UNIT 1. Introduction to Computer Science

Héctor D. Menéndez

Endless Science

endsci.net

Index

Index

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

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: A machine that is able to use some incoming data through an input device, processes the data automatically using a stored program and shows the results in an output device.

Basic Concepts: Computer Components

Hardware (physical support): set of electronic circuits, wires, electromagnetic devices, etc. following specific protocols.

Software (logic support): set of programs that the computer can execute.

Peopleware (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**, and **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** to convert the language to machine-readable format.

Types of programming languages: **Low-level** (assembly) and **High-level** (Java, Python,C++).

Index

Main Control

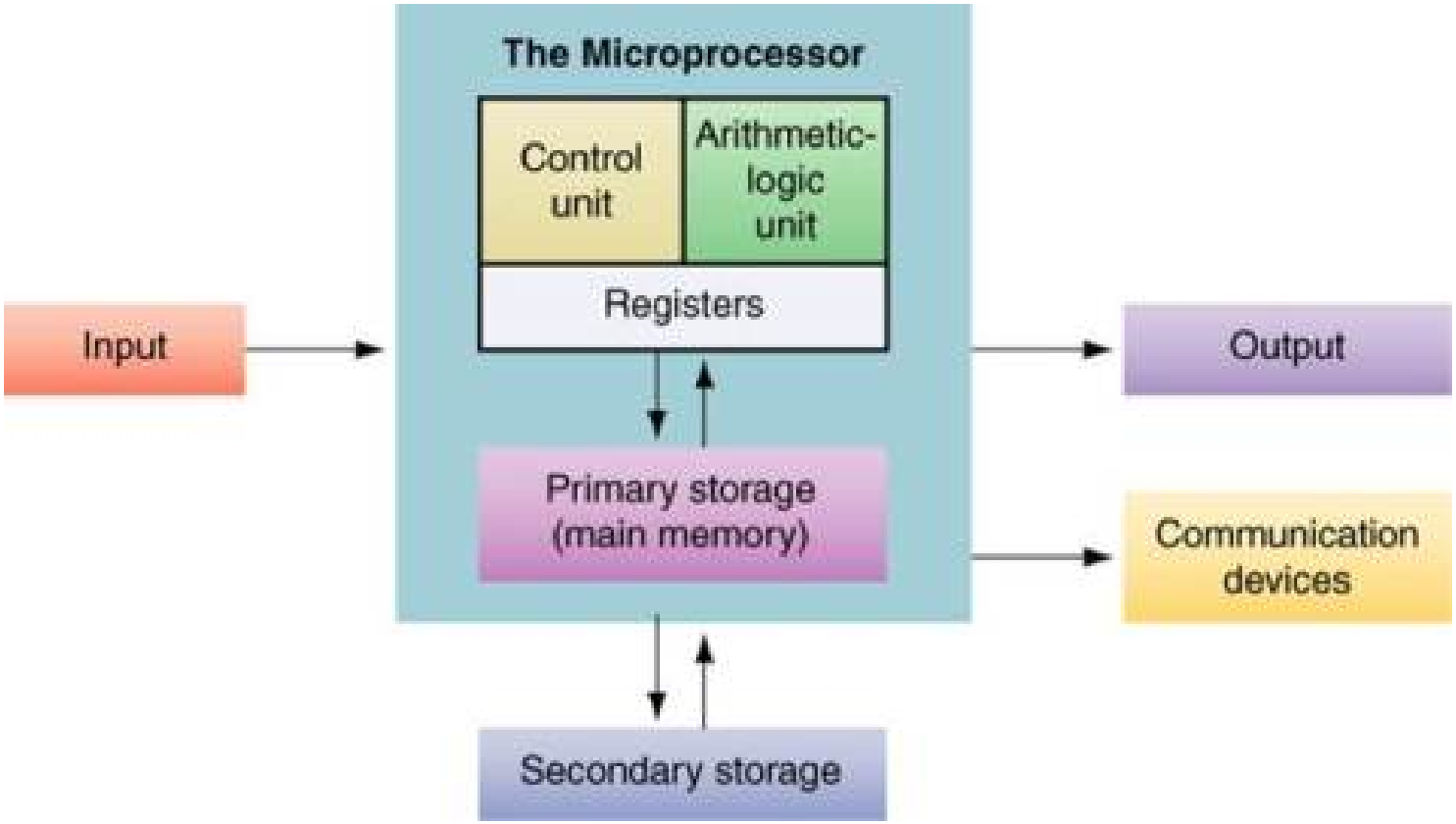
Main Units:

- **CPU o Processor**: Control Unit y Arithmetic-Logic Unit.
- **Central Memory**.

Devices:

- I/O devices.
- Auxiliary Memory.

Main Control



Index

How a computer works

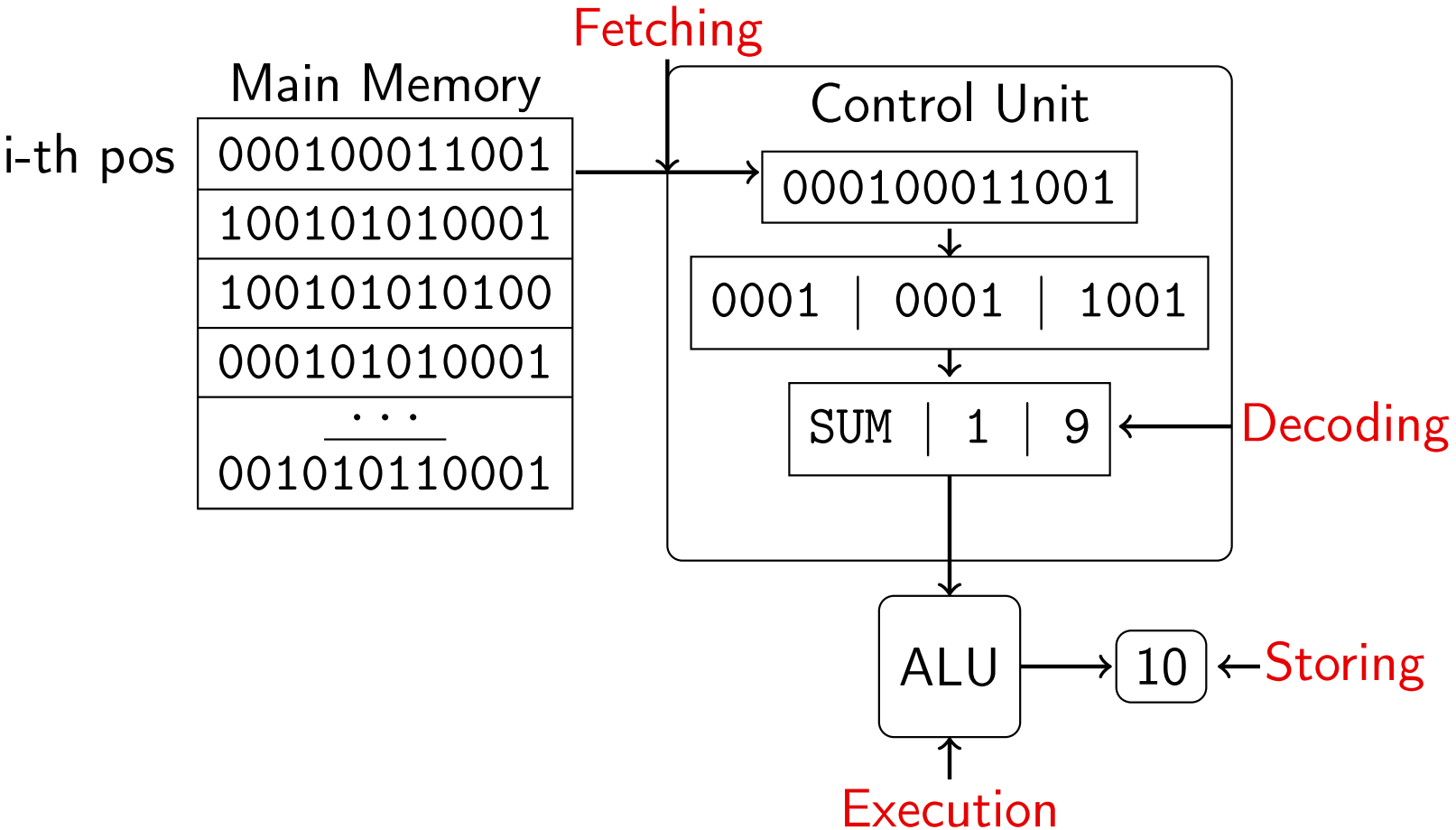
The computer reads the program and runs it. The execution is divided into the following steps:

1) The program goes into the main memory.

2) The operating system asks the computer to move the control to the ith-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 instructions (**managing execution**) and then stores the results (**storing**).

Programs & Instructions



Index

Computer Software: System Software

Operating 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.