SUMMARY

KEYBOARDS

Chapter Objective 1: Explain the purpose of a computer keyboard and the types of keyboards widely used today.

Most people use a **keyboard** for computer input. Keyboards typically include the standard alphanumeric keys, plus other keys for special purposes. Many handheld PCs and mobile devices include a keyboard or a *thumb pad*—if not, a *portable keyboard* can often be used. *Wireless keyboards* are also available; *virtual keyboards* are an emerging possibility.

POINTING DEVICES

Chapter Objective 2: List several different pointing devices and describe their functions.

Pointing devices are hardware devices that move an onscreen *mouse pointer* or similar indicator. The most widely used pointing device is the **mouse**. Another common pointing device is the **electronic pen** (also called a **stylus** or *digital pen*). Electronic pens are used with computers and *digital writing systems* to input handwritten data and select options; with **handwriting recognition** technology, the input can be converted to typed text. Use of *digital forms* in conjunction with handwriting recognition is a growing trend. **Touch screens** are monitors that are touched with the finger to select commands or provide input. Touch screens are commonly used in consumer kiosks, as well as with personal computers, mobile phones, mobile devices, and other consumer devices. Other pointing devices include the **graphics tablet**, **joystick**, **trackball**, and **touch pad**.

SCANNERS, READERS, AND DIGITAL CAMERAS

Chapter Objective 3: Describe the purposes of scanners and readers and list some types of scanners and readers in use today.

There are many different input devices that can be used to convert data that already exists (such as *source documents*) to digital form or to initially capture data in digital form. A **scanner** allows users to input data that exists in physical form, such as photographs, drawings, and printed documents, into a computer. Most scanners are **flatbed scanners** or **handheld scanners**. *Drum*, *3D*, *receipt*, and *business card scanners* are also available. When used with *optical character recognition* (*OCR*) software, the computer system recognizes scanned text characters and stores them digitally. If not, the scanned data is input as an image.

Barcode readers read **barcodes**, such as the *UPC codes* used to identify products in many retail stores. **Radio frequency identification** (**RFID**) is a technology used to store and transmit data located in **RFID tags**, which contain tiny chips and antennas and which are attached to items. RFID tags are read by **RFID readers** and are most often used in conjunction with shipping containers and other large assets. RFID can also be used to track individuals, assets, and other items, as well as be used for electronic payment systems.

Optical mark readers read specific types of marks on certain forms, such as on testing forms and voter ballots. **Optical character recognition** (**OCR**) *devices* read specially printed *optical characters*, such as those on bills and other *turnaround documents*; *magnetic ink character recognition* (*MICR*) is used by the banking industry to rapidly sort, process, and route checks to the proper banks; and **biometric readers** identify individuals by their fingerprint, hand geometry, face, or other *biometric* characteristic.

Chapter Objective 4: Understand how digital cameras differ from conventional cameras.

Digital cameras work much like regular cameras, but record digital images on some type of digital storage medium (such as a flash memory card, digital tape cartridge, built-in hard drive, or DVD disc), instead of on conventional film or videotape. The images are immediately available without processing and can be transferred to a PC for manipulation or printing, or sent directly to some printers for printing. *Digital still cameras* take still photos; *digital video cameras* consist of *digital camcorders*; and *PC cams* are used to capture video images for videoconferencing, video phone calls, or to broadcast via a Web site.

AUDIO INPUT

Chapter Objective 5: Explain how audio input is accomplished.

Voice input systems, which enable computer systems to recognize spoken words, are one means of audio input. Voice input technologies offer tremendous work-saving potential in the legal and medical fields, such as for transcription. *MIDI* devices can be used to input original music compositions into a PC. Music can also be input via a CD, DVD, or Web download.

DISPLAY DEVICES

Chapter Objective 6: Describe the characteristics of a display device and explain some of the technologies used to display images.

Display devices (also called **monitors** and **display screens**) are the most common of the output devices for a computer; they are also incorporated into a wide variety of other electronic devices. Monitors are available in a wide variety of sizes and are generally either **CRT monitors** or **flat-panel displays**. Flat-panel displays are most often **liquid crystal displays** (**LCDs**) or **plasma displays**, but these technologies are expected to be replaced by **organic light emitting diode** (**OLED**) **displays** and other new display technologies, such as *interferometric modulator* (*IMOD*) displays and *surface-conduction electron-emitter displays* (*SEDs*). OLED displays generate their own light so they do not require *backlighting*, are more energy efficient, and produce sharper and brighter images. Special types of OLEDs (such as *flexible*, *transparent*, and *Phosphorescent OLEDs*) are emerging for special applications. Regardless of the technology used, the screen of a display device is divided into a fine grid of small areas or dots—**pixels**. Monitors can be *color* or *monochrome*, *wired* or *wireless*, and are available in a wide variety of sizes. Some monitors support 3D images, some can display *HDTV* broadcasts and other types of *digital television*, and some include touch screen capabilities. Many of the characteristics of a display device are determined by the *video card* being used. **Data projectors** connect to a PC and project any output sent to the PC's monitor through the projector onto a wall or projection screen.

PRINTERS

Chapter Objective 7: List several types of printers and explain their functions.

Printers produce *hard copy* output through either *impact* or *nonimpact* printing technology. Most printers today form images as matrices of dots, although with many technologies, the dots are too small to be visible. Quality of printers is usually measured in *dots per inch* (*dpi*); speed is typically measured in *pages per minute* (*ppm*). Both *personal* and *network printers* are available and there are a number of options for connecting a printer to a network or a PC or other device; some printers print in color and others print in just black and white.

The most common printers are **laser printers** and **ink-jet printers**. Special-purpose printers include **photo printers**, **barcode printers**, **portable printers**, **plotters**, and **3D printers**. **Multifunction devices (MFDs)** incorporate the functions of multiple devices—typically a printer, scanner, and fax machine—into a single unit.

AUDIO OUTPUT

Chapter Objective 8: Understand the hardware devices used for audio output.

Audio output devices include **speakers**, to output music or spoken voice, and *voice output* systems, which enable computer systems to play back or compose spoken messages from digitally stored words, phrases, and sounds. **Headphones** or **headsets** can be used to prevent the sound from disturbing other people.

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