Introduction to Computers (CSC 101)

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Lecture 1

WELCOMING LECTURE & COURSE INTRODUCTION

Heba Hamdy

- Bachelor in Computer Science *from* Helwan University
- Masters in Computer Science *from* Helwan University
- PhD. in Computer Science (Image Processing &Pattern Recognition) *from* Helwan University

Lecture Rules

- Cellular phones' OFF
- No side talking
- No more than 10 min. delay

COURSE OBJECTIVES

Students by the end of this course should be able to:

- Know the key components of a computer system (hardware, software, data).
- Be familiar with how computers work through an introduction to number systems.
- Understand the logic Gates and its functions
- Understand the basic concepts used in programming.
- Know how to think in a problem.
- Know how to write a small program to solve problems.
- The Lab will teach Windows, Word ,Excel and PowerPoint
- The class will use the C programming language

GRADING POLICY

Mid-term Written Exam	**20 %**
Course Work (4 Quizzes)	**20 %**
Take-Home Assignments (6 Sheets)	**-3% *per non-submitted assignment***
Lab Attendance (10 Labs)	***-1% per non-attended lab.***
Final Practical Exam	**10%**
Final Written Exam	**50 %**

Outline

This lecture covers:

√What is a Computer?

√Computer terminology.

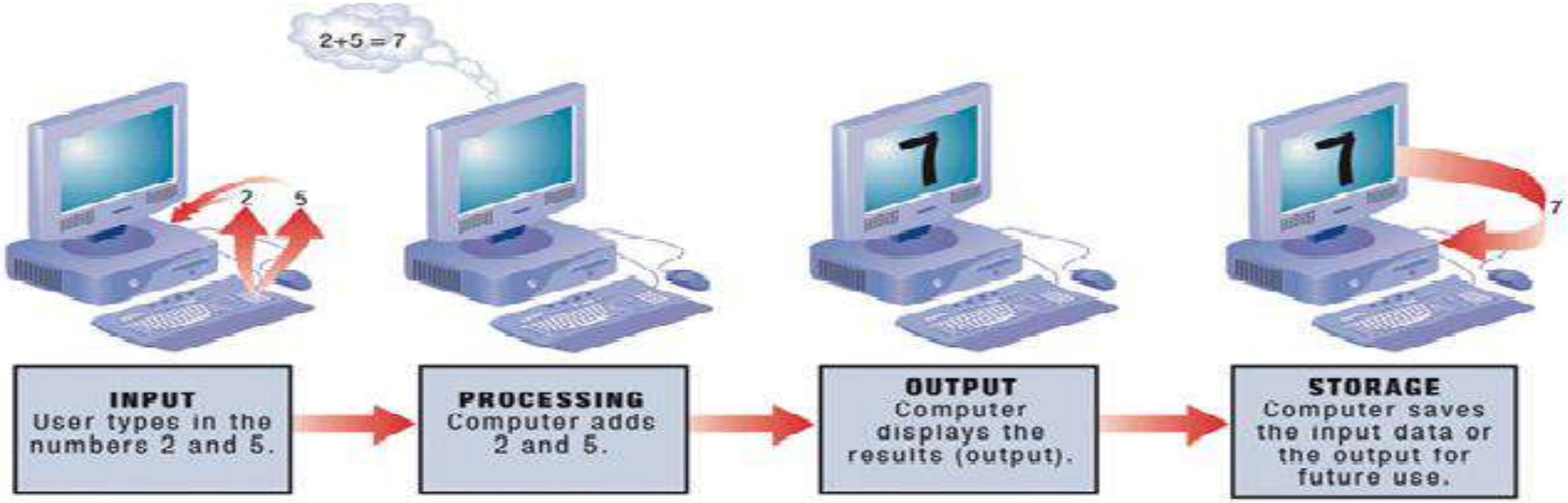
√Generations of Computers.

√Computers classification.

√Hardware & Software.

What is a Computer?

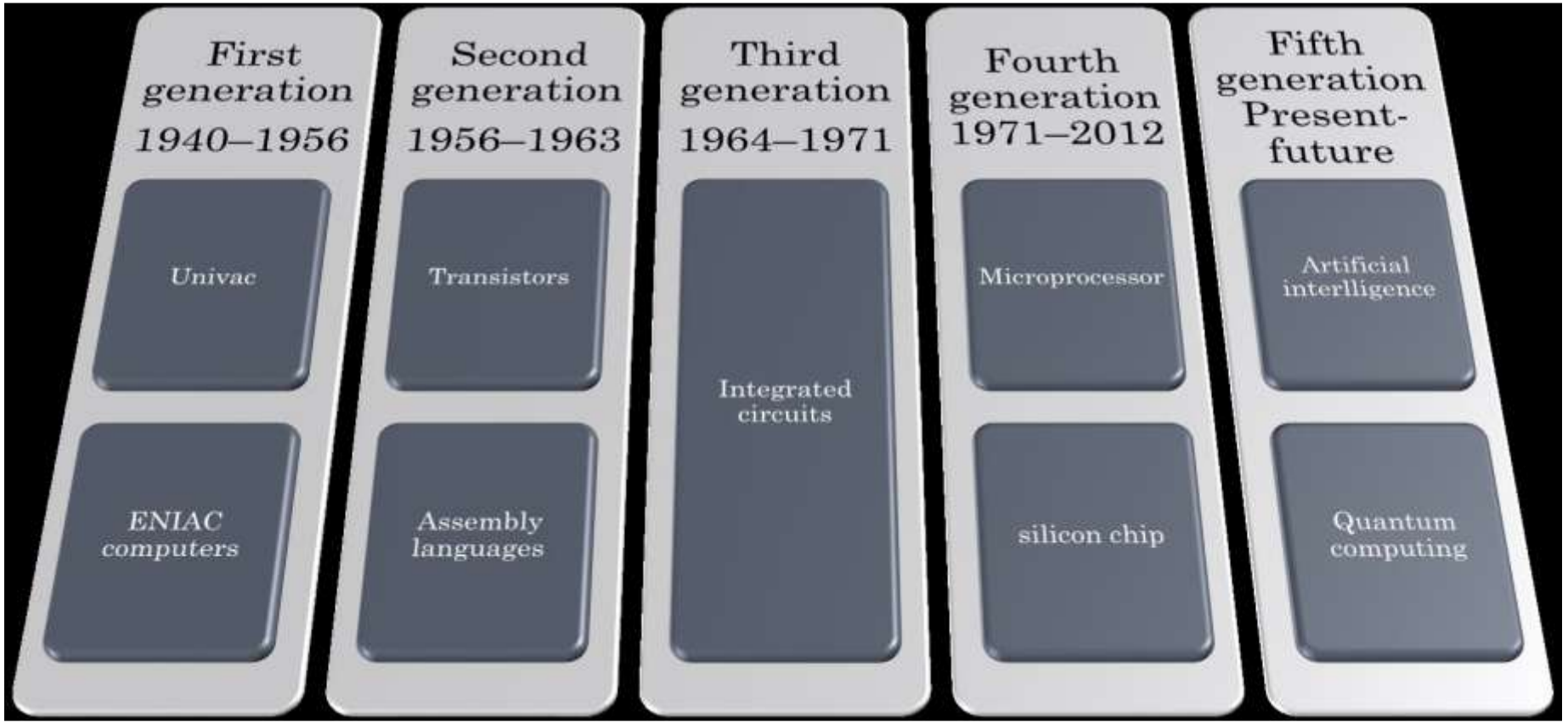
- **Computer** is an advanced electronic device that takes raw data as input from the user and processes these data under the control of set of instructions (called program) and gives the result (output) and saves output for the future use.



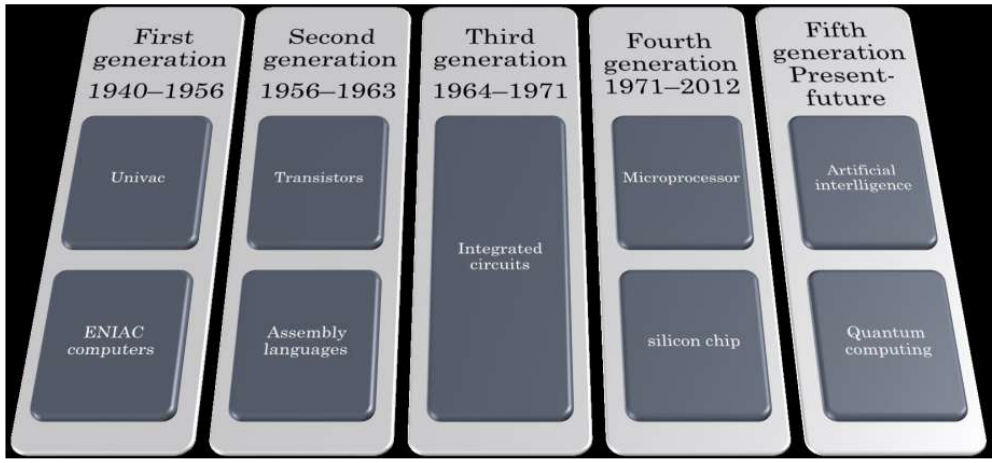
Data Vs. Information

- Data
  - Row, unorganized facts
  - Can be in form of text, audio ,graphics and video
- Information
  - Data that has been processed into meaningful information
- Information Processing
  - Convert Data into information

The Evolution of the computers



The Evolution of the computers



Ismail al - Jazari;
Invented the first programmable humanoid robot in 1206
.

Alan Turing;
Father of theoretical computer science and artificial intelligence.

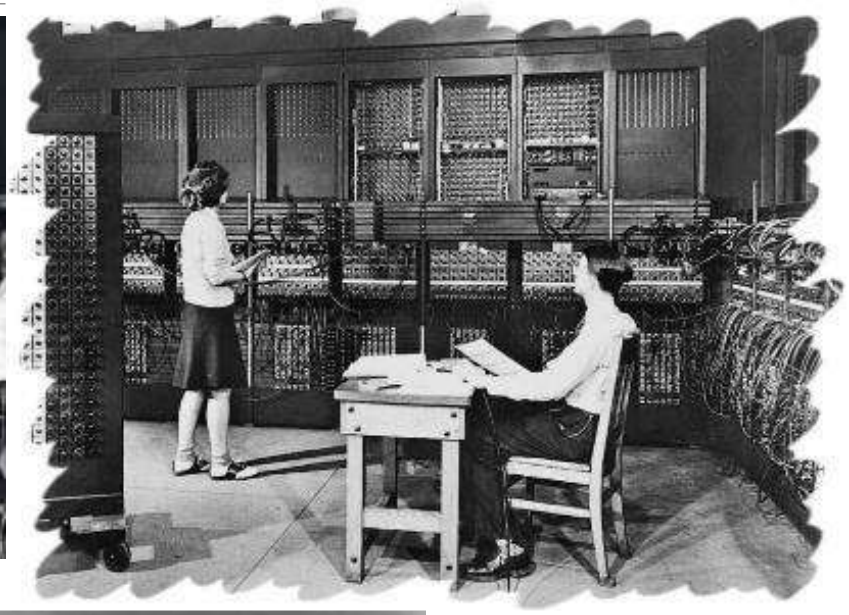
George Boole;
Invented Boolean logic, the basis of modern digital computer logic.

Ada Lovelace;
Writer of the world's first computer program.

FIRST GENERATION 1940 -1956: VACUUM TUBES

- Vacuum Tube Based.
- Magnetic Drums For Memory,
- Large In Size.
- Produce Enormous Heat.
- Lack In Versatility And Speed.
- Expensive.
- High Electricity Consumption.
- **Examples:**

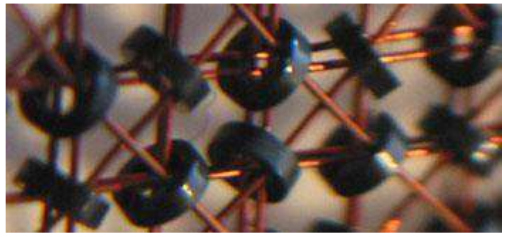
UNIVAC and ENIAC



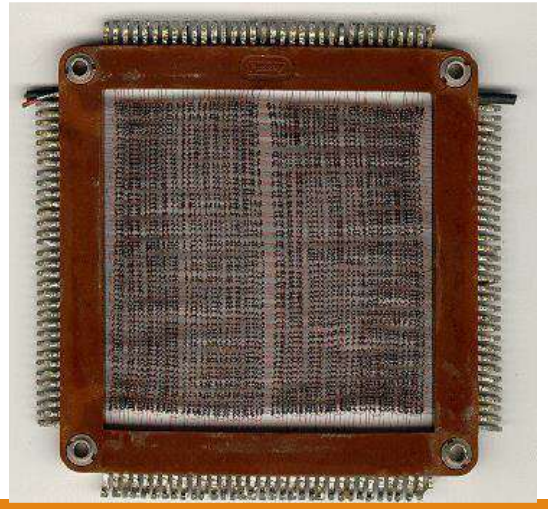
A vacuum-tube circuit storing 1 byte

SECOND GENERATION 1956-1963: TRANSISTORS

- Using transistors, it becomes smaller, faster, cheaper, energy-efficient and more reliable.
- Produce considerable heat.
- Used punched cards for input and printouts for output
- Magnetic core memory introduced.
- Assembly languages allowed programmers to specify
- instructions in words.



An array of magnetic core memory very expensive $1 million for 1 Mbyte!



THIRD GENERATION 1964-1971: INTEGRATED CIRCUITS

- Based on Integrated Circuits (ICs).
- Transistors were made smaller in size and placed on silicon chips.
- Smaller size, faster, lower cost and more efficient.
- Keyboards and monitors were used.
- They were interfaced with an operating system

which allowed to solve many problems at a time.

FOURTH GENERATION 1971-PRESENT: MICROPROCESSORS

- the size of the computer got reduced.
- Intel developed a CPU on a single chip (the microprocessor).
- This led to the development of microcomputers (Personal computers (PCs) and later workstations and laptops).
- They could be linked together to form networks, which eventually led to the development of the Internet.

FIFTH GENERATION (PRESENT & BEYOND): ARTIFICIAL INTELLIGENCE

The speed is extremely high.

- The concept of **Artificial intelligence (AI)** has been introduced to allow the computer to take its own decisions.
- It is still in a developmental stage.

COMPUTERS CLASSIFICATION

Six basic categories of computers:

- Embedded computers
- Mobile devices
- Personal computers
- Midrange servers
- Mainframe computers
- Supercomputers

EMBEDDED COMPUTERS

- Designed to perform specific tasks or functions for that product.
- Cannot be used as general-purpose computers.
- Often embedded into:
  - Household appliances
  - Thermostats
  - Sewing machines
  - Cars

MOBILE DEVICES

- A very small device with some type of built-in computing or Internet capability
- Typically based on cellular phones
- Examples:
  - Smart phones
  - Smart watches
  - Handheld gaming devices
  - Portable digital media players

PERSONAL COMPUTERS

A computer system designed to be used by one person at a time, Also called a **microcomputer**.

- Can be:

– Desktop PCs: fit on or next to a desk

– Portable PCs: Notebook (laptop) or Tablets

TOWER CASE; PC-COMPATIBLE COMPUTER

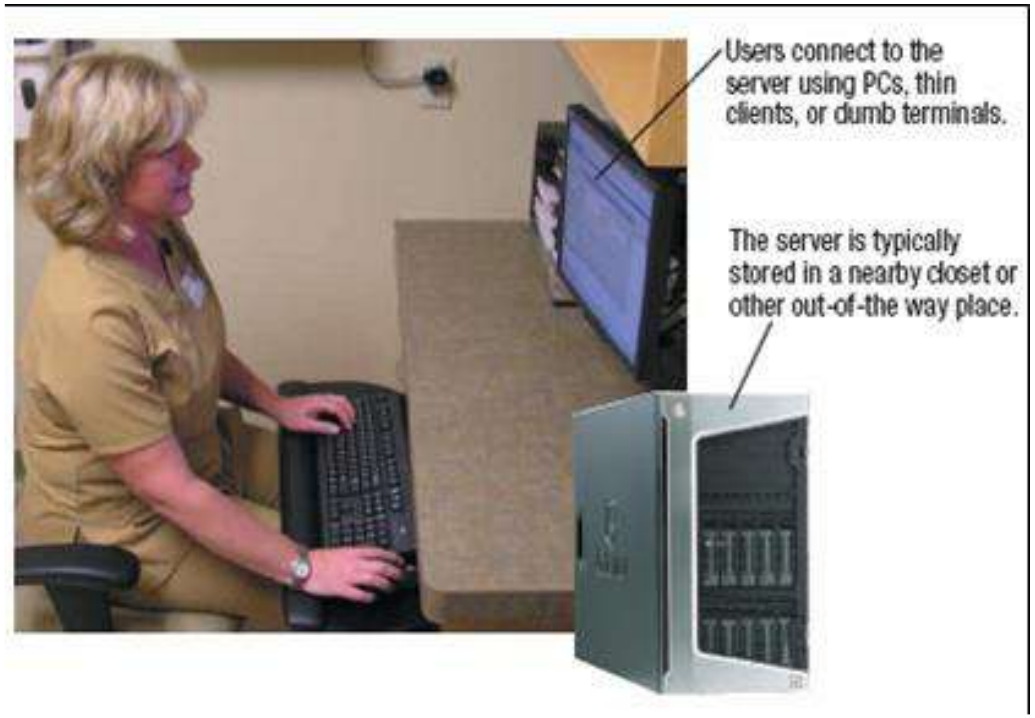
ALL-IN-ONE CASE; MACINTOSH COMPUTER

NOTEBOOK COMPUTER

SLATE TABLET PC

MIDRANGE SERVERS

- Midrange server: A medium-sized computer used to host programs and data for a small network, Also called a **minicomputer**.
- a midrange server is usually located in an out-of-the-way place and can serve many users at one time.
- Users connect via a network with a desktop computer, portable computer, thin client, or a dumb terminal consisting of just a monitor and keyboard.



MAINFRAME COMPUTERS

- Mainframe computer: Powerful computer used by several large organizations to manage large amounts of centralized data.
- Standard choice for large organizations, hospitals, universities, large businesses, banks, government offices.
- Located in climate-controlled data centers and connected to the rest of the company computers via a network.
- Larger, more expensive, and more powerful than midrange servers.
- Usually operate 24 hours a day.
- Also called **high-end servers** or **enterprise-class servers.**

MAINFRAME COMPUTERS

SUPER COMPUTERS

- Supercomputer: Fastest, most expensive, most powerful type of computers.
  - Generally run one program at a time, as fast as possible.
  - Commonly built by connecting hundreds of smaller computers, supercomputing cluster.
  - Used for space exploration, satellites, weather forecast, oil exploration, scientific research, complex Web sites, decision support systems, 3D applications, etc.
- Grid computing: Using the unused processing power of a large number of computers to work together on a single task.

SUPER COMPUTERS

BLUE GENE/L SUPERCOMPUTER
This supercomputer is installed at Lawrence Livermore National Laboratory.

BLUE GENE/L CIRCUIT BOARDS
Each rack holds several circuit boards; each circuit board contains four processors.

COMPONENTS OF COMPUTERS

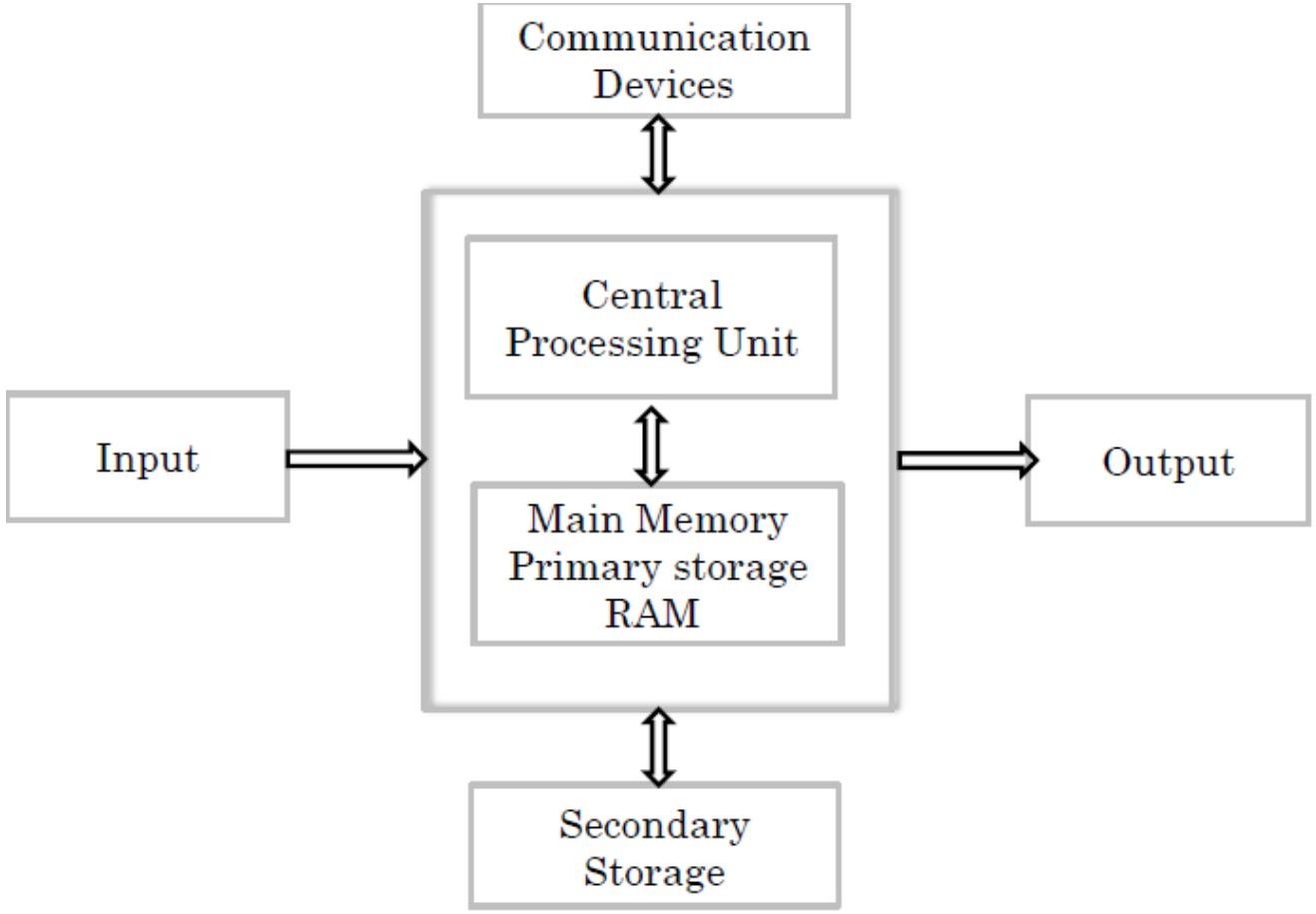
Hardware

The physical components present in the computer.

Software

It is a collection of programs and it can perform some operations.

HARDWARE (BASIC COMPUTER ORGANIZATION)



HARDWARE

- Central Processing Unit (CPU)

– This is where the calculations are performed and logical functions are carried out.

– Has three parts:

- **Control Unit**: controls all the operations in computer.
- **Arithmetic and logic unit (ALU):** all the arithmetic and logic operations are performed in it.
- **A set of registers:** is used for temporarily storing data or instructions in CPU.

HARDWARE

- Primary Storage

– is computer memory that is accessible to the CPU of a computer without the use of computer's input/output channels.

– Has three kinds:

• **Processors Registers:** contain information that the ALU needs to carry out the current instruction. They are the fastest.

• **Main memory (RAM):** It contains the programs that are being run and the data the programs are operating on. It is temporary memory and is erased when you turn off your computer.

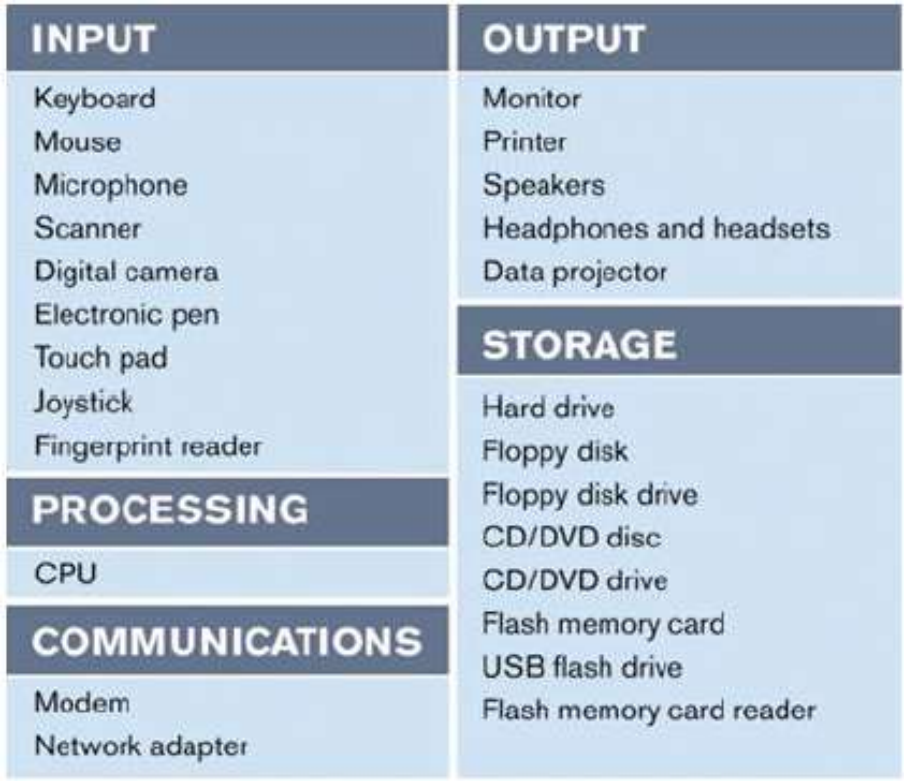
• **Cache memory:** is used to increase CPUs performance. It stores a copy of the instructions and data to be immediately used instead of main memory.

HARDWARE

- **Input devices;**
  - Anything that feeds the data into the computer.
  - Keyboards, mice, scanners, cameras, microphones, joysticks, etc.
- **Output devices;**
  - Present results to the user.
  - Monitors, printers, speakers, projectors, etc.
- **Storage devices;**
  - Used to store data on or access data from storage media.
  - Hard drives, DVD disks and drives, USB flash drives, etc.

HARDWARE

- Communications devices;
  - Allow users to communicate with others and to electronically access information.
  - Modems, network adapters, etc.



SOFTWARE

- The programs or instructions used to tell the computer hardware what to do.

– **System software**: Operating system allows a computer to operate

- Boots the computer and launches programs at the user's direction.
- Most use a GUI to interact with the user via Windows, icones, menus, buttons, etc.
- Windows, Mac OS, Linux, etc.

– **Application software:** programs which allow the Computer to carry out specific tasks related to the users such as payroll processing, inventory control, or word processing.

ANNOUNCEMENTS

❖ The **Course Plan & Lecture 1** were posted Online Facebook Group last week.

Please read them carefully.

❖**Sheet # 1** were posted online this week.

❖**Submissions of Sheet #1** is during next week's Labs *(i.e., week 3, Starting on Saturday 6th of October)*.

❖**Quiz # 1** will be held in the week after *(i.e., week 4, Starting on Saturday 13 of October)* during the Labs.

Thanks