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Hierarchy and Characteristic of Storage Devices

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Abstract

This paper explores information about hierarchy and characteristic of storage devices. Lack of knowledge about storage device that used by everyone in the world is the main background of this paper. People can understand what the different types, function, advantage, and disadvantage of several storage devices. This paper examines several articles from an online source and writer's experience in use of storage devices. In order to gain a complete understanding of Storage Device's types, divisions, functions and relationships, it is necessary to conduct a study that examines all parts of the storage device. It is important to gain knowledge about storage device because in this modern age, every information stored as data more efficient, less space, and can easily access. The needs of each individual will be different, will be better if we know about what we do, what we need, and what best storage device that can suit our activities.

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1. Introduction

Allen, S. C. (1996), the development of technology cannot be resisted. Chernock, R. S., Dettori, P., Schaffa, F. A., & Seidman, D. I. (2004), the technology of computer makes our life more efficient. We can easily access, share and store any information that stored at the computer. From the past, we carry our own data stored in paper or documents but now we just store every data in a single device, for example, is flash drive / USB. Imagine there is a university that has many student data and stores all of the data just on paper, how many papers will be used, and how much time wasted when they want to find one of the student data. Therefore, device storage is a critical need for this development of technology cannot be resisted. Federighi, C., & Rowe, L. A. (1994, April), the technology of computer makes our life more efficient. We can easily access, share, and store any information that stored at the computer. From the past, we carry our own data stored in paper or documents but now we just store every data in a single device, for example, is flash drive / USB. Imagine there is a university that has many student data and stores all of the data just on paper, how many papers will be used, and how much time wasted when they want to find one of the student data. Therefore, device storage is a critical need for this modern age. Prahlad, A., Kavuri, S., Madeira, A. D., Lunde, N. R., Bunte, A. G., May, A., & Schwartz, J. (2008), it is important for us to know what types and function of every storage device that we can use for different needs.

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2. Research Methods

The present study applied qualitative methods. All data is analyzed descriptively. It is used a paraphrase to explain, elaborate, and explore regarding the phenomenon belonging. The conclusion is the last remarked based on the previous described.

3. Results and Analysis

Kottomtharayil, R., & Chen, H. C. (2010), storage Devices (SD) is a device for recording information (storing data). A Storage Device may hold information, process information, or both. Devices that process information (data storage equipment) may either access a separate portable (removable) recording medium or a permanent component to store or retrieve data.

Mattson, R. L., Gecsei, J., Slutz, D. R., & Traiger, I. L. (1970), storage Device has four hierarchy, primary storage, a second storage, tertiary storage, and off-line storage. Primary storage is the main memory or internal memory of the computer. Second storage is an external memory or auxiliary memory. Tertiary storage is a third level storage such as cloud storage. Off-line storage is computer data storage on a medium or a device.

Primary storage is the only one directly accessible to the CPU. The CPU continuously reads instructions stored there and executes them as required. Any data actively operated on is also stored therein in a uniform manner. Random Access Memory (RAM) and Read Only Memory (ROM) is the example of primary storage type.

Xu, J., Wang, K., Zu, S. Z., Han, B. H., & Wei, Z. (2010), the secondary storage is often formatted according to a file system format, which provides the abstraction necessary to organize data into files and directories, providing also additional information (called metadata) describing the owner of a certain file, the access time, the access permissions, and other information. Examples of secondary storages are a hard disk drive, flash memory, floppy disk, magnetic tape, paper tape and punched cards.

Typically, it involves a robotic mechanism which will mount (insert) and dismount removable mass storage media into a storage device according to the system's demands; this data is often copied to secondary storage before use. It is primarily used for archiving rarely accessed information since it is much slower than secondary storage (e.g. 5–60 seconds vs. 1–10 milliseconds). This is primarily useful for extraordinarily large data stores, accessed without human operators. Typical examples include tape libraries and optical jukeboxes.

Off-line storage is used to transfer information since the detached medium can be easily physically transported. Additionally, in case a disaster, for example, a fire, destroys the original data, a medium in a remote location will probably be unaffected, enabling disaster recovery. Off-line storage increases general information security, since it is physically inaccessible from a computer, and data confidentiality or integrity cannot be affected by computer-based attack techniques.

Storage technologies at all levels of the storage hierarchy can be differentiated by evaluating certain core characteristics as well as measuring characteristics specific to a particular implementation. These core characteristics are volatility, mutability, accessibility, and addressability. For any particular implementation of any storage technology, the characteristics worth measuring are capacity and performance.

Non-volatile memory retains the stored information even if not constantly supplied with electric power. It is suitable for long-term storage of information. Volatile memory requires constant power to maintain the stored information. The fastest memory technologies are volatile ones, although that is not a universal rule. Since the primary storage is required to be very fast, it predominantly uses volatile memory.

Mutability has three categories, read/write storage or mutable storage that allows information to be overwritten at any time for example hard disk drive, read-only storage that retains the information stored at the time of manufacture and write-once storage, for example, CD-ROM and CD-R, slow write fast read storage which allows information to be overwritten multiple times but with the operation being much slower than the read operation, for example, is CD-RW.

Accessibility has two categories, random access, and sequential access. Random access can access any location in storage at any moment in approximately the same amount of time, such characteristic is well suited for primary and secondary storage, most semiconductor memories, and disk drives provide random access. Sequential access pieces of information will be in a serial order, one after the other; therefore the time to access a particular piece of information depends upon which piece of information was last accessed. Such characteristic is typical of off-line storage.

Addressability is about storage device that can access different location, file, or content. Location-addressable storage usually limits to primary storage, accessed internally by computer programs, since location-addressability is very efficient, but burdensome for humans. For file-addressability information is divided into files of variable length, and a particular file is selected with human-readable directory and file names, the underlying device is still location-addressable, but the operating system of a computer provides the file system abstraction to make the operation more understandable, secondary tertiary and off-line storage for example. Content-addressability each individually accessible unit of information is selected based on the basis of (part of) the contents stored there. Content-addressable storage can be implemented using software (computer program) or hardware (computer device), with hardware being faster but more expensive option. Hardware content addressable memory is often used in a computer's CPU cache.

4. Conclusion

In order to gain a complete understanding of Storage Device's types, divisions, functions and relationships, it is necessary to conduct a study that examines all parts of the storage device. It is important to gain knowledge about storage device because in this modern age, every information stored as data more efficient, less space, and can easily access. The needs of each individual will be different, will be better if we know about what we do, what we need, and what best storage device that can suit our activities.

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