## **Functioning Principles**

A computer is based on the simple idea of models or imitations; it imitates or creates an electronic work model made of numbers and arithmetic.



The west culture uses a decimal number system based on 10 digits, from 0 to 9. On the contrary computers work with a binary number system based on 2 digits: 0 and 1. This happens for two reasons. Firstly, because computers are mainly a combination of electric circuits where just two values are possible: with or without current. Secondly, because the binary number system can represent any number of any number system, the decimal one included. The most striking difference is that the binary system requires more digits than the decimal system to represent the same number.

As an example, see the following table where the first 11 numbers are represented with both the decimal system and the binary system.

DECIMAL	BINARY
0	0
1	1
2	10
3	11
4	100
5	101
6	110
7	111

8	1000
9	1001
10	1010

Any binary digit is called bit, an abbreviation of binary digit. A bit can have two values: 0 and 1.

The measure unit used by computers is a byte. A byte represents a group of 8 bits, which is a sequence of eight 0 or 1: e.g. 10110010. With a byte we can represent any character of the ASCII code. Each byte corresponds to a character, i.e. a letter, a number or a special character. E.g. the following word is formed by 18 characters; blanks included, and therefore require 18 bytes:

## He is 31 years old

Bytes are used to measure spaces both of RAM memory and disks. In this case we have to speak about thousands or millions of bytes and we have to use larger measure unites. Therefore we use a kilobyte, corresponding to 1024 byte, or a megabyte, corresponding to 1024 kilobyte that is 1048576 byte. A kilobyte is represented with KB and a megabyte with MB. E.g., a quantity of 512 kilobyte is written as 512 KB; a quantity of 512 megabyte is written as 512 MB.

Currently also a gigabyte is used, corresponding to 1024 MB and represented as GB. Although not used frequently, there is a larger measure corresponding to 1024 GB: it is a terabyte, represented as TB. Measure units of the binary system are reported in the following table, together with their symbols and their equivalence with the immediate lower unit.

SUMMARY TABLE		
Measure unit	Symbol	Corresponding to:
Bit	-	Just 0 or 1 values
Byte	-	8 bit
Kilobyte	К, КВ	1024 byte
Megabyte	M, MB	1024 КВ
Gigabyte	GB	1024 MB
Terabyte	ТВ	1024 GB

## General functioning of a computer

The general scheme of a computer is very simple. Keyboard and mouse are entry devices used for inputting data in a computer. Monitor and printer are output devices used to present a user the results processed by the computer. Every external device connected to a computer is called generically peripheral. Inside the computer, microprocessor is the brain controlling and managing every operation; RAM memory and disks are storage devices used to record data, both temporarily (RAM memory) or permanently (hard and floppy disks).

RAM memory is a compulsory stage for transmitting every element of a computer. Any datum passing from a place to another must pass through RAM memory. All data must necessarily pass through a RAM memory. Any different route for data transmission is impossible. Data flow between keyboard and RAM memory and between monitor and RAM memory can happen just in a direction: from keyboard to RAM memory and from RAM memory to monitor, never in the opposite direction. On the contrary, communication between RAM memory and disks and between Ram memory and microprocessor is bidirectional, i.e. it happens in both directions.