Chapter 4
Storage of Multimedia

4.1 Basics of optical storage technologies

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4.1 Basics of optical storage technologies

- **Optical storage**, electronic storage medium that uses low-power laser beams to record and retrieve digital (binary) data.
- In optical-storage technology, a laser beam encodes digital data onto an optical, or laser disk in the form of tiny pits arranged in concentric tracks on the disk's surface.
- A low-power laser scanner is used to "read" these pits, with variations in the intensity of reflected light from the pits being converted into electric signals.

- This technology is used in the compact disc, which records sound; in the CD-ROM which can store text and images as well as sound; and in newer disks that are totally rewritable.
- On optical discs information is stored as a series of lands, or flat areas, and pits. A laser assembly reads the spinning disc, converting lands and pits into sequences of electric signals.
- When the beam hits a land, it is reflected onto a photodiode, which produces an electric signal. Laser beams are scattered by pits, so no signal is generated.

- Optical storage provides greater memory capacity than magnetic storage because laser beams can be controlled and focused much more precisely than can tiny magnetic heads, thereby enabling the condensation of data into a much smaller space.
- Besides higher capacity, optical-storage technology also delivers more authentic duplication of sounds and images.
- Optical disks are also inexpensive to make: the plastic disks are simply molds pressed from a master, as phonograph records are.
- The data on them cannot be destroyed by power outages or magnetic disturbances. Optical-scanning equipment is similarly durable because it has relatively few moving parts.

4.2 Compact Disc (CD)

- **Compact disc (CD):** a molded plastic disc containing digital data that is scanned by a laser beam for the reproduction of recorded sound and other information.
- Since its commercial introduction in 1982, the audio CD has almost completely replaced the phonograph disc (or record) for high-fidelity recorded music.
- Compact discs are made from tough, highly transparent polycarbonate plastic.

Recording and replication mechanism

- The production of a CD begins with a digital tape master supplied by the recording studio. The information on this tape is used to modulate a beam of light from a blue laser as it traces a spiral path on the surface of a spinning glass disc.
- The glass is coated with a photosensitive material that dissolves where it is exposed to laser pulses, forming the pits.
- By the mid-1990s, however, developments in computer technology advanced such that CD recording and replication could avoid the need for a digital tape master.
- High-quality sound recordings could be sent from the microphone or other device directly to computer programs whose digital files could be stored on the computer's hard disk (or magnetic storage media) before being transferred to a CD.

Playback mechanism

The laser scanning method employed in compact disc players:

- An infrared laser is focused onto the metallic reflective layer of the disc, where a spiral track of “pits” and “lands” represents the zeros and ones of digital signals.
- Each “dark” pit on the track is interpreted (based on its length) as a sequence of 0s in binary logic, and each “bright” land is interpreted (again based on its length) as a sequence of 1s.
- The return signal is converted by a photodiode sensor into a digital electric signal, which is converted to analog form for reproduction of the original recorded sound.

4.3 Digital Versatile Disc (DVD)

- **DVD**, in full **digital video disc** or **digital versatile disc:** type of optical disc used for data storage and as a platform for multimedia.
- Its most prominent commercial application is for playing back recorded motion pictures and television programs (hence the designation “digital video disc”), though read-only, recordable, and even erasable and rewritable versions can be used on personal computers to store large quantities of almost any kind of data (hence “digital versatile disc”).

- The DVD represents the second generation of compact disc (CD) technology.
- Like a CD drive, a DVD drive uses a laser to read digitized (binary) data that have been encoded onto the disc in the form of tiny pits tracing a spiral track between the center of the disc and its outer edge.
- However, because the DVD laser emits red light at shorter wavelengths than the red light of the CD laser, it is able to resolve shorter pits on more narrowly spaced tracks, thereby allowing for greater storage density.
- The DVD player uses a laser that is higher-powered and has a correspondingly finer focus point than that of the CD player. This enables it to resolve shorter pits and narrower separation tracks and thereby accounts for the DVD's greater storage capacity