Тема 1. Computer Science. Principles of computers. Computing systems. Hardware (hard ware)

Information

"Information" from the Latin "information" (explanation, presentation, interpretation) - information about something as specific data.

Claude Shannon, the founder of information theory - the science of the processes of transmission, reception, conversion and storage of information, considering the information how to remove the uncertainty of our knowledge about something.

Information - display real (physical) world, expressed in the form of signals, signs etc.

Features information

• objectivity; • certainty;	• completeness; • topicality;	• utility; • intelligibility.

By way of perception distinguish the types of information

• visual; sound;	• olfactory; flavor.	• tactile;

By appointment information is divided into:

• mass;	• special;	• personal.

Noise - part of the message does not carry useful information.

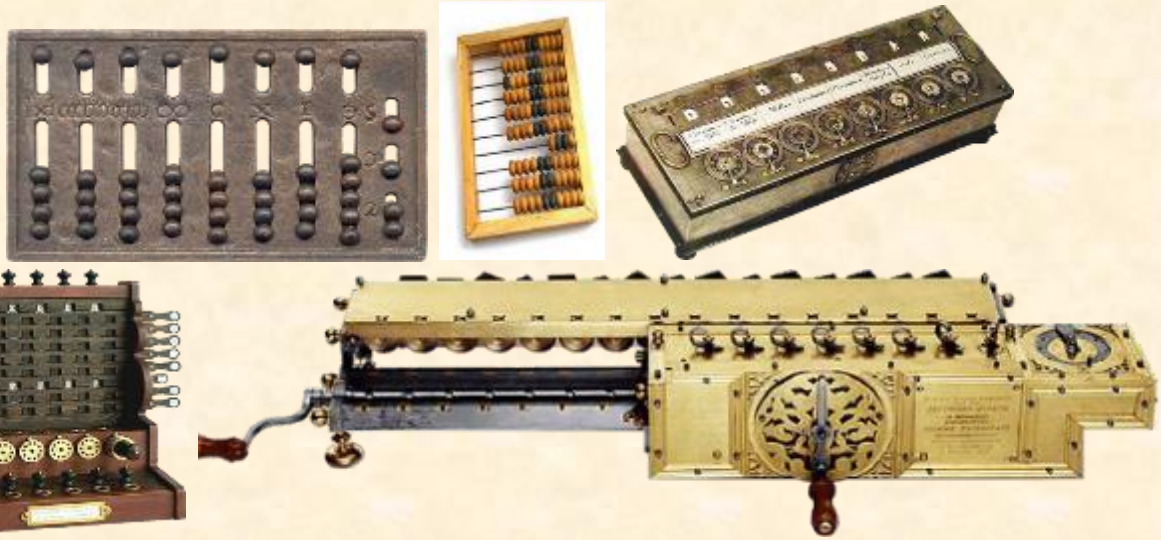
Computer Science - the science that studies the structure and properties of the information, patterns and methods of presentation, searching, storing, processing and transmitting information through a computer system.

Information activities - a process that is associated with the receipt, conversion, accumulation, storage, transmission, submission information.

Specialist every day should read Article 100 pages' technical content.

The history of computers

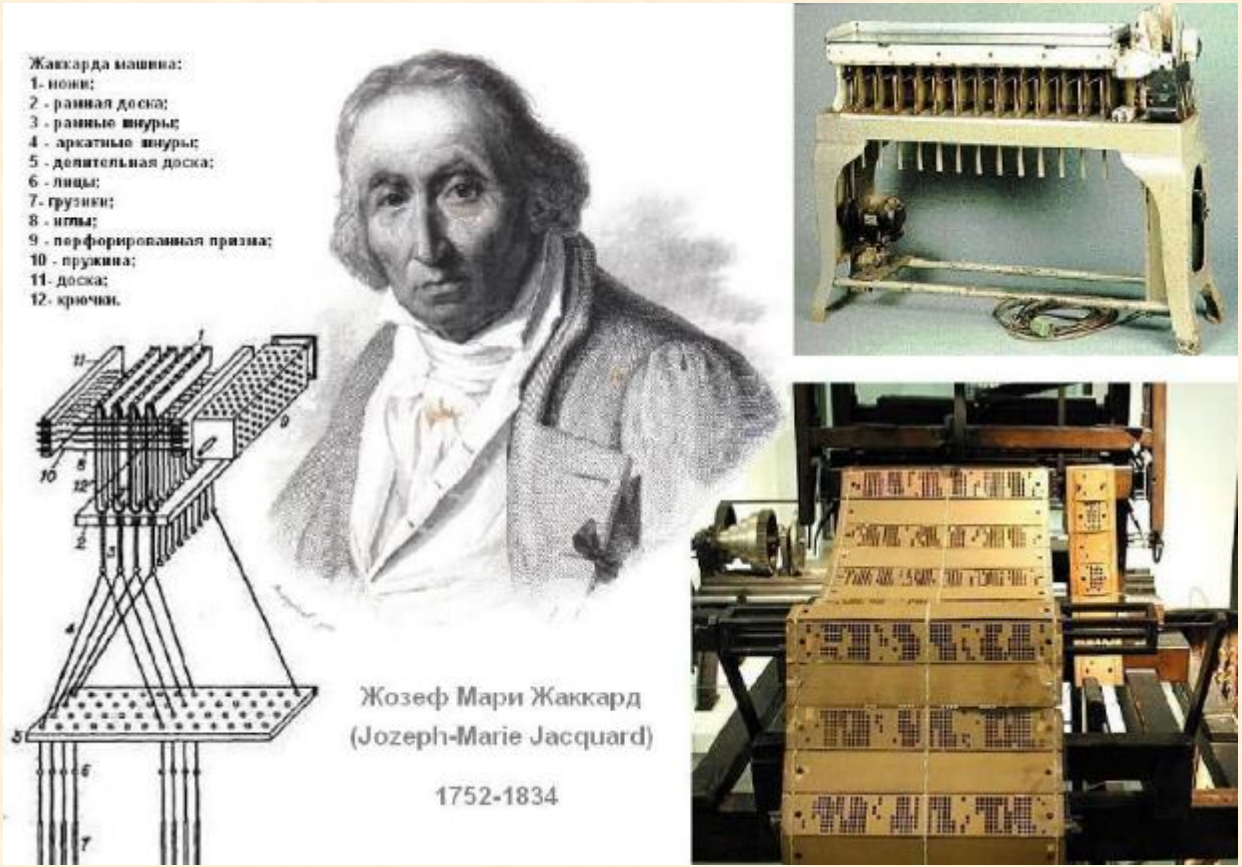
Abacus (3 century BC) - the prototype abacus



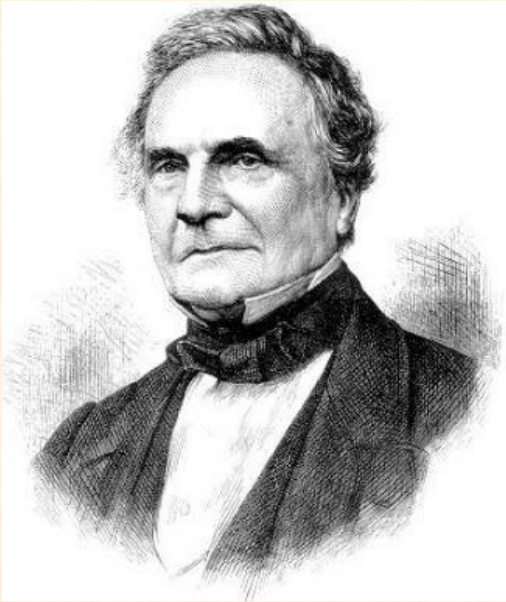
1623 - "counting the hours" William Shykarda: add and subtract six-digit numbers

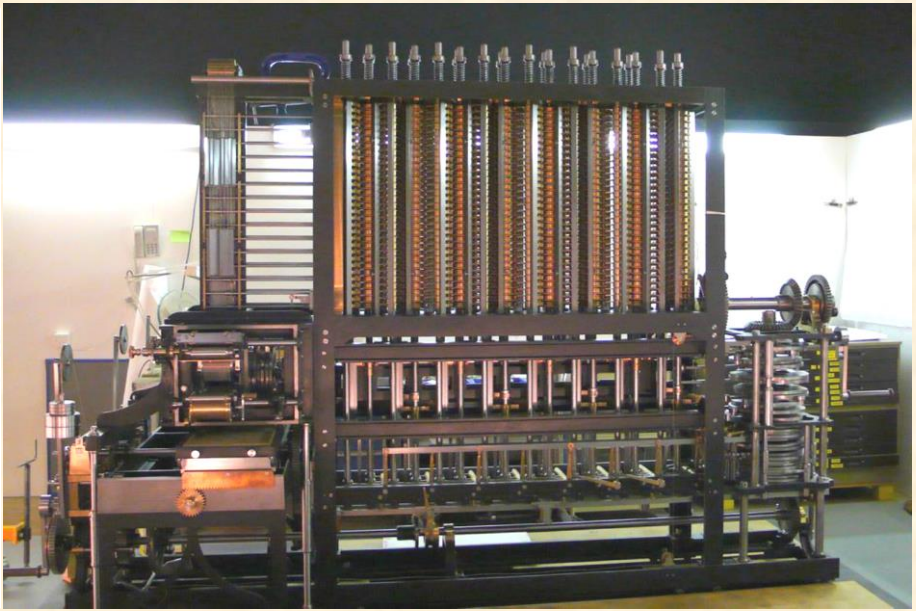
1673 - "Mechanical Calculator" Ґotfrida Leibniz: addition, subtraction, multiplication and division in the binary system

Programmable Jacquard weaving machine (1804)



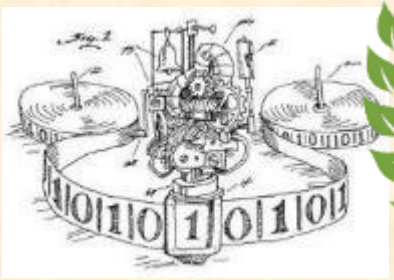
Bebidzha Machine (1830)



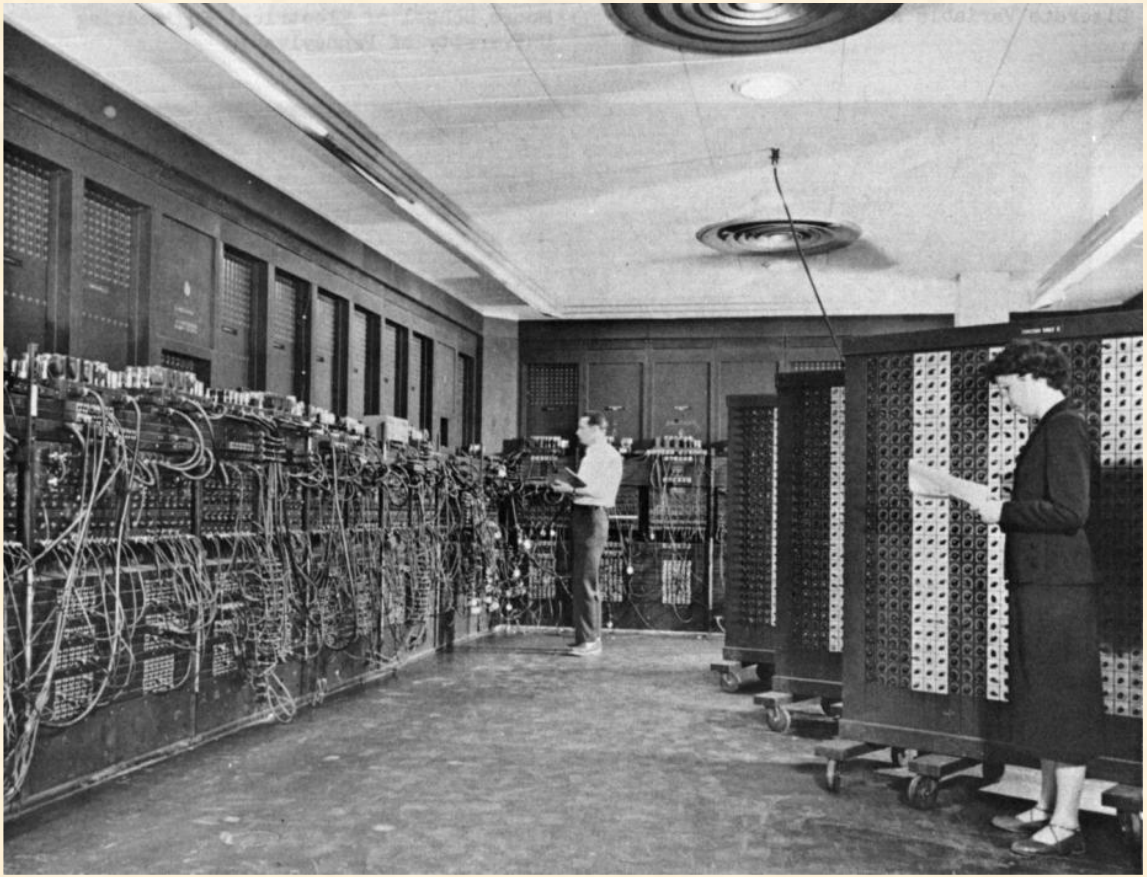


Alan Turing (1912-1954)

1. By the first mathematical model of a general purpose computer.
2. Cryptographer, designer Enigma machine to crack German military codes.
3. Developer the first computer program stored in memory.
4. By testing for testing artificial intelligence.

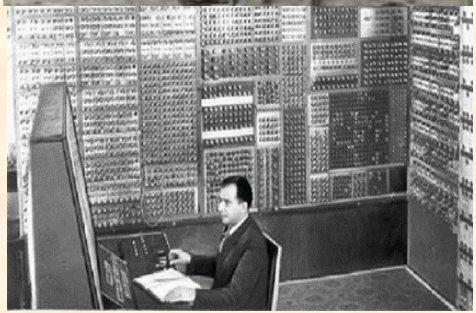


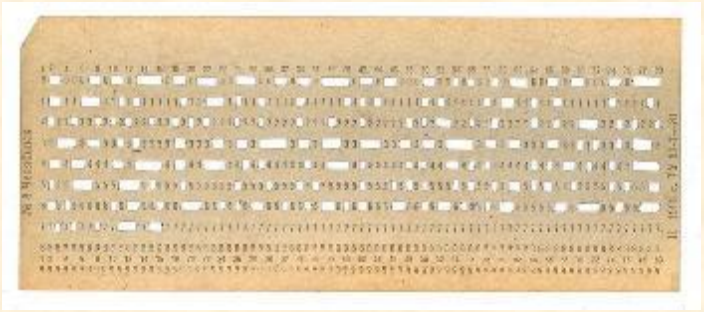
ENIAC (1946) - 1 generation



MECM Lebedev (1950)

1. The first fully electronic computer in Europe
2. 50 operations per second, 6,000 vacuum lamps. room 60 sq.m.



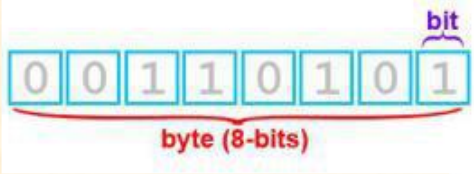


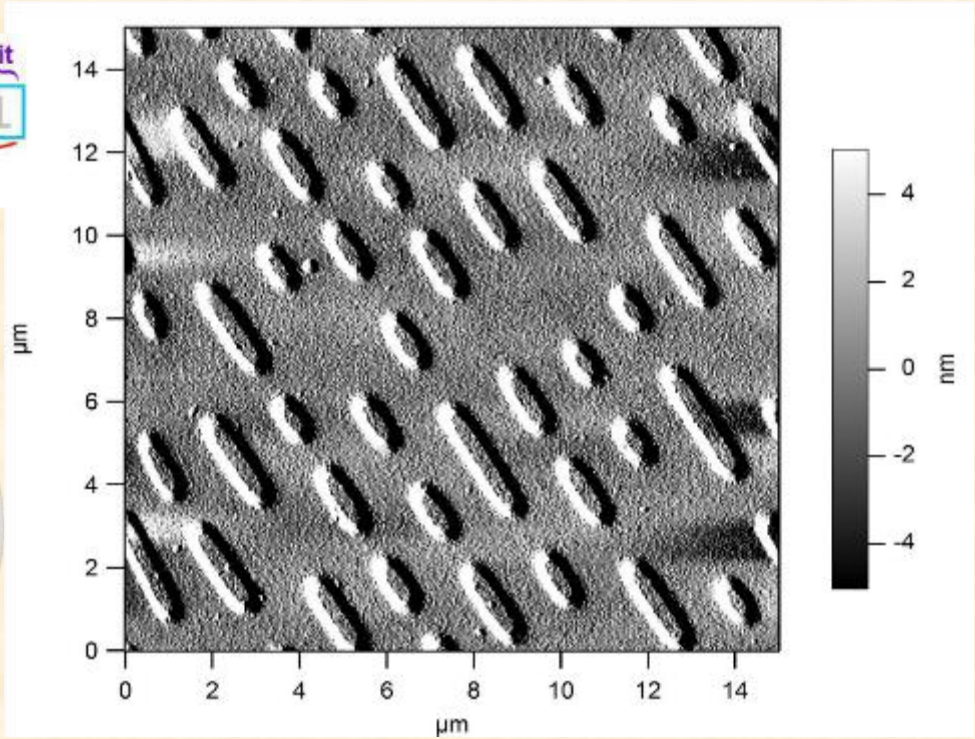
Apple (1976) - 3 generation

Electronics SC-8010 (1981)

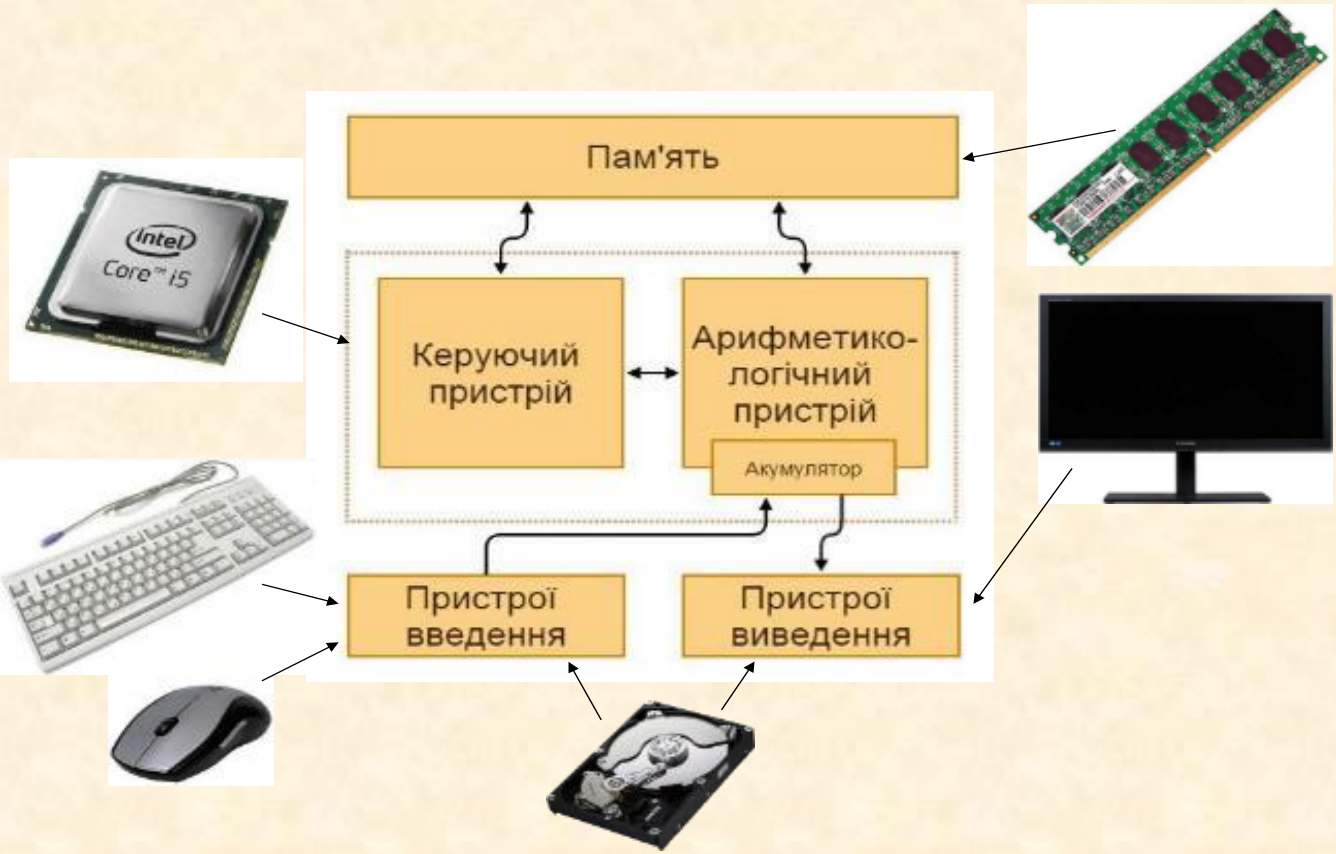
IBM PC 5150 (1981)

The surface of the CD-ROM





Von Neumann architecture computer



Number systems

In computer using three basic number systems:

- binary
- octal
- hex

Units of information

Bit (Binary digit) - binary digit, which takes a value of 0 or 1, is the smallest unit of information. Bit can be represented as a cell memory.

Byte - eight consecutive bits, is the basic unit of computer information.

Eight bits fit 28 = 256 integers (0 to 255).

To measure the amount of information using the following units:

1 Kilobyte (K) = 1024 = 2^{10} B = 10^3 B

1 Megabyte (M) = 1048576 = 2^{20} B = 2^{10} B = 10^6 K

1 Gigabyte (G) = 1,073,741,824 = 2^{30} B = 2^{20} K = 2^{10} M = 10^9 B

1 Terabyte (T) = 2^{40} B = 2^{30} K = 2^{20} M = 2^{10} G

Character encoding

Coding - the process of replacing one set of signs other signs.

- *ASCII* (American Standard Code for Information Interchange - standard code for information exchange).

The system fixed ASCII encoding table 2:

- base table establishes the importance of codes from 0 to 127
- expanded from 128 to 255.

Part of the code page 866 for MS DOS

..	*48 - 0*	*65 - A*	*97 - a*	*128 - A*	*160th*	*251 - √*
24 - ↑	*49 - 1*	*66 - B*	*98 - b*	*129 - B*	*161 - b*	*252 - №*
25 - ↓	*50 - 2*	*67 - C*	*99 - c*	*130 - B*	*162 - a*	*255 - _*

Hardware (hardware)

Computer system - a set of hardware and software that provide automated collection, accumulation, processing, systematization, preservation, presentation, transmission of information.

Architecture PC - Block diagram of the internal organization and communication of major functional modules PC.

The principle of **openness of architecture** - the possibility of assembling a computer with devices made by different manufacturers.

Production of components for the PC involved: Intel, AMD, Cyrix, IBM, Toshiba, Fujitsu, Hewlett-Packard, Phillips, Samsung and others.

System unit

CPU, internal memory and system bus structurally located on the motherboard in a separate unit called systemic.

Motherboard - motherboard chipsets on which the processor, memory, expansion slots, etc.

Tires are divided into:

- **parallel** - consists of several lines of data (Mbit/s);
- **consistent** - consisting of one-line data are transferred bit by bit (Kbit/s).

The CPU (Central Processing Unit) - PC main unit, which performs arithmetic and logical operations on data (executes the program), managed by a joint operation of all devices.

The most important features of the processor are:

- **performance** (speed) depends on the clock frequency (MHz);
- **bit capacity** – the number of bits that are processed per clock cycle.

Memory

Inside memory your PC has access memory (RAM) - Random Access Memory and permanent memory (ROM) - (Read-Only Memory - ROM).

Key Features Memory: **type** - defines the static or dynamic memory; **structure** - the number of cells and their bit; **volume** - shows its capacity; sampling time (nano seconds, ns).

Structurally internal memory takes the form of memory cells, each of which is given a number (address). The length of each cell memory, which is called the bit can be 1, 2, 4 and 8 bytes (respectively 8, 16, 32 and 64 bit).

Present characterized by widespread use of flash memory (flash drives) capacity of 2-64 GB.

Hard drive (Hard disk) is used for long-term storage.

The main characteristics of the hard drive: firm-**manufacturer** - Fujisu, Western; capacity ranges from 20 GB to 4 TB or more; **access time** - mini 7-20 seconds; read and write speed of 5 MB / s; **speed**, number of disks and their volume, structure dividing into tracks, sectors, cluster, cylinders.

The speed of rotation of about 4,500 ... 12,000 rev/min.

Information is recorded on concentric circles (tracks), which are cylinders.


Peripherals

All external devices are connected to the PC through special ports - connectors are designed to connect electrical peripheral device to the PC.

Share ports to:

- serial (COM) - for connecting a printer, modem, joystick and mouse.
- parallel (LPT) - for connecting a printer, scanner, CDs.

For peripheral device must have a driver - a program that controls the operation of the device.

Video system (Video, monitor, monitor, display, display) is designed to display text and graphic information.

Video system consists of display and video card.

Video adapter is connected to the system bus through a high-speed local bus PCI (32 bit, 33 MHz frequency, 132 MB/s of exchange), AGP (Accelerated Graphics Port) - (64 bit, 66 MHz, 528 MB/s).

The main characteristics of the **display**:

- **resolution** - the number of pixels horizontally and vertically
- **palette** - the amount of color video system.
- **size** of the visible screen measured diagonally in inches (25.4 mm) and they are 14 ', 15', 17 ', 19', 21 " or more;
- frame rate video mode 75 Hz (preferably 100 Hz) provides less flickering, which is important for eye person.

Keyboard is the principal means of introduction character information (letters, numbers, punctuation marks) and commands for control of the PC. The most widely used version of the 101-key keyboard.

Printer is designed to output on paper symbolic or graphic information. Printers are divided into the matrix, inkjet and laser. Connects to the serial LPT-port.

Key Features - printer type, speed, size format and print quality.

The quality of the printing is determined by the printer resolution, expressed as the number of printed dots per inch (dpi - dots per inch).

Laser printers provide the highest speed and best quality printing. Resolution laser printer 300, 600, 1200, 2400 dpi, print speeds - up to 20 pages in 1 minute.

Mouse - input device and control.


Scanner - input device for a PC of any information (text, pictures, etc.) on paper. The principle of operation is based on the conversion of scanner images into electrical signals.

Using three types of scanners: Hand (handheld), roller and tablet (board).

Key Features scanners - resolution (2400 dpi), scanning speed and format.

Modems - a device for converting digital information to analog and vice versa.

Modems are divided into: external and internal; to the maximum data transfer rate - 38, 56, ... 10,000 kbit/s.