How computer works?

"I think there is a world market for maybe five computers."
[1] Thomas Watson, chairman of IBM, 1943

The first general-purpose computer, the nearly 30-ton ENIAC (1947), contains 18 000 vacuum tubes, 70 000 resistors and 10 000 capacitors.

Computers in the future may weigh no more than 1,5 tons.

[2] Popular Mechanics, 1949

A computer is a programmable machine that receives input, stores and manipulates data, and provides output in a useful format.
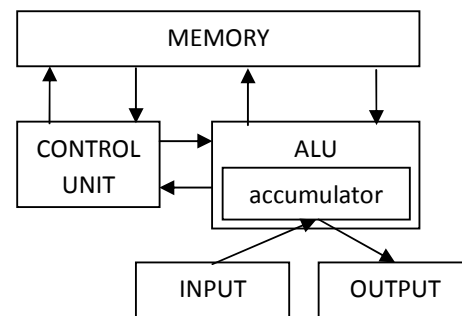
The US-built ENIAC (Electronic Numerical Integrator and Computer) was the first electronic general-purpose computer. It combined, for the first time, the high speed of electronics with the ability to be programmed for many complex problems. It could add or subtract 5000 times a second, a thousand times faster than any other machine.

IBM introduced a smaller, more affordable computer in 1954. The IBM 650 weighed over 900 kg, the attached power supply weighed around 1350 kg and both were held in separate cabinets of roughly 1,5 meters by 0,9 meters by 1,8 meters. It cost 500 000 US dollars and adjusted for inflation, now it would cost more than 4 million US dollars.

Basic architecture

The five basic function of any digital computer are: 1-input, 2-storage, 3-control, 4-processing and 5-output.
Von Neumann architecture describes the computer using four main parts: arithmetic-logic unit (ALU), control unit (CU), memory and input/output devices. These parts are interconnected using a bus and are usually synchronized using a clock (although they can be controlled using events).

```
                    +------------------------+
                    |        MEMORY          |
                    +------------------------+
                      ^    |        ^    |
                      |    v        |    v
        +-----------+      +------------------+
        | CONTROL   | ---> |      ALU         |
        | UNIT      | <--- | +--------------+ |
        +-----------+      | | accumulator  | |
                           | +--------------+ |
                           +------------------+
                      |             ^
                      v             |
              +-----------+    +-----------+
              |  INPUT    |    |  OUTPUT   |
              +-----------+    +-----------+
```

Computer boot

- You press the power button.
- BIOS software starts performing basic checks (checking keyboard, memory and disk drives).
- BIOS looks into Master Boot Record (MBR) of the first bootable devices and starts loading operating system using a boot loader.

- Operating system takes over and loads its most important parts into memory.
- Once the operating system is online it allows users to load and unload user applications.

Computer configuration

A **computer case** is the enclosure that contains the main components of a computer. The main components are: motherboard with CPU, primary storage (RAM memory), secondary storage (hard disk), expansion cards (graphics, sound cards, modem, etc.), power supply, floppy disks, interfaces, …

A **mouse** on a computer is a small, movable device that users hold and slide around to point at, click, and sometimes drag objects on screen in a graphical user interface using a pointer on screen.

A **scanner** is a device that optically scans images, printed text, handwriting, or an object, and converts it to a digital image.

A **loudspeaker** (or "speaker") is an electro-acoustical transducer that converts an electrical signal to sound.

A **microphone** is an acoustic-to-electric transducer or sensor that converts sound into an electrical signal.
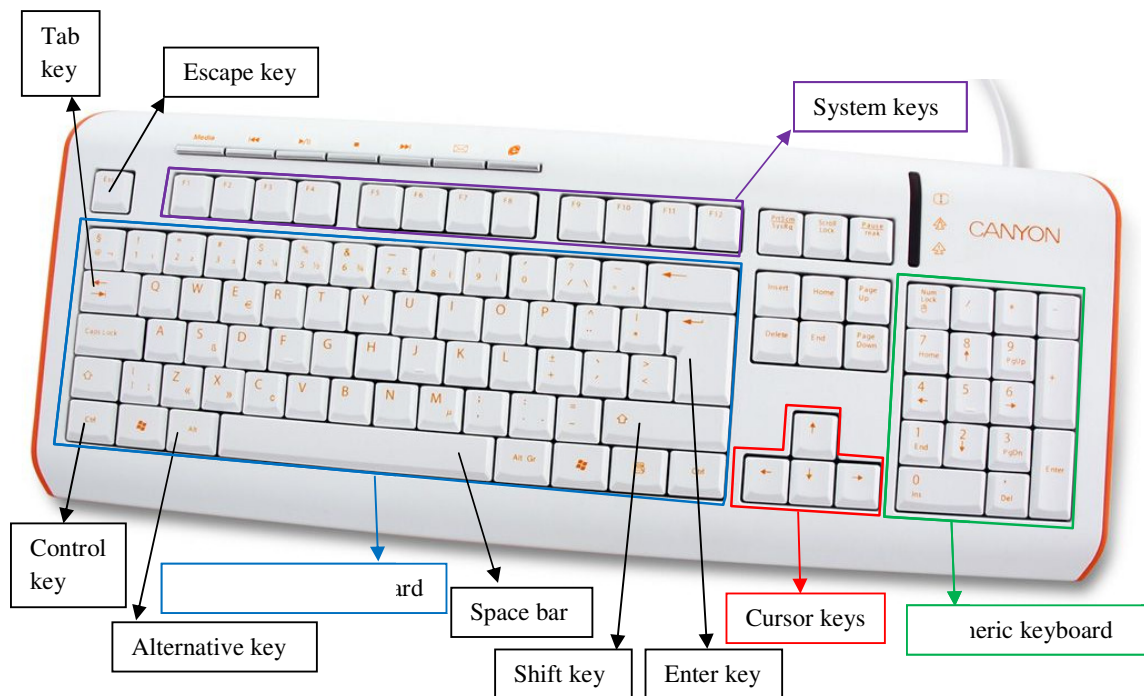
The **optical drives** retrieve and/or store data on optical disks like CDs and DVDs which hold much more information than classic portable media options like the floppy disk.

The **floppy disk** drive reads data from and writes data to a small disk. The most common type is the 3,5" drive followed by the completely obsolete 5,25" drive, among other sizes. These are not used anymore and soon they will be obsolete.

The **modem** (from modulator-demodulator) is a device that modulates an analog carrier signal to encode digital information, and also demodulates such a carrier signal to decode the transmitted information. The goal is to produce a signal that can be transmitted easily and decoded to reproduce the original digital data.

A **network interface card** (or LAN card) enables computers to join computer networks and exchange various messages and data. Technologies, such as Ethernet or Token-Ring, are employed for communication on computer networks. Today LAN cards all computers include LAN cards and because they transmit data at high-speeds, they replaced modems.

A **keyboard** is an arrangement of buttons that each correspond to a function, letter, or number. They are the primary devices of inputting text.

Tab key · Escape key · System keys · Control key · Alternative key · Space bar · Shift key · Enter key · Cursor keys · numeric keyboard

What is the software?

Computer software, or just software, is a general term used to describe the role that computer programs, procedures and documentation play in a computer system.

The term includes:

- Application software, such as word processors which perform productive tasks for users.
- Firmware, which is a software program resident to electrically programmable memory devices on motherboard or other types of integrated hardware carriers.
- Middleware, which controls and co-ordinates distributed systems.
- System software such as operating systems, which interface with hardware to provide the necessary services for application software.
- Testware, which is an umbrella term or container term for all utilities and application software that serve in combination for testing a software package but not necessarily may optionally contribute to operational purposes.

Software includes things such as **websites**, **programs** or **video games**, that are coded by programming languages like C or C++.

"**Software**" is sometimes used in a broader context to mean anything which is not hardware but which is used with hardware, such as film, tapes and records.

Folder, directory, catalog, or drawer, in computing, is a virtual container within a digital file system, in which groups of computer files and other folders can be kept and organized.
A **file** format is a particular way that information is encoded for storage in a computer file.

Each file must have a name and possibly an extension that defines its format. For example: name.txt (read as: name dot txt).

The file extension usually associates files to their types. Examples are:

Executable: *.exe; *.cmd; *.bat;
System: *.sys; *.ini;   *.dll;   *.ttf;   *.fnt;
Document: *.txt;   *.doc; *.docx; *.htm; *.rtf;   *.wpd; *.pdf;
Database: *.dbf; *.dat; *.mdb;
Picture: *.bmp; *.wmf; *.jpg; *.gif;   *.tif;   *.pcs; *.ico;
Audio: *.wav; *.snd; *.mp3; *.wma;
Video: *.avi;   *.mp4; *.mov;
Compressed: *.arj;   *.zip; *.lzh;

There are many other file extensions in use and they sometimes change with application revisions and updates. It is the responsibility of the user application or the operating system to register each extension to appropriate application.

Joke:

You know you are addicted to the Internet when:

➢ You kiss your boyfriend's/girlfriend's home page.
➢ You eyeglasses have a web site burned in on them.
➢ Your dog has its own web page.
➢ You dream in HTML.

VOCABULARY

vacuum tube – elektrónka   extension - prípona
enclosure – kryt, puzdro