Chapter 6: Output

What is Output?

- Data that has been processed into a useful form, called information
  - Text
  - Graphics
  - Audio
  - Video

What Are Output Devices?

What is an output device?

- Any hardware component that can convey information to a user
  - Printer
  - Monitor
  - Speakers

Display Devices

What is a display device?

- Television-like
- Information on a display device sometimes is called soft copy

What is a CRT monitor?

- Large sealed, glass screen
- Screen coated with tiny dots of phosphor material
- Pixel, or picture element, is single point in electronic image
- Three dots (red, blue, and green) combine to make up each pixel

What are typical sizes for CRT monitors?

- 15, 17, 19, 21, and 22 inch screen size
- Viewable size is diagonal measurement of actual viewing area provided by the monitor
  - Screen size
  - Viewable size

What is a liquid crystal display (LCD) monitor?

- Type of flat-panel display
- Uses liquid crystals between two sheets of material to present information on screen
- Electric current passes through crystals, which creates images on the screen

Where are some features of LCD screens?

- Lightweight and compact
- Consumes less than one-third of the power than does a CRT monitor
• Ideal for notebook and handheld computers

What is a Web-enabled device?
Allows access to the Web or e-mail
  Cellular telephones
  Pagers
Many use monochrome LCD displays to save battery power

What is an electronic book (e-book) ?
Small, book-sized computer that uses an LCD screen
Allows users to read, save, highlight, bookmark, and add notes to online text
Download new book content from Web

What are the two technologies used for LCD monitors?
Active-matrix display
  Can display high-quality color viewable from all angles
Passive-matrix display
  Color often not as bright
  Images best viewed when working directly in front of display

What is a gas plasma monitor?
Flat-panel display uses layer of gas plasma between two sheets of material

What is display resolution?
Describes the sharpness and clarity of image
The higher the resolution, the sharper the image and the more that can display on the monitor
  800 x 600 most common
    800 horizontal pixels
    600 vertical pixels
    Total of 480,000 pixels on screen
  1280 x 1024 maximum resolution of most monitors
  2048 x 1536 maximum for high-end monitors

What is dot pitch?
Measure of the distance between pixels
Sometimes called pixel pitch
Smaller the distance between the pixels, the sharper the image
  Use a monitor with a dot pitch of .29 millimeters or lower to minimize eye fatigue

What is refresh rate?
Speed at which monitor redraws images on the screen
Should be fast enough to maintain a constant, flicker-free image
High-quality monitor will provide refresh rate of at least 75 hertz
Image on the screen redraws itself 75 times per second

**What is a video card?**
Converts digital output from computer into analog video signal
Controls how display device produces picture
Also called graphics card or video adapter

**How does video travel from the processor to a CRT monitor?**
1: Processor sends digital data to video card
2: Video card converts digital data to analog signal
3: Analog signal sent via cable to CRT monitor
4: CRT separates signal into red, green, and blue signals
5: Electron guns fire color signals to front of CRT
6: Image displays

**What is bit depth?**
Number of bits a video card uses to store information about each pixel
Also called color depth
Determines number of colors a video card can display
Greater the number of bits, better the resulting image

- **8-bit video card**
  - Uses 8 bits to store information about each pixel
  - Can display 256 different colors
- **24-bit video card**
  - Uses 24 bits to store information about each pixel
  - Can display 16.7 million colors

**What are video standards?**
Video Electronics Standards Association (VESA) develops video standards
Resolution
Simultaneous Colors

**What are various video card configurations?**
Video Memory in MB
Color Depth
Number of Colors
Resolution
What is electromagnetic radiation (EMR)?
Magnetic field that travels at speed of light
Small amount produced by all CRT monitors
   Sit at arm’s length from CRT
   EMR is greatest on sides and back of CRT monitor
   LCD monitors do not pose this risk

What is the ENERGY STAR® program?
Program to encourage manufacturers to create energy-efficient devices that require little power when not in use
Monitors and devices meeting guidelines display ENERGY STAR® label

What is Interactive TV?
Two-way communications technology in which users interact with television programming
   Select a movie
   Vote
   Bank
   Shop
   Play games
HDTV works directly with interactive TV

Printers
What is a printer?
Output device that produces text and graphics on paper
Result is hard copy, or printout
Two orientations
   Portrait
   Landscape
What is an impact printer?
Forms characters by striking a mechanism against ink ribbon that physically contacts paper
Ideal for printing multipart forms
Can withstand dusty environments, vibrations, and extreme temperatures
What is a dot-matrix printer?
Impact printer that produces printed images when tiny wire pins on print head mechanism strike inked ribbon
Most use continuous-form paper
How does a dot-matrix printer work?
When ribbon presses against paper, it creates dots that form characters and graphics. A higher number of pins (9 to 24) means the printer prints more dots per character, which results in higher print quality.

**What is a line printer?**
High-speed impact printer that prints entire line at a time. Speed measured by number of lines per minute (lpm) it can print.

- Band printer prints fully-formed characters using a hammer mechanism.
- Shuttle-matrix printer is a high-speed printer that works more like a dot-matrix printer.

**What is a non-impact printer?**
Forms characters and graphics on piece of paper without actually striking paper.

- Ink-jet Printer
- Laser Printer
- Thermal Printer

**What is an ink-jet printer?**
Nonimpact printer forms characters and graphics by spraying tiny drops of liquid ink onto piece of paper. Most popular type of color printer for home use.

**What is the resolution of a printer?**
Sharpness and clarity of characters.
Measured by number of dots per inch (dpi) printer can output:
- 300 dpi
- 600 dpi
- 1,200 dpi

**How does an ink-jet printer work?**
1: Small resistor heats ink, causing ink to boil and form vapor bubble
2: Vapor bubble forces ink through nozzle
3: Ink drops onto paper
4: As vapor bubble collapses, fresh ink is drawn into firing chamber

**What is a laser printer?**
High-speed, high-quality nonimpact printer.
Prints text and graphics in very high-quality resolution, ranging from 600 to 1,200 dpi.
Typically costs more than ink-jet printer, but is much faster.

**How does a laser printer work?**
1: Drum rotates as paper is fed through
2: Mirror deflects laser beam across surface of drum
3: Laser beam creates charge that causes toner to stick to drum
4: As drum rotates, toner transfers from drum to paper
5: Rollers use heat and pressure to fuse toner to paper

What is a thermal printer?
Generates images by pushing electrically heated pins against heat-sensitive paper
Ideal for small devices, such as adding machines

What is a photo printer?
Color printer that produces photo lab quality pictures and prints everyday documents

What is a label printer?
- Small printer that prints on adhesive type material that can be placed on a variety of items
- Most also print bar codes and e-stamps

What is a portable printer?
- Small, lightweight ink-jet or thermal printer that allows mobile user to print from notebook or handheld computer while traveling

What is a plotter?
- Sophisticated printer used to produce high-quality drawings
- Large-format printer similar to plotter and is used to print quality color prints

Speakers and Headsets
What is an audio output device?
- Computer component that produces music, speech, and other sounds (.wav files)
- Speakers and headsets are common devices

What is voice output?
- Computer talks to you through speakers on computer
  - RealPlayer

What is Internet telephony?
- Allows you to have a conversation over the Web, just as if you were talking on the telephone

Other Output Devices
What is a data projector?
- Device that takes image from a computer screen and projects it onto a larger screen

What is a facsimile (fax) machine?
- Device that transmits and receives documents over telephone lines

What is a fax modem?
- Modem that allows you to send and receive electronic documents as faxes
  - External fax modem
Internal fax modem card in system unit
- Must have OCR software to convert to characters

What is a multifunction device (MFD)?
- Provides the functionality of a printer, scanner, copy machine, and fax machine
  - All in one

**Terminals**

What is a terminal?
- Device that performs both input and output
  - Dumb terminals
  - Intelligent terminals
  - Special-purpose terminals

What is a dumb terminal?
- Has a keyboard and monitor, but no processor or memory
- Connects to host computer that performs processing and then sends output back

What is an intelligent terminal?
- Has monitor, keyboard, memory and processor
- Similar to a PC in that it can perform tasks independent of host computer
- Programmable

**Special Purpose Terminals**

What is a point-of-sale (POS) terminal?
- Records purchases at point where purchase is made
- Output from POS terminals serves as input to host computer
  - POS terminal in a grocery store
  - Scanner and keyboard are input

What is an automated teller machine (ATM)?
- Self-service banking machine that connects to host computer through telephone network

**Output Devices for Physically Challenged Users**

What is the Magnifier command?
- Windows Magnifier command enlarges text and other items in window on screen

What other output options are available for visually impaired users?
- Change Window’s settings such as increasing size or changing color of text to make words easier to read
- Blind users can work with voice output
• Braille printer outputs information in Braille onto paper

Summary

What are suggested output devices for the Home user?
• 17- or 19-inch color CRT monitor
• High-definition television
• Ink-jet color printer; or photo printer; or label printer
• Speakers and headset

What are suggested output devices for the SOHO user?
• 19- or 21-inch color CRT monitor
• Color LCD display for handheld computer
• Multifunction device; or ink-jet color printer; or laser printer, black and white
• Label printer
• Fax machine
• Speakers and headset

What are suggested output devices for the Mobile user?
• 15.4-inch color LCD display with notebook computer
• 19-inch color CRT monitor for notebook computer docking station
• Color LCD display for handheld computer
• Portable printer
• Ink-jet color printer; or laser printer, black and white, for in-office use; or photo printer
• Fax modem
• Headset
• DL data projector

What are suggested output devices for the Large Business user?
• 19- or 21-inch color CRT or LCD monitor
• 15.4-inch color LCD display for notebook computer
• Color LCD display for handheld computer
• Laser printer, black and white
• Line printer (for large reports from mainframe)
• Label printer
• Fax machine or fax modem
• Speakers and headset
• DLP data projector
• Dumb terminal
What are suggested output devices for the Power user?

- 21-inch color LCD monitor
- Laser printer
- Plotter
- Photo printer; or dye sublimation printer
- Fax machine or fax modem
- Speakers and headset

Chapter 6 Complete

This material is made by Mr. Louis Henry at GSU