Chapter 1
Introduction to Databases

Objectives

- What is a database?
- What does database design do?
- What is database management system (DBMS)?

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Database

- A database is a single, large, organized collection of data that can be used simultaneously by many departments and users.
- Databases allow for data to be stored quickly and easily and are used in many aspects of your daily life.
- Your school, grocery store, bank, and clothing store all use databases to keep track of customer, inventory, employee and accounting information.

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- What does database design do?
- What is Database Management System (DBMS)?

Database Design

- **Database design** is the organisation of data according to a database model.
- The designer determines what data must be stored and how the data elements interrelate.
- With this information, they can begin to fit the data to the database model.
  - In the case of relational databases the storage objects are tables which store data in rows and columns.
  - In an Object database the storage objects correspond directly to the objects used by the Object-oriented programming language used to write the applications that will manage and access the data.

Database Design – Relational Model

Additional tasks for Relational Model:

- ER diagram (entity-relationship model)
- Normalization
  - *normalization* is a systematic way of ensuring that a database structure is suitable for general-purpose querying and free of certain undesirable characteristics — insertion, update, and deletion anomalies that could lead to loss of data integrity.

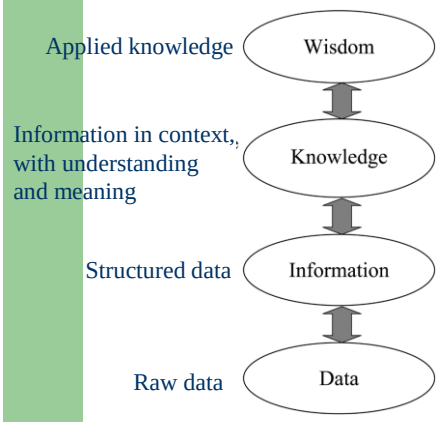
Database Management System (DBMS)

- A database management system (DBMS) provides you with the software tools you need to organize that data in a flexible manner.
- It includes tools to add, modify or delete data from the database, ask questions (or queries) about the data stored in the database and produce reports summarizing selected contents.
- Examples include Access, IBM DB2, Oracle or Microsoft SQL Server etc.

Knowledge Hierarchy

- The purpose of a database management system is to transform

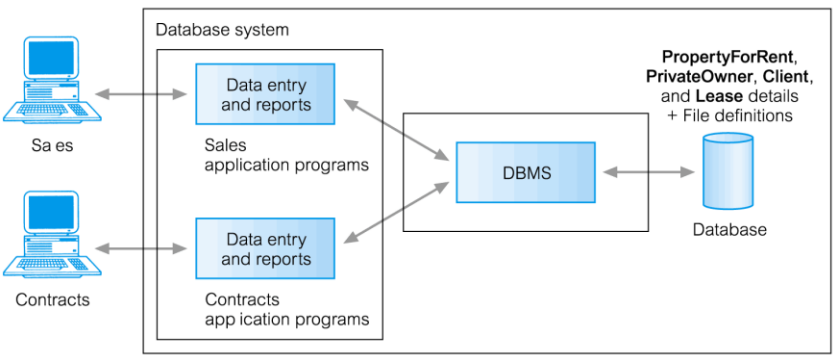
Data → Information → Knowledge → Action



In the **knowledge hierarchy**, imagine a sensor measuring heart beat.

- Each heart beat is raw data
- A series of heart beat collected over time can convey information regarding your recent health condition.
- Adding the context of your history of health record creates knowledge of your health status to determine whether medical action is needed.

Database Processing (Fig 1.7)



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, rentF nish)

Summary

We have covered the following:

- **Difference between a database and Database Management System (DBMS)**