

Input, Output and Storage Devices

Barcode Reader:

- Barcodes are used to uniquely identify millions of products
- There are two main types:
 - 1D Barcode (linear): Holds a limited amount of data, most often seen on goods sold in shops
 - 2D Barcode (QR): Can encode more complex information, often used in mobile apps
- There are two main types:
 - Laser Scanners (supermarket checkout):
 - Camera-based readers: used in smartphones (with image processing software)

Digital Camera

- Digital cameras use either a:
 - Charge-coupled device (CCD) sensor
 - Produces higher quality images (used in high end cameras)
 - Uses much more power than CMOS
 - Complementary Metal Oxide Semiconductor (CMOS) sensor
- Normally, the image is greyscale
- To make a colour image, the sensors are placed behind coloured filters

Laser Printer:

- Produces high quality printing at high speeds
- Maximum quality is around 1200dpi (not photorealistic)
- Colour laser printers use four different toner colours (Cyan, Magenta, Yellow or black)
 - Process is slower as it must do one run per colour

RFID:

- RFID tags store information, used to track products and animals
- They can be read without line of site from up to three hundred meters away
- There are two types:
 - Active tags
 - Larger, onboard battery, actively transmits a signal
 - Passive tags
 - Smaller, relies on radio waves from a reader to provide EM power
 - The RFID tag can then send its data

Magnetic Storage

- Any devices which store data using magnetic fields
- Examples: magnetic tapes, old floppy disks
- Cheapest, Large capacity, Slow access times
- Fragile (due to delicate nature of moving parts (platters, read/write head))
- Strong magnetic fields can damage the data
- Ideal for companies, offices, schools, and large data centres. Not good for mobile devices

Optical storage

- Any devices which store data using optical lasers
- CDs, DVDs, and Blu-ray disks
- Cheap (but expensive for large amounts of data), Light weight, Highly Portable, Resilient
- Slowest, Prone to scratches
- Popular for music and films

Solid-State devices

Input, Output and Storage Devices

- Any devices which store data using electrical charges
- USB memory sticks, Solid State drives, microSD cards
- Durable (no moving parts), Reliable, fastest, and silent, Large storage capacity
- Expensive, limited read/write cycles
- Excellent choice for mobile devices (phones, tablets)

Secondary storage: Used to store data permanently.

Six key factors: Capacity, Speed, Portability, Durability, Reliability, And Cost.

Volatile memory: loses stored data when the power supply is lost or interrupted.

RAM

- Large, Volatile, read-write
- Stores the data and instructions of the programs currently running on the computer
- Faster access speeds than the hard disk (since it is closer to the CPU)
- Can be removed and updated

ROM

- Small, Non-volatile, read-only
- Stores some of the BIOS and the MAC address
- Solid-State, allowing fast access to data
- Can be accessed at any time, by anything, and will return data from any address
- Stuck to the motherboard, so cannot be removed

When you need to store a massive amount of data, use Virtual Storage.

Advantages:

- Easier to manage backups
- If a storage drive becomes old or fails, it is easily replaced, improving reliability
- Additional storage can easily be added

Disadvantage: Complicated, needs a good Internet connection

Network-Attached Storage: A single device, connected to over the Internet. Cloud Storage: where people pay organisations to store their data. With this, businesses do not have to purchase expensive storage hardware. However, they must deal with a third party whenever more storage is needed.

Comparisons between SRAM and DRAM:

- SRAM is used in the cache, DRAM is used in the RAM
- DRAM is cheaper
- DRAM is slower to access
- DRAM requires a refresh signal to keep its capacitors charged, while SRAM does not
- Both Volatile

Flash Memory is used to store the rest of the BIOS (Basic Input / Output System).

The BIOS:

- Checks the peripherals are working
- Checks the computer components are working
- Loads the OS