

COMPACT DISC READ ONLY MEMORY

3.2 Magnetic Tape sequential access device

A device which supports sequential access.

3.3 Disk vs Tape

Tape-based data backup infrastructures have inherent weaknesses: Tape is not a random access medium. Backed up data must be accessed as it was written to tape. Recovering a single file from a tape often requires reading a substantial portion of the tape and can be very time consuming. The recovery time of restoring from tape can be very costly. Recent studies have shown most IT administrators do not feel comfortable with their tape backups today.

The Solution

Disk-to-disk backup can help by complimenting tape backup. Within the data center, data loss is most likely to occur as a result of file corruption or inadvertent deletion. In these scenarios, disk-to-disk backup allows a much faster and far more reliable restore process than is possible with a tape device, greatly reducing the demands on the tape infrastructure and on the manpower required to maintain it. Disk-to-disk backup is quickly becoming the standard for backup since data can be backed up more quickly than with tape, and restore times are dramatically reduced.

3.4 Introduction to CD-ROM

A **CD-ROM**, an acronym of "Compact Disc Read-only memory") is a pre-pressed compact disc that contains data accessible to, but not writable by, a computer for data storage and music playback.

CD-ROMs are popularly used to distribute computer software, including video games and multimedia applications, though any data can be stored (up to the capacity limit of a disc). Some CDs hold both computer data and audio with the latter capable of being played on a CD player, while data (such as software or digital video) is only usable on a computer (such as ISO 9660 format PC CD-ROMs). These are called enhanced CDs.

- A single disc can hold more than 600 megabytes of data (~ 400 books of the textbook's size)
- CD-ROM is read only. i.e., it is a publishing medium rather than a data storage and retrieval like magnetic disks.

3.5 Physical Organization of CD-ROM

Tracks and sectors

- There is only one track, a long spiral, much like the groove in a vinyl LP.
- The track is divided up into 2353 byte sectors
- Each sector contains 2048 bytes of user data and 305 bytes of non-data overhead
- Since there is only 1 track, sectors are not addressed as they are on disks.

Sectors and the audio ancestors

- 75 sectors create 1 second of audio. 60 seconds of audio create 1 minute of audio.
- We provide a sector address in this format: mm:ss:cc, mm is minutes, ss is seconds, cc is sector #
- Humans are said to be capable of hearing sounds approximately in the range from 20Hz - 20KHz.
- You need to sample a signal at twice the rate at which you want to produce it.
- Therefore if we want to reproduce sound, we must sample at approximately twice this frequency -- about 40KHz.
- Specifically the designers of audio CD's sampled at 44.1KHz
- Each sample on an audio CD is two bytes allowing for 65,536 distinct audio levels.
- For stereo sound, we sample twice each time -- left and right channels
- The implication is that we must store (2 x 2 x 44,200) bytes per second of audio. (This is 176, 000 bytes per second).
- Divide this 176,000 bytes by the 75 sectors per second, and discover the sector capacity of 2,352 bytes

Sector format on data disks

- 12 bytes synch
- 4 bytes sector ID
- 2,048 bytes user data
- 4 bytes error detection
- 8 bytes null
- 276 bytes error correction

Data is stored on the disc as a series of microscopic indentations. A laser is shone onto the reflective surface of the disc to read the pattern of pits and lands ("pits", with the gaps between them referred to as "lands"). Because the depth of the pits is approximately one-quarter to one-sixth of the wavelength of the laser light used to read the disc, the reflected beam's phase is shifted in relation to the incoming beam, causing destructive interference and reducing the reflected beam's intensity. This pattern of changing intensity of the reflected beam is converted into binary data.