

# Secondary Storage Media





- Each of the following secondary storage devices have various differences, however they are each used to store programs and data for later retrieval

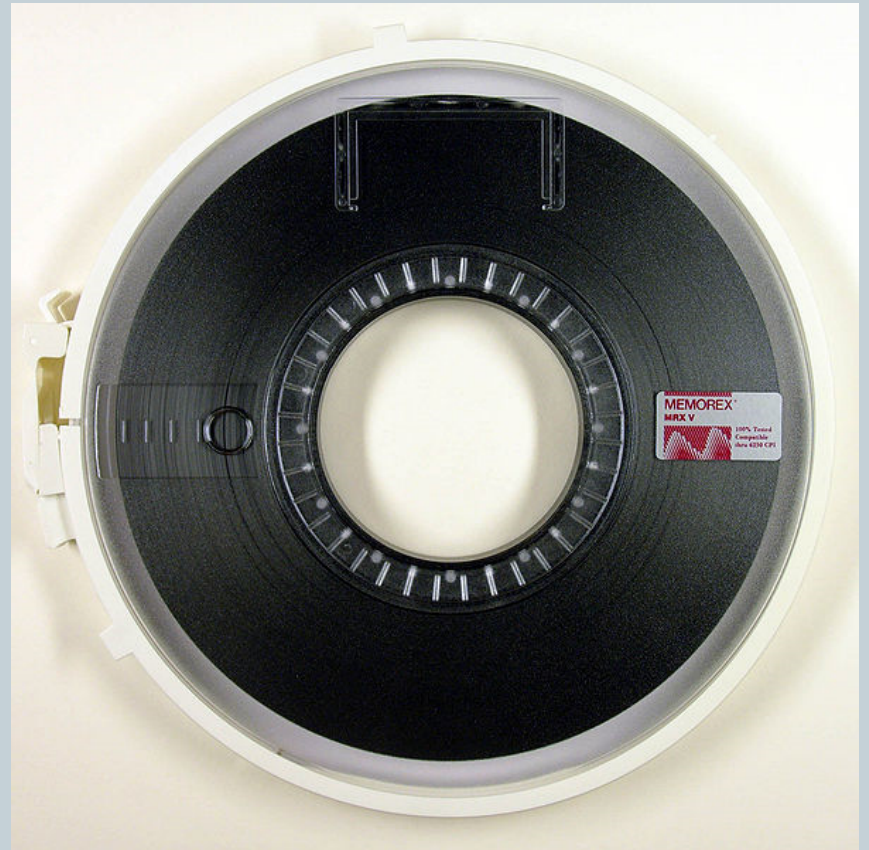
# Magnetic Tape



- Used for storing large amounts of data.
- Very inexpensive.
- Takes the form of a reel or cartridge and is made of plastic that is coated with a metal oxide. Similar to an audio/video cassette tapes
- High-density
- High-speed
- Data is accessed **sequentially**, i.e. Data is accessed in the order which it was stored

# Magnetic Tape

- Primarily used for:
  - Backing up the hard disk
  - Data entry using a key-to-tape device
  - Archiving data
- Tape is divided in parallel rows called tracks
- Most common tape is one with 9 tracks



# Floppy disk



- Also called a diskette, 3.5 inch floppy disk.
- Has a small storage capacity. 1.44MB of data.
- Used to store documents to permit easy transfer of information from one computer to another

# Floppy disk



- Data is stored on a flat, round, plastic disk coated with magnetic material.
- This is divided into tracks similar to the magnetic tape
- Tracks are in the form of concentric circles
- Disk must be formatted before use in the computer to prepare it for reading and writing. This deletes all files on the disk.
- Data can be accessed either sequentially or directly

# Floppy disk



- Floppy disks are used to:
  - Store small programs
  - Backing up data files
  - Storing small documents

# Precautions with floppy disks



- Don't place disk on a device that generates a magnetic field
- Don't bend the disk
- Don't place the disk in hot or wet places
- Only write on the disk with a soft-tip pen
- Don't remove the disk from the drive when the disk light is on



# Hard Disk



# Hard Disk



- Sometimes referred to as hard drive is the main storage space within a computer
- Use circular hard platters to store data on
- Data is read from or written to a hard disk using an arm-like device known as a read/write head with speeds of approximately 7200 Rpm
- Can store large amounts of data
- Various storage capacities, up to several gigabytes

# Hard Disk



- There are two types of read/write heads:
  - moving read/write head
  - fixed head
- Moving read/write head moves to the track that corresponds to the data while the disks is spinning
- Fixed head do not move, instead each track has a fixed head
- External hard disks is the type that is externally connected to a computer



## How is data stored?



- A thin layer of magnetic film is found on each platter
- Data is stored in 1's and 0's
- These are arranged in different ways to represent different characters
- When read back, the data is retrieved and processed

# Hard disk speeds



- There are various ways of measuring the speed of the hard disk.
- ***Maximum Transfer Rate*** - This is the highest amount of data that can be transferred per second. Common forms of hard disks come with an ATA format. the speed rating of an ATA100 disk would be 100Mb/s. Likewise a ATA66 disk would be able to transfer a maximum of 66Mb/s.



- ***Spindle Rotation Speed*** - The rotation speed of the disk really is the basis of the other two factors of hard disk speed. The faster the rotation speed, the more data can be written per second and the quicker it is to find the correct data on the platter.
- ***Seek Time*** - The seek time of a hard disk is the average time it takes for the disk to find the data you need on the platters. A fast spinning, highly accurate and responsive disk will have a shorter seek time and will perform much better, especially when the data is scattered around the disk.



- **Hard disks are used for storing:**
  - Operating systems
  - Office programs
  - Multimedia programs
  - Games
  - Images, songs
  - databases

# Precautions with hard disk



- Don't turn the power off without shutting down the computer through the normal shut-down procedure. Failure to do so may lead to data corruption.
- Don't subject the computer to severe vibrations or move the computer is the power is on. May cause physical damage to the hard drive



# Optical Disk



- Can store much more data than most magnetic media
- Two types of optical disks are: CDs and DVDs
- These are disks that are read using laser beams
- Under the plastic layer on the reflective side, there are areas that reflect light differently
- The drive detects these differences and converts these to binary digits that are interpreted by the computer



- Stores data in tracks similar to other media
- Has only one track that spirals from the inside of the disk to the outside.

# Compact Disk (CD)



- Very inexpensive
- Storage capacity of typically 650 or 700 MB
- Three types of CDs commonly used are:
  - CD-ROM
  - CD-R
  - CD-RW

# Compact Disk – Read Only Memory (CD-ROM)



- They are read only
- Can be used to computer software including games and multimedia applications
- Read using CD-ROM drives

# Compact Disk-Recordable



- Suitable for average computer use
- Disk can be written to only once and read many times (WORM)
- Has a special layer of transparent dye on top of the reflective layer
- When the CD-R is being burnt the writer heats up parts of the dye.
- This makes them opaque



- Devices that read CD-Rs can detect the difference between the transparent and opaque parts.
- Used to store MP3s, digital images and custom written software

# Precautions with CD-R



- Do not leave in sunlight for prolonged periods
- In a similar fashion to the laser, the sunlight may heat up the dye causing the data to be lost

# Compact Disk- Rewriteable (CD-RW)



- Type of CD that allows data to be recorded and erased several times
- Has a more advanced dye layer similar to the CD-R
- Heated at one temperature it becomes transparent; at another it becomes opaque
- Can not only be used to store files but also for backing up files
- Are more expensive than CD-Rs
- Not compatible with older CD-ROM drives



# Digital Versatile Disk (DVD)



- Has larger storage capacity and features to reduce piracy
- Need to be decode before they can be read
- Can store high quality movies
- DVD-ROM is the main type of DVD
- These are read only optical disk

Storage	Advantages	Disadvantages
<b>Floppy Disk</b> Storage capacity: 1.44MB	<ul style="list-style-type: none"> <li>• cheap</li> <li>• used everywhere</li> <li>• light, portable</li> </ul>	<ul style="list-style-type: none"> <li>• smallest storage capacity</li> <li>• read/write data slowly</li> </ul>
<b>Hard drive</b> Storage capacity: several gigabytes	<ul style="list-style-type: none"> <li>• stores/retrieves data quickly</li> <li>• Stores much more data</li> <li>• cheap on a cost per megabyte basis</li> </ul>	<ul style="list-style-type: none"> <li>• not portable</li> </ul>
<b>Tape</b> Storage capacity: 2, 4 and 8 GB	<ul style="list-style-type: none"> <li>• used to backup data on hard disks</li> <li>• low-cost storage</li> </ul>	<ul style="list-style-type: none"> <li>• not used with desktop computers</li> <li>• slow</li> </ul>
<b>Removable drives (zip and jazz drives)</b> Storage capacity: 100MB to 2 GB	<ul style="list-style-type: none"> <li>• stores more data than floppy disks</li> <li>• excellent for backing up files</li> <li>• removable and portable</li> <li>• Relatively cheap</li> </ul>	<ul style="list-style-type: none"> <li>• computers must have a suitable drive fitted to read these disks</li> <li>• do not hold as much data as hard drives</li> <li>• not as fast of hard drives</li> </ul>

Storage	Advantages	Disadvantages
<b>CD-ROM</b> Storage capacity: 650MB	<ul style="list-style-type: none"> <li>• stores large amounts of data – 650MB per CD</li> <li>• cheap to produce on a large scale</li> <li>• good way to distribute software</li> </ul>	<ul style="list-style-type: none"> <li>• read only – data cannot be changed/deleted</li> <li>• slower access times compared to hard drives</li> <li>• cannot read DVD</li> </ul>
<b>CD-R</b> Storage capacity: 650 MB	<ul style="list-style-type: none"> <li>• stores large amounts of data</li> <li>• can write data to the device in more than one session</li> <li>• backing up files</li> </ul>	<ul style="list-style-type: none"> <li>• need a CD-R recorder to write to a disk</li> <li>• CD-R software has varying capabilities</li> </ul>
<b>CD-RW</b> Storage capacity:650MB	<ul style="list-style-type: none"> <li>• stores large amounts of data</li> <li>• can be erased and reused several times</li> <li>• backing up files</li> </ul>	<ul style="list-style-type: none"> <li>• need CD-RW recorder to write to a disk</li> <li>• does not work in all CD players</li> </ul>



<b>Storage</b>	<b>Advantages</b>	<b>Disadvantages</b>
<b>DVD</b> Storage capacity: 17GB	<ul style="list-style-type: none"><li>• stores massive amounts of data</li><li>• Excellent for video</li><li>• DVD players can read CD-ROM</li></ul>	<ul style="list-style-type: none"><li>• drives are relatively expensive</li><li>• DVDs do not work in CD-ROM drives</li></ul>

# Flash Drive



- Small portable flash memory card
- Plugs into the USB port of a computer
- Functions as a portable hard drive
- Have less storage capacity than hard drives, e.g. 1, 2, 4, 8GB etc.
- Smaller and more durable than hard drives since they do not contain internal moving parts

# Flash memory card



- Small storage medium used to store data such as text, pictures, audio, video
- Used on small. Portable or remote computing devices
- Cards include types such as:
  - Secure Digital card (SD card)
  - CompactFlash card (CF card)
  - Smart Media
  - Memory Stick
  - MultiMediaCard (MMC)



- Cards have varying sizes and a range of storage capacities
- Have constantly powered non volatile memory
- Are solid state media, hence have no movable parts

# References



- Oxford Information Technology for CXC CSEC by Glenda Gay, Ronald Blades
- CXC Information Technology by Kelvin Skeete
- [http://www.webopedia.com/TERM/U/USB\\_flash\\_drive.html](http://www.webopedia.com/TERM/U/USB_flash_drive.html)