

Secondary Storage Devices

This kind of storage is a means of storing large amounts of data permanently for future use. A computer system will have at least one form of secondary store or backing store as it is sometimes called. There are two modes of secondary storage: serial access and direct access.

Serial Access Devices: In these storage devices, records are stored one after the other and, in order to access a record, the computer has to go through all the previous records. Serial access is ideal for billing and payroll applications. Serial access devices tend to be slow to access data. An example of a storage device that could only be accessed serially is magnetic tape.

Direct Access Devices: In these devices, records are also stored one after the other but each record could be accessed directly. This means that if the computer needs to access record 5, there is no need to go through all the previous four records, but go directly to record 5. Most computer applications, such as a booking system, use direct access. Magnetic disk is an example of a storage device that could be accessed directly.

All the storage devices could be divided into categories according to the way they store the data, that is, magnetic, optical or electronic.

Magnetic Media

These storage devices use the principle of magnetism where data is stored as electromagnetic charges on a coating of magnetic material. Where an area is electromagnetically charged it means binary '1' and where it is not, means '0'.

Magnetic Tape

Magnetic tapes are only used for backups as they use serial access and therefore they are quite slow. Modern magnetic tape consists of a flexible tape packaged in cartridges and cassettes and a special tape drive is required to access magnetic tapes.

- Can store up to around 5TB, although one can find tapes that can store around 300TB of data
- Slower than most devices as it has a high access time
- Cheap to buy
- Used to backup data



Floppy disk

Nowadays floppy disks are obsolete. A floppy disk was made up of one flexible disk held in a protective plastic jacket which was 3½ inches wide. It is quite small and lightweight and therefore portable, easy to carry around. A floppy drive is required to access floppy disks.



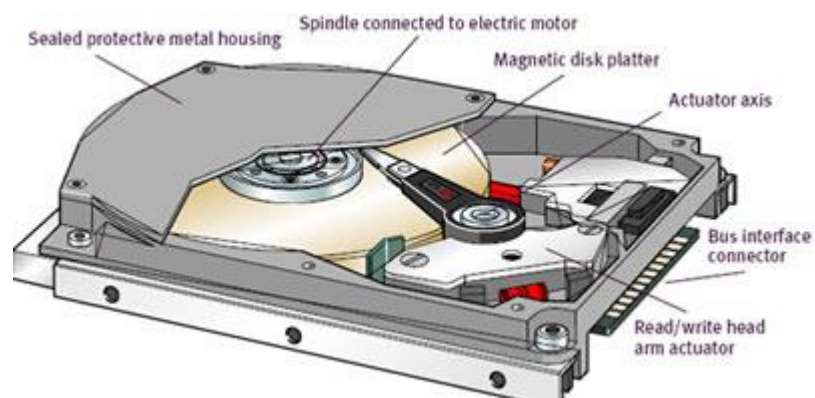
- Very cheap
- Small, lightweight and portable
- Allow direct access
- Easily damaged, short shelf life, susceptible to dirt and humidity
- Slow since they have a high access time
- Very low in capacity (1.44Mb)

Hard Disk Drive

A hard disk is made up of a stack of rotating metal disks, called platters, mounted on a spindle sealed inside a container. The container contains a motor for rotating these disks together at constant speed. The container also contains an access arm and read-write heads for every disk and so they are very fast. These heads float just above the surface (they never touch) to such precision that data can be packed very tightly.

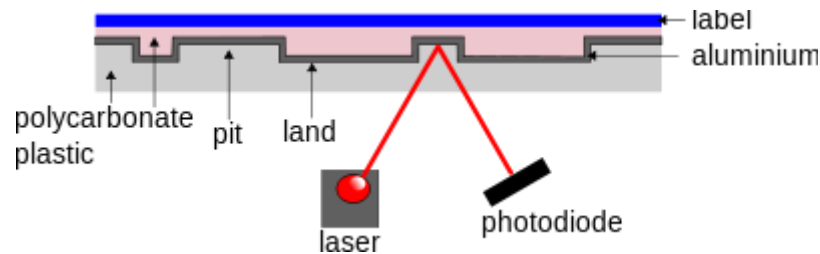


- Can store a large amount of data, around 6TB
- Has very low access time, currently the lowest
- Is very reliable since the stack of disks is sealed and therefore it is protected from dust
- Is always getting larger but cheaper
- Not portable. External hard disks exist and are portable
- Backup is important because if the hard disk fails, all data is lost



Optical Disks

Optical storage makes use of a reflective layer of a disk found between the top protective cover layer and a bottom polycarbonate layer. Data is written on these disks by burning microscopic spots off the aluminium disks using a high power laser beam. The burnt spots, or the non-reflective spots, are called pits and represent a logic '0'. Shiny spots, or the flat areas, are called lands and represent a logic '1'. To read data from an optical disk, a laser projects a tiny beam of light on the surface and the amount of reflected light determines whether the area is a 1 or 0. Optical disks allow direct access.



CD/DVD

A CD (Compact Disk) or DVD (Digital Versatile Disk) can only store information that the manufacturer records on it. The user can only read it. CDs are mainly used to store multimedia and gaming applications while the most significant developing sector of DVDs is in the film industry as DVDs have a much larger capacity than CDs.

- Portable
- Capacity of CD of around 650MB to 700MB
- Capacity of DVD of 4.7GB
- Slower than hard disks and electronic devices
- Reliable although can be easily scratched
- Cheap

CD-R / DVD-R

This type of disk allows users to write on it or add data to it. However, data could not be erased from it and it is recorded only once. Moreover, the user must have a CD/DVD writer in order to write on a CD-R or DVD-R disks.

CD-RW / DVD-RW

These disks allow the user to read, delete and re-write on the disks for a limited amount of times. However, these disks do not allow editing and manipulation of documents stored on them.

Blu-Ray Disks

These are optical disks which however use a different kind of blue laser instead of the red laser used in CDs and DVDs, hence the name Blu-Ray. The use of a blue laser made it possible to increase the capacity of these disks to up to 25GB and therefore they can be used to store high-definition multimedia files on them.

Electronic Devices

These new devices are also referred to as solid-state devices. The major difference between electronic devices and magnetic/optical devices is that they do not have any moving parts. They are made of a circuit on a small pc board and they do not have any mechanical parts.



- Very fast
- Capacity depends on type of device but they have a large capacity when compared to other devices
- Expensive when compared to other devices
- Very robust, very difficult to damage



These solid-state devices come in different formats such as solid-state drives, flash drives and USB pen drives. Flash memory comes in the form of small memory cards and is mainly used in portable devices such as digital cameras and smart phones. The capacity of such cards ranges from 2GB to 16GB. A Pen drive is a flash memory card connected to a USB connector. It has replaced the floppy disk as it is portable and has a much higher capacity of up to 64GB. Solid State hard disks are also entering the market replacing the magnetic hard disk. They have already surpassed the capacity of 320GB but they are still very expensive.

Secondary Storage – Review

Type	Advantage	Disadvantage	Typical Use	Typical Capacity
Floppy Disk	cheap, portable	low capacity, slow access, easily damaged	transfer data to other computers	1.44MB
Magnetic Tape	high capacity	slow, serial data access	backup data	Up to 5TB
Hard Disk	very fast, large capacity, robust	not portable unless it is external	store data permanently	Up to 5TB
CD	adequate capacity, portable	slow access, read only,	reference material	650 - 700MB
DVD	large capacity, portable	slow access, read only,	multimedia files	4.7GB
Electronic Devices	large capacity, very robust, very fast	Expensive	store data permanently or to transfer	2GB – 320GB