Tomorrow's Technology and You

8th Edition

Chapter 3

Hardware Basics: Peripherals

Objectives

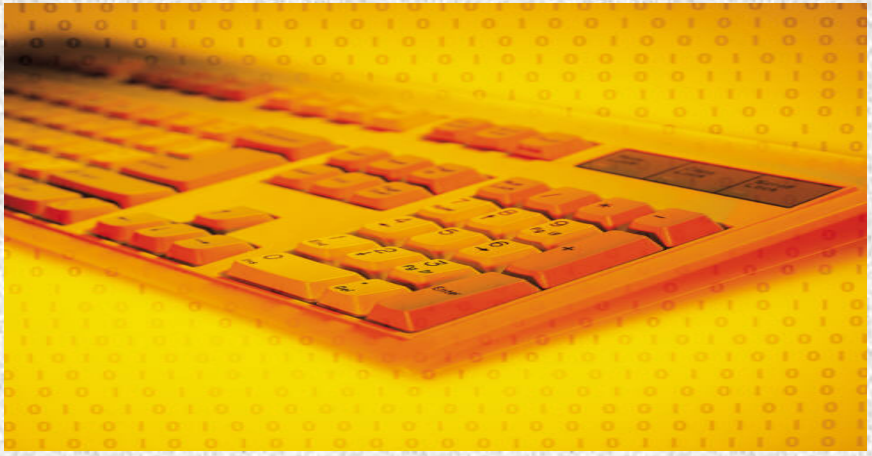
- ✓ List input devices and explain how they work.
- ✓ List output devices and the explain how they work.
- ✓ Explain why a typical computer has different types of storage devices.
- ✓ Diagram how the components of a computer system fit together.




Input: From Person to Processor

Keyboard

- ✓ The most familiar input device
- ✓ Used to enter letters, numbers and special characters



Keybords

- Standard keyboard
- Ergonomic keyboards
  - To address possible **medical problems**
- Wireless keyboard
- Folding keyboards
  - Used with palm-sized computers
- One-handed keyboards
- Keyboards printed on membranes

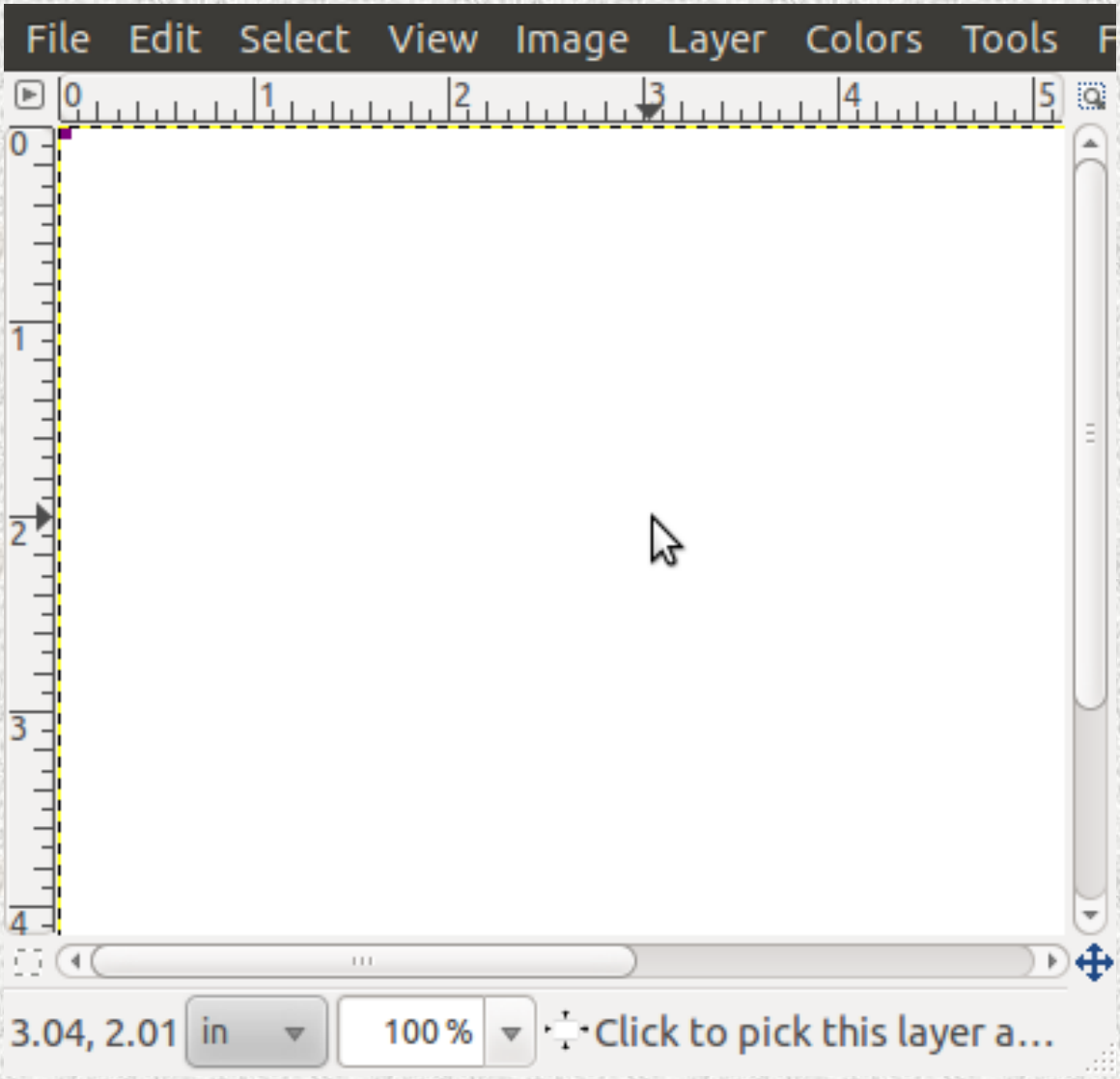
Input: From Person to Processor

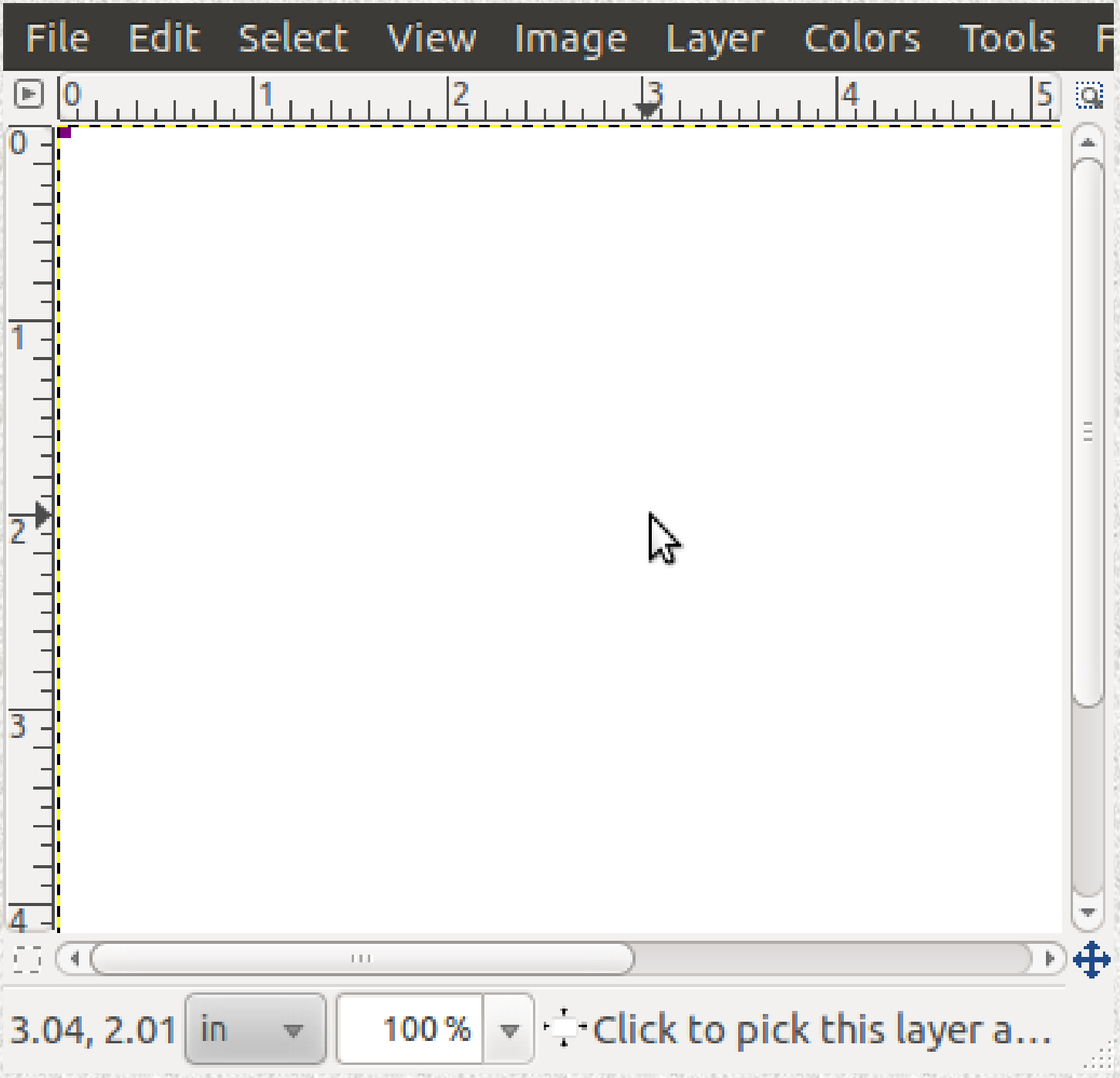
Pointing Devices

- ✓ Mouse
- ✓ Touchpad
- ✓ Pointing stick
- ✓ Trackball
- ✓ Joystick
- ✓ Graphics tablet
- ✓ Touch screen
- ✓ Stylus

Input: From Person to Processor

Pointing Devices – plane co-ordinates

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Input: From Person to Processor

Reading Tools

- ✓ Read marks representing codes specifically designed for computer input

Input: From Person to Processor

- Optical-mark readers
- Magnetic-ink character readers
- Bar-code readers
- Pen scanners
- QR-code readers
- Tablets
- Radio Frequency Identification Readers (RFID)

Digitizing the Real World

- Scanners capture and digitize printed images.
  - Flatbed
  - Slide
  - Drum
  - Sheet-fed

- Digital camera
  - Snapshots captured as digital images
  - Digital images stored as bit patterns on disks or other digital storage media

- Video digitizer
  - Capture input from a:
    - Video camera (analog or digital)

Video cassette recorder (analog) or television (analog or digital)

Convert it to a digital signal (if analog)

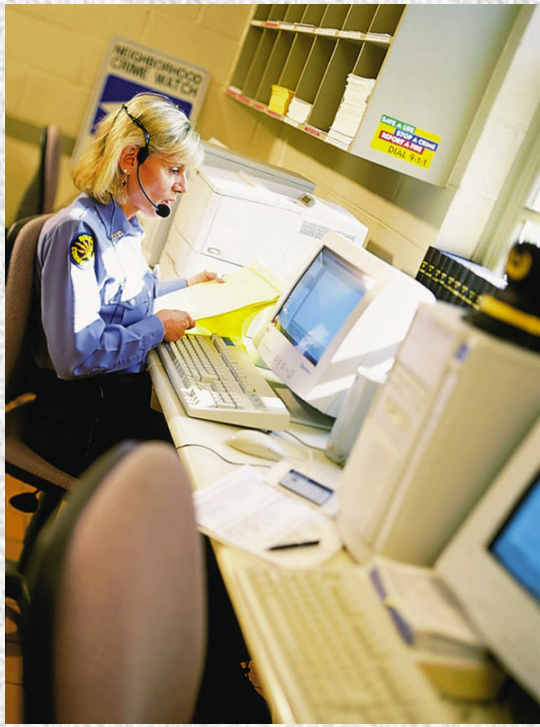
    - Stored in memory and displayed on computer screens

- Videoconferencing
  - People in diverse locations can see and hear each other
    - Used to conduct long-distance meetings
  - Video images transmitted through networks

- Audio digitizers
  - Digitize sounds from
    - Microphones (analog)
    - Other input devices (analog)
  - Digital signals can be
    - Stored
    - Further processed with specialized software
  - A digital signal processing chip compresses the stream of bits before it is transmitted to the CPU.




- Speech recognition software
  - Converts voice digital data into words that can be edited and printed



- Sensors
  - Designed to monitor physical conditions
    - Temperature, humidity, pressure
  - Provide data used in:
    - Robotics
    - Local climate control
    - Weather forecasting
    - Medical monitoring
    - Biofeedback
    - Scientific research



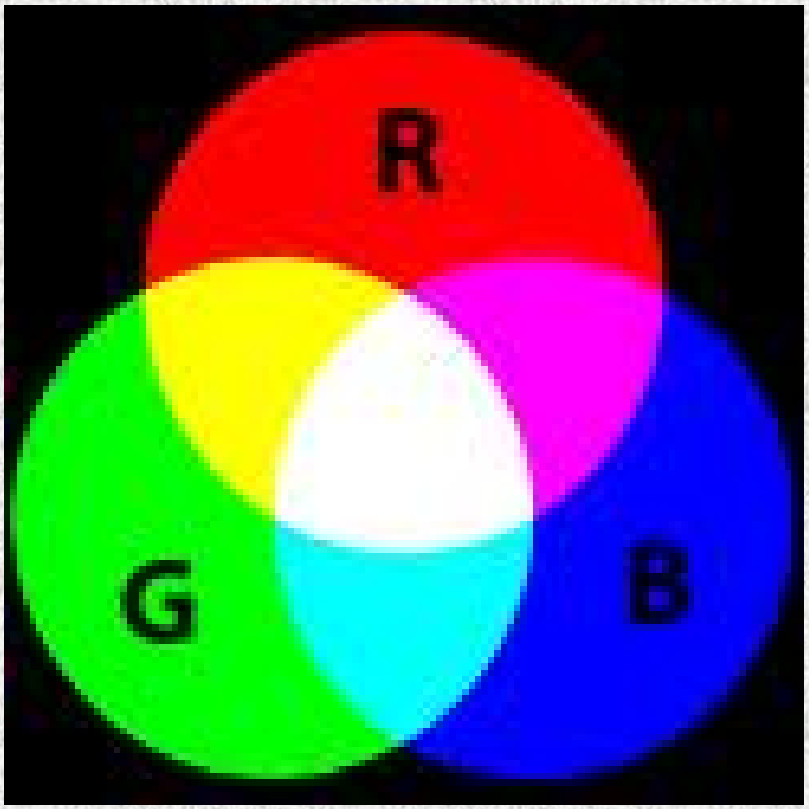

- Screen Output
  - A monitor or video display terminal (VDT) displays characters, graphics, photographic images, animation and video.
    - Video adapter—connects the monitor to the computer
    - VRAM or video memory—a special portion of RAM to hold video images
  - The more video memory, the more picture detail is displayed and with better quality.



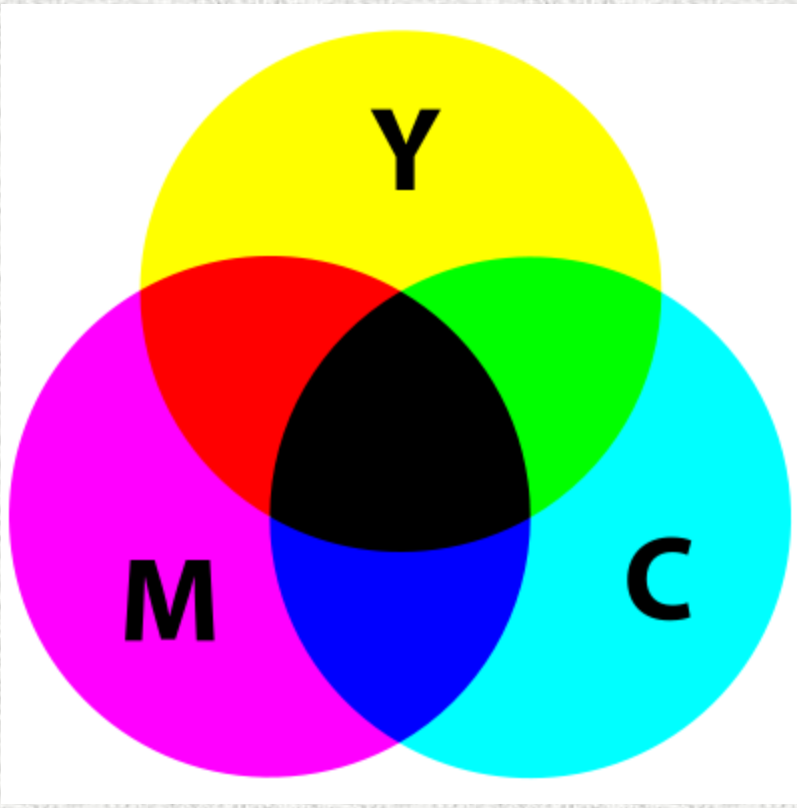

- Monitor size: Measured as a diagonal line across the screen
- Resolution: The number of pixels displayed (horizontally) on the screen
  - Pixels (or picture elements): tiny dots that compose a picture
  - Given monitor size, the higher the resolution, the closer together the dots.
- Image quality is affected by resolution and color depth (or bit depth).
  - Color depth refers to the number of different colors a monitor displays at one time.




- Subtracting and adding colors
- Adding colors:



Subtraction of colors:



- Basic colors of pixels

Output: From Pulses to People

- Monitor classes
  - CRTs (cathode-ray tubes, RedGreenBlue)
  - LCDs (liquid crystal displays, CyanMagentaYellowKey)
    - Overhead projection panels
    - Video projectors
    - Portable computers

- Paper Output
  - Printers produce paper output or hard copy.
  - Two basic groups of printers:
    - Impact printers
      - Line printers
      - Dot-matrix printers

- Non-impact printers
  - Laser printers
    - Laser beam reflected off a rotating drum to create patterns of electrical charges
    - Faster and more expensive than dot matrix printer
    - High-resolution output
  - Inkjet printers
    - Sprays ink onto paper to produce printed text and graphic images
    - Prints fewer pages/minute than laser printer
    - High-quality color (CMYK); costs less than laser printer




- Fax Machines and Fax Modems
  - Facsimile (fax) machine
    - **Sending:**
      - scans each page as an image
      - converts the image into a series of electronic pulses
      - sends those signals over phone lines to another fax
    - **Receiving:**
      - uses the signals to reconstruct the image
      - prints black-and-white facsimiles or copies of the originals
  - Fax modem (modulator – demodulator)
    - Connect from PC to fax machine via modem and phone line




- Output You Can Hear
  - Sound card
    - Enables the PC to:
      - Accept microphone input (analog)
      - Play music and other sound through speakers or headphones
      - Process (digital) sound in a variety of ways
  - Synthesizers
    - Used to produce music, noise




Storage Devices: Input Meets Output

- Magnetic Tape
  - Can permanently store large amounts (up to 185 TB) of information in a small space at a relatively **low cost**
  - Limitation: sequential data access
  - Used mainly for backup purposes




- Magnetic Disks
  - Random access to data
  - Floppy disks (becoming less popular)
    - Provide inexpensive, portable storage (a few MB)
  - Hard disks (up to 14 TB)
    - Non-removable, rigid disks that spin continuously and rapidly
    - Can be external.
      - Provide much faster access than a floppy disk

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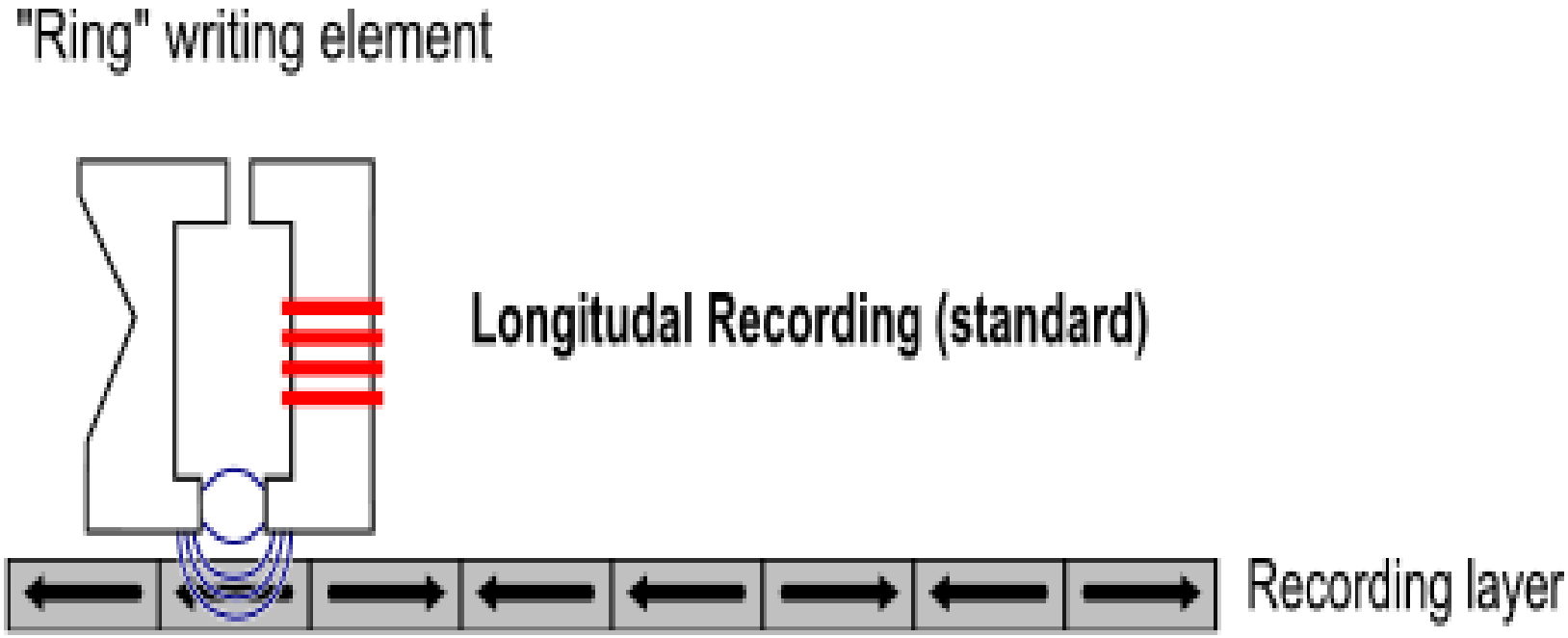
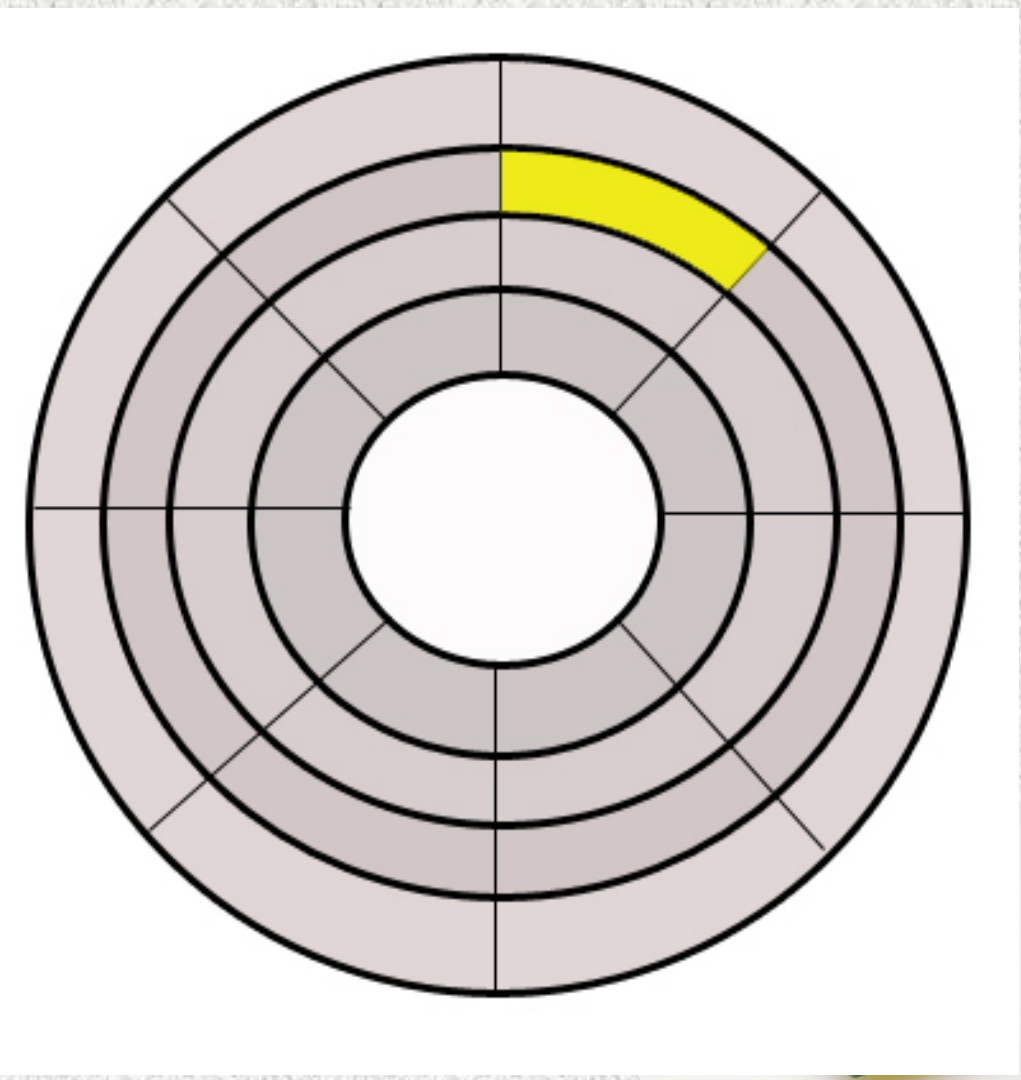
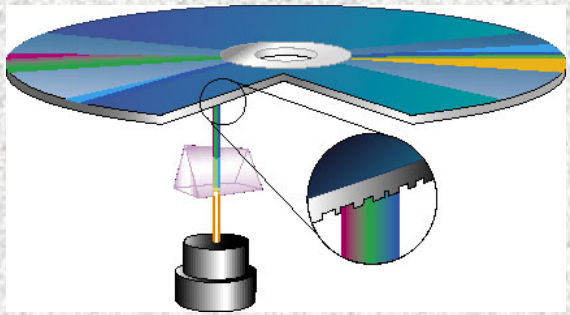


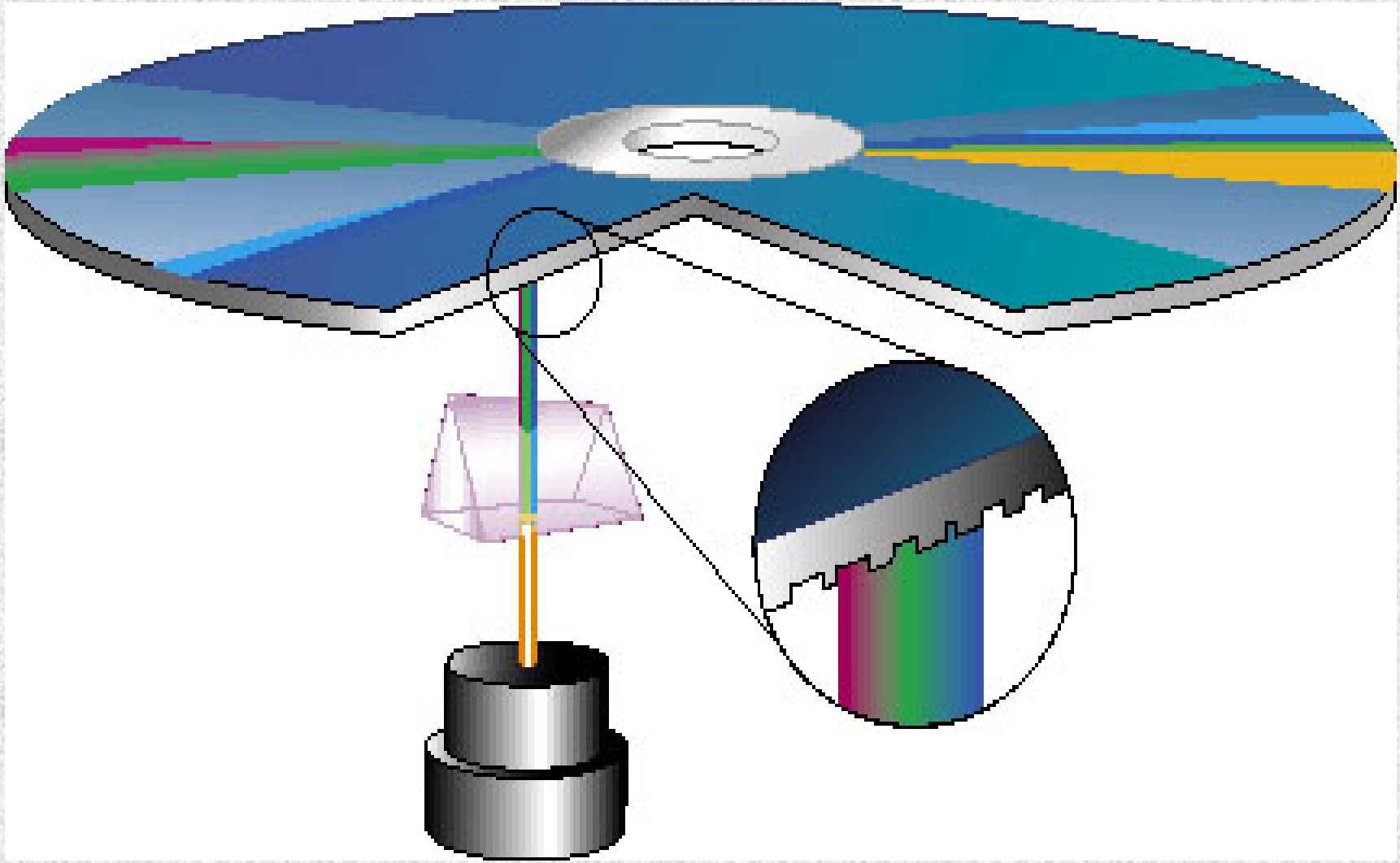
- Magnetic Disks
  - Removable media (Zip & Jaz disks)
    - Provides high-capacity portable storage (up to 750 MB)

- Magnetic Disks
  - Many concentric tracks
  - CAV – constant angular velocity (few to 15 thousands RPM)

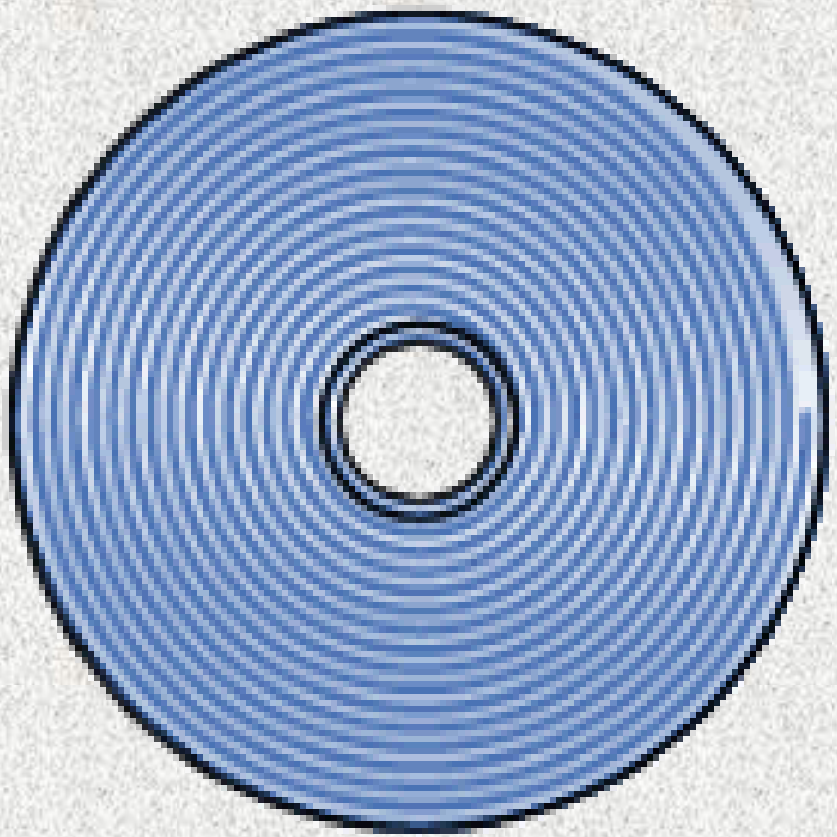


- Optical Disks
  - Use laser beams to read and write bits of information on the disk surface
    - Not as fast as magnetic hard disks
    - Massive storage capacity (up to 128 GB)
    - Very reliable





- Optical Disks
  - 1 spiral track
  - CLV (constant linear velocity; angular velocity varies – for a 12X CD between 2,400 – 6,000 RPM)



- **CD-ROM**
  - Optical drives that *read* CD-ROMs
- **CD-R**
  - *WORM* media (write-once, read many)
- **CD-RW**
  - Can read CD-ROMs and write, erase and rewrite data onto CD-R & CD-RW disks




- **DVD** (Digital Versatile Disk)
  - Holds between 3.8 and 17 GB
- **DVD-ROM** drives
  - Read-only: can't write data or video
- **DVD-RAM drives**
  - Can read and write data but not DVD video
- **DVD/RW drives**
  - Can read and write data and DVD video

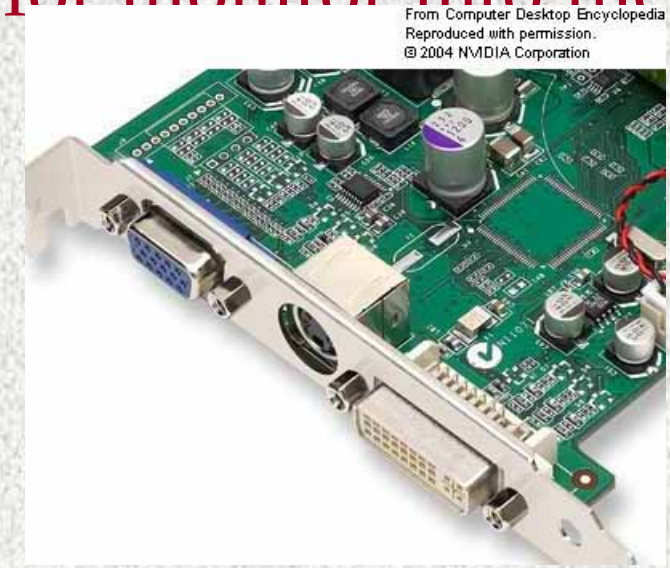



- Solid-State Storage Devices
  - Flash memory is an erasable memory chip:
    - Sizes range from 16 MB to 1 TB
    - Compact alternative to disk storage
    - Contains no moving parts
    - Likely (?) to replace disk and tape storage




- Ports and Slots Revisited
  - **Serial Port** to send/receive messages one bit at a time (external modems)
  - **Parallel Port** send/receive several bits simultaneously in groups (printers)
  - **Keyboard/Mouse Port** for attaching a keyboard and a mouse

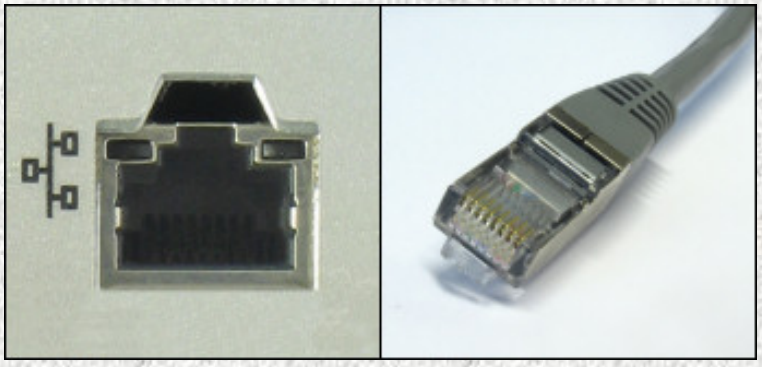
- Other ports:
  - A **video port** to plug a color monitor into the video board.



  - **Microphones, speakers, headphones, MIDI ports** to attach sound equipment.

- Other ports:
  - **SCSI port** allows several peripherals attached to a single port.

  - **LAN port** connects to a local-area network (LAN).



Computer Systems: The Sum of Its Parts

- ✓ Additions Made Easy
  - ➢ PC open architecture - new interfaces allow to hot swap devices.
    - ❑ USB (Universal Serial Bus)

      Allows several ports, one for each peripheral
    - ❑ Firewire – a Mac bus for data-intensive work, like digital video.




Computer Systems: The Sum of Its Parts

- Additions Made Easy
  - PC open arc
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      Allows sev
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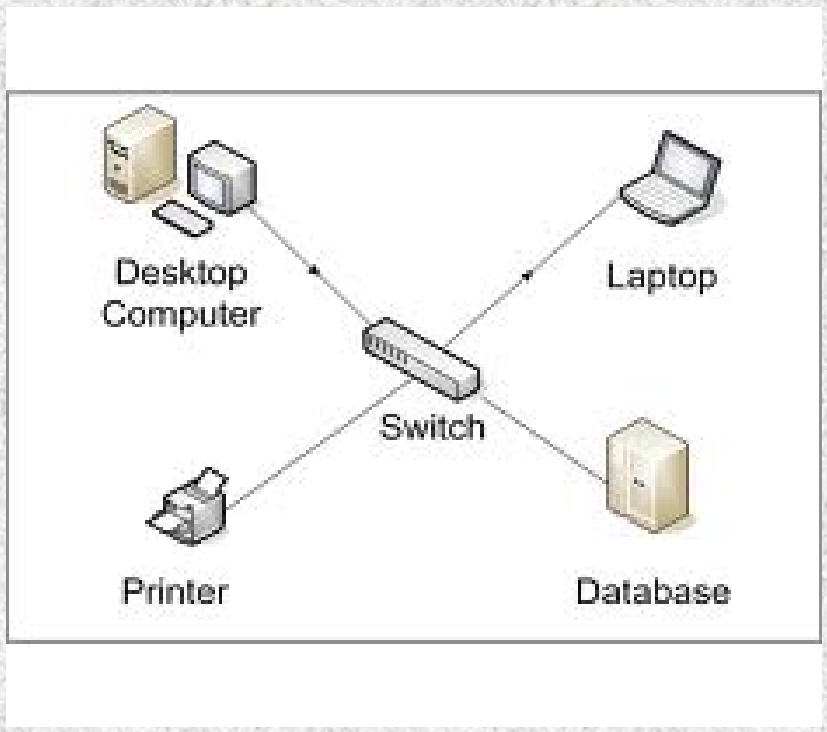
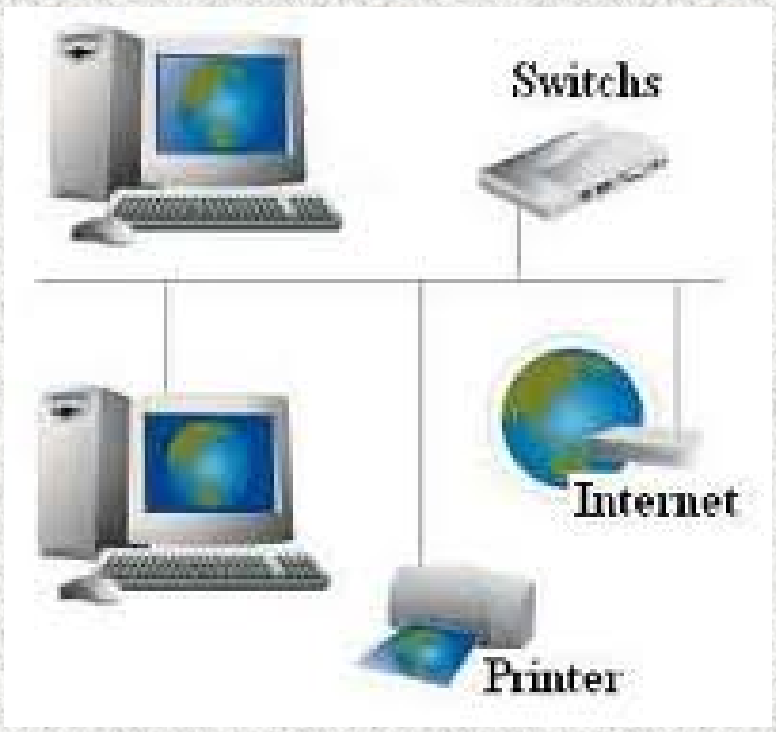
- Putting It All Together
  - Different input, output, and storage peripherals
  - The key is compatibility.
  - Networks blur the boundaries between computers.
  - Networked computers have access to remote peripherals on the network.




•Putting It All Together





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Chapter 3

Lesson Summary

- ✓ Peripherals allow computer to communicate with the outside world and store information for later use information.
- ✓ The most common input devices today are the keyboard and the mouse. A variety of other input devices can be connected to the computer.
- ✓ Output devices perform the opposite function: They accept strings of bits from the computer and transform them into a form that is useful or meaningful outside the computer.




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Chapter 3
Lesson Summary (continued)

- ✓ Storage devices are capable of two-way communication with the computer. Because of their high-speed random access capability, magnetic disks are the most common forms of storage on modern computers.
- ✓ Network connections make it possible for computers to communicate with one another directly.