Storage devices and media

Backing up of data

- Backing up of data refers to the copying of data to a different medium in case of a problem with the main secondary storage device

Reasons why backups are made

- To safeguard loss of data due to the failure of the original secondary storage device
- To safeguard against damage caused by hackers
- Backups are made in case the files need to be used elsewhere

Types of access

Serial access

- When using serial access it is necessary to start at the beginning of the file and then access each record in turn until the required record is found.
- It is primarily used on magnetic tape systems and is essentially a very slow form of data access
- It is used in applications where speed of access or order in which the data is in is not important

Direct access

- Direct access is able to access data directly from a calculated position
- It is faster than serial access
- It is used in real time and online applications where data access speed is vital

Magnetic storage media

Fixed hard disk drives

- Has a read/write head that allows data to be written to or read from the surface of the disk
- The disk surface is coated in a magnetic film that allows data to be stored by altering magnetic properties to represent binary codes

Uses

- To store the operating system, system software and working files/data
- Storing application software that needs fast retrieval and storage of data
- Used in real time or online systems to store data
- Used in file servers for computer networks

Advantages

i. They have a very fast data transfer speed and access time
ii. They have very large memory capacity

Disadvantages

i. Can be easily damaged if shut down procedure is not carried out
ii. They have many more moving parts when compared to solid state drives
iii. Their read/write operation can be quite noisy compared to SSDs

Portable hard disk drives

- The same as fixed hard disk drives but are connected to the computer via a USB port
- Can be connected and disconnected to and from several different computers

Uses

- They can be used as backup systems to prevent loss of data
- They can be used to transfer data/files/software between computers

Advantages

i. The data access time and data transfer rate is very fast
ii. They have a large memory capacity
iii. They can be used as a method of transferring information between computes

Disadvantages

i. They can be easily damaged if dropped, exposed to a strong magnetic field or damaged by an incorrect shut down procedure

Magnetic tape

- A very thin strip of plastic that has been coated in a magnetic layer'
- They are read and written to by a read/write head
- Data stored in the magnetic areas and represent binary codes
- Serial access
- Suitable for offline and batch processing

Uses

- Clearing bank cheques, utility billing, producing pay slips
- Used as a backup media since all data needs to be stored
- Used in long term archiving of data

Advantages

i. They are generally less expensive than the equivalent hard disk
ii. Robust –doesn't deteriorate over time
iii. They have a huge storage capacity
iv. The data transfer rate is fast

Disadvantages

i. Very slow data access times
ii. When updating another tape is needed
iii. They are affected by strong magnetic fields

Optical storage media

CD ROM and DVD ROM

- These are read only memory which means that they cannot be written over and can only be read

Uses

- CD ROMs are used to store music files, software, computer games and reference software
- DVD ROMs have a much larger storage and are used to store films, computer data and ever more sophisticated computer/arcade games
- CD ROMs and DVD ROMs are used in applications where there is a real need to prevent the deletion or overwriting of important data

Advantages

i. They hold far more data than floppy disks
ii. They are less expensive than hard disk drive systems

Disadvantages

i. The data transfer rate/access time is slower than that for hard disks

CD-R and DVD-R

- The letter R means that the disk is recordable once only, it becomes a CD-ROM or DVD-ROM once it has been finalised

Uses

- Home recording of music and films
- Used to store data to be kept for late use of to be transferred to another computer

Advantages

i. Cheaper than RW disks
ii. Once burned (and finalised) they are like a ROM

Disadvantages

i. Since the disk can only be recorded upon once, if an error occurs the disk has to be discarded as it can no longer be written to
ii. Not compatible with CD/DVD players

CD-RW and DVD-RW

- The RW means these disks are rewritable media and can be written over several times

Uses

- Used to record television programmes which can be recoded over time and time again
- Used in CCTV systems

Advantages

i. Can be written over many times
ii. Can use different file formats each time it is used

iii.   Not wasteful as data can be added at a later stage

DVD RAM

Uses

- In recording devices such as satellite receivers to allow simultaneous recording and playback
- Used in camcorders to store movies

Advantages

i.   They have a long life (est. 30 years)
ii.   It is possible to perform the rewrite application over 100 000 times
iii.   They have a built in verification software to ensure accuracy of data
iv.   Very fast access if files are fairly small
v.   No need to finalise the disk
vi.   Very large capacity
vii.   The offer the ability to read data at the same time as data is being written

Disadvantages

i.   Not compatible with many systems as they don't recognise the DVD RAM format
ii.   Relatively expensive
iii.   They have been superseded by new technology such as solid state memories

Blu-ray disks

Uses

- Home video consoles
- Storing and playing back movies
- PCs cam use this technology for data storage or backing up hard drives
- Camcorders can use this media to store movie footage

Advantages

i.   Very large storage capacity
ii.   Very fast data transfer rate
iii.   The data access speed is also greater than any other optical media
iv.   Blu-ray disks automatically come with a secure encryption system, which helps prevent piracy and copyright infringement

Disadvantages

i.   Relatively expensive
ii.   Encryption problems when used to store video
iii.   There are fewer movie titles on Blu-ray format, which is reducing its impact on the home market

Solid State Storage Media

Advantages of using SSD over HDD

- They are more reliable (no moving parts to go wrong)
- They are considerable lighter
- They don't have to get up to speed to work properly

- They have a lower power consumption
- They run much cooler than HDDs
- Because they have no moving parts, they are very thin
- Data access is considerably faster than HDD

Memory sticks/pen drives

Uses

- Transporting files between computers or used as a backup store
- Used as a security device to prevent software piracy

Advantages

i. Very compact and portable media
ii. Very robust
iii. Doesn't need additional software to work on most computers
iv. They are not affected by magnetic fields

Disadvantages

i. Can't write protect the data/files
ii. Easy to lose
iii. Incorrect removal will corrupt the data on the memory stick, rendering it useless

Flash memory cards

Uses

- Storing photos on digital cameras
- Used as mobile phone memory cards
- Used in MP3 players to store music files
- Used as a backup store in hand held computer devices

Advantages

i. Very compact and can easily removed and attached to another device
ii. Since they are solid state, they are very robust

Disadvantages

i. Expensive per GB when compared to hard disk drives
ii. Have a finite life regarding the number of times they can be read from or written to
iii. Have a lower storage capacity than hard disks