Introduction to Databases
A database is...

• An information manager.

• Databases make it possible to store, organize and retrieve information in ways that otherwise would not be possible.

• Databases come in all sizes and shapes from mainframe applications that run multi-national corporations to appointment calendars in PDAs.

• Just about any collection of information can be turned into a database.
Why use a database?

- Storing information in a database has many benefits
  - Organize and analyze in different ways
    - Reports
    - Mailing labels
    - Inventory
  - Many advantages over other ways to store data
    - Speed
    - Reliability
    - Precision
    - Ability to automate tasks
Why use a database?

• Databases make it easy to store large quantities of information. The larger the mass of information, the bigger the benefit of using a database.

• Databases make it easy to retrieve information quickly and flexibly.

• Databases make it easy to organize and reorganize information. You can quickly switch between schemes.

• Databases make it easy to print and distribute information in a variety of ways.
Database Organization

- Organized into one or more tables
  - Tables store records
  - Each record is a collection of fields
- Imagine your address book as a database
  - Each listing in the address book is one record
  - Each record has information in fields
    - Name
    - Address
    - City
Tables

• The core of a database is a table or series of tables - each table similar to a spreadsheet

• They are also made of rows (records) and columns (fields)
Nuts & Bolts

• Databases have a specialized vocabulary.

• A database is a collection of information stored in an organized form in a computer.

• A database program is a software tool for organizing storage and retrieval of that information.

• Many of the terms that describe the computer come from the file cabinet terminology of the office.

• For databases, the term ‘file’ means a data file that is a part of a database.

• A ‘record’ is the information relating to one person, item or event.
Fields and Views

• Each discreet chunk of information in a record is called a **field**
  • There are different types of fields, field types include:
    • A text field that contains text
    • A numeric field which contains only numbers and date fields which contain only dates
    • Other field types can include other types of data including graphics, photos, sounds or even videos
    • Computed fields contain formulas similar to spreadsheets.
• Most database programs have more than one way that data can be viewed. For example, form views show one record at a time and list views which show several records at a time
Operations

- Most database programs can easily import or receive data in the form of text files created with word processors, spreadsheets or other databases
- You can browse through these information records just as you would if they were paper records in a notebook
- You can make an information request from the database called an information query
- A query may be a simple search for or a specific record or a search for a group of records that meet a defined criteria
- A **sort command** allows you to arrange records in alphabetic or numeric order based on values in one or more fields
- **Reports** are the most common types of database printouts
- Many database programs don’t print themselves, they export data or transport selected records to word processing programs with mail merge capabilities
Database Management System

- A file manager is a program that allows users to work on one file at a time. A true DBMS is a program or a system of programs that can manipulate data in a large collection of files cross referencing as needed.
- A file manager is sufficient for mailing lists and other common data management applications.
- For large, complex jobs a DBMS is needed.
- With a DBMS there is no need to store redundant information in multiple files.
- With a DBMS databases that are related are linked using key fields. These are fields that are shared by all files that use data from each other.
- Since the files in databases that have DBMSs relate to each other, they are commonly called **relational databases**.
Flat file vs. Relational DB

- Flat file databases store all information in a single data table. For large databases this may mean much duplicate information.

- Relational databases have a table for each type of data and the tables ‘point’ to each other. Thus they are more efficient, though they may be more difficult to manage.