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Without a storage device, a computer would not be able to run or even boot up. Or in other words, we can say that a storage device is hardware that is used for storing, porting, or extracting data files. It can also store information/data both temporarily and permanently. Types of Computer MemoryPrimary MemorySecondary MemoryTertiary Memory1. Primary Memory: It is also known as internal memory and main memory. This is a section of the CPU that holds program instructions, input data, and intermediate results. It is generally smaller in size. RAM (Random Access Memory) and ROM (Read Only Memory) are examples of primary storage. 2. Secondary Memory: Secondary storage is a memory that is stored external to the computer. It is mainly used for the permanent and long-term storage of programs and data. Hard Disks, CDs, DVDs, Pen/Flash drives, SSD, etc, are examples of secondary storage. 3. Tertiary Memory: Tertiary Memory is a type of Memory that is rarely used in personal computers and due to this, tertiary memory is not considered to be an important one. Tertiary memory works automatically without human intervention. Types of Computer Storage DevicesNow we will discuss different types of storage devices available in the market. These storage devices have their own specification and use. Some of the commonly used storage devices are: Primary Storage DevicesMagnetic Storage DevicesFlash memory DevicesOptical Storage DevicesCloud and Virtual Storage1. Primary Storage DevicesRAM: It stands for Random Access Memory. It is used to store information that is used immediately or we can say that it is a temporary memory. Computers bring the software installed on a hard disk to RAM to process it and to be used by the user. Once, the computer is turned off, the data is deleted. With the help of RAM, computers can perform multiple tasks like loading applications, browsing the web, editing a spreadsheet, experiencing the newest game, etc. It allows you to modify quickly among these tasks, remembering where you're in one task once you switch to a different task. It is also used to load and run applications, like your spreadsheet program, answers commands, like all edits you made within the spreadsheet, or toggle between multiple programs, like once you left the spreadsheet to see the email. Memory is nearly always actively employed by your computer. It ranges from 1GB - 32GB/64GB depending upon the specifications. There are different types of RAM, and although they all serve the same purpose, the most common ones are :SRAM: It stands for Static Random Access Memory. It consists of circuits that retain stored information as long as the power supply is on. It is also known as volatile memory. It is used to build Cache memory. The access time of SRAM is lower and it is much faster as compared to DRAM but in terms of cost, it is costly as compared to DRAM.DRAM: It stands for Dynamic Random Access Memory. It is used to store binary bits in the form of electrical charges that are applied to capacitors. The access time of DRAM is slower as compared to SRAM but it is cheaper than SRAM and has a high packaging density.SDRAM: It stands for Synchronous Dynamic Random Access Memory. It is faster than DRAM. It is widely used in computers and others. After SDRAM was introduced, the upgraded version of double data rate RAM, i.e., DDR1, DDR2, DDR3, and DDR4 was entered into the market and widely used in home/office desktops and laptops.ROM: It stands for Read-Only Memory. The data written or stored in these devices are non-volatile, i.e, once the data is stored in the memory cannot be modified or deleted. The memory from which will only read but cannot write it. This type of memory is non-volatile. The information is stored permanently during manufacture only once. ROM stores instructions that are used to start a computer. This operation is referred to as bootstrap. It is also used in other electronic items like washers and microwaves. ROM chips can only store a few megabytes (MB) of data, which ranges between 4 and 8 MB per ROM chip. There are two types of ROM:PROM: PROM is Programmable Read-Only Memory. These are ROMs that can be programmed. A special PROM programmer is employed to enter the program on the PROM. Once the chip has been programmed, information on the PROM can't be altered. PROM is non-volatile, that is data is not lost when power is switched off.EPROM: Another sort of memory is the Erasable Programmable Read-Only Memory. It is possible to erase the info which has been previously stored on an EPROM and write new data onto the chip.EEPROM: EEPROM is Electrically erasable programmable read-only memory. Here, data can be erased without using ultraviolet light, with the use of just applying the electric field.Primary Storage Devices 2. Magnetic Storage DevicesFloppy Disk: Floppy Disk is also known as a floppy diskette. It is generally used on a personal computer to store data externally. A Floppy disk is made up of a plastic cartridge and secured with a protective case. Nowadays floppy disk is replaced by new and effective storage devices like USB, etc.Hard Disk: Hard Disk is a storage device (HDD) that stores and retrieves data using magnetic storage. It is a non-volatile storage device that can be modified or deleted n number of times without any problem. Most computers and laptops have HDDs as their secondary storage device. It is actually a set of stacked disks, just like phonograph records. In every hard disk, the data is recorded electromagnetically in concentric circles or we can say track present on the hard disk, and with the help of a head just like a phonograph arm(but fixed in a position) to read the information present on the track. The read-write speed of HDDs is not so fast but decent. It ranges from a few GBs to a few and more TB.Magnetic Card: It is a card in which data is stored by modifying or rearranging the magnetism of tiny iron-based magnetic particles present on the band of the card. It is also known as a swipe card. It is used like a passcode(to enter the house or hotel room), credit card, identity card, etc.Tape Cassette: It is also known as a music cassette. It is a rectangular flat container in which the data is stored in an analog magnetic tape. It is generally used to store audio recordings.SuperDisk: It is also called LS-240 and LS-120. It is introduced by Imation Corporation and it is popular with OEM computers. It can store data up to 240 MB.Magnetic Storage Devices3. Flash Memory DevicesIt is a cheaper and more portable storage device. It is the most commonly used device to store data because is more reliable and efficient as compared to other storage devices. Some of the commonly used flash memory devices are: Pen Drive: It is also known as a USB flash drive that includes flash memory with an integrated USB interface. We can directly connect these devices to our computers and laptops and read/write data into them in a much faster and more efficient way. These devices are very portable. It ranges from 1GB to 256GB generally.SSD: It stands for Solid State Drive, a mass storage device like HDD. It is more durable because it does not contain optical disks inside like hard disks. It needs less power as compared to hard disks, is lightweight, and has 10x faster read and writes speed as compared to hard disks. But, these are costly as well. While SSDs serve an equivalent function as hard drives, their internal components are much different. Unlike hard drives, SSDs don't have any moving parts and thus they're called solid-state drives. Instead of storing data on magnetic platters, SSDs store data using non-volatile storage. Since SSDs haven't any moving parts, they do not need to "spin up". It ranges from 150GB to a few more TB.SD Card: It is known as a Secure Digital Card. It is generally used with electronic devices like phones, digital cameras, etc. to store larger data. It is portable and the size of the SD card is also small so that it can easily fit into electronic devices. It is available in different sizes like 2GB, 4GB, 8GB, etc.Memory Card: It is generally used in digital cameras. printers, game consoles, etc. It is also used to store large amounts of data and is available in different sizes. To run a memory card on a computer you require a separate memory card reader. Multimedia Card: It is also known as MMC. It is an integrated circuit that is generally used in-car radios, digital cameras, etc. It is an external device to store data/information.Flash Memory Devices 4. Optical Storage DevicesOptical Storage Devices is also secondary storage device. It is a removable storage device. Following are some optical storage devices: CD: It is known as Compact Disc. It contains tracks and sectors on its surface to store data. It is made up of polycarbonate plastic and is circular in shape. CD can store data up to 700MB. It is of two types:CD-R: It stands for Compact Disc read-only. In this type of CD, once the data is written can not be erased. It is read-only.CD-RW: It stands for Compact Disc Read Write. In this type of CD, you can easily write or erase data multiple times.DVD: It is known as Digital Versatile Disc. DVDs are circular flat optical discs used to store data. It comes in two different sizes one is 4.7GB single-layer discs and another one is 8.5GB double-layer discs. DVDs look like CDs but the storage capacity of DVDs is more than as compared to CDs. It is of two types:DVD-R: It stands for Digital Versatile Disc read-only. In this type of DVD, once the data is written can not be erased. It is read-only. It is generally used to write movies, etc.DVD-RW: It stands for Digital Versatile Disc Read Write. In this type of DVD, you can easily write or erase data multiple times.Blu-ray Disc: It is just like CD and DVD but the storage capacity of blu ray is up to 25GB. To run a Blu-ray disc you need a separate Blu-ray reader. This Blu-ray technology is used to read a disc from a blue-violet laser due to which the information is stored in greater density with a longer wavelength.Optical Storage Devices 5. Cloud and Virtual StorageNowadays, secondary memory has been upgraded to virtual or cloud storage devices. We can store our files and other stuff in the cloud and the data is stored for as long as we pay for the cloud storage. There are many companies that provide cloud services largely Google, Amazon, Microsoft, etc. We can pay the rent for the amount of space we need and we get multiple benefits out of it. Though it is actually being stored in a physical device located in the data centers of the service provider, the user doesn't interact with the physical device and its maintenance. For example, Amazon Web Services offers AWS S3 as a type of storage where users can store data virtually instead of being stored in physical hard drive devices. These sorts of innovations represent the frontier of where storage media goes. Cloud and Virtual Storage Characteristics of Computer Storage DevicesData stored in the Memory can be changed or replaced in case of a requirement, because of the mobility of the storage devices.Storage Devices validate that saved data can be replaced or deleted as per the requirements because the storage devices are easily readable, writeable, and rewritable.Storage Devices are easy and convenient to access because they do not require much skill set to handle these resources.The storage capacity of these devices is an extra advantage to the system.Storage Devices have better performance and data can be easily transferred from one device to another.1. What is a computer storage device? Computer storage device gives a way to the user to store data and safely access it on a computer system. There are various types of storage devices. 2. What are examples of Optic storage devices? Examples of optic devices are CD-ROMs, DVDs, Blu-Disc, etc. 3. Is online cloud storage a device? Online cloud storage is not a device, it is simply a tool where we can store our data files, images, etc. and these data are stored over the internet. Computer Fundamental Tutorial What is a Computer? Basics of Computer and its Operations Advantages and Disadvantages of Computer Classification of Computers Basic Applications of Computers History of Computers Evolution of Generation of Computers Central Processing Unit (CPU) Input Devices What are Different Output Devices? Computer Hardware What is a Computer Software? What is a Motherboard? Random Access Memory (RAM) Hard Disk Drive (HDD) Secondary Memory Introduction to Solid-State Drive (SSD) What is a Graphics Processing Unit (GPU)? What is Power Supply Unit (PSU)? What is a Computer Software? Software and its Types What is Application Software? System Software Utility Software What is a Keyboard? What is a Mouse in Computer? What is a Joystick? What is a Light Pen? What is Scanner? What is Optical Character Recognition (OCR)? What is a Barcode Reader? What is WebCam? What is a Speaker? What is a Printer? What is a Monitor? What is a Plotter? What is a Projector? What are Headphones? What is a Storage Device? Definition, Types, Examples Hard Disk Drive (HDD) Secondary Memory Introduction to Solid-State Drive (SSD) Optical Storage Systems What is Flash Drive? What is a Memory Card? Computer Memory What is Register Memory? Cache Memory Primary Memory Secondary Memory Introduction to memory and memory units Storage devices are essential for saving, retrieving, and managing data in computers and digital devices. Each type of storage device offers unique advantages suited for specific tasks.Modern computers rely on large-capacity storage devices to store files, applications, and operating systems.Types of Storage Devices1. Hard Disk Drive (HDD)Description: HDDs are traditional storage devices that use spinning magnetic disks to store data.Advantages:Large storage capacity.Cost-effective for storing large amounts of data.Common Uses: Storing operating systems, applications, files, and videos.2. Solid-State Drive (SSD)Description: SSDs use flash memory instead of spinning disks, making them faster and more durable.Advantages:Faster data access and boot times.More resistant to shock and physical damage compared to HDDs.Common Uses: Preferred for modern laptops, tablets, and performance-critical systems.SSDs are smaller and lighter than HDDs, making them ideal for portable devices.3. CD-ROM (Compact Disc - Read Only Memory)Description: Optical discs used primarily for reading data, such as music, software, or educational materials.Advantages:Inexpensive and portable.Useful for distributing content.Common Uses: Movies, software installation, and older forms of digital backups.Limitations: Limited storage capacity (650-700 MB) and declining usage due to newer technologies.4. Flash Drives (USB Drives)Description: Small, portable devices that use flash memory for data storage and transfer.Advantages:Compact and easy to carry.Plug-and-play compatibility with most modern computers.Common Uses: Quick data transfers, presentations, and temporary storage.Selecting the Right Storage DeviceChoosing a storage device depends on factors like storage capacity, speed, durability, and budget. For example:HDDs are best for affordable long-term storage.SSDs offer speed and durability for frequent use.Flash drives are ideal for quick and portable data transfers.Understanding the features and capabilities of these devices ensures efficient and practical data management.Last updated on December 12, 2024 Different Types of Computer Storage Devices Image Credit: Jae Young Ju/iStock/GettyImages Like the shelves in a library that store books, computers require a place to store digital data. Most computers use two types of computer storage: primary and secondary memory. Primary storage, which is temporary, is used to store programming instructions, data in use, and the results of data operations. Secondary storage is used for long-term data storage, often on external devices. Primary storage, which is also referred to as internal memory, is accessed by a computer's central processing unit (CPU). It is usually the fastest and most expensive type of memory in the computer. Primary storage uses random-access memory (RAM), cache memory, or some other specialized hardware to store data while the computer is powered on. When power is removed, RAM is wiped clean. The volatile nature of RAM means that additional storage devices are needed that continue to work when a computer is powered off.Secondary storage on a computer is provided by non-volatile devices such as hard disk drives. Even though a hard drive may be housed within a desktop or laptop, it's not considered to be primary because it's not accessed directly by the CPU. Data stored on hard disk drives and most other types of secondary storage devices is organized according to a file system. This type of storage is slower than primary storage, but it's also cheaper.Tertiary storage is a third type of storage not typically found on a personal computer. This kind of storage device consists of high-capacity archives designed to house massive amounts of data on mountable media such as optical discs. The device typically includes a robotic arm or another mechanism that locates media containing specific data and transfers it from a storage location to a drive where the contained data can be accessed. The average personal computer user mainly comes into contact with secondary computer storage devices. These include an internal hard drive and external drives that are typically connected via a standard interface like a USB cable. In the past, many computers came equipped with a drive to read and write CDs and DVDs. Today, this type of disc drive is more often connected as an external device, along with Blue-ray disc drives.Flash drives, also known as thumb drives, have replaced CDs and DVDs as a portable storage medium. They are more compact and connect through a USB port rather than requiring a special drive. Memory cards used in digital cameras are also examples of secondary storage devices. The data stored on the card can be transferred to a computer using a built-in card reader or a reader connected via USB.The solid-state drive (SSD) is a non-volatile storage medium that replaces the hard disk in some computers. Unlike a hard disk that has several moving components that can fail, an SSD has no moving parts. Originally expensive, the cost of SSDs has come down, and they are now often used in desktop and laptop computers. The term cloud storage refers to remote data storage done over a computer network. Instead of using an external device connected to the computer, cloud storage makes use of storage devices located elsewhere and connected by the internet or some other type of network connection. The cloud service provider manages the storage devices and makes sure the data is backed up. Many companies and personal computer users appreciate the managed aspects of cloud storage compared to having to back up data on their own using storage devices such as hard drives and flash drives. Home / Data Storage / Storage Devices A storage device is a piece of computer hardware used for saving, carrying, and pulling out data. It can keep and retain information short-term or long-term. It can be a device inside or outside a computer or server. Other terms for the storage device are storage medium or storage media.A storage device is one of the basic elements of any computer device. It almost saves all data and applications in a computer except for hardware firmware. It comes in different shapes and sizes depending on the needs and functionalities. There are two different types of storage devices: Primary Storage DeviceSecondary Storage DeviceSizeSmallerLargerData RetentionTemporaryPermanentLocationInternalInternal / ExternalExamplesRAM, Cache MemoryHard disk, Compact Disk Drive, USB storage device Magnetic Storage Device one of the most popular types of storage used. Floppy diskette A normal 3 inch disk can store 1.44 MB of data. Hard drive An internal hard drive is the main storage device in a computer. An external hard drive is also known as removable hard drive. It is used to store portable data and backups. Magnetic strip Magnetic tape drive stores video and audio using magnetic tape, like tape and video tape recorders. Super disk A disk drive and diskette that can hold 120 MB and 240 MB of data. Cassette tape A magnetic storage device used for audio recording and playback. Zip diskette Like a floppy diskette but more advanced. Optical Storage Device uses lasers and lights as its mode of saving and retrieving data. Blu-ray disc A digital optical storage device which was intended to replace the DVD format. CD-ROM disc An optical storage device that is read-only or cannot be modified nor deleted. CD-R and CD-RW disc CD-R is a recordable disc that can be written to once, while CD-RW is a rewritable disc that can be written to multiple times. DVD-R, DVD+R, DVD-RW and DVD+RW disc DVD-R and DVD+R are recordable discs that can be written to once, while DVD-RW and DVD+RW are rewritable discs that can be written to multiple times. The difference between the + and is in the formatting and compatibility. Flash Memory Device is now replacing magnetic storage device as it is economical, more functional and dependable. Memory card An electronic flash memory device used to store digital information and commonly used in mobile electronic devices. Memory stick A memory card that is removable. SSD Solid State Drive A flash memory device that uses integrated circuit assemblies to save data steadily. USB flash drive, jump drive or thumb drive A small, portable storage device connected through the USB port. Online and Cloud is now becoming widespread as people access data from different devices. Cloud storage Data is managed remotely and made available over a network. Basic features are free to use but upgraded version is paid monthly as a per consumption rate. Network media Audio, Video, Images or Text that are used on a computer network. A community of people create and use the content shared over the internet. Paper Storage method used by early computers for saving information. OMR stands for Optical Mark Recognition A process of capturing marked data of human from forms like surveys and tests. It is used to read questionnaires with multiple choices that are shaded. Punch card A piece of hard paper used to contain digital information coming from the perforated holes. The presence or absence of holes in predetermined positions define the data. Further Readings: I may earn a small commission if you buy through the links in this website without any extra cost to you. My Recommendations however are not biased in any way.Computers utilize a variety of storage devices and media in order to read and write data. Without permanent or temporary storage, a computer wouldnt function as expected.Most machines would be completely useless without a place to store digital data. Everything from the operating system to programs and individual files exist on storage after all.The early days of computer memory featured magnetic tape and floppy disks. Now things like hard drives, solid state drives, cloud storage services etc are used more often.In general, storage device types can be separated into two broad categories: Nearly a dozen types of permanent storage are available for computers. On the other hand, temporary memory is often limited to Random Access Memory (RAM) and cache memory.Each type of storage or memory comes with its own benefits and disadvantages. Its important to understand what options are available on the market today and decide which solutions make sense for a given computer.Consider the following storage devices used in computer systems starting from permanent storage devices: Types of Permanent Storage DevicesMagnetic Storage Types1. Hard Disk DriveA hard disk drive (HDD) is a non-volatile storage medium. Non-volatile data remains on a given device unless rewritten or deleted.In hard drives, an electromagnet creates positive or negative charges on the disk surface. The charges create binary code read as the rotating disk and actuator arm work in conjunction.Data is read along concentric circles, known as tracks, and sectors, known as wedges. Currently, hard disks remain in regular use but their popularity is diminishing.HDDs come with a variety of benefits, including high storage capacities and overall low cost, thats why they are mostly used for backup and archiving purposes.Alternative forms of storage often cost more for similar storage capacities. These days, a two-terabyte hard drive might cost $50.00 or less.Hard drives include mechanical parts, though, so they wear down over time and are susceptible to sudden data loss from impact damage. Many hard drives feature fast read/write speeds, but other faster storage types are available today.Mechanical HDDs have a rotating head, that is why you will see specs like 7.5K RPM or 10K RPM (Revolutions Per Minute) on HDD devices.Typical Storage Capacity: 500 GB to 4+ TB2. Magnetic Tape DeviceThe Eckert-Mauchly UNIVAC I system originally used magnetic storage device tapes back in 1951. Surprisingly enough, magnetic tape is still used today and sees regular improvements.Data is written onto magnetic tape through various means, which is outside the scope of this description.Its possible to write data onto magnetic tape along its length or width, though. At this point, magnetic tape is used in academic fields and countless other situations such as backup storage systems. Specialized equipment is required to read magnetic tape.For ordinary consumers, magnetic tape might seem like an outdated technology. Researchers continue to develop magnetic tape for commercial use.Tape features higher storage capacities than hard drives, and theyre more reliable than HDDs.They feature a similar overall cost compared to similar hard disks as well. In fact, some analysts predict that the use of magnetic tape will continue to grow and expand. Tape could replace hard drives in commercial settings moving forward.3. Floppy DisksGenerally speaking, floppy disks existed as storage devices from 1971 to 1999. The disk drives required to read floppy disks are no longer included in mainstream computers.Finding a working floppy disk drive outside of industrial settings can prove challenging in some cases.Nonetheless, floppy disks relied on a magnetic disk that could be read and written via read/write heads. Various motors and the floppy disk drive are required in order to access data on floppy disks.In the past, floppy disks came with the benefit of being affordable and relatively fast. They supplemented a computers main storage device well and usually they were used to boot-up a computer (e.g older computers using MSDOS operating system could boot-up using a floppy disk).Most floppy disks held less than two megabytes of data. Unfortunately, floppy disks maxed out at 240 MB of storage space.Although floppy disks are used in industrial settings, consumers often consider them extinct and obsolete compared to hard drives. Floppy disks were manufactured in various sizes over the years.Flash Storage Types4. SSD (Solid State Drive) (Internal Disks)Solid state drives rely upon NAND flash memory to deliver blistering read/write speeds. Transistors are wired in series on a given circuit board, meaning SSDs lack moving parts. For that reason, data can be accessed immediately and without much noise or heat.A computers operating system accesses the storage drive, and SSDs come in both internal and external configurations. Faster read/write speeds lead to better load times, a faster operating system, and other benefits.Typically, SSDs cost more money than HDDs with similar storage capacities. They cannot be beaten on read/write speeds or longevity, though.Solid State Drives degrade in memory quality over millions of write operations, but theyre not susceptible to damage like hard drives.Plus, theyre quieter than hard drives and come in smaller form factors. Portable devices achieve better battery life due to the non-mechanical function, which is always a desirable result.Typical Storage Capacity: 120 GB to 1+ TB5. USB Flash DriveLike SSDs, USB Flash Drives rely upon NAND flash memory. These devices are designed to be portable, pocketable storage solutions.They plug into a computers USB port and feature fast read/write speeds. In simple terms, flash drives are best used as ultraportable storage devices.Flash drives provide an excellent solution for moving files from one device to another quickly. Theyre often used as backup devices for large amounts of data as well.The benefits of USB flash drives speak for themselves. These devices are extremely portable and feature no moving parts, so the data is secure.Also, a variety of storage capacities are available on the market, although capacities over 256 GB are uncommon.It doesnt help that flash drives are expensive compared to HDDs, which feature much higher capacities at lower prices. Such memory sticks serve a variety of purposes, and it never hurts to keep one lying around.Typical Storage Capacity: 8 GB to 256GB (Maximum 2 TB)6. SD CardSD Cards rely upon flash memory and are designed for portable devices such as cameras, smartphones etc. Most laptops and many smartphones feature SD Card readers.For sizing options, manufacturers offer full-size SD, miniSD, and microSD cards with various capacities.Full-size SD cards often slot into desktop PCs and laptops. Cameras and smartphones or tablets often accommodate miniSD or microSD cards.SD cards are categorized by their read/write speed, which can vary 12.5 megabytes per second to 3,938 MB/s.Like USB flash drives, SD Cards are portable and easy to pocket. Smaller capacities are available at competitive pricing compared to flash drives and other memory.Theyre best used as portable device storage or for transferring files between devices. Otherwise, higher capacity cards cost a far more amount of money, and theyre not suitable for running programs or operating systems on computers. A better solution for portable devices and storage might not be available.Typical Storage Capacity: 2 GB to 32 GB and Beyond7. CFexpress CardsCFexpress is a newer memory card format designed for high-performance applications such as professional photography and videography. They offer even faster speeds than XQD cards.Here are the key characteristics of CFexpress cards:1. Speed: CFexpress cards offer incredibly fast read and write speeds, making them ideal for demanding applications such as high-resolution video recording, continuous burst photo shooting, and high-speed data transfer. They can achieve read speeds of up to 1700 MB/s and write speeds of up to 1400 MB/s, depending on the cards specifications.2. Capacity: These cards are available in various storage capacities, typically ranging from 64GB to 1TB or more, catering to the needs of professionals who require ample storage space for their high-resolution content.3. Form Factor: CFexpress cards come in three different form factors: Type A: Similar in size to SD cards, with dimensions of 20mm x 28mm x 2.8mm. Type B: Larger than Type A, with dimensions of 38.5mm x 29.8mm x 3.8mm, similar to XQD cards. Type C: The largest form factor, with dimensions of 54mm x 74mm x 4.8mm, primarily used in professional video cameras.4. Compatibility: CFexpress cards are designed to be backward compatible with select XQD devices, as they share the same form factor (Type B). However, compatibility varies, so its essential to check your devices specifications before purchasing a CFexpress card.5. Durability: These cards are built to withstand harsh conditions, featuring robust construction and resistance to temperature extremes, shock, vibration, and X-rays. They are suitable for use in challenging environments, such as outdoor photography and videography.6. Performance Consistency: CFexpress cards maintain high performance levels even under demanding workloads, ensuring reliable data capture and transfer without dropped frames or data corruption.7. Error Correction: They incorporate advanced error correction technologies to maintain data integrity and protect against data loss due to power failures or sudden ejection.8. Cost: CFexpress cards are generally more expensive than other memory card formats due to their high-end performance and durability. However, prices may vary depending on the brand, capacity, and specifications.8. External USB Hard Disk (SSD)These are portable HDDs or SSDs that connect to a computer via USB, Thunderbolt, or other interfaces. They provide additional storage space and are useful for backing up data or storing large files.Here are some key characteristics and features of external USB hard disks:Portability: External USB hard disks are designed to be portable, making it easy to carry large amounts of data anywhere. They are typically compact and lightweight, fitting easily into a bag or pocket.Storage Capacity: These drives come in a wide range of storage capacities, from a few hundred gigabytes (GB) to several terabytes (TB). This makes them suitable for storing large files such as videos, photos, music, and backups.Interface: The USB interface is the most common connection type for external hard disks. USB 3.0 and USB 3.1 are the standard interfaces, offering faster data transfer speeds compared to the older USB 2.0. USB-C is also becoming more popular due to its reversible connector and high-speed data transfer capabilities.Speed: The data transfer speed of an external USB hard disk depends on the type of USB interface and the internal drive technology. USB 3.0 can transfer data at speeds up to 5 Gbps, while USB 3.1 can reach up to 10 Gbps. The internal drive can be either a traditional Hard Disk Drive (HDD) or a Solid-State Drive (SSD), with SSDs offering significantly faster read/write speeds.Durability: Many external USB hard disks are designed to be durable, with features such as shock resistance and rugged enclosures to protect against physical damage. Some models are specifically built to withstand harsh conditions, making them ideal for use in challenging environments.Power Supply: Most external USB hard disks are powered directly through the USB connection, eliminating the need for an external power source. However, some high-capacity models may require an additional power adapter.Compatibility: External USB hard disks are generally compatible with a wide range of devices, including Windows and Mac computers, gaming consoles, and media players. They often come pre-formatted for a specific operating system but can be easily reformatted to work with other systems.Security: Some external USB hard disks offer built-in security features such as hardware encryption and password protection to safeguard sensitive data. This is particularly important for users who need to protect confidential information.Cost: The cost of external USB hard disks varies based on factors such as storage capacity, speed, brand, and additional features. Generally, HDD-based external drives are more affordable than SSD-based ones.9. M.2 DrivesM.2 is a form factor for SSDs that are smaller and more compact than traditional 2.5-inch SSDs. They are commonly used in laptops and other devices where space is limited.Here are some more details about M.2 drives:1. Form Factor: M.2 SSDs are shaped like a stick of gum making them ideal for slim and lightweight devices such as laptops and ultrabooks. Their small size allows for efficient use of space within computer systems.2. Interfaces: M.2 drives can use two different interfaces: SATA: Similar to traditional 2.5-inch SSDs in terms of speed NVMe (Non-Volatile Memory Express): Offers significantly faster speeds by utilizing PCIe lanes3. Sizes: M.2 drives come in various lengths, typically denoted by a four-digit number (e.g., 2280, 2242). The first two digits represent the width (22mm), while the last two indicate the length (80mm, 42mm, etc.).4. Performance: NVMe M.2 SSDs generally offer superior performance compared to SATA-based M.2 drives. They can achieve read/write speeds of several gigabytes per second, significantly faster than traditional SATA SSDs.5. Compatibility: M.2 slots are commonly found in modern laptops, ultrabooks, and desktop motherboards.6. Capacity: M.2 SSDs are available in a wide range of capacities, from 128GB to 4TB or more, catering to various storage needs.7. Power Efficiency: Due to their lack of moving parts, M.2 SSDs are generally more power-efficient than traditional hard drives, which can contribute to better battery life in laptops.Optical Storage Types10. CDCompact Disks (CDs) are known as optical storage devices. The disks feature microscopic pits and bumps that disk drives read as binary data.While running in an optical disk drive, CDs rotate at a constant speed. A laser glides over the surface of the disk to read the binary data.An optical lens reads this data and sends it to the computer or laptop being used. Depending on the disk type, CDs can be read only or read/write capable.CDs typically contain audio and other small amounts of data. Storage capacity is limited to 700 MB, so theyre not suitable for high definition video storage.Luckily, CDs cost very little money and take up very little space. Theyre prone to scratches that render the disk unreadable, which leads to reliability problems.Not all computers and laptops feature an optical disk drive today, either. Better disk-based storage options are available.Typical Storage Capacity: 700 MB11. DVDOf course, DVDs look like CDs because theyre identical in size. All DVDs feature a spiral track with more data capacity than a CD, though.The DVD drive utilizes a finer laser to read data due to the higher density. In essence, DVDs work exactly like CDs but with higher storage capacities. Dual layering is a process with DVDs that further increases storage capacity.Large amounts of data, including standard definition video, can be stored on DVDs without a problem.The average DVD features 4.7 GB of read/write data today. DVDs have been supplanted by BluRay Disks, so theyre often considered obsolete.Regardless, DVDs are affordable and feature decent storage capacity. Computers from a decade ago typically featured a DVD drive by default. Thats not necessarily the case in 2020, so DVDs should be avoided unless absolutely necessary.Typical Storage Capacity: 4.7 GB12. BluRay DisksThe king of optical storage is the BluRay Disk. Once again, BluRay disks look like a standard CD or DVD. Even more data is packed into the spiral tracks of the disk.An even more specialized violet laser reads the binary data on the disks surface. BluRay disks feature layering technology to increase capacity like DVDs.With that in mind, a BluRay may feature storage capacity anywhere from 25 GB to 128 GB although the most popular capacity sizes are 25GB (single layer) or 50GB (double layer).BluRay disks cost more than CDs and DVDs but should be considered the gold standard of optical media.Multiple high definition movies and other data can be loaded onto a BluRay. Based on capacity alone, BluRay disks make more sense than other optical media solutions. BluRay disk drives dont come standard on all computers, but theyre quite affordable to buy and install.Typical Storage Capacity: 25 GB to 128 GBOnline Storage13. Cloud StorageCloud Storage relies upon data stored on servers accessible at all times over the Internet.Data might be stored on multiple servers to ensure 100% uptime and reliability. To access cloud storage, a computer needs access to the internet and a cloud storage provider.Companies like Amazon, Google, and others offer cloud storage solutions. Data is always accessible and synced from the server to individual devices. Cloud data is essentially always available via the internet.Since cloud storage is, in theory, always accessible, its convenient. A computer with an internet connection should be able to access data within seconds.Location doesnt matter with cloud storage, and a fast connection means instant access.However, cloud storage is typically offered as a service and costs more money based on overall data storage needs.Unavailable internet connections render cloud storage useless, and the overall security of such storage is sometimes questionable (although there are cloud storage services that offer encryption of data as well).Types of Temporary Storage14. RAM (Random Access Memory)Unlike the previously covered storage devices, RAM is volatile data. Data stored in RAM is constantly cycled in and out and disappears after power is removed.A computers CPU accesses RAM, which acts like a middleman between the CPU and non-volatile storage devices.Otherwise, a computer would operate too slow for comfort by relying on non-volatile storage alone. Any data stored in RAM is available to the CPU in quick fashion, acting like the working memory for the CPU.RAM directly affects the performance of a given computer. Most computers need 8 GB of RAM in order to function fast and smooth.Sometimes, 16 GB or more is required for intensive use cases. RAM is quite expensive compared to other storage types but serves an invaluable purpose.A quality RAM module leads to better PC performance and faster loading speeds in various applications.15. ROM (Read Only Memory)As the name suggests, this type of memory can only be read from the computer but you cant write any data to it.Another important characteristic is that ROM does not lose its data when the power is off (i.e it is non-volatile data).ROM is usually used to store critical and essential data that helps to power-up a computer system and to perform an initial hardware test and setup. After the computer powers up, it starts using other types of storage such as hard disk, RAM etc.An example of ROM is the BIOS of the computer (Basic Input Output System) which initializes the hardware and helps to start-up the whole computer system.16. Cache MemoryCPUs feature cache memory embedded in the processing chip. Cache memory is faster than RAM but features much smaller storage capacity.In a basic summary, such memory stores program instructions and similar data a CPU needs to access immediately.This particular setup allows a computer to run faster and process tasks more efficiently. The cache memory handles the minute compute instructions in nanoseconds.Network Based Storage17. NAS (Network Attached Storage)NAS, or Network Attached Storage, is a dedicated file storage system that enables multiple users and heterogeneous client devices to retrieve data from centralized disk capacity.Users on a local area network (LAN) access the shared storage via a standard Ethernet connection using regular TCP/IP communication.NAS systems are flexible and scale out, meaning that as you need additional storage, you can add to what you have.A NAS system is a high-capacity storage device connected to a network that allows authorized network users and heterogeneous clients to store and retrieve data from a centralized location for both file and block data.Some Use Cases of NAS storage include:1. File Storage and Sharing: NAS systems are ideal for centralizing file storage in a safe, reliable, and accessible manner, allowing users within a network to share files seamlessly.2. Home Media Server: Many users set up NAS devices to manage and stream multimedia content, such as music, movies, and photos, across their home network.3. Data Backup: NAS can be used for backing up data from multiple computers on the network, providing a centralized point for storing and managing backups.4. Business Collaboration: NAS allows distributed teams to collaborate by providing remote access to files and data, which is especially useful for teams working from various locations.5. Virtualization: In business environments, NAS can store virtual machines or provide storage for virtualized environments, enabling efficient management and deployment of resources.6. Surveillance: With the addition of surveillance software, NAS devices can be used to store and manage video surveillance footage from IP cameras.These use cases highlight the flexibility and utility of NAS systems in both personal and professional contexts.18. SAN (Storage Area Network)A Storage Area Network (SAN) is a dedicated, high-speed network that interconnects and presents shared pools of storage devices to multiple servers.SANs are designed to handle large amounts of block-level data, which is data stored in volumes or blocks, making it ideal for applications that require high performance and low latency access to storage.SANs typically use Fibre Channel (FC) technology or Internet Small Computer Systems Interface (iSCSI) to provide servers with fast and reliable access to storage devices.Key features of a SAN include: Centralized Storage Management: SANs centralize storage resources, which simplifies management and backup tasks. High Performance: SANs are designed for high throughput and low latency, which is essential for enterprise applications and data-intensive workloads. Scalability: SANs can easily expand to accommodate growing data by adding more storage devices to the network. Reliability and Availability: SANs often include features like redundancy, failover, and robust data protection mechanisms to ensure data is always available and secure. Block-level Storage: SANs provide block-level storage, which is efficient for databases and other applications that require direct, raw access to storage.SAN storage is commonly used in enterprise environments where large volumes of data require fast and reliable access, such as in databases, transaction processing, and data warehousing.What Types of Storage Devices Are Commonly Used Today?In todays world, youll encounter certain storage devices more often than others.RAM and cache memory comprise core parts of a computer. Solid state drives have started to replace hard drives in many computers due to speed and reliability.On top of that, cloud storage continues to creep into the equation, especially for enterprise uses. Regular consumers still utilize USB drives and SD Cards for portability.Conversely, floppy disks have all but died out except for extreme industrial use cases.CDs and even DVDs remain rare in comparison to BluRay disks. Magnetic tape existed over 50 years ago but remains popular in academic and commercial settings.More forms of storage devices are bound to pop up as time goes on. For now, manufacturers continue to develop and refine existing storage devices to increase capacity and reliability.What is the most common type of storage device in computers?The most common type of storage device historically has been the Hard Disk Drive (HDD), which is a magnetic storage device found in both desktop and laptop computers.HDDs have been widely used due to their large storage capacity and affordability. However, in recent years, Solid State Drives (SSDs), which use flash memory, have become increasingly popular because they offer faster data access speeds, lower power consumption, and greater durability due to the lack of moving parts.The choice between HDDs and SSDs often depends on the specific needs and budget of the user.What is the most popular storage size?The most popular storage size for consumer devices like smartphones and computers has been steadily increasing over the years.As of the latest updates, for smartphones, 128GB is a common choice, offering a good balance between price and capacity for many users.In the realm of computers, particularly laptops and desktops, 256GB to 1TB SSDs are commonly used, with 512GB being a popular choice for users who

Application Software? System Software Utility Software What is a Keyboard? What is a Mouse in Computer? What is a Joystick? What is a Light Pen? What is Scanner? What is Optical Character Recognition (OCR)? What is a Barcode Reader? What is WebCam? What is a Speaker? What is a Printer? What is a Monitor? What is a Plotter? What is a Projector? What are Headphones? What is a Storage Device? Definition, Types, Examples Hard Disk Drive (HDD) Secondary Memory Introduction to Solid-State Drive (SSD) Optical Storage Systems What is Flash Drive? What is a Memory Card? Computer Memory What is Register Memory? Cache Memory Primary Memory Secondary Memory Introduction to memory and memory units Storage devices (auxiliary) are needed to permanently save data and programs until they are needed at which time the computer will load them from secondary storage into primary memory.The general term for the secondary storage containers of data and programs is files; however, the term is so general that it has many, often confusing, uses. So, let us first understand the concept of a file here.what is storage deviceIt should be remembered that, although humans envision files containing the number, words, pictures, sounds, etc., everything on secondary storage (as well as in primary storage) are actually composed of bits (binary digits, i.e., 0 or 1) which are the only forms that can be processed by digital computers.Some examples of data files, with a human view of their contents, are:Database files or flat files (often confusingly called data files, simply, files) contain files that contain records that further contain fields.Text files which can be encoded using ASCII or the newer 16-bit Unicode or as document files in which formatting is encoded along with the text, e.g. the .doc files of Microsoft Word. (See the Note at the end of this section.)Spreadsheet files consist of tables of numbers, formulas, or text; the basic unit called a cell, is the intersection of a row and a column.Graphic files contain two basic forms (bitmap images and vector graphics).Audio files contain digitized sounds, and vi) video files contain multiple bitmap images that are displayed sequentially (e.g. 30 frames per second) to give the illusion of motion video.The advantages of storage devices are given below summarises the need for secondary storage devices:CapacityReliabilityCostPortabilityAdvantages of Storage DevicesOrganizations may store the equivalent of a roomful of data on sets of disks that take up less space than a breadbox. A simple diskette for a personal computer holds the equivalent of 500 printed pages or one book. An optical disk can hold the equivalent of approximately 400 books.Data in secondary storage is basically safe since secondary storage is physically reliable. Also, it is more difficult for unscrupulous people to tamper with data on a disk than data stored on paper in a file cabinet. l Convenience. With the help of a computer, authorized people can locate and access data quickly.Together the three previous benefits indicate significant savings in storage costs. It is less expensive to store data on tape or disk (the principal means of secondary storage) than to buy and house filing cabinets. Data that is reliable and safe is less expensive to maintain than data subject to errors.But the greatest savings can be found in the speed and convenience of filing and retrieving data.Data stored in detachable secondary storage devices can be used across various computers without much difficulty.Basically, types of storage devices are classified broadly into two categories. They are:Sequential Access Storage DevicesDirect Access Storage DevicesTypes of Storage DevicesIn Sequential access devices, the data has to be accessed in a pre-defined sequences. This also applies to analogue media like videotapes and audiotapes.The idea even predates magnetic computer storage, e.g. data used to be stored by punching holes in paper tapes. Magnetic tapes and Cartridge/cassette tapes are good examples of sequential access storage devices.The following are the characteristics of sequential access storage devices:No direct access, but very fast sequential access.Resistant to different environmental conditions.Easy to transport, store, cheaper than disk.Before it was widely used to store application data; nowadays, it is mostly used for backups or archives (tertiary storage).Sequential Access Storage Devices Examples:Magnetic TapesCartridge TapesDigital Audio Tapes (DAT)Magnetic tapes are similar to the commonly used audiotapes. It is a long roll of flexible plastic material with a magnetic coating.The magnetic coating consists of small particles of iron oxide mixed with a binding material. Data is stored as a magnetic pattern of bits on tracks that run the length of the tape. A magnetic spot represents a 1; no magnetic spot represents a 0.In a magnetic tape unit, the read-write heads are kept stationary and the tape is moved past them (See the figure below). The tape unwinds from one reel, passes through the read-write mechanism, and winds on to the second reel.A tape contains 9 tracks, 8 for a byte of data and one for a parity bit used for checking for errors. Each character or byte of data is recorded across the tape, with one bit of the character or byte on each track. The remaining tract is used for checking the accuracy of recording.When data is recorded on a tape it may get corrupted due to some malfunction of the system. Such corruption of data may occur even when the tape is not in use. Several methods are available for detecting such errors.These tapes are quarter-inch wide and are sealed in a cartridge much like an audio cassette tape. Unlike a half-inch tape discussed in section 3.4.1 above, these tapes record information serially in a track with one head. When the end of the tape is reached the tape is rewound and data is recorded on the next track.There are 9 to 30 tracks and data is recorded in a serpentine fashion. Data bits are serial on a track and blocks of around 6000 bytes are written followed by error-correction code to enable correction of data on reading if any error occurs.The density of these tapes is around 16000 bpi in modern tapes. The tape store is around 500 Mb. These tapes are usually interfaced with a computer using SCSI standards.This is the latest addition to the tape family. This uses 4 mm tape enclosed in a cartridge. It uses a helical scan, read after write recording technique which provides reliable data recording. Helical scan records at an angle to the tape. The head spins at a high speed while the tape moves. Very high recording densities are obtained.The tape length is either 60 meters or 90 meters. It uses a recording format called Digital Data Storage (DDS), which provides three levels of error-correcting code to ensure excellent data integrity. The capacity of this tape is up to 4 GB with a data transfer speed of 366 KB/sec. This tape also uses the SCSI interface.Direct access (often misleadingly called random access) is characteristic of disks. Thus the idea predates computer storage, e.g. phonograph records are direct access analog storage.In order to store files on any disk that disk must be formatted, i.e. initialized so that data can be stored in an organized manner; this organization is characteristic of the Operating System (O.S.) being used.Therefore a Windows-based computer can not read Mac files, Unix files, etc. unless special translation software is available. Formatting creates sectors and tracks (See below) on which the data is stored and creates a file directory (called a file allocation table or FAT in Windows) which is loaded into RAM along with the O.S. when the system boots.Direct access storage is currently dominated by magnetic media (hard disks, removable hard disks, and floppies), but magneto-optical and read/write optical media (DVD, DVD-RAM, and DVD+RW) promise to revolutionize storage technologies.Direct Access Storage Devices Examples:Magnetic DisksOptical DisksMagnetic disks are the most popular medium for direct-access secondary storage. A magnetic disk is a metal or plastic platter that resembles a groveless phonograph record. Like the songs on a sound tape, the data records organised on a magnetic tape must be retrieved according to the storage sequence.And like the music, the data recorded on a magnetic disk can also be accessed in a sequence if they have been organised in a way that supports such retrieval. Read/Write heads are tiny electromagnets that can read, write, or erase the polarised spots that represent data on magnetic media.When such heads are fastened to an arm in a disk storage device, they can be moved quickly and directly to any disk location to store or retrieve data.This data is encoded as magnetic bit patterns, which can be created or read by the read/write head of the disk drive. Data is directly accessed by rotating the disk beneath an actuator (single disk) or access arms (multi-disk) which move the read/write head in and out across the tracks.Hard DisksDiskettes (floppies)Hard CardsCartridge DiskMagneto-Optical DisksTypes of Magnetic DisksHard Disks: are rigid aluminium platters coated with magnetic oxide whose high precision provide the highest storage capacities and quickest access rates of all magnetic media. This requires a contaminant-free environment; if contaminants do reach the disk surface a crash occurs where a scratch on the disk surface results in data loss.Hard disks, currently reaching double-digit GB ranges, have the advantage of being the fastest mass storage but are permanent (i.e. the storage disks can not be switched). High-capacity storage units of all sizes that use sealed housings are often called Winchester disks.Diskettes (floppies) are made of flexible Mylar plastic coated with magnetic oxide. They come in 8, 5.25, and 3.5-inch sizes, can have single (SD), double (DD), or high densities (HD), and can be either single- or double-sided.Older diskettes, 5.25 DD that hold 360 KB, 3.5 DD that hold 720 KB, and 3.5 HD diskettes that hold 1.4 MB are all virtually obsolete now because the LS-120 Super Drive (120MB) can store about hundred times the equivalent of an HD floppy and Sonys HD (200MB) will be able to store about two hundred HD floppies! Both can read and write standard floppy disks as well.Hard Cards are hard disks that are mounted directly on their interface card and fit directly into the expansion slots on a PC motherboard.Cartridge Disk drives are devices that accept small removable (but hermetically sealed) disk cartridges (typically 3.5 with 10 MB to single digit GB storage capacity.) This blend of the advantages of hard disks and floppies will, no doubt, revolutionise mass storage in the near future.Magneto-Optical Disks (read/write/erasable) are often confusingly categorised as optical disks because lasers are used to read data as well as facilitate writing data. However, the data is stored magnetically in microscopic magnetic domains. When the high-power laser heats the magnetic storage film the domains can be aligned in higher densities than on regular magnetic disks, thus giving higher storage capacity than hard disks.Data is retrieved by reflecting a low-power polarised laser beam off of the magnetic film. The polarisation of reflected beam can be interpreted as binary data.Data is encoded on the disk surface by a laser beam either burning holes (ablative method) or heating the surface until bubble forms (bubble method). Data, text, audio signals and video images are stored as digitised patterns in frames. Data is read when the surface reflects light through a series of mirrors to a photodiode (which converts light to electrical signals).Digital data is represented as a series of Pits (a little depression, forming a lower level in the track) and Lands (the flat part between pits, or the upper levels of the track. The storage capacity is around 650 MB.CD-ROMWORMRead/write Optical disksTypes of Optical DisksCD-ROMCD-ROM is a read-only, removable medium with a large data storage capacity (630MB) which makes it is a suitable storage medium for the distribution and online use of encyclopedias and dictionaries; conceptually, CD-ROM data storage is similar to magnetic disk; data is stored in form of blocks on the disk.The blocks can be arranged in files, with a directory structure similar to, although larger than, that of magnetic disks.WORM: (digital data; Write Once Read Many) the most popular of which are recordable CD called CD-R, for compact disk recordable. l Video disk: (analog data, read only) stores text, graphics, video images, and audio signals.Read/write Optical disksRead/write capability has only recently been made possible on Optical media. (CD-ROMs have been available for a long time, but they are read-only. Also WORM (write once, read many) drives can not be used as secondary storage because data can be stored on them only once.) True read/write technology.However, is becoming available and will, no doubt, revolutionize secondary storage capabilities. Technologies include CD-RW, DVD, DVD-RAM.Its worth bearing in mind that, while external devices bring multiple advantages around portability, they also carry an increased risk of loss and physical damage. The external storage options range from modern, more expensive technology, all the way through to near-redundant legacy media formats. Well run through the most common varieties to give you an idea of whats available. External HDDs and SSDs You can get both HDD and SSD devices as external hard drives. These generally offer the largest storage capacity among the external options available to you. External HDDs and SSDs serve the same purpose as their internal counterpartsstoring databut they work very differently inside, and thats what makes SSDs faster and more reliable than HDDs. SSDs are much faster than HDDs, which makes them popular when you require quick file access and data transfer. Most external hard drives can connect to any computer; theyre not tied to one device, so theyre a decent solution for transferring files across devices. Flash memory devices Flash memory devices, such as USB flash drives and memory cards, provide a reliable means of transporting smaller files. They're widely compatible with devices featuring USB ports, though newer computers might require an adapter. Despite being surpassed by other options in many ways, they remain a popular choice for their ease of use and portability. Legacy storage Its unlikely youll be using these day to day, but there are a number of older external storage methods that you may be able to use, depending on what you are trying to store and the devices youre using. Examples of these legacy external storage formats include: Optical mediasuch as CDs, DVDs, and Blu-ray discs. Most devices no longer include a disk drive, so you would need an external USB device to use them Floppy diskslargely obsolete, these were once a common method of file storage before CDs took over as the default external storage for PCs in the late 1990s Generally speaking you wont be looking to use legacy external storage media. However, if you are working with older technology, you may be required to use one of these formats. The storage unit is a part of the computer system which is employed to store the information and instructions to be processed. A storage device is an integral part of the computer hardware which stores information/data to process the result of any computational work. Without a storage device, a computer would not be able to run or even boot up. Or in other words, we can say that a storage device is hardware that is used for storing, porting, or extracting data files. It can also store information/data both temporarily and permanently. Types of Computer MemoryPrimary MemorySecondary MemoryTertiary Memory1. Primary Memory: It is also known as internal memory and main memory. This is a section of the CPU that holds program instructions, input data, and intermediate results. It is generally smaller in size. RAM (Random Access Memory) and ROM (Read Only Memory) are examples of primary storage. 2. Secondary Memory: Secondary storage is a memory that is stored external to the computer. It is mainly used for the permanent and long-term storage of programs and data. Hard Disks, CDs, DVDs, Pen/Flash drives, SSD, etc, are examples of secondary storage. 3. Tertiary Memory: Tertiary Memory is a type of Memory that is rarely used in personal computers and due to this, tertiary memory is not considered to be an important one. Tertiary memory works automatically without human intervention. Types of Computer Storage DevicesNow we will discuss different types of storage devices available in the market. These storage devices have their own specification and use. Some of the commonly used storage devices are: Primary Storage DevicesMagnetic Storage DevicesFlash memory DevicesOptical Storage DevicesCloud and Virtual Storage1. Primary Storage DevicesRAM: It stands for Random Access Memory. It is used to store information that is used immediately or we can say that it is a temporary memory. Computers bring the software installed on a hard disk to RAM to process it and to be used by the user. Once, the computer is turned off, the data is deleted. With the help of RAM, computers can perform multiple tasks like loading applications, browsing the web, editing a spreadsheet, experiencing the newest game, etc. It allows you to modify quickly among these tasks, remembering where you're in one task once you switch to a different task. It is also used to load and run applications, like your spreadsheet program, answers commands, like all edits you made within the spreadsheet, or toggle between multiple programs, like once you left the spreadsheet to see the email. Memory is nearly always actively employed by your computer. It ranges from 1GB - 32GB/64GB depending upon the specifications. There are different types of RAM, and although they all serve the same purpose, the most common ones are :SRAM: It stands for Static Random Access Memory. It consists of circuits that retain stored information as long as the power supply is on. It is also known as volatile memory. It is used to build Cache memory. The access time of SRAM is lower and it is much faster as compared to DRAM but in terms of cost, it is costly as compared to DRAM.DRAM: It stands for Dynamic Random Access Memory. It is used to store binary bits in the form of electrical charges that are applied to capacitors. The access time of DRAM is slower as compared to SRAM but it is cheaper than SRAM and has a high packaging density.SDRAM: It stands for Synchronous Dynamic Random Access Memory. It is faster than DRAM. It is widely used in computers and others. After SDRAM was introduced, the upgraded version of double data rate RAM, i.e., DDR1, DDR2, DDR3, and DDR4 was entered into the market and widely used in home/office desktops and laptops.ROM: It stands for Read-Only Memory. The data written or stored in these devices are non-volatile, i.e, once the data is stored in the memory cannot be modified or deleted. The memory from which will only read but cannot write it. This type of memory is non-volatile. The information is stored permanently during manufacture only once. ROM stores instructions that are used to start a computer. This operation is referred to as bootstrap. It is also used in other electronic items like washers and microwaves. ROM chips can only store a few megabytes (MB) of data, which ranges between 4 and 8 MB per ROM chip. There are two types of ROM:PROM: PROM is Programmable Read-Only Memory. These are ROMs that can be programmed. A special PROM programmer is employed to enter the program on the PROM. Once the chip has been programmed, information on the PROM can't be altered. PROM is non-volatile, that is data is not lost when power is switched off.EPROM: Another sort of memory is the Erasable Programmable Read-Only Memory. It is possible to erase the info which has been previously stored on an EPROM and write new data onto the chip.EEPROM: EEPROM is Electrically erasable programmable read-only memory. Here, data can be erased without using ultraviolet light, with the use of just applying the electric field.Primary Storage Devices 2. Magnetic Storage DevicesFloppy Disk: Floppy Disk is also known as a floppy diskette. It is generally used on a personal computer to store data externally. A Floppy disk is made up of a plastic cartridge and secured with a protective case. Nowadays floppy disk is replaced by new and effective storage devices like USB, etc.Hard Disk: Hard Disk is a storage device (HDD) that stores and retrieves data using magnetic storage. It is a non-volatile storage device that can be modified or deleted n number of times without any problem. Most computers and laptops have HDDs as their secondary storage device. It is actually a set of stacked disks, just like phonograph records. In every hard disk, the data is recorded electromagnetically in concentric circles or we can say track present on the hard disk, and with the help of a head just like a phonograph arm(but fixed in a position) to read the information present on the track. The read-write speed of HDDs is not so fast but decent. It ranges from a few GBs to a few and more TB.Magnetic Card: It is a card in which data is stored by modifying or rearranging the magnetism of tiny iron-based magnetic particles present on the band of the card. It is also known as a swipe card. It is used like a passcode(to enter the house or hotel room), credit card, identity card, etc.Tape Cassette: It is also known as a music cassette. It is a rectangular flat container in which the data is stored in an analog magnetic tape. It is generally used to store audio recordings.SuperDisk: It is also called LS-240 and LS-120. It is introduced by Imation Corporation and it is popular with OEM computers. It can store data up to 240 MB.Magnetic Storage Devices3. Flash Memory DevicesIt is a cheaper and more portable storage device. It is the most commonly used device to store data because is more reliable and efficient as compared to other storage devices. Some of the commonly used flash memory devices are: Pen Drive: It is also known as a USB flash drive that includes flash memory with an integrated USB interface. We can directly connect these devices to our computers and laptops and read/write data into them in a much faster and more efficient way. These devices are very portable. It ranges from 1GB to 256GB generally.SSD: It stands for Solid State Drive, a mass storage device like HDD. It is more durable because it does not contain optical disks inside like hard disks. It needs less power as compared to hard disks, is lightweight, and has 10x faster read and writes speed as compared to hard disks. But, these are costly as well. While SSDs serve an equivalent function as hard drives, their internal components are much different. Unlike hard drives, SSDs don't have any moving parts and thus they're called solid-state drives. Instead of storing data on magnetic platters, SSDs store data using non-volatile storage. Since SSDs haven't any moving parts, they do not need to "spin up". It ranges from 150GB to a few more TB.SD Card: It is known as a Secure Digital Card. It is generally used with electronic devices like phones, digital cameras, etc. to store larger data. It is portable and the size of the SD card is also small so that it can easily fit into electronic devices. It is available in different sizes like 2GB, 4GB, 8GB, etc.Memory Card: It is generally used in digital cameras. printers, game consoles, etc. It is also used to store large amounts of data and is available in different sizes. To run a memory card on a computer you require a separate memory card reader. Multimedia Card: It is also known as MMC. It is an integrated circuit that is generally used in-car radios, digital cameras, etc. It is an external device to store data/information.Flash Memory Devices 4. Optical Storage DevicesOptical Storage Devices is also secondary storage device. It is a removable storage device. Following are some optical storage devices: CD: It is known as Compact Disc. It contains tracks and sectors on its surface to store data. It is made up of polycarbonate plastic and is circular in shape. CD can store data up to 700MB. It is of two types:CD-R: It stands for Compact Disc read-only. In this type of CD, once the data is written can not be erased. It is read-only.CD-RW: It stands for Compact Disc Read Write. In this type of CD, you can easily write or erase data multiple times.DVD: It is known as Digital Versatile Disc. DVDs are circular flat optical discs used to store data. It comes in two different sizes one is 4.7GB single-layer discs and another one is 8.5GB double-layer discs. DVDs look like CDs but the storage capacity of DVDs is more than as compared to CDs. It is of two types:DVD-R: It stands for Digital Versatile Disc read-only. In this type of DVD, once the data is written can not be erased. It is read-only. It is generally used to write movies, etc.DVD-RW: It stands for Digital Versatile Disc Read Write. In this type of DVD, you can easily write or erase data multiple times.Blu-ray Disc: It is just like CD and DVD but the storage capacity of blu ray is up to 25GB. To run a Blu-ray disc you need a separate Blu-ray reader. This Blu-ray technology is used to read a disc from a blue-violet laser due to which the information is stored in greater density with a longer wavelength.Optical Storage Devices 5. Cloud and Virtual StorageNowadays, secondary memory has been upgraded to virtual or cloud storage devices. We can store our files and other stuff in the cloud and the data is stored for as long as we pay for the cloud storage. There are many companies that provide cloud services largely Google, Amazon, Microsoft, etc. We can pay the rent for the amount of space we need and we get multiple benefits out of it. Though it is actually being stored in a physical device located in the data centers of the service provider, the user doesn't interact with the physical device and its maintenance. For example, Amazon Web Services offers AWS S3 as a type of storage where users can store data virtually instead of being stored in physical hard drive devices. These sorts of innovations represent the frontier of where storage media goes. Cloud and Virtual Storage Characteristics of Computer Storage DevicesData stored in the Memory can be changed or replaced in case of a requirement, because of the mobility of the storage devices.Storage Devices validate that saved data can be replaced or deleted as per the requirements because the storage devices are easily readable, writeable, and rewritable.Storage Devices are easy and convenient to access because they do not require much skill set to handle these resources.The storage capacity of these devices is an extra advantage to the system.Storage Devices have better performance and data can be easily transferred from one device to another.1. What is a computer storage device? Computer storage device gives a way to the user to store data and safely access it on a computer system. There are various types of storage devices. 2. What are examples of Optic storage devices? Examples of optic devices are CD-ROMs, DVDs, Blu-Disc, etc. 3. Is online cloud storage a device? Online cloud storage is not a device, it is simply a tool where we can store our data files, images, etc. and these data are stored over the internet. Computer Fundamental Tutorial What is a Computer? Basics of Computer and its Operations Advantages and Disadvantages of Computer Classification of Computers Basic Applications of Computers History of Computers Evolution of Generation of Computers Central Processing Unit (CPU) Input Devices What are Different Output Devices? Computer Hardware What is a Computer Software? What is a Motherboard? Random Access Memory (RAM) Hard Disk Drive (HDD) Secondary Memory Introduction to Solid-State Drive (SSD) What is a Graphics Processing Unit (GPU)? What is Power Supply Unit (PSU)? What is a Computer Software? Software and its Types What is Application Software? System Software Utility Software What is a Keyboard? What is a Mouse in Computer? What is a Joystick? What is a Light Pen? What is Scanner? What is Optical Character Recognition (OCR)? What is a Barcode Reader? What is WebCam? What is a Speaker? What is a Printer? What is a Monitor? What is a Plotter? What is a Projector? What are Headphones? What is a Storage Device? Definition, Types, Examples Hard Disk Drive (HDD) Secondary Memory Introduction to Solid-State Drive (SSD) Optical Storage Systems What is Flash Drive? What is a Memory Card? Computer Memory What is Register Memory? Cache Memory Primary Memory Secondary Memory Introduction to memory and memory units

What are the two main types of storage devices. What are the two storage devices. Different storage types. What are the two types of secondary storage devices. What are the two main types of storage devices in a computer. What are the two types of storage devices in computer. What are the 2 types of storage devices.