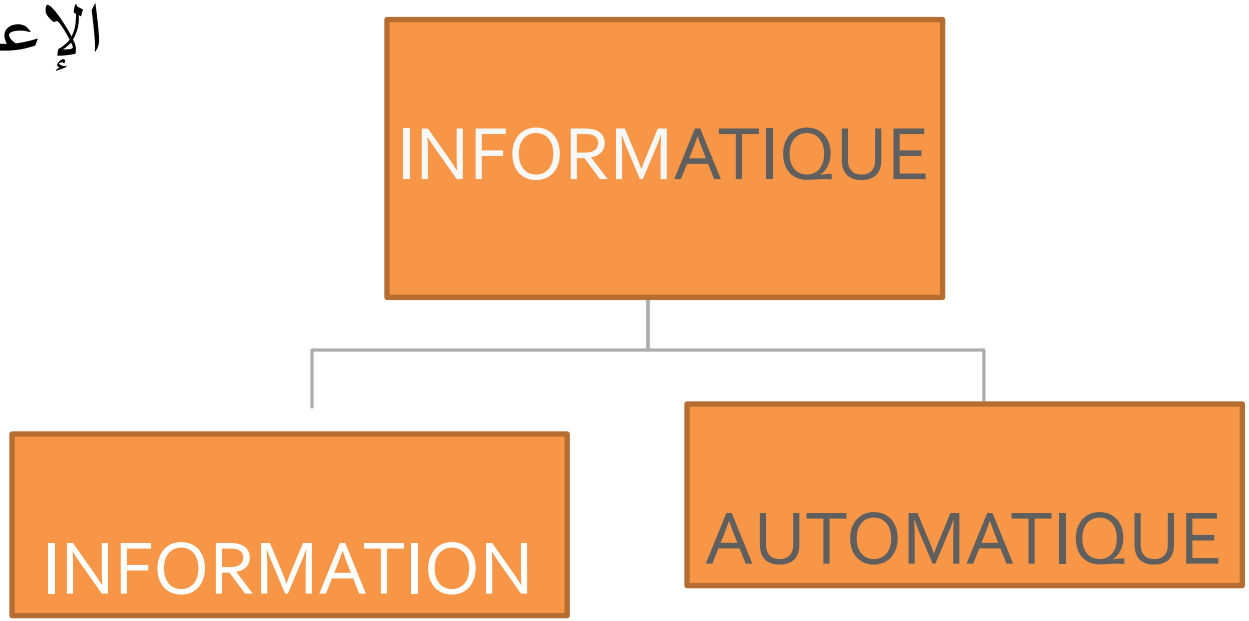
Part I:
Basic Elements

Chapter 1:
General Introduction

2024-2025

1. Introduction to Computer Science

- Informatique? Computer science? Informatics?
  الإعلام الآلي



« The science that treats automatically the information»

علم الحاسوب

What is a computer?

A computer is an electronic device,
operating under the control of instructions (software) stored in its own memory unit,
that can accept data (input),
manipulate data (process), and
produce information (output) from the processing.

Generally, the term is used to describe a collection of devices that function together as a system.

Definitions

Computer: Information processing machine

Computer: capable of acquiring and retaining information to carry out treatments and restore stored information

Information === Data + instructions

A Computer system: is a set of software and hardware means necessary to satisfy the computing needs of users

2. General structure of a computer

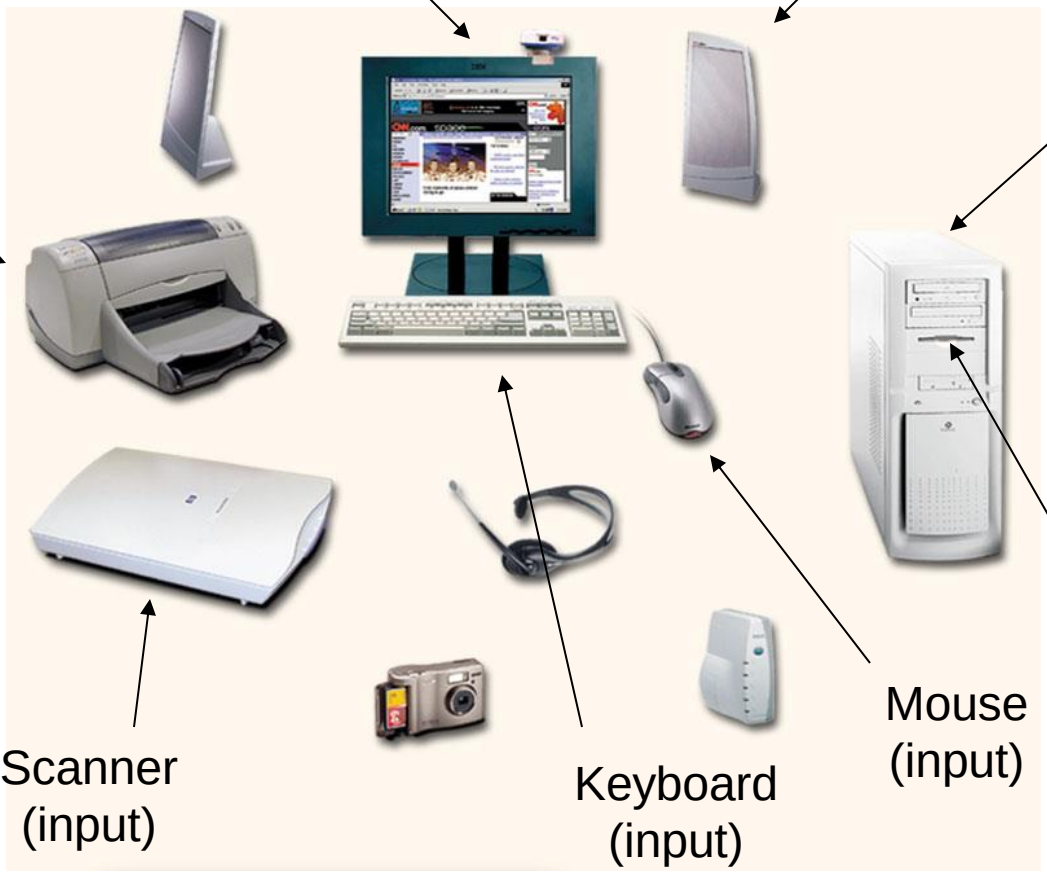
- A computer is a set of electronic components capable of running computer programs.

- It is composed of two parts:

1. **“Hardware”:** refers to all the hardware elements of the computer.
2. **“Software”:** designates the software part.

Components of a Computer: Hardware

Devices that comprise a computer system

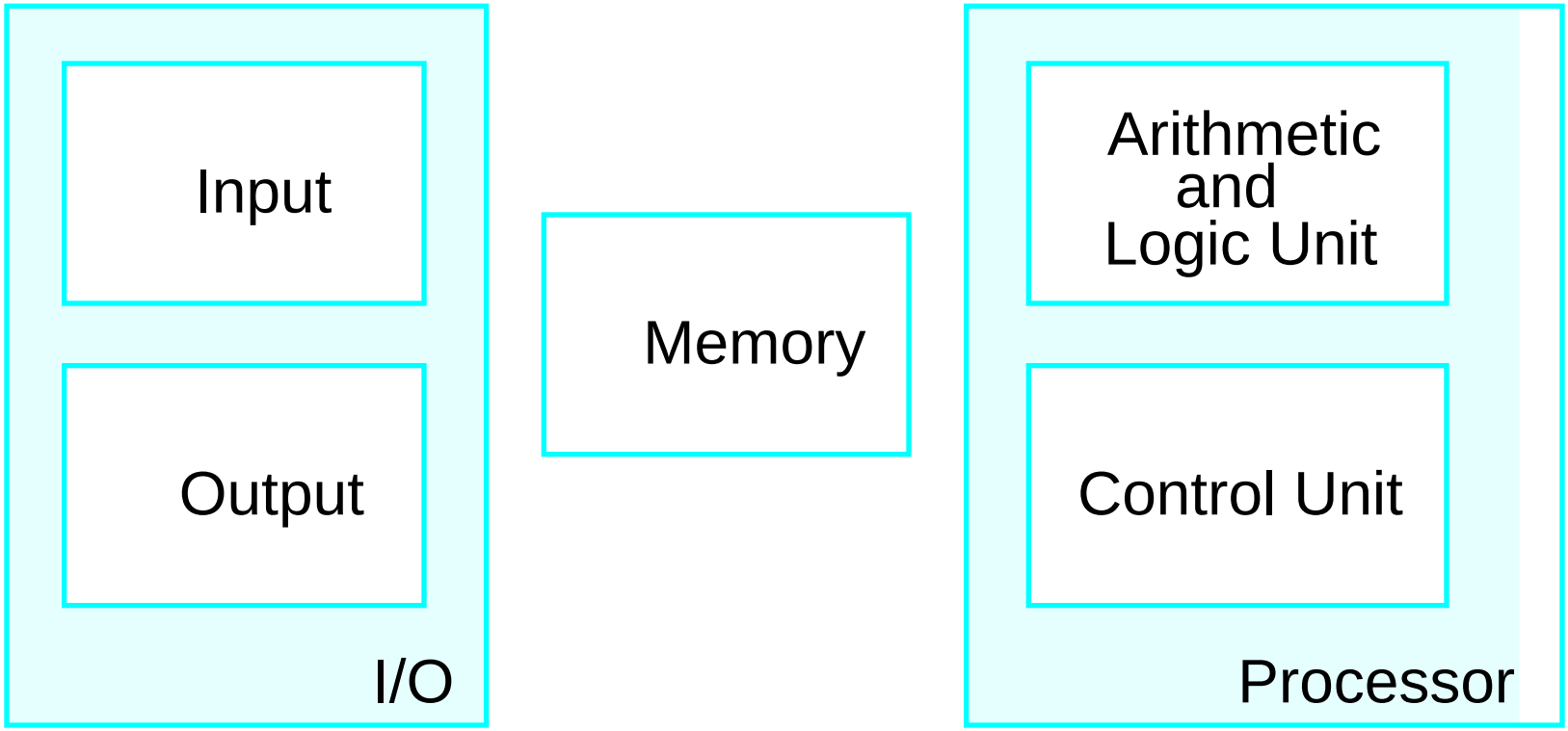


Components of a Computer: Software

1. **Basic Systems:** Operating systems like Windows, Linux, etc. as well as hardware component drivers.

2. **Application programs**: These are executable programs that allow us to perform functions: word processing, internet browsing, reading multimedia content (sound, video, etc.). Example: Microsoft Office (Word, Excel, PowerPoint,…), PhotoShop, ……Software used to develop applications and software, such as C, Java, Pascal, Matlab, etc. language environments.

Basic functional units of a computer



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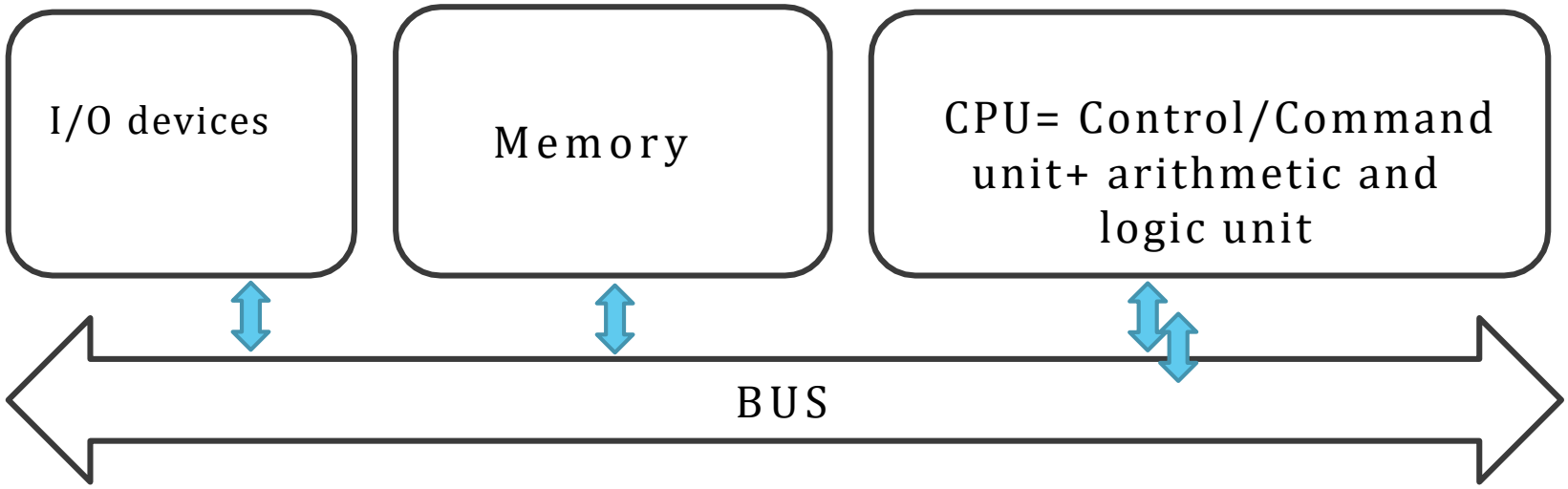
General structure of a computer

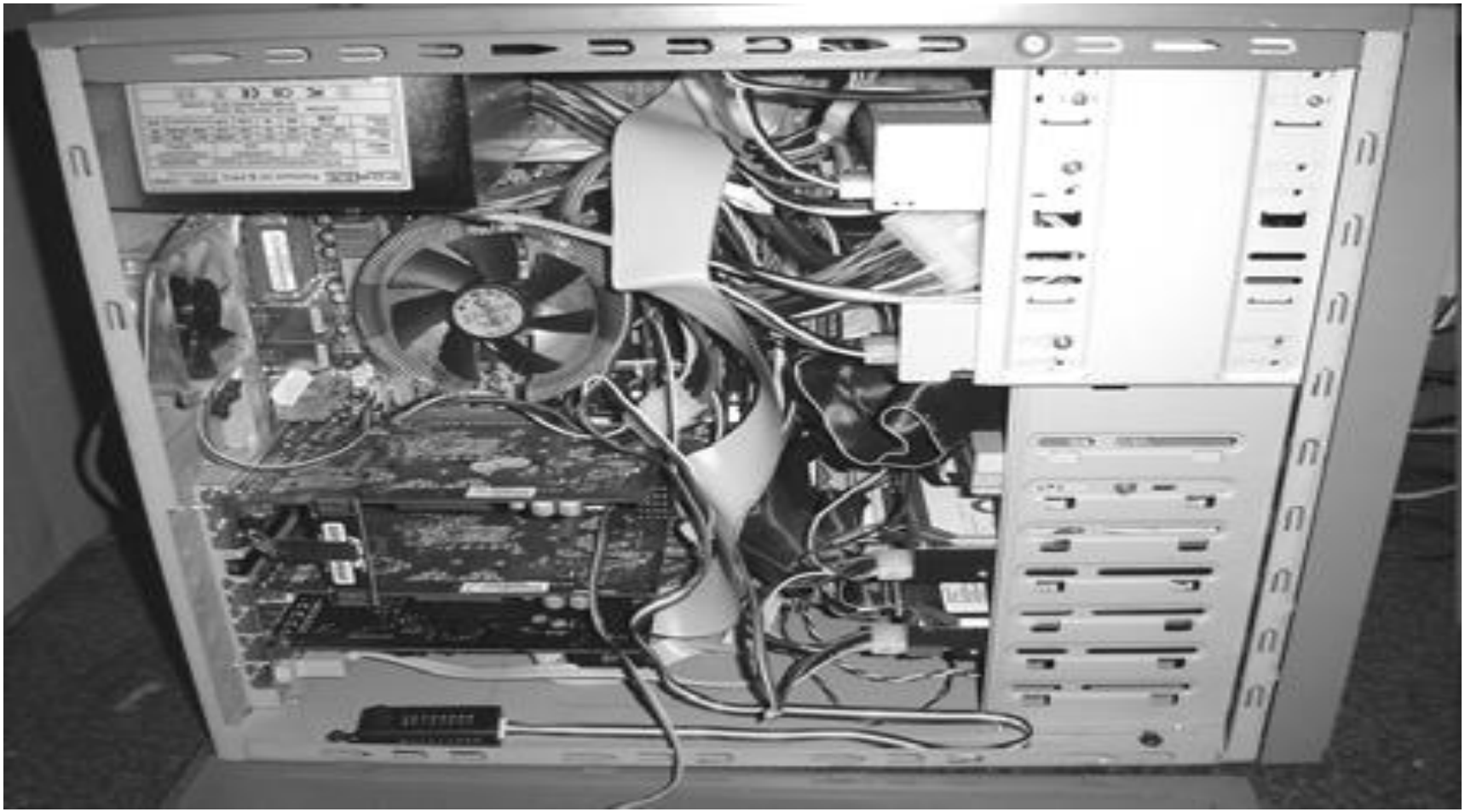
- **The central unit:** consists of a Central Processing Unit (CPU or microprocessor) and central memory.
- **The microprocessor (CPU)** is made up of two units: control or command unit, and Arithmetic and Logic Unit (ALU).
- **Peripherals:** composed of input devices, output devices and backup devices (external memories).

All these entities are connected by buses



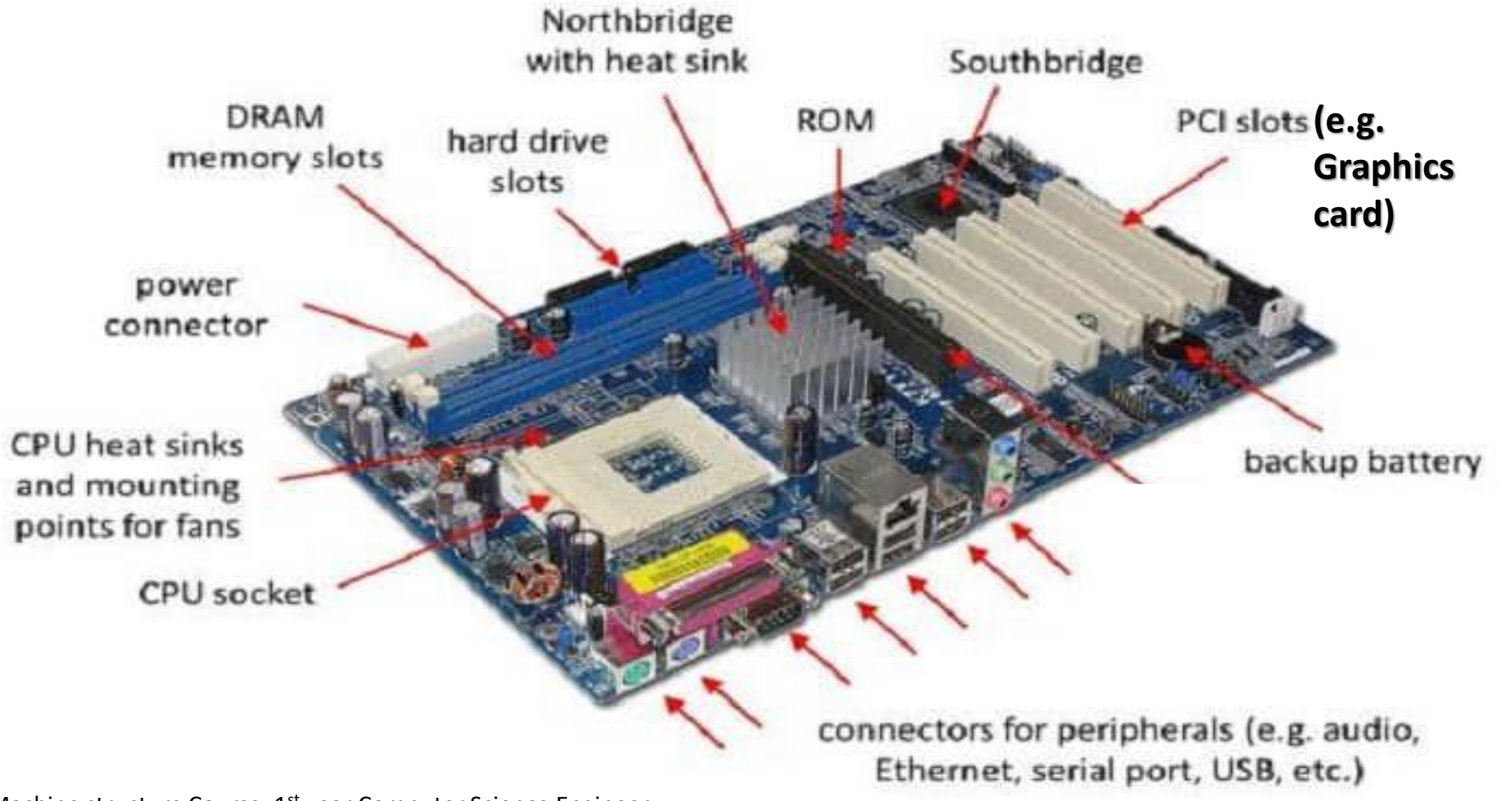
Exterior view of the computer

View from inside…

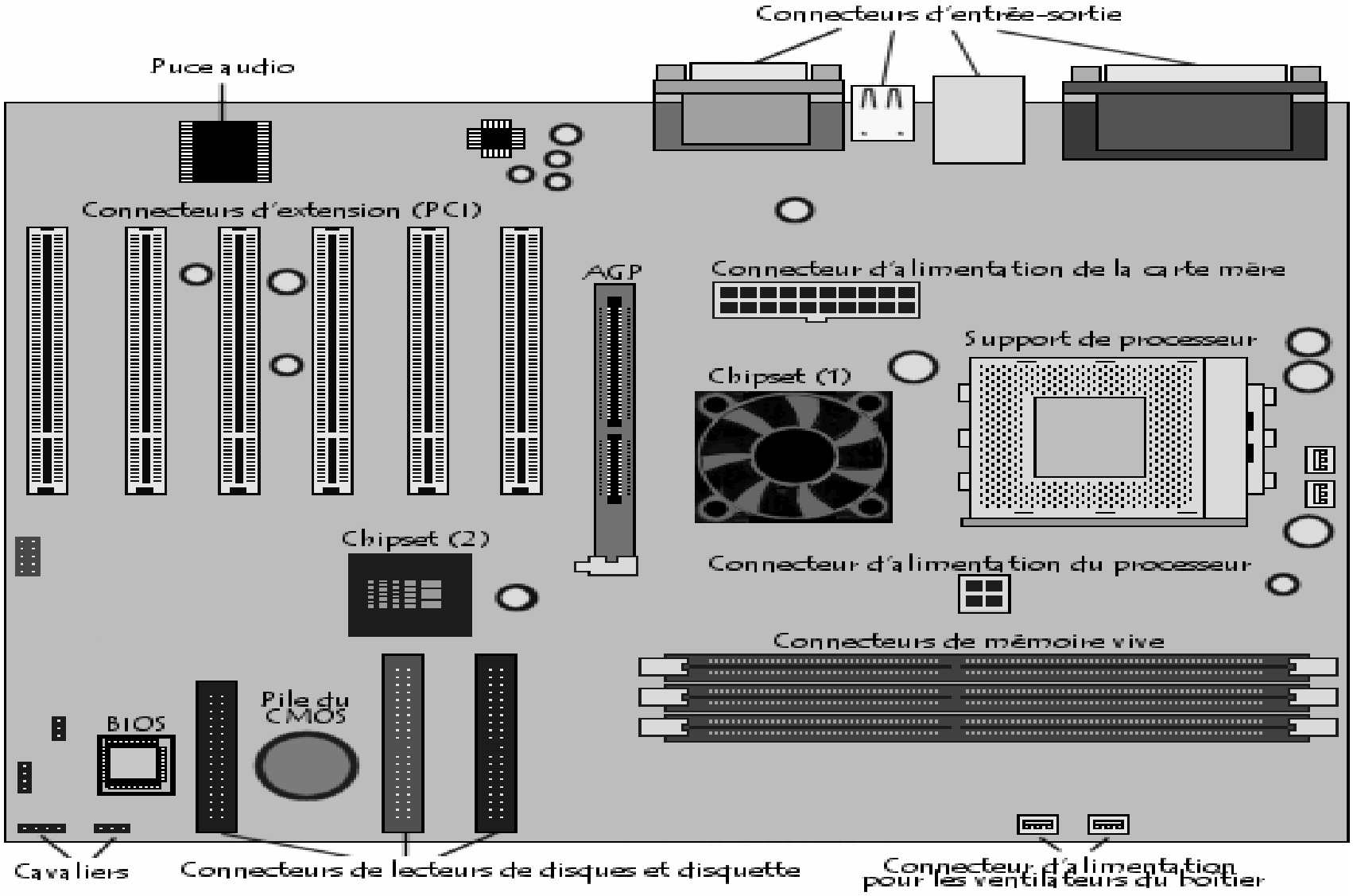


Motherboard

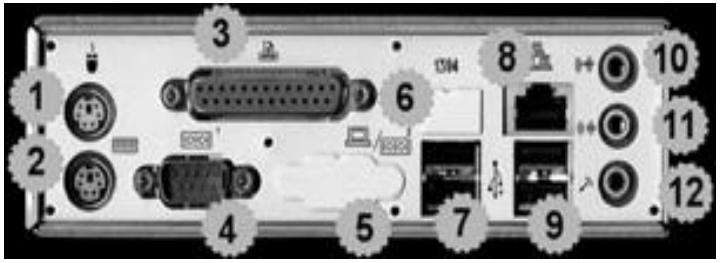
- The main constituent element of the computer is the motherboard.
- The motherboard is the base allowing the connection of all the essential elements of the computer,



Motherboard



Ports of the Motherboard



1: PS(Personal System)/2 mouse port
2: PS/2 keyboard port
3: Parallel port
4: Serial port
5: Serial port
6: Firewire Port (can be used for example for video content acquisition)
7: USB (Universal Serial Bus) port
8: LAN port
9: USB port
10: Auxiliary sound input jack
11: Output jack (for connection to speakers or headphones)
12: Microphone input jack

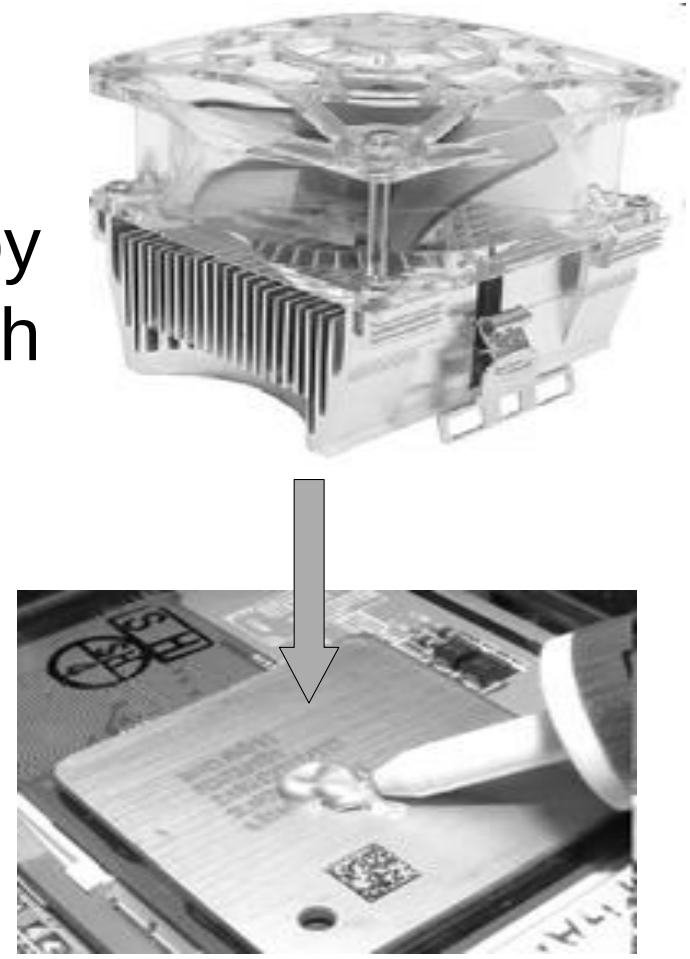
Source : http://www.wikituto.org

Processor

- The processor is the central element of the computer.
- Generally, it is rectangular or square in shape.
- It is made up of several million tiny transistors.
- It is connected to the motherboard by gold pins through which it communicates with the other elements of the motherboard.

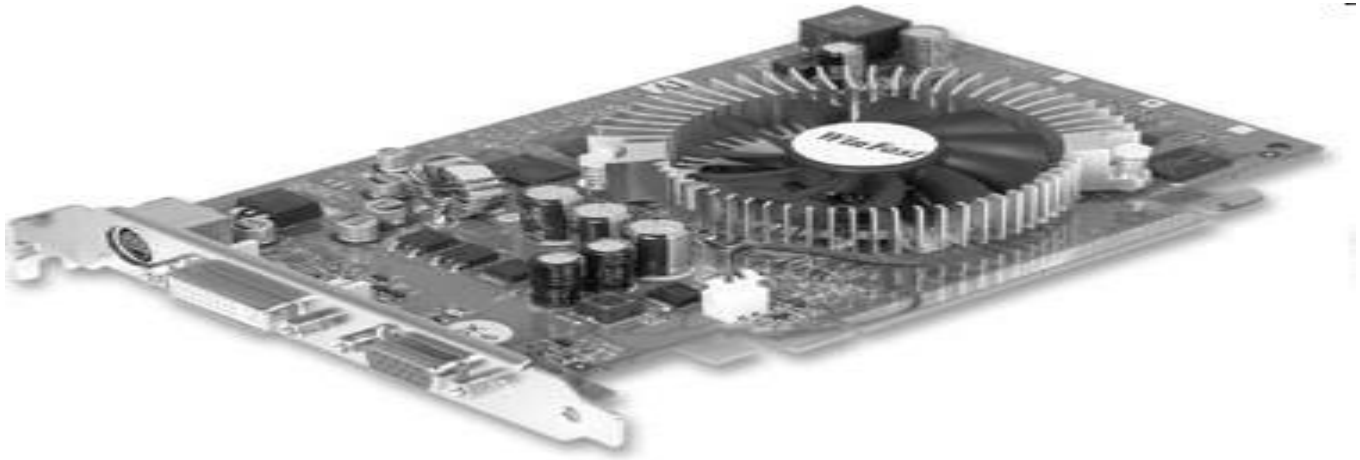
CPU Fan

To dissipate the heat released by the processor, it is covered with a fan.



Graphics card

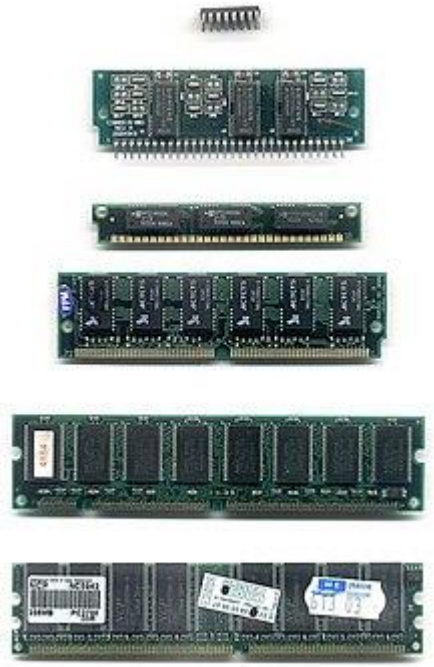
- Card whose function is to ensure the display of computer information on the monitor.
- Fixed on the motherboard, the graphics card is made up of processors, printed circuits, connectors, etc.



Memory of the computer

It is the computer memory in which information processed by a computing device can be stored.

There are two types: **RAM (Random Access Memory) and ROM (Read Only Memory)**



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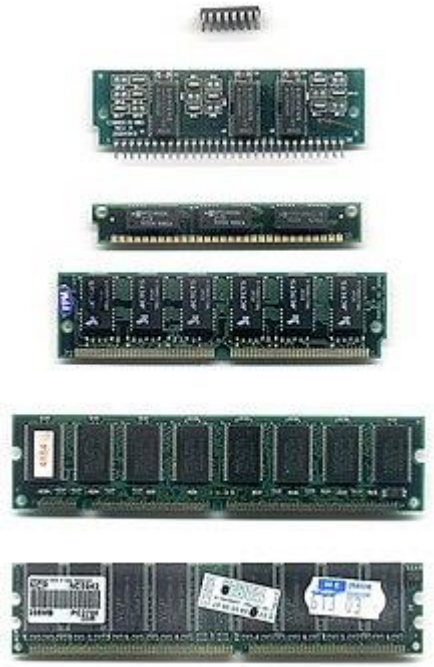

Primary Memory

There are two types of primary memory:

- **RAM: Random Access Memory**

It is a type of computer memory that temporarily stores data that the computer is currently using or processing.
RAM is volatile memory, which means that the data stored in it is lost when the power is turned off,

- **ROM: Read Only Memory**

It is a type of computer memory used to store data that does not need to be modified permanently.
ROM is non-volatile memory, which means that the data stored in it is retained even when the power is turned off

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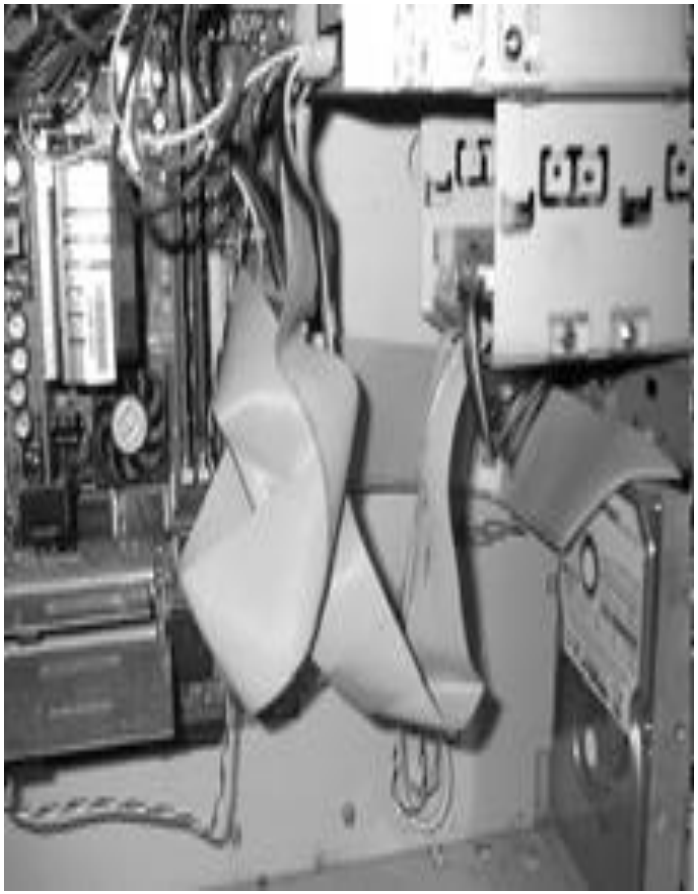
Bus

A bus is a set of wires connected in parallel (or a single wire), intended to transport binary data.

For example, there is a bus which connects the microprocessor to the RAM modules.



Input devices

- Keyboard,
- Mouse
- Scanner
- Optical pencil
- Microphone
- Barcode reader
- Camera
- Webcam

Output devices

- Video projector
- Printer
- Speakers
- Headphones
- …….

Auxiliary memories

- Fixed or removable hard drive
- CD-ROM, CD-RW
- DVD-ROM
- USB memories (or USB “key”)
- Memory cards (from digital cameras)

3. History of Computers

Computer can be divided into generations

- **First Generation (1945 – 1956):** Vacuum tubes and switchboards
- **Second Generation (1956 – 1963):** Trans and batch systems

- **Third Generation (1964 – 1971):** Integrated circuits - Multiprogramming - Time-sharing

- **Fourth Generation (1971-1980):** Thousands, ... millions of transistors on a chip
- **Fifth Generation (1980 -….)**