

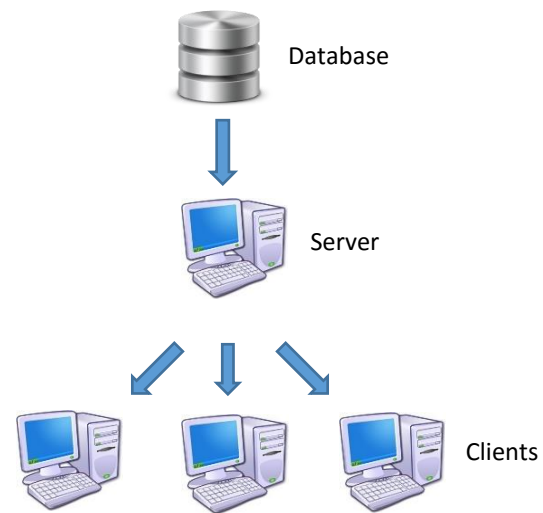
# Introduction to databases *(Readability 30,2)*

**Database** is an entity to store data in a structured and related way, with the least possible redundancy. Different applications and users should use these data simultaneously. Therefore, *database* concept is usually related to *network* concept, since the information contained on the database needs to be shared.

A database can be *local*, which means that only can be used by a user in one machine, or it can be *distributed*, which means the information is stored in remote machines and users can access data through a network, as it is shown in Figure 1.

Nowadays, the main **database requirements** are:

- Integration of all information of the organization
- Data persistency
- Simultaneous access to different users or software applications
- Unified description of data and application independency
- Partial views of data for different users
- Mechanisms to ensure data integrity and security



*Figure 1. Distributed database*

Nevertheless, *Information System* is the general concept used to name the global structure including all tools needed to share data. Thus, an **Information System** could be defined as a set of information stored in memory and a set of applications to manipulate these data.

An Information System is composed by:

- *Content*: data, description of data and management applications
- *Physical equipment*: computer on which is installed the information system
- *Logical equipment*: communication system, *Database Management System* (DBMS), operative system, ...
- *Administrator*: person or team responsible of ensure data quality and accessibility.
- *Users*

## Database administration

Database allows users access to data, which can visualise, insert or update depending on their access privileges assigned by the **database administrator**. This entity can manage users and assign privileges to them in order to control the access to the database and ensure the quality and security of data.

Furthermore, database administration is controlled under a *Database Management System*. This **DBMS** is a set of services (software applications) used as an interface between database and applications trying to access data, in order to allow:

- Easy access to data
- Multiuser data access
- Management of data stored into the database (insert, delete or edit data)

DBMS is controlled by **three languages**:

- Data definition language
- Managing data language
- Consulting language

Internally, an DBMS has a standard architecture that allows database definition at **three abstraction levels** called *logical*, *physical* and *external*. The goal of this structure is to separate physical database, data and users. Database definition at each level is called *schema*.

- *Logical level*: Data structure of the database is defined.
- *Physical level*: One implementation for each structure defined in the logical level is chosen. This definition is called *physical schema* or *internal schema*.
- *External level*: Partial views of database are defined to different groups of users.