**Functional units of digital computers:**

As we know, all computer operations can be grouped into five functional categories. The five major functional units of a digital computer are:

1. Input— to insert outside information into the machine;
2. Storage or memory — to store information and make it available at the appropriate time;
3. Arithmetic-logical unit(ALU) — to perform the calculations;
4. Output — to remove data from the machine to the outside world
5. Control unit — to cause all parts of a computer to act as a team.

A complete set of instructions and data are usually fed through the input devices to the memory where they are stored. Each instruction is then fed to the control unit. The control unit interprets the instructions and issues commands to the other functional units to cause operations to be performed on the data.

Arithmetic operations are performed in the ALU and the results are then fed back to the memоry. The five units of the computer must communicate with each other. They can do this by means of a machine language which uses a code composed of combinations of electric pulses represented which by 1 and 0. The input translates from our language into the 1 — 0 combinations understandable to the computer.

**Storage unit:**

As you know, there are primary and secondary storage units. Both contain data and the instructions for processing the data. Data as well as instructions must flow into and out of primary storage.

Primary storage is also called main storage or internal storage. The specific functions of internal storage are to hold (store):

1. all data to be processed;
2. intermediate results of processing;
3. final results of processing;
4. all the instructions required for ongoing process.

Computer memory must be able to retain very large numbers of symbol combinations, without forgetting or changing any details. It must be able to locate all its contents quickly upon demand. The combinations of characters, that is, the letters, numbers, and special symbols by which we usually communicate, are coded. The codes used by computer based upon a binary number system that has only two possible values, 0 and 1.

Secondary storage. Primary storage is expensive because each bit is represented by a high-speed device, such as a semiconductor. A million bytes is a large amount of primary storage. Often it is necessary to store many millions, sometimes billions, of bytes of data. Therefore slower, less expensive storage units are available for computer systems. These units are called secondary storage. Data are stored in them in the same binary codes as in main storage and are made available to main storage as needed.

**Central processing unit (CPU):**

The internal memory, control and processing components make up the heart of the computer system. Manufactures design the CPU to control and carry out basic instructions for their particular computer.

The CPU coordinates all actions of various components of the computer. It determines which operations should be performed and in what order. The CPU monitors the operation of the entire system, issuing commands to other parts of the system and acting on the responses.

In digital computers the CPU can be divided into two functional units called the control unit (CU) and the arithmetic-logical unit (ALU). These two units are made up of electronic circuits with millions of switches that can be in one of two states, either on or off.

The function of the CU within the central processor is to transmit coordinating control signals and commands. The CU is a part of the computer that directs the sequence of step-by-step operations of the system, selects instructions and data from memory, interprets programs and controls the flow between the main storage and the arithmetic logic unit.

The ALU, is that part of the computer in which the actual arithmetic operations, namely, addition, subtraction, multiplication, division and exponentiation, called for in the instructions are performed.

Programs and the data on which the CU and the ALU operate, must be in internal memory in order to be processed. Thus, if located in secondary memory devices, such as disks or tapes, programs and data are first loaded into internal memory.

**Input-output environment:**

Data and instructions must enter the data processing system, and information must leave it. These operations are performed by input and output (I/O) units that link the computer to its external environment.

The I/O environment may be human-related or human-independent. A remote banking terminal is an example of a human-related input environment, and a printer is an example of a device that produces output in a human-readable format. An example of a human-independent input environment is a device that measures traffic flow. A reel of magnetic tape upon which the collected data are stored in binary' format is an example of a human-independent output.

Input-Output Interfaces. Data enter input units in forms that depend upon the particular device used. For example, data are entered from a keyboard in a manner similar to typing, and this differs from the way that data are entered by a bar-code scanner. However, regardless of the forms in which they receive their inputs, all input devices must provide a computer with data that are transformed into the binary' codes that the primary memory of the computer is designed to accept. This transformation is accomplished by units called I/O interfaces or input-output processors (IOP).

The major differences between devices are the media that they use and the speed with which they are able to transfer data to or from primary storage.

Input-Output Device Speed. Input-output devices can be classified as high-speed, medium-speed, and low-speed. It should be noted that the high-speed devices are entirely electronic in their operation or magnetic media that can be moved at high speed. The low-speed devices are those with complex mechanical motion or operate at the speed of a human operator. The medium-speed devices are those that fall between — they tend to have mechanical moving parts.

High-speed devices: magnetic disk; magnetic tape.

Medium-speed devices: card readers; line printers; page printers; magnetic diskette; visual displays.

Low-speed devices: bar-code readers; keyboard input devices; plotters; voice recognition and response units.

**Computer programming:**

Programming is the process of preparing a set of coded instructions which enables the computer to solve specific problems or to perform specific functions. The essence of computer programming is the encoding of the program for the computer by means of algorithms. The thing is that any problem is expressed in mathematical terms, it contains formulae, equations and calculations. But the computer cannot manipulate formulae, equations and calculations. Any problem must be specially processed for the computer, that is — coded or programmed.

The phase in which the system's computer programs are written is called the development phase. The programs are lists of instructions that will be followed by the control unit of the central processing unit (CPU). The instructions of the program must be complete and in the appropriate sequence, or else the wrong answers will result.

There are two common techniques for planning the logic of a program:

1. The first technique is flowcharting. A flowchart is a plan in the form of a graphic representation that uses predefined symbols to illustrate the program logic. Each of the predefined symbol shapes stands for a general operation. The symbol shape communicates the nature of the general operation, and the specifics are written within the symbol.
2. The second technique is pseudocode. Pseudocode is an imitation of actual program instructions. It allows a program-like structure without the burden of programming rules to follow. Pseudocode is less time-consuming for the professional programmer than is flowcharting. Pseudocode has three basic structures: sequence, decision, and looping logic. With these three structures, any required logic can be expressed.

**The World Wide Web:**

People have dreamt of a universal information database since late nineteen forties. In this database, not only would the data be accessible to people around the world, but it would also easily link to other pieces of information, so that only the most important data would be quickly found by a user. Only recently the new technologies have made such systems possible. The most popular system currently in use is the World-Wide Web (WWW) which began in March 1989. The Web is an Internet-based computer network that allows users on one computer to access information stored on another through the world-wide network.

As the popularity of the Internet increases, people become more aware of its colossal potential. The World-Wide Web is a product of the continuous search for innovative ways of sharing information resources. The WWW project is based on the principle of universal readership; "if information is available, then any person should be able to access it from anywhere in the world." The Web's implementation follows a standard client-server model. In this model, a user relies on a program (the client) to connect to a remote machine (the server), where the data is stored.

One of the main features of the WWW documents is their hypertext structure. On a graphic terminal, for instance, a particular reference can be represented by underlined text, or an icon. This method makes copying of information unnecessary: data needs only to be stored once, and all referenced to it can be linked to the original document.