

UNIT 1. Introduction to Computer Science

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¹based on the original slides of the subject

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- 1 Basic Concepts
- 2 Computer Structure and Operations
- 3 How a computer works
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Basic Concepts: Computer Science

What is Computer Science?

- Computer Science is a set of disciplines and technologies that deal with the acquisition, representation, storage, treatment and transmission of information.
- These tasks can be done automatically using machines (systems) called “Computers”.

Basic Concepts: Computer Science

- The word *informatics* comes from Germany. It was coined by Karl Steinbuch in 1957.
- It was used in a publication entitle: *Informatik: Automatische Informationsverarbeitung* (Informatics: Automatic Information Processing).
- Can be understood as a contraction of **information** and **automatic**.

Basic Concepts: Computer Science

- In Russian, Alexander Ivanovich Mikhailov was the first one who used the word informatics as “**study, organization and spread of the scientific information**”.
- In English, the word **informatics** was used by Walter F. Bauer in 1962 when he established the company “Informatics General, Inc”.

Basic Concepts: Informatics

- Walter F. Bauer registered the name and he pursued universities that used the name. Alternative: **Computer Science**.
- *Association for Computing Machinery (ACM)* went to **Informatics General Inc.** in order to use **informatics** instead of **computer science** (or computer machinery), but the corporation refused it.
- Informatics General Inc. **closed down in 1985**.

Basic Concepts: Informatics

- In Spain, the word informatic (informática) is used in business domains, while Computer Science is used in academic or research domains.

Basic Concepts: Computer Science

- **Information**: To acquire knowledge from data analysis.
- **Automatics**: Demands a set of logic rules (algorithm) for the generation of information in such a way these rules determine its behaviour.
- **Informatics**: Set of disciplines and technologies for automatic information treatment understood as a media for the knowledge and decision making.

Basic Concepts: Computer

- **Computer**: Machine that is able to use some incoming data through an input device, process the data automatically using a stored program and show the results in the output device.

Basic Concepts: Computer

- **Hardware (physical support)**: set of electronic circuits, wires, electromagnetic devices, etc.
- **Software (logic support)**: set of programs that the computer can execute.
- **Peopware (human support)**: users that participate in the human-computer-interaction and people that design and develop software and/or hardware.

Basic Concepts: Program

- **Instruction**: Set of symbols that represent a single operation. There are three types: **Data handling and memory operations**, **Arithmetic and logic**, **Control flow**.
- **Program**: is a sorted set of instructions that computers must execute.

Basic Concepts: Programming Language

- Programming Language: Set of rules and symbols used to build or to write a program. Some programming languages have a syntax similar to any written language syntax. In this case programmers need a **Compiler** or **Interpreter**.
- Types of programming languages: **Low-level** (assembly) and **High-level** (Java, C#, Ruby).

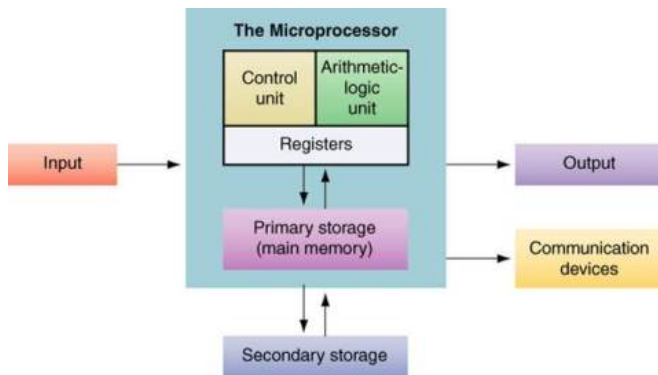
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Main Control

- Main Units:
 - CPU o Processor: Control Unit y Arithmetic-Logic Unit.
 - Central Memory.
- Devices
 - I/O devices.
 - Auxiliary Memory.

Main Control



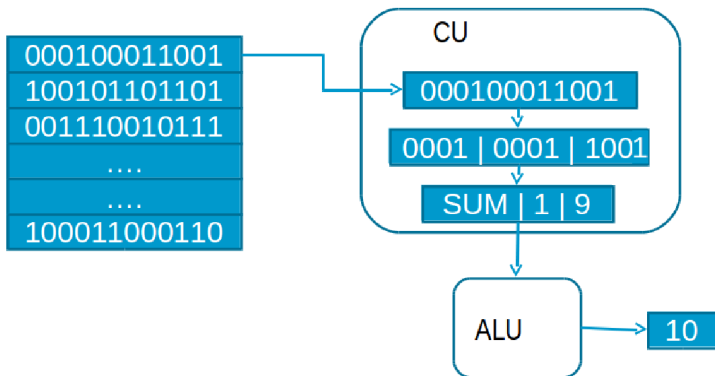
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How a computer works

- The program is read by the machine.
- The execution is divided in the following steps:
 - 1 The program is introduced in the main memory.
 - 2 The Operative System asks the computer to move the control to the i-position of the main memory (where the program stars).
 - 3 The Control Unit repeats the following steps: it takes the program instructions (**fetching**), decode them (**decoding**), executes the instruction (**managing execution**) and then stores the results (**storing**).

How a computer works



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Computer Software: System Software

- Operative System.
- Drivers.
- Diagnosis software: to evaluate the state of the computer.

Computer Software: Programming Software

- General tools to create applications for users (text editors, compilers, interpreter, debuggers, develop environments).

Computer Software: Application Software

- Mathematical Libraries.
- Text Processors.
- Web browsers.
- Videogames.
- Multimedia players.
- Own Programs.