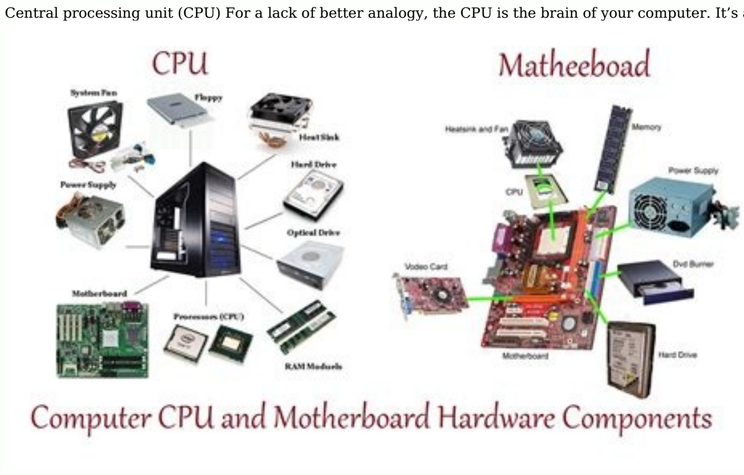
What are the types of computer hardware and their functions

What is computer hardware and its types. What are the four main types of computer hardware. What are the 5 categories of computer hardware.

Every piece of computer hardware is a physical object. It can be made of different materials, have specific dimensions or shape, and serve a variety of purposes. However, as long as it’s tangible and a part of your computer system, it’s considered hardware. To answer the question from the introductory passage, your central processing unit (CPU), graphics card (GPU), and power cable all fall under hardware.
Hardware can also be viewed as a direct opposite to everything considered software. Software is, by definition, intangible – it doesn’t have a physical component and exists only as digital data. The term refers to your operating system, internet browser, and even that “New hardware found” popup users get when a new device is plugged into their computers. Naturally, computer hardware and software go hand in hand. None could perform its function without the other. It’s obvious that not all hardware components are the same. No one would say that a computer mouse and a graphics card are in any way similar. This is because hardware comes in several types based on its location and purpose. Hardware Types by Location Classification by location is relatively straightforward. Based on whether they’re housed in or outside the computer case, hardware components can be internal or external. But before we get deeper into explaining types of hardware, there’s an interesting question of the computer case. It is undoubtedly hardware, yet doesn’t fall into either of the mentioned types. Computer cases (or towers) are a hardware category of their own. Since other parts are defined by their location relative to the case, the case itself can be neither internal or external. In some cases, a computer case with PC components inside is collectively called “PC hardware.” Returning to the more straightforward matter of other hardware components, let’s look at how individual computer parts are defined. Internal Hardware Internal hardware parts of a computer are often simply called “components.” They are contained within the case and include: Motherboard Central processing unit (CPU) RAM (computer memory) Internal hard drives like HDDs and SSDs Disk drives – CD, DVD, Blu-ray, and the long-extinct floppy drive Graphics card (GPU) Sound processing card Power supply unit Network and modem units Cooling fans and heat sinks External Hardware (In Desktop Computers) External components are found outside the computer case, for example: Monitor Keyboard Mouse Speakers Printer Scanner Joysticks, gamepads, and other gaming controllers Microphone Headset USB flash drive External variants of internal components like storage devices or disk drives The two basic divisions of computer hardware have subsets based on what each component or peripheral device does. It’s worth noting that these subsets somewhat overlap in modern builds. Internal Component Types by Use Internal computer hardware is what provides processing and memory power to a computer setup. When people mention hardware upgrades, it falls into two main categories: Processing Memory and storage Processing Components Processing internal components include the motherboard, central processing unit, sound and graphics cards, and network cards or modems. Motherboard The motherboard represents the main connection between all other hardware components.

It’s a printed circuit board that allows information to pass to and from other crucial units so they can perform their function correctly. For example, suppose you have a game installed on an internal hard drive. In order for you to play the game, relevant electronic data needs to be pulled into the RAM and processed through the CPU. Additionally, the game needs to react to your input, whether you’re using a controller or a keyboard and mouse setup. Finally, the gameplay has to be presented in real time through your monitor and speakers. The motherboard makes all this possible by connecting various components and getting them to work together. It’s the vital computing hardware device within your computer.

Central processing unit (CPU) For a lack of better analogy, the CPU is the brain of your computer. It’s a tiny chip with massive power that processes inbound and outbound commands. Let’s translate that last part into something more understandable with an example.



A user decides to open a document in their word processor. They find the folder and click on the document icon, and soon enough, the page appears on the screen. While this is a simple action, it’s only made possible by the CPU which is constantly working in the background. When the user clicks on the software icon, the command is accepted by the hardware which directs the motherboard to load it into the CPU memory cache. From there, the CPU takes over performing what is called the instruction cycle. This cycle consists of three phases: fetch, decode, and execute. In essence, the CPU fetches the command from the RAM, decodes what’s supposed to happen, and then executes the appropriate actions. CPUs are really blunt, and they only operate in machine language (1s and 0s). They perform various arithmetic and logical operations on the input and forward the output, constantly. The list of these operations is pre-set by the manufacturer. The operating system and underlying software are in charge of making sure the CPU gets the most use. They also break down complex instructions into the basic set that the CPU understands. This process happens for everything your computer does, from running complex computer programs to clock updates and even mouse scrolls. Graphics card (GPU) The purpose of a graphics or video card is somewhat similar to the CPU. However, while the CPU processes every task, the GPU is specialized for graphics. Here, it’s important to make one vital distinction. The terms “graphics card,” “video card,” and “GPU” are usually used interchangeably, but don’t actually mean the same thing. The graphics card is much like the motherboard, while the GPU is the actual processing unit. Separate processing units for graphics were initially made for 3D rendering. In time, these units became more developed and versatile. The main difference between a GPU and a CPU is that GPUs are more specialized, with thousands of cores. Each core is slower individually than the CPU core, but together they can finish their intended task faster. Sound card Much like the graphics component, this hardware device is designed for a single specific purpose: processing sound. This is a somewhat more complex task than it might seem, which is precisely why it requires a dedicated piece of hardware. Whenever a sound is played on your computer, the system needs to pull the sound file based on a particular trigger. For example, order the machine to shut down and it will play the familiar sound. Of course, sound reproduction can become much more complex than system sounds. Imagine the processing that needs to happen for music software to function efficiently. That example is precisely why sound processing cards have become staple computer components. network card and modem Network-related hardware components process the data coming to and from the network cable plugged into the computer. These components don’t have the same processing power as other hardware on this list. Instead, most of their tasks are limited to forwarding information according to specific protocols. They represent a link between your internet service provider and your computer. Memory and Storage Memory and storage are divided into three categories: primary, secondary, and tertiary.

This classification is made according to how readily the CPU can access the stored data.

Primary storage Primary storage is usually called “memory,” while other types are simply called “storage.” When talking about memory, we’re referring to the components that store data necessary for applications to run properly. In particular, these are the CPU cache and RAM. Cache memory is a temporary data storage dedicated to the CPU. It stores information necessary for the processing unit to perform its queued tasks. For this reason, the cache unit is often integrated into the processor or placed very near it on the motherboard. RAM (Random Access Memory) is much more extensive than cache. It stores all data needed to run programs, which is why certain apps require huge amounts of RAM. The differences between RAM and CPU cache are in size and speed. CPU cache is orders of magnitude faster than RAM so it can keep up with the CPU’s speed. However, this means that sacrifices have to be made in terms of size. CPU cache is loaded from and to RAM by the motherboard in chunks to alleviate resource use. RAM upgrades are possible since every modern motherboard includes at least one expansion slot for this storage type. Memory isn’t stored permanently. Instead, it represents a temporary resource, unlike storage devices. Secondary Storage Secondary storage doesn’t provide direct CPU access. Instead, when data files from this storage need to be used, they are pulled into the memory, i.e., primary storage. This category includes storage devices that we’re probably most familiar with like the hard disk drive and solid state drive. Hard disk drives (HDDs) consist of magnetically coated metal platters and arms designed to read and write data. All this is housed within an airtight casing. A solid state drive, on the other hand, doesn’t feature any moving parts. Instead, SSDs use a different system – their storage is designed similarly to a RAM memory or a USB stick. The defining feature of all secondary storage devices is that they retain the data stored on them even when powered off. Tertiary storage Tertiary storage is another step further from direct CPU usage. A storage device in this group will have no direct contact with the processor and will depend on a mechanism to load the storage media. Simply put, tertiary storage devices are those that need to open and be loaded with particular media. An example would be a CD-ROM, DVD, or Blu-ray unit. Other Components Besides the components used for computing, certain pieces of hardware perform crucial functions related to the overall system health. These are primarily power supplies, cooling units, and other electronics. The power supply unit provides sufficient power to the computer and can protect sensitive physical components from overloading. Some types of power supplies come with fuses, making the rest of the machine more resistant to surges. When talking about cooling units, we’re thinking of the primary fan installed in the computer case. This fan regulates the overall temperature inside the case. The fan’s function is critical to prevent overheating, especially since some components can reach very high temperatures. Graphic cards and CPUs are particularly prone to heating up. These hardware devices have their own heat sinks and fans, but those don’t push the hot air all the way out of the case. That’s the job of the primary fan. External Device Types by Use Most of the time when the “new computer hardware found” message pops up, it will be due to a piece of external hardware. These are the physical parts of your computer that get changed the most – the peripheral devices. External hardware is largely divided into input and output devices.
It’s quite clear what each category does from the name alone. Input Devices Input devices are used to issue user commands to the internal processing units. Most people don’t think of it that way, but every time you type a letter or click a button, you’re issuing a command to your computer. You’re likely familiar with the most common input devices: Keyboard Mouse Gaming controller Microphone However, maybe you didn’t think of a USB memory stick as an input device. Yet, that’s precisely what it is. When connected to USB ports, these storage devices are usually used to access the data stored on them. Additional hardware components that represent external input devices include external storage drives and scanners. Output devices An output device is any external piece of computer hardware that gives you system feedback. This includes all external devices that desktop computers use to show images or play sounds. The following could serve as a good example of an output device: Computer monitor Speakers Headphones Printer

What About Laptop Computers? Laptops are slightly different from desktop computers in that most of their hardware components are considered internal. Since a laptop can be thought of as all case, hardware like the computer screen or keyboard is technically internal. The only hardware components that could be external on a laptop would be devices connected via USB or other ports. Although laptops are made much more compact compared to desktop PCs, that doesn’t make a hardware upgrade impossible. A piece like the power supply unit can be easily replaced, but other units like memory and storage can be upgraded, too. Hardware Examples Examples of computer hardware include: Internal computer hardware like the hard drive, processor, or video card. External computer hardware, such as the monitor, keyboard, and mouse. Less common external hardware components like UPS batteries.
This is a lesson in the course Introduction to Computers, which is a part of The School of Computer Science Hardware Details[edit | edit source] Inside a personal computer: 1. Monitor 2. Motherboard 3. CPU(Microprocessor 4. Main memory(RAM) 5. Expansion cards. 6. Power supply unit. 7. Optical disc drive. 8. Hard disk drive (HDD). 9. Keyboard. 10. Mouse. Hardware refers to the physical elements of a computer. Also referred to as the machinery or the equipment of the computer. Examples of hardware in a computer are the keyboard, the monitor, the mouse and the processing unit However, most of a computer's hardware cannot be seen; It's inside the computer case. I/O lets the computer talk with the world around it. Sometimes its necessary to add functionality to a computer to keep it up to date, or make it better.
The amount of I/O a computer has can be changed, by adding expansion cards that support I/O. A graphics card can be added to a computer to let it talk with a display, or a WiFi card can be added, which will let a computer talk to other computers without a connecting wire. Sometimes functionality can be added through a universal port, a port that supports multiple kinds of I/O. USB, FireWire, and Thunderbolt (Types of I/O) support multiple data types. Your keyboard, mouse, and monitor all connect to a computer's I/O. CPUs or processors perform computations. They do the math for your calculator application, they compare the size of numbers; people have likened the CPU to the "brain" of a computer. Memory is what allows a computer to remember things. Similar to human memory, there's long term memory (a hard disc or optical media (like a CD)) and short term memory (RAM). When a computer is turned off, it forgets everything in the RAM, so the computer saves everything it knows it will need later on in the long term memory. The short term memory is easier to use because it can do I/O faster, so when a data is needed by the CPU, it's sent from the hard disk drive (HDD) to the RAM. The short term memory lives on RAM, while the long term memory is in the hard disk drive (HDD). Optical disks let you change certain parts of the memory, it's kind of like having a book or notebook that you might read and get information from. The motherboard is a piece of hardware that makes connections in the right places between all of the other components in a computer. It tells data where it should go. When the CPU is finished processing some data, it might say to the CPU, OK, put this in the HDD, and the motherboard will figure out where the HDD is and send the data there. A motherboard is an electronic circuit board in a computer which interconnects hardware devices attached to it. At a minimum it includes one or more Central processing units, and the main processing activity of the computer takes place on it. However, other connected printed circuit boards may contain their own pre-processing or post-processing CPUs, to take some of the load off of the motherboard; these, together with other plug-in boards without CPUs, may be called "daughter boards." It was called a "mother" board in relation to these. A PC motherboard may have a series of sockets, allowing daughter boards to be plugged in directly. Other connectors on the motherboard allow communication through cables with various peripheral devices, both inside and outside the computer case. Ports[edit | edit source] Ports are used by a motherboard to interface with electronics both inside and outside of the computer. Serial[edit | edit source] An example of a serial port A legacy technology, serial ports were most often used to connect a mouse or modem.
By circa 2000, most personal computers stopped relying on serial ports and were replaced by PS/2 and/or USB ports. Serial ports are sometimes still used for specialized applications such as industrial automation systems, scientific instruments, and point of sale systems. PS/2[edit | edit source] PS/2 ports (now outdated) were for connecting peripherals such as your keyboard and mouse to the computer. PS/2 based mice and keyboards have now been replaced by USB ports as the popular standard. This trend for USB over PS/2 started in circa 2004. Parallel[edit | edit source] Parallel ports are used to connect other peripherals such as joysticks, and more commonly, printers. Similar to the serial port, this technology is slowly being phased out in favour of USB. Parallel ports can still be found in many motherboards today. Small Computer System Interface (SCSI)[edit | edit source] Pronounced "scuzzy", this was used primarily as a connection interface for tape drives and hard disk drives. SCSI has been superseded in favour of newer and cheaper technologies such as USB and Firewire. USB[edit | edit source] USB, short for Universal Serial Bus, is an industry standard developed in the mid-1990s that defines the cables, connectors and communications protocols used in a bus for connection, communication, and power supply between computers and electronic devices.[1] A bus is a communication system that transfers data between components inside a computer, or between computers.[2] Firewire[edit | edit source] Technically known as the IEEE 1394 interface, but dubbed by Apple as Firewire, this connection medium hoped to surpass USB in terms of speed and popularity. While it did outperform USB v2 in speed tests, uptake was very limited due to the existing widespread use of USB. Slots[edit | edit source] Slots are an opening in a computer where a circuit board can be inserted to add new capabilities. All personal computers contain expansion slots for adding more memory, graphics capabilities, and support for special devices. Expansion slots come in different flavours, which will be described below. An alternative explanation for expansion slots can be found here.
Graphics card[edit | edit source] Graphics Card Graphic cards are also called video cards or a video adapter. They are in all PCs. Graphic cards convert signals into video signals so the images can be displayed on the monitor. While many graphics cards are integrated into the CPU these days, enthusiasts will invest in standalone graphics cards with stronger and more powerful processing capabilities. This allows for heavy image editing, or better rendering and framerates in computer games. Graphics cards are designed to offload rendering from the CPU. Graphics cards are powered by the motherboard and require a PCIX or PCIX 2.0 slot to install.
Some cards require more power and thus will need a 6-8 pin connector that runs directly to the power supply. Graphics cards also include on board memory for efficient rendering. Typical sizes include 128-1024mb of memory. Today, high end graphics cards have multiple core processors that are largely parallel to increase texture fill and process more 3D objects in real time. Graphics Card on Wikipedia Sound card[edit | edit source] Close-up of a Sound Card A sound card, also referred to as an audio card facilitates the input and output of audio signals to and from a computer under the control of computer programs.
Sound cards for computers were uncommon until 1988, which left the single internal PC speaker as the only way early PC software could produce sound and music. Sound Card on Wikipedia. Network Interface Cards (NICs)[edit | edit source] Network Interface Card Network Interface Cards can be a network card, network adapter, LAN Adapter or NIC (network interface card). They are a piece of computer hardware designed to allow computers to communicate over a computer network.
It is used for fault communication via cable. Data is transmitted over a cable network. The NIC connects computers and other devices such as printers.
Many modern motherboards have NICs built in by default. NICs on Wikipedia PC Card[edit | edit source] A PC Card (originally PCMCIA Card) is a device that uses a specific peripheral interface designed for laptop computers. PC Card on Wikipedia See Also[edit | edit source] Computer Hardware IT Fundamentals References[edit | edit source] ↑ Wikipedia: USB ↑ Wikipedia: Bus (computing)