

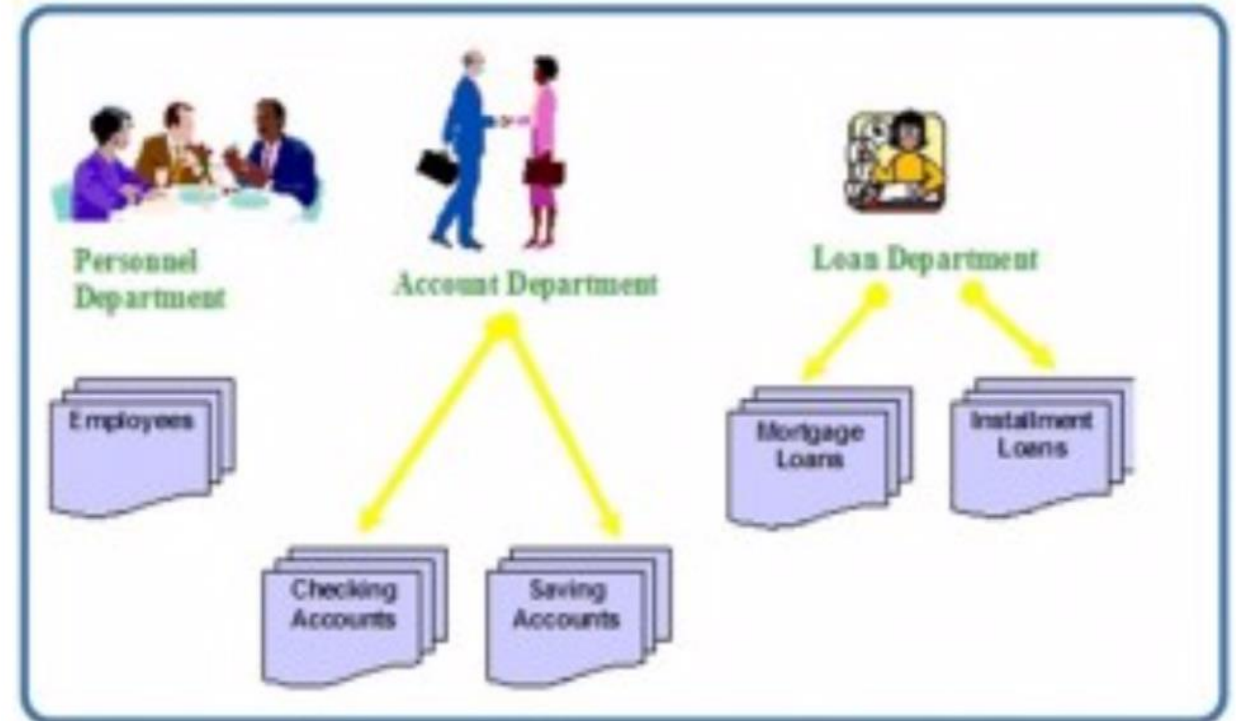
# database

# The importance of storing data

- **Improved functionality** - If data is easily available, in an organization for example, it makes its functionality smoother
- **Easy access and sharing** – businesses can share documents easily with clients who cannot access it directly
- **Availability** - Storing data ensures that it'll be available when you need to use it in the future

# The traditional ways of storing data (file based system)

- A company system has a number of application programs
- Each of them is designed to manipulate data files
- These application programs have been written at the request of the users in the organization
- New applications are added to the system as the need arises



*Example of a file-based system used by banks to manage data.*

There are different departments in the bank, each has its own applications that manage and manipulate different data files.

# The problems of a file based system

- **Data redundancy** – data inconsistency, the same info kept in several different files
- **Data isolation** – difficult for new applications to retrieve the appropriate data
- **Integrity problems** – difficult to make changes to the application programs to enforce new constraints
- **Security problems** – there are constraints regarding accessing privileges + difficult to enforce constraints
- **Concurrency access** – when an application opens a file, it's locked, meaning that no one else has access to the file at the same time

# Database approach and its importance

Database approach - An approach that manages large amounts of organizational information.

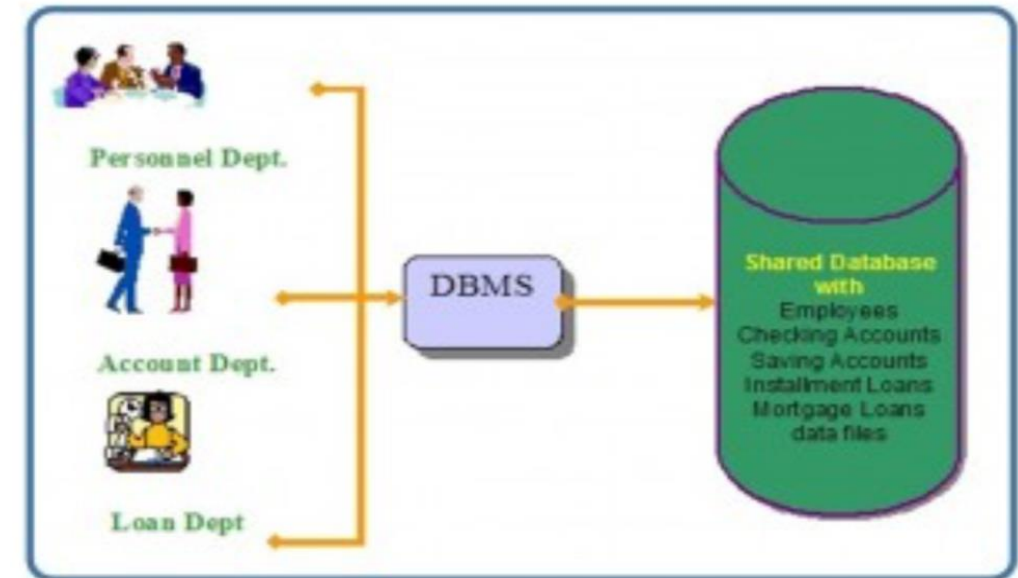
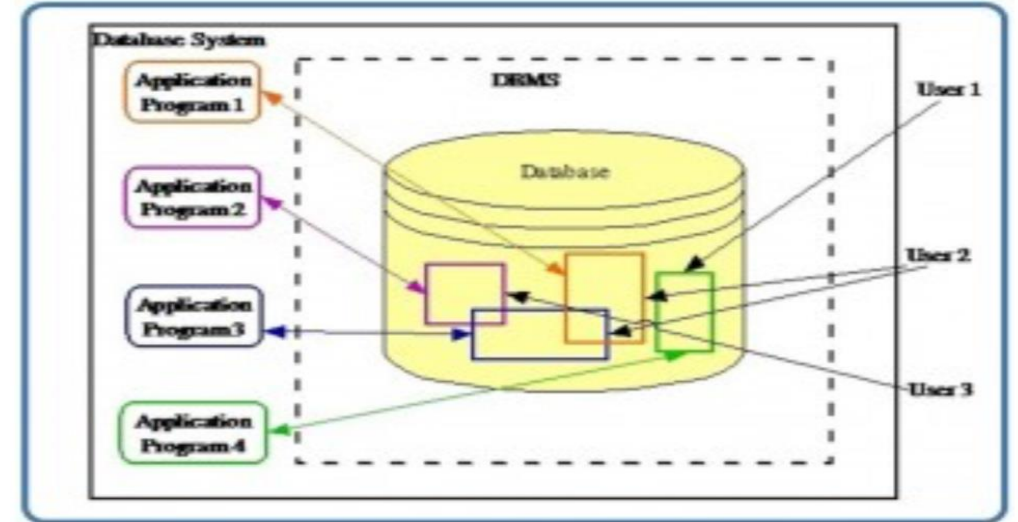
- In a business for example, the best way to store data is by using *database management software*, which is a powerful tool that allows you to store, manipulate and retrieve data in a variety of different ways. Most companies keep track of customer info by storing it in a database
- Because of the mechanical nature of databases, they have terrific power to manage and process the info they hold, which makes this info much more useful for your work

# The characteristics of data base

- Self-describing
- Insulation between program and data
- Support for multiple views of data
- Sharing of data and multiuser system
- Control of data redundancy
- Data sharing
- Enforcement of integrity constraints
- Restriction of unauthorized access
- Data independence
- Transaction processing
- Provision for multiple views of data
- Backup and recovery facilities

# The difference between database and database management system

- A *database* is a shared collection of related data used to support the activities of a particular organization. A database can be viewed as a repository of data that is defined once and then accessed by various users
- A *database management system (DBMS)* is a collection of programs that enables users to create and maintain databases and control all access to them. The primary goal of a DBMS is to provide an environment that is both convenient and efficient for users to retrieve and store information.



# Database modelling and design

## The process of database design

- 1st step → Data modelling, it describes:
  - The data in the database ( students, lectures, courses)
  - The relationships between data items (students are supervised by lecturers, lecturers teach courses)
  - The constraints on data (a student number has 8 digits)
- 2nd step →
  - the data items, the relationships and the constraints are expressed using the concepts provided by the high level data model.
  - Because these concepts do not include the implementation details, the result of the data modelling process is a (semi) formal representation of the database structure.
  - This result is quite easy to understand so it is used as reference to make sure that all the user's requirements are met.



- 3rd step → database design, 2 sub-steps
  - Database logical design – defines a database in a data model of a specific DBMS
  - Database physical design – defines the internal database storage structure, file organization or indexing techniques

**Data model** – a collection of concepts or notations for describing data, data relationships, data semantics and data constraints. ( include a set of basic operations for manipulating data in the database