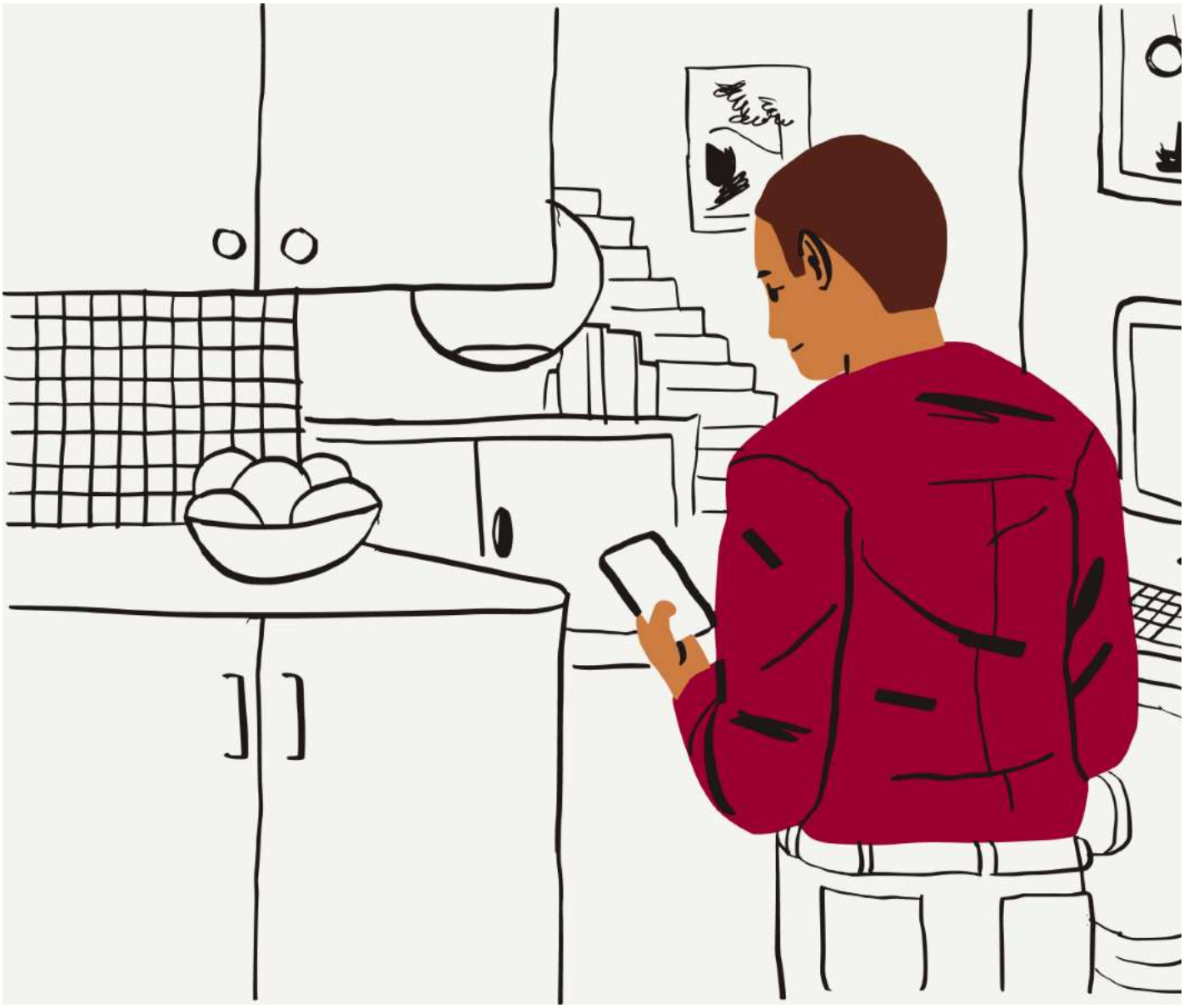

Storage capacity is no longer dependent on the physical capacity of your computer. Many options exist to hold your files while saving storage space on your computer, phone, or tablet. If your devices are slow and running out of space, you can offload files onto a physical storage device. Or better yet, use the best storage technology and save your files to the cloud.

Cloud storage

While not exactly a device per se, cloud storage is the newest and most versatile type of storage for computers. "The cloud" is not one place or object, but rather a huge collection of servers housed in data centres around the world. When you save a document to the cloud, you're storing it on these servers.

Because cloud storage stores everything online, it doesn't use any of your computer's secondary storage, allowing you to save space.

Cloud storage offers significantly higher storage capacities than USB flash drives and other physical options. This saves you from having to sift through each device to find the right file.

While external HDDs and SSDs were once favoured for their portability, they, too, fall short compared to cloud storage. There aren't many pocket-friendly external hard drives. While they're smaller and lighter than a computer's internal storage drive, they are still tangible devices. The cloud, on the other hand, can go with you anywhere without taking up any physical space, and without the physical vulnerabilities of an external drive.

External storage devices were also popular as a quick solution for transferring files, but they're only useful if you can access each physical device. Cloud computing is thriving as many businesses now operate remotely. It's likely that you wouldn't mail a USB drive overseas to send a large file to a colleague. Cloud storage acts as a bridge between remote workers, making collaboration from afar a breeze.

If you forget to bring a hard drive containing important documents to a meeting, there's not much you can do other than go back and grab it. If you break or lose a hard drive altogether, it's unlikely you'll ever get that data back. These risks don't exist for cloud storage—your data is backed up and accessible whenever and wherever you are so long as you have access to the internet.

With Dropbox, you can access any file in your account from your desktop. It's just like storing your files locally only they don't use up any of your disk space. Keeping all your files saved in Dropbox means they're always one click away. You can access them from any device with internet connection, and share in an instant.

External storage devices

In addition to storage media contained within a computer, there are also digital storage devices that are external from computers. These are commonly used to expand storage capacity on a computer that runs low on space, allow more portability, or provide easy file transfers from one device to another.

And if you want to transfer files from external drives to the cloud, you can use external drive backup and access your files from anywhere.

External HDDs and SSDs

You can get both HDD and SSD devices as external drives. These generally offer the largest storage capacity among external options, with external HDDs offering up to 20 TB of storage and (reasonably-priced) external SSDs offering up to 8 TB of storage.

External HDDs and SSDs work in the exact same way that their internal counterparts do. Most external drives can connect to any computer; they're not tied to one device, so they're a decent solution for transferring files across devices.

Flash memory devices

We mentioned flash memory earlier when discussing SSDs. A flash memory device contains trillions of interconnected flash memory cells that store data. These cells hold millions of transistors that when switched on or off represent 1s and 0s in binary code, allowing a computer to read and write information.

One of the most recognizable types of flash memory device is the USB flash drive. Also known as a thumb drive or a memory stick, these small, portable storage devices have long been a popular choice for extra computer storage. Before it was quick and easy to share files online, USB-flash drives were essential for easily moving files from one device to another. However, they can only be used on devices with a USB port. Most older computers have a USB port, but newer ones may require an adapter.

These days, a USB flash drive can hold up to 2 TB of storage. They're more expensive per gigabyte than an external hard drive, but they have prevailed as a simple, convenient solution for storing and transferring smaller files.

Aside from USB drives, flash memory devices also include SD and memory cards, which you'll recognize as the storage medium used in digital cameras.

Optical Storage Devices

CDs, DVDs, and Blu-Ray discs are used for a lot more than playing music and videos—they also act as storage devices. Collectively they're known as optical storage devices or optical media.

Binary code is stored on these disks in the form of minuscule bumps along a track that spirals outwards from the centre of the disk. When the disk is in operation it spins at a constant speed, while a laser contained within the disk drive scans the bumps on the disk. The way the laser reflects or bounces off a bump determines whether it represents a 0 or 1 in binary.

A DVD has a tighter spiral track than a CD, allowing it to store more data despite being the same size, and a finer red laser is used in DVD drives than CD drives. DVDs also allow dual layering to increase their capacity further. Blu-Ray took things to another level, storing data on multiple layers with even smaller bumps that require an even finer blue laser to read them.

CD-ROM, DVD-ROM, and BD-ROM refer to read-only optical storage disks. The data written on them is permanent and cannot be removed or overwritten. This is why they can't be used as a personal storage. Instead, they are typically used for software installation programs.

CD-R, DVD-R, and BD-R format disks are recordable, but cannot be overwritten. Whatever data you save on a blank recordable disk will then be permanently stored on that disk. So, they can store data, but they're not quite as flexible as other storage devices.

CD-RW, DVD-RW, and BD-RE are re-writable. This allows you can to write new data on them and erase unwanted data from them as much as you want. They've been overtaken by newer technology like flash memory, but CD-RWs were once the top choice for external storage. Most desktop computers and many laptops have a CD or DVD drive.

CD can store up to 700 MB of data, DVD-DL can store up to 8.5 GB, and Blu-Ray can store between 25 and 128 GB of data.

Floppy Disks

While they may be obsolete at this point, we can't discuss storage devices without at least mentioning the humble floppy disk, aka diskette. Floppy disks were the first widely-available portable, removable storage devices. This is why most "Save" icons look the way they do; they're modelled after the floppy disk. They work in the same way as hard disk drives, although at a much smaller scale.

The storage capacity of floppy disks never exceeded 200 MB before CD-RW and flash drives became the favoured storage media. The iMac was the first personal computer released without a floppy disk drive in 1998. From here, the over 30-year reign of the floppy disk very quickly declined.

Storage in computer systems

A storage device is a piece of hardware that is primarily used for storing data. Every desktop computer, laptop, tablet, and smartphone will have some kind of storage device within it. There are also standalone, external storage drives that can you can use across devices.

Storage is not only necessary for saving files, but also for running tasks and applications. Any file you create or save on your computer saves to your computer's storage device. This storage device also stores any applications and your computer operating system.

As technology has advanced over time, data storage devices have also evolved in a major way. Nowadays, storage devices come in many shapes and sizes, and there are a few different types of storage device that cater to different devices and functions.

A storage device is also known as a storage medium or storage media. Digital storage is measured in megabytes (MB), gigabytes (GB), and, these days, terabytes (TB).

Some computer storage devices are able to hold information permanently while others can only hold information temporarily. Every computer has both primary and secondary storage, with primary storage acting as a computer's short-term memory, and secondary as a computer's long-term memory.

Primary Storage: Random Access Memory (RAM)

Random Access Memory, or RAM, is the primary storage of a computer.

When you're working on a file on your computer, it will temporarily store data in your RAM. RAM allows you to perform everyday tasks like opening applications, loading webpages, editing a document or playing games. It also allows you to jump from one task to another without losing your progress. In essence, the larger the RAM of your computer, the smoother and quicker it is for you to multitask.

RAM is a volatile memory, meaning it cannot hold onto information once the system turns off. For example, if you copy a block of text, restart your computer, and then attempt to paste that block of text into a document, you'll find that your computer has forgotten the copied text. This is because it was only stored temporarily in your RAM.

RAM makes it possible for a computer to access data in a random order, and thus reads and writes much faster than a computer's secondary storage.

Secondary Storage: Hard Disk Drives (HDD) & Solid-State Drives (SSD)

In addition to RAM, every computer also has another storage drive that's used for storing information on a long-term basis. This is secondary storage. Any file you create or download saves to the computer's secondary storage. There are two types of storage device used as secondary storage in computers: HDD and SSD. While HDDs are the more traditional of the two, SSDs are fast overtaking HDD as the preferred tech for secondary storage.

Secondary storage devices are often removable, so you can replace or upgrade your computer's storage, or move your storage drive to a different computer. There are notable exceptions, like MacBooks, which don't offer removable storage.

Hard Disk Drives (HDD)

The hard disk drive (HDD) is the original hard drive. These are magnetic storage devices that have been around since the 1950s, though they've evolved over time.

A hard disk drive is comprised of a stack of spinning metal disks known as platters. Each spinning disk has trillions of tiny fragments that can be magnetized in order to represent bits (1s and 0s in binary code). An actuator arm with a read/write head scans the spinning platters and magnetizes fragments in order to write digital information onto the HDD, or detects magnetic charges to read information from it.

HDDs are used for TV recorders, servers, and laptop and PC storage.

Solid-State Drives (SSD)

Solid-state drives emerged far more recently, in the '90s. SSDs don't rely on magnets and disks, instead they use a type of flash memory called NAND. In an SSD, semiconductors store information by changing the electrical current of circuits contained within the drive. This means that unlike HDDs, SSDs don't require moving parts to operate.

Because of this, SSDs not only work faster and smoother than HDDs (HDDs take longer to gather information due to the mechanical nature of their platters and heads), they also generally last longer than HDDs (with so many intricate moving parts, HDDs are vulnerable to damage and wear).

Outside of newer PCs and high-end laptops, you can find SSDs in smartphones, tablets, and sometimes video cameras.

The best way to store large amounts of data

If you're running out of space on your devices, it's time to look into an alternative storage device. Even external storage devices such as flash drives can run out of space, break, or get lost. That's why the best way to store all your files is in the cloud. It's safer, faster, and easier to access.

KT0302 Solid-state drives such as IDE, SATA, and SCSI

Types of Hard Drives – SATA, PATA, SCSI, and SSD

A hard drive is a non-volatile hardware component on a computer that acts as the storage for all digital content. It holds program files, documents, pictures, videos, music, and more.

The non-volatile nature of hard drives means they don't lose data, even if power is lost. Due to this, they help computers store files and other data for a long time – as long as they don't get damaged or corrupted.

Since the first release of hard drives by IBM in 1956, hard drives have evolved from being the size of a refrigerator and having a storage capacity of just 5MB to ones that are pocket-sized and have up to 4 TB of storage capacity.

In this article, I will cover the different types of hard drives so you can choose the best for your computer.

The first hard drive

Types of Hard Drives

Currently, hard drives are divided into 4 major types:

Parallel Advanced Technology Attachment (PATA)

Serial Advanced Technology Attachment (SATA)

Small Computer System Interface (SCSI)

Solid State Drive (SSD)

These names come from the way they connect to the computer. In this article, I'm now going to elaborate on each of these types of hard drives as concisely as possible.

Parallel Advanced Technology Attachment (PATA)

The PATA hard drives were first introduced to the market by Compaq and Western Digital in 1986. They can have up to 80GB capacity and transfer data as fast as 133 MB/S.

They were named Parallel Advanced Technology Attachment because they use a parallel ATA interface to connect to the computer. Apart from PATA, they are also called Integrated Drive Electronics (IDE) and Enhanced Integrated Drive Electronics (EIDE).

PATA hard drives are made of mechanical moving parts and are based on parallel signalling technology – meaning they transmit multiple bits of data simultaneously.

Serial Advanced Technology Attachment (SATA)

In recent times, a lot of desktop and laptop computers have gotten SATA hard drives because they have superseded PATA hard drives in size, power consumption, and even better pricing.

The mode of connection to a computer remains the same as PATA, but instead of parallel signalling technology for data transmission, they use serial signalling technology. This means that they transfer data one bit at a time.

A notable advantage SATA hard drives have over PATA hard drives is the transmission of data at a rate of 150 – 300 MB/S. In addition, they have thinner cables and a cable limit of 1 meter.

Small Computer System Interface (SCSI)

SCSI hard drives are upgrades over SATA and PATA drives for many reasons such as round-the-clock operations, speed, storage, and several others.

For connection, SCSI hard drives use a small computer system interface – which is a standard for connecting peripheral devices such as printers, scanners, and others.

Best of all, they allow the connection of peripheral devices such as printers, scanners, and other hard drives. In addition, they transmit data at 320 MB/S and you can connect them internally or externally.

Connections through SCSI on personal computers have now been replaced by the Universal Serial BUS (USB). This means that SCSI is no longer used as consumer hardware.

Solid State Drive (SSD)

SSD hard drives are one of the latest hard drive technologies at the time of writing this article.

Unlike the hard drive technologies before SSD drives, they don't consist of moving parts and they don't use magnetism for storing data.

Instead, they use integrated circuits (ICs) just like third-generation computers. This makes them more durable, faster, and less prone to damage and corruption.

SSD hard drives have a notable advantage of transferring data at speed of 550 MB/S and allow faster boot times than the types of hard drives before them.

KT0303 Processors and CPUs, processing speeds, operating systems, and controlsnternal Assessment Criteria and Weight

What are Different Types of Processors: Applications and Characteristics

[Text Wrapping Break]

What is a Processor?

Definition: The processor is a chip or a logical circuit that responds and processes the basic instructions to drive a particular computer. The main functions of the processor are fetching, decoding, executing, and write back the operations of an instruction. The processor is also called the brain of any system which incorporates computers, laptops, smartphones, embedded systems, etc. The ALU (Arithmetic Logic Unit) and CU (Control Unit) are the two parts of the processors. The Arithmetic Logic Unit performs all mathematical operations such as additions, multiplications, subtractions, divisions, etc and the control unit works like traffic police, it manages the command or the operation of the instructions. The processor communicates with the other components also they are input/output devices and memory/storage devices.

Types of Processors

There are different types of processors in the embedded system which include the following.

General Purpose Processor

There are five types of general-purpose processors they are, Microcontroller, Microprocessor, Embedded Processor, DSP and Media Processor.

Microprocessor

The general-purpose processors are represented by the microprocessor in embedded systems. There are different varieties of microprocessors available in the market from different companies. The microprocessor is also a general-purpose processor that consists of a control unit, ALU, a bunch of registers also called scratchpad registers, control registers and status registers.

There may be an on-chip memory and some interfaces for communicating with the external world like interrupt lines, other lines for the memory and ports for communicating with the external world. The ports often called the programmable ports that means, we can program these ports either to be acting as an input or as an output. The general-purpose processors are shown in the below table.

S.NO	Processor	Clock Speed	Bus Width	MIPS	Power	Price
1	Intel Pentium 111	The clock speed of Intel Pentium 111 processor is 1GHz	The bus width of Intel Pentium 111 processor is 32	A million instructions per second of Intel Pentium 111 processor is ~900	The power of this processor is 97 W	$900

2	IBM PowerPC 750X	The clock speed of the IBM PowerPC 750X processor is 550 MHz	The bus width of the IBM PowerPC 750X processor is 32/64	A million instructions per second of IBM PowerPC 750X processor is ~1300	The power of this processor is 5 W	#900
3	MIPS R5000	The clock speed of the MIPS R5000 processor is 250 MHz	The bus width of the MIPS R5000 processor is 32/64	NA	NA	NA
4	StrongARM SA-110	The clock speed of StrongARM SA-110 processor is 233 MHz	The bus width of StrongARM SA-110processor is 32	The million instructions per second of StrongARM SA-110processor is 268	The power of this processor is 1 W	NA

Microcontroller

The microcontroller is basically a computer that comes in various packages and sizes. The reading input and responding to output is the basic function of the microcontroller. Generally, it is known as General Purpose Input Output (GPIO). Some of the microcontrollers are Microchip Atmega328-AU, Microchip P1C16F877A-I/P, Microchip P1C16F1503-I/P, Microchip P1C16F671-I/SN, Microchip P1C18F45K22-I/P, etc.

Embedded Processor

An embedded processor is one type of processor which is designed to control mechanical functions and electrical functions. It consists of several blocks they are the processor, timer, an interrupt controller, program memory and data memory, power supply, reset and clock oscillator circuits, system application-specific circuits, ports and interfacing circuits.

Digital Signal Processor

The digital signal processor is one type of processor used for measuring, filtering and/or compress digital or analog signals. The signal processing means analysis and manipulation of signal. This processing can be done via computer or Application Specific Integrated Circuits (ASIC), Field Programmable Gate Array (FPGA) or Digital Signal Processor (DSP) to obtain the clear signal. The DSP processors are used in an oscilloscope, barcode scanners, mobile phones, printers, etc. These processors are fast and use for real-time applications. The typical DSP system is shown in the below figure.

Typical-system-for-digital-signal-processors

The digital signal processors are shown in the below table

S.NO	Processor	Clock Speed	Bus Width	MIPS	Price
1	T1 C5416 Processor	The clock speed of the T1 C5416 processor is 160 MHz	The bus width of T1 C5416 Processor is 32	The million instructions per second for T1 C5416 The processor is ~600	The price of the T1 C5416 The processor is R34
2	DSP 32C Processor	The clock speed of the DSP 32C Processor is 80 MHz	The bus width of DSP 32C Processor is 32	The million instructions per second for DSP 32C Processor is 40	The price of the DSP 32C Processor R75

Applications of DSP

The applications of the digital signal processor are

Speech processing

Image processing

Medical processing

Biometric Processing

Seismology

Radar

Media Processor

The image/video processor is the media processor that is designed or created to deal with the data in real-time. The voice user interface and professional audio are the applications of the audio processor. Some of the media processors are TN2302AP IP, IN2602 AP IP, DM3730, DM3725, DM37385, DM388, TMS320DM6467, TMS320DM6431, etc

Application-Specific System Processors (ASSPs)

The application-specific system processor is a semiconductor integrated circuit product used to implements a specific function. The performance, characteristics and die size of the application-specific system processor is the same as the ASIC. The ASSP's are used in various types of industries to perform video encoding or decoding and audio encoding or decoding. In place of embedded software, the application-specific system processor is used to run the application and it provides the solution faster. Example: IIM7100, W3100A

Application-Specific Instruction Set Processors (ASIPs)

The application-specific instruction-set processors are designed for specific applications. These processors have low power consumption, high computational speed, and good flexibility. Due to programmability, the data path utilization is high in ASIPs, and the performance of this instruction set processor is good.

ASIC Processors

The application-specific integrated circuits are built for specific applications. These chips are small in size and consume low power. The design cost of ASIC is high and this is the main disadvantage. The application-specific integrated circuit chips are used in satellites, modems, computers, etc. Some of the top ASICs manufacturer companies are Ams AG. Listed Company, Bitfury. Private Company, XMOS Semiconductor Private Company, Analogix Semiconductor Private Company, EDAptive Computing Private Company, Lumen Radio Private Company, Integrated Device Technology, Hookit. Private Company, etc.

MultiProcessor

The multiprocessor is a computer with more than one CPU, each shares main memory, a computer bus, and peripherals to simultaneously process the programs and these systems are also known as tightly coupled systems. The advantages of multiprocessors are increased throughput, increased reliability and economy of scale. These processors are used when very high speed is required to process a large volume of data.

Characteristics of Multiprocessors

The Characteristics of Multiprocessor are

The multiprocessors consist of more than two processors or two processors which are similar

Memory and input/output facilities shared by the processors

The access time of the memory is the same for each processor because the processors are connected by bus

Access to the input/output devices are shared by the processors

The same function performed by all the processors

FAQs

1). What is a microcontroller?

The microcontroller is an IC (Integrated Circuit) which is designed to perform specific functions in an embedded system.

2). What are the types of microprocessors?

There are five types of microprocessors they are DSP (Digital Signal Processor), ASIC (Application Specific Integrated Circuit), RISC (Reduced Instruction Set Computing), CISC (Complex Instruction Set Computing) and Super Scalar Processor.

3). What is the need of the DSP processor?

The digital signal processors need to filter and compress the signals which are analog and used to detect the errors.

4). What is the core?

The core is the brain of the Central Processing Unit. There are different types of cores they are octa-core, dual-core, quad-core, etc.

5). What is the main memory of the computer?