Discovering Computers
Tools, Apps, Devices, and the Impact of Technology

Chapter 3

Computers and Mobile Devices

Objectives Overview

Describe the characteristics and uses of laptops, tablets, desktops, and all-in-ones

Describe the characteristics and types of servers

Differentiate among POS terminals, ATMs, and self-service kiosks

Describe cloud computing and identify its uses

Describe the characteristics and uses of smartphones, digital cameras, portable and digital media players, e-book readers, and wearable devices

Objectives Overview

Describe the characteristics of and ways to interact with game devices

Identify uses of embedded computers

Differentiate a port from a connector, identify various ports and connectors, and differentiate among Bluetooth, Wi-Fi, and NFC wireless device connections

Identify safeguards against hardware theft and vandalism and hardware failure

Discuss ways to prevent health-related injuries and disorders caused from technology use, and describe ways to design a workplace ergonomically

Computers and Mobile Devices

- Types of **computers** and **mobile devices** include:

Laptops, tablets, and desktops	Servers and terminals	Smartphones, digital cameras, e-book readers, portable and digital media players and wearable devices

Game devices	Embedded computers

Mobile Computers and Desktops

- A **mobile computer** is a portable personal computer, designed so that a user easily can carry it from place to place

- A personal computer (PC) is a mobile computer or desktop that can perform all of its input, processing, output, and storage activities by itself and is intended to be used by one person at a time

Mobile Computers and Desktops

Mobile Computers and Desktops

- A **laptop**, also called a notebook computer, is a thin, lightweight mobile computer with a screen in its lid and a keyboard in its base

traditional laptop

ultrathin laptop

Mobile Computers and Desktops

- A **tablet** is a thin, lighter-weight mobile computer that has a touch screen

slate tablet in stand

magnetic keyboard cover
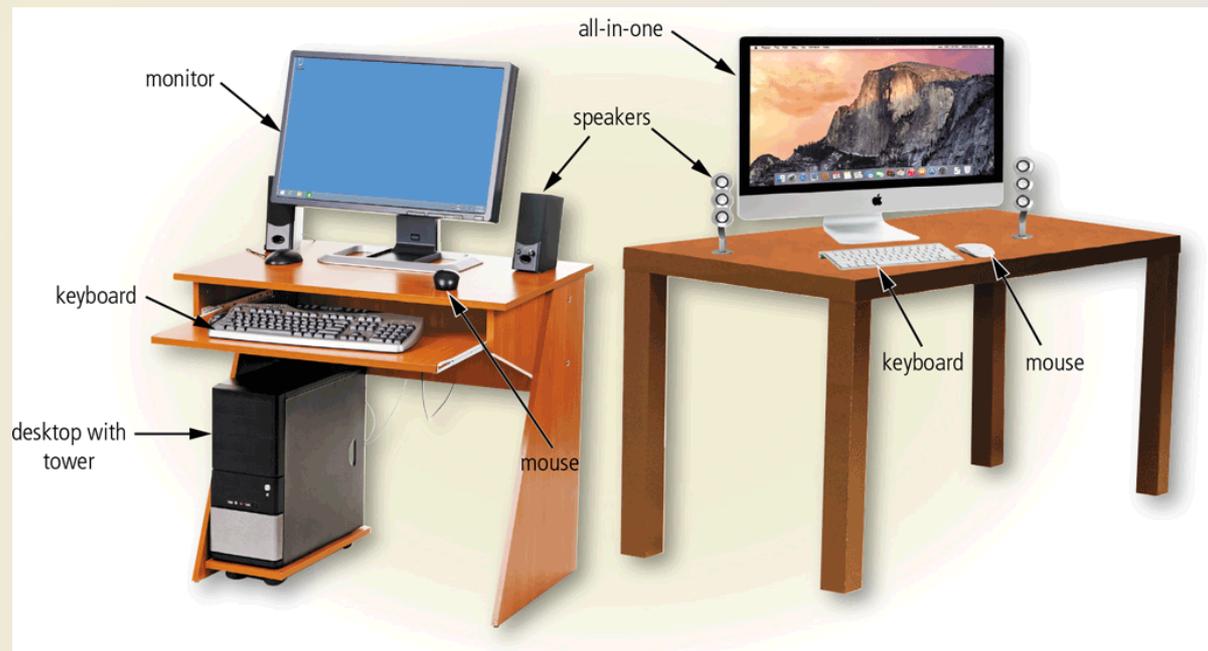
stylus

convertible tablet

Mobile Computers and Desktops

• A handheld computer is a computer small enough to fit in one hand

Mobile Computers and Desktops

- A **desktop**, or desktop computer, is a personal computer designed to be in a stationary location, where all of its components fit on or under a desk or table

all-in-one

monitor

speakers

keyboard

desktop with tower

mouse

keyboard   mouse

Page 114
Figure 3-7

Servers

- A **server** is a computer dedicated to providing one or more services to other computers or devices on a network
  - Rack server
  - Blade server
  - Tower server
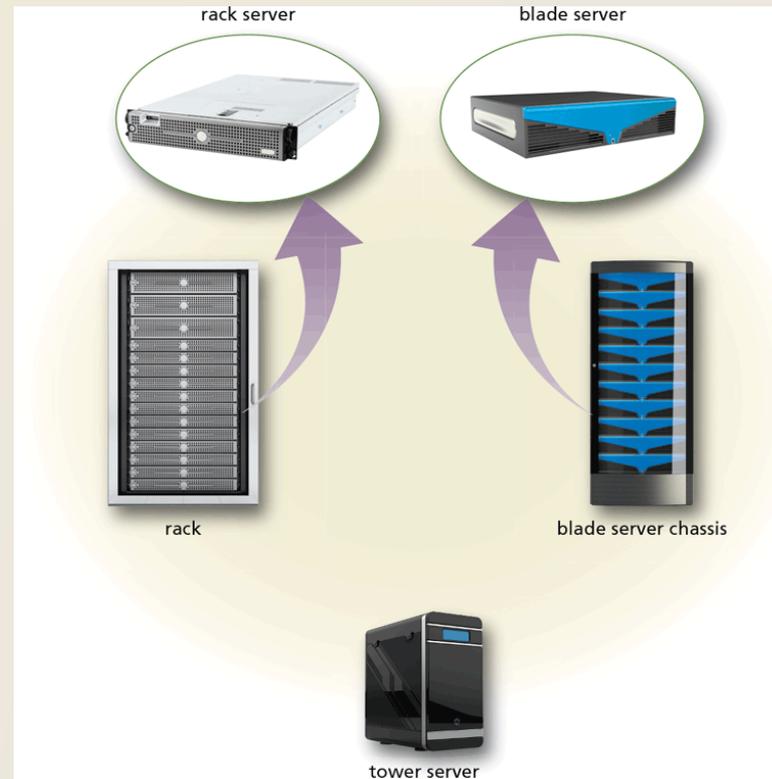
Servers

Table 3-1 Dedicated Servers	
Type	**Main Service Provided**
Application server	Stores and runs apps
Backup server	Backs up and restores files, folders, and media
Database server	Stores and provides access to a database
Domain name server	Stores domain names and their corresponding IP addresses
File server (or *storage server*)	Stores and manages files
FTP server	Stores files for user upload or download via FTP
Game server	Provides a central location for online gaming
Home server	Provides storage, Internet connections, or other services to computers and devices in a household
List server	Stores and manages email lists
Mail server	Stores and delivers email messages
Network server	Manages network traffic
Print server	Manages printers and documents being printed
Web server	Stores and delivers requested webpages to a computer via a browser

Servers

- Virtualization is the practice of sharing or pooling computing resources, such as servers and storage devices

  - Server virtualization uses software to enable a physical server to emulate the hardware and computing capabilities of one or more servers, known as virtual servers

- A server farm is a network of several servers together in a single location

Servers

- A mainframe is a large, expensive, powerful server that can handle hundreds or thousands of connected users simultaneously

Terminals

- A terminal is a computer, usually with limited processing power, that enables users to send data to and/or receive information from a server, or host computer

- A thin client is a terminal that looks like a desktop but has limited capabilities and components

- Most retail stores use a POS terminal to record purchases, process credit or debit cards, and update inventory

touch screen

Scan and Bag

bar code reader scans bar code on item being purchased
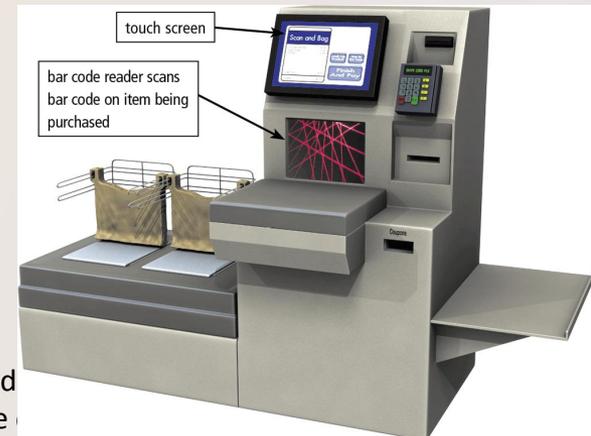
Terminals

- An ATM (automated teller machine) is a self-service banking terminal that connects to a host computer through a network

Terminals

- A self-service kiosk is a freestanding terminal that usually has a touch screen for user interaction

Table 3-2	Self-Service Kiosks
Type	**Typical Services Provided**
Financial kiosk	Pay bills, add minutes to phone plans, add money to prepaid cards, and perform other financial activities.
Photo kiosk	Print photos from digital images. Some allow editing of digital photos. Users may print directly at the kiosk or may send an order to a photo lab to be printed.
Ticket kiosk	Print tickets. Located in airports, amusement parks, movie theaters, rental companies, and train stations.
Vending kiosk	Dispense item after payment is received. Examples include DVD rentals and license plate renewals.
Visitor kiosk	Manage and track visitors upon check-in. Located in businesses, schools, hospitals, and other areas where access is controlled or registration is required.

Supercomputers

- A supercomputer is the fastest, most powerful computer – and the most expensive

  - Capable of processing many trillions of instructions in a single second

18

Cloud Computing

- **Cloud computing** refers to an environment that provides resources and services accessed via the Internet

Mobile Devices

- A **smartphone** is an Internet-capable phone that usually also includes a calendar, an address book, a calculator, a notepad, games, browser, and numerous other apps

- Many smartphones have touch screens. Instead of or in addition to an on-screen keyboard, some have a built-in mini keyboard on the front of the phone or a keyboard that slides in and out from behind the phone

Mobile Devices

on-screen keyboard

swipe keyboard app

mini keyboard

keypad

slide out keyboard

portable keyboard

virtual keyboard

speech to text

21

Mobile Devices

Short Message Service (SMS)	Multimedia Message Service (MMS)
• Mobile to mobile • Mobile to email • Mobile to provider • Web to mobile	• Mobile to mobile • Mobile to email

Mobile Devices

- A **digital camera** is a mobile device that allows users to take photos and store the photographed images digitally
  - Smart digital camera
  - Point-and-shoot camera
  - SLR camera

point-and-shoot camera

SLR camera

smart digital camera

camera in smartphone

Pages 125 - 126
Figure 3-16

Mobile Devices

How a Digital Camera Might Work

Step 1
Point to the image to photograph and take the photo. Light passes into the lens of the camera.

Step 2
The image is focused on a chip called a *charge-coupled device* (CCD).
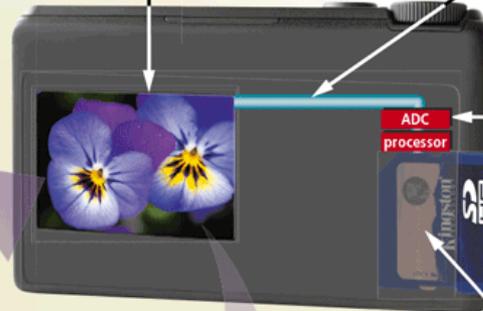
Step 3
The CCD generates an analog signal that represents the image.

Step 4
The analog signal is converted to a digital signal by an analog-to-digital converter (ADC).

Step 5
A processor in the camera adjusts the quality of the image and usually stores the digital photo on media inserted in the camera.

Mobile Devices

- **Resolution** is the number of horizontal and vertical pixels in a display

pixel

25
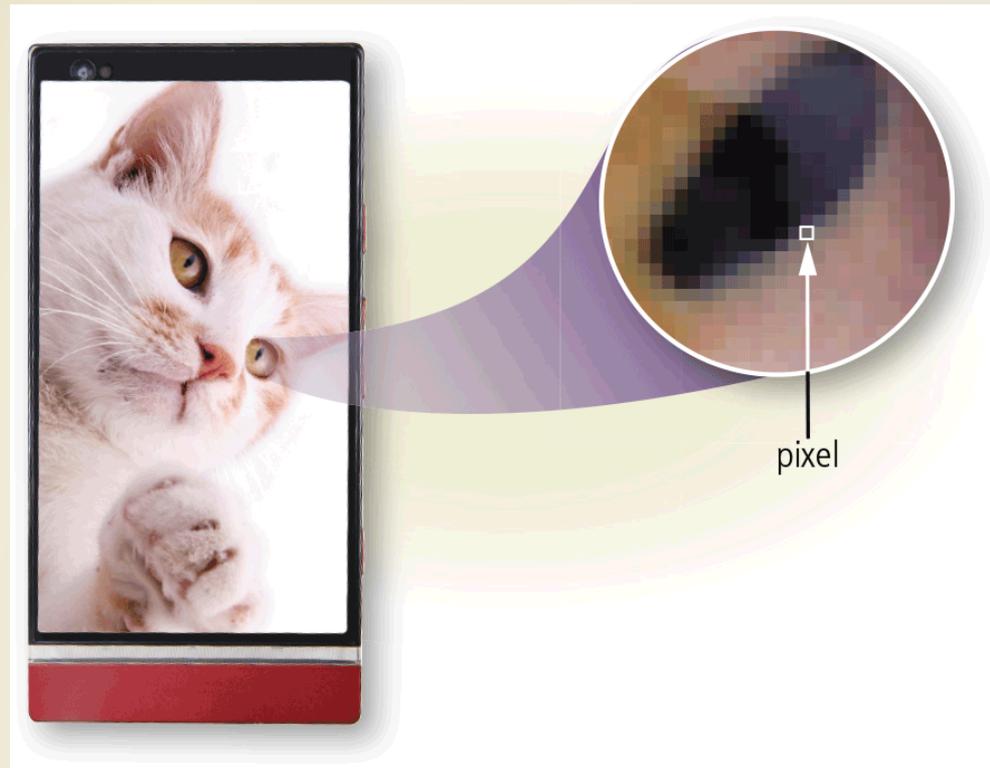
Mobile Devices

- A **portable media player** is a mobile device on which you can store, organize, and play or view digital media

portable media player with button controls

earbuds

portable media player with touch screen

portable media player with touch-sensitive pad

Mobile Devices

- A **digital media player** or streaming media player is a device, typically used in a home, that streams digital media from a computer or network to a television, projector, or some other entertainment device

digital media player

Mobile Devices

- An **e-book reader** (short for electronic book reader), or e-reader, is a mobile device that is used primarily for reading e-books and other digital publications

Mobile Devices

- A **wearable device** or wearable is a small, mobile computing device designed to be worn by a consumer

activity tracker communicates with health fitness app on smartphone

smartwatch wirelessly communicates with compatible smartphone

smartglasses, such as Google Glass shown here, respond to voice instruction to access note taking and other apps
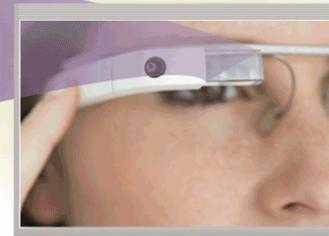
Game Devices

- A **game console** is a mobile computing device designed for single-player or multiplayer video games

- A **handheld game device** is a small mobile device that contains a screen, speakers, controls, and game console all in one unit

- Game controllers include gamepads, joysticks and wheels, dance pads, and a variety of motion-sensing controllers

Game Devices

gamepad

joystick

pedals and wheel

dance pad

motion-sensing game controller

balance board

31

Embedded Computers

- An **embedded computer** is a special-purpose computer that functions as a component in a larger product

| Consumer electronics | Home automation devices | Automobiles |

| Process controllers and robotics | Computer devices and office machines |

Embedded Computers

Smartphone apps, such as the OnStar RemoteLink app shown here, remotely start the engine, unlock doors, stream music through the vehicle's sound system, display driving directions, and more.

Cars equipped with wireless communications capabilities, called *telematics*, include features such as navigation systems, remote diagnosis and alerts, and Internet access.

Adaptive cruise control systems detect if vehicles in front of you are too close and, if necessary, adjust the vehicle's throttle, may apply brakes, and/or sound an alarm.

Tire pressure monitoring systems send warning signals if tire pressure is insufficient.

Advanced airbag systems have crash-severity sensors that determine the appropriate level to inflate the airbag, reducing the chance of airbag injury in low-speed accidents.

Electronic stability control automatically applies brakes, and may reduce engine power, when you lose control of steering or traction.

Drive-by-wire systems sense pressure on the gas pedal and communicate electronically to the engine how much and how fast to accelerate.

Putting It All Together

Table 3-3 Categories of Computers and Mobile Devices

Category	Physical Size	Number of Simultaneously Connected Users	General Price Range
Personal computers (desktop)	Fits on a desk	Usually one (can be more if networked)	Several hundred to several thousand dollars
Mobile computers and mobile devices	Fits on your lap or in your hand	Usually one	Less than a hundred dollars to several thousand dollars
Game consoles	Small box or handheld device	One to several	Several hundred dollars or less
Servers	Small cabinet to room full of equipment	Two to thousands	Several hundred to several million dollars
Supercomputers	Full room of equipment	Hundreds to thousands	Half a million to several billion dollars
Embedded computers	Miniature	Usually one	Embedded in the price of the product

Page 134
Table 3-3

Ports and Connections

- A **port** is the point at which a peripheral device attaches to or communicates with a computer or mobile device so that the peripheral device can send data to or receive information from the computer or mobile device

ports on a desktop

ports on a laptop

ports on a tablet

port on a smartphone

ports on a digital camera

Ports and Connections

- A **connector** joins a cable to a port. A connector at one end of a cable attaches to a port on the computer or mobile device, and a connector at the other end of the cable attaches to a port on the peripheral device

Ports and Connections

Table 3-4   Popular Ports and Connectors

Port Type	Connector Photo	Port Photo	Port Type	Connector Photo	Port Photo
DisplayPort (audio/video)			Mini USB		
DVI (digital video interface)			Mini HDMI (audio/video)		
HDMI (audio/video)			Network (Ethernet)		
Headphones			Speaker		
Lightning			Thunderbolt		
Microphone			USB (Type A)		
Micro USB			USB (Type B)		
Mini DisplayPort			VGA		

Ports and Connections

- A **USB port**, short for universal serial bus port, can connect up to 127 different peripheral devices together with a single connector

- Instead of connecting peripheral devices directly to ports on a mobile computer, some mobile users prefer the flexibility of port replicators and docking stations

Ports and Connections

tablet in docking station

close-up of docking station

docking station

wireless keyboard

USB ports

stylus

39

Ports and Connections

- Instead of connecting computers and mobile devices to peripheral devices with a cable, some peripheral devices use wireless communications technologies

Bluetooth

Wi-Fi

NFC

Protecting Hardware

- To help reduce the chances of theft, companies and schools use a variety of security measures
  - Physical access controls
  - Alarm system
  - Physical security devices
  - Security or device-tracking app
  - Require identification

fingerprint reader

Protecting Hardware

- Hardware can fail for a variety of reasons: aging hardware; random events such as electrical power problems; and even errors in programs or apps

  - **Undervoltage**

  - **Overvoltage** or **power surge**

Protecting Hardware

- A **surge protector**, also called a surge suppressor, uses electrical components to provide a stable current flow and minimize the chances of an overvoltage reaching the computer and other electronic equipment

Protecting Hardware

- An **uninterruptible power supply** (**UPS**) is a device that contains surge protection circuits and one or more batteries that can provide power during a temporary or permanent loss of power

44

Health Concerns of Using Technology

- A repetitive strain injury (RSI) is an injury or disorder of the muscles, nerves, tendons, ligaments, and joints

- **Computer vision syndrome** (CVS) is a technology-related health condition that affects eyesight

- **Ergonomics** is an applied science devoted to incorporating comfort, efficiency, and safety into the design of items in the workplace

- **Technology addiction** occurs when the technology consumes someone's entire social life

Health Concerns of Using Technology

viewing angle: 20° to center of screen **viewing distance**: 18 to 28 inches

arms: elbows at about 90° and arms and hands approximately parallel to floor

keyboard height: 23 to 28 inches depending on height of user

adjustable height chair with 4 or 5 legs for stability

feet flat on floor

Summary

Characteristics of and purchasing guidelines for laptops, tablets, desktops, smartphones, digital cameras, and portable and digital media players

Servers, supercomputers, point-of-sale terminals, ATMs, self-service kiosks, e-book readers, wearable devices, game devices, embedded computers, and cloud computing

Ports and connections

Ways to protect hardware

Health concerns of using technology and preventative measures

Discovering Computers
Tools, Apps, Devices, and the Impact of Technology

Chapter 3

Computers and Mobile Devices

Chapter 3 Complete