Intro: A brief history of Data, Information, Knowledge

Introduction

Today, people use computers to perform many tasks formerly done with other tools. Computers have replaced typewriters for creating and modifying documents. They've surpassed electromechanical calculators as the best way to do math.

They've also replaced millions of pieces of paper, file folders, and file cabinets as the principal storage medium for important information. Compared to those old tools, of course, computers do much more, much faster — and with greater accuracy. These increased benefits do come at a cost, however. Computer users no longer have direct physical access to their data. When computers occasionally fail, office workers may wonder whether computerization really improved anything at all. In the old days, a manila file folder only "crashed" if you dropped it —then you merely knelt down, picked up the papers, and put them back in the folder. Barring earthquakes or other major disasters, file cabinets never "went down," and they never gave you an error message.

A hard drive crash is another matter entirely: You can't "pick up" lost bits and bytes. Mechanical, electrical, and human failures can make your data go away and never to return.

If you are storing important data, you have four main concerns:

1- Storing data needs to be quick and easy, because you're likely to do it often.

2- The storage medium must be reliable. You don't want to come back later and find some (or all) of your data missing.

3- Data retrieval needs to be quick and easy, regardless of how many items you store.

4- You need an easy way to separate the exact information that you want today from the tons of data that you don't want right now.

Data: streams of raw facts representing events such as business transactions.

Information: is data that have been organized and communicated in a coherent and meaningful manner.

Knowledge: is information evaluated and organized so that it can be used purposefully as shown in figure:
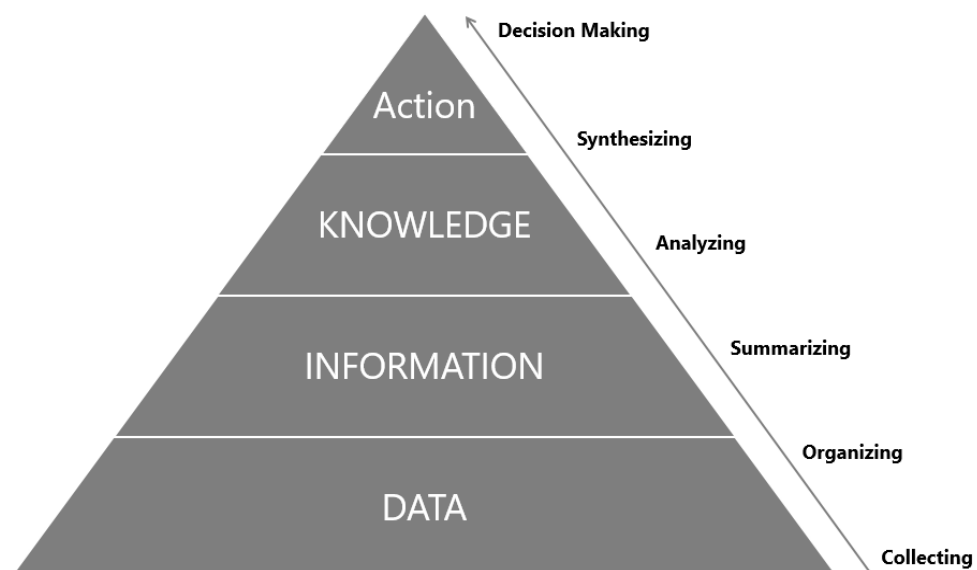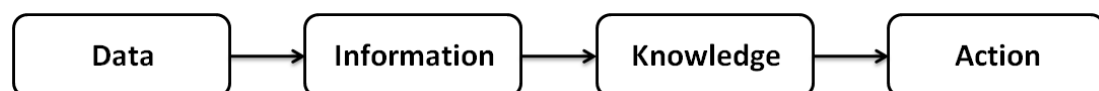
What is a Data Base?

A **database** is an organized collection of data for one or more uses, typically in digital form. The data can be textual, like order or inventory data, or it can be pictures, programs or anything else that can be stored on a computer in binary form.

One way of classifying databases involves the type of their contents, for example: bibliographic, document-text, statistical.

The purpose of a database is to store and retrieve related information, so databases are
designed to offer an organized mechanism for :
- Storing
- managing
- and retrieving information.

Files System:
The File is a block of arbitrary information, it is a place that application programs stores there data in it. These application programs either database application or non-database application. Each file has a format. The information stored in the file can be organized in a record, which is a collection of fields.

The file system is typically described as various files and a number of different application programs are written to read from and add to the appropriate files.

File System Disadvantage:

• Program dependence : Each file has a format, the non-database application must know exactly the format of the file to deal with it. Any other application cannot access the file unless knowing the format of the file.

• When file format updated, then the application program must be updated, it is complicated to update all programs when data format is update.

• Security problems existed. Anyone can write a program to read the data in the file.

• Data redundancy , if there are application A deals with file A and application B deals with file B, if application A store an information in file A, and if application B need this information, application B cannot access file A, so application B must record the same information in file B.

Some basic Definitions:

Field: one category of information(one data value), i.e., Name, Address, Semester Grade, Academic topic.

Record: Collection of fields i.e., one student's information, a recipe, a test question.

A File: A group or collection of similar records, like student File.

Digital databases are managed using database management systems (DBMS) , which store database contents, allowing data creation and maintenance, and search and other access to the database.

Files vs. Databases

Advantages of Files:

• Many already exist.

• Good for simple applications.

Disadvantage of Files:

• Program dependence: Each file has a format. Any application cannot access the file unless knowing the format of the file.

• When file format updated, then the application program must be updated, it is complicated to update all programs when data format is update.

• Security problems existed. Anyone can write a program to read the data in the file.

• Data redundancy**.**

Advantages of Databases:

• Reduction in data redundancy.

• The ability to operate on deferent data structure.

• Independent of data from the program.

• High speed of retrieval and fast on line.

• High degree of flexibility in handling data format.

• Inconsistent can be avoided.

• Integrity can be maintained.

• Security restriction can be applied.

Disadvantages of Databases:

- Requiring lots of time for development.

- Maintenance, high startup costs and application programs becoming reliant on the database.

- Training required.

Additional Benefits of Database Technology

- Sharing of data among multiple users.

- Restricting unauthorized access to data.

- Providing multiple interfaces to different classes of users.

- Representing complex relationships among data.

- Providing backup and recovery services.

- Flexibility to change data structures.

- Reduced application development time.

Example

- University Database

- Employees Database

- Car Booking

- Mailing Letters

- Sales

- Orders database

System: is a group of interrelated components working together towards a common goal by accepting inputs and producing outputs in an organized transformation process.

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Input  ───────▶  │  Process  │  ───────▶  Output
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Systems analysis: The process of understanding and specifying in detail what the information system should do, or is the process of investigation of a system's operation with a view to changing it to new requirements or improving its current working.

Systems design: The process of specifying in detail how the many components of information system should do physically implemented.