Chapter 6 – Output Devices - Review

1. What Are the Four Types of Output?

Output is data that has been processed into a useful form. Computers process data (input) into information (output). Four categories of output are text, graphics, audio, and video. An output device is any hardware component that conveys information to one or more people. Commonly used output devices include display devices; printers; speakers, headphones, and earbuds; data projectors; interactive whiteboards; and force-feedback game controllers and tactile output.

2. What Are the Characteristics of Various Display Devices?

A display device, or simply display, is an output device that visually conveys text, graphics, and video information and consists of a screen and the components that produce the information on the screen. Desktop computers typically use a monitor as their display device; most mobile computers and devices integrate the display into the same physical case. LCD monitors, LCD screens, and plasma monitors are types of flat-panel displays. A flat-panel display is a lightweight display device with a shallow depth that typically uses LCD or gas plasma technology. An LCD monitor is a desktop monitor that uses a liquid crystal display to produce images. A plasma monitor is a display device that uses gas plasma technology, which substitutes a layer of gas for the liquid crystal material in an LCD monitor. A CRT monitor is a desktop monitor that contains a cathode-ray tube (CRT). CRT monitors take up more desk space and thus are not used much today.

3. What Factors Affect the Quality of an LCD monitor or LCD screen?

The quality of an LCD monitor or LCD screen depends primarily on its resolution, response time, brightness, dot pitch, and contrast ratio. Resolution is the number of horizontal and vertical pixels in a display device; a higher resolution uses a greater number of pixels and provides a sharper image. Response time is the time in milliseconds that it takes to turn a pixel on or off. Brightness of an LCD monitor or LCD screen is measured in nits; the higher the nits, the brighter the image. A nit is a unit of visible light intensity equal to one candela per square meter. Dot pitch, or pixel pitch, is the distance in millimeters between pixels on a display device. Contrast ratio describes the difference in light intensity between the brightest white and darkest black that can be displayed on a monitor.

4. What Are the Various Ways to Print?

Users can print by connecting a computer to a printer with a cable that plugs in a port on the computer. Bluetooth printing uses radio waves to transmit output to a printer. With infrared printing, a computer or other device communicates with the printer via infrared light waves. Some digital cameras connect directly to a printer via a cable; others store images on memory cards that can be removed and inserted in the printer. Networked computers can communicate with the network printer via cables or wirelessly.

5. How Is a Nonimpact Printer Different from an Impact Printer?

A printer is an output device that produces text and graphics on a physical medium, such as paper. A nonimpact printer forms characters and graphics on a piece of paper without actually striking the paper. Some spray ink, while others use heat or pressure to create images. Commonly used nonimpact printers are ink-jet printers, photo printers, laser printers, thermal printers, mobile printers, label and postage printers, plotters, and large-format printers. An impact printer forms characters and graphics on a piece of paper by striking a mechanism against an inked ribbon that physically contacts the paper. These printers commonly produce near letter quality (NLQ) output, which is print quality slightly less clear than what is acceptable for business letters. Two commonly used types of impact printers are a dot-matrix printer and a line printer.


An ink-jet printer is a type of nonimpact printer that forms characters and graphics by spraying tiny drops of liquid ink onto a piece of paper. One factor that influences the quality of an ink-jet printer is its resolution. Printer resolution is measured by the number of dots per inch (dpi) a printer can print. A photo printer is a color printer that produces photo-lab-quality pictures. A laser printer is a high-speed, high-quality nonimpact printer that operates in a manner similar to a copy machine, creating images using a laser beam and powdered ink, called toner. Laser printers usually print at faster speeds than inkjet printers. A multifunction peripheral (MFP), or all-in-one device, is a single device that looks like a printer or a copy machine but provides the functionality of a printer, scanner, copy machine, and perhaps a fax machine. Some MFPs use color ink-jet printer technology; others include a black-and-white or color laser printer. The primary disadvantage of these devices is that if the device breaks down, you lose all four functions. A thermal printer generates images by pushing electrically heated pins against heat-sensitive paper. They are inexpensive, but the print
quality is low and the images tend to fade over time. A mobile printer is a small, lightweight, battery-powered printer that allows a mobile user to print from a notebook computer or other mobile device. A label printer is a small printer that prints on an adhesive-type material that can be placed on a variety of items. Most label printers also print bar codes. A postage printer is a special type of label printer that has a built-in scale and prints postage stamps. Plotters are sophisticated printers used to produce high-quality drawings, such as blueprints, maps, and circuit diagrams. A large-format printer uses ink-jet technology on a large scale to create photo-realistic-quality color prints.

What Are the Uses and Characteristics of Speakers, Headphones, and Earbuds?

Speakers, headphones, and earbuds are three commonly used audio output devices. An audio output device is a component of a computer that produces music, speech, or other sounds. Many personal computer users add stereo speakers to their computers, including game consoles and mobile devices, to generate higher-quality sounds. With headphones or earbuds, only the individual wearing the headphones or earbuds hears the sound from the computer. The difference is that headphones cover or are placed outside of the ear, whereas earbuds, or earphones, rest inside the ear canal. A headset is a device that functions as both headphones and a microphone, so that users' hands are free for typing or other activities while listening to audio output.

What Are the Purposes and Features of Data Projectors, Interactive Whiteboards, and Force-Feedback Game Controllers and Mobile Devices?

A data projector is a device that takes the text and images displaying on a computer screen and projects them onto a larger screen so that an audience of people can see the image clearly. An LCD projector attaches directly to a computer and uses its own light source to display information shown on the computer screen. A digital light processing (DLP) projector uses tiny mirrors to reflect light. An interactive whiteboard is a touch-sensitive device, resembling a dry-erase board, that displays the image on a connected computer screen. Joysticks, wheels, gamepads, and motion-sensing game controllers are input devices used to control actions of a player or object in computer games, simulations, and video games. Today's joysticks, wheels, gamepads, and motion-sensing game controllers also include force feedback, which is a technology that sends resistance to the device in response to actions of the user. Some input devices include tactile output that provides the user with a physical response from the device.

What Output Options Are Available for Physically Challenged Users?

Hearing-impaired users can instruct programs to display words instead of sound. The Magnifier in Windows enlarges text and other items in a window on the screen. Visually impaired users can enlarge items on the screen and change other settings, such as increasing the size or changing the color of text to make words easier to read. Blind users can work with voice output instead of a monitor via Windows Narrator. Another alternative is a Braille printer, which prints information in Braille on paper.