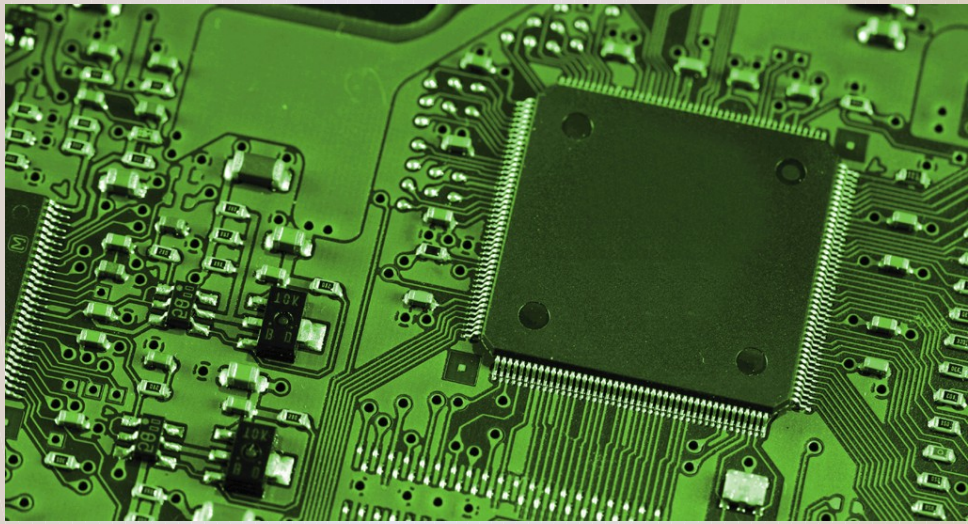
Discovering Computers Enhanced Edition ©2017

Tools, Apps, Devices, and the Impact of Technology

Chapter 6

Computing Components



Objectives Overview

Describe the various computer and mobile device cases and the contents they protect

Describe multi-core processors, the components of a processor, and the four steps in a machine cycle

Identify characteristics of various personal computer processors on the market today, and describe the ways processors are cooled

Explain the advantages and services of cloud computing

Define a bit, and describe how a series of bits represents data

Explain how program and application instructions transfer in and out of memory

See Page 276
for Detailed Objectives

© 2017 Cengage Learning®. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

Objectives Overview

Differentiate among the various types of memory

Describe the purpose of adapter cards and USB adapters

Explain the function of a bus

Explain the purpose of a power supply and batteries

Describe how to care for computers and mobile devices

See Page 276
for Detailed Objectives

© 2017 Cengage Learning®. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

Inside the Case

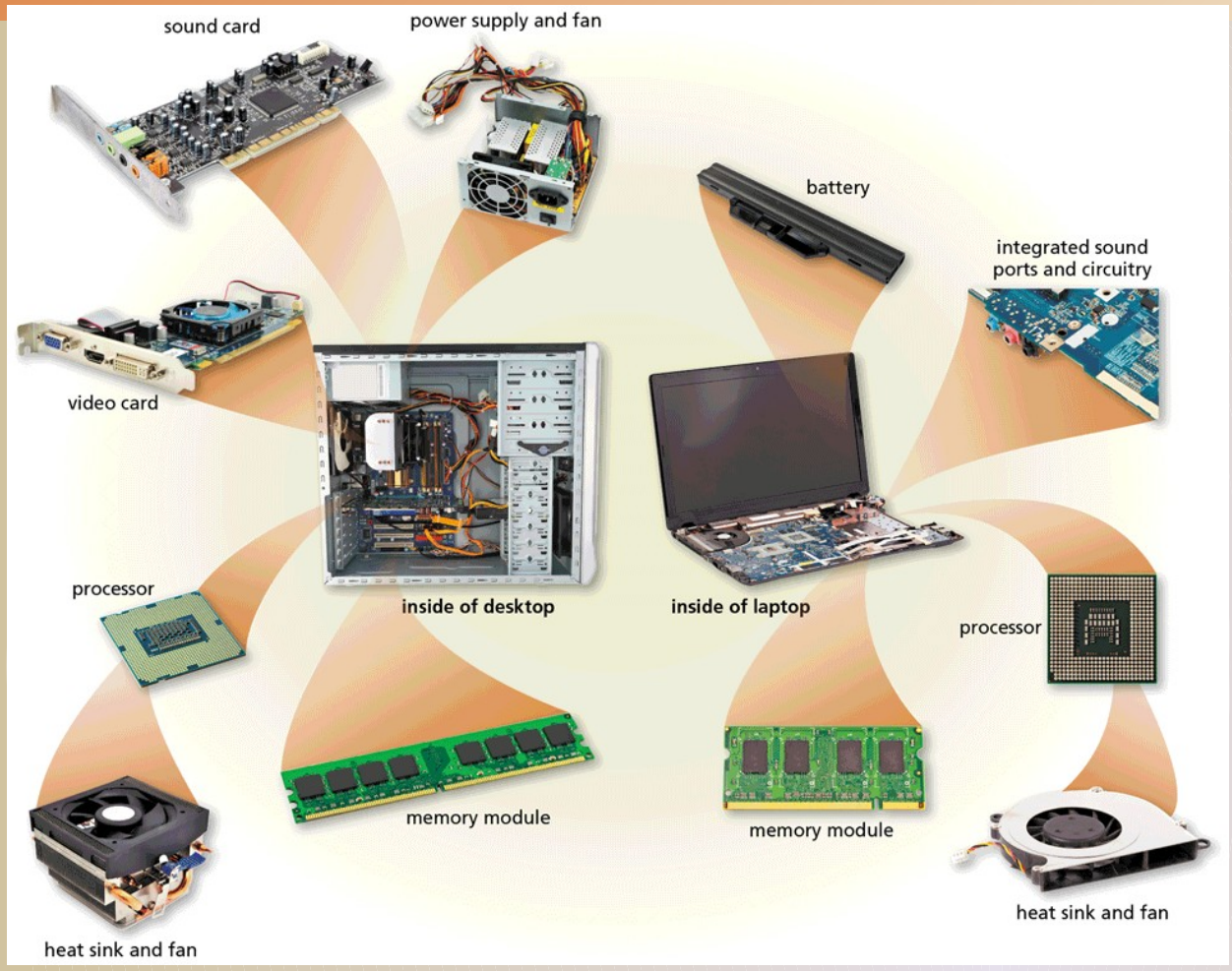
- The case contains and protects the electronics of the computer or mobile device from damage



Pages 276 - 277
Figure 6-1

© 2017 Cengage Learning®. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

Inside the Case

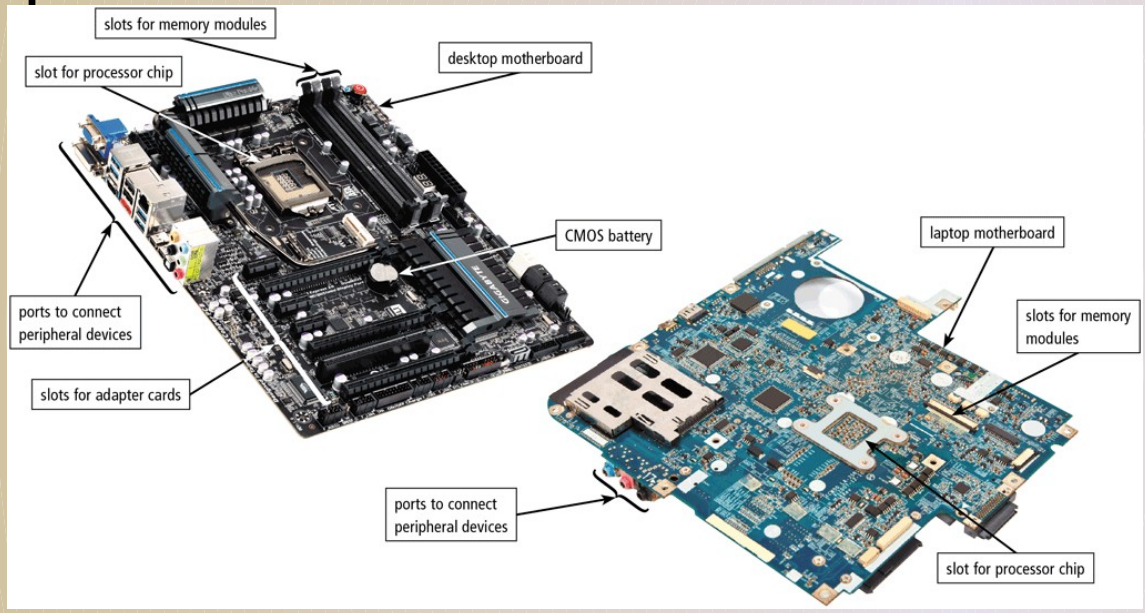


© 2017 Cengage Learning®. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

Page 278
Figure 6-2

Inside the Case

- The **motherboard** is the main circuit board of the computer
  - A computer **chip** contains integrated circu



Pages 278 - 279
Figure 6-3

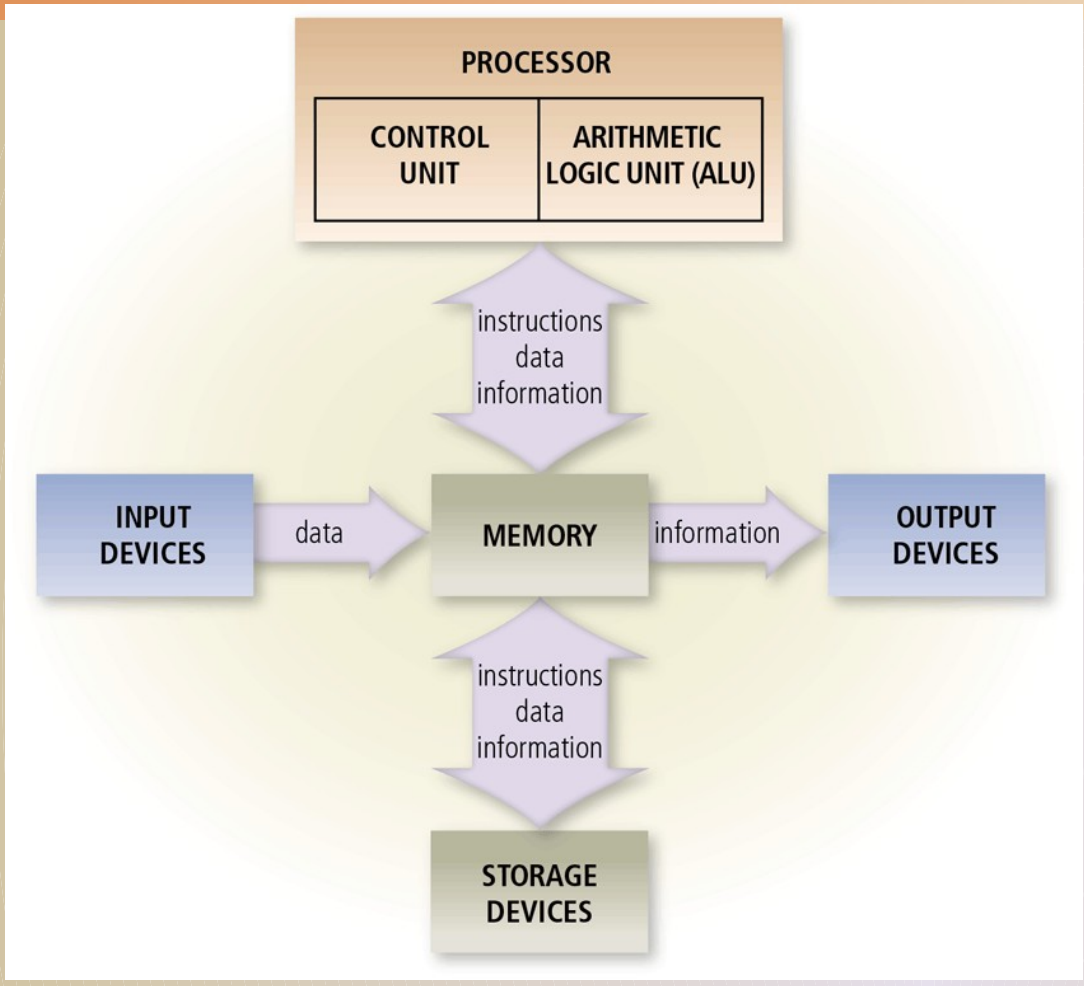
© 2017 Cengage Learning®. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

Processors

- The **processor**, also called the **central processing unit** (**CPU**), interprets and carries out the basic instructions that operate a computer
- A **multi-core processor** is a single chip with two or more separate processor cores
- Processors contain a control unit and an arithmetic logic unit (ALU)

© 2017 Cengage Learning®. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

Processors



© 2017 Cengage Learning®. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

Page 281
Figure 6-4

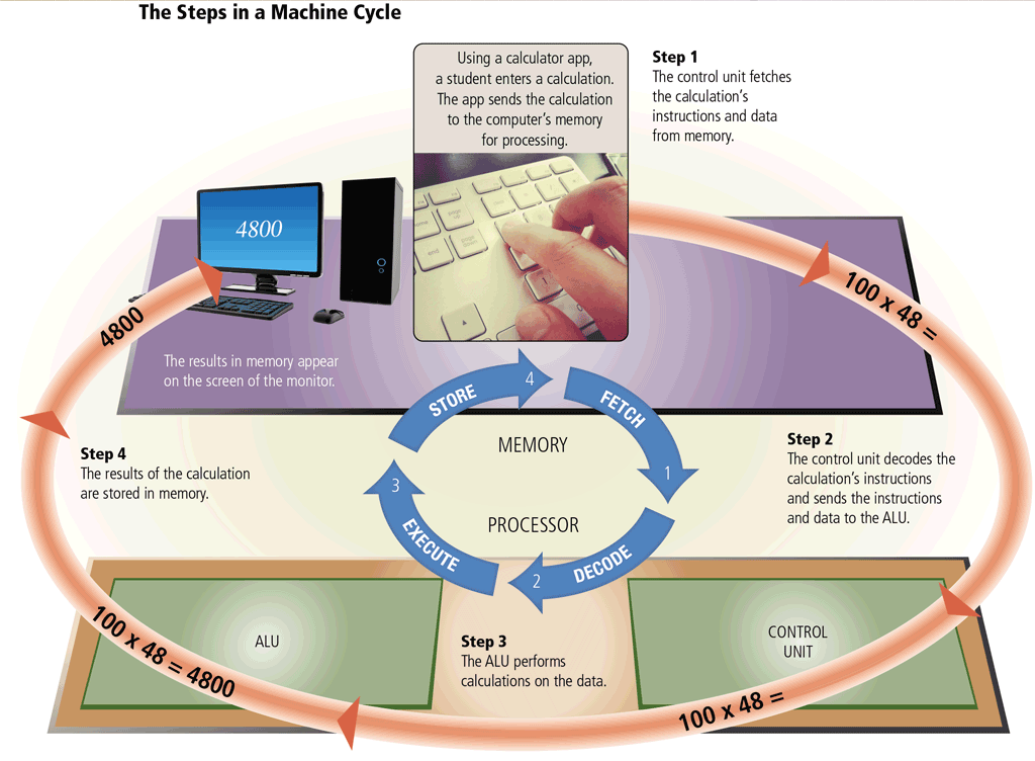
Processors

- The **control unit** is the component of the processor that directs and coordinates most of the operations in the computer
- The **arithmetic logic unit** (ALU) performs arithmetic, comparison, and other operations

© 2017 Cengage Learning®. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

Processors

- For every instruction, a processor repeats a set of four basic operations, which com



© 2017 Cengage Learning®. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

Pages 281 - 282
Figure 6-5

Processors

© 2017 Cengage Learning®. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

Processors

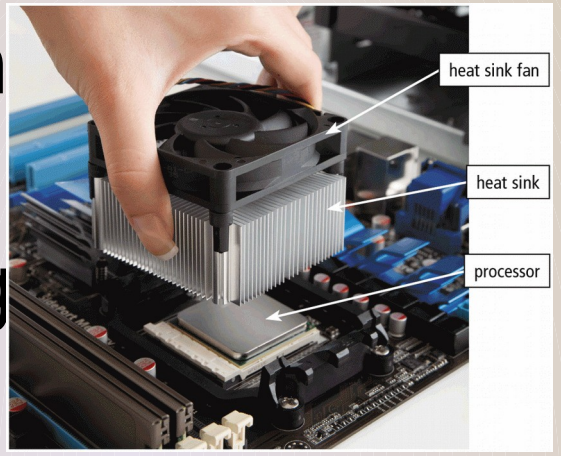
- The leading manufacturers of personal computer processor chips are Intel and AMD



© 2017 Cengage Learning®. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

Processors

- A processor chip generates heat that could cause the chip to m fail
- Require additional cooling
  - Heat sinks
  - Liquid cooling technology
  - Cooling pads





Page 284
Figures 6-6 – 6-7

© 2017 Cengage Learning®. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

Cloud Computing

- Home and business users choose cloud computing for a variety of reasons

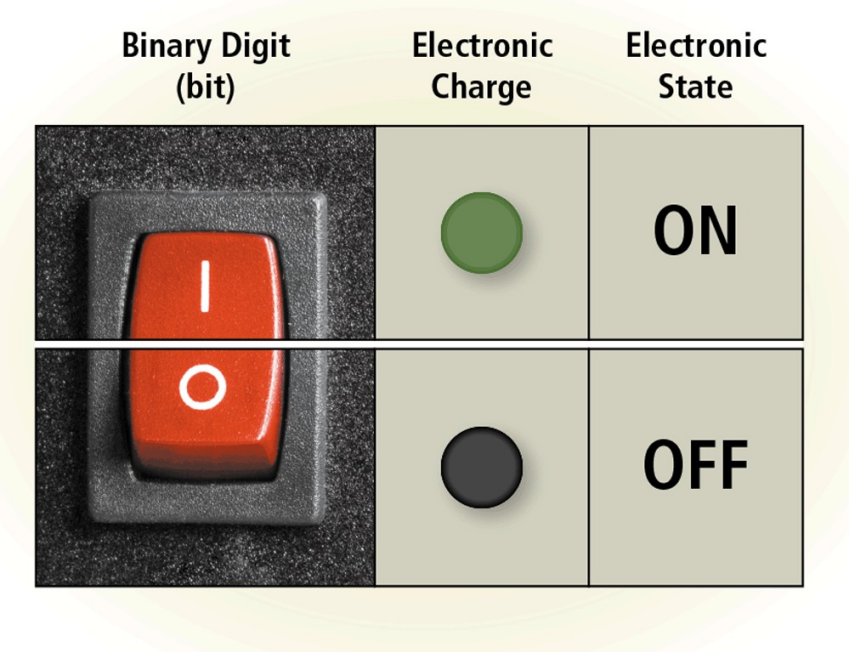
© 2017 Cengage Learning®. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

Data Representation

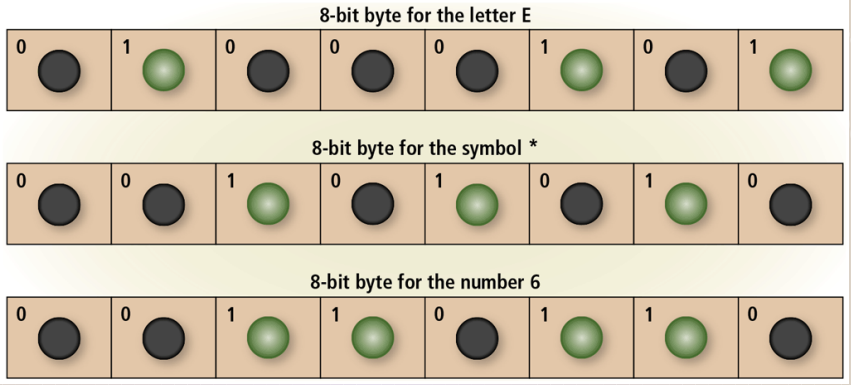
© 2017 Cengage Learning®. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

Data Representation

The circuitry in a computer or mobile device represents the on or the off states electronically by the presence or absence of an electronic charge



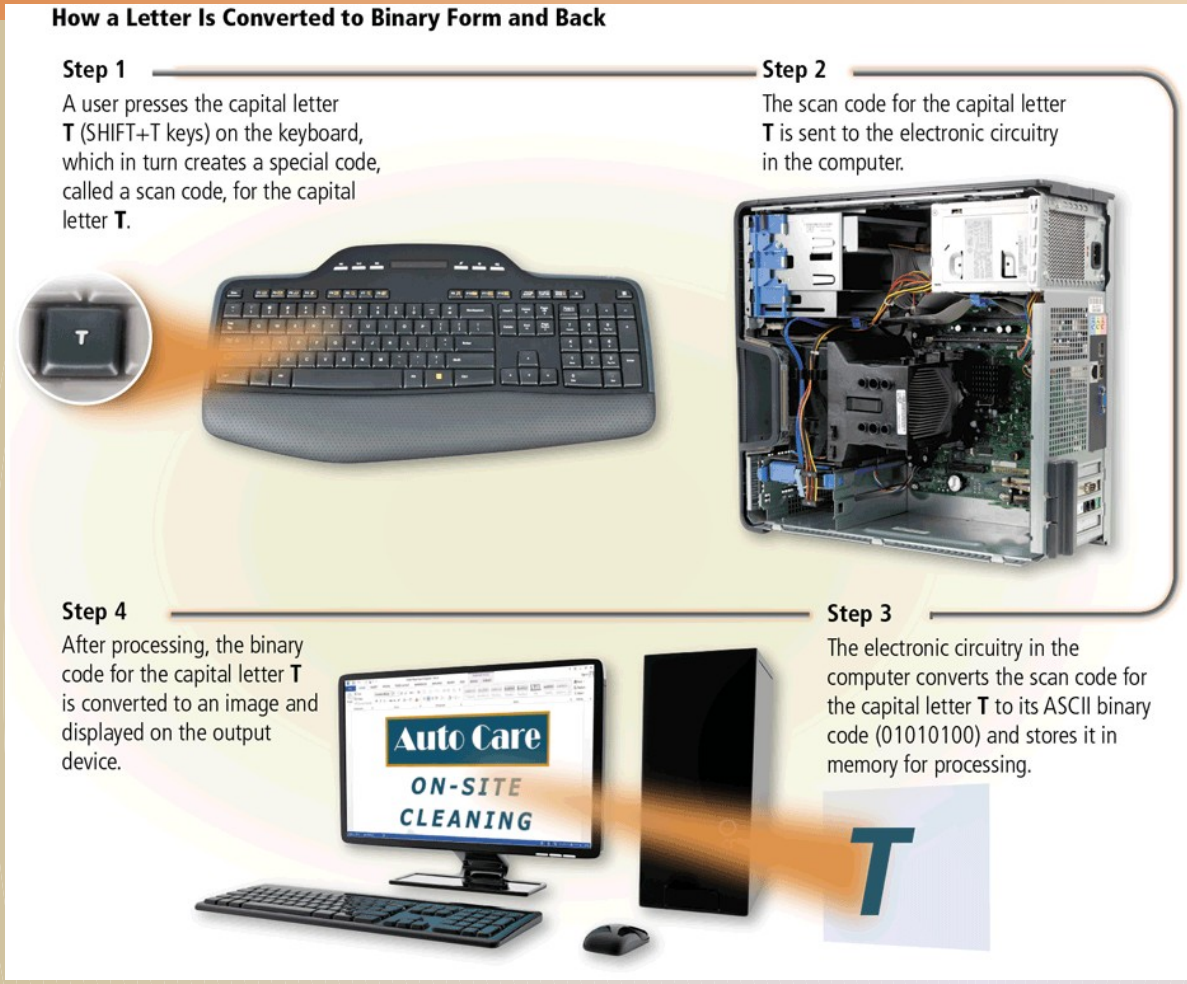
Eight bits grouped together as a unit are called a byte. A byte represents a single character in the computer or mobile device



Pages 288- 289
Figures 6-8 – 6-9

© 2017 Cengage Learning®. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

Data Representation



© 2017 Cengage Learning®. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

Page 289
Figure 6-10

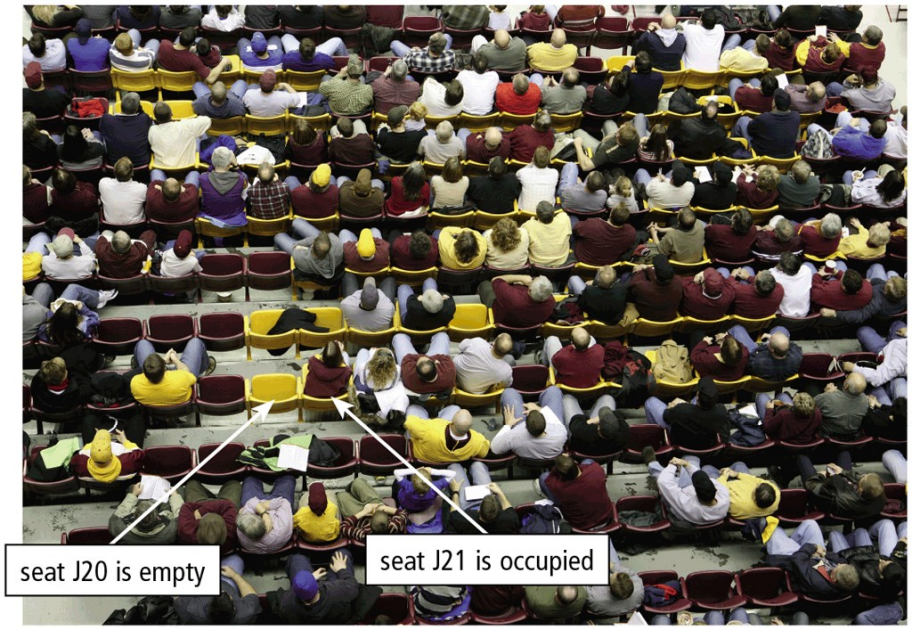
Memory

- **Memory** consists of electronic components that store instructions waiting to be executed by the processor, data needed by those instructions, and the results of processing the data
- Stores three basic categories of items:

© 2017 Cengage Learning®. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

Memory

- Each location in memory has an address
- Memory size commonly is measured in gigabytes (GB) or terabytes (TB)



© 2017 Cengage Learning®. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

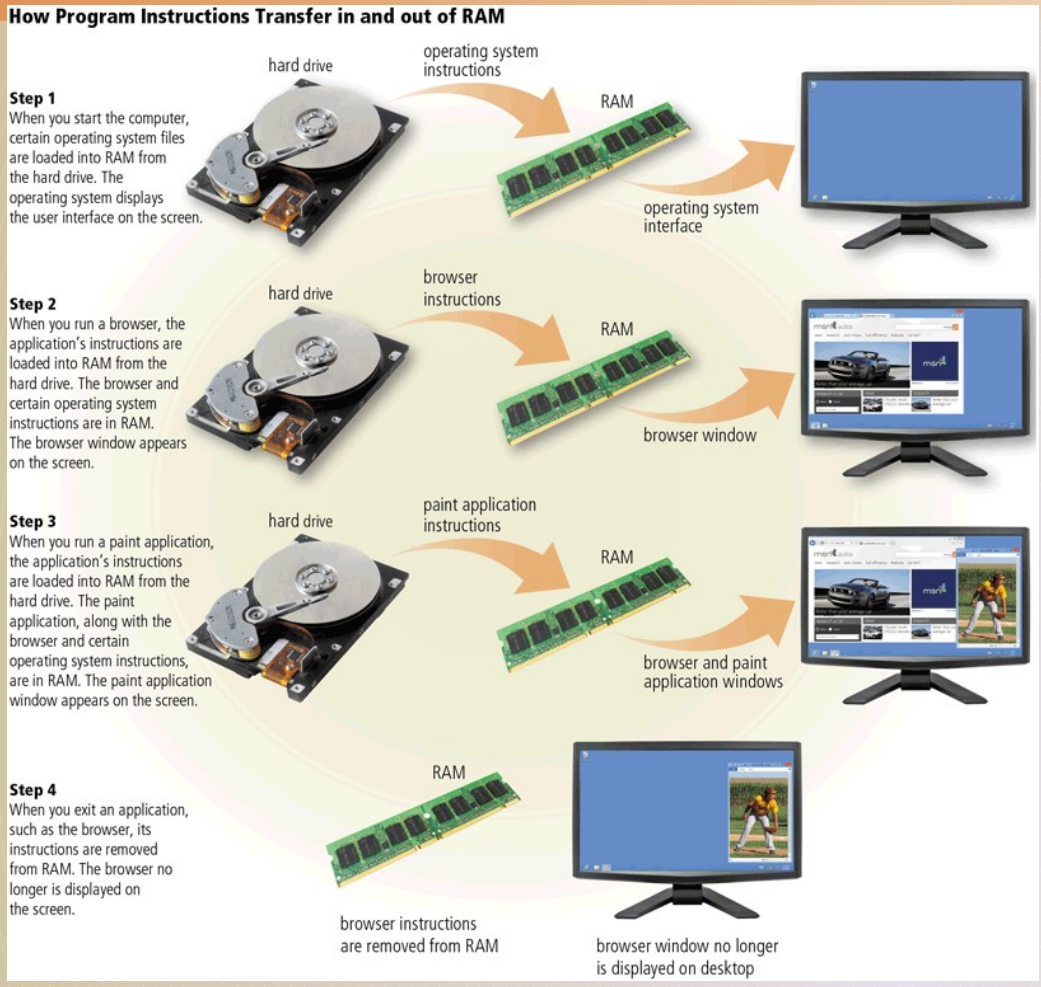
Page 290
Figure 6-11

Memory

- Computers and mobile devices contain two types of memory:

© 2017 Cengage Learning®. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

Memory



Page 291
Figure 6-12

© 2017 Cengage Learning®. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

Memory

- Two common types of RAM exist:

Table 6-1 Common DRAM Variations

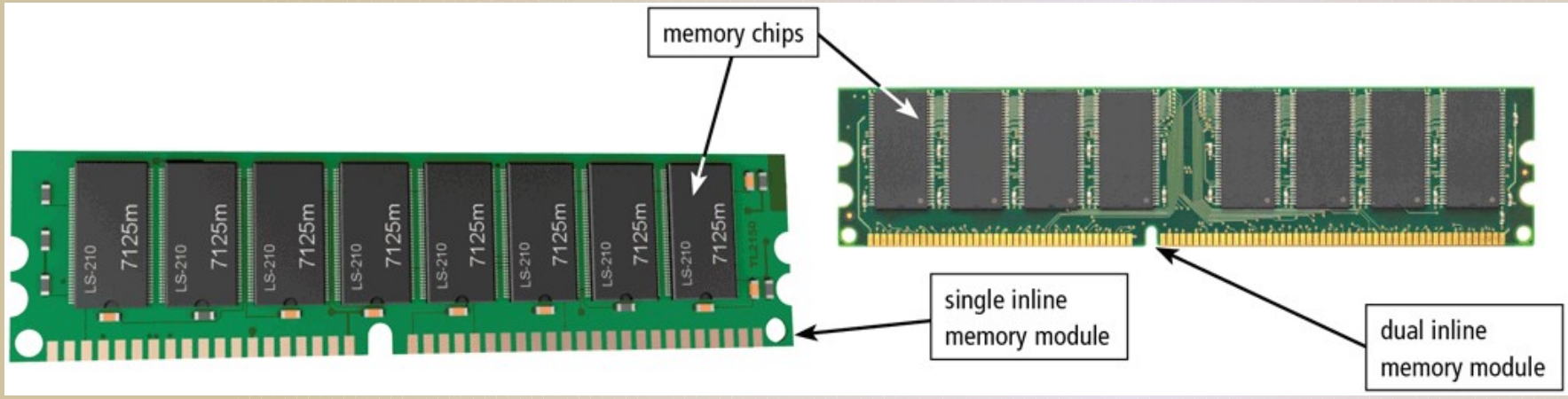
Name	Comments
SDRAM (Synchronous DRAM)	• Synchronized to the system clock • Much faster than DRAM
DDR SDRAM (Double Data Rate SDRAM)	• Transfers data twice, instead of once, for each clock cycle • Faster than SDRAM
DDR2	• Second generation of DDR • Faster than DDR
DDR3	• Third generation of DDR • Designed for computers with multi-core processors • Faster than DDR2
DDR4	• Fourth generation of DDR • Faster than DDR3
RDRAM (Rambus DRAM)	• Much faster than SDRAM

Page 292
Table 6-1

© 2017 Cengage Learning®. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

Memory

- RAM chips usually reside on a memory module and are inserted into memory slots

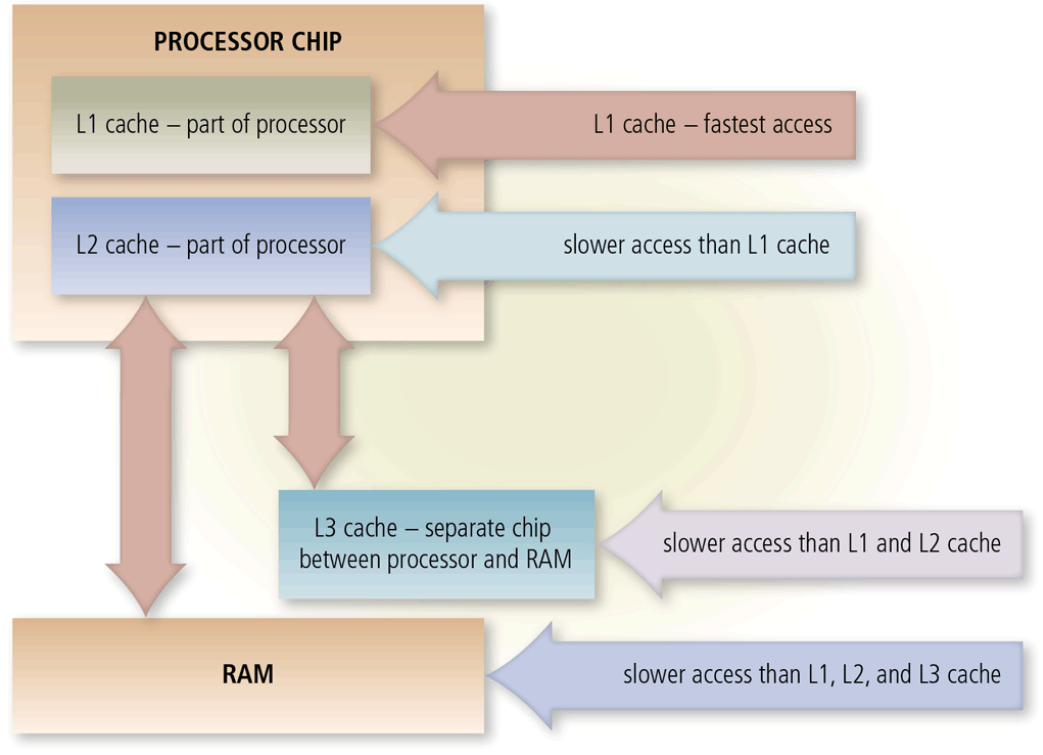


Page 293
Figure 6-13

© 2017 Cengage Learning®. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

Memory

- **Memory cache** speeds the processes of the computer because it stores frequently used instructi



Page 294
Figure 6-14

© 2017 Cengage Learning®. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

Memory

© 2017 Cengage Learning®. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

Memory

- **Flash memory** can be erased electronically and rewritten
  - CMOS technology uses battery power to retain information when when the power to the computer is off

Pages 295- 296

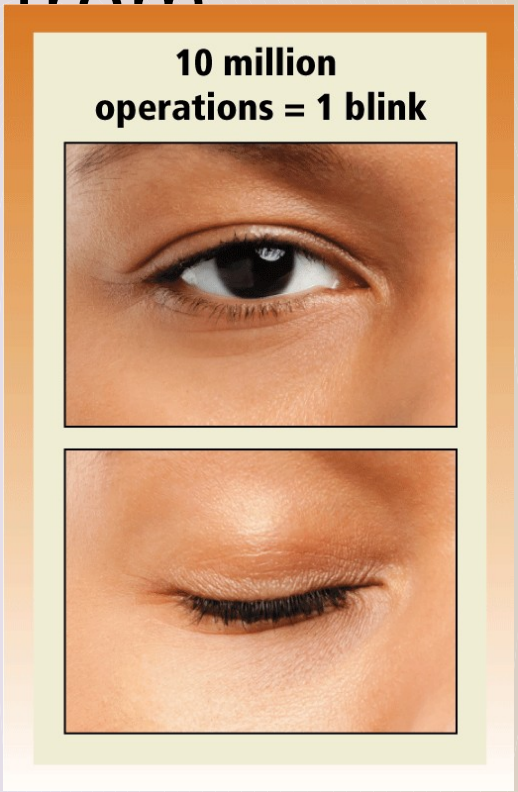
© 2017 Cengage Learning®. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

Memory

- **Access time** is the amount of time it takes the processor to read from memory
  - Measured in nanoseconds

Table 6-2 Access Time Terminology

Term	Abbreviation	Speed
Millisecond	ms	One-thousandth of a second
Microsecond	µs	One-millionth of a second
Nanosecond	ns	One-billionth of a second
Picosecond	ps	One-trillionth of a second



Page 296
Table 6-2 and Figure 6-15

© 2017 Cengage Learning®. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

Adapters

- An **adapter card** enhances functions of a component of a desktop or server system unit and/or provides connections to peripherals
  - Sound card and video card
- An **expansion slot** is a socket on a desktop or server motherboard that can hold an adapter card

Table 6-3 Adapter Cards

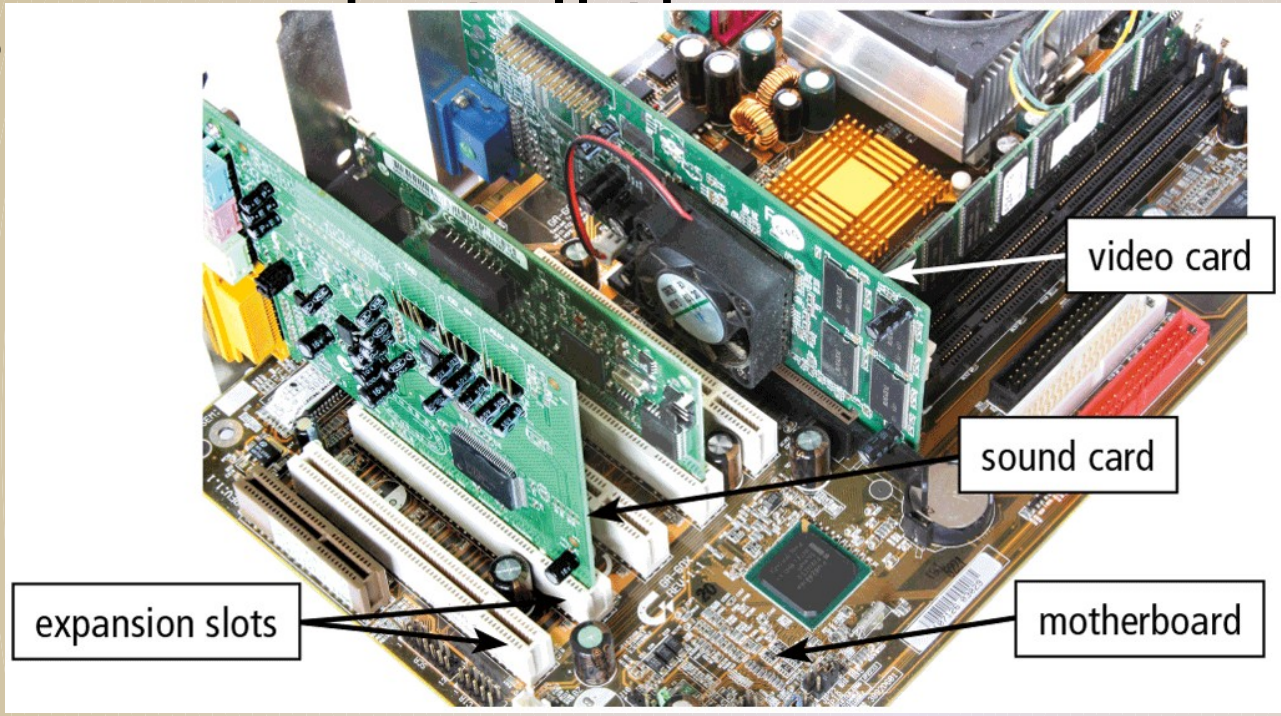
Type	Purpose
Bluetooth	Enables Bluetooth connectivity
MIDI	Connects to musical instruments
Modem	Connects to transmission media, such as cable television lines or phone lines
Network	Provides network connections, such as to an Ethernet port
Sound	Connects to speakers or a microphone
TV tuner	Allows viewing of digital television broadcasts on a monitor
USB	Connects to high-speed USB ports
Video	Provides enhanced graphics capabilities, such as accelerated processing or the ability to connect a second monitor
Video capture	Connects to a video camera

Pages 297 - 298
Table 6-3

© 2017 Cengage Learning®. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

Adapters

- With **Plug and Play**, the computer automatically can recognize peripheral devices



Pages 297 - 298
Figure 6-16

© 2017 Cengage Learning®. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

Adapters

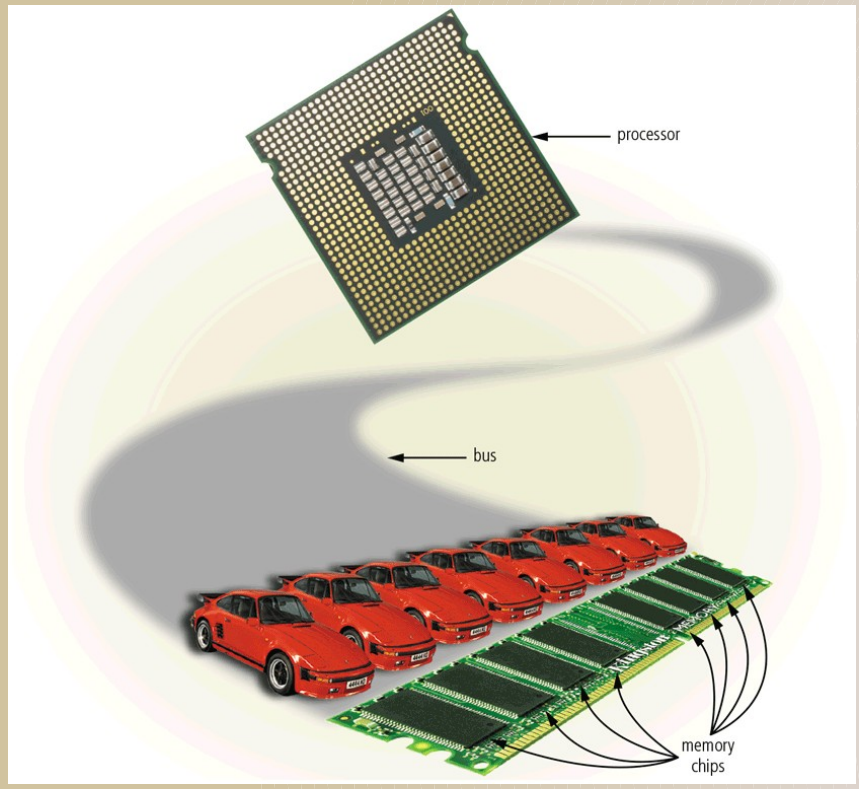
- A USB adapter enhances functions of a mobile computer and/or provides connections to peri



Pages 298 - 299
Figure 6-17

© 2017 Cengage Learning®. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

Buses



- A **bus** allows the various devices both inside and attached to the system unit to communicate with one another
  - Data bus
  - Address bus
- **Word size** is the number of bits the processor can interpret and execute at a given time

Pages 299 - 300
Figure 6-18

© 2017 Cengage Learning®. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

Buses

- A computer might have these three types of buses:

© 2017 Cengage Learning®. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

Power Supply and Batteries

- The **power supply** or laptop AC adapter converts the wall outlet AC power into DC power



Page 301
Figure 6-19

© 2017 Cengage Learning®. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

Power Supply and Battery

- Mobile computers and devices can run using either a power supply or batteries
- Batteries typically are rechargeable lithium-ion batteries



Pages 301 – 302
Figure 6-20

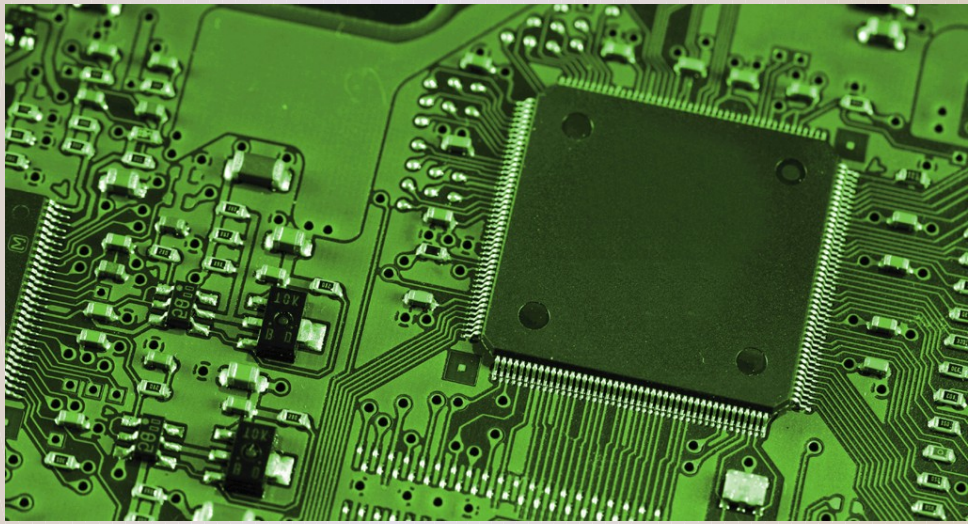
© 2017 Cengage Learning®. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

Summary

© 2017 Cengage Learning®. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

Discovering Computers Enhanced Edition ©2017

Tools, Apps, Devices, and the Impact of Technology



Chapter 6

Computing Components

Chapter 6 Complete