

1 Basic Architecture of a Computer

Topic

The basic elements of a computer system

Learning objectives

Students will be able:

- to describe the main items of hardware
- to classify computer devices
- to explain how a computer system works by describing its functions
- to understand the structure and functions of the CPU
- to use basic IT vocabulary

Key words

hardware, software, input devices, output device, CPU=Central Processing Unit, main memory, peripherals, storage device, disk drive, monitor, printer, mouse, keyboard, modem, router, DVD, USB = A Universal Serial Bus, USB port, bus, control unit, ALU = Arithmetic Logic Unit, register, motherboard, integrated circuit

Computer Hardware

A computer is an electronic machine which can **accept data** in a certain form, **process** the data according to a set of instructions known as a **program** and give the **results** of the processing in a specified format

A computer system consists of two parts:

- **hardware** = any electronic or mechanical part, you can see or touch
- **software** = a set of instructions, called a program, which tells the computer what to do.

First let's concentrate on the **hardware**.

There are three basic hardware sections:

- **central processing unit (CPU)**

- **main memory**
- **peripherals**

The main circuit board inside the system is called the **motherboard** and contains the processor, the memory chips, expansion slots and controllers for the peripherals, connected by **buses** – electrical channels which allow devices inside the computer to communicate with each other.



Central Processing Unit

A CPU (Central Processing Unit) is the core of every PC.

The CPU acts as the brain of the computer. Its function is to **execute** program **instructions** and coordinate the activities of all the other units. It is **built into** a single chip, a small piece of silicon with a complex electrical circuit called an integrated circuit.



The CPU consists of three main parts:

- the **control unit** examines the instructions in the user's program, interprets each instruction and causes the rest of the components to execute the functions specified.
- the **arithmetic logic unit (ALU)** consists of a series of special registers and circuits which are able to perform the operations of addition, subtraction, multiplication, division, comparison, data shifting, etc. The ALU can distinguish positive, negative, and zero values, **perform** calculations, make logical decisions, and **transfer** the results to other units of the computer.
- the **registers** are high speed units of memory used to store and **control** data.

Main Memory

The main memory (a collection of RAM chips) holds the instruction and data which are being processed by the CPU. **RAM (random access memory)** is volatile – its information is lost when the computer is turned off. The other type of memory is **ROM (read only memory)** which is non-volatile and contains instructions and routines for the basic operations of the CPU.

Peripherals

Peripherals are physical units attached to the computer. They include:

- **storage devices** – hard drives, DVD drives or flash drives, provide a permanent storage of both data and programs
- **input devices** – the mouse, keyboard, etc. enable data to go into the computer's memory
- **output devices** - a monitor, a printer, etc. enable us to extract the finished product from the system.

Vocabulary

	Definition	Translation
ALU = Arithmetic Logic Unit	a part of the CPU which performs the actual arithmetic and logical operations asked for by a program	aritmetická jednotka
bus	an electrical channel which carries signals between units inside the computer	sběrnice
control unit	a part of the CPU which coordinates all the other parts of the computer system.	řadič, řídicí jednotka
CPU=Central Processing Unit	the hardware unit that performs the basic operations of a computer, the 'brain' of the computer	procesor
disk drive	a device that reads and writes data on disks	disková mechanika/jednotka
DVD	a Digital Versatile Disc that uses optical technology to store large amounts of audio-visual material.	
expansion slot	a connector that allows the user to install expansion cards to improve the performance of the computer (add features like sound, memory, network capabilities)	rozšiřující slot, rozhraní
hardware	the physical units which make up a computer system	technické vybavení počítače
input devices	hardware units which allow user to enter information to the computer	vstupní zařízení
keyboard	an input device, a set of keys including the standard typewriter keys (for letters and numbers), function keys and several special keys	klávesnice
main memory	the hardware section that holds the instructions and data currently being processed	hlavní/operační paměť
modem	a device that converts digital signals used by computers into the analogue signals used by the telephone lines and allowing the access to the Internet	modem
monitor	an output device with a screen on which words and pictures can be shown, also called a display screen	obrazovka, monitor
mouse	an input device used to specify the position of the cursor or to make choices from menus.	myš

output devices	the units of hardware that display the results produced by the computer	výstupní zařízení
peripherals	the units attached to the computer, I/O devices, storage devices	periferní zařízení
printer	an output device that converts data into printed form.	tiskárna
router	a device used to transmit data between two computers or networks.	směrovač, router
software	the set of program instructions that tell a computer what to do	programové vybavení
storage device	a hardware device used to record and store data	paměťové zařízení
USB = A Universal Serial Bus	a hardware interface that allows peripheral devices to be easily connected to a computer	univerzální externí sběrnice
USB port	a USB socket on a computer device into which you can plug a USB cable	konektor USB

Summary

A computer is an electronic machine which can accept data in a certain form, process the data according to a set of instructions known as a program and give the results of the processing in a specified format

A computer system consists of two parts hardware and software.

There are three basic hardware sections - central processing unit (CPU), consisting of a control unit and the arithmetic logic unit (ALU), main memory and peripherals (input devices, output devices and storage devices).

Tasks

1) Match the words with the definitions

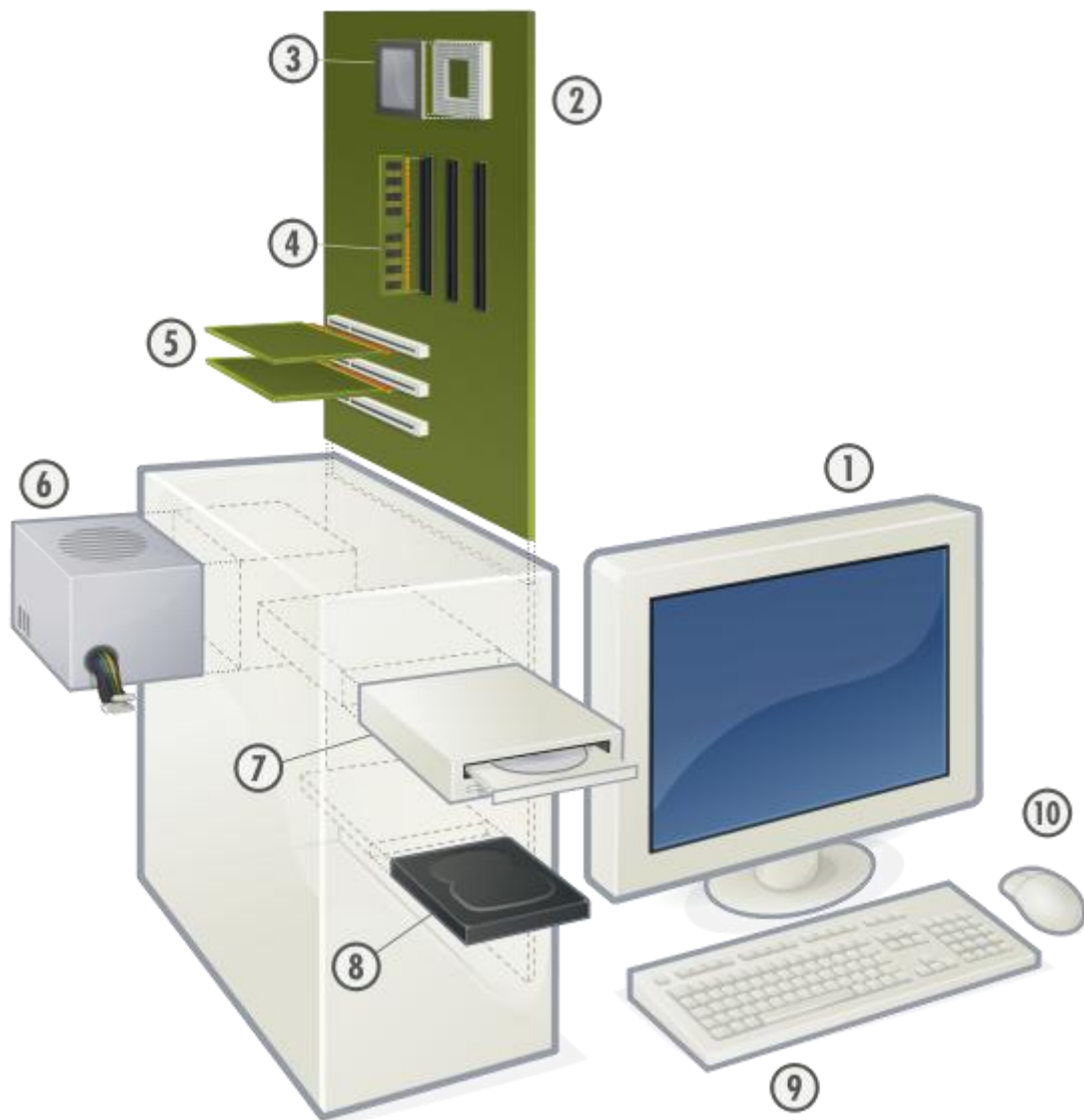
- | | |
|-----------------|---|
| 1) hardware | a) sockets into which an external device may be connected |
| 2) main memory | b) the set of program instructions that tell a computer what to do |
| 3) ports | c) magnetic device used to store information |
| 4) CPU | d) the hardware section that holds the instructions and data while they are processed |
| 5) output | e) a device that converts digital signals into the analogue signals |
| 6) software | f) physical parts that make up the computer system |
| 7) hard disk | g) a part of the CPU which performs arithmetic and logical operations |
| 8) modem | h) results produced by the computer |
| 9) ALU | i) the units attached to the computer, I/O devices, storage devices |
| 10) peripherals | j) the "brain" of the computer |

2) Complete the text using the words from the vocabulary section:

The computer system consists of two main parts, the physical units make up the 1)....., the set of programs is called the 2).....
The 3)..... is the "brain" of a computer and consists of three main parts – the 4)..... which coordinates the operation of all the other components of

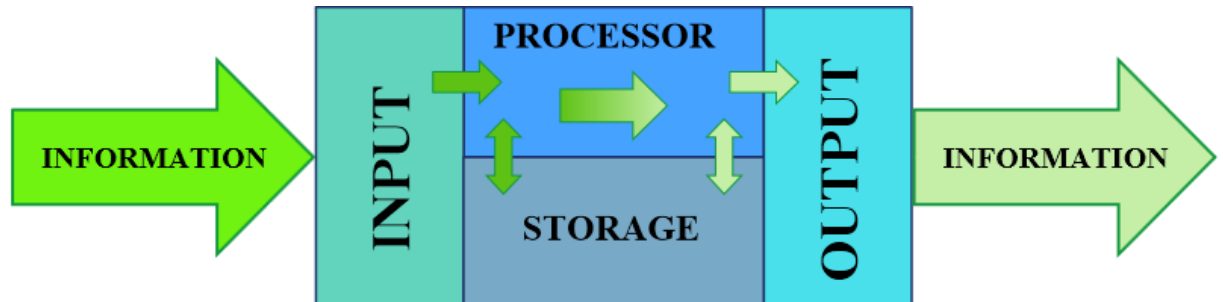
a computer, the 4)..... which performs arithmetic and logical operations and high speed units of memory called the 5)..... 6)..... are the physical units attached to a computer, the 7)..... enable a user to enter information, the 8)..... serve for extracting results from the computer, the 9)..... record and store data. The 10)..... holds the instruction and data which are being processed by the CPU.

- 3) Look at the picture and name the parts of the personal computer, say a few words about each part.



http://en.wikipedia.org/wiki/File:Personal_computer_exploded_5.svg

- 4) According to the following scheme describe the function of a PC, use the phrases from the box



http://en.wikipedia.org/wiki/History_of_computing_hardware

Describing diagrams

.....includes.....

.... consists of and ...

...is composed of... ,and ...

... serves for...

.....is made up of.....

Questions

1. Name the main components of a computer system.
2. What is a CPU?
3. What are the main parts of a CPU? Describe them briefly.
4. Describe the operation of a mouse.
5. What input devices do you know?
6. What type of memory is volatile?
7. What is hardware?
8. What is software?
9. What are peripherals?
10. What input devices do you know?
11. What output devices do you know?
12. What storage devices do you know?

Literatura

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