The processor is defined as a logic circuit or simple chip which reacts to fundamental instructions and input processes to operate the computer. The important purposes of a processor are getting, decoding, processing, executing and writing back as feedback to the instructions of the chip. The processor is termed as the brain of any electronic systems that incorporate into a laptop, computers, smartphones, and embedded systems. The control unit and arithmetic logic unit are the two significant components of the processors.

The logic functions can be addition, multiplication, subtraction and division whereas the control unit manages the traffic flow which follows the operation or command according to the input instruction. This processor interacts with the neighbouring component which can be their output, input, storage and memory components.

**Different Types of Processors**

The different types of processors are microprocessor, microcontroller, embedded processor, digital signal processor and the processors can be varied according to the devices. The important elements of the CPU are labelled as heart elements of the processor and system. The control unit activates, fetches, and execute the input instructions. The processor can be embedded in a microprocessor and comprise of unit IC chip. But some devices are based on multi-core processors. It comprises one or more CPU. It is a typical tiny component with pins embedded on the motherboard. It can also be linked to motherboard with fan and heat sink to disperse the produced heat.

**1. Microprocessor**

The fundamental process of the system is denoted by a microprocessor incorporated in the embedded systems. There are various types of microprocessors in the market implemented by different enterprises. The microprocessor is a standard processor which comprises of ALU, control unit and club of registers known as control registers, status registers, and scratchpad registers.

It can be on-chip memory and few interfaces can be interacting to the outer world via interrupting lines, and the other can be ports and memory registers to interact with the external world. These ports are often termed as programmable and make them act as output or input. These programs can be fed and modified according to the behaviour of the devices.

A one or two microprocessor can be merged together to form a multiprocessor. The input and output operations and memory are shared by the processors. The access time in the memory register is similar for every processor and every processor are associated by bus. The working and access and their input and output functions are mutually shared by the processor to perform the same function.

**2. Microcontroller**

The microcontroller is standard which is available in different size and packages. The input reading and reacting to its corresponding output is the fundamental function of the basic microcontroller and so it is called as general-purpose input and output processors (GPIO). Few of the microcontrollers are Microchip P1C16F877A, Microchip Atmega328, Microchip P1C18F45K22, Microchip P1C16F671, and Microchip P1C16F1503.

### 3. Embedded Processor

The embedded processor is structured to control the electrical and mechanical functions. It comprises of numerous blocks like timer, program memory, data memory, reset, power supply, data memory, interrupt controller, clock oscillator systems, interfacing circuits, specific circuits and system application ports and circuits.

### 4. Digital Signal Processor

The digital signal processor is used for filtering, measuring, compressing analogue and digital signals. The processing of signal means that manipulation and analysis of digital signals. This process can be made using application specified integration circuits, digital signal processor, field-programmable gate array or it can be a computer to achieve a distinct signal. The processors in DSP are used for barcode scanners, oscilloscope, printers, mobile phones. These processors are used for rapid and implied for real-time applications.

**Components of Processor**

The fundamental parts of the processor are control units, arithmetic logic unit, registers, floating points, L1 and L2 cache memory.

The arithmetic logic unit is comprised of logical and arithmetic functions on the operands in instructions.

The unit of floating-point is called as numeric coprocessor or math coprocessor. It is a specialized operator which manipulates the numbers in rapid when compared to the operation of basic microprocessor circuits.

The registers are used to save the instructions and other data to feed the operands to ALU and store the operation result. The L2 and L1 cache memory saves the time of CPU to fetch the data from RAM.

The primary functions are fetching, decode, write back and execute. The fetch is the function which gets the instruction from memory and feeds to RAM.

The decode is a process where the instructions can be edited to understand from the other elements of CPU is required to persist in the operation which is done by the instruction decoder. In the execute process, the CPU is required to trigger and carry out the functions.

Many processors in the market are multi-cored which comprises of multiple IC to enhance the performance of the processor, power consumption is limited, and gives a simultaneous process to perform parallel processing or multiple tasks.

The installation of multiple cores has separate processors as they are plugged into the one socket and gives a common established connection to make it faster.

In some computers, it has two or more cores and can be increased to twelve cores. If the CPU can process only with a set of finite commands at one time, and it is called a single-core processor. If the CPU obeys the two instructions at a time then it is called a dual-core processor.

If it obeys four sets of commands then its called as quad-core processors. If there are more cores, the computer can obey multiple commands simultaneously.

**Types of Processors**

Few processors are multi-threading that uses the core of the virtualized processor. These processors are also called as vCPU's. It is not powerful like physical core and is implied to increase the performance in virtual machines. It can add the unnecessary vCPU to affect the consolidate ratio which can be built from four-six built-in one physical core.

**KT0502 Terminology**

**Basic Computer Terminologies**

**1. CPU**

CPU means 'Central Processing Unit'. This is the place of computer data handling. Moreover, it does all the data manipulation, calculations and formatting data for output. Hence, whenever someone buys a computer, he/she becomes more conscious about the CPU and its capabilities.

The execution of the instructions within the computer system is very fast. It measures it in cycles of time and refers it to as megahertz. That's why the 'Mhz' of a computer's processor is sometimes referred to as the clock speed. Think about CPUs (and aligned circuitry) beating like a heart, this pulsing/beating is expressed as "MHz" e.g. 2000Mhz.

**2. RAM**

Specifically, RAM stands for "Random Access Memory" or "Ready Access Memory". It is a temporary notepad where your computer sends information to disk, or to the storage place of instructions from other input devices. The term "random access" indicates that memory locations in RAM are accessible in any order unlike sequential access of a data cassette tape.

**3. Hard-disk Drive**

Your computers hard disk drive is like an audio CD that you possess at home – except your computer can read and write to it. In other words, your computer can take data from your hard drive (to process it in the CPU or place it in RAM to work with).

Also, it can record the results of the work it does back to the disk, which is "writing to disk". The abbreviation HDD stands for "hard disk drive".

If you open your HDD, you would find a pancake stack on double-sided disks.

**4. Floppy Disk**

You can also read and write data in a floppy disk. Simply, it is smaller than HDD and portable – you can take it to another computer and read from it there also. Floppy disks are sometimes called "secondary storage devices". They were known as 'floppy' originally because they were 5¼ inches in width and floppy. They could carry almost 720kb of data. Today, however floppy disks are smaller, rigid, and can carry more data like 1.44Mb.

**5. Hardware**

Hardware is the term referring to all the physical parts in a computer system. It includes the monitor, the keyboard, the mouse, the main case which stores the RAM, CPU and the motherboard.

**6. Software**

'Software' is the term which refers to the instructions needed to make a computer work. It is intangible in nature. The software is also known as a "program". Also, it is a set of computer files which are used to perform various actions on the computer. You can have a program for 'word processing'. The software can be transferred to a compact disk and floppy disks, but usually, sit on the computer's hard drive waiting to be "run".

**KT0503 Processor speeds in megahertz and gigahertz**

**What Does a Processor Do?**

The Processor, also called CPU, is an essential piece of hardware of computer that enables your computer to interact with all of the applications and programs installed on your computer. The processor is able to interpret the program's instructions and create the output that you interface with when you are using a computer.

The processor provides information and is able to complete tasks that you request when you open an application or make changes to a file because it is made of hardware that works together.

The processor would affect your computer experience since it may perform quickly or slowly. At the same time, computer performance may be decided by the processor cores and clock speed.
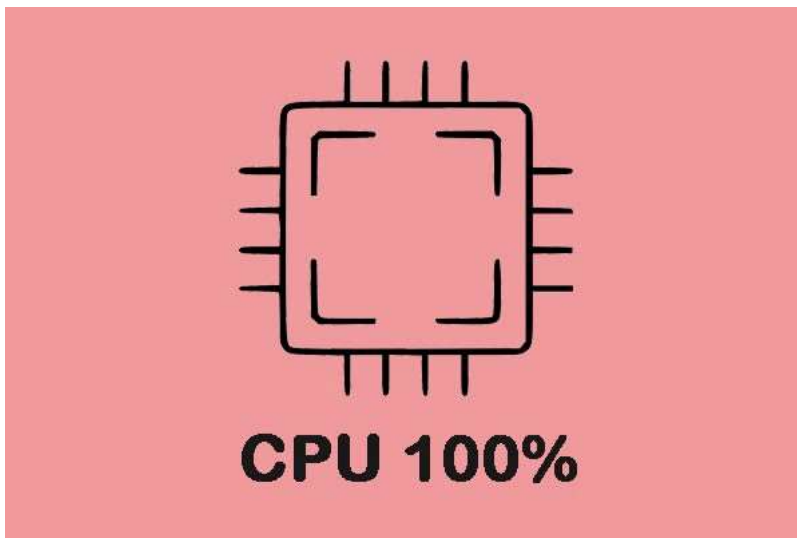


[Sometimes your CPU is running at 100% and the speed of your computer becomes slow. This post will provide 8 solutions for you to fix this issue.](#)

**What Is Processor Speed?**

The computer performance may be influenced by a lot of factors. Computer processor speed would be one of them. The processor is often regarded as the brain of the computer, so ensuring its working properly is very important to the longevity and functionality of your computer.

So, you should know what makes a good processor speed. Usually, the processor cores and clock speed may make a good speed for processor. Therefore, we will show you some information about the CPU cores and clock speeds.

**What Are Processor Core and Clock Speed?**

Processor Cores and Clock Speed are two different components of the CPU, but they depend on each other and work toward the same goal to improve the computer processor speed so as to improve computer performance.

Processor core is a single processing unit within the computer's central processing unit. It receives instructions from a single computing task, working with the clock speed to quickly process this information and temporarily store it in the [RAM](#) and the permanent information is saved to the hard drive.

In general, most computers have multiple cores so that helps you to complete several tasks at the same time.

The clock speed of a CPU decides how quickly the central processing unit can retrieve and interpret instructions, which helps the computer to complete more tasks by getting them down faster. Clock speed is measured in GHz. If the value is larger, the clock speed is faster.

However, it is difficult to increase the clock speed, so more processor cores are increased to improve computer performance.

What Makes a Computer Fast? Here Are Main 8 Aspects

What makes a computer fast or do not know how to make computer faster? This post is what you need as it shows the fast computer specs.

**What Is a Good Processor Speed for a Laptop or Desktop PC?**

After knowing what makes computer processor speed, what is a good processor speed? Read on to know more detailed instructions.

As for most laptops on the market, they have dual-core processors, which is able to meet the needs of most everyday users. Meanwhile, some users use quad-core processors which can improve computer performance.

What is a good speed for processor? If you are a professional or a student, the quad-core processor with up to 4.00 GHz is required. If you are a hardcore gamer, you may need a 6 or 8 core processor. A good processor speed is between 3.50 to 4.2 GHz, but it is more important to have a single-thread performance. In short, 3.5 to 4.2 GHz is a good speed for processor.

**KT0504 Architecture, including registers, cache memory, virtualization, graphics processing units, throttling, and overclocking**

**What is a CPU?**

At the heart of the computer there is a unit called the central processing unit (CPU).
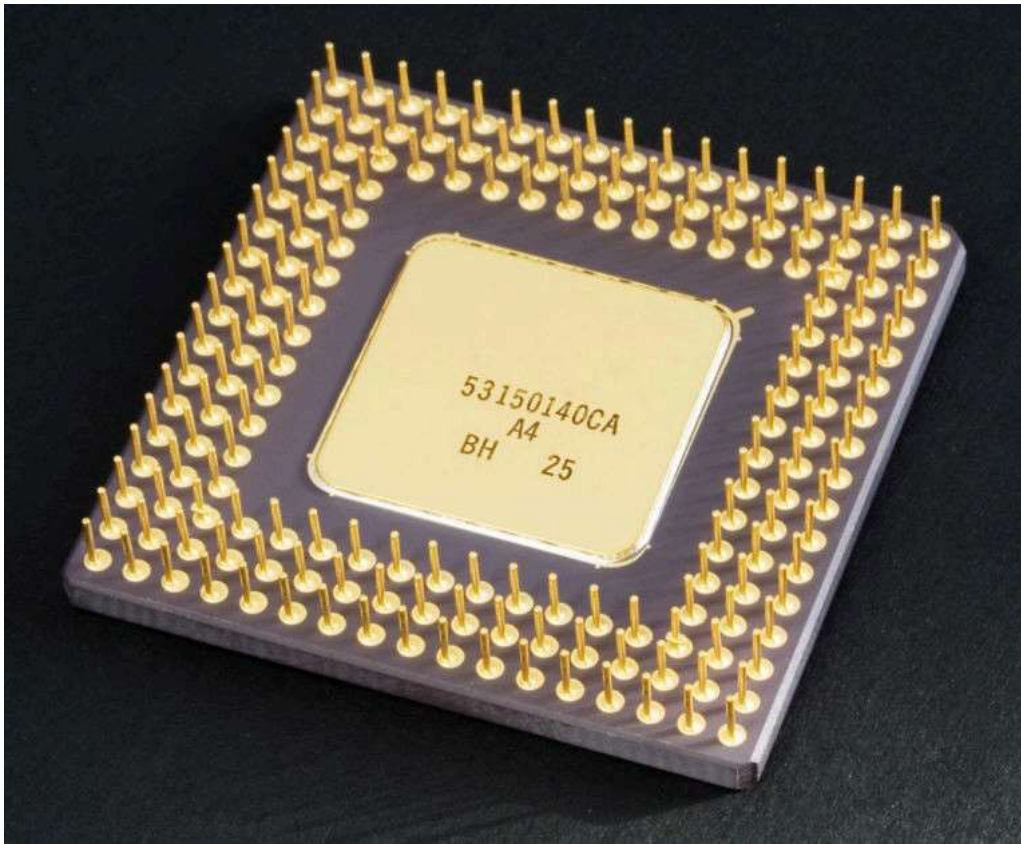
You've probably heard of CPUs before. They're made by companies like Intel, AMD, Fujitsu, Zhaoxin, and Qualcomm, and have technical data associated with them such as Quad Core, 3.2 GHz with 6Mb of cache.

https://www.futurelearn.com/courses/how-computers-work

The CPU can be further divided into three main parts: the arithmetic logic unit (ALU), the control unit (CU), and what are known as registers. You will look at these first.

**CPU Main Parts**

**1. Registers**

Registers are parts of the CPU that can store data. They operate a little like RAM, but rather than use capacitor-based memory cells, the memory cells are only composed of logic gates. Registers can't hold as much data as RAM can, but they operate considerably faster.

There are five different types of register within the CPU. The table below gives you some basic details, and you will see how these registers operate in the next section.

| | | |
|---|---|---|
| Accumulator | AC | Stores the results of calculations |
| Instruction Register | IR | Stores the address in RAM of the instruction to be processed |
| Memory Address Register | MAR | Stores the address in RAM of the data to be processed |
| Memory Data Register | MDR | Stores the data that is being processed |
| Program Counter | PC | Stores the address in RAM of the next instruction |

**2. The Arithmetic Logic Unit**
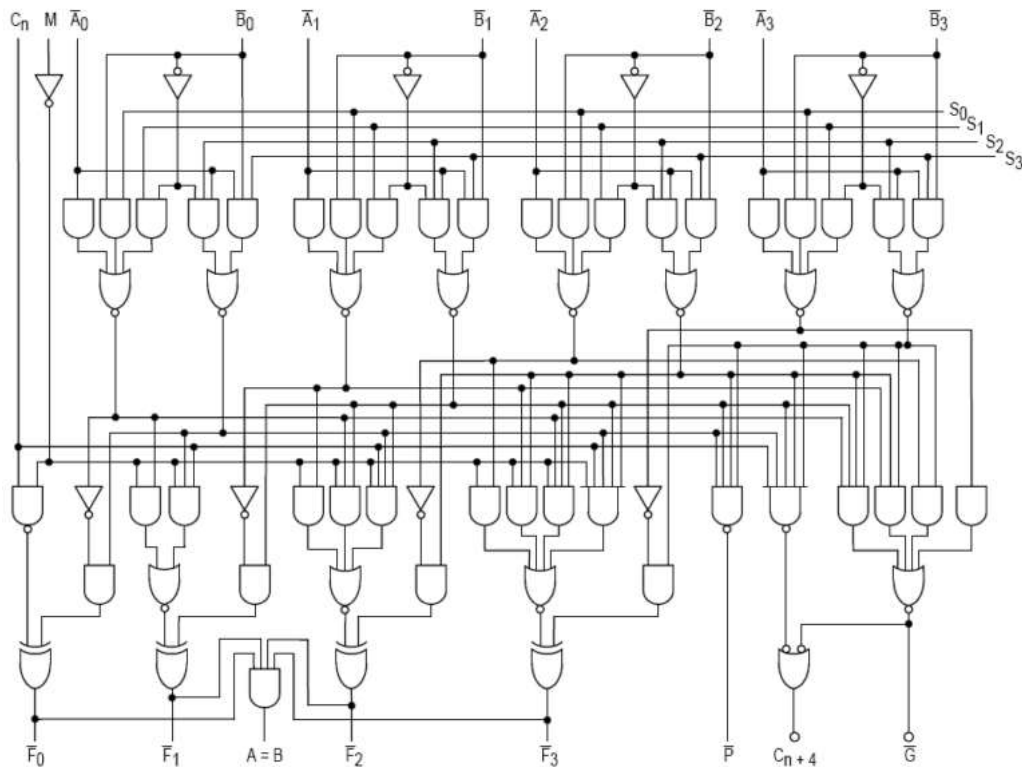
The ALU is the core of the CPU. It is made up of all those logic circuits that you have been learning about for the past three weeks.

The ALU uses these logic circuits to perform a variety of operations. It can perform addition of binary numbers. It can also perform a variety of other arithmetic operations, such as subtraction and incrementation. The ALU can also perform logical operations, such as comparing two binary numbers to see if they are the same or not.

### 3. The Control Unit

The control unit decodes what each instruction means, and can then controls how the other components operate. So when the control unit receives an instruction, which is just a binary number, it will then signal what the ALU and memory is supposed to do. It might be that the instruction is to add two numbers together, or it might be that the instruction is to store a number in RAM.

The control unit also contains a clock. This is a tiny oscillating crystal, which controls the rate at which calculations are performed by the CPU.

### Memory

The RAM stores both the instructions that the computer needs to perform, and the data on which to perform it. The idea of storing both data and instructions in the same memory is the basis of what is known as the stored-program computer. When reading from or writing to RAM, two registers are needed: one to store the address in RAM that is being read from or written to, and another register to store the data itself.

### Buses

All of these components are connected together by bundles of wires that are collectively known as buses. So there is a bus to carry data, another for addresses, and another for instructions.

### Input and Output

Additionally, a computer would usually have some input and output devices that can receive external data and then output the results of the calculation. This could be something as simple as a data connection, or something more complicated such as a keyboard and monitor.

This method of putting together a computer is known as the Von Neumann Architecture. It was devised by John von Neumann in about 1945, well before any of the components that would be needed to produce it had actually been invented.

*Internal Assessment Criteria and Weight*

• IAC0501 Understanding of processers and related aspects is demonstrated

*(Weight 5%)*