Storage Types, Devices and Characteristics

You must be able to:

- Describe the need for secondary storage
- Explain the term 'data capacity'
- Describe common types of storage media and devices and their characteristics
- Explain the most suitable choice of storage device for a given application.

What is Secondary Storage and Why Do We Need It?

- Away from the CPU and motherboard, **secondary storage** refers to the devices used to store programs, documents and files.
- These devices need to be **non-volatile**, otherwise we would need to install programs every time we wanted to use them.
- Data is stored magnetically, optically or electronically (SSD using flash memory).

Key Point

Non-volatile secondary storage means that data is still intact when the power source is removed.

Data Capacity and File Size

- The choice of secondary storage depends on the capacity of the device compared with the file size of the data to be stored.
- Common **storage capacities** are described in the tables on the next page and are based on the following units of measurement:

– 1 character	=	1 bit
– 4 bits	=	1 nibble
– 8 bits	=	1 byte
– 1000 bytes	=	1 kilobyte (KB)
– 1000 kilobytes	=	1 megabyte (MB)
– 1000 megabytes	=	1 gigabyte (GB)
– 1000 gigabytes	=	1 terabyte (TB)
– 1000 terabytes	=	1 petabyte (PB)

- Please note that you may also see sizes referred to as 1024 rather than 1000. This is because 1024 is a power of 2 in relation to binary calculations.

Comparing Secondary Storage Media

- Optical, magnetic and SSD secondary storage devices can be categorized by their properties to help decide on the most appropriate storage device for any situation.
- Characteristics used to compare devices are capacity, speed, portability, durability, reliability and cost.

Key Point

Although visually very similar, optical discs come in many different formats.

Revise

Magnetic storage

Technology

Hard drives contain spinning magnetic discs, accessed by an arm that moves across the surface to read and write data.

Advantages

- High capacity at a low cost.
- Fast data access.

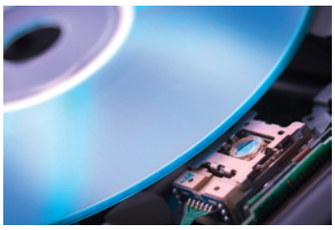
Common usage

- Desktop PCs.
- **Network storage**.
- Backup systems.
- Large document files.

Disadvantages

- The disk will eventually fail.
- Easily damaged, resulting in corruption of data.
- Large physical size.
- Complex moving parts.

Optical storage



Technology

A track of pits spirals from the centre to the edge of the disc. Read by a laser and lens, this pattern is converted into binary data stream that can contain digital text, images, sound and video.

Advantages

- Cheap to manufacture.
- Very portable.
- Widely available.

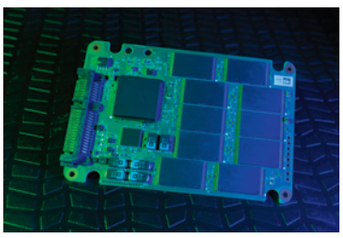
Common usage

- Storing music, video and games.
- CD (compact disc) 700 MB.
- DVD (digital versatile disc) 4.7–9.4 GB.
- Blu-ray 25–128 GB.

Disadvantages

- Discs can be damaged easily and degrade over time.
- Limited capacity.
- Compatibility issues between players.

SSD storage



Technology

A grid of electrical cells divided into sections called pages and then into **blocks** are used to send and receive data.

Advantages

- Faster read/write access than magnetic storage.
- Small size.
- No moving parts.
- Ideal for USB (Universal Serial Bus) and other portable devices.

Common usage

- USB portable drives.
- Smartphone and digital camera memory.
- Laptop hard drives.

Disadvantages

- More expensive per GB than magnetic or optical storage.
- Can wear out over time.

Quick Test

1. Give three reasons why games consoles use optical discs to store games.
2. Why is a magnetic hard drive not very durable?
3. Name five portable uses of SSDs.

Key Words

secondary storage
non-volatile
storage capacities
network storage
blocks