LEARNING OBJECTIVES

Upon successful completion of this chapter, you will be able to:

- describe information systems hardware;
- identify the primary components of a computer and the functions they perform; and
- explain the effect of the commoditization of the personal computer.

INTRODUCTION

As we learned in the first chapter, an information system is made up of five components: hardware, software, data, people, and process. The physical parts of computing devices – those that you can actually touch – are referred to as hardware. In this chapter, we will take a look at this component of information systems, learn a little bit about how it works, and discuss some of the current trends surrounding it.

As stated above, computer hardware encompasses digital devices that you can physically touch. This includes devices such as the following:

- desktop computers
- laptop computers
- mobile phones
- tablet computers
- e-readers
- storage devices, such as flash drives
- input devices, such as keyboards, mice, and scanners
- output devices such as printers and speakers.

Besides these more traditional computer hardware devices, many items that were once not considered digital devices are now becoming computerized themselves. Digital technologies are now being integrated into many everyday objects, so the days of a device being labeled categorically as computer hardware may be ending. Examples of these types of digital devices include **automobiles**, **refrigerators**, and even **soft-drink dispensers**. In this chapter, we will also explore digital devices, beginning with defining what we mean by the term itself.

DIGITAL DEVICES

A digital device processes electronic signals that represent either a one ("on") or a zero ("off"). The *on* state is represented by the presence of an electronic signal; the *off* state is represented by the absence of an electronic signal. Each one or zero is referred to as a *bit* (a contraction of *binary digit*); a group of eight bits is a *byte*. The first personal computers could process 8 bits of data at once; modern PCs can now process 64 bits of data at a time, which is where the term *64-bit processor* comes from.

UNDERSTANDING BINARY

As you know, the system of numbering we are most familiar with is base-ten numbering. In base-ten numbering, each column in the number represents a power of ten, with the far-right column representing 10^0 (ones), the next column from the right representing 10^1 (tens), then 10^2 (hundreds), then 10^3 (thousands), etc. For example, the number 1010 in decimal represents: (1 x 1000) + (0 x 100) + (1 x 10) + (0 x 1).

Computers use the base-two numbering system, also known as binary. In this system, each column in the number represents a power of two, with the far-right column representing 2^0 (ones), the next column from the right representing 2^1 (tens), then 2^2 (fours), then 2^3 (eights), etc. For example, the number 1010 in binary represents (1 x 8) + (0 x 4) + (1 x 2) + (0 x 1). In base ten, this evaluates to 10.

As the capacities of digital devices grew, new terms were developed to identify the capacities of processors, memory, and disk storage space. Prefixes were applied to the word *byte* to represent different orders of magnitude. Since these are digital specifications, the prefixes were originally meant to represent multiples of 1024 (which is 2^{10}), but have more recently been rounded to mean multiples of 1000.

A Listing of Binary Prefixes

Prefix	Represents	Example
kilo	one thousand	kilobyte=one thousand bytes
mega	one million	megabyte=one million bytes
giga	one billion	gigabyte=one billion bytes
tera	one trillion	terabyte=one trillion bytes