



1.1.3 Input, Output & Storage

- 1 A software company is producing software that allows users with severe mobility issues to input data into a computer.

The software flashes up letters on the screen one at a time. The user sends a signal to the computer when the letter they want appears on the screen.

- (a) State the name of an input device and describe how it could be used by a user with very limited mobility in their hands and arms to send a signal to the computer.

[2 marks]

- Camera / eye tracker
- ... Move/blink to send signal
- Microphone
- ... Make sound to send signal
- Foot mouse/pedal
- ... press button to send signal
- Puff/such switch
- ... blow/suck to send signal

- 2 A company sells digital photo frames which can also play video clips. Due to the limited storage on the device the videos are stored on the company's servers (i.e. in the cloud) and streamed when needed.

- (a) Give **one** disadvantage to the user of using cloud storage for their photos.

[1 mark]

- Potentially vulnerable to hacking
- An internet connection is required to access the files





The company allows users to connect a local storage device to the photo frame to increase storage capacity.

(b) State the name of **one** device that might be connected to the photo frame to increase storage capacity.

[1 mark]

- **Hard drive / SSD**
- **Flash memory drive**

3 Mobile Treasure Hunt is a game played on a mobile phone. The game shows the user's position on a map of their local area. Treasure randomly appears on the map and users must move to the appropriate area to collect the treasure before it disappears.

(a) State the name of a sensor or input device the phone might use when playing Mobile Treasure Hunt and explain why it might be used.

[2 marks]

- **GPS**
- **... to determine the user's geographic location**
- **Compass/magnetometer**
- **... to determine the direction the user is facing**
- **Accelerometer**
- **... to recognise the user's movements**
- **Touchscreen**
- **... to select options/ play the game**

4 Traditionally films have been distributed on optical media such as Blu-Ray.

(a) Giving an example other than Blu-Ray, describe what is meant by the term 'optical media'.

[2 marks]

- **Read/write using a laser**
- **Read/write on reflective surface**
- **Data is stored in lands/pits**
- **E.g. CD / DVD**





(b) Give **one** advantage of films being distributed using optical media.

[2 marks]

- Cheap to produce
- Sufficient capacity to store a film
- Robust enough to be used over long periods / transported around
- Does not require an internet connection

5 To prove parcels have not been damaged in transit, the delivery drivers use a digital camera to take a photograph of them when they arrive at their destination. The digital camera uses flash memory.

Describe **one** advantage of the digital camera using flash storage rather than magnetic.

[2 marks]

- Has no moving parts
- ... less likely to be damaged / loss data
- Consumes less power
- ... meaning longer battery life
- Unaffected by magnetic fields
- ... which could lead to data loss
- Faster access speed
- ... so photos can quickly be written to it / browsed

6 A company uses secondary storage in its server, client machines and for backup purposes. For each of these, discuss whether magnetic storage or solid state storage would be most suitable, considering the advantages and disadvantages of both.

[9 marks]

- Magnetic devices include magnetic hard drives and magnetic tape.
- Data stored by altering the magnetic field of a small section of the tape or disk; one orientation represents a binary value of 1, the opposite orientation represents a binary value of 0. Written to using a read head. Read head can then read the magnetic field and retrieve the data.
- These read and write heads move across the disk or the tape moves under the heads. Solid state devices store data using semiconductors; drives can be based on NAND Flash or DRAM. No moving parts are required.





- Backup involves copying potentially large amounts of data to and from storage devices at regular intervals. Servers distribute data to client devices.
- Magnetic hard drives entirely suitable for storing operating system, software and data. Large capacity, cheap (by comparison) purchasing price and reliability make them ideal for heavy use in an insurance office.
- Solid state drives have no moving parts and offer an increase in speed and quicker access to customer records. However, smaller capacity (in comparison) may be an issue for larger data sets.
- Backup systems may be required to maximise storage whereas access speed is not so much of an issue
- Limited lifespan of SSDs due to limited read/writes may restrict use in data heavy applications.
- Servers will require quick access to data to serve multiple client machines but will also be extremely read/write heavy.
- Both suitable for the insurance office but for different purposes.
- SSDs to store operating system and program files will ensure quicker boot up and loading of programs. May be useful for both client and servers to store operating systems
- Magnetic hard drives to store large quantities of data provides reliability and large capacity at small (by comparison) cost. May be most suitable for storing large amounts of data on client devices and for backup systems.
- Magnetic tape device may be suitable for backing up customer data as too slow for use on day-to-day basis.
- Use of solid state devices for storing customer data that is frequently accessed means needing to plan for replacement of drives when read/write limit reached.
- Solid state devices better if used in mobile devices (e.g. for mobile insurance workers) as relatively small chance of damage if dropped as no moving parts.

7 Explain the difference between RAM and ROM, including how these are used by the computer system.

[4 marks]

- RAM is volatile
- ... used for storing programs currently in use
- ROM is non-volatile
- ... used for storing bios/bootstrap





8 Most printers have their own onboard RAM. State what the printer's RAM is used for.

[1 mark]

- Stores print jobs temporarily before they are printed
- Reduced buffering (waiting for documents to load for a computer)

9 A digital photo frame has an embedded operating system. Give **two** reasons why this operating system may be stored in ROM.

[2 marks]

- The operating system is intended to be permanent and should not normally be modified
- Can be loaded quickly when the frame is switched on / not be lost when the frame is switched off
- Cannot be accidentally overwritten / deleted

10 Describe how virtual memory allows a user to run programs when physical memory is full.

[2 marks]

- Less-used data/pages are moved from RAM to secondary storage
- ... to free space in RAM
- Data/pages moved back to RAM when they are required

