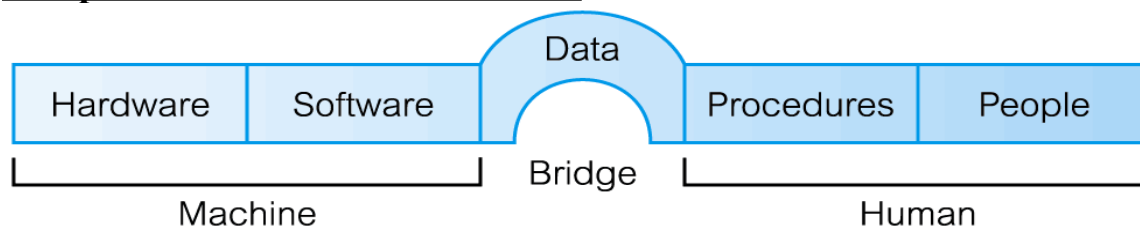
### **Views**

- Allows each user to have his or her own view of the database.
- A view is essentially some subset of the database.

### **Views – Benefits**

- Reduce complexity
- Provide a level of security
- Provide a mechanism to customize the appearance of the database
- Present a consistent, unchanging picture of the structure of the database, even if the underlying database is changed

### **Components of DBMS Environment**



- Hardware

Can range from a PC to a network of computers.

- Software

DBMS, operating system, network software (if necessary) and also the application programs.

- Data

Used by the organization and a description of this data called the schema.

- Procedures

Instructions and rules that should be applied to the design and use of the database and DBMS.

- People

Includes database designers, DBAs, application programmers, and end-users.

**Roles in the Database Environment**

- Data Administrator (DA)
- Database Administrator (DBA)
- Database Designers (Logical and Physical)
- Application Programmers
- End Users (naive and sophisticated)

**Advantages of DBMSs**

- Control of data redundancy
- Data consistency
- More information from the same amount of data
- Sharing of data
- Improved data integrity
- Improved security
- Enforcement of standards
- Economy of scale
- Balance conflicting requirements
- Improved data accessibility and responsiveness
- Increased productivity
- Improved maintenance through data independence
- Increased concurrency
- Improved backup and recovery services