University of Mohamed Khider Biskra
Faculty of Economic, Commercial, and Management Sciences
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Chapter 1

Basic Concepts in Databases

Module
Computer Science (L2)

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1. Introduction

Databases and their applications have become an essential element in managing daily life in contemporary society. These activities practiced by community members include registering:

● births and deaths

● academic results

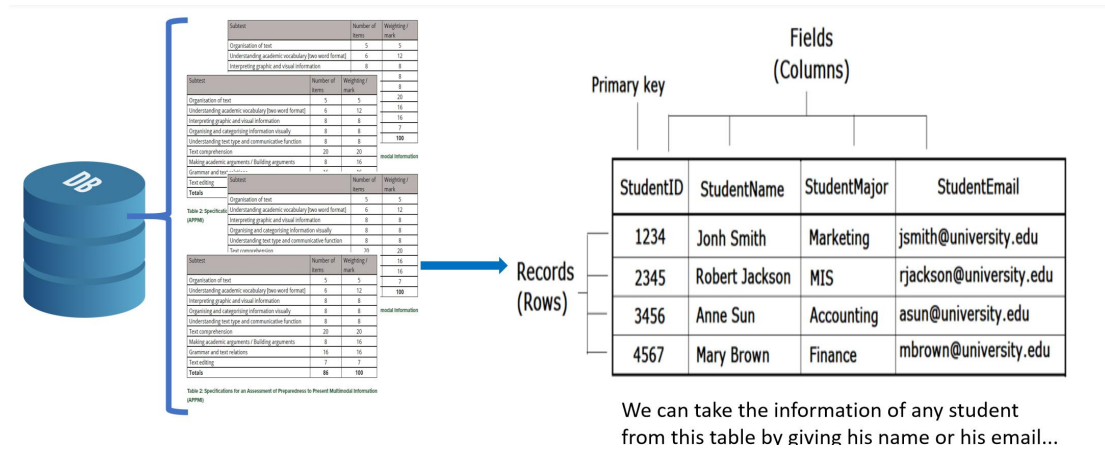● travel documents

● banking operations

....

All the activities must deal with a database.

2. Databases Definition

Databases are a collection of a large amount of data linked together, stored and organized in a certain way that allows to conclude the needed information in an easier way.

● Database is a collection of tables.

● Each table contains a collection of records(rows) ("enregistrements" in French).

● Each record is a collection of fields (columns).

Figure 1: Database components

3. Database Properties

● Storing all data in integrated and accurate ways, and classifying and organizing this data so that it is easy to retrieve in the future.

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- Follow up on the changes that occur in the stored data and make the necessary modifications to it, so that it is always in the picture suitable for use immediately upon request.

- Storing a huge amount of data that exceeds human capabilities to remember its details and then perform some operations and treatments that are impossible to perform manually.

- It helps to store data in an integrated manner, meaning linking different types of data that express all activities.

- It helps to achieve complete confidentiality of the data stored in it, so that no information is made available to anyone who does not have the right to view it.

4. Principal Concepts of Database

4.1. Data

- Data refers to raw facts that have no specific meaning. It's a collection of facts that represents the base of any information.
- Data is a collection of numbers, texts or images that are stored and processed by computer.

4.2. Information

- Information refers to processed data that has a purpose and meaning.
- In other words, it is the result of processing data to extract what it contains or indicates in terms of indicators, signs, etc.

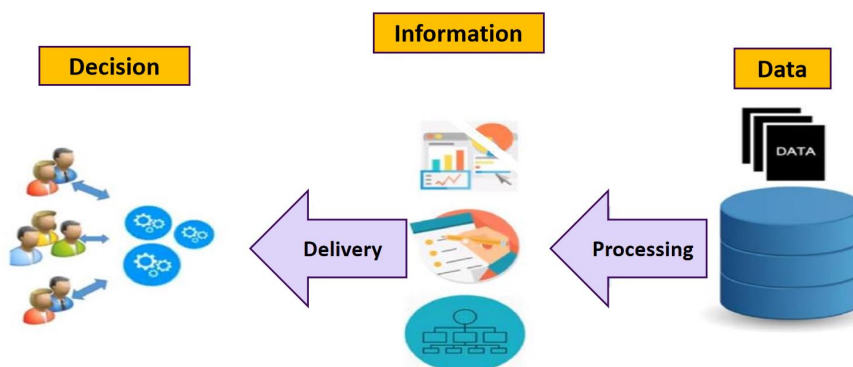The relationship between data and information is shown in the following figure:

Figure 2: The relationship between data and information

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4.3. Entity

It can be a thing, place, person, or object that is independent of another.

4.4. Attribute

Attribute= field=column
It describes a feature (characteristic or a property) of an entity.

4.5. Relation

It is a situation that exist between two tables when one table has a foreign key that references the primary key of the other table.

4.6. Primary Key

It is a unique identifier (a field) for each record in the database table which must contain a not Null values.

4.7. Foreign Key

It is a key used to link two tables. Generally it is a primary key of a table that is exist in another table.

4.8. Instance

It is a collection of data stored in the DB at a certain moment.

4.9. Normalization

It is the process of organizing the data in a database. It includes creating tables and establishing relationships between them according to rules designed both to protect the data and to insure the flexibility of the DB by eliminating redundancy and inconsistent dependency.

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Example:

Customer ID	First name	Last name	Adress	Email	Order number	Cookies ordered
1	Mohamed	Askri	123 Main street	mohamed_askri@gmail.com	46758	80
2	Lina	Soltani	321 Main street	lina_soltani@gmail.com	85790	65
3	Mohamed Mousadek	Gouacem	435 Side street	mohamed_mousadek@gmail.com	47846	38
4	Wissal	Seboula	66 Main street	wissal_seboula@gmail.com	38947	98
5	Skander Ahmed Kosay	Maache	867 Back street	skandar_ahmed@gmail.com	47484	40

5. Database Management System (DBMS)

- It is a set of programs that enable users to create, maintain, and control access to databases.
- The primary goal of a database management system is to provide a convenient and efficient environment for users to retrieve, store, modifying or deleting information.
- The program links the user with the database engine to perform this task.

Examples:

The most important database systems: (Microsoft Access, Oracle, My SQL, Microsoft SQL, Post gress, ...).

Figure 3: The most important database systems
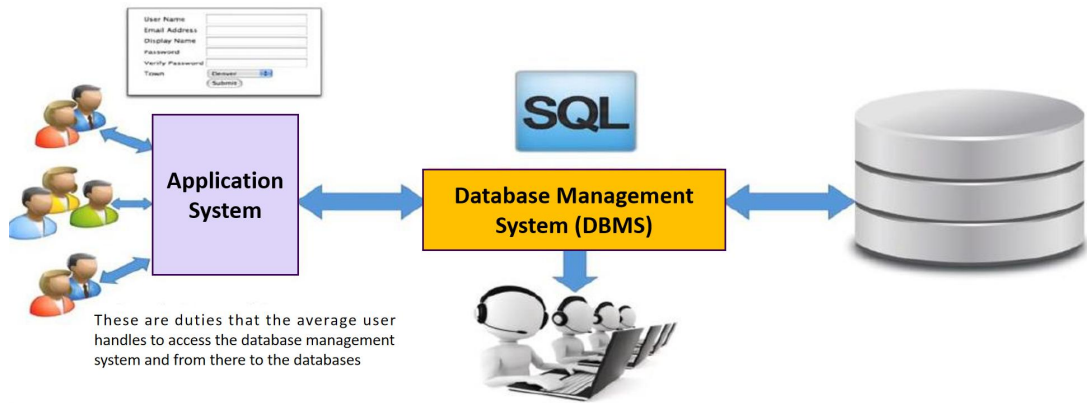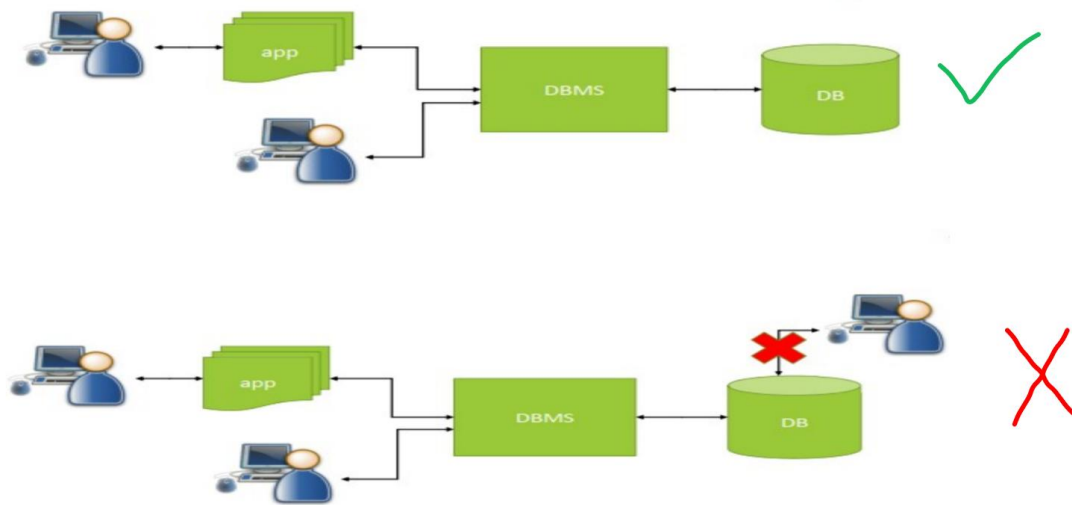
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Figure 4: The database management system

Figure 5: Database application architecture

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