

13

INTERNET AND THE WORLD WIDE WEB

CHECK YOUR IT IQ

Before you begin this chapter, see what you already know about information technology by scanning the QR code to take the chapter pretest. If you do not have a smartphone, visit www.g-wlearning.com.



It is not uncommon to find people who think that the Internet and the World Wide Web (WWW) are the same thing. The Internet is an interconnected network of networks, while the web is a collection of documents connected by universal resource locator (URL) codes and hypertext protocol. The Internet also includes e-mail, file transfers, and instant messaging. Although many web-based services have reached out to support these protocols, these protocols were well in place before the web was created.

The Internet had its beginning in 1969 with an Advanced Research Projects Agency (ARPA) grant to create communication between remote computers. The first communications network, ARPANET, included computers at University of California at Los Angeles, University of California at Santa Barbara, University of Utah, and Stanford University. The final step that created what is known today as the Internet was the definition of the transmission control protocol/Internet protocol (TCP/IP) standards in 1982. The Internetworking Group was responsible for defining how a network of networks would communicate. The formal name of Internet came from that group's name.

SECTIONS

- 13.1 INTERNET AND THE WORLD WIDE WEB
- 13.2 CREATING FOR THE WEB



College and Career Readiness

Reading Prep. As you read this chapter, stop at the Section Reviews and take time to answer the questions. Were you able to answer these questions without referring to the chapter content?

IC3 CERTIFICATION OBJECTIVES

Computing Fundamentals

- Domain 2.0** Hardware devices
 - Objective 2.11** Understand concepts regarding connecting to the Internet
- Domain 3.0** Computer software architecture
 - Objective 3.9** Searching for files
 - Objective 3.11** Define an IP address
 - Objective 3.13** Troubleshooting
- Domain 7.0** Security
 - Objective 7.4** Connecting to secured vs. unsecured network (wired and wireless)

Key Applications

- Domain 1.0** Common features
 - Objective 1.2** Understand the difference between plain text and HTML (text with markup)
- Domain 4.0** Databases
 - Objective 4.2** Understand how websites utilize databases

Living Online

- Domain 1.0** Internet (navigation)
 - Objective 1.1** Understand what the Internet is
- Domain 2.0** Common functionality
 - Objective 2.1** Understand how to use common website navigation conventions
- Domain 9.0** Digital principles/ethics/skills/citizenship
 - Objective 9.2** Understand digital wellness basics

Living Online

- Domain 1.0** Browsers
 - Objective 1.1** Internet vs. browsers vs. WWW
 - Objective 1.2** Navigation
- Domain 2.0** Networking concepts
 - Objective 2.2** Network types and features, capabilities
 - Objective 2.3** Network troubleshooting
- Domain 4.0** Digital citizenship
 - Objective 4.2** Legal and responsible use of computers
- Domain 5.0** Safe computing
 - Objective 5.2** Ergonomics
- Domain 6.0** Research fluency
 - Objective 6.1** Using search engines
 - Objective 6.2** Evaluate search results
 - Objective 6.3** Using advanced features of search engines

**SECTION
13.1**

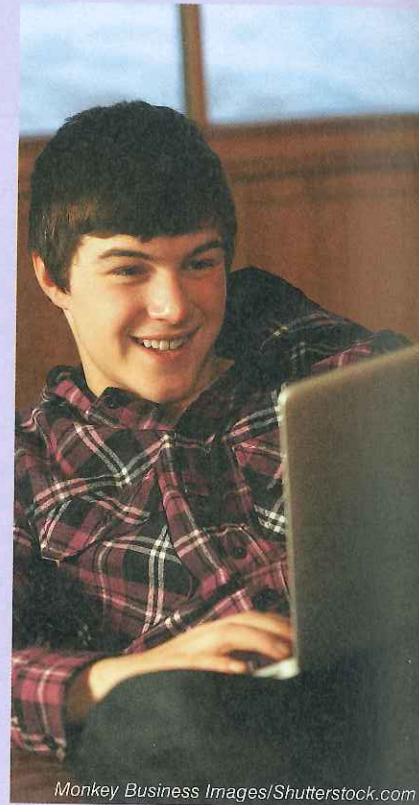
**INTERNET AND THE
WORLD WIDE WEB**

**Essential
Question**

Why is ethical use of Internet resources important to maintaining a functioning society?

The Internet is an interconnected network of networks used for communication. File transfers, electronic mail, messaging, news feeds, and the web are all made possible by the Internet. There are several parts to the Internet. These parts include computers, communication hardware, software, and standards. The Internet was designed to be redundant and fault tolerant. This means that there are many duplications to ensure the communication takes place.

The World Wide Web is a collection of programs, called web servers, running on Internet networks all over the world. On these servers are over 50 billion hypertext pages. Each page has its own uniform resource locator (URL) or web address. Searching through all of this information is supported by software called a search engine. Learning to perform good searches is important for a user and for the search engine.



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TERMS

- | | |
|----------------------------------|--------------------------------|
| Boolean operators | modem |
| browser | packet |
| digital wellness | plug-in |
| download | protocol |
| ergonomics | public switched network |
| human-computer interaction (HCI) | search engine |
| hypertext markup language (HTML) | uniform resource locator (URL) |
| Internet service provider (ISP) | upload |

LEARNING GOALS

After completing this section, you will be able to:

- Describe the operation of the Internet.
- Discuss the aspects of maintaining digital wellness.
- Use a search engine to locate information.
- Explain how to use the Internet in an ethical manner.

Internet

The *Internet* is a worldwide communication network that connects individual computer networks. Messages are exchanged between these networks, and then the destination network must deliver the message to the correct computer in its network. It sounds complicated, but the process is very simple to understand.

The routing mechanism is based on small file fragments called **packets**. The transmission control protocol (TCP) identifies a file to be sent and breaks it into packets, each of which is given a header. The packet *header* contains the:

- file's source computer's Internet protocol (IP) address;
- destination computer's IP address;
- packet number; and
- total number of packets in the entire file.

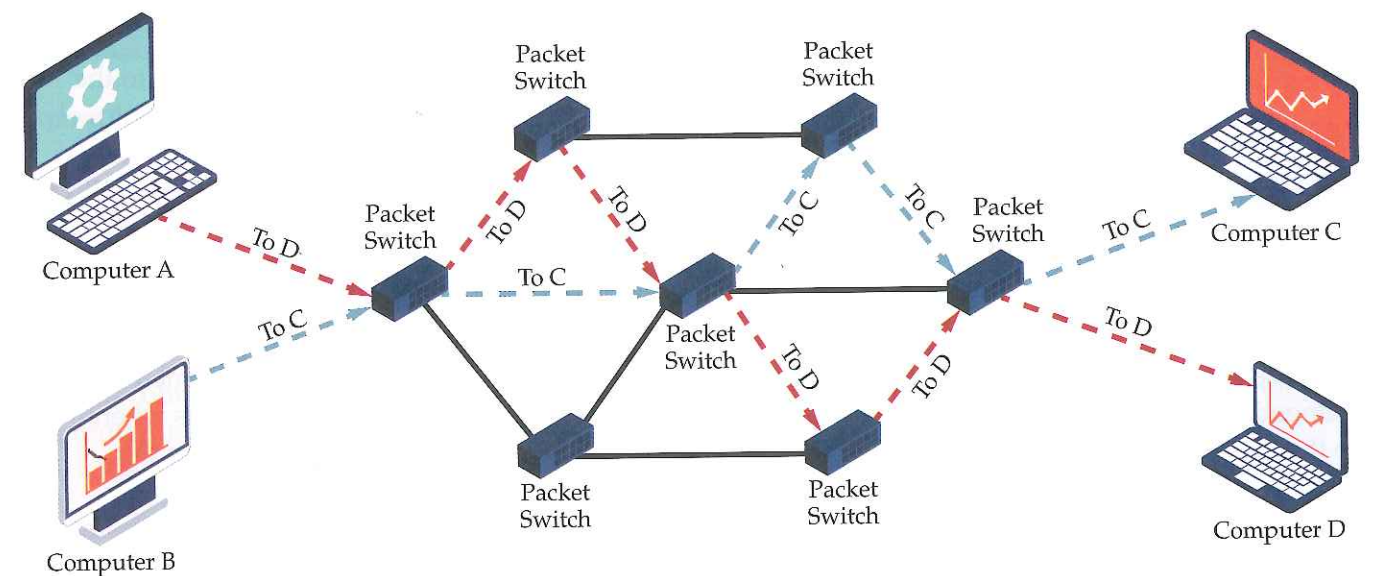
These packets are sent through the network of networked computers, possibly not on the same path, as shown in Figure 13-1. If a server along the way is too busy or not working, a packet sent to that server is rerouted to another network. When the packets arrive at the destination network, they are reassembled into the original file. If any packets are missing or corrupted in the transmission, messages are sent to the source computer and the lost packets are resent.

The process of creating packets and transmitting them over a network is called *packet-switching*. It happens at the speed of light. Electricity and light travel a little less than one foot in one nanosecond, or about one billion feet in one second. That is why transmissions are so quick on the Internet. A **public switched network** makes use of packet switching to transfer information and is available to the general public. Examples are the Internet and the telephone network. A private switched network is protected from the general public by security measures. An

GS5 Living Online
1.1.1.1

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1.1.1, 1.1.2, 1.1.3

GS4 Living Online
2.2.1



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Figure 13-1. The TCP breaks a file into packets, which are then sent through the network.

example of a privately switched network is the ATM network, which requires a high degree of security.

Internet Service Provider

In order to connect to the Internet, an ISP must be used. An **Internet service provider (ISP)** is a company or organization that provides access to the Internet. The Internet is a network of networks, and each ISP owns one of those networks. Examples of ISPs are Verizon, Comcast, AOL, and many others. There is usually a fee charged by ISPs to access the Internet.

The device used to connect to the ISP is called a modem. These connections are either hardwired or wireless. A wireless connection may be cellular based or Wi-Fi. Wi-Fi is the name given to wireless networks, and the ISP owns the Wi-Fi network. Wi-Fi connections may be fee-based or offered free of charge in many public locations, such as airports, hotels, and libraries.

The task of a **modem** is to deliver the data channel for Internet transmissions. Its original use was via telephone landlines. Digital signals were modulated into analog transmissions, sent along telephone lines, and then demodulated back into digital signals for the computer. Hence the term *modem*, from *modulate* and *demodulate*.

Modems come in a variety of configurations. At home or in businesses, ISPs provide modems that are wired to cable service, digital subscriber lines, or satellite dish service. Traditional landline modems are still in use, especially in remote areas where cable or satellite transmissions are not available. Cellular modems are used in mobile devices. In this case, the cellular carrier is the ISP.

Internet Protocol

A **protocol** is a system of agreed-on rules. Each network on the Internet has a unique Internet protocol address. The *Internet protocol (IP) address* is the number the networks on the Internet use to identify a particular network location. The host of the network is identified by this number. Each device on a network has a subnet address relative to the host. This allows each computer connected to the Internet to be uniquely identified. For example, the IP address 4.31.38.9 is for the Google home page. There are two schemes for assigning an address to a network: IPv4 and IPv6.

In the IPv4 scheme, four bytes of data are assigned to the address. Each byte can hold 256 numbers, from 0 to 255. That provides 4,294,967,296 unique addresses ($256 \times 256 \times 256 \times 256$). When the TCP/IP transmission scheme was invented, four billion addresses seemed like plenty. However, it is not enough for today's technology needs when there are so many embedded devices that require connection to the Internet.

The IPv6 scheme was developed to increase the number of possible IP addresses. In the IPv6 scheme, 16 bytes are assigned to each IP address. This provides 2^{128} or more than 8×10^{28} addresses. Each IPv6 address

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2.11.1

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2.2.3, 2.3.3

FYI

The IP address of a web page or other Internet resource may be changed at some point, so the IP address you have or find may not be current.

is represented by eight groups of four hexadecimal digits separated by colons, such as 2001:0:5ef5:79fd:85c:18f2:b84c:a02a.

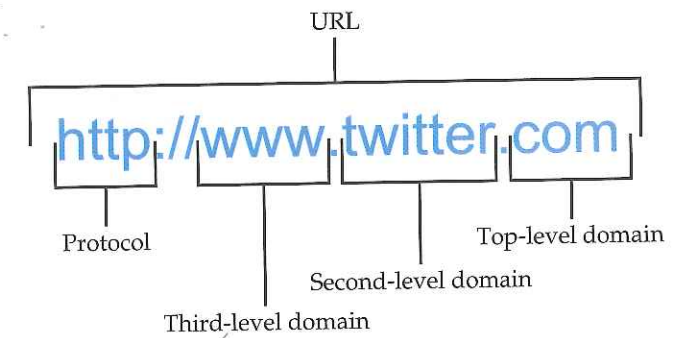
Conversion to the IPv6 scheme is necessary because available addresses based on the IPv4 scheme are being exhausted. However, the two schemes are not compatible, and that is slowing the adoption of IPv6.

Whichever scheme is used, such an address is too difficult for people to easily use. The domain name system (DNS) was invented to make IP addresses easier to use. The *domain name system (DNS)* uses name servers to map the numbers and letters in an IP address to a human-readable string of characters. For example, the IPv4 address of a web server may be 216.167.196.196, but its DNS address may be www.g-w.com.

Each network belongs to a domain depending on its ownership, as shown in Figure 13-2. Figure 13-3 lists several Internet top-level domains. In addition to these top-level domains, each country has its own top-level domain, such as .us for the United States, .ca for Canada, .au for Australia, and .uk for the United Kingdom. There are many sources on the Internet that provide a comprehensive list of domains for countries.

GS4 Living Online
2.2.2

GS4 Living Online
1.2.1



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Figure 13-2. A URL consists of several subparts. The second-level domain is what most people think of when talking about a website.

| Top-Level Domain | Members | Example |
|------------------|----------------------------------|---------------------|
| com | Commercial entities | g-w.com |
| gov | US governmental agencies | whitehouse.gov |
| edu | US colleges and universities | stanford.edu |
| org | Organizations | internetsociety.org |
| net | Open domain, anyone can register | sourceforge.net |

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Figure 13-3. Common top-level domains and examples of who may use them.

HANDS-ON EXAMPLE 13.1.1

GS5 Computing Fundamentals
3.13.4

FINDING AN IP ADDRESS

All computers connected to the Internet have an IP address. It is easy to find the IP address for a computer using a utility that comes with Windows.

1. In Windows 10 and Windows 7, click the **Start** button on the taskbar. In Windows 8, click the **Apps** button.
2. Click **Command Prompt** in the **Windows System** folder or area or the **Accessories** folder of the menu. The **Command Prompt** window is displayed.

HANDS-ON EXAMPLE 13.1.1 (CONTINUED)

3. Enter `ipconfig.exe` at the command prompt. A listing of the IP configuration for the computer is displayed, as shown.

```

Command Prompt
Microsoft Windows [Version 10.0.10240]
(c) 2015 Microsoft Corporation. All rights reserved.

C:\>ipconfig

Windows IP Configuration

Ethernet adapter Wireless Network Connection:

    Connection-specific DNS Suffix  . : 
    IP Address . . . . . : 192.168.1.2
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.1.1

Ethernet adapter Local Area Connection:

    Media State . . . . . : Media disconnected

C:\>
  
```

4. Identify the IPv4 address. In this example it is 192.168.1.2.
 5. Identify the subnet mask. In this example it is 255.255.255.0.
 6. Enter `exit` to close the **Command Prompt** window.

Other Protocols

The Internet protocol works together with other protocols within the Internet protocol suite. The *Internet protocol suite* is the group of network models and communication protocols used by the Internet and similar networks. The Internet protocol suite is more commonly known as *TCP/IP* for the transmission control protocol and Internet protocol standards contained within the suite. These are a few examples of protocols in the Internet protocol suite:

- transmission control protocol (TCP)
- Internet protocol (IP)
- hypertext transfer protocol (HTTP)
- post office protocol (POP3)
- Internet message access protocol (IMAP)
- simple mail transfer protocol (SMTP)
- file transfer protocol (FTP)

The transmission control protocol (TCP) provides the safe delivery of packets of information between computers on the Internet. The hypertext transfer protocol (HTTP) provides the hypermedia information system otherwise known as the World Wide Web. The post office protocol (POP3) provides retrieval of e-mail messages from a remote server over a TCP/IP connection. The Internet message access protocol (IMAP) works with POP3 to provide access to storage and retrieval of e-mail messages. The simple mail transfer protocol (SMTP) provides the sending of e-mail

messages. The file transfer protocol (FTP) provides transmittal of files between hosts on a TCP network.

Upload and Download

The basic function of the Internet is to move digital files from one computer to another. These files can be text, video, image, or audio files; office documents; or any other type of digital file. There are two functions to transmitting files:

- **Upload** is a user at one computer sending a document to a server.
- **Download** is a user retrieving a document from the server to the computer.

The speeds of early Internet transmissions were too low to make the uploading and downloading of anything other than text files efficient. E-mail and basic text-only documents were transferred between computers. These transmissions each represented only a few kilobytes of data. As transmission speeds increased, larger files could be efficiently uploaded and downloaded. Now it is common to send streaming video from one machine to another, which represents the transmission of gigabytes of data.

In general, it is considered more important to provide faster download speeds than upload speeds because a user is waiting for the document. Upload on the other hand, could be handled in a slower fashion because it is simply storing the documents and no person is actually waiting for it. Because of limited resources, Internet servers ration transmission times and routinely assign faster speeds to the download function.

However, this balance between upload and download has changed with the advent of Internet-based services such as video conferencing. In these applications, it is important to provide real-time interaction. The transmission speed for both upload and download must be as fast as possible for these real-time applications.

World Wide Web

The *World Wide Web (WWW)* is a subset of the Internet that consists of a collection of documents connected by universal resource locator (URL) codes and hypertext protocol. Invented by Sir Timothy Berners-Lee in the early 1990s, the web made it easy for people who were not experts in computers to access documents stored on the Internet. Today, there are client programs that provide functionality supported by the above Internet protocols.

Servers connected to the Internet have a WWW folder at the root of the computer. Within this folder and its subfolders are all of the accessible documents for the web for the server. Figure 13-4 illustrates how the web works. These are the basic steps:

1. The user either enters a location in the navigation bar of a web browser or clicks a link on a web page, which issues the URL for a document to the browser.

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1.1.3.11

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1.1.1, 1.1.2, 1.1.3

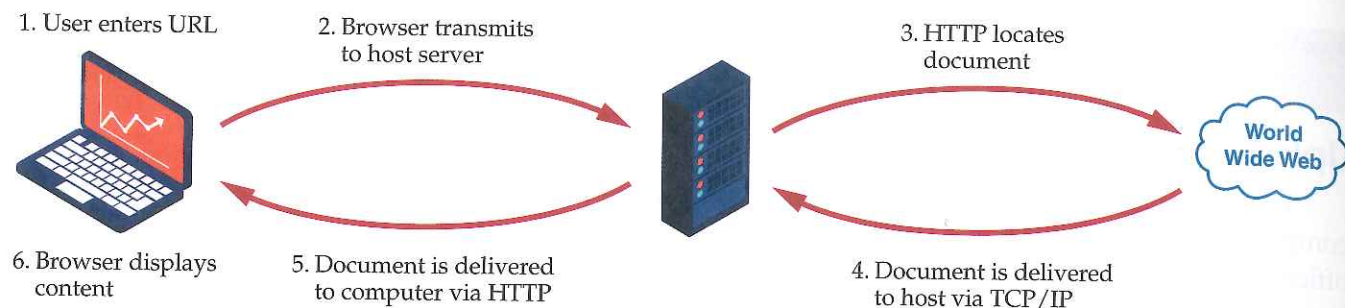


Figure 13-4. The operation of the web is really just a series of simple steps.
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2. The web browser transmits that to its WWW program on the host server.
3. The HTTP protocol locates the document specified by the URL and requests its delivery to the host.
4. If necessary, the document is delivered via TCP/IP packets to the host.
5. The host delivers the document to the requesting computer using HTTP.
6. The web browser determines how the document should be formatted and displays it.

The web *uses* the Internet, but it is not the Internet. The Internet is an interconnected network of networks. The Internet includes many functions that are not core to the web, such as e-mail, file transfers, and instant messaging, although these functions may be offered through web-based services. The key notions of the web are hyperlinks and uniform resource locators (URLs).

Hyperlinks

A *hyperlink* is the data needed to navigate to another resource, often a URL for a website, attached to text or an image in a document, as shown in Figure 13-5. The text or image to which the hyperlink is attached is called *hypertext*. Clicking the hypertext activates the hyperlink and retrieves the resource specified in the hyperlink. In common usage, the term hyperlink is used to mean hypertext, so one might say “click the hyperlink,” or link, instead of saying “click the hypertext.” However, be aware there is a technical distinction between the two terms.

Hyperlinks are one of the foundations of the World Wide Web. Web pages contain hyperlinks to other web pages or Internet resources. However, hyperlinks can also be used within documents. For example, the table of contents in a report may contain hyperlinks to the pages in the document indicated by the page numbers.

Uniform Resource Locator

A **uniform resource locator (URL)** is an address that points to a specific document or other resource on a computer network. Many people call this a *web address*, but while all web addresses are URLs, a URL is

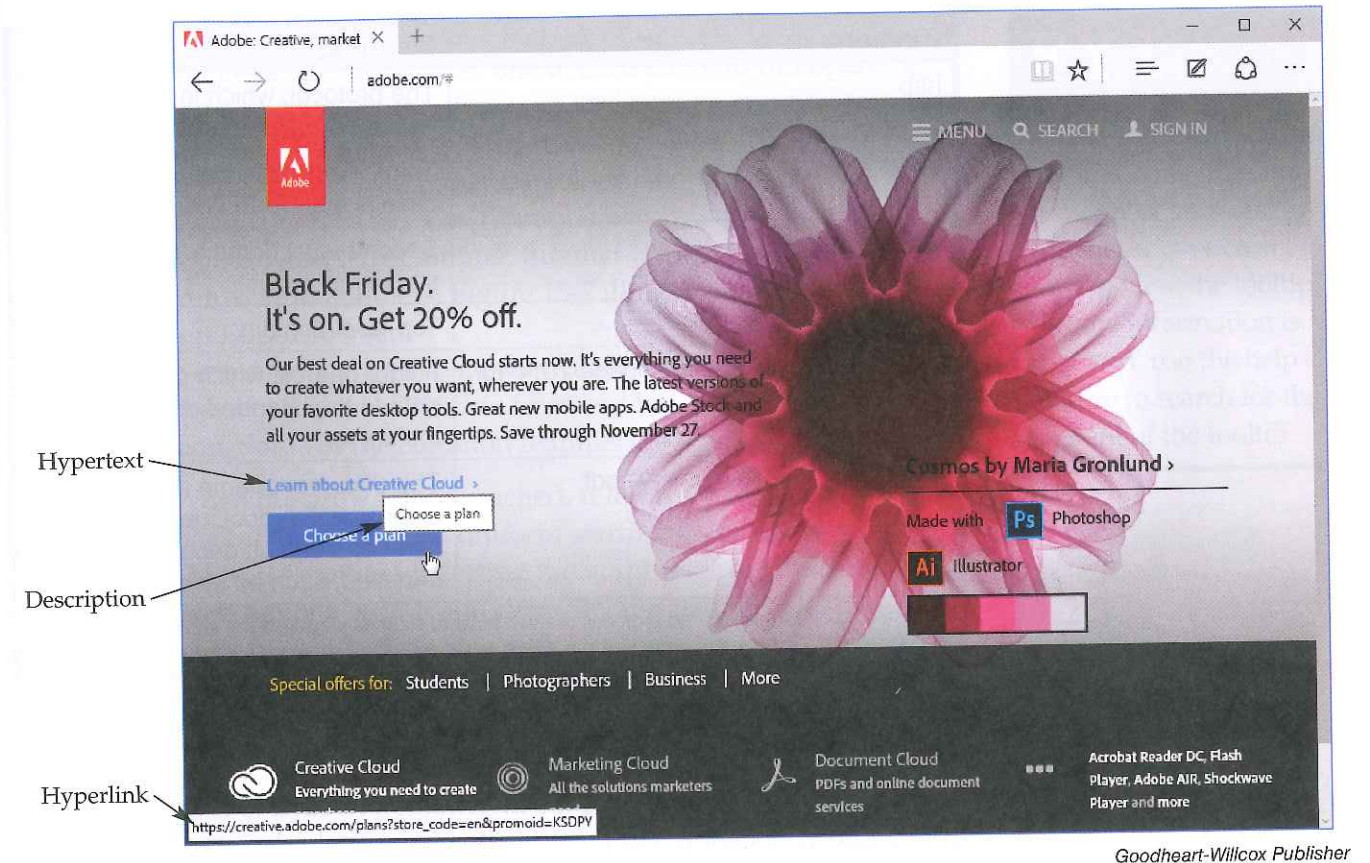


Figure 13-5. Hypertext contains a hyperlink, which is the data needed to navigate to another resource.
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not necessarily a web address. Each web page on the World Wide Web has a URL, and the use of URLs is another foundation of the web. It was Berners-Lee's group that defined the URL and made each document in a WWW folder on any server discoverable.

There are several parts to a URL. Consider this URL:

`http://www.internetsociety.org/deploy360/wp-content/uploads/2014/10/IPv6-Fact-Sheet-English-v1.pdf`

Beginning with the protocol, a URL provides the path to the domain, through the servers' folders, to the location of a specific document. Figure 13-6 explains the elements of this URL.

The addresses in a URL may be absolute or relative. An *absolute address* contains all of the information to locate the resource no matter from where the search begins. Think about a house address, such as:

123 Main Street
Anytown, MD 20010

The mailing address contains not only the street address, but the city, state, and ZIP code. This allows a document to be mailed to a specific address from anywhere. This is considered the absolute address of the house. An absolute URL begins at the domain of the website that contains the document.

FYI

The theoretical foundation of hypertext was developed in the 1960s by Ted Nelson and Andries van Dam at Brown University based on earlier work by others.

| Element | Meaning |
|--|---|
| http | The protocol, which in this case is hypertext transfer protocol |
| www | Third-level domain, which in this case is the World Wide Web |
| internetsociety | Second-level domain, which is the site name |
| org | Top-level domain |
| /deploy360/wp-content/uploads/2014/10/ | Folder names, which provide a path to the intended document on the server |
| IPv6-Fact-Sheet-English-v1.pdf | The document name and file extension; if a document is not named, a default document is retrieved, such as index.html |

Note: the colon terminates the protocol, the two forward slashes introduce the site identifier, the periods (dots) separate the domains, and single forward slashes separate folders on the server.

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Figure 13-6. A breakdown of the URL given in the text.

A *relative address* provides the information needed to find the resource from a known location. For example, to give somebody instructions to a house from where you are standing:

Go two streets over and down a block to 123 Main Street.

Web designers often use relative addresses when programming websites. Relative addresses are used for locations on the same domain, where absolute addresses are used for locations on other domains. Consider the previous URL. A hyperlink on a web page stored in the top folder may be:

./deploy360/wp-content/uploads/2014/10/IPv6-Fact-Sheet-English-v1.pdf

The period or dot (.) represents the current folder on the website. Therefore, this URL tells the browser to start at the current folder and then use the remaining information to locate the PDF. If a web page on another domain, such as code.org, contains a hyperlink pointing to this document, the absolute address must be used:

http://www.internetsociety.org/deploy360/wp-content/uploads/2014/10/IPv6-Fact-Sheet-English-v1.pdf

Browsers

Browsers are the user's interface to the World Wide Web. A **browser** is a computer program that retrieves hypertext documents via the HTTP protocol and displays them on the computer monitor. The name is derived from the activity of browsing, or surfing, the web to locate files. While these programs are also known as *web browsers*, browsers now offer many abilities beyond surfing the World Wide Web.

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GS5 1.1.3.10,
 1.1.3.12, 2.1.4
GS4 Living Online
 1.2.9

Most browsers support tabs. Tabs provide the ability to open multiple web pages at the same time, one in each tab, without opening new application windows. Without tabs, or *tab browsing*, moving to a new page overwrites the previous page. Tabs usually appear along the top of the browser window, similar to paper file folder tabs, but each browser implements the idea of tabs in its own unique way.

Examples of browsers are Chrome, Internet Explorer, Microsoft Edge, Safari, and Firefox, among others. Figure 13-7 illustrates the main features of the Microsoft Edge browser.

There are common features that every browser supports. The specific function of a feature may vary from one browser to another or by software version. Some of the common features are discussed below.

Home Page. When the browser is launched, it loads a page designated as the home page. This provides a uniform starting place for browsing. In Microsoft Edge, the option for setting the home page is found by clicking the **More Actions** button and then clicking **Settings**, as shown in Figure 13-8A. In Google Chrome, this option is found in the **Customize and Control Google Chrome** menu, as shown in Figure 13-8B. The option is similarly located in other browsers.

FYI

If you need help learning the functions of a new browser or version, hover the cursor over each icon to view the tooltip. If more information is required, use the help feature to search for the content of the tooltip.

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GS4 1.2.3



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Figure 13-7. The basic layout of the Microsoft Edge screen.

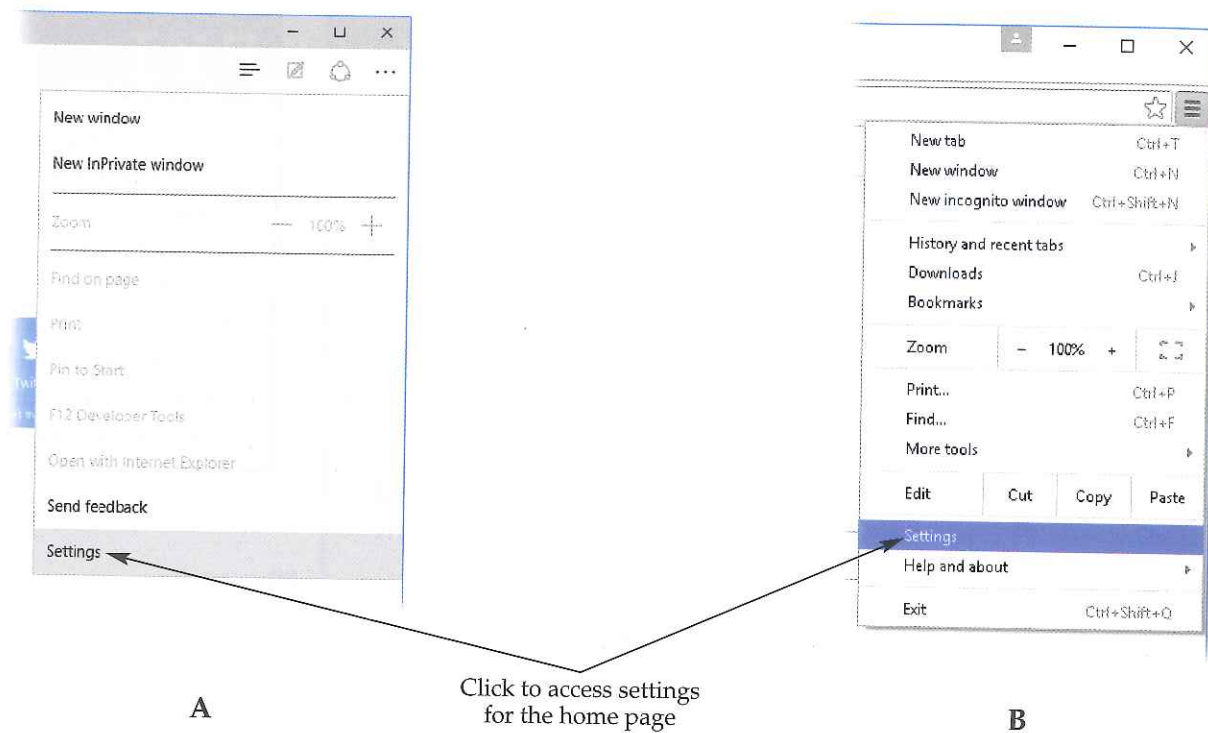


Figure 13-8. The home page can be set in all popular browsers.

Some schools, businesses, or companies use an intranet. An *intranet* is an internal network similar in function to the Internet. If an intranet is used, often the home page for the browser is set to the home page of the intranet. Other users may prefer to set the home page to a search engine or even to a blank screen.

GS5 Living Online
1.1.3.11

Scroll Bars. Usually a web page is too large to fit on the display. Scroll bars are provided for the user to see the extra content that does not fit on the display. Web designers often place the attention-grabbing content on the top of the display to encourage users to scroll to see the rest. Click and drag the scroll bar up and down or use the up and down arrow buttons to move the extra content into the display. The mouse wheel can also be used to scroll the page.

GS5 Living Online
1.1.3.4

Breadcrumbs. A common type of website navigation is breadcrumbs. Breadcrumbs, or a breadcrumb trail, are hyperlinks back to each page the user has navigated to on the website. The breadcrumbs typically appear along the top of the website. A separator, usually a chevron (>), is used between each breadcrumb. These elements are called breadcrumbs because they show a trail back to the home page of the website, just as Hansel and Gretel left breadcrumbs to find their way out of the forest in the fairytale of the same name.

Mouse Actions. Moving the cursor over a hyperlink on a webpage, known as a mouse-over or roll-over, causes the cursor to change to indicate the presence of a hyperlink. The browser will display the URL of the hyperlink, typically in the status bar at the bottom of the browser window. In general, a single click selects an item on a webpage, while a double click activates an item. The exception is a hyperlink, which is activated with a single click, not a double click. A right-click displays a shortcut menu of actions including navigation and page-management tools. Generally, this shortcut menu provides browser-based actions, but it is possible for a web designer to program a shortcut menu for page-based actions.

GS5 Living Online
2.1.1, 2.1.2

Downloads. Files and applications may be downloaded to the user's computer. Browsers use file transfer protocol to bring image, text, PDF, or other files to the local computer. The process is known as *downloading*. Each browser has a default location where downloaded files are saved. For example, Microsoft Edge (Internet Explorer) in a Windows 10 environment has a default location as This PC>Download, which is the C:\Users*user name*\Downloads folder. One of the settings that can be made in the browser is whether or not to prompt for a download location. A good file-management technique is to make the browser prompt for the storage location each time a download is requested. Then, save the file in your project's folder. If this setting is not to prompt, the browser automatically stores the downloaded file in the default location.

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3.9

History. The history feature keeps track of the locations visited using the browser. This feature makes it easy to return to one of the listed pages. Figure 13-9 shows the history feature in Internet Explorer.

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7.4.3.1

GS4 Living Online
1.2.7

TITANS OF TECHNOLOGY

Although the Internet is the result of many talented people, one person stands out as the individual who made the Internet accessible to the masses. Sir Timothy Berners-Lee conceived and built the World Wide Web. While working as a computer programmer at CERN in Bern, Switzerland, Berners-Lee noticed how very difficult it was to find and read documents of research results that were stored on the Internet. He devised the notion of the uniform resource locator (URL)

as an address for every document on the Internet. Then he used the existing technology of hypertext to describe markup rules for developing browsers to view the documents. His final step was to create the hypertext transfer protocol (HTTP) for locating and delivering the documents to the requesting computer. That was in 1989. At this time, Berners-Lee is working at the World Wide Web Consortium. He directs the World Wide Web foundation.

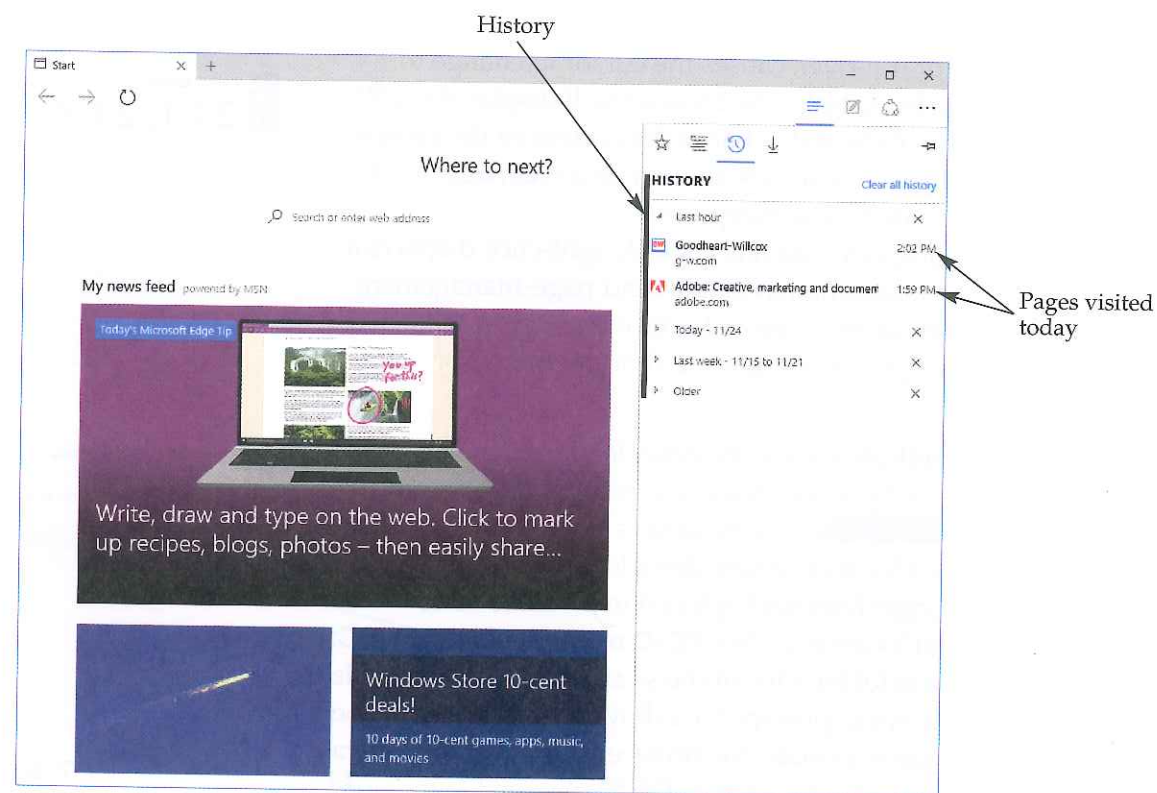


Figure 13-9. The history feature keeps track of visited pages. This is the history feature for Microsoft Edge.

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GS4 Living Online
1.2.5

Back, Forward, and Refresh. The back and forward functions allow you to move backward and forward through the pages you have visited. This is easier than reentering the URL of a previously visited page. The refresh function is used to reinitialize the current page. This is sometimes needed if the page has frozen or is used to update dynamic information on the page, such as the display of the amount of time left in an online auction.

Favorites or Bookmarks. Often while searching for information, several sites may prove to be helpful. Rather than writing down the URLs and reentering them later to return to the sites, it is possible to flag the sites as a favorite or bookmark. The browser stores the title and URL of the page. Opening the list of favorites or bookmarks and clicking the link retrieves that page.

Most browsers allow a specific list of bookmarks to be made that can be shared with other users. This is a useful feature when researching a group project. All of the relevant bookmarks can be kept together and shared with everybody in the group.

GS5 Living Online
1.1.3.5, 1.1.3.7

GS4 Living Online
1.2.6

Plug-ins. A **plug-in**, or add-on, is a helper file that extends the capability of a software application, in this case, a browser. For example, Adobe Flash Player is a browser plug-in. The benefit of a plug-in is that patches can be sent from the developer to update only that part of the browser. It is not necessary to install a new browser each time an update needs to be made.

Most plug-ins will be suggested when a user tries to use a feature that is not native to a browser. Suppose you click a link to play a video. If the browser is not able to play the video, it needs a plug-in that supports the format of the video being played. As a security measure, the browser makes the user choose whether or not to install a plug-in.

Once a plug-in is installed, it can be deleted or its configuration can be changed. In Chrome, enter `chrome://plugins` in the address bar. Then, click the **Disable** link for the plug-ins you wish to disable. In its initial release, Microsoft Edge does not support add-ons.

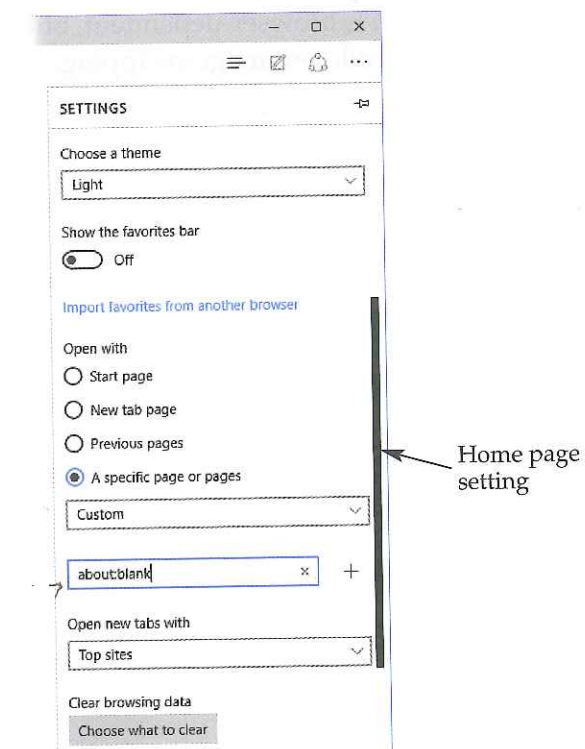
HANDS-ON EXAMPLE 13.1.2

GS4 Living Online
1.2.3

SETTING THE BROWSER HOME PAGE

When launched, a browser displays what has been set as the home page. Changing the home page is easy in most browsers.

1. Launch Microsoft Edge.
2. Click the **More Actions** button, and click **Settings** in the drop-down menu. The **Settings** menu is displayed, as shown.



3. Click the **A specific page or pages** radio button.
4. Click the drop-down list below the radio button, and click **Custom** in the list.
5. If any pages are listed, such as `about:start`, click the X next to the page to remove it.
6. Click in the text box that states Enter a web address, and enter `www.google.com` or the address of your school's intranet.
7. Click the **More Actions** button to close the menu.

HTML and Web 2.0

Part of the problem of using documents stored on various computers around the world was solved by the URL and web servers. Once the document could be obtained, there remained the problem of how to open it and read its contents. HTML solved this problem. As the web has advanced, new capabilities have been introduced, giving rise to Web 2.0.

HTML

Hypertext markup language (HTML) is a language used to create documents that tell browsers how to assemble text, images, and other content to display as a web page. It allows a universal practice of marking up the documents for browsers. The basis of HTML is tags, which are codes that let the browser know how to display a document. Figure 13-10 shows a basic web page and the HTML used to create it.

HTML provides for basic formatting for a document. A cascading style sheet provides advanced formatting and has become the standard for how to control the appearance of a website. A *cascading style sheet (CSS)* provides definitions that control the formatting of HTML documents and other markup documents.

Interactive or dynamic pages require additional programming tools. JavaScript is browser-dependent, but provides interactions such as buttons and rollover image swapping. For form handling, pages that change content based on interactions, or even more advanced interactions, tools such as PHP, active server pages (ASP), and structured query language (SQL) are required. Some web pages are even programmed to allow the user to drag and drop content. Drag and drop may also be used as a navigation method for the website. In this case, the user may need to drag the image on the page to move the focus to a different area.

There are software applications for building web pages, such as Adobe Dreamweaver and CoffeeCup. These are known as WYSIWYG

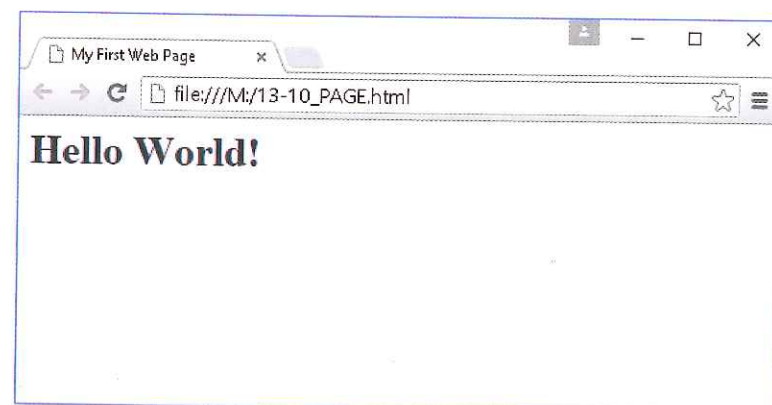
Living Online
1.1.3.1

Key Applications
1.2

FYI

JavaScript and the Java programming language are not related.

Living Online
2.1.3



Web Page

```
<!DOCTYPE html>
<html>
  <title>
    My First Web Page
  </title>
  <body>
    <h1>
      Hello World!
    </h1>
  </body>
</html>
```

Code

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Figure 13-10. Very little code is needed to create a simple web page.

editors, which stands for “what you see is what you get,” because you are able to design a web page in an environment that shows how the web page will look. The software also inserts the HTML tags for you.

To learn more about programming web pages, visit the W3 Schools website (www.W3Schools.com). This is a free web-development resource. There are tutorials with many examples, language reference documents, and certification tests.

Web 2.0

Web 2.0 is a movement that promotes increased use of multimedia and social networking on the web. *Web 2.0* describes websites that provide more opportunity for people to collaborate rather than simply read static pages, as originally found on the web. The term is used to describe how the web has evolved since it was created. Twitter is an example of Web 2.0, as shown in Figure 13-11.

A major advancement of web design that led to Web 2.0 was the ease of incorporating multimedia. *Multimedia*, or many media, is a combination of text, video, graphics, animations, audio, and user interaction. There are some basic concepts that every web designer needs to understand:

- new media
- interactivity
- interaction design
- human-computer interaction



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Figure 13-11. Web 2.0 promotes the use of multimedia and social networking, such as Twitter.



Career Skills

Promotional Specialist

Using social media, promotional specialists advertise their businesses on a variety of electronic platforms to attract visitors to their events and locations. They maintain web presence and offer special deals for visitors to their sites. These specialists must be sure to make their promotions stand out in a culture of information overload.

FYI

The typeface Tahoma was designed specifically for the computer display.

New Media. The term *new media* refers to the Internet-based content that can be accessed on-demand on any digital device and involves user control and dialogue. The definition of new media continually changes as new interactions and models for communication are developed.

Interactivity. The magic of computers is the ability to put the user in control of the speed, order, and use of information. *Interactivity* refers to items the user can control, such as hyperlinks, text-entry boxes, selection buttons, scroll bars, video controls, and audio controls. Interactivity allows the user to be in control of gathering and providing information on each page.

Interaction Design. Online communication is facilitated by understanding what is to be communicated and presenting it in the clearest and easiest way. *Interaction design* refers to creating interactivity. All elements of the page must work together to communicate the message. The selection of typeface is an important consideration. The typefaces easiest to read on a computer monitor are sans serif fonts. Images should promote the message and not be meaningless graphics. Video should be incorporated when a series of intricate steps must be followed to perform a task. Color should be used to highlight important ideas and should not be used simply to decorate the page.

Human-Computer Interaction. The **human-computer interaction (HCI)** describes how computer users communicate with the computer. The HCI part of web design is often referred to as *usability*. Readability, ease of interaction, and intuitive use of the page are all considerations for web design. Considerations must also be included for accessibility by users with disabilities as well as others. In addition, consider how the web page design will be presented if the content is viewed on a mobile device.

Digital Wellness

With new digital technology comes new health concerns. Users can become addicted to the technologies or injure themselves as a result of use. **Digital wellness** is the area of study to discuss and remedy excessive use of screen time, online addictions, and smartphone addictions. Caution must be taken to be aware of how much time and energy is devoted to use of games or social media. Excessive use of digital technology may be considered an addiction. Smartphone use is very common across all age groups. There is a distinct difference between idle use of these technologies and smartphone use to the exclusion of other social activities. A recent Pew Research Center study found that 46 percent of smartphone owners said they “could not live without” their smartphones. Section 15.3 provides more information on good communication practices related to online and cell phone communication.

Ergonomics is the science concerned with designing and arranging things people use so that they can interact with them both efficiently and safely. In the workplace, it can include designing workstations to fit the unique needs of the worker and the equipment used. Applying

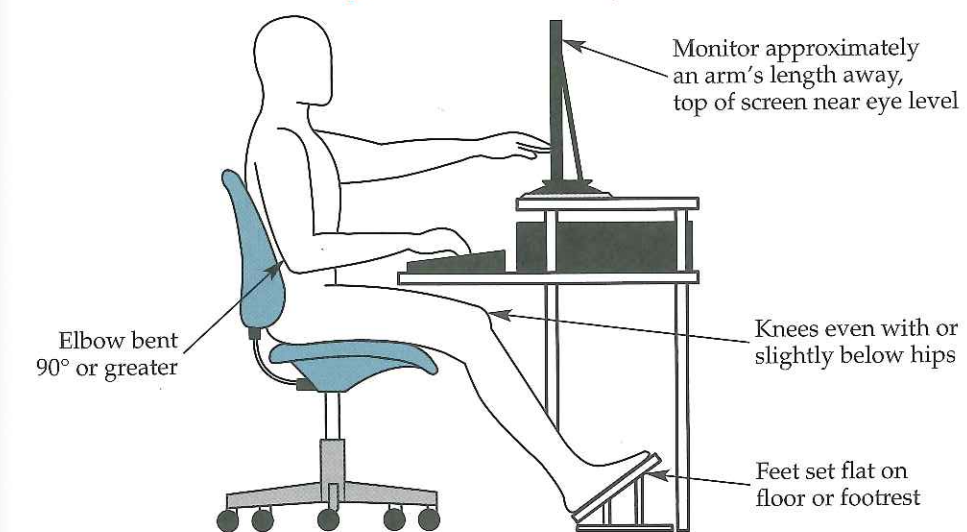
ergonomic principles results in a comfortable, efficient, and safe working environment. Ergonomics can help make reading on a screen more comfortable. There are many types of ergonomic accessories that may improve the comfort of reading on a screen, including wrist rests; specially designed chairs, keyboards, and mice; and back supports. In addition, Figure 13-12 identifies actions that can be taken to create a comfortable environment for reading on a screen and help prevent injury or strain to the worker’s body.

Using Search Engines

A **search engine** is a software program that looks through massive databases of links and information to try to identify the best matches for the search request. Web-based search engines are powerful tools for locating information on the Internet and World Wide Web. Most modern search engines have natural language processing that makes searching very easy. For example, a question such as what is the boiling point of water can be entered as the search “term.”

However, the more specific the search phrase, the better the results. For example, a search using the phrase, or string, sports information may return two billion results in about a half second. To optimize the search, be as specific as possible. The search for top 2016 fielding percentage narrows the results to around three hundred thousand. This is still too many pages to read. Fortunately, the links are ordered by relevance to the search string. The links near the top are more likely to contain the information than links near the bottom. Figure 13-13 shows a page at espn.go.com that allows the user to select a season and player position to show the fielding percentage. This was one of the first links in the search results.

Ergonomic Workstation



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Figure 13-12. The application of ergonomics helps prevent muscle pain, eyestrain, and headaches caused by improper placement of monitors, desks, and chairs.

Key Applications

4.2

Living Online

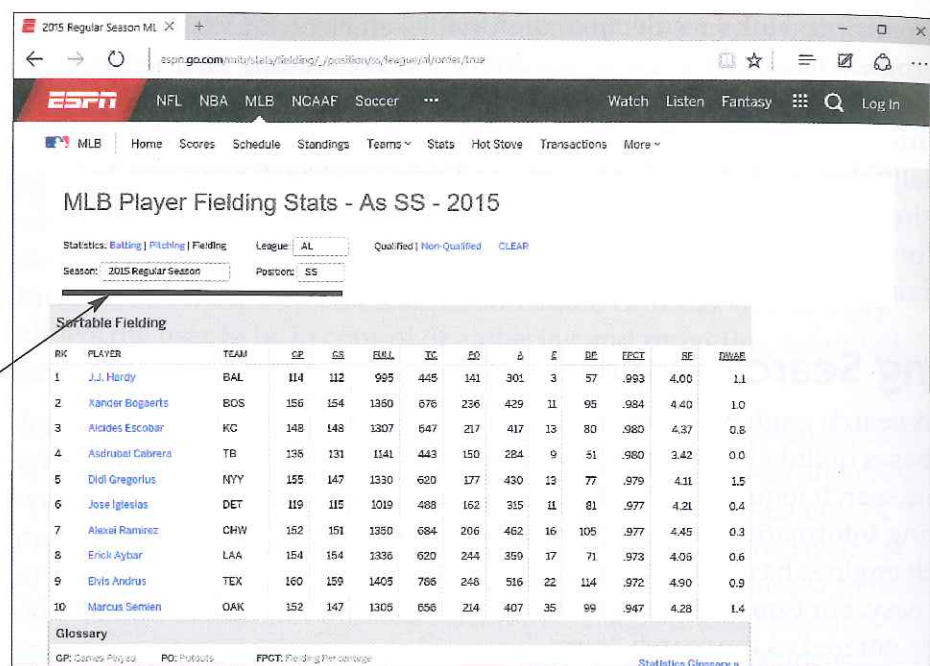
1.1.2.1.1

Living Online

1.2.8, 6.1.1

Living Online
9.2.1, 9.2.2

Living Online
5.2.1, 5.2.2,
5.2.3, 5.2.4,
5.2.5



Select season, league, and position

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Figure 13-13. Using a specific search phrase narrowed the results to pages more likely to match, such as this espn.go.com page.

GS4 Living Online 4.2.2, 6.3.1

Search engines provide filters to help to narrow your search. For example, Google and Bing have filters for images, videos, news, and other categories. There are also sites dedicated to a particular type of media. Flickr is a website for posting and storing images. When searching for an image, using Flickr automatically limits the results to images. When searching for video, using a site for posting videos, such as YouTube, limits the results to videos. For music, search a music site such as iTunes.

A technology named Boolean logic can be used to construct very precise search strings. English mathematician George Boole invented a logical algebra, or Boolean algebra, in the 19th century. It is still relevant to computing today. **Boolean operators**, or logical operators, define the relationship between words in the search string. The Boolean operators AND, OR, and NOT can be used to create precise search strings. Also available are proximity operators such as NEAR or FOLLOWED BY. Figure 13-14 shows how the Boolean operators can be applied to a search string.

For example, to use Boolean operators to find information about space launches to Pluto near the word “stellar,” enter the search string: space launches AND Pluto NEAR stellar. Without the Boolean operators, the search will return any result that includes the word space, launches, Pluto, or stellar.

Evaluating Results

There are two reasons to use a search engine: acquire knowledge and solve problems. Problem solving is enhanced by use of a search engine. Problem solving involves:

- statement of the problem;
- gathering of information;

GS4 Living Online 6.1.2

| Boolean Operator | Example | Effect |
|------------------|----------------------------------|--|
| AND | space launches AND Pluto | Locate information in both phrases on the same page |
| OR | space launches OR Pluto | Locate information on either phrase |
| NOT | space launches NOT Pluto | Locate information on the first phrase, exclude information on the second phrase |
| NEAR | space launches NEAR Pluto | Locate information where both phrases are used in close proximity on the same page |
| FOLLOWED BY | space launches FOLLOWED BY Pluto | The first phrase comes before the second phrase on the page |

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Figure 13-14. Boolean operators and proximity operators can be used to improve searches.

- formulation of a solution; and
- action to resolve the problem.

Finding accurate, relevant, and valid information is critical to the problem-solving process.

Locating information on the web is relatively simple. However, it is important to evaluate the results. The criteria for evaluating results include accuracy, relevance, and validity.

Accuracy

Accuracy refers to the correctness of the information. Are the dates, places, and other factual information correct? For example, the freezing point of water is 32 degrees Fahrenheit. If the site gives the freezing point of water as some other temperature, the accuracy of all information on the site should be questioned. Does the page contain misspellings? Misspellings and grammar errors can be a sign that the information on the site is inaccurate. At the very least, it is a sign of sloppiness on the creator’s part.

Relevance

Relevance refers to how the results relate to the search phrases. Do the results include all words in the search string or just one? Most browsers support the [Ctrl][F] key combination to launch a search function. After clicking a link in the search results, use this function to locate the search string on the page. If it cannot be found, the page is likely not relevant to the search string.

Validity

Validity refers to how appropriate the results are to the search question. Do the results answer the question of the searcher? It is important to verify the validity of the information that you retrieve. A method for ensuring the correctness of the information is called *triangulation*. If the same information can be located in at least three different sources, it is likely to be valid information. Another method

FYI

Anyone can create a web page. Just because information appears on a web page does not make the information true, correct, or accurate.

GS5 Living Online 1.1.2.1.1, 1.1.2.2.1

GS4 Living Online 6.2.5

used to judge validity is to examine the source of the information. Information that is part of an official site, such as a university or a news agency, is more likely to be valid. Sources that are less likely to contain valid information are blog entries, a student research paper, or a social media site where opinions rather than facts may be included.

Types of Returned Results

The list of returned results for a search will likely contain links to many types of websites or sources. In evaluating the validity of the results, it is important to be aware that some types of sources will be less reliable than others. Some typical types of sources include forums, ads, sponsored links, knowledge bases, and articles.

Forums

Forums are Internet sites that support conversations or posts on certain topics. These can be useful for people interested in the same subject. Forums are good for finding suggestions or solutions to common problems or having a discussion about a topic. Good forum users try to post accurate and helpful information on the topic. However, that does not make them experts on the topic. Forums are not good sources to cite for accurate and valid information.

Ads

Take care to see if a page is providing accurate and valid information or if it is an advertisement for a product or service. If the page is really an ad, it is likely promoting something other than accurate, research-based information. An advertisement is not a good source of reliable information.

Sponsored Links

Most popular search engines are owned by for-profit companies. Since the search engine is free to use, the search engine displays sponsored links related to the search results in addition to the results, as shown in Figure 13-15. These sponsored links are really advertisements placed by companies that pay for them, often on a per-click basis. Sponsored links may be useful if you are shopping for something specific. However, sponsored links are paid ads and not a reliable source of information.

Knowledge Bases

A knowledge base is a collection of data about a certain topic, often from a manufacturer of an item or product. Help and support information is posted to these sites. When looking at the page, check the URL to see if it is the manufacturer that has posted the information about its products. If the URL is not for the manufacturer's website, the site may be fake or an advertisement posing as a knowledge base. Information posted by the manufacturer is generally accurate and valid.

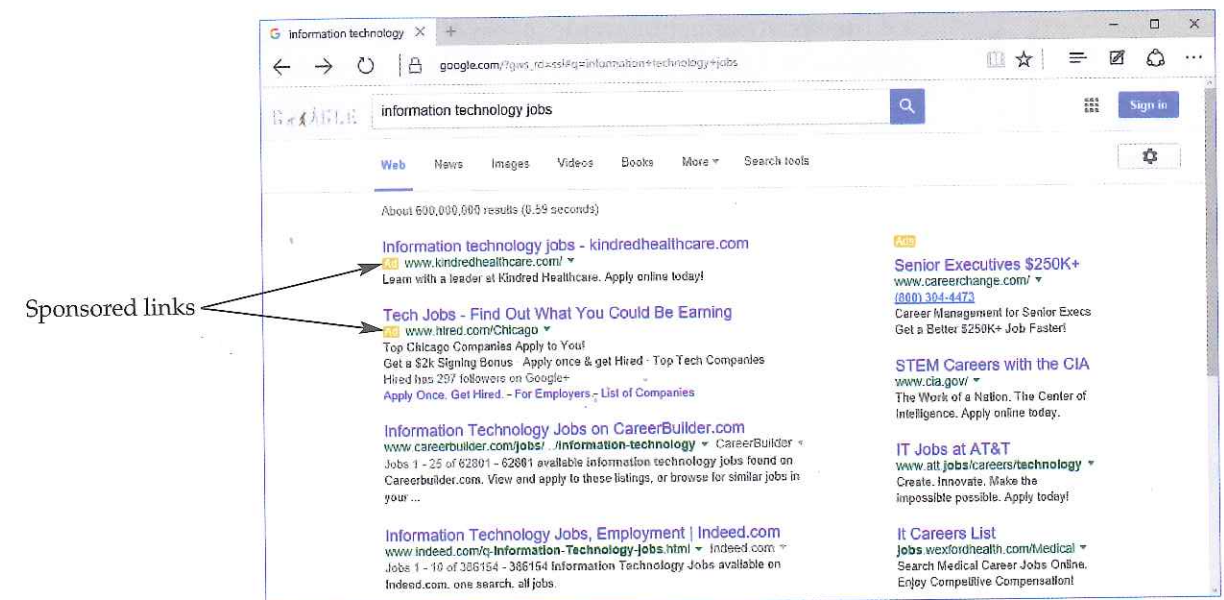
GS5 Living Online
1.1.2.1.1

GS4 Living Online
6.2.1

GS4 Living Online
6.2.2

GS4 Living Online
6.2.3

GS4 Living Online
6.2.4



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Figure 13-15. Sponsored links usually appear at the top or along the side of the search results.

Articles

Articles can contain both fact and fiction. The source of the article is important in determining the validity of the information. Professional journals, governmental sites, and educational institutions generally control their sites to maintain the value of the information. If an article is open to review, such as the Wikipedia site, the accuracy and validity of the information is more likely to be good. Personal websites, advertising websites, blogs, and forums may contain articles, but the accuracy and validity of these articles can be questionable.

GS4 Living Online
6.2.6

Ethical Use of the Internet

Similar to the concerns for plagiarism when creating word processing documents, there are ethical concerns for use of information on the Internet. The topics included in ethical use are Internet safety and intellectual property. More information on these topics is found in Chapters 8 and 16 of this textbook.

Many schools and companies provide an acceptable use policy to guide students and employees on expectations for ethical use of the Internet. An *acceptable use policy (AUP)* is a set of rules that explains what is and is not acceptable use of school- or company-owned equipment and networks. This document should describe policies on copyrights, fair use, file sharing, online privacy, cyber predators, and cyberbullying.

Every document placed on the Internet has an author, and the content is the intellectual property of that author. Intellectual property is protected by laws. Some information on the Internet is available for free use, but it must be labeled as such. If the material is not specifically labeled as free use, assume it is copyrighted. When basing your own work on material found on the Internet, proper attribution or citation

of the source must be made. Most style guides, including the *MLA Style Manual and Guide to Scholarly Publishing*, provide guidelines for how to cite Internet-based work.

HANDS-ON EXAMPLE 13.1.3

CITING ONLINE SOURCES

The Internet is a great resource for information. The *MLA Style Manual and Guide to Scholarly Publishing* provides guidelines for properly citing Internet-based information.

1. Launch a browser.
2. Navigate to a search engine, such as Google or Bing.
3. Enter the search string MLA citation format for websites.
4. Evaluate the results for relevance and validity.
5. Select an appropriate link in the results.
6. Evaluate the site for accuracy.
7. Use the information on the website to determine the proper method for citing a web document.

13.1

SECTION REVIEW

CHECK YOUR UNDERSTANDING

1. Distinguish between upload and download.
2. How does the World Wide Web relate to the Internet?
3. List four programming tools used to create interactive or dynamic web pages.
4. List the three Boolean operators that can be used in a search string.
5. If basing your own work on material found on the Internet, what must you do to document that?

IC3 CERTIFICATION PRACTICE

The following question is a sample of the types of questions presented on the IC3 exam.

1. In the domain name system, which top-level domain would be used by a university?
 - A. .gov
 - B. .com
 - C. .org
 - D. .edu

BUILD YOUR VOCABULARY

As you progress through this course, develop a personal IT glossary. This will help you build your vocabulary and prepare you for a career. Write a definition for each of the following terms and add it to your IT glossary.

| | |
|----------------------------------|--------------------------------|
| Boolean operators | modem |
| browser | packet |
| digital wellness | plug-in |
| download | protocol |
| ergonomics | public switched network |
| human-computer interaction (HCI) | search engine |
| hypertext markup language (HTML) | uniform resource locator (URL) |
| Internet service provider (ISP) | upload |

CREATING FOR THE WEB

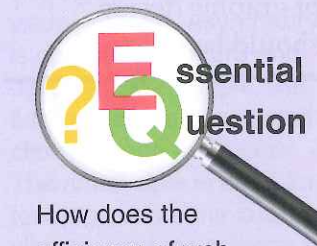
SECTION 13.2



Paul Matthew Photography/Shutterstock.com

The primary principle for web designers is the usability of their pages. Users must be able to perform tasks with a minimum of effort. This requires a great deal of design. Once the design is in place, the pages can be created. Web pages are developed on a rising scale of complexity. For each level, more sophisticated tools are used.

The tools for creating documents for the web include HTML for simple markup of existing documents or creating of static web pages, CSS for formatting web pages, and programming and scripting languages to make dynamic pages. This section explores how to use these tools to create web pages.



Essential Question
How does the efficiency of web programming impact the usability of a web page?

TERMS

alignment
cascading style sheet (CSS)
contrast
external style
inline style
internal style
JavaScript
PHP hypertext preprocessor
proximity
repetition
semantic tag
tag
validation

LEARNING GOALS

After completing this section, you will be able to:

- Identify graphic design principles that should be applied when creating a web page.
- Explain how to create a basic web page using HTML.
- Discuss programming languages used to create web pages.