



Computer Workshop

EC4 - Group 1D

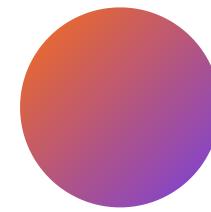


- **Content:-**
 - 1. History of storage devices**
 - 2. SSD and HDD**
 - 3. Advantage of using SSD**
 - 4. Future of storage device**



History of Storage devices

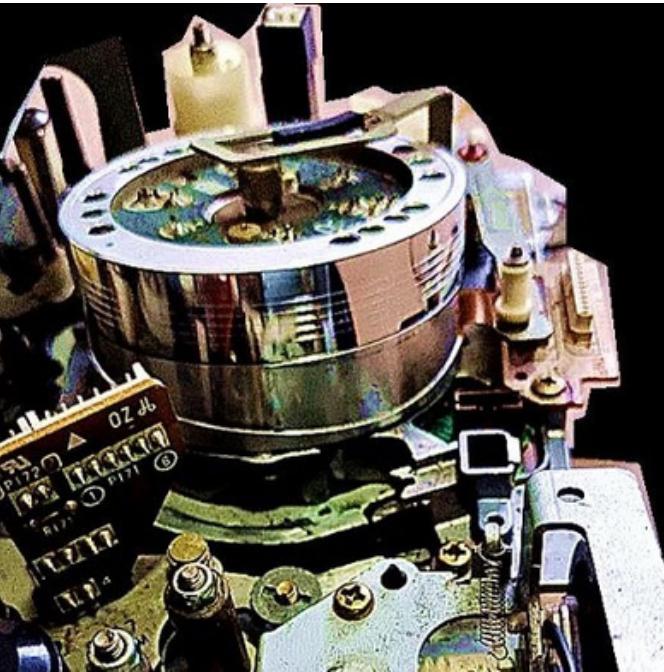
- Some people say that "most technology products are destined to be open for only a short period of time." Today, I intend to talk about the evolutionary history of storage devices in the age of technology.
- Punched cards and punched paper tapes--the original storage form of mechanized information
- In 1890, the American statistician Herman Hollerith invented the punch-card tabulating machine that can record up to 960 bits for collecting and counting census data. It marks the beginning of the era of semi-automatic data processing systems. It has gradually been widely used in the fields of industrial retrieval and data statistics.



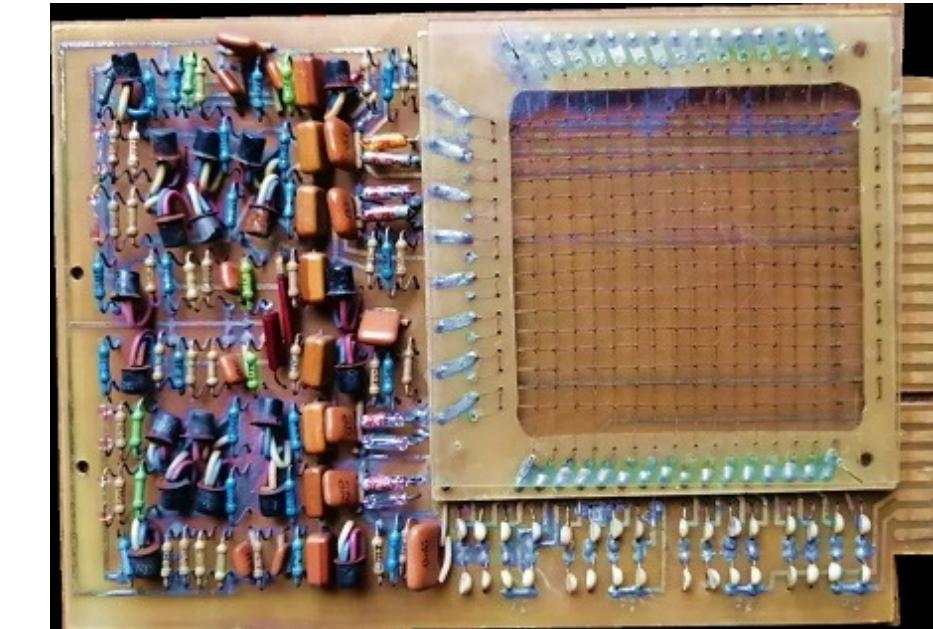
Some storage devices from past is in following slides



Magnetic tape



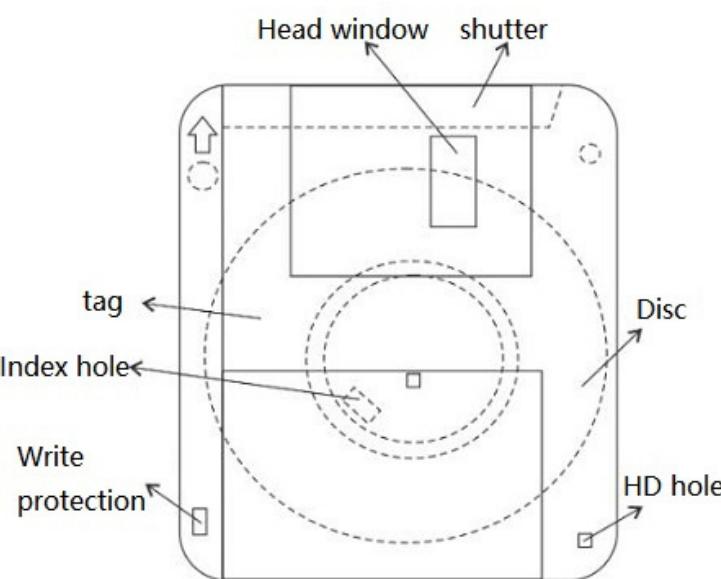
Drum memory



Magnetic core memory



Hard disk drive



Floppy disk



CD



Solid state drive



SD card



USB flash drive



Our topic is SSD and HDD



SSD



HDD

Hard Disk Drive

- A hard disk drive (HDD), hard disk, hard drive, or fixed disk is an electro-mechanical data storage device that stores and retrieves digital data using magnetic storage with one or more rigid rapidly, HDDs use spinning disks to write and store data, and their speed is generally measured in RPM (Rotations Per Minute) in line with this.
- Data is accessed in a random-access manner, meaning that individual blocks of data can be stored and retrieved in any order. HDDs are a type of non-volatile storage, retaining stored data when powered off.
- Modern HDDs are typically in the form of a small rectangular box.

HDD was invented by IBM team
in 1954



More about HDD

- A solid-state drive (SSD) is a solid-state storage device that uses integrated circuit assemblies to store data persistently, typically using flash memory, and functioning as secondary storage in the hierarchy of computer storage.
- It is also sometimes called a semiconductor storage device, a solid-state device or a solid-state disk
- Even though SSDs lack the physical spinning disks and movable read-write heads used in hard disk drives (HDDs) and floppy disks.
- SSD also has rich internal parallelism for data processing.

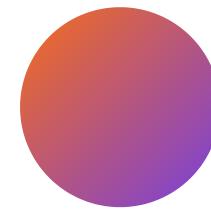


Solid State Drive

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SSD introduced by SanDisk
in 1991 by capacity 20 MB





Basic SSD types :-



- **2.5 inch SATA SSD**



- **M.2 SATA SSD**



- **M.2 NVMe SSD**

Major difference between SSD and HDD

SSD	HDD
0.1 ms	Access times SSDs exhibit virtually no access time 5.5 ~ 8.0 ms
SSDs deliver at least 6000 io/s	Random I/O Performance SSDs are at least 15 times faster than HDDs 400 io/s
SSDs have a failure rate of less than 0.5 %	Reliability This makes SSDs 4 - 10 times more reliable HDD's failure rate fluctuates between 2 ~ 5 %
SSDs consume between 2 & 5 watts	Energy savings This means that on a large server like ours, approximately 100 watts are saved HDDs consume between 6 & 15 watts
SSDs have an average I/O wait of 1 %	CPU Power You will have an extra 6% of CPU power for other operations HDDs' average I/O wait is about 7 %
the average service time for an I/O request while running a backup remains below 20 ms	the I/O request time with HDDs during backup rises up to 400~500 ms
SSDs allow for much faster data access	



Boottime of same
configuration system

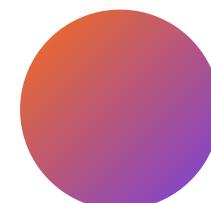




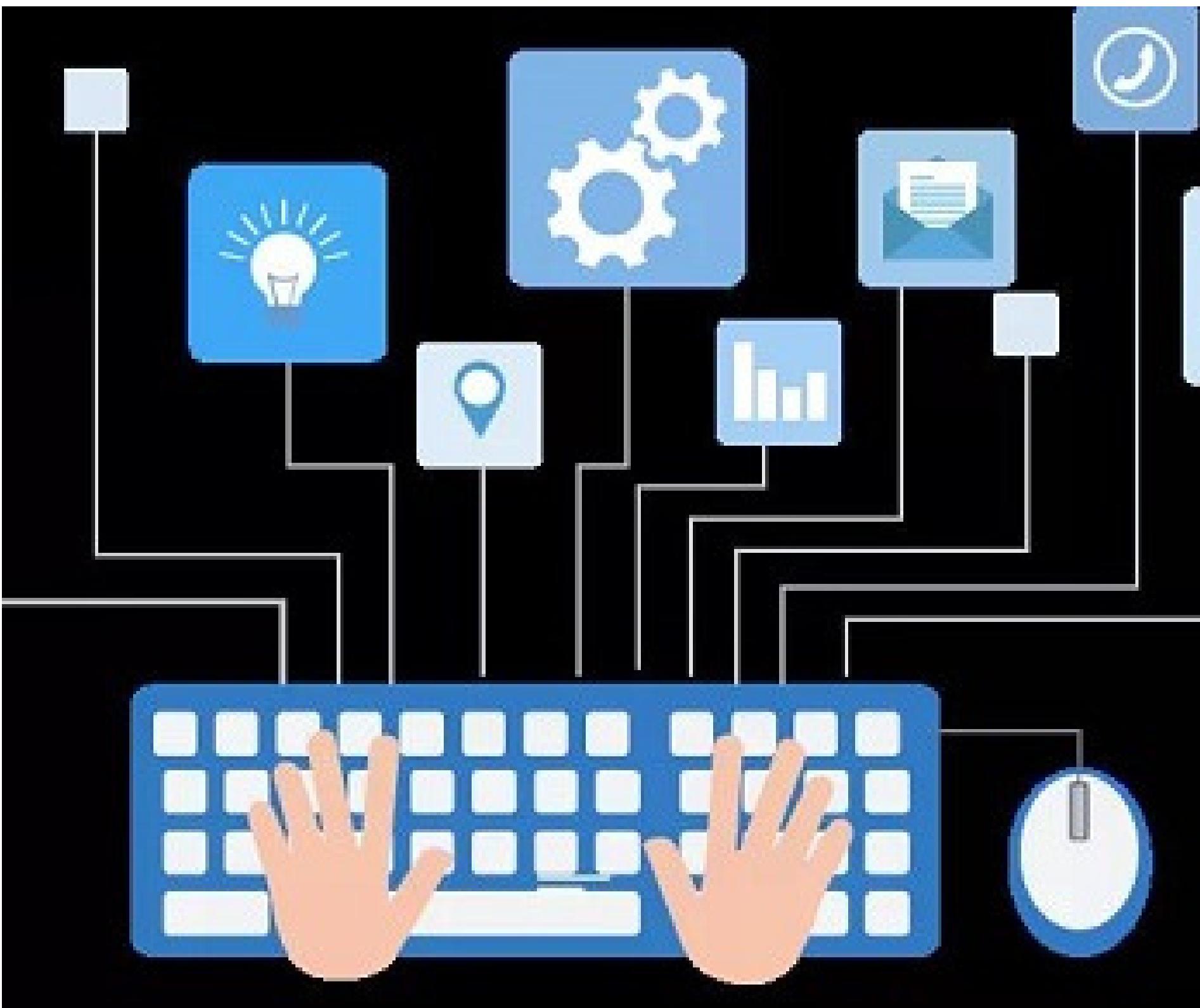
Conclusion



In coming years SSD will replace HDDs.



Future of data storage



Cloud storage

With the rapid development of cloud computing, big data, the Internet of Things, and artificial intelligence, people are also ushering in the era of "information explosion". Information has exploded, and storage is accelerating. It is believed that with the continuous advancement of technology, storage devices, as carriers of information, will also develop faster. Let's talk about the storage technology of the future.



Cloud storage

- Nano storage uses various methods to fundamentally improve storage capacity and replace existing storage media with ultra-high-density media and devices. This is a major development direction for future storage devices.
- Cloud storage-storage technology that continues to evolve
- Finally, I will briefly talk about cloud storage. Generally speaking, cloud storage is to store storage resources in a collection composed of many storage devices and servers. Users can connect to the "cloud" through any networkable device to conveniently access data anytime and anywhere.



Cloud storage provider



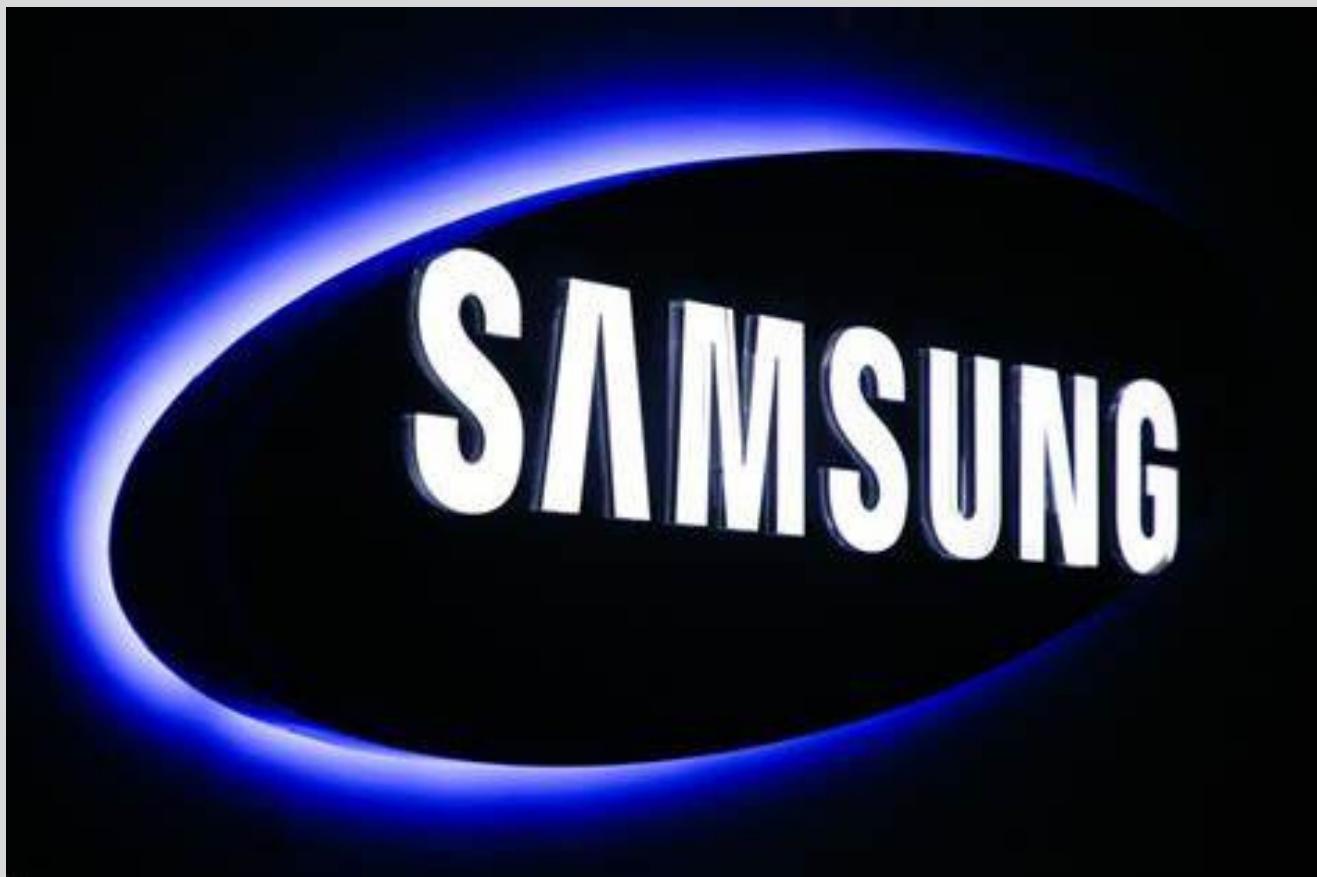
Cloud based companies



Netflix



Facebook



Samsung

Engineering Quotes

*"Science is about knowing;
Engineering is about doing."*



Thank You

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