Digital Planet: Tomorrow's Technology and You

Chapter 3

Hardware Basics

Peripherals

Chapter 3 Objectives

- ✓ List several examples of input devices and explain how they can make it easier to get different types of information into the computer
- ✓ List several examples of output devices and explain how they make computers more useful
- ✓ 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

- ✓**0s** and **1s** of information processing hidden from computer user.
- ✓User sees only input and output or **I/O**.
- ✓Early computer users had to flip switches or plug wires into switchboards.
- ✓Today, users have choice of hundreds of input devices that make it easy to enter data and commands.

The Keyboard

- ✓ ***Keyboard:*** Most familiar input device
- ✓ QWERTY keyboard dates back to manual typewriters
- ✓ Typical keyboard sends signals to computer through cable—usually USB
- ✓ Keyboards may be wireless
- ✓ ***Ergonomic keyboards:*** Keys are at angles; easy on arms and hands

Pointing Devices

- ✓ ***Mouse:*** Designed to move pointer around screen
- ✓ ***Wireless mice:*** Use Bluetooth or other wireless frequencies
- ✓ ***Touchpad:*** A flat panel, sensitive to light pressure
- ✓ ***Trackpoint*** and ***trackball:***

  Used to control pointer

- ✓ ***Game controllers***, ***graphics tablets***, ***touch screens:*** Used for inputting

Multi-Touch Input Devices

- ✓ Use multi-finger or multi-hand gestures to accomplish complex tasks quickly
- ✓ Touch-sensitive screen, touch tablet, or trackpad can recognize position, pressure, and movement of more than one finger or hand at a time
- ✓ Best known example is Apple's iPhone
- ✓ iPad recognizes one- and two- fingered movements

Reading Tools

- ✓ Devices allow computers to read marks that represent codes:
  - ***Optical mark readers***
  - ***Magnetic ink character readers***
  - ***Bar code readers***
  - ***Radio frequency identification (RFID) readers***
  - ***Scanners*** and ***pen scanners***
  - ***Handwriting recognition devices***

Digitizing Devices and Sensors

✓ Devices for capturing and ***digitizing*** information—converting it into digital form:

- ***Scanners***
  - Flatbed scanner
  - Film scanners
  - Drum scanners
- **Digital cameras** and ***digital video cameras***

Digitizing Devices and Sensors (cont.)

✓ Voice Input

- PCs contain circuitry to convert audio signals from microphones or other sound sources into digital signals.
- ***Speech recognition software*** can convert voice data into words that can be edited and printed.

Output: From Pulses to People

✓ Output devices convert computer's internal bit patterns into a form humans can understand.

✓ Output produced through two main devices:

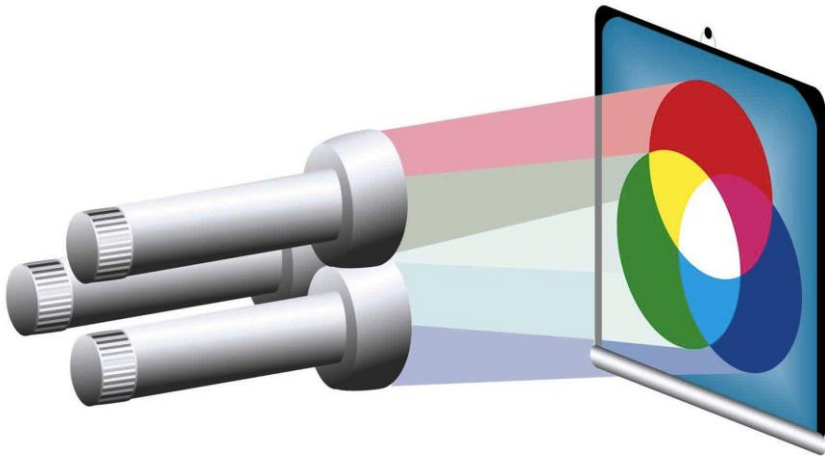
- Display screens for immediate visual output
- Printers for permanent paper output

Screen Output

- ✓ ***Display:*** Also called a ***monitor***
- ✓ Display size measured length of diagonal line across screen
- ✓ Images composed of tiny dots called ***pixels***.
- ✓ ***Resolution:*** Measured in dots per inch (dpi)
- ✓ ***Aspect ratio:*** Relationship between width and height
- ✓ Monitors use ***liquid crystal digital (LCD)*** technology.

Color Display

- ✓ Image is made up of rows of colored pixels
- ✓ Pixels are extremely small and can't be distinguished
- ✓ Monitor's image is refreshed many times per second
- ✓ Each pixel is made up of mixture of red, green, blue
- ✓ By varying the brightness of the three colors, a monitor can display millions of unique colors



Paper Output

- ✓ Printers come in two basic groups:
- ✓ ***Impact printers:*** Form images by physically striking paper, ribbon, and print hammer together
- ✓ ***Nonimpact printers:*** Replaced impact printers
  - ***Laser printers:*** High-quality pages, quickly
  - ***Inkjet printers:*** Spray ink directly onto paper
  - ***Photo printers:*** Specialized inkjets print photos

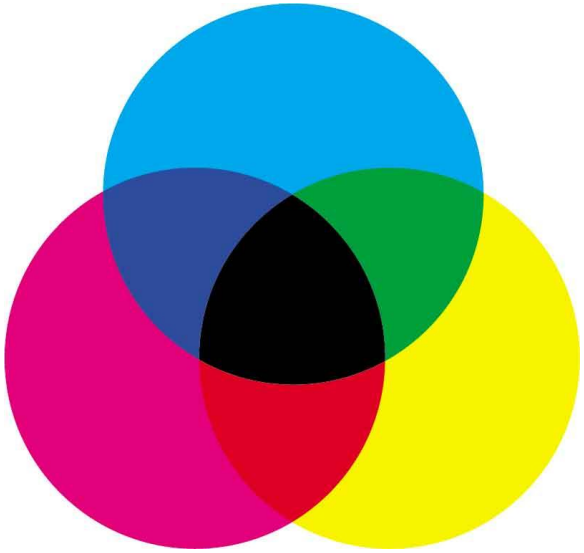
Paper Output (cont.)

✓ Multifunction Printers

- ***All-in-one devices:*** Take advantage of fact that different tools can use similar technology
- Devices can serve as a printer, scanner, color photocopy machine, and fax machine.

Color Printing

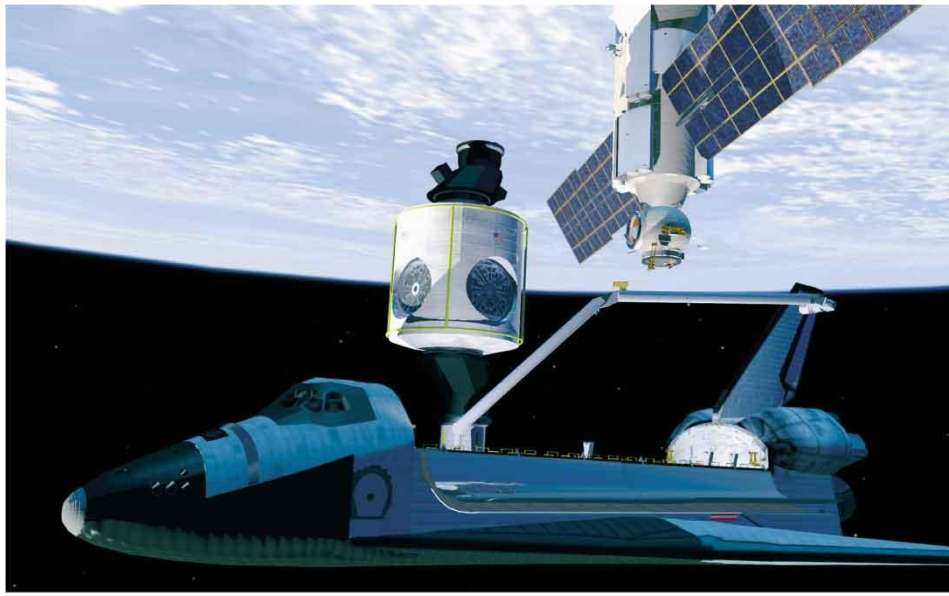
- ✓ Most printers, like monitors, form images from tiny dots.
- ✓ Most printers mix various amounts of cyan, magenta, yellow, and black pigments to create a color.
- ✓ Matching on-screen color with printed color is difficult.
- ✓ Monitors can display more colors than printers.



Controlling Other Machines

✓ Many machines and systems accept orders from computers:

- Robot arms
- Telephone switchboards
- Transportation devices
- Automated factory equipment
- Spacecraft



Storage Devices: Input Meets Output

✓ Some peripherals perform both input and output functions :

- ***Storage devices*** (وسائط تخزين): Include tape and disk drives
- Referred to as ***secondary storage*** (تخزين ثانوي)
- Record information so it can be read later

Magnetic Tape
شريط ممغنط

✓ ***Tape drives:*** Common storage devices on most mainframe computers

- Can store massive amounts of information on ***magnetic tape*** in a small space at a relatively low cost
  (سعة عالية وتكلفة قليلة)
- Tape is ***sequential-access*** medium, so retrieving information is time consuming
  (بطء في القراءة لأن التخزين تتابعي.)

✓ Primarily used to back up data (تستعمل للنسخ الاحطياطية)

Magnetic Disks
أقراص ممغنطة

- ✓ Magnetically coated surface stores encoded information
  - Provide ***random access*** capability
  - Retrieve information rapidly
- ✓ PCs include ***hard disks*** as main storage device
- ✓ Older diskettes (floppy disks) and Zip disks have all but disappeared

وسائط استرجاع رئيسية، استرجاع المعلومات سريع لان الوصول عشوائي .

Optical Discs

- ✓ ***Optical disc drives:*** Use laser beams to read and write data
- ✓ Transparent plastic disc surface protects from physical damage
- ✓ Access speeds are slower than for magnetic disks
- ✓ Often used to make backup copies

Optical Discs (cont.)

- ✓ ***CD-ROM*** (compact disc—read-only memory) discs
- ✓ ***CD-RW drive:*** Read data from CD-ROMs; record data onto CD-R and CD-RW discs
  - CD-R (compact disc-recordable)—write-once, read-many
  - CD-RW (compact disc rewritable) erasable
- ✓ ***Rewritable DVD drives:*** Commonplace in PCs today
  - Can read and write to CD and DVD media
  - Gradually being replaced by Blu-ray drives

Disc Capacity

CD-ROM (read-only CD)	CD-RW	DVD-ROM (read-only DVD)	DVD/RW	BD/ROM (read-only Blu-ray)	BD/RW
		4.7 GB (single-layer disc)	4.7 GB (single-layer disc)	27 GB (single-layer disc)	27 GB (single-layer disc)
700 MB	700 MB	9.4 GB (dual-layer disc)	9.4 GB (dual-layer disc)	50 GB (dual-layer disc)	50 GB (dual-layer disc)

Internal and External Drives

✓ Hard disk drives and optical disk drives can be external or internal.

- ***Internal drives:*** Reside inside casing of computer
- ***External drives:*** Can be connected through USB or FireWire ports
  - Relatively easy to transport between locations
  - Can be shared between computers

Flash Memory Storage Devices

ذاكرة ومضية

- ***Flash memory:*** Type of erasable memory (امكانية اعادة الكتابة عليها)
- ***Flash memory cards:*** Used to store images in digital cameras
- ***USB flash drives:*** Store and transport data
- Still more expensive than spinning drives **Hard disk** (لا زالت الاكثر تكلفة)

The Computer System: The Sum of Its Parts

✓ **Four basic design classes for personal computers:**

- ***Tower systems:*** Tall narrow boxes that generally have more expansion slots and bays

- ***Flat desktop systems:*** Designed to sit under the monitor like a platform

- ***All-in-one systems:*** Combine the monitor and system unit into a single housing

- ***Laptop computers:*** Include all essential components in one compact box

Ports and Slots Revisited

✓ ***Legacy ports*** are too slow for today's needs:

- Serial ports send and receive data one bit at a time

- Parallel ports send and receive bits in groups

✓ ***USB (universal serial bus)*** transmits data faster:

- USB 1.0 data transmitted at approximately 11 Mbps
- USB 2.0 has transfer rates of up to 480 Mbps
- USB 3.0 has data transfer rate of more than 3 Gbps

Ports and Slots Revisited (cont.)

- ✓***FireWire:*** A high-speed connection standard developed by Apple
- ✓Can move data between devices at:
  - 400 Mbps (original version)
  - 800 Mbps (newer FireWire 800)
- ✓FireWire allows multiple devices to be connected to the same port.
- ✓Also can supply power to peripherals so they don't need an external power supply

Wireless Peripherals, Network Peripherals, and the Cloud

- ✓Wireless technology
  - Wireless keyboards, mice, cameras, printers
- ✓Computer networks
  - Peripherals communicate with multiple PCs
- ✓Internet “cloud”
  - Common for computers to use peripherals—especially storage devices—located somewhere in the cloud