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Storage devices

By the end of this unit you should be able to:

- List various types of storage media and their practical applications

Unit at a glance

- Storage devices are used to preserve files in a form that can be read by the computer. Some storage devices are:
 - Compact disk (CD-ROM and CD-RW).
 - Digital video disk (DVD).
 - Floppy disk.
 - Hard disk.
 - Flash drives.
 - Memory cards.

Storage devices

When a computer is switched off, the data that is in the main memory of the central processing unit is erased. Secondary **storage** devices are used to retain data and programs until they are needed again. These devices are also called **auxiliary storage** or **backing store**. Storage devices include floppy disks, hard disks, optical disks, flash drives and memory cards.

Disks are used to store information.

As has already been explained, data in a computer is represented as a series of coded electrical impulses called bits. A group of bits called a byte is used to represent each character. All information on computers is stored in **files**. The size of a file is measured in bytes.

All disks need a drive from which they get information (this is also called 'reading'),

and they put information onto the disk (also called 'writing'). Each drive is designed for a specific type of disk whether it is a CD, DVD, hard disk or floppy disk. The disk is the **storage medium** which contains computer files such as data or programs. The disk drive is the **storage device** that runs the disk, or reads from and writes to the disk.

Disks are either magnetic or optical (Figure 4.1). A **magnetic disk** stores data by magnetising microscopic particles of iron oxide. These particles are then oriented in either a positive (north) or negative (south) direction to represent the on-off pattern of the bits. Magnetic disks include floppy disks and hard disks. An **optical disk** stores data as microscopic light-and-dark spots on the disk surface. The dark spots are called **pits** while the lighter non-pitted areas are called **lands**. The pattern of pits and lands represent binary-coded data. The optical disk drive uses a laser light to read this data. Optical disks include compact disks (CDs) and digital video disks (DVDs).

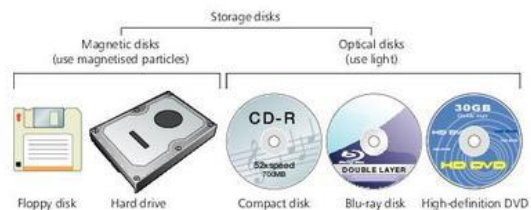


Figure 4.1 Magnetic and optical disks

Hard-disk drive

The **hard-disk drive** consists of one or more flat, rigid platters about 3.5 inches in diameter, mounted on a spindle inside a sealed case. The disks are made of aluminium or glass and are coated with magnetic iron oxide particles. The disks spin rapidly, making thousands of rotations per minute. Each disk has at least one read/write head which moves in and out from the centre of the disk to locate data. This enables data to be accessed quickly and directly. Hard disks are the most commonly used storage media. This is because:

- They have large storage capacity.
- They are fast and relatively cheap.
- The information on a hard disk can be stored and deleted as necessary.



Figure 4.2 A hard disk

Hard disks are usually found inside the computer, but there are also external hard drives, available as a separate component. These are useful for adding capacity to a computer. Newer computers have hard drives of more than 200 GB.

DID YOU KNOW?

The hard disk makes over 7,000 revolutions each minute. That is fast! It means that the computer can access data very quickly from this device.

To do

Find out how many bytes make up the following units:

- A kilobyte.
- A megabyte.
- A gigabyte.
- A terabyte.

Floppy disk

A **floppy disk** or **diskette** is a thin, flexible magnetic disk enclosed in a rigid plastic body. Diskettes are still a popular means of transporting information, although they are rapidly being replaced by higher capacity alternatives. They are still used by some persons because they are extremely cheap, small and relatively durable.



Figure 4.3 A diskette and disk drive

Magnetic tape

Magnetic tape used for computer storage resembles audio cassette tape. It is used mainly as a backup storage medium. It takes a relatively long time to retrieve data from magnetic tape. With the development of faster, low-cost storage devices, magnetic tape is not used as frequently.



Figure 4.4 Magnetic tape

Compact disk

Compact disks or CDs can store large amounts of information. One CD can store 650 MB of data or about 70–80 minutes of music. A compact disk may be CD-ROM, CD-R or CD-RW. CD-ROM stands for **compact disk read-only memory**. Your computer can only read the data on a CD-ROM. You cannot write any additional data to it. Likewise, a CD-ROM drive is designed to read the disk; you cannot ‘burn’ a CD with a CD-ROM drive. CD-RW stands for **compact disk – read/write**. CD-RW drives can copy information or burn information onto a blank CD. **Read-only CD** blanks (CD-R) can only be written to once. The more expensive **Read/Write CDs** (CD-RW) allow you to erase and write over existing data several times.

DVD disk

DVD disks can store over 4 GB. **DVD-R** drives allow you to record large files, such as movies, on a single disk. A DVD-R drive can also read and write compact disks. DVD-RW disks may be reused several times.

Blu-ray is a newer version DVD that uses a blue laser instead of the traditional red laser. Blue light has a shorter wavelength, enabling far more data to be stored on the same-size disk. A Blu-ray DVD can store up to 50 GB of data, over 12 times more than a standard DVD.

Flash drives



Figure 4.5 Flash drives

The **flash drive** is a small, relatively inexpensive, portable storage device that connects to the computer via a USB port (Figure 4.5). It is known by a variety of names, including memory stick, thumb drive, USB drive, key drive, finger stick, pen drive, jump drive, disk-on-key and memory key. Some flash drives offer as much as 128 GB of storage, and the capacity continues to increase.

Memory cards

A **memory card** is a small plastic-coated rectangle that can be used to store data, including photographs, videos and text files. It is also called a storage card or flash memory card. This versatile storage medium is used in different types of device including digital cameras, music players, cell phones, laptops and game consoles. Memory cards are popular because they are small, lightweight, durable and can be swapped among many different devices.



Figure 4.6 Memory card reader

Changing technology

Computer devices are constantly being developed and improved. The aim is usually to offer faster, smaller and higher-capacity alternatives. You can keep abreast of the latest developments in computer technology by browsing the Internet or reading trade magazines.

DID YOU KNOW?

Information that we save is placed on a storage medium such as a floppy disk or compact disk. When the computer reads the data, input is taking place. When the computer writes the information on the disk, output occurs. Therefore, the storage devices really perform a combination of input, output and storage.

To do

Identify the use and benefits of each storage device.

My glossary

Write definitions of the following terms.

Auxiliary storage	Magnetic disk
Backing store	Magnetic tape
Files	Memory card
Flash drive	Optical disk
Floppy disk	Storage devices
Hard-disk drive	Storage medium

Examination-type questions

- 1 a Define the terms:
- (i) Auxiliary store
 - (ii) Bit
 - (iii) File (6 marks)
- b Arrange the following in order of capacity, from largest to smallest:
Hard disk Memory card CD Diskette (4 marks)
- c Differentiate between:
- (i) Magnetic disks and optical disks
 - (ii) Hard disks and diskettes
 - (iii) Storage device and storage medium
 - (iv) CD/R and CD/RW (8 marks)
- d Magnetic tapes were once commonly used. Why are they no longer very popular? (2 marks)