COMP 1011

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ADVANCEMENTS IN PYHSICAL DEVICES:

Size VS Capacity

TOPIC #5 (HARDWARE)

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Abstract

The purpose of this research is to gather information on the various types of physical storage devices and comment on their size related to their storage capabilities. In this research, storage devices such as the hard disk drive, flash drives, CD and DVD drives, CD-RW drives and Blu-ray drives were discussed along with solid-state storage devices including the USB flash drive, Express cards, Flash Memory card and Smart cards. Information was gathered via websites and articles on the World Wide Web along with chapters from Information Technology and Computer Science textbooks. The findings of this research report consist of the demand for advancements in physical storage devices with respect to its size and relating storage capacities.

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Introduction

Storage refers to the ways a computer system retains software and data for future use. It relies on hardware components, collectively called storage devices such as **hard disks, flash memory, USB devices, CDs and DVDs**, on which data is held. Many organizations increasingly turn to computer storage systems since it can include one or several of these mediums, to store all of their computer software, data and information. This happens because relying on paper for storage is more expensive and allows no opportunity for electronic manipulation and sharing. A simple storage device is able to store the amount of information that would cost $10,000 to store on paper for less than $10 per gigabyte (1 billion characters). Moreover, storage devices are increasing in capacity to the point that they can hold an entire library's worth of information.

Types of Physical Storage Devices

Storage also known as mass storage or secondary storage refers to a way in which the computer system retains data and software for future use. This software and data are stored on hardware devices including hard disk drives (HDD), flash drives, USB Flash drive, CD and DVD drive, CD-RW drives and Blu-ray discs.

Hard disk drives: The most important storage device. It is a high-speed device and has high capacity, it is considered secondary storage that is, it is storage that is completely separate from the computer itself. The storage is permanent (non-volatile). Hard disk drives use a coating of magnetic material to store data on rotating discs (platters) on concentric rings by a read write head.

Additionally, their storage capacity can be up to 1 terabyte, it is large compared to modern storage devices. However, they have evolved and gotten smaller in size and can store more data, up to 12 terabytes.

https://goo.gl/images/WTPzKv

In fact, Western Digital, an American computer hard disk drive manufacturer company recently announced that they have plans for developing an HHD with "ultra-high capacity, of up to 40 terabytes, made possible by new technology such as Microwave- Assisted Magnetic Recording and Heat- Assisted Magnetic Recording (HAMR)".

Flash drive: Also known as solid state drives (SSD) uses solid state circuitry, they have no moving parts. Data is stored electronically on what is known as a chip in "blocks" and deleted using an electric charge. However, the flash drive has a limit of 100,000 write cycles.

Because they are lighter and use less power, they are becoming highly preferable over hard disk drives, even though they are more expensive and have less capacity. They can hold up to 1 GB.

USB flash drives: Another advanced form of flash memory is the USB Flash drive, also known as thumb drives and memory sticks. They are portable or removable devices, it doesn't require a device driver. Due to their small size and ease of use, they have superseded floppy disks and zip disks. These two are now considered as legacy technology.

Advancements in USB flash drives are being made. At present there is a dual USB drive from SanDisk. One side is the regular chunky USB shape and size while the other side is the thin connector, that is "taking over the tech world by storm." According to SanDisk's Jared Peck (2015). USB flash drives can hold up to 64GB.

CD and DVD Drives: Are storage devices that are referred to as optical storage devices. They are used by individuals to store movies and music. Nowadays these movies can be downloaded directly from the Internet and no longer needs to be stored on a CD or DVD. Thereby forcing manufacturers of computers to exclude CD or DVD ports and make it as an external drive to purchase separate and connected via USB ports.

http://globalfuze.com/wp-content/uploads/2013/03/dvd-drive.jpg

CD-ROM: Compact disc read only memory and DVD, digital video disc read only memory, records data on the surface of flat plastic discs in microscopic indentations called pits by a laser light. The data on CD-ROM cannot be altered. Both are inexpensive. CD-ROMs can store up to 700 MB, they are different from data CDs and audio CDs while DVD-ROMs store data up to 17GB. DVDs transfer rates are much quicker than CD. DVDs are 12 Mbps whereas CD drives are150Kbps.

CD-RW Drives: CDs later evolved and became modified to CD-RE drives, compact disc-rewritable drives. In this case the data can now be altered and erased. However, it is more expensive, they are also called burners and provide full read/write capabilities. They have not changed in shape but their storage capacity has increased up to 650 MB.

Blu-ray Disc: Is the latest form of optical storage devices. It got its name from the blue-violet laser beam that is used to read and write data. It was developed to store large amounts of data that offers up to five times the storage of a traditional DVD.

A single layer can hold up to 25GB while a dual layer disc can retain up to 50 GB. This extra capacity combined with advanced video and audio features offers an HD experience. In the future data capacity can be increased by adding more layers to the discs.

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Solid-state Storage Devices

Solid-state storage devices (SSDs) are devices which retain the data stored even after they have been removed from the computer or disconnected from the power source. They consist of nonvolatile memory chips and have many advantages compared to mechanical storage devices such as the hard drive. SSDs are small, portable, lightweight and highly reliable. Examples include the USB flash drive as previously described, Express cards, flash memory cards and smart cards.

Express Cards: An ExpressCard is a proprietary printed circuit board that uses slots to enable a computer system with additional features through a computer bus. This computer bus transfers information between the peripheral device and the computer's internal hardware. Express cards use two form factors standards known as the ExpressCard/34 and the ExpressCard/54. The 34mm slot is only used with 34mm cards, whereas the 54mm slot can be used with both the 34mm and 54mm cards. ExpressCards used as storage devices are typically used to transfer data from one computer to another and can hold a maximum of 2.5GB.

https://c.slashgear.com/wp-content/uploads/2008/11/expresscard.jpg

Flash Memory cards: Flash memory cards or storage cards are devices that use nonvolatile semiconductor memory to store various types of data including pictures, text, audio and video on portable or remote computing devices. Most products utilize flash memory, but other memory

technologies are currently under development. Flash Memory cards come in varying sizes with the storage capacities directly related to their price. In order for a flash memory card to be used, the device must contain a compatible flash memory reader which is a slot or compartment where the flash memory card can be inserted. Compared to the smart card, which is also a memory card, the flash memory card is smaller, requires less power and has higher storage capabilities. SanDisk offers the highest capacity SD card at 512GB.

http://cdn.gadgetreview.com/wp-content/uploads/2014/08/flash-memory-cards.jpg

Smart cards: A smart card is a card that stores information on a microprocessor or memory chip rather than the magnetic stripe found on ATM and credit cards. They have a maximum storage hold of 256KB and look like typical credit cards. Smart cards are read either by physical slots or short-range Wi-Fi via near field communication. The cards are used for transferring financial information along with a variety of identification purposes. Some companies use smart cards as identification cards for added security for not only the organization but for the people that work there. Transactions made with smart cards are encrypted and cannot be hacked.

http://techblogcorner.com/wp-content/uploads/2017/11/smart-cards-uses-techblogcorner.jpg

Advancements in Physical Storage Devices

Holographic Storage: this type of storage seeks to combine two laser beams to create a pattern on photosensitive media resulting in a three-dimensional (3D) image. It is being enabled with much higher density storage and archival capabilities. The goal with this development it to store terabytes of data on a very flat surface – no thicker than the width of several CD's.

Wireless Memory Cards: This memory card uses all the features of a typical flash memory card but combines them with wireless circuitry. This enables the card to be wirelessly connected to a PC which allows for easy transfer of storage such as pictures. Digital photography currently utilizes this technology but more uses are being developed. The Eye-Fi wireless memory card currently stores up to 2GB of data.

Racetrack Memory: With today's demand of more storage space on reduced object sizes, racetrack memory tends to eliminate the use of physical hard drives and flash memory completely. This new technology is currently being developed to use the spin of electrons to store information. Transferring and receiving would be done at much higher rates with the storage capability of 10,000x more than today's hard drive and flash memory.

Conclusion

In final, it can clearly be seen that storages devices are specially designed and built for the collection of data. These devices include the hard disks, flash memory, USB devices, CD and DVD devices and much more. This also comprises of the solid-state storage devices such as express cards, flash memory cards and smart cards. These devices basically retain all the information or data that have been removed from the computer or disconnected from a power source. Research shows that there are upcoming advancements in physical storage devices still under development and these are holographic storage, wireless memory cards and racetrack memory. These three technological advancements basically show the increasing demand for higher storage capacities within a reduced size and even educating one's perspective on modern technology as of today. In the end, storage devices play a critical role in computer science and technology and continues to advance with respect to size versus capacity.

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