COMPUTER SYSTEMS & PROGRAMMING

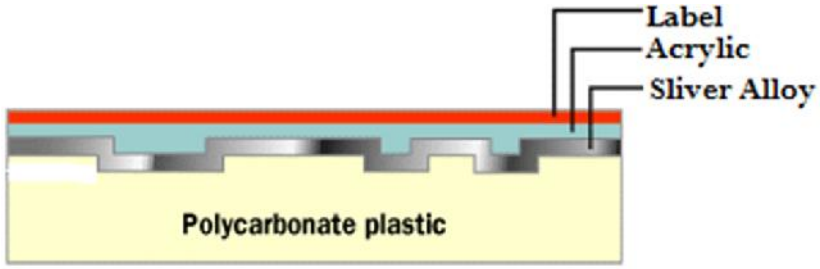
Optical Disk & Drive

Zuhaib A. Shaikh,
Asst. Prof., CSE Deptt.,QUEST
Web: zuhaib-shaikh.neocities.org

Introduction

- Based on optical phenomenon
- Types:
  - Compact Disk (CD) – Introduced by Sony+Philips in 1982
  - Digital Versatile Disk (DVD) – Introduced by Sony+Philips+Toshiba+Panasonic in 1995
- Non-volatile storage
- Optical disk stores data in pit (1) and land (0) form
- Optical drive is responsible to read/write the pit and land form disk
- The data on optical disk is stored on spiral track
- Head has to move on the spiral track, thus spindle motor rotate at different speed depends on position of head
- Avg. rotation speed: 200 to 500RPM
- Reading/writing is performed in sequential manner
- Head uses LASER diode to emit light focused with a lens
- It also uses photoelectron sensor to sense reflection (i.e. 1 from pit)

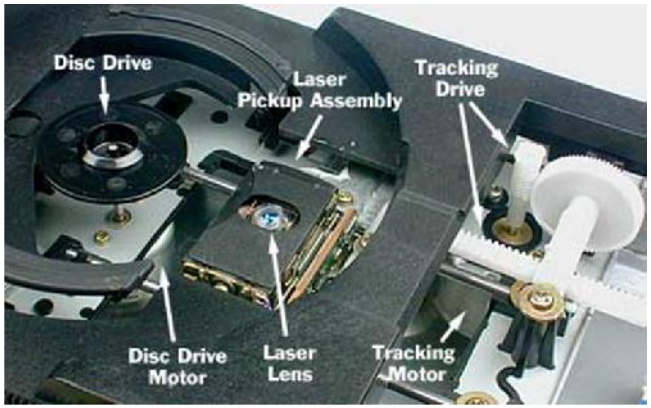
Compact Disk



- Types:
  - CD-ROM
    - Contains three to four layers to represent data
    - Data can be fabricated once and can be read many times
    - Read operation is performed at lower power (3mw to 5mw) power emission
  - CD-R
    - Contains an extra layer of dye (Azo or cyanine)
    - Dye starts burning at high power (6mW to 8mW) laser emission
    - Burned dye creates non-reflective spot to represent zero
  - CD-RW
    - Contains phase-change dye (amorphous alloy)
    - Dye burns an high power (6mW to 8mW) laser emission (non-reflective, amorphous)
    - Erasing is performed by emitting laser at higher power (8mW to 12mW), makes it reflective again(crystalline)
- CD capacities:
  - Mini-CD: 210MB
  - Standard Size: 700MB, 800MB and 900MB

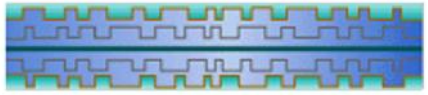
Compact Disk Drive

- CD drive contains:
  - Disk drive and tracking drive
  - Sensor and Laser diode
  - CD tray
  - Some gears and grippers
- Interfaces
  - IDE
  - SATA
  - USB (for external ODD)
- Factor 1x = 150kB/s
- Write operation can be done using:
  - CD Writing
  - Track Writing
  - Packet Writing

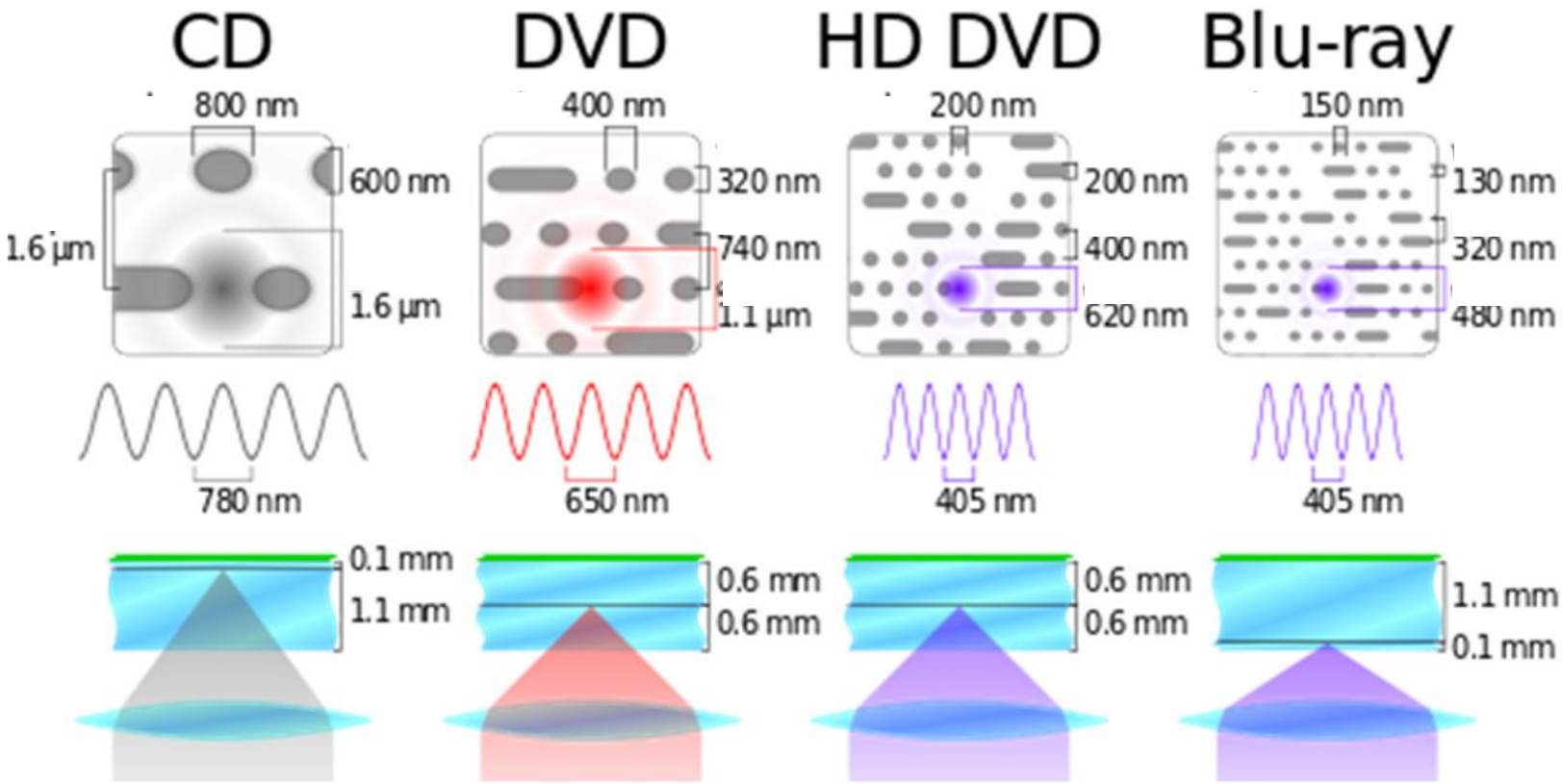


Digital Versatile Disk

- Similar to CD with more storage capacity
- Same kind of material is used to design DVD, DVD-R and DVD-RWs
- Difference is in the size of pit and land, space b/w track and laser spot size
- Factor 1x = 1.39MB/s
- Types:
  - Single Side, Single Layer
    - Same as CD/CD-R/CD-RW, uses same kind of layers.
    - 4.7GB storage
  - Single Side, Double Layer
    - Same as CD, but contains an extra layer before silver alloy
    - Extra layer (semi-reflective outer layer) track starts from outer to inner
    - And extra layer of dye for DVD-R or DVD-RW
    - Laser can be focused on inner or outer reflective layer by changing focus of lens
    - Support up-to 8.5GB
  - Double Side, Double Layer
    - Double layers are placed on both sides of acrylic layer
    - Requires two-sided head DVD drive
    - Allows to store more data (15GB)



Optical Disks



- HD-DVD: 4.5 MB/S and 15GB each layer
- Blue-ray: 4.5 MB/S and 25GB each layer
  - Blue-ray can have max. 4 layers

Questions