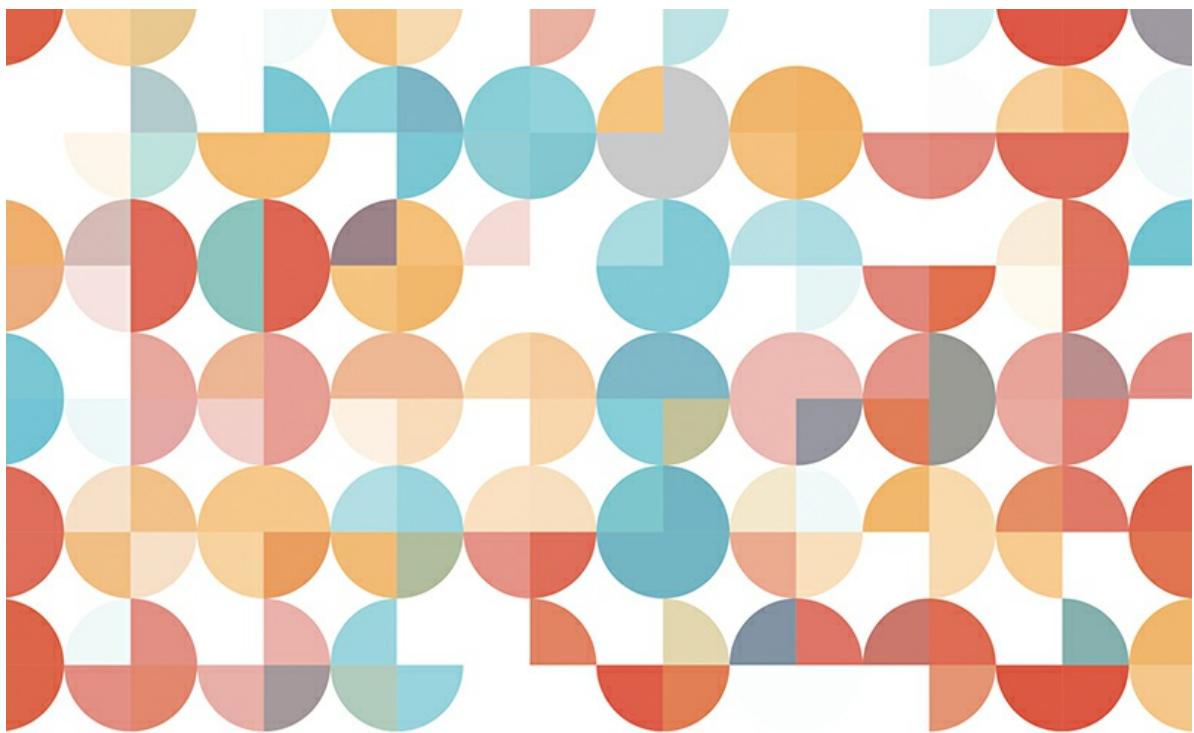




NINTH EDITION



WEB DEVELOPMENT  
& DESIGN FOUNDATIONS  
WITH **HTML5**



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Pearson

TERRY FELKE-MORRIS

# **Web Development and Design Foundations with HTML5**

9th Edition



# **Web Development and Design Foundations with HTML5**

9th Edition

Terry Ann Felke-Morris, Ed.D.

Professor Emerita Harper College



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# Preface

*Web Development and Design Foundations with HTML5* is intended for use in a beginning web development course. This textbook introduces HTML and CSS topics such as text configuration, color configuration, and page layout, with an enhanced focus on the topics of design, accessibility, and Web standards. The text covers the basics that web developers need to build a foundation of skills:

- Internet concepts
- Creating web pages with HTML5
- Configuring text, color, and page layout with Cascading Style Sheets (CSS)
- Web design best practices
- Accessibility standards
- The web development process
- Using media and interactivity on web pages
- New CSS3 properties
- Website promotion and search engine optimization
- E-commerce and the Web
- JavaScript

A special feature of this text is the *Web Developer's Handbook*, which is a collection of appendixes that provide resources such as an HTML5 Reference, Comparison of XHTML and HTML5, Special Entity Character List, CSS Property Reference, WCAG 2.0 Quick Reference, FTP Tutorial,

and web-safe color palette.

## New to This Edition

Building on this textbook's successful eighth edition, new features for the ninth edition include the following:

- Updated coverage of HTML5 elements and attributes
- Expanded coverage of designing for mobile devices
- Updates for HTML5.1 elements and attributes
- Expanded coverage of responsive web design techniques and CSS media queries
- Updated code samples, case studies, and web resources
- An introduction to CSS Grid Layout
- Updated reference sections for HTML5 and CSS
- Additional Hands-On Practice exercises

Student files are available for download from the companion website for this textbook at [www.pearson.com/cs-resources](http://www.pearson.com/cs-resources). These files include solutions to the Hands-On Practice exercises, the Website Case Study starter files, and access to the book's companion VideoNotes. See the access card in the front of this textbook for further instructions.

## Design for Today and Tomorrow

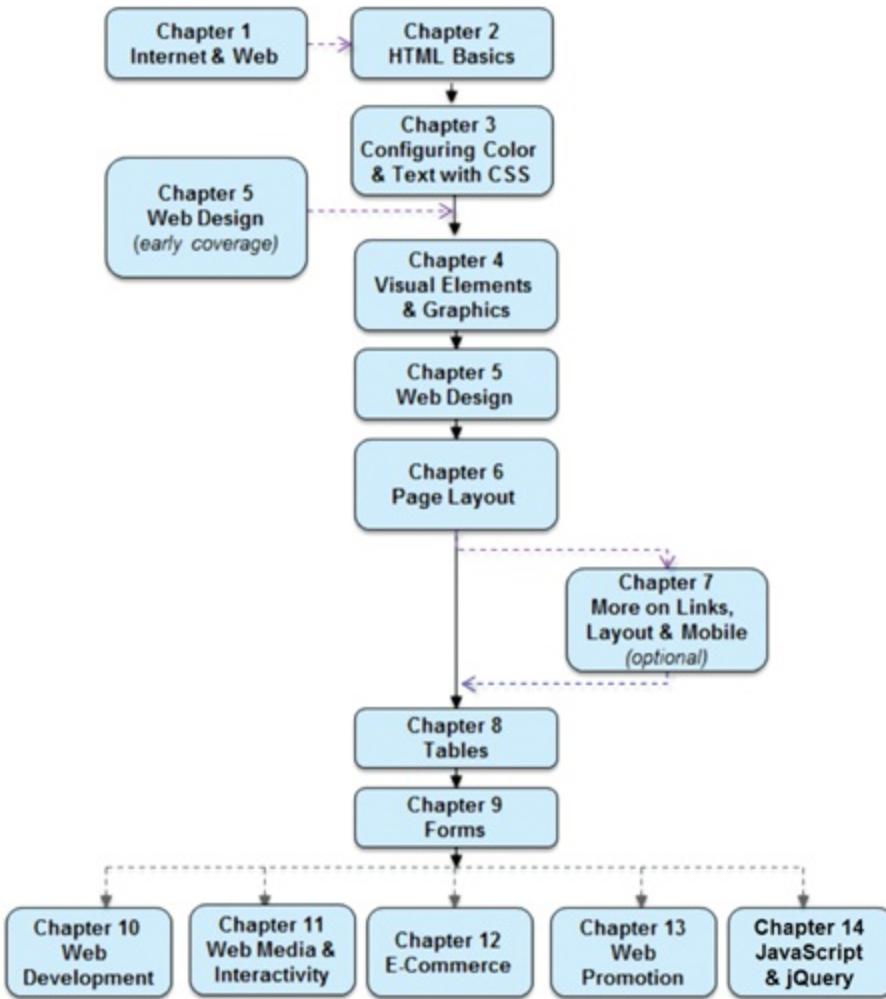
This textbook has a modern approach that prepares students to design web pages that work today, in addition to being ready to take advantage of the new HTML5 and CSS coding techniques of the future.

# Organization of the Text

This textbook is designed to be used in a flexible manner; it can easily be adapted to suit a variety of course and student needs. [Chapter 1](#) provides introductory material, which may be skipped or covered, depending on the background of the students. [Chapters 2](#) through [4](#) introduce HTML and CSS coding. [Chapter 5](#) discusses web design best practices and can be covered anytime after [Chapter 3](#) (or even along with [Chapter 3](#)). [Chapters 6](#) through [9](#) continue with HTML and CSS.

Any of the following chapters may be skipped or assigned as independent study, depending on time constraints and student needs: [Chapter 7](#) (More on Links, Layout, and Mobile), [Chapter 10](#) (Web Development), [Chapter 11](#) (Web Multimedia and Interactivity), [Chapter 12](#) (E-Commerce Overview), [Chapter 13](#) (Web Promotion), and [Chapter 14](#) (A Brief Look at JavaScript and jQuery). A chapter dependency chart is shown in [Figure P.1](#).

## Figure P.1



This textbook is flexible and can be adapted to individual needs

## Brief Overview of Each Chapter

# **Chapter 1: Introduction to the Internet and World Wide Web**

This brief introduction covers the terms and concepts related to the Internet and the Web with which Web developers need to be familiar. For many students, some of this will be a review. [Chapter 1](#) provides the base of knowledge on which the rest of the textbook is built.

## Chapter 2: HTML Basics

As HTML5 is introduced, examples and exercises encourage students to create sample pages and gain useful experience. Solution pages for the Hands-On Practice are available in the student files.

# Chapter 3: Configuring Color and Text with CSS

The technique of using Cascading Style Sheets to configure the color and text on web pages is introduced. Students are encouraged to create sample pages as they read through the text. Solutions for the Hands-On Practice are available in the student files.

# Chapter 4: Visual Elements and Graphics

This chapter discusses the use of graphics and visual effects on web pages, including image optimization, CSS borders, CSS image backgrounds, new CSS3 visual effects, and new HTML5 elements. Students are encouraged to create web pages as they read through the text. Sample solutions for the Hands-On Practice are available in the student files.

# Chapter 5: Web Design

This chapter focuses on recommended web design practices and accessibility. Some of this is reinforcement because tips about recommended website design practices are incorporated into the other chapters.

# Chapter 6: Page Layout

This chapter continues the study of CSS begun earlier and introduces techniques for positioning and floating web page elements, including a two-column CSS page layout. New HTML5 semantic elements and techniques to provide HTML5 compatibility for older browsers are also introduced. Sample solutions for the Hands-On Practice are available in the student files.

# Chapter 7: More on Links, Layout, and Mobile

This chapter revisits earlier topics and introduces more advanced techniques related to hyperlinks, using CSS sprites, a three-column page layout, configuring CSS for print, designing pages for the mobile web, responsive web design with CSS media queries, responsive images, the new Flexible Box Layout Module, and the new CSS Grid Layout Module. Students are encouraged to create pages as they read through the text. Sample solutions for the Hands-On Practice are available in the student files.

# Chapter 8: Tables

This chapter focuses on the HTML elements used to create tables. Methods for configuring a table with CSS are introduced. Students are encouraged to create pages as they read through the text. Sample solutions for the Hands-On Practice are available in the student files.

# Chapter 9: Forms

This chapter focuses on the HTML elements used to create forms. Methods for configuring the form with CSS are introduced. New HTML5 form control elements and attribute values are introduced. Students are encouraged to create sample pages as they read through the text. Sample solutions for the Hands-On Practice are available in the student files.

# Chapter 10: Web Development

This chapter focuses on the process of website development, including the job roles needed for a large-scale project, the web development process, and web hosting. A web host checklist is included in this chapter.

# Chapter 11: Web Multimedia and Interactivity

This chapter offers an overview of topics related to adding media and interactivity to web pages. These topics include HTML5 video and audio, Flash<sup>®</sup>, Java<sup>TM</sup> applets, CSS3 transform and transition properties, interactive CSS menu, interactive image gallery, JavaScript, jQuery, Ajax, and HTML5 APIs. Students are encouraged to create pages as the topics are discussed. Sample solutions for the Hands-On Practice are available in the student files.

# Chapter 12: E-Commerce Overview

This chapter introduces e-commerce, security, and order processing on the Web.

# Chapter 13: Web Promotion

This chapter discusses site promotion from the web developer's point of view and introduces search engine optimization.

# Chapter 14: A Brief Look at JavaScript and jQuery

This chapter provides an introduction to client-side scripting using JavaScript and jQuery. Sample solutions for the Hands-On Practice are available in the student files.

# ***Web Developer's Handbook***

## **Appendixes:**

This handbook contains appendixes that include resources and tutorials that are useful for students, such as an HTML5 Quick Reference, Special Entity Characters, a Comparison of XHTML and HTML5, a CSS Property Reference, a WCAG 2.0 Quick Reference, an FTP Tutorial, and a web-safe color palette.

## **Features of the Text**

### **Well-Rounded Selection of Topics**

This text includes both “hard” skills such as HTML5, CSS, and JavaScript ([Chapters 2, 3, 4, 6, 7, 8, 9](#), and [14](#)) and “soft” skills such as web design ([Chapter 5](#)), website promotion ([Chapter 13](#)), and e-commerce ([Chapter 12](#)). This well-rounded foundation will help students as they pursue careers as web professionals. Students and instructors will find classes more interesting because they can discuss, integrate, and apply both hard and soft skills as students create web pages and websites.

### **Hands-On Practice**

Web development is a skill and skills are best learned by hands-on practice. This text emphasizes hands-on practice through exercises within the chapters, end-of-chapter exercises, and the development of websites through ongoing real-world case studies. The variety of exercises provides instructors with a choice of assignments for a particular course or semester.

# **Website Case Studies**

There are four case studies that continue throughout most of the text (starting with [Chapter 2](#)). An additional case study starts in [Chapter 5](#). The case studies serve to reinforce the skills discussed in each chapter. Instructors can cycle assignments from semester to semester or allow students to choose the case study that most interests them. Sample solutions to the case studies are available for download from the Instructor Resource Center at [www.pearson.com](http://www.pearson.com).

## **Web Research**

Each chapter offers web research activities that encourage students to further study the topics introduced in the chapter.

## **Focus on Web Design**

Most chapters offer additional activities that explore the web design topics related to the chapter. These activities can be used to reinforce, extend, and enhance the course topics.

## **FAQs**

In the author's web development courses, she is frequently asked similar questions by students. They are included in this textbook and are marked with the identifying FAQ logo.



# Checkpoints

Each chapter contains two or three Checkpoints, which are groups of questions to be used by students to self-assess their understanding of the material. A special Checkpoint icon appears with each group of questions.



## Focus on Accessibility

Developing accessible websites is more important than ever and this textbook is infused with accessibility techniques throughout. The special icon shown here makes accessibility information easy to find.



## Focus on Ethics

Ethics issues related to web development are highlighted throughout the textbook and are marked with the special ethics icon shown here.



# Reference Materials

The appendixes in the *Web Developer’s Handbook* offer reference materials, including an HTML5 Quick Reference, Special Entity Characters, Comparison of XHTML and HTML5, a CSS Property Reference, a WCAG 2.0 Quick Reference, an FTP Tutorial, an introduction to ARIA Landmark Roles, and a Web-Safe Color Palette.

## VideoNotes

These short step-by-step videos demonstrate how to solve problems from design through coding. VideoNotes allow for self-placed instruction with easy navigation including the ability to select, play, rewind, fast-forward, and stop within each VideoNote exercise.

Margin icons in your textbook let you know when a VideoNote video is available for a particular concept or homework problem.



## Supplemental Materials

## Student Resources

The student files for the web page exercises, Website Case Study assignments, and access to the book’s VideoNotes are available to all readers of this textbook at its companion website [www.pearson.com/cs-resources](http://www.pearson.com/cs-resources). A complimentary access code for the companion website is available with a new copy of this textbook. Subscriptions may also be purchased online.

# Instructor Resources

The following supplements are available to qualified instructors only. Visit the Pearson Instructor Resource Center ([www.pearson.com](http://www.pearson.com)) for information on how to access them:

- Solutions to the end-of-chapter exercises
- Solutions for the case study assignments
- Test questions
- PowerPoint® presentations
- Sample syllabi

## Author's Website

In addition to the publisher's companion website for this textbook, the author maintains a website at <http://www.webdevfoundations.net>. This website contains additional resources, including review activities and a page for each chapter with examples, links, and updates. This website is not supported by the publisher.

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## About the Author

Terry Ann Felke-Morris is a Professor Emerita of Computer Information Systems at William Rainey Harper College in Palatine, Illinois. She holds a Doctor of Education degree, a Master of Science degree in information systems, and numerous certifications, including Adobe Certified Dreamweaver 8 Developer, WOW Certified Associate Webmaster, Microsoft Certified Professional, Master CIW Designer, and CIW Certified Instructor.

Dr. Felke-Morris has been honored with Harper College's Glenn A. Reich Memorial Award for Instructional Technology in recognition of her work in designing the college's Web Development program and courses. In 2006, she received the Blackboard Greenhouse Exemplary Online Course Award for use of Internet technology in the academic environment. Dr. Felke-Morris received two international awards in 2008: the Instructional Technology Council's Outstanding e-Learning Faculty Award for Excellence and the MERLOT Award for Exemplary Online Learning Resources—MERLOT Business Classics.

With more than 25 years of information technology experience in business and industry, Dr. Felke-Morris published her first website in 1996 and has been working with the Web ever since. A long-time promoter of Web

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## **LOCATION OF VIDEONOTES IN THE TEXT**



A series of videos have been developed as a companion for this textbook. VideoNote icons indicate the availability of a video on a specific topic.

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# **1 Introduction to the Internet and World Wide Web**

# Chapter Objectives

In this chapter, you will learn how to . . .

- Describe the evolution of the Internet and the Web
- Explain the need for web standards
- Describe universal design
- Identify benefits of accessible web design
- Identify reliable resources of information on the Web
- Identify ethical use of the Web
- Describe the purpose of web browsers and web servers
- Identify networking protocols
- Define URIs and domain names
- Describe HTML, XHTML, and HTML5
- Describe popular trends in the use of the Web

**The Internet and the Web are parts of our daily lives.** How did they begin? What networking protocols and programming languages work behind the scenes to display a web page? This chapter provides an introduction to some of these topics and is a foundation for the information that web developers need to know. You'll be introduced to Hypertext Markup Language (HTML), the language used to create web pages.

# **1.1 The Internet and the Web**

## **The Internet**

The Internet, the interconnected network of computer networks that spans the globe, seems to be everywhere today. It has become part of our lives. You can't watch television or listen to the radio without being urged to visit a website. Even newspapers and magazines have a place on the Internet.

## **Birth of the Internet**

The Internet began as a network to connect computers at research facilities and universities. Messages in this network would travel to their destination by multiple routes, or paths. This configuration allowed the network to function even if parts of it were broken or destroyed. In such an event, the message would be rerouted through a functioning portion of the network while traveling to its destination. This network was developed by the Advanced Research Projects Agency (ARPA)—and the ARPAnet was born. Four computers (located at UCLA, Stanford Research Institute, University of California Santa Barbara, and the University of Utah) were connected by the end of 1969.

## **Growth of the Internet**

As time went on, other networks, such as the National Science Foundation's NSFnet, were created and connected with the ARPAnet. Use of this interconnected network, or Internet, was originally limited to government, research, and educational purposes. The number of individuals accessing the Internet continues to grow each year. According to Internet World Stats (<http://www.internetworkworldstats.com/emarketing.htm>), the percentage of the global population that used the Internet was 0.4% in 1995, 5.8% in 2000,

15.7% in 2005, 28.8% in 2010, 45% in 2015, and 49.6% in 2017. Visit <http://www.internetworldstats.com> to explore more statistics about the usage and growth of the Internet.

The lifting of the restriction on commercial use of the Internet in 1991 set the stage for future electronic commerce: Businesses were now welcome on the Internet. However, the Internet was still text based and not easy to use. The next set of developments solved this issue.

## Birth of the Web

While working at CERN, a research facility in Switzerland, Tim Berners-Lee envisioned a means of communication for scientists by which they could easily “hyperlink” to another research paper or article and immediately view it. Berners-Lee created the World Wide Web to fulfill this need. In 1991, Berners-Lee posted the code for the Web in a newsgroup and made it freely available. This version of the World Wide Web used Hypertext Transfer Protocol (HTTP) to communicate between the client computer and the web server, used Hypertext Markup Language (HTML) to format the documents, and was text based.



**VideoNote Evolution of the Web**

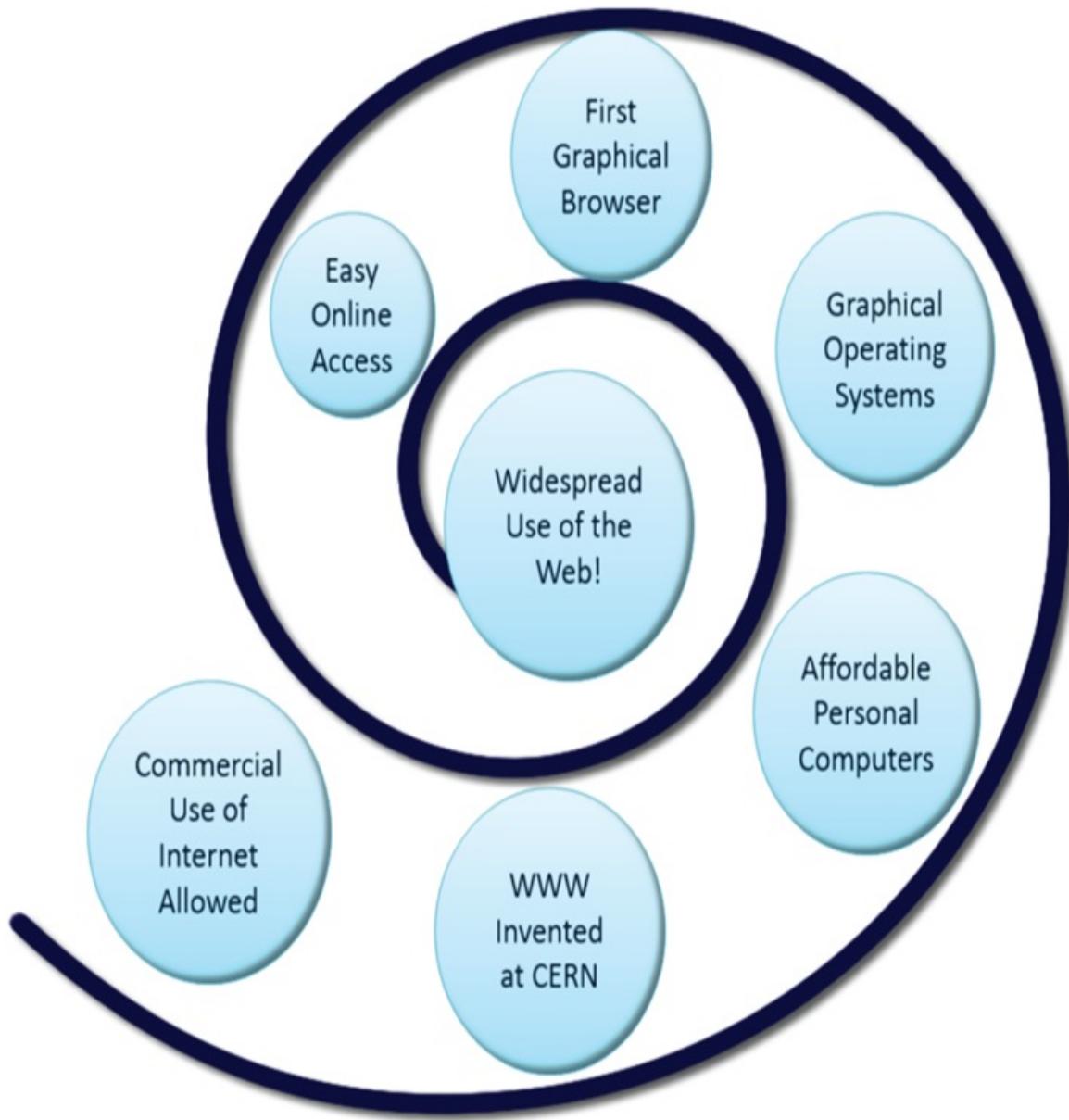
## The First Graphical Browser

In 1993, Mosaic, the first graphical web browser became available. Marc Andreessen and graduate students working at the National Center for Supercomputing Applications (NCSA) at the University of Illinois Urbana-Champaign developed Mosaic. Some individuals in this group later created another well-known web browser—Netscape Navigator—which is an ancestor of today’s Mozilla Firefox browser.

# Convergence of Technologies

By the early 1990s, personal computers with easy-to-use graphical operating systems (such as Microsoft's Windows, IBM's OS/2, and Apple's Macintosh OS) were increasingly available and affordable. Online service providers such as CompuServe, AOL, and Prodigy offered low-cost connections to the Internet. [Figure 1.1](#) depicts this convergence of available computer hardware, easy-to-use operating systems, low-cost Internet connectivity, the HTTP protocol and HTML language, and a graphical browser that made information on the Internet much easier to access. The World Wide Web—the graphical user interface to information stored on computers running web servers connected to the Internet—had arrived!

## Figure 1.1



[Figure 1.1 Full Alternative Text](#)

## Who Runs the Internet?

You may be surprised that there is no single person “in charge” of the global interconnected network of computer networks known as the Internet. Instead, Internet infrastructure standards are overseen by groups such as the Internet

Engineering Task Force (IETF) and the Internet Architecture Board (IAB). The IETF is the principal body engaged in the development of new Internet protocol standard specifications. It is an open international community of network designers, operators, vendors, and researchers concerned with the evolution of Internet architecture and the smooth operation of the Internet. The actual technical work of the IETF is completed in its working groups. These working groups are organized into areas by topic, such as security and routing.

The IAB is a committee of the IETF and provides guidance and broad direction to the IETF. As a function of this purpose, the IAB is responsible for the publication of the Request for Comments (RFC) document series. An RFC is a formal document from the IETF that is drafted by a committee and subsequently reviewed by interested parties. RFCs are available for online review at <http://www.ietf.org/rfc.html>. Some RFCs are informational in nature, while others are meant to become Internet standards. In the latter case, the final version of the RFC becomes a new standard. Future changes to the standard must be made through subsequent RFCs.

The Internet Corporation for Assigned Numbers and Names (ICANN), <http://www.icann.org>, was created in 1998 and is a nonprofit organization. Its main function is to coordinate the assignment of Internet domain names, IP address numbers, protocol parameters, and protocol port numbers. Prior to 1998, the Internet Assigned Numbers Authority (IANA) coordinated these functions. IANA still performs certain functions under the guidance of ICANN and maintains a website at <http://www.iana.org>.

## Intranets and Extranets

Recall that the Internet is an interconnected network of computer networks that is globally available. When an organization needs the communication capabilities of the Internet, but doesn't want its information to be available to everyone, either an intranet or extranet is appropriate.

An intranet is a private network that is contained within an organization or business. Its purpose is to share organizational information and resources

among coworkers. When an intranet connects to the outside Internet, usually a gateway or firewall protects the intranet from unauthorized access.

An extranet is a private network that securely shares part of an organization's information or operations with external partners such as suppliers, vendors, and customers. Extranets can be used to exchange data, share information exclusively with business partners, and collaborate with other organizations. Privacy and security are important issues in extranet use. Digital certificates, encryption of messages, and virtual private networks (VPNs) are some technologies used to provide privacy and security for an extranet. Digital certificates and encryption used in e-commerce are discussed in [Chapter 12](#).

# 1.2 Web Standards and Accessibility

Just as with the Internet, no single person or group runs the World Wide Web. However, the World Wide Web Consortium (<http://www.w3.org>), referred to as the **W3C**, takes a proactive role in developing recommendations and prototype technologies related to the Web. Topics that the W3C addresses include web architecture, standards for web design, and accessibility. In an effort to standardize web technologies, the W3C produces specifications called recommendations.

## W3C Recommendations

The W3C Recommendations are created in working groups with input from many major corporations involved in building web technologies. These recommendations are not rules; they are guidelines. Major software companies that build web browsers, such as Microsoft, do not always follow the W3C Recommendations. This makes life challenging for web developers because not all browsers will display a web page in exactly the same way. The good news is that there is a convergence toward the W3C Recommendations in new versions of major browsers. You'll follow W3C Recommendations as you code web pages in this book. Following the W3C Recommendations is the first step toward creating a website that is accessible.

## Web Standards and Accessibility

The Web Accessibility Initiative (WAI) (<http://www.w3.org/WAI>), is a major area of work by the W3C. Since the Web has become an integral part of daily life, there is a need for all individuals to be able to access it.



## Focus on Accessibility

The Web can present barriers to individuals with visual, auditory, physical, and neurological disabilities. An accessible website provides accommodations that help individuals overcome these barriers. The WAI has developed recommendations for web content developers, web authoring tool developers, web browser developers, and developers of other user agents to facilitate use of the Web by those with special needs. See the WAI's Web Content Accessibility Guidelines (WCAG) at <http://www.w3.org/WAI/WCAG20/glance/WCAG2-at-a-Glance.pdf> for a quick overview.

The WAI continues its work toward an accessible Web. In 2017 the WAI released a draft of WCAG 2.1 which is intended to extend WCAG 2.0 and introduce additional success criteria. The new criteria include requirements for increased support of mobile device accessibility, low vision accessibility, and cognitive and learning disability accessibility.

## Accessibility and the Law

The Americans with Disabilities Act (ADA) of 1990 is a federal civil rights law that prohibits discrimination against people with disabilities. The ADA requires that business, federal, and state services are accessible to individuals with disabilities.



## Focus on Accessibility

Section 508 of the Federal Rehabilitation Act was amended in 1998 to require that U.S. government agencies give individuals with disabilities

access to information technology that is comparable to the access available to others. This law requires developers creating information technology (including web pages) for use by the federal government to provide for accessibility. The Federal IT Accessibility Initiative (<http://www.section508.gov>) provides accessibility requirement resources for information technology developers. As the Web and Internet technologies developed, it became necessary to review the original Section 508 requirements. New Section 508 requirements, commonly referred to as the Section 508 Refresh, were aligned to WCAG 2.0 guidelines and published in 2017. This textbook focuses on WCAG 2.0 guidelines to provide accessibility.

In recent years, state governments have also begun to encourage and promote web accessibility. The Illinois Information Technology Accessibility Act (IITAA) guidelines (see <http://www.dhs.state.il.us/IITAA/IITAAWebImplementationGuidelines.html>) are an example of this trend.

## Universal Design for the Web

Universal design is a “strategy for making products, environments, operational systems, and services welcoming and usable to the most diverse range of people possible” (<https://www.dol.gov/odep/topics/UniversalDesign.htm>). Examples of universal design are all around us. The cutouts on curbs that make it possible for people in wheelchairs to access the street also benefit a person pushing a stroller or riding a Segway Personal Transporter ([Figure 1.2](#)). Doors that open automatically for people with mobility challenges also benefit people carrying packages. A ramp is useful for a person in a wheelchair, a person dragging a rolling backpack or carry-on bag, and so on.

## Figure 1.2



A smooth ride is a benefit of universal design

Awareness of universal design by web developers has been steadily increasing. Forward-thinking web developers design with accessibility in mind because it is the right thing to do. Providing access for visitors with visual, auditory, and other challenges should be an integral part of web design rather than an afterthought.

A person with visual difficulties may not be able to use graphical navigation buttons and may use a screen reader device to provide an audible description of the web page. By making a few simple changes, such as providing text descriptions for the images and perhaps providing a text navigation area at the bottom of the page, web developers can make the page accessible. Often, providing for accessibility increases the usability of the website for all visitors.



## Focus on Accessibility

Accessible websites, with alternative text for images, headings used in an organized manner, and captions or transcriptions for multimedia features, are more easily used not only by visitors with disabilities, but also by visitors using a browser on a mobile device such as a phone or tablet. Finally, accessible websites may be more thoroughly indexed by search engines, which can be helpful in bringing new visitors to a site. As this text introduces web development and design techniques, corresponding web accessibility and usability issues are discussed.

## 1.3 Information on the Web

These days anyone can publish just about anything on the Web. In this section we'll explore how you can tell if the information you've found is reliable and how you can use that information.

### Reliability and Information on the Web

There are many websites—but which ones are reliable sources of information? When visiting websites to find information, it is important not to take everything at face value ([Figure 1.3](#)).

**Figure 1.3**



Who really updated that web page you are viewing?

Questions to ask about web resources are listed as follows:

- Is the organization credible? Anyone can post anything on the Web! Choose your information sources wisely. First, evaluate the credibility of the website itself. Does it have its own domain name, such as <http://mywebsite.com>, or is it a free website consisting of just a folder of files hosted on a free web hosting site (such as [weebly.com](#), [awardspace.com](#), or [000webhost.com](#))? The URL of a free website usually includes part of the free web host's domain name. Information obtained from a website that has its own domain name will usually (but not always) be more reliable than information obtained from a free website.

Evaluate the type of domain name: Is it for a nonprofit organization (.org), a business (.com or .biz), or an educational institution (.edu)? Businesses may provide information in a biased manner, so be careful. Nonprofit organizations and schools will sometimes treat a subject more objectively.

- How recent is the information? Another item to look at is the date the web page was created or last updated. Although some information is timeless, very often a web page that has not been updated for several years is outdated and may not be the best source of information.
- Are there links to additional resources? Hyperlinks indicate websites with supporting or additional information that can be helpful to you in your research as you explore a topic. Look for these types of hyperlinks to aid your studies.
- Is it Wikipedia? Wikipedia (<http://wikipedia.org>) is a good place to begin research, but don't accept what you read there for fact, and avoid using Wikipedia as a resource for academic assignments. Why? Well, except for a few protected topics, anyone can update Wikipedia with anything! Usually it all gets sorted out eventually—but be aware that the information you read may not be valid.

Feel free to use Wikipedia to begin exploring a topic, but then scroll down to the bottom of the Wikipedia web page and look for

“References”—and then explore those websites and others that you may find. As you gather information on these sites, also consider the other criteria: credibility, domain name, timeliness, and links to additional resources.

## Ethical Use of Information on the Web

This wonderful technology called the World Wide Web provides us with information, graphics, and music—all virtually free (after you pay your Internet service provider, of course). Let’s consider the following issues relating to the ethical use of this information:

- Is it acceptable to copy someone’s graphic to use on your own website?
- Is it acceptable to copy someone’s website design to use on your own site or on a client’s site?
- Is it acceptable to copy an essay that appears on a web page and use it, or parts of it, as your own writing?
- Is it acceptable to insult someone on your website or link to that person’s site in a derogatory manner?



**Focus on  
Ethics**

The answer to all of these questions is no. Using someone’s graphic without permission is the same as stealing it. In fact, if you link to it, you are actually using up some of the site’s bandwidth and may be costing the owner money. Instead, ask the owner of the website for permission to use the graphic. If permission is granted, store the graphic on your own website and be sure to indicate the source of the graphic when you display it on your web page. The

key is to request permission before using someone else's resources. Copying the website design of another person or company is also a form of stealing. Any text or graphic on a website is automatically copyrighted in the United States, regardless of whether a copyright symbol appears on the site or not. Insulting a person or company on your website or linking to the person's or company's website in a derogatory manner could be considered a form of defamation.

Issues like these, related to intellectual property, copyright, and freedom of speech, are regularly discussed and decided in courts of law. Good Web etiquette requires that you ask permission before using others' work, give credit for what you use ("fair use" in the U.S. copyright law), and exercise your freedom of speech in a manner that is not harmful to others. The World Intellectual Property Organization (WIPO), <http://wipo.int>, is dedicated to protecting intellectual property rights internationally.

What if you'd like to retain ownership, but make it easy for others to use or adapt your work? Creative Commons, <http://creativecommons.org>, is a nonprofit organization that provides free services that allow authors and artists to register a type of a copyright license called a Creative Commons license. There are several licenses to choose from, depending on the rights you wish to grant. The Creative Commons license informs others as to exactly what they can and cannot do with your creative work. See <http://meyerweb.com/eric/tools/color-blend> to view a web page licensed under a Creative Commons Attribution-ShareAlike 1.0 License.



## Checkpoint 1.1

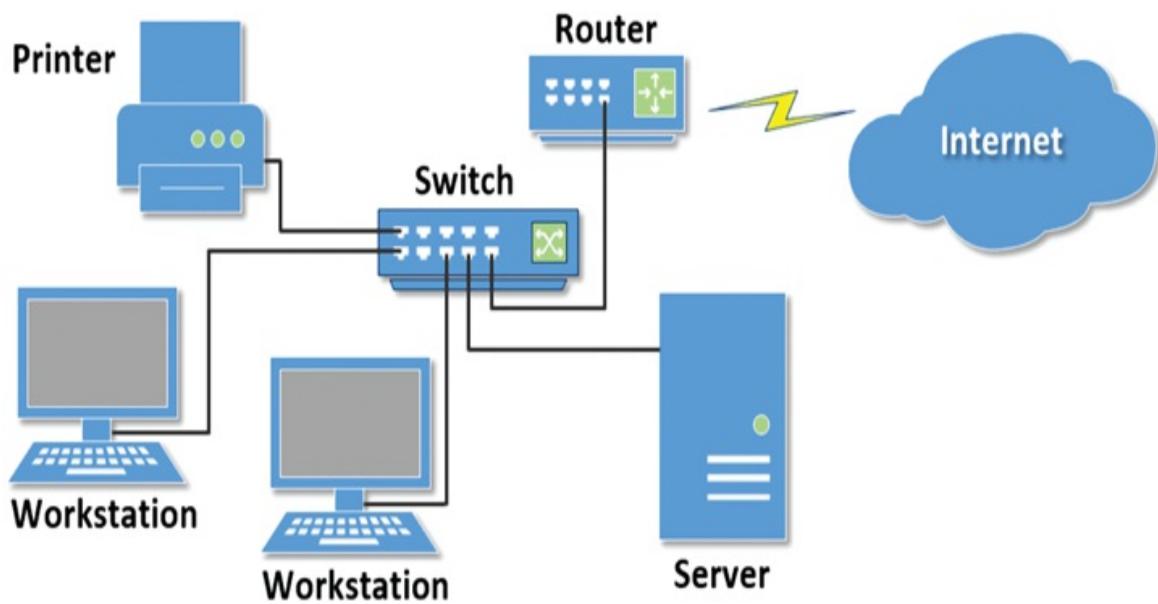
1. Describe the difference between the Internet and the Web.
2. Explain three events that contributed to the commercialization and exponential growth of the Internet.
3. Is the concept of universal design important to web developers? Explain

your answer.

# 1.4 Network Overview

A network consists of two or more computers connected for the purpose of communicating and sharing resources. Common components of a network are shown in [Figure 1.4](#) and include the following:

## Figure 1.4



Common components of a network

- Server computer(s)
- Client workstation computer(s)
- Shared devices such as printers
- Networking devices (routers, hubs, and switches) and the media that connect them

The clients are the computer workstations used by individuals, such as a

personal computer (PC) on a desk. The server receives requests from client computers for resources such as files. Computers used as servers are usually kept in a protected, secure area and are accessed only by network administrators. Networking devices, such as hubs and switches, provide network connections for computers, and routers direct information from one network to another. The media connecting the clients, servers, peripherals, and networking devices may consist of copper cables, fiber optic cables, or wireless technologies.

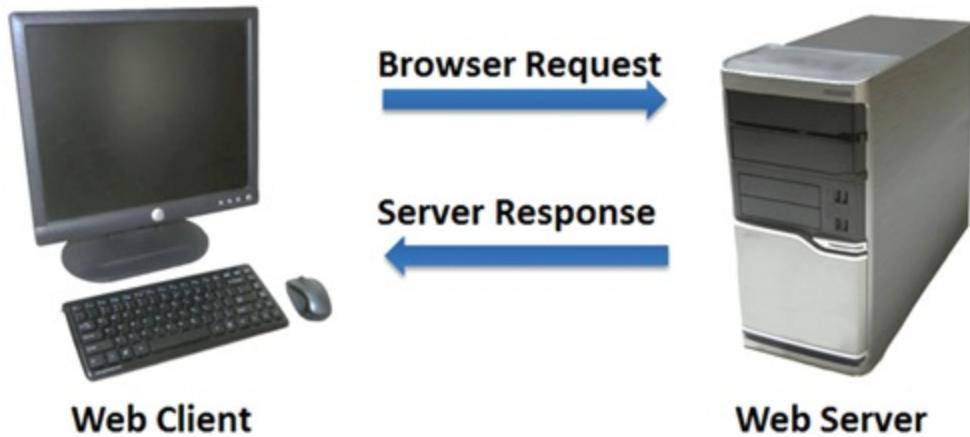
Networks vary in scale. A local area network (LAN) is usually confined to a single building or group of connected buildings. Your school computer lab may use a LAN. If you work in an office, you probably use a computer connected to a LAN. A wide area network (WAN) is geographically dispersed and usually uses some form of public or commercial communications network. For example, an organization with offices on both the East and West coasts of the United States probably uses a WAN to provide a link between the LANs at each of the offices.

A backbone is a high-capacity communication link that carries data gathered from smaller links that interconnect with it. On the Internet, a backbone is a set of paths that local or regional networks connect to for long-distance interconnection. The Internet is a group of interconnected networks with very high-speed connectivity provided by the Internet backbones.

# 1.5 The Client/Server Model

The term client/server dates from the 1980s and refers to personal computers joined by a network. “Client/server” can also describe a relationship between two computer programs—the client and the server. The client requests some type of service (such as a file or database access) from the server. The server fulfills the request and transmits the results to the client over a network. While both the client and the server programs can reside on the same computer, typically they run on different computers ([Figure 1.5](#)). It is common for a server to handle requests from multiple clients.

**Figure 1.5**



Web client and web server

The Internet is a great example of client/server architecture at work. Consider the following scenario: An individual is at a computer using a web browser client to access the Internet. The individual uses the web browser to visit a website, let's say <http://www.yahoo.com>. The server is the web server program running on the computer with an IP address that corresponds to yahoo.com. It is contacted, locates the web page and related resources that were requested, and responds by sending them to the individual.

Here's how to distinguish between web clients and web servers:

## Web Client

- Connected to the Internet when needed
- Usually runs web browser (client) software such as Microsoft Edge or Firefox
- Uses HTTP
- Requests web pages from a server
- Receives web pages and files from a server

## Web Server

- Continually connected to the Internet
- Runs web server software (such as Apache or Internet Information Server)
- Uses HTTP
- Receives a request for the web page
- Responds to the request and transmits the status code, web page, and associated files

When clients and servers exchange files, they often need to indicate the type of file that is being transferred; this is done through the use of a MIME type. Multipurpose Internet Mail Extensions (MIME) are rules that allow multimedia documents to be exchanged among many different computer systems. MIME was initially intended to extend the original Internet e-mail protocol, but it is also used by HTTP. MIME provides for the exchange of

seven different media types on the Internet: audio, video, image, application, message, multipart, and text. MIME also uses subtypes to further describe the data. The MIME type of a web page is text/html. MIME types of GIF and JPEG images are image/gif and image/jpeg, respectively.

A web server determines the MIME type of a file before the file is transmitted to the web browser. The MIME type is sent along with the document. The web browser uses the MIME type to determine how to display the document.

How does information get transferred from the web server to the web browser? Clients (such as web browsers) and servers (such as a web server) exchange information through the use of communication protocols such as HTTP, TCP, and IP, which are introduced in the next section.

# 1.6 Internet Protocols

Protocols are rules that describe how clients and servers communicate with each other over a network. There is no single protocol that makes the Internet and Web work; a number of protocols with specific functions are needed.

## File Transfer Protocol (FTP)

File Transfer Protocol (FTP) is a set of rules that allow files to be exchanged between computers on the Internet. Unlike HTTP, which is used by web browsers to request web pages and their associated files in order to display a web page, FTP is used simply to move files from one computer to another. Web developers commonly use FTP to transfer web page files from their computers to web servers. FTP is also commonly used to download programs and files from other servers to individual computers.

## E-mail Protocols

Most of us take e-mail for granted, but there are two servers involved in its smooth functioning: an incoming mail server and an outgoing mail server. When you send e-mail to others, Simple Mail Transfer Protocol (SMTP) is used. When you receive e-mail, Post Office Protocol (POP; currently **POP3**) and Internet Message Access Protocol (IMAP) can be used.

## Hypertext Transfer Protocol (HTTP)

HTTP is a set of rules for exchanging files such as text, images, audio, video, and other multimedia on the Web. Web browsers and web servers usually use

this protocol. When the user of a web browser requests a file by typing a website address or clicking on a hyperlink, the browser builds an HTTP request and sends it to the server. The web server in the destination machine receives the request, does any necessary processing, and responds with the requested file and any associated files (such as image files, media files, and other related files).

## Transmission Control Protocol/Internet Protocol (TCP/IP)

Transmission Control Protocol/Internet Protocol (TCP/IP) has been adopted as the official communication protocol of the Internet. TCP and IP have different functions that work together to ensure reliable communication over the Internet.

### TCP

The purpose of TCP is to ensure the integrity of network communication. TCP starts by breaking files and messages into individual units called packets. These packets (see [Figure 1.6](#)) contain information such as the destination, source, sequence number, and checksum values used to verify the integrity of the data.

### Figure 1.6



## TCP packet

TCP is used together with IP to transmit files efficiently over the Internet. IP takes over after TCP creates the packets, using IP addressing to send each packet over the Internet via the best path at the particular time. When the destination address is reached, TCP verifies the integrity of each packet by using the checksum, requests a resend if a packet is damaged, and reassembles the file or message from the multiple packets.

# IP

Working in harmony with TCP, IP is a set of rules that controls how data is sent between computers on the Internet. IP routes a packet to the correct destination address. Once sent, the packet gets successively forwarded to the next closest router (a hardware device designed to move network traffic) until it reaches its destination.

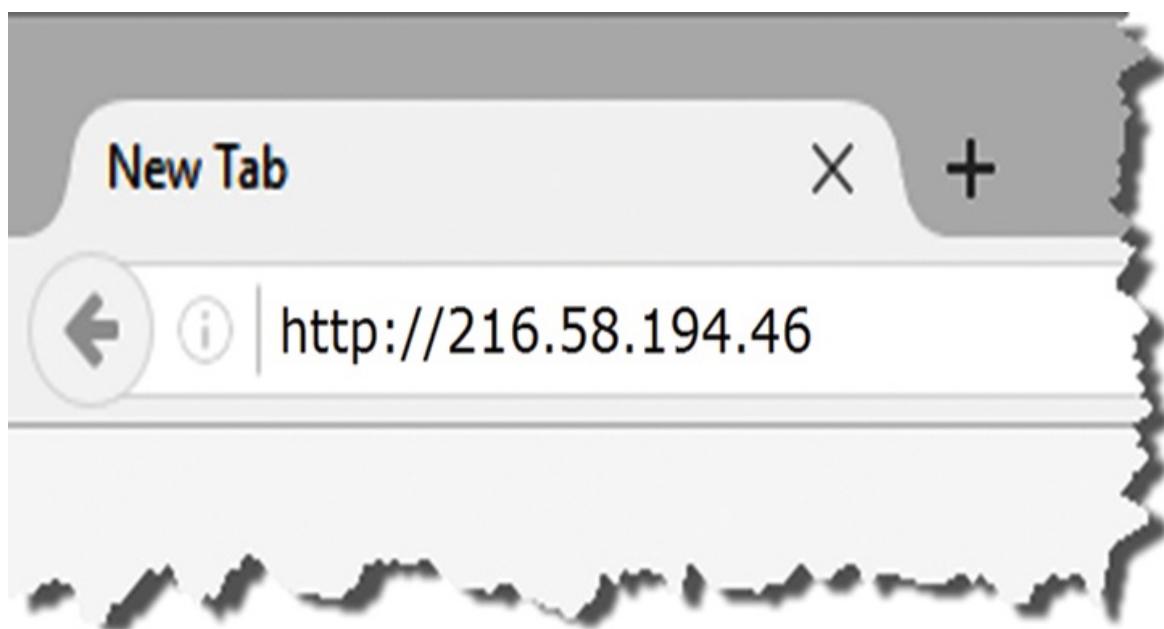
Each device connected to the Internet has a unique numeric IP address. These addresses consist of a set of four groups of numbers, called octets. The current version of IP, Internet Protocol Version 4 (IPv4), uses 32-bit (binary digit) addressing. This results in a decimal number in the format of xxx.xxx.xxx.xxx, where each xxx is a value from 0 to 255. Theoretically, this system allows for at most 4 billion possible IP addresses (although many potential addresses are reserved for special uses). However, even this many addresses will not be enough to meet the needs of all of the devices expected to be connected to the Internet in upcoming years.

IP Version 6 (IPv6) will be the next standard IP protocol and will provide a huge increase in the number of possible addresses and many technological advances. IPv6 was designed as an evolutionary set of improvements to the current IPv4 and is backwardly compatible with it. Service providers and Internet users can update to IPv6 independently without having to coordinate with each other. IPv6 provides for more Internet addresses because the IP address is lengthened from 32 bits to 128 bits. This means that there are potentially  $2^{128}$  unique IP addresses possible, or 340,282,366,920,938,463,463,347,607,431,768,211,456 addresses. (Now

there will be enough IP addresses for everyone's PC, notebook, cell phone, tablet, toaster, and so on!)

The IP address of a device may correspond to a domain name. The Domain Name System (DNS) associates these IP addresses with the text-based URLs and domain names you type into a web browser address box. For example, at the time this book was written, an IP address for Google was 216.58.194.46. You can enter this number in the address text box in a web browser (as shown in [Figure 1.7](#)), press Enter, and the Google home page will display. Of course, it's much easier to type "google.com," which is why domain names such as google.com were created in the first place! Since long strings of numbers are difficult for humans to remember, the Domain Name System was introduced as a way to associate text-based names with numeric IP addresses.

## Figure 1.7



Entering an IP address in a web browser



# FAQ

## 1. What is HTTP/2?

HTTP/2 will be the first major update to HTTP, which was first developed in 1999. As websites have become more image and media intensive, the number of requests needed to display a web page and its related files have increased. A major benefit of HTTP/2 will be quicker loading of web pages by processing multiple concurrent HTTP requests. For more information about HTTP/2, visit <https://http2.github.io>.

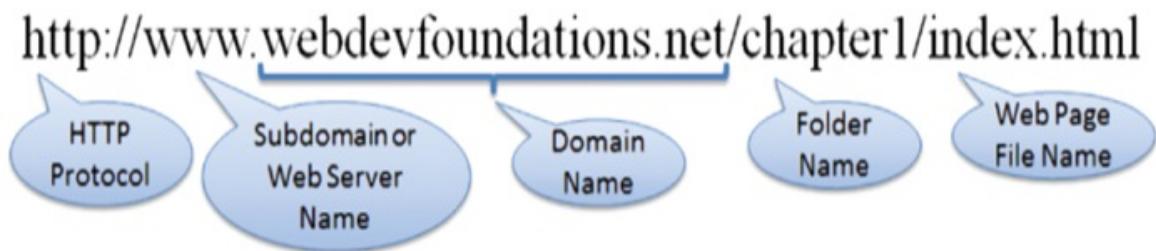
# 1.7 Uniform Resource Identifiers and Domain Names

## URIs and URLs

A Uniform Resource Identifier (URI) identifies a resource on the Internet. A Uniform Resource Locator (URL) is a type of URI which represents the network location of a resource such as a web page, a graphic file, or an MP3 file. The URL consists of the protocol, the domain name, and the hierarchical location of the file on the web server.

The URL `http://www.webdevfoundations.net`, shown in [Figure 1.8](#), denotes the use of HTTP protocol and the web server named www at the domain name of `webdevfoundations.net`. In this case, the root file (usually `index.html` or `index.htm`) in the directory named [chapter1](#) will be displayed.

**Figure 1.8**



URL Describing a file within a folder

[Figure 1.8 Full Alternative Text](#)

## Domain Names

A domain name locates an organization or other entity on the Internet. The purpose of the Domain Name System (DNS) is to divide the Internet into logical groups and understandable names by identifying the exact address and type of the organization. The DNS associates the text-based domain names with the unique numeric IP address assigned to a device.

Let's consider the domain name www.google.com. The portion "google.com" is the domain name that is registered to Google. The ".com" is the top-level domain name. The "google" is considered a second-level domain name. The "www" is the name of the web sever (sometimes called the host) at the google.com domain.

A subdomain can be configured to house a separate website located at the same domain. For example, Google's Gmail can be accessed by using the subdomain "gmail" in the domain name (gmail.google.com). Google Maps can be accessed at maps.google.com, and Google News Search is available at news.google.com. See <http://www.labnol.org/internet/popular-google-subdomains/5888/> for a list of the top 40 Google subdomains. The combination of a host/subdomain, second-level domain, and top-level domain name (such as www.google.com or mail.google.com) is called a fully qualified domain name (FQDN).

## Top-Level Domain Names

A top-level domain (TLD) identifies the rightmost part of the domain name, starting with the final period. A TLD is either a generic top-level domain (gTLD), such as .com for commercial, or a country-code top-level domain, such as .fr for France. The **Internet Assigned Numbers Authority (IANA)** website has a complete list of TLDs (<http://www.iana.org/domains/root/db>).

## Generic Top-Level Domain Names (gTLDs)

The Internet Corporation for Assigned Names and Numbers (ICANN) administers gTLDs (<http://www.icann.org>). [Table 1.1](#) shows several common gTLDs and their intended use.

## Table 1.1 Top-level domains

Generic TLD	Used By
.aero	Air-transport industry
.asia	Pan-Asia and Asia Pacific community
.biz	Businesses
.cat	Catalan linguistic and cultural community
.com	Commercial entities
.coop	Cooperative
.edu	Restricted to accredited degree-granting institutions of higher education
.gov	Restricted to government use

.info	Unrestricted use
.int	International organization (rarely used)
.jobs	Human resources management community
.mil	Restricted to military use
.mobi	Corresponds to a .com website—the .mobi site is designed for easy access by mobile devices
.museum	Museums
.name	Individuals
.net	Entities associated with network support of the Internet, usually Internet service providers or telecommunication companies
.org	Nonprofit entities
.post	Universal Postal Union, an agency of the United Nations
.pro	Professionals such as accountants, physicians, and lawyers
.tel	Contact information for individuals and businesses

.travel      Travel industry

The .com, .org, and .net TLD designations are currently used on the honor system, which means that, for example an individual who owns a shoe store (not related to networking) can register shoes.net.

Expect the number and variety of gTLDs to increase. As of 2017 there were over 1,500 TLDs. The new gTLDs include place names (.quebec, .vegas, and .moscow), retail terms (.blackfriday), financial terms (.cash, .trade, and .loans), technology terms (.systems, .technology, and .app), and whimsical, fun terms (.ninja, .buzz, and .cool). ICANN has set a schedule to periodically launch new gTLDs. Visit <http://newgtlds.icann.org/en/program-status/delegated-strings> for a list of the newest gTLDs.

## Country-Code Top-Level Domain Names

Two-character country codes have also been assigned as TLD names. These codes were originally intended to be meaningful by designating the geographical location of the individual or organization that registered the name. [Table 1.2](#) lists some popular country codes used on the Web.

### Table 1.2 Country codes

Country Code TLD	Country
.au	Australia

.de	Germany
.es	Spain
.eu	European Union (a group of countries rather than a single country)
.in	India
.jp	Japan
.ly	Libya
.nl	The Netherlands
.us	United States
.ws	Samoa

The IANA website at <http://www.iana.org/domains/root/db> has a complete list of country-code TLDs. Domain names with country codes are often used for municipalities, schools, and community colleges in the United States. For example, the domain name `www.harper.cc.il.us` denotes, from right to left, the United States, Illinois, community college, Harper, and the web server named “`www`” as the site for Harper College in Illinois.

Although country-code TLD names were intended to designate geographical location, it is fairly easy to obtain a domain name with a country-code TLD that is not local to the registrant. Examples of non-geographical use of

country-code TLDs include domain names such as mediaqueri.es, webteacher.ws, and bit.ly. Visit <http://register.com>, <http://godaddy.com>, and many other domain name registration companies for examples of readily - available country-code TLDs.

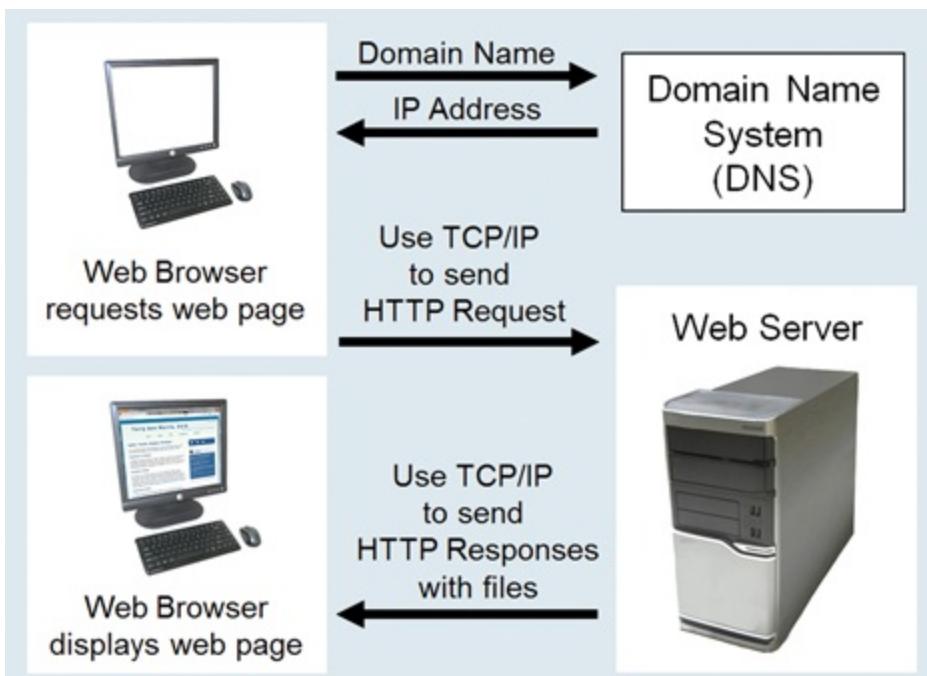
## Domain Name System (DNS)

The DNS associates domain names with IP addresses. The following happens each time a new URL is typed into a web browser:

1. The DNS is accessed.
2. The corresponding IP address is obtained and returned to the web browser.
3. The web browser sends an HTTP request to the destination computer with the corresponding IP address.
4. The HTTP request is received by the web server.
5. The necessary files are located and sent by HTTP responses to the web browser.
6. The web browser renders and displays the web page and associated files.

We all get impatient sometimes when we need to view a web page. The next time you wonder why it is taking so long to display a web page, think about all of the processing that goes on behind the scenes before the browser receives the files needed to display the web page ([Figure 1.9](#)).

## Figure 1.9



Accessing a web page

[Figure 1.9 Full Alternative Text](#)

# **1.8 Markup Languages**

Markup languages consist of sets of directions that tell the browser software (and other user agents such as mobile phones) how to display and manage a web document. These directions are usually called tags and perform functions such as displaying graphics, formatting text, and referencing hyperlinks.

## **Standard Generalized Markup Language (SGML)**

SGML is a standard for specifying a markup language or tag set. SGML in itself is not a document language, but a description of how to specify one and create a document type definition (DTD). When Tim Berners-Lee created HTML, he used SGML to create the specification.

## **Hypertext Markup Language (HTML)**

HTML is the set of markup symbols or codes placed in a file intended for display on a web browser. The web browser renders the code in the HTML file and displays the web page document and associated files. The W3C (<http://www.w3.org>) sets the standards for HTML.

## **Extensible Markup Language (XML)**

XML was developed by the W3C as a flexible method to create common

information formats and share the format and the information on the Web. It is a text-based syntax designed to describe, deliver, and exchange structured information. It is not intended to replace HTML, but to extend the power of HTML by separating data from presentation. Using XML, developers can create whatever tags they need to describe their information.

## **Extensible Hypertext Markup Language (XHTML)**

XHTML uses the tags and attributes of HTML4 along with the more rigorous syntax of XML. XHTML was used on the Web for over a decade and you'll find many web pages coded with this markup language. At one point the W3C was working on a new version of XHTML, called XHTML 2.0. However, the W3C stopped development of XHTML 2.0 because it was not backward compatible with HTML4. Instead, the W3C decided to move forward with HTML5.

## **HTML5—the Newest Version of HTML**

HTML5 is the successor to HTML4 and replaces XHTML. HTML5 incorporates features of both HTML and XHTML, adds new elements, provides new features such as form edits and native video, and is intended to be backward compatible. The W3C approved HTML5 for final Recommendation status in late 2014. The W3C continued its development of HTML and added more new elements, attributes, and features in an update to HTML5 called HTML5.1. HTML5.1 reached final Recommendation status in late 2016 and work has already begun on HTML5.2.



## Checkpoint 1.2

1. Describe the components of the client/server model as applied to the Internet.
2. Identify two protocols used on the Internet to convey information that use the Internet, but do not use the Web.
3. Explain the similarities and differences between a URL and a domain name.

# **1.9 Popular Uses of the Web**

## **E-Commerce**

Continued growth is expected for e-commerce, which is the buying and selling of goods and services on the Internet. The research firm eMarketer projects that worldwide retail e-commerce sales will increase from \$23 trillion in 2017 to \$27 trillion in 2020

(<https://www.emarketer.com/Article/Worldwide-Retail-Ecommerce-Sales-Will-Reach-1915-Trillion-This-Year/1014369>). A study by PEW Research Center indicates that about 80% of American adults shop online (<http://www.pewinternet.org/2016/12/19/online-shopping-and-e-commerce>). As mobile web access has become more commonplace, e-commerce will be regularly done not only from desktop computers, but also from portable devices—tablets, netbooks, smartphones, and technology we haven't even - imagined yet.

## **Mobile Access**

Accessing the Web with devices other than the standard desktop, notebook, and netbook computers is a growing trend. The PEW Research Center reported in 2017 that 77% of Americans own a smartphone and about 50% own a tablet (<http://www.pewinternet.org/fact-sheet/mobile>). Web designers must consider how their pages will display and function not only on personal computers, but also on smartphones, tablets, and other mobile devices.

## **Blogs**

The trend of keeping a web log, or blog, has been driven by individuals as a forum for personal expression. A blog is a journal that is available on the Web; it is a frequently updated page with a chronological list of ideas and

links. Blog topics range from politics to technical information to personal diaries. Blogs can focus on one subject or range across a diverse group of topics—it's up to the person, called a blogger, who has created the blog and maintains it. Bloggers usually update their blogs daily with easy-to-use software designed to allow people with little or no technical background to update and maintain a blog. Many blogs are hosted at blog communities such as <http://www.wordpress.com>. Others are hosted at individual websites, such as the blog kept by the web designer Eric Meyer at <http://meyerweb.com>. Businesses have noted the value of blogs as communication and customer relationship tools. Companies such as Microsoft (<http://blogs.msdn.com>) and IBM (<https://www.ibm.com/developerworks/mydeveloperworks/blogs>) utilize blogs in this manner.

## Wikis

A wiki is a website that can be updated immediately at any time by visitors, using a simple form on a web page. Some wikis are intended for a small group of people, such as the members of an organization. The most powerful wiki is Wikipedia (<http://wikipedia.org>), an online encyclopedia, which can be updated by anyone at any time. Wikis are a form of social software in action—visitors sharing their collective knowledge to create a resource freely used by all. While there have been isolated incidents of practical jokes, and inaccurate information has occasionally been posted at Wikipedia, the given information and linked resources are a good starting point when exploring a topic.

## Social Networking

Blogs and wikis provide web visitors with new methods for interacting with websites and other people—a use referred to as social computing, or social networking. A trendy activity these days is participating in a social networking site such as Facebook (<http://www.facebook.com>) or LinkedIn (<http://www.linkedin.com>). Research firm eMarketer predicts that in 2020, 70% of Internet users will regularly access a social network.

(<https://www.emarketer.com/Article/Nearly-One-Third-of-World-Will-Use-Social-Networks-Regularly-This-Year/1014157>). If it seems to you as if most of your friends are on Facebook, that may be the case: As of 2017, Facebook had over two billion monthly active users (<http://newsroom.fb.com/company-info>). While LinkedIn was created with professional and business networking in mind, businesses have also found it useful to create Facebook sites to - promote their products and services.

Twitter (<http://www.twitter.com>) is a social networking site for microblogging, or frequently communicating with a brief message (280 characters or less) called a tweet. Twitter users (called twitterers) tweet to update a network of friends and followers about their daily activities and observations. Twitter is not limited to personal use. The business world has also discovered the marketing reach that Twitter can provide. Visit <https://business.twitter.com/basics> for insights on how to use Twitter to promote your business and communicate with customers.

## Cloud Computing

Document collaboration sites like Google Drive and Microsoft OneDrive, blogs, wikis, and social networking sites are all accessed via the Internet (the “cloud”) and are examples of cloud computing. The National Institute of Standards and Technology (NIST) defines cloud computing as the on-demand use of software and other computing resources hosted at a remote data center (including servers, storage, services, and applications) over the Internet. Expect to see more public and private use of cloud computing in the future.

## RSS

Really Simple Syndication, or **Rich Site Summary (RSS)** is used to create newsfeeds from blog postings and other websites. The RSS feeds contain a summary of new items posted to the site. The URL to the RSS feed is usually indicated by the letters XML or RSS in white text within an orange rectangle.

A newsreader is needed to access the information. Some browsers, such as Firefox and Safari, can display RSS feeds. Commercial and shareware newsreader applications are also available. The newsreader polls the feed URL at intervals and displays the new headlines when requested. RSS provides web developers with a method to push new content to interested parties and (hopefully) generate return visits to the site.

## Podcasts

Podcasts are audio files on the web that take the format of an audio blog, radio show, or interview. Podcasts are typically delivered by an RSS feed, but can also be made available by providing the link to a recorded MP3 file on a web page. These files can be saved to your computer or to an MP3 player (such as an iPod) for later listening.

## Web 2.0

Flickr (<http://www.flickr.com>) and Pinterest (<http://pinterest.com>) are two social software sites that provide information-sharing opportunities. Flickr, a photo-sharing site, calls itself the “best way to store, search, sort, and share your photos.” Pinterest describes itself as “a place to discover ideas for all your projects and interests, handpicked by people like you.” Pinterest users “pin” photos from websites they have found useful or intriguing on “boards” that are organized by categories. Users can search for pins, follow other users, and follow boards. Pins of interest are displayed. Websites such as Wikipedia, Flickr, Twitter, and Pinterest are examples of what is called Web 2.0. Web 2.0 is the next step in the transition of the Web from isolated static websites to a platform that utilizes technology to provide rich interfaces and social networking opportunities. You may also read Tim O'Reilly's informative Web 2.0 essay at <http://www.oreilly.com/pub/a/web2/archive/what-is-web-20.html> for more information on this developing topic.

The single trend that you can expect to remain the same for the foreseeable

future is the trend of constant change. Internet and web-related technologies are in a constant state of development and improvement. If constant change and the opportunity to learn something new excite you, web development is a fascinating field. The skills and knowledge you gain in this book should provide a solid foundation for your future learning.



## FAQ

### 1. What is the next big thing on the Web?

The Web is changing by the minute. Check the textbook's companion website at <http://www.webdevfoundations.net> for a blog that will help you stay current about web trends.

# Chapter Summary

This chapter has provided a brief overview of Internet, Web, and introductory networking concepts. Much of this information may already be familiar to you.

Visit the textbook's website at <http://www.webdevfoundations.net> for links to the URLs listed in this chapter and to view updated information.

## Key Terms

- [Accessible](#)
- [Americans with Disabilities Act \(ADA\)](#)
- [backbone](#)
- [blog](#)
- [client/server](#)
- [clients](#)
- [cloud computing](#)
- [country-code top-level domain](#)
- [Creative Commons](#)
- [domain name](#)
- [Domain Name System \(DNS\)](#)
- [e-commerce](#)

- [extranet](#)
- [Federal IT Accessibility Initiative](#)
- [File Transfer Protocol \(FTP\)](#)
- [fully qualified domain name \(FQDN\)](#)
- [generic top-level domain \(gTLD\)](#)
- [hashtag](#)
- [host](#)
- [HTML5](#)
- [Hypertext Markup Language \(HTML\)](#)
- [Hypertext Transfer Protocol \(HTTP\)](#)
- [Internet](#)
- [Internet Architecture Board \(IAB\)](#)
- [Internet Assigned Numbers Authority \(IANA\)](#)
- [Internet Corporation for Assigned Numbers and Names \(ICANN\)](#)
- [Internet Engineering Task Force \(IETF\)](#)
- [Internet Message Access Protocol \(IMAP\)](#)
- [intranet](#)
- [IP](#)
- [IP address](#)
- [IP Version 4 \(IPv4\)](#)

- [IP Version 6 \(IPv6\)](#)
- [local area network \(LAN\)](#)
- [markup languages](#)
- [media](#)
- [microblogging](#)
- [Multipurpose Internet Mail Extensions \(MIME\)](#)
- [network](#)
- [newsreader](#)
- [packets](#)
- [podcasts](#)
- [Post Office Protocol \(POP3\)](#)
- [protocols](#)
- [Really Simple Syndication or Rich Site Summary \(RSS\)](#)
- [Request for Comments \(RFC\)](#)
- [Section 508 of the Federal Rehabilitation Act](#)
- [server](#)
- [Simple Mail Transfer Protocol \(SMTP\)](#)
- [social computing](#)
- [social networking](#)
- [Standard Generalized Markup Language \(SGML\)](#)

- [subdomain](#)
- [tablet](#)
- [TCP](#)
- [Tim Berners-Lee](#)
- [top-level domain \(TLD\)](#)
- [Transmission Control Protocol/ Internet Protocol \(TCP/IP\)](#)
- [tweet](#)
- [Uniform Resource Indicator \(URI\)](#)
- [Uniform Resource Locator \(URL\)](#)
- [universal design](#)
- [Web 2.0](#)
- [Web Accessibility Initiative \(WAI\)](#)
- [Web Content Accessibility Guidelines \(WCAG\)](#)
- [web host server](#)
- [wide area network \(WAN\)](#)
- [wiki](#)
- [World Intellectual Property Organization \(WIPO\)](#)
- [World Wide Web](#)
- [World Wide Web Consortium \(W3C\)](#)
- [XHTML](#)

- [XML](#)

# Review Questions

## Multiple Choice

1. What is a unique text-based Internet address corresponding to a computer's unique numeric IP address called?
  1. IP address
  2. domain name
  3. URL
  4. user name
2. Select the item below that indicates the top-level domain name for the URL <http://www.mozilla.com>.
  1. mozilla
  2. com
  3. http
  4. www
3. Of the following organizations, which one coordinates applications for new TLDs?
  1. Internet Assigned Numbers Authority (IANA)
  2. Internet Engineering Task Force (IETF)
  3. Internet Corporation for Assigned Numbers and Names (ICANN)

4. World Wide Web Consortium (W3C)
4. Which of the following is a network that covers a small area, such as a group of buildings or campus?
  1. LAN
  2. WAN
  3. Internet
  4. WWW
5. Which of the following organizations takes a proactive role in developing recommendations and prototype technologies related to the Web?
  1. World Wide Web Consortium (W3C)
  2. Web Professional Standards Organization (WPO)
  3. Internet Engineering Task Force (IETF)
  4. Internet Corporation for Assigned Numbers and Names (ICANN)

## True or False

6. A URL is one type of URI.
7. Markup languages contain sets of directions that tell the browser software how to display and manage a web document.
8. The World Wide Web was developed to allow companies to conduct e-commerce over the Internet.
9. A domain name that ends in .net indicates that the website must be for a networking company.

10. An accessible website provides accommodations that help individuals overcome barriers such as visual, auditory, physical, and neurological disabilities.

## Fill in the Blank

11. \_\_\_\_\_ is the set of markup symbols or codes placed in a file intended for display on a web browser.
12. A \_\_\_\_\_ can be configured to house a separate website located at the same domain.
13. A standard language used for specifying a markup language or tag set is \_\_\_\_\_.
14. Frequently communicating by posting brief messages at a social networking site is called \_\_\_\_\_.
15. The purpose of \_\_\_\_\_ is to ensure the integrity of network communication.

## Hands-On Exercise

1. Twitter (<http://www.twitter.com>) is a social networking website for microblogging, or frequently communicating with a brief message (280 characters or less) called a tweet. Twitter users (referred to as twitterers) tweet to update a network of friends and followers about their daily activities, observations, and information related to topics of interest. A hashtag (the #symbol) can be placed in front of a word or term within a tweet to categorize the topic, such as typing the hashtag #SXSWi in all tweets about the SXSW Interactive Conference for the web design industry. The use of a hashtag makes it easy to search for tweets about a category or event in Twitter.

If you don't already use Twitter, sign up for free account at

<http://www.twitter.com>. Use your Twitter account to share information about websites that you find useful or interesting. Post at least three tweets. You might tweet about websites that contain useful web design resources. You might describe sites that have interesting features, such as compelling graphics or easy-to-use navigation. After you begin to develop your own websites, you could tweet about them, too!

Your instructor may direct you to include a distinctive hashtag (for example, something like #CIS110) in your tweets that are related to your web design studies. Searching Twitter for the specified hashtag will make it easy to collect all the tweets posted by the students in your class.

2. Create a blog to document your learning experiences as you study web development. Visit one of the many sites that offer free blogs, such as <http://www.blogger.com>, <http://www.wordpress.com>, or <http://www.tumblr.com>. Follow the site's instructions to establish your own blog. Your blog could be a place to note websites that you find useful or interesting. You might report on sites that contain useful web design resources. You might describe sites that have interesting features, such as compelling graphics or easy-to-use navigation. Write a few sentences about each site that you find intriguing. After you begin to develop your own sites, you could include the URLs and reasons for your design decisions. Share this blog with your fellow students and friends. Display your page in a browser, and print the page. Hand in the printout to your instructor.

## Web Research

1. The World Wide Web Consortium creates standards for the Web. Visit its site at <http://www.w3c.org> and then answer the following questions:
  1. How did the W3C get started?
  2. Who can join the W3C? What does it cost to join?
  3. The W3C home page lists a number of technologies. Choose one

that interests you, click on its link, and read the associated pages. List three facts or issues you discover.

2. The Internet Society takes an active leadership role in issues related to the Internet. Visit its site at <http://www.isoc.org> and then answer the following questions:
  1. Why was the Internet Society created?
  2. Determine which local chapter is closest to you. Visit its website. List the website's URL and an activity or service that the chapter provides.
  3. How can you join the Internet Society? What does it cost to join? Would you recommend that a beginning Web developer join the Internet Society? Why or why not?
3. HTTP/2 is the first major update to HTTP, which was first developed in the late 1990s. As websites have become more image and media intensive, the number of requests needed to display a web page and its related files have increased. A major benefit of HTTP/2 will be quicker loading of web pages.

#### HTTP/2 Resources:

- <http://readwrite.com/2015/02/18/http-update-http2-what-you-need-to-know>
- <https://http2.github.io>
- <http://www.engadget.com/2015/02/24/what-you-need-to-know-about-http-2>
- <https://tools.ietf.org/html/rfc7540>

Use the resources listed above as a starting point as you research HTTP/2 and answer the following questions.

1. Who developed HTTP/2?

2. When was the HTTP/2 proposed standard published?
3. Describe three methods used by HTTP/2 intended to decrease latency and provide for quicker loading of web pages in browsers.

## Focus on Web Design

1. Visit a website that interests you. Print the home page or one other pertinent page from the site. Write a one-page summary of the site that addresses the following topics:
  1. What is the URL of the site?
  2. What is the purpose of the site?
  3. Who is the intended audience?
  4. Do you think that the site reaches its intended audience? Why or why not?
  5. Is the site useful to you? Why or why not?
  6. Does this site appeal to you? Why or why not? Consider the use of color, images, multimedia, organization, and ease of navigation.
  7. Would you encourage others to visit this site? Why or why not?
  8. How could this site be improved?

## **2 HTML Basics**

# Chapter Objectives

In this chapter, you will learn how to . . .

- Describe HTML, XHTML, and HTML5
- Identify the markup language in a web page document
- Use the html, head, body, title, and meta elements to code a template for a web page
- Configure the body of a web page with headings, paragraphs, line breaks, divs, lists, and blockquotes
- Configure text with phrase elements
- Configure special characters
- Use the new HTML5 header, nav, main, and footer elements
- Use the anchor element to link from page to page
- Create absolute, relative, and e-mail hyperlinks
- Code, save, and display a web page document
- Test a web page document for valid syntax

This chapter gets you started on your very first web page. You'll be introduced to Hypertext Markup Language (HTML), the language used to - create web pages. The chapter begins with an introduction to the syntax of HTML5; continues with sample web pages; and introduces HTML structural, phrase, and hyperlink elements as more example web pages are created. You will learn more if you work along with the sample pages in the text. Coding HTML is a skill, and every skill improves with practice.

## 2.1 HTML Overview

Markup languages consist of sets of directions that tell the browser software (and other user agents such as mobile phones) how to display and manage a web document. These directions are usually called tags and perform functions such as displaying graphics, formatting text, and referencing hyperlinks.

The World Wide Web is composed of files containing Hypertext Markup Language (HTML) and other markup languages that describe web pages. Tim Berners-Lee developed HTML using Standard Generalized Markup Language (SGML). SGML prescribes a standard format for embedding descriptive markup within a document and for describing the structure of a document. SGML is not in itself a document language, but rather a - description of how to specify one and create a document type definition (DTD). The W3C (<http://www.w3c.org>) sets the standards for HTML and its related languages. Like the Web itself, HTML is in a constant state of change.

## HTML

HTML is the set of markup symbols or codes placed in a file that is intended for display on a web page. These markup symbols and codes identify structural elements such as paragraphs, headings, and lists. HTML can also be used to place media (such as graphics, video, and audio) on a web page and describe fill-in forms. The browser interprets the markup code and renders the page. HTML permits the platform-independent display of information across a network. No matter what type of computer a web page was created on, any browser running on any operating system can display the page.

Each individual markup code is referred to as an element or tag. Each tag has a purpose. Tags are enclosed in angle brackets, the < and > symbols. Most tags come in pairs: an opening tag and a closing tag. These tags act as containers and are sometimes referred to as container tags. For example, the

text that is between the `<title>` and `</title>` tags on a web page would display in the title bar on the browser window. Some tags are used alone and are not part of a pair. For example, a `<br>` tag that configures a line break on a web page is a stand-alone, or self-contained, tag and does not have a closing tag. Most tags can be modified with **attributes** that further describe their purpose.

## XML

XML (eXtensible Markup Language) was developed by the W3C to create common information formats and share the format and the information on the Web. It is a text-based syntax designed to describe, deliver, and exchange structured information, such as RSS feeds. XML is not intended to replace HTML, but to extend the power of HTML by separating data from presentation. Using XML, developers can create any tags they need to describe their information.

## XHTML

eXtensible HyperText Markup Language (XHTML) uses the tags and attributes of HTML4 along with the syntax of XML. XHTML was used on the Web for over a decade and you'll find many web pages coded with this markup language. At one point the W3C was working on a new version of XHTML, called XHTML 2.0. However, the W3C stopped development of XHTML 2.0 because it was not backward compatible with HTML4. Instead, the W3C decided to move forward with HTML5.

## HTML5

HTML5 is the successor to HTML4 and replaces XHTML. HTML5 incorporates features of both HTML and XHTML, adds new elements of its own, provides new features such as form edits and native video, and is intended to be backward compatible.

The W3C approved HTML5 for final Recommendation status in late 2014. The W3C continued its development of HTML and added more new elements, attributes, and features in an update to HTML5 called HTML 5.1. In 2017, HTML5.1 reached final Recommendation status and work had already begun on HTML5.2.

Recent versions of popular browsers, such as Microsoft Edge, Firefox, Safari, Google Chrome, and Opera, support most features of HTML5 and HTML5.1. You'll learn to use HTML5.1 syntax as you work through this textbook. W3C HTML5 documentation is available at <https://www.w3.org/TR/html/>.



## FAQ

### 1. What software do I need?

No special software is needed to create a web page document; all you need is a text editor. The Notepad text editor is included with Microsoft Windows.TextEdit is distributed with the Mac OS X operating system. (See <http://support.apple.com/kb/TA20406> for configuration information.) An alternative to the operating system's basic text editor is one of the many free or shareware editors that are available, such as - Notepad++ for Windows (<http://notepad-plus-plus.org/download>) and BBEdit for Macs (<http://www.barebones.com/products/bbedit/index.html>). Another commonly used alternative is a commercial web-authoring tool, such as Adobe Dreamweaver. Regardless of the software or program you use, having a solid foundation in HTML will be useful.

You will need to test your web pages in the most popular browsers, such as Microsoft Edge, Mozilla Firefox, Apple Safari, and Google Chrome. Access a free download of Firefox at [www.mozilla.org/mozilla/firefox](http://www.mozilla.org/mozilla/firefox). A free download of Google Chrome is available at <http://www.google.com/chrome>.

You will also find the Web Developer Extension for Firefox (<https://addons.mozilla.org/en-us/firefox/addon/web-developer>) to be useful.

## 2.2 Document Type Definition

Because multiple versions and types of HTML and XHTML exist, the W3C recommends identifying the type of markup language used in a web page document with a Document Type Definition (DTD). The DTD identifies the version of HTML contained in your document. Browsers and HTML code validators can use the information in the DTD when processing the web page. The DTD statement, commonly called a doctype statement, is the first line of a web page document. The DTD for HTML5 is:

```
<!DOCTYPE html>
```

## 2.3 Web Page Template

You already know that the HTML markup language tells browsers how to display information on a web page. Let's take a closer look at what's "under the hood" ([Figure 2.1](#)) of every web page you create. Every single web page you create will include the DTD and the html, head, title, meta, and body elements. We will follow the coding style to use lowercase letters and place quotes around attribute values. A basic HTML5 web page template (see chapter2/template.html in the student files) is as follows:

### Figure 2.1



It's what is under the hood that matters.

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>Page Title Goes Here</title>
```

```
<meta charset="utf-8">
</head>
<body>
... body text and more HTML tags go here ...
</body>
</html>
```

With the exception of the specific page title, the first seven lines will usually be the same on every web page that you create. Review the code above and notice that the document type definition statement has its own formatting and that the HTML tags all use lowercase letters. Next, let's explore the purpose of the html, head, title, meta, and body elements.

## 2.4 HTML Element

The purpose of the `html` element is to indicate that the document is HTML formatted. The `html` element tells the browser how to interpret the document. The opening `<html>` tag is placed on a line below the DTD. The closing `</html>` tag indicates the end of the web page and is placed after all other HTML elements in the document.

The `html` element also needs to indicate the spoken language, such as English, of the text in the document. This additional information is added to the `<html>` tag in the form of an attribute, which modifies or further describes the function of an element. The **lang attribute** specifies the spoken language of the document. For example, `lang="en"` indicates the English language. Search engines and screen readers may access this attribute.

# 2.5 Head, Title, Meta, and Body Elements

There are two sections on a web page: the head and the body. The head section contains information that describes the web page document. The body section contains the actual tags, text, images, and other objects that are displayed by the browser as a web page.

## The Head Section

Elements that are located in the head section include the title of the web page, meta tags that describe the document (such as the character encoding used and information that may be accessed by search engines), and references to scripts and styles. Many of these features do not show directly on the web page.

The head element contains the head section, which begins with the `<head>` tag and ends with the `</head>` tag. You will always code at least two other elements in the head section: a title element and a meta element.

The first element in the head section, the title element, configures the text that will appear in the title bar of the browser window. The text between the `<title>` and `</title>` tags is called the title of the web page and is accessed when web pages are bookmarked and printed. Popular search engines, such as Google, use the title text to help determine keyword relevance and even display the title text on the results page of a search. A descriptive title that includes the website or organization name is a crucial component for establishing a brand or presence on the Web.

The **meta element** describes a characteristic of a web page, such as the character encoding. Character encoding is the internal representation of letters, numbers, and symbols in a file such as a web page or other file that is stored on a computer and may be transmitted over the Internet. There are

many different character-encoding sets. However, it is common practice to use a character-encoding set that is widely supported, such as utf-8, which is a form of Unicode (<http://www.unicode.org>). The meta tag is not used as a pair of opening and closing tags. It is considered to be a stand-alone, or self-contained, tag (referred to as a **void element** in HTML5). The meta tag uses the **charset attribute** to indicate the character encoding. An example meta tag is as follows:

```
<meta charset="utf-8">
```

## The Body Section

The body section contains text and elements that display directly on the web page in the browser window, also referred to as the browser viewport. The purpose of the body section is to configure the contents of the web page.

The body element contains the body section, which begins with the `<body>` tag and ends with the `</body>` tag. You will spend most of your time writing code in the body of a web page. Text and elements typed between the opening and closing body tags will display on the web page in the browser viewport.

## 2.6 Your First Web Page



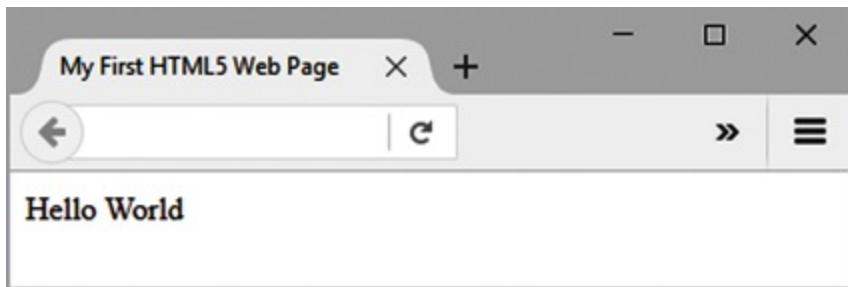
VideoNote **Your First Web Page**



### Hands-On Practice 2.1

Now that you're familiar with basic elements used on every web page, it's your turn to create your first web page, shown in [Figure 2.2](#).

### Figure 2.2



Your first webpage

## Create a Folder

You'll find it helpful to create folders to organize your files as you develop the web pages in this book and create your own websites. Use your operating system to create a new folder named mychapter2 on your hard drive or a

portable flash drive.

To create a new folder on a Mac:

1. Launch Finder, and select the location where you would like to create the new folder.
2. Choose File > New Folder to create an untitled folder.
3. To rename the folder, select the folder and click on the current name. Type a name for the folder, and press the Return key.

To create a new folder with Windows:

1. Launch File Explorer (formerly called Windows Explorer):
  1. Display the Desktop.
  2. Right-click on the Start button and select File Explorer.
2. Navigate to the location where you would like to create the new folder, such as Documents, your C: drive, or an external USB drive.
3. Select the Home tab. Select New Folder.
4. To rename the New Folder, right-click on it, select Rename from the context-sensitive menu, type in the new name, and press the Enter key.



## FAQ

1. Why should I create a folder? Why not just use the desktop?

Folders will help you to organize your work. If you just use the desktop, it would quickly become cluttered and disorganized. It's also important to know that websites are organized on web servers within folders. By

starting to use folders right away to organize related web pages, you are on your way to becoming a successful web designer.

# Your First Web Page

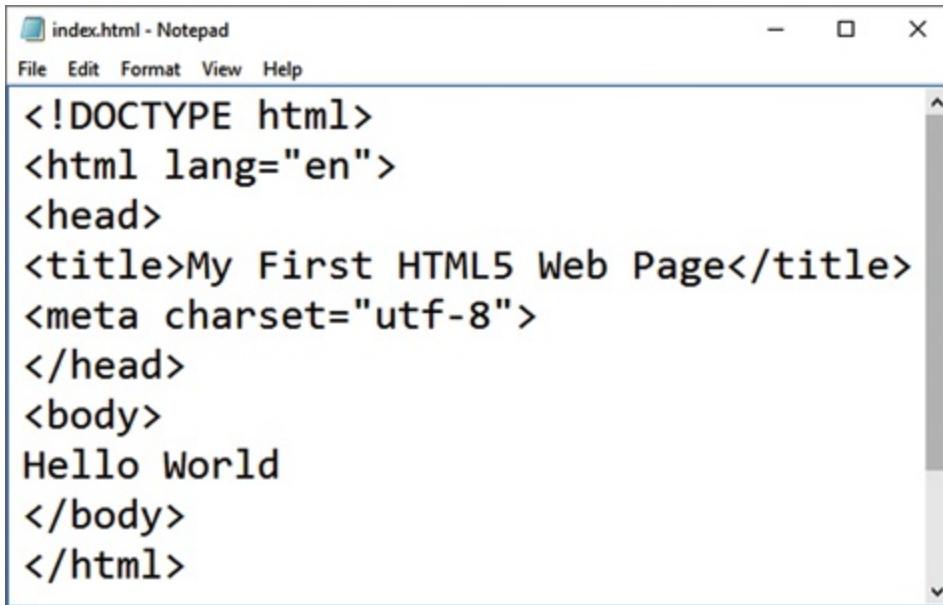
Now you are ready to create your first HTML5 web page. Launch Notepad or another text editor. Type in the following code:

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>My First HTML5 Web Page</title>
<meta charset="utf-8">
</head>
<body>
Hello World
</body>
</html>
```

Notice that the first line in the file contains the doctype. The HTML code begins with an opening `<html>` tag and ends with a closing `</html>` tag. The purpose of these tags is to indicate that the content between them makes up a web page. The head section is delimited by `<head>` and `</head>` tags and contains a pair of title tags with the words “My First HTML5 Web Page” in between, along with a `<meta>` tag to indicate the character encoding.

The body section is delimited by `<body>` and `</body>` tags. The words “Hello World” are typed on a line between the body tags. See [Figure 2.3](#) for a screenshot of the code as it would appear in Notepad. You have just created the source code for a web page document.

## Figure 2.3



The screenshot shows a Microsoft Notepad window titled "index.html - Notepad". The menu bar includes File, Edit, Format, View, and Help. The main content area contains the following HTML code:

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>My First HTML5 Web Page</title>
<meta charset="utf-8">
</head>
<body>
Hello World
</body>
</html>
```

Code displayed in Notepad. Courtesy of Microsoft Corporation.

[Figure 2.3 Full Alternative Text](#)



## FAQ

1. Do I have to start each tag on its own line?

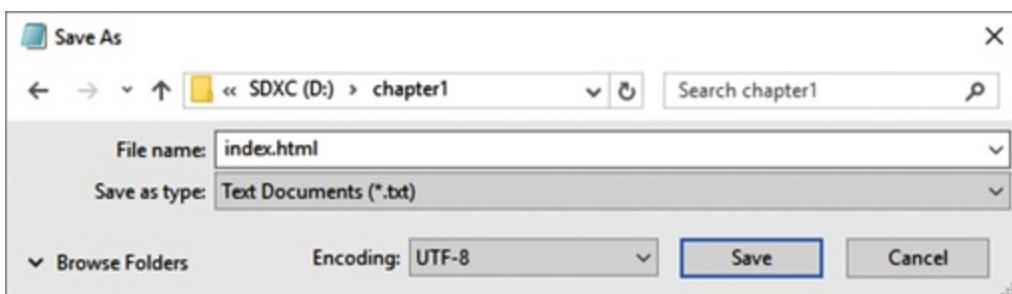
No, you are not required to start each tag on a separate line. A browser can display a page even if all the tags follow each other on one line with no spaces. Humans, however, find it easier to write and read web page code if line breaks and indentation are used.

## Save Your File

You will save your file with the name of index.html. A common file name for the home page of a website is index.html or index.htm. Web pages use either

a .htm or a .html file extension. The web pages in this book use the .html file extension. Display your file in Notepad or another text editor. Select File from the menu bar, and then select Save As. The Save As dialog box will appear. Navigate to your mychapter2 folder. Using [Figure 2.4](#) as an example, type the file name. Click the Save button after you type the file name. Sample solutions for the exercises are available in the student files. If you like, you can compare your work with the solution in the student files at chapter2/index.html before you test your page.

## Figure 2.4



The Save As dialog box. Courtesy of Microsoft Corporation.



## FAQ

1. Why does my file have a .txt file extension?

In some older versions of Windows, Notepad will automatically append a .txt file extension. If this happens, type the name of the file within quotation marks ("index.html"), and save your file again.

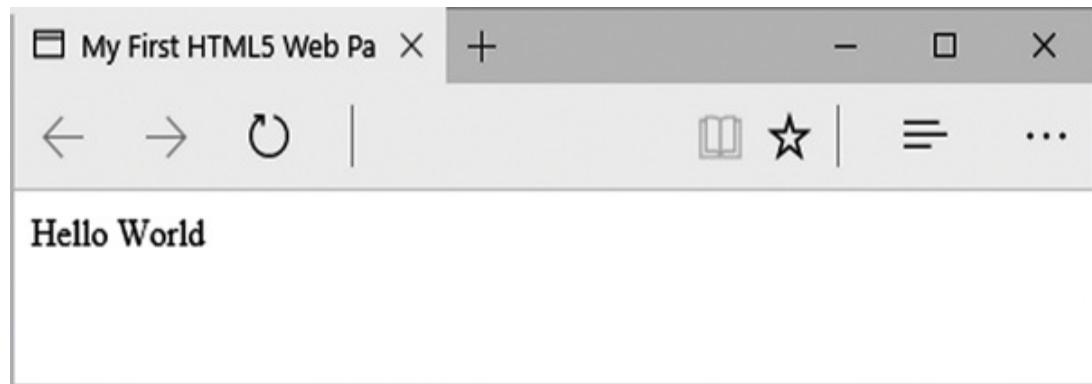
## Test Your Page

There are two ways to test your page:

1. Launch File Explorer or Finder (Mac). Navigate to your index.html file. Double-click index.html. The default browser will launch and will display your index.html page.
2. Launch a web browser. Select File > Open, and navigate to your index.html file. Double-click index.html and click OK. The browser will display your index.html page.

Examine your page. If you are using Microsoft Edge, your page should look similar to the one shown in [Figure 2.5](#). A display of the page using Firefox is shown in [Figure 2.2](#). Look carefully at the browser window. Notice how the browser title bar or browser tab displays the title text, “My First HTML5 Web Page.” Some search engines use the text enclosed within the `<title>` and `</title>` tags to help determine the relevancy of keyword searches, so make certain that your pages contain descriptive titles. The title element is also used when viewers bookmark your page or add it to their Favorites. An engaging and descriptive page title may entice a visitor to revisit your page. If your web page is for a company or an organization, it’s a best practice to include the name of the company or organization in the title.

## Figure 2.5



Web page displayed by Microsoft Edge. Courtesy of

Microsoft Corporation.



## FAQ

1. When I viewed my page in a browser, the file name was index.html.html—why did this happen?

This usually happens when your operating system is configured to hide file extension names. You will correct the file name, using one of the following two methods:

- Use the operating system to rename the file from “index.html.html” to “index.html”.

OR

- Open the index.html.html file in your text editor and save it with the name “index.html”.

It’s a good idea to change the settings in your operating system to show file extension names. Access the system help for your operating system or the resources below for information about how to configure your operating system to show file extension names:

- *Windows*: <http://www.file-extensions.org/article/show-and-hide-file-extensions-in-windows-10>
- *Mac*: [http://www.fileinfo.com/help/mac\\_show\\_extensions](http://www.fileinfo.com/help/mac_show_extensions)



## Checkpoint 2.1

1. Describe the origin, purpose, and features of HTML.
2. Describe the software needed to create and test web pages.
3. Describe the purpose of the head and body sections of a web page.

## 2.7 Heading Element

Heading elements are organized into six levels: h1 through h6. The text contained within a heading element is rendered as a “block” of text by the browser (referred to as **block display**) and displays with empty space (sometimes called “white space”) above and below. The size of the text is largest for `<h1>` (called the heading 1 tag) and smallest for `<h6>` (called the heading 6 tag). Depending on the font being used (more on font sizes in [Chapter 3](#)), the text contained within `<h4>`, `<h5>`, and `<h6>` tags may be displayed smaller than the default text size. All text contained within heading tags is displayed with bold font weight. [Figure 2.6](#) shows a web page document with six levels of headings.

### Figure 2.6

The screenshot shows a web browser window with a title bar labeled "Heading Example". The main content area displays a hierarchical list of headings:

- Heading Level 1**
- Heading Level 2**
- Heading Level 3**
- Heading Level 4**
- Heading Level 5**
- Heading Level 6**

Sample headings



## FAQ

1. Why doesn't the heading tag go in the head section?

It's common for students to try to code the heading tags in the head

section of the document, but doing this is not valid and will cause issues with the way the browser displays the web page. Even though “heading tag” and “head section” sound similar, always code heading tags in the body section of the web page document.



## Hands-On Practice 2.2

To create the web page shown in [Figure 2.6](#), launch Notepad or another text editor. Select File > Open to edit the HTML5 template file located at chapter2/template.html in the student files. Modify the title element and add heading tags to the body section as indicated by the following highlighted code:

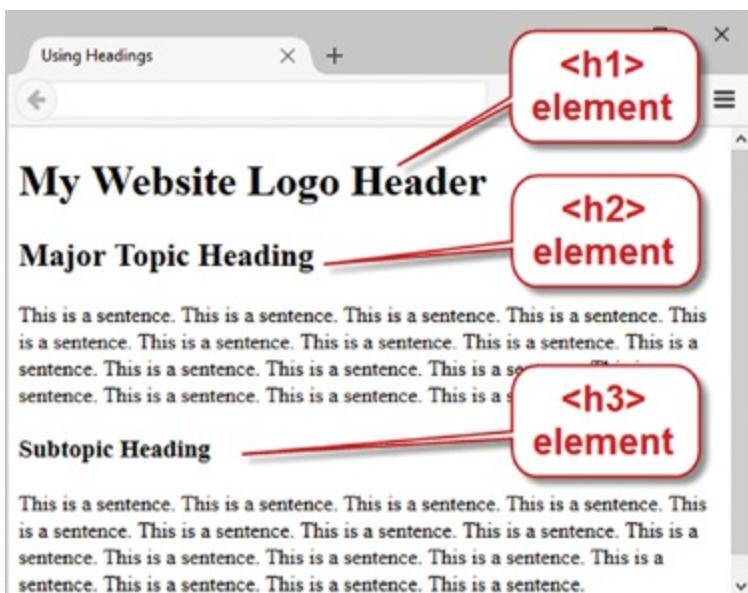
```
<!DOCTYPE html>
<html lang="en">
<head>
<title>Heading Example</title>
<meta charset="utf-8">
</head>
<body>
<h1>Heading Level 1</h1>
<h2>Heading Level 2</h2>
<h3>Heading Level 3</h3>
<h4>Heading Level 4</h4>
<h5>Heading Level 5</h5>
<h6>Heading Level 6</h6>
</body>
</html>
```

Save the document as heading.html on your hard drive or flash drive. Launch a browser such as Microsoft Edge or Firefox to test your page. It should look similar to the page shown in [Figure 2.6](#). You can compare your work with the solution found in the student files (chapter2/heading.html).

## Accessibility and Headings

Heading tags can help to make your pages more accessible and usable. It is good coding practice to use heading tags to outline the structure of your web page content. To indicate areas within a page hierarchically, code heading tags numerically as appropriate (h1, h2, h3, and so on), and include page content in block display elements such as paragraphs and lists. In [Figure 2.7](#), the <h1> tag contains the name of the website in the logo header area at the top of the web page, the <h2> tag contains the topic or name of the page in the content area, and other heading elements are coded in the content area as needed to identify major topics and subtopics.

## Figure 2.7



Heading tags outline the page

## Figure 2.7 Full Alternative Text



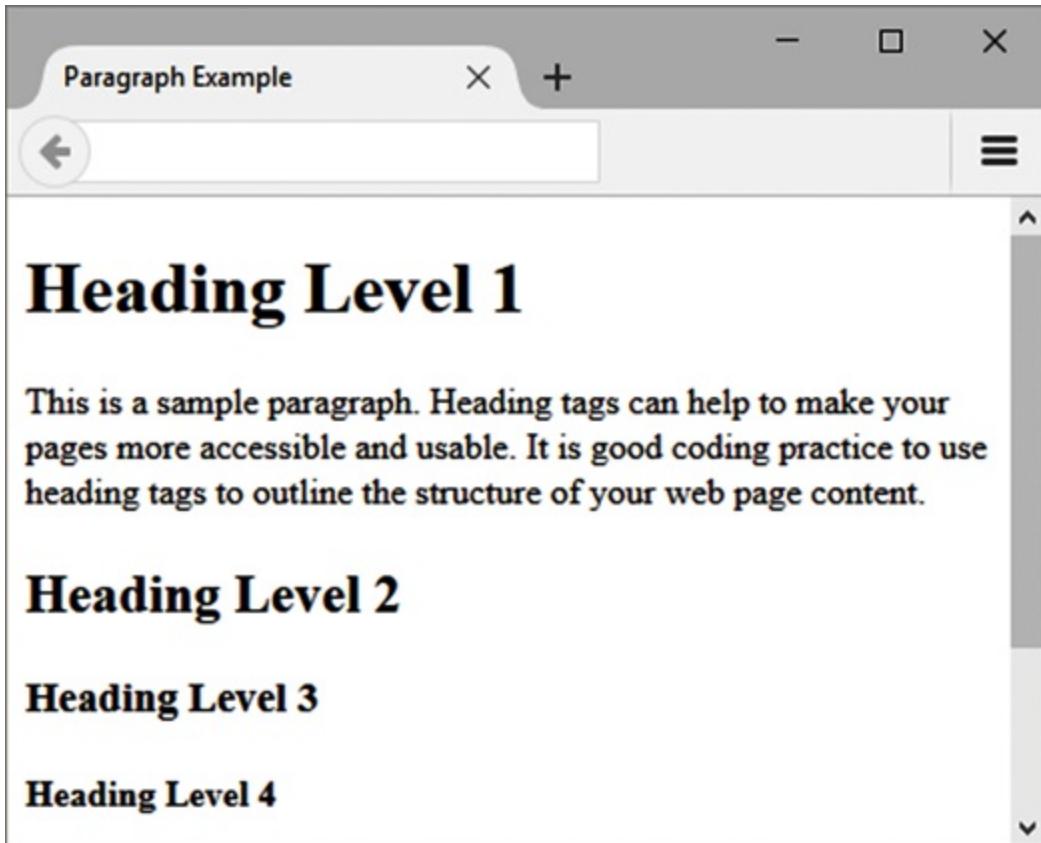
Visually challenged visitors who are using a screen reader can direct the software to display a list of the headings used on a page to focus on the topics that interest them. Your well-organized page will be more usable for every visitor to your site, including those who are visually challenged.

## 2.8 Paragraph Element

Paragraph elements are used to group sentences and sections of text together. Text that is contained by `<p>` and `</p>` tags display as a “block” (referred to as block display) and will appear with empty space above and below it.

[Figure 2.8](#) shows a web page document with a paragraph after the first heading.

### Figure 2.8



Web page using headings and a paragraph

[Figure 2.8 Full Alternative Text](#)



## Hands-On Practice 2.3

To create the web page shown in [Figure 2.8](#), launch a text editor. Select File > Open to edit the file located at chapter2/heading.html in the student files. Modify the page title, and add a paragraph of text to your page below the line with the `<h1>` tags and above the line with the `<h2>` tags. Use the following code as an example:

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>Paragraph Example</title>
<meta charset="utf-8">
</head>
<body>
<h1>Heading Level 1</h1>
<p>This is a sample paragraph. Heading tags can help to make your
</p>
<h2>Heading Level 2</h2>
<h3>Heading Level 3</h3>
<h4>Heading Level 4</h4>
<h5>Heading Level 5</h5>
<h6>Heading Level 6</h6>
</body>
</html>
```

Save the document as paragraph.html on your hard drive or flash drive. Launch a browser to test your page. It should look similar to the page shown in [Figure 2.8](#). You can compare your work with the solution (chapter2/paragraph.html) found in the student files. Notice how the text in the paragraph wraps automatically as you resize your browser window.

## Alignment

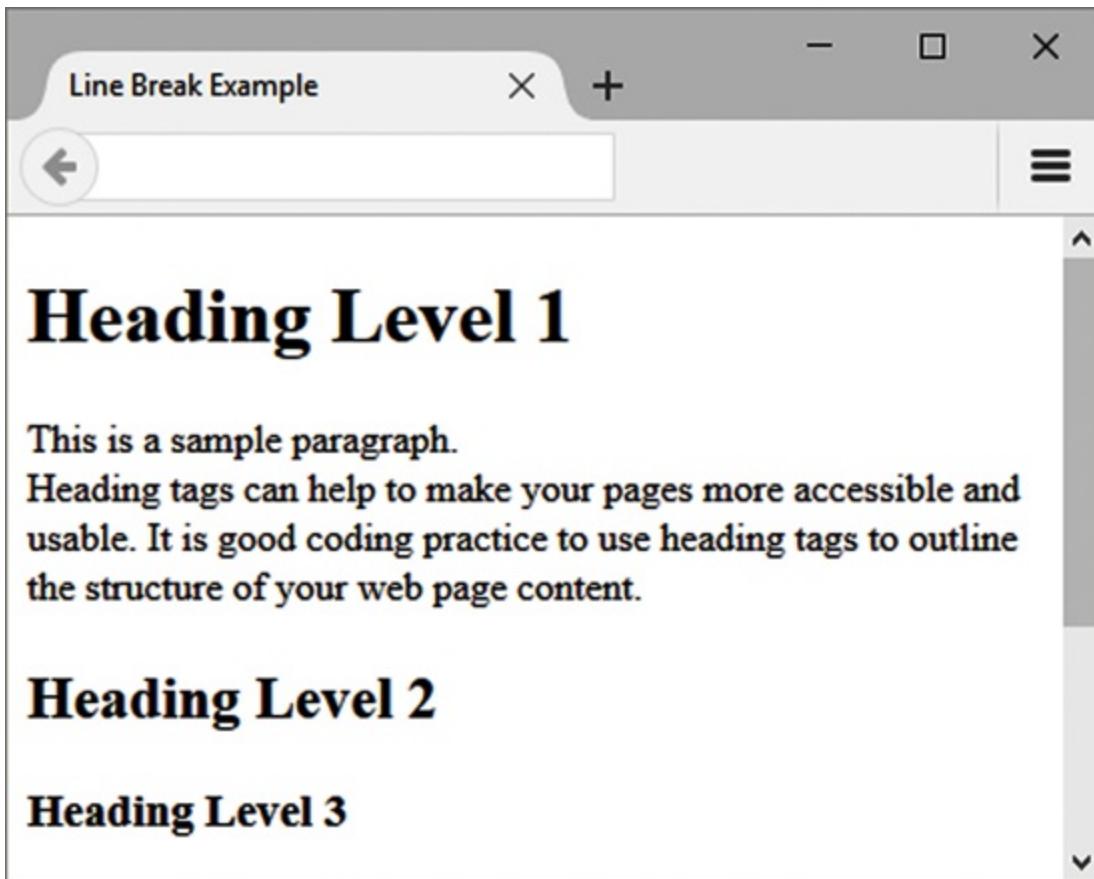
As you tested your web pages, you may have noticed that the headings and text begin near the left margin. This placement is called left alignment and is

the default alignment for web pages. There are times, however, when you want a paragraph or heading to be centered or right aligned. The align attribute can be used for this purpose. The purpose of an **attribute** is to modify the properties of an HTML element. In this case, the **align attribute** modifies the element's horizontal alignment (left, center, or right) on a web page. To center an element on a web page, use the attribute align="center". To right-align the text within an element, use the align="right" attribute. In XHTML syntax, the align attribute can be used with a number of block display elements, including the paragraph (`<p>`) and heading (`<h1>` through `<h6>`) tags. The align attribute is obsolete in HTML5, which means that while it may be used in XHTML, the attribute has been removed from the W3C HTML5 specification and is invalid. In [Chapter 6](#), you will learn how to configure alignment using a more modern approach with Cascading Style Sheets (CSS).

## 2.9 Line Break Element

The **line break element** causes the browser to advance to the next line before displaying the next element or portion of text on a web page. The line break tag is not coded as a pair of opening and closing tags. It is a **stand-alone**, or **void** element, and is coded as <br>. [Figure 2.9](#) shows a web page document with a line break after the first sentence in the paragraph.

**Figure 2.9**



Notice the line break after the first sentence



## Hands-On Practice 2.4

To create the web page shown in [Figure 2.9](#), launch a text editor. Select File > Open to edit the file located at chapter2/paragraph.html in the student files. Modify the text contained between the title tags to be “Line Break Example”. Place your cursor after the first sentence in the paragraph (after “This is a sample paragraph.”). Press the Enter key. Save your file. Test your page in a browser, and notice that even though your source code showed the “This is a sample paragraph.” sentence on its own line, the browser did not render it that way. A line break tag is needed to configure the browser to display the second sentence on a new line. Edit the file in a text editor, and add a `<br>` tag after the first sentence in the paragraph, as shown in the following code snippet:

```
<body>
<h1>Heading Level 1</h1>
<p>This is a sample paragraph. <br> Heading tags can help to make
</p>
<h2>Heading Level 2</h2>
<h3>Heading Level 3</h3>
<h4>Heading Level 4</h4>
<h5>Heading Level 5</h5>
<h6>Heading Level 6</h6>
</body>
```

Save your file as linebreak.html. Launch a browser to test your page. It should look similar to the page shown in [Figure 2.9](#). You can compare your work with the solution found in the student files (chapter2/linebreak.html).



## FAQ

1. Why does my web page still look the same?

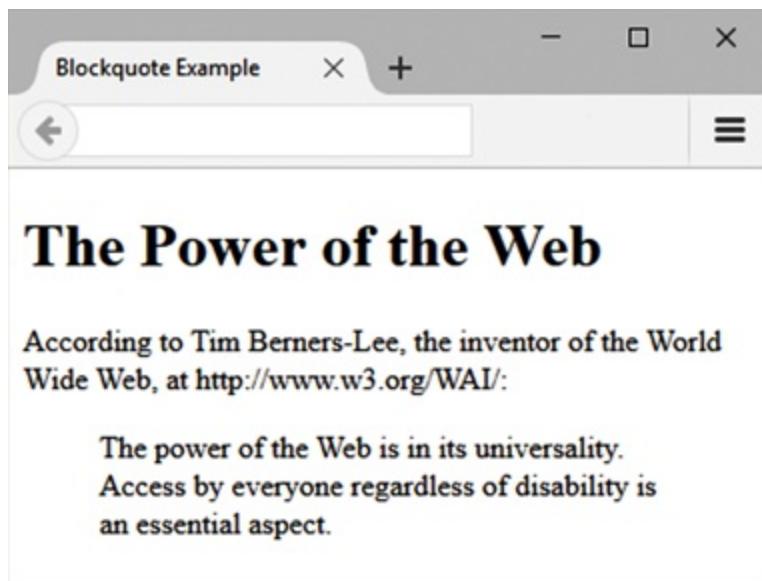
Often, students make changes to a web page document, but get frustrated because their browser shows an older version of the page. The following troubleshooting tips are helpful when you know you modified your web page, but the changes do not show up in the browser:

1. Make sure you save your page after you make the changes.
2. Verify the location that you are saving your page to—a specific folder on the hard drive or removable storage.
3. Verify the location that your browser is requesting the page from—a specific folder on the hard drive or removable storage.
4. Be sure to click the Refresh or Reload button in your browser.

## 2.10 Blockquote Element

In addition to organizing text in paragraphs and headings, sometimes you need to add a quotation to a web page. The `<blockquote>` element is used to display a block of quoted text in a special way—indented from both the left and right margins. A block of indented text begins with a `<blockquote>` tag and ends with a `</blockquote>` tag. [Figure 2.10](#) shows a web page document with a heading, a paragraph, and a blockquote.

### Figure 2.10



The text within the `<blockquote>` element is indented

[Figure 2.10 Full Alternative Text](#)



## Hands-On Practice 2.5

To create the web page shown in [Figure 2.10](#), launch a text editor. Select File > Open to edit the template file located at chapter2/template.html in the student files. Modify the title element. Add a heading tag, a paragraph tag, and a blockquote tag to the body section as indicated by the following highlighted code:

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>Blockquote Example</title>
<meta charset="utf-8">
</head>
<body>
<h1>The Power of the Web</h1>
<p>According to Tim Berners-Lee, the inventor of the World Wide W
<blockquote>
The power of the Web is in its universality. Access by everyone r
</blockquote>
</body>
</html>
```

Save the document as blockquote.html on your hard drive or flash drive. Launch a browser to test your page. It should look similar to the page shown in [Figure 2.10](#). You can compare your work with the solution (chapter2/blockquote.html) found in the student files.

You have probably noticed how convenient the `<blockquote>` tag could be if you need to indent an area of text on a web page. You may have wondered whether it would be okay to use the `blockquote` element anytime you would like to indent text or whether the `blockquote` element is reserved only for long quotations. The semantically correct use of the `blockquote` element is only for displaying large blocks of quoted text within a web page. Why should you be concerned about semantics? Consider the future of the Semantic Web, described in *Scientific American* (<http://www.scientificamerican.com/article.cfm?id=the-semantic-web>) as “A

new form of Web content that is meaningful to computers [that] will unleash a revolution of new possibilities.” Using HTML in a semantic, structural manner is one step toward the Semantic Web. So, avoid using a blockquote element just to indent text. You will learn modern techniques to configure margins and padding on elements later in this book.

## 2.11 Phrase Elements

Phrase elements indicate the context and meaning of the text between the container tags. It is up to each browser to interpret that style. Phrase elements are displayed right in line with the text (referred to as inline display) and can apply to a section of text or even just a single character of text. For example, the `<strong>` element indicates that the text associated with it has strong importance and should be displayed in a “strong” manner in relation to normal text on the page. [Table 2.1](#) lists common phrase elements and examples of their use. Notice that some tags, such as `<cite>` and `<dfn>`, result in the same type of display (italics) as the `<em>` tag in popular browsers. These tags semantically describe the text as a citation or definition, but the physical display is usually italics in both cases.

### Table 2.1 Phrase elements

Element	Example	Usage
<code>&lt;abbr&gt;</code>	WIPO	Identifies text as an abbreviation; configure the title attribute with the full name
<code>&lt;b&gt;</code>	<b>bold</b> text	Text that has no extra importance, but is styled in bold font by usage and convention
<code>&lt;cite&gt;</code>	<i>cite</i> text	Identifies a citation or reference; usually displayed in italics
<code>&lt;code&gt;</code>	code text	Identifies program code samples; usually a

		fixed-space font
<dfn>	<i>dfn</i> text	Identifies a definition of a word or term; usually displayed in italics
<em>	<i>emphasized</i> text	Causes text to be emphasized in relation to other text; usually displayed in italics
<i>	<i>italicized</i> text	Text that has no extra importance, but is styled in italics by usage and convention
<kbd>	<code>kbd</code> text	Identifies user text to be typed; usually a fixed-space font
<mark>	<code>mark</code> text	Text that is highlighted in order to be easily referenced
<samp>	<code>samp</code> text	Shows program sample output; usually a fixed-space font
<small>	<code>small</code> text	Legal disclaimers and notices (“fine print”) displayed in small font size
<strong>	<b>strong</b> text	Strong importance; causes text to stand out from surrounding text; usually displayed in bold
<sub>	<code>sub</code> text	Displays a subscript as small text below the baseline

<code>&lt;sup&gt;</code>	<code>sup</code> text	Displays a superscript as small text above the baseline
<code>&lt;var&gt;</code>	<code>var</code> text	Identifies and displays a variable or program output; usually displayed in italics

Each phrase element is a container element, so an opening and a closing tag must be used. As shown in [Table 2.1](#), the `<strong>` element indicates that the text associated with it has “strong” importance. Usually, the browser (or other user agent) will display `<strong>` text in bold font type. A screen reader, such as JAWS or Window-Eyes, might interpret `<strong>` text to indicate that the text should be more strongly spoken. In the following line, the phone number is displayed with strong importance:

Call for a free quote for your web development needs: **888.555.55**

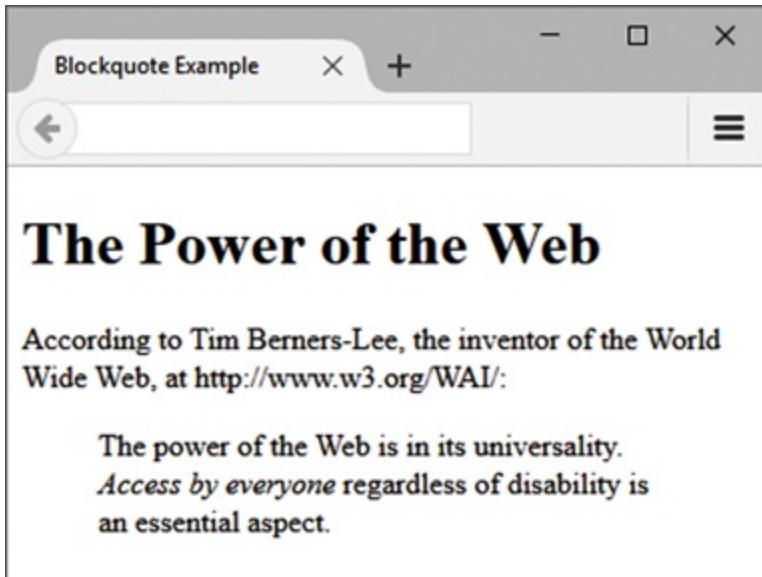
The corresponding code is:

```
<p>Call for a free quote for your web development needs:  
<strong>888.555.5555</strong></p>
```

Notice that the opening `<strong>` and closing `</strong>` tags are contained within the paragraph tags (`<p>` and `</p>`). This code is properly nested and is considered to be well formed. When improperly nested, the `<p>` and `<strong>` tag pairs overlap each other instead of being nested within each other. Improperly nested code will not pass validation testing (see [Section 2.18](#), “HTML Validation”) and may cause display issues.

[Figure 2.11](#) shows a web page document (also found in the student files at chapter2/em.html) that uses the `<em>` tag to display the emphasized phrase “Access by everyone” in italics.

## Figure 2.11



The `<em>` tag in action

The code snippet is

```
<blockquote>
The power of the Web is in its universality.
<em>Access by everyone</em>
regardless of disability is an essential aspect.
</blockquote>
```

## 2.12 Ordered List

Lists are used on web pages to organize information. When writing for the Web, headings, short paragraphs, and lists can make your page more clear and easy to read. HTML can be used to create three types of lists—description lists, ordered lists, and unordered lists. All lists are rendered as block display with an empty space above and below. This section focuses on the ordered list, which displays a numbering or lettering system to itemize the information contained in the list. Ordered lists can be organized by the use of numerals (the default), uppercase letters, lowercase letters, uppercase Roman numerals, and lowercase Roman numerals. See [Figure 2.12](#) for a sample ordered list.

**Figure 2.12**



Sample ordered list

Ordered lists begin with an `<ol>` tag and end with an `</ol>` tag. Each list item begins with an `<li>` tag and ends with an `</li>` tag. The code to configure the heading and ordered list shown in [Figure 2.12](#) follows:

```
<h1>My Favorite Colors</h1>
<ol>
    <li>Blue</li>
    <li>Teal</li>
```

```
<li>Red</li>  
</ol>
```

# The Type, Start, and Reversed Attributes

The **type** attribute configures the symbol used for ordering the list. For example, to create an ordered list organized by uppercase letters, use `<ol type="A">`. [Table 2.2](#) documents the type attribute and its values for ordered lists.

## Table 2.2 The type attribute for ordered lists

Value	Symbol
1	Numerals (the default)
A	Uppercase letters
a	Lowercase letters
I	Roman numerals
i	Lowercase Roman numerals

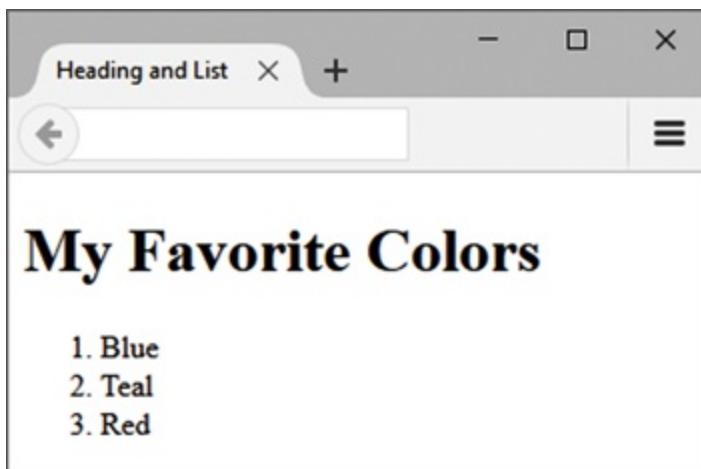
The **start attribute** is useful when you need a list to begin with an integer value other than 1 (for example, `start="10"`). Use the new HTML5 **reversed attribute** (set `reversed="reversed"`) to configure the list markers to display in descending order.



## Hands-On Practice 2.6

In this Hands-On Practice, you will use a heading and an ordered list on the same page. To create the web page shown in [Figure 2.13](#), launch a text editor. Select File > Open to edit the template file located at chapter2/template.html in the student files. Modify the title element and add h1, ol, and li elements to the body section as indicated by the following highlighted code:

**Figure 2.13**



An ordered list

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>Heading and List</title>
```

```
<meta charset="utf-8">
</head>
<body>
<h1>My Favorite Colors</h1>
<ol>
    <li>Blue</li>
    <li>Teal</li>
    <li>Red</li>
</ol>
</body>
</html>
```

Save your file as ol.html. Launch a browser and test your page. It should look similar to the page shown in [Figure 2.13](#). You can compare your work with the solution in the student files (chapter2/ol.html).

Take a few minutes to experiment with the type attribute. Configure the ordered list to use uppercase letters instead of numerals. Save your file as ola.html. Test your page in a browser. You can compare your work with the solution in the student files (chapter2/ola.html).

## 2.13 Unordered List

An unordered list displays a bullet, or list marker, before each entry in the list. This bullet can be one of several types: disc (the default), square, and circle. See [Figure 2.14](#) for a sample unordered list.

**Figure 2.14**



Sample unordered list

Unordered lists begin with a `<ul>` tag and end with a `</ul>` tag. Each list item begins with an `<li>` tag and ends with an `</li>` tag. The code to configure the heading and unordered list shown in [Figure 2.14](#) is

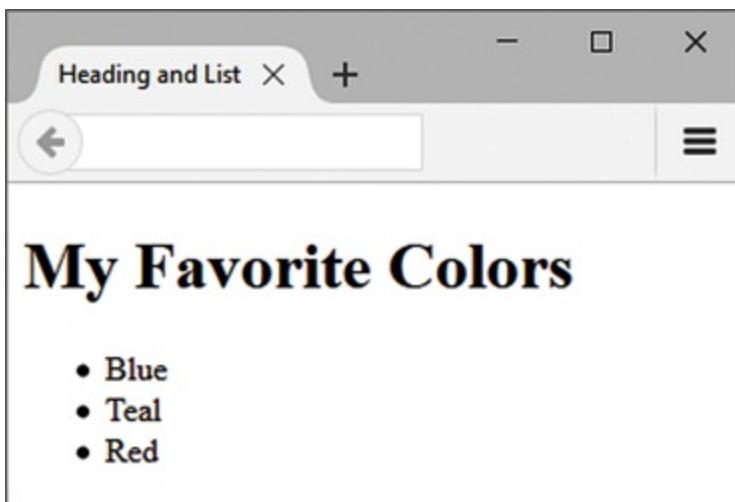
```
<h1>My Favorite Colors</h1>
<ul>
    <li>Blue</li>
    <li>Teal</li>
    <li>Red</li>
</ul>
```



**Hands-On Practice 2.7**

In this Hands-On Practice, you will use a heading and an unordered list on the same page. To create the web page shown in [Figure 2.15](#), launch a text editor. Select File > Open to edit the template file located at chapter2/template.html in the student files. Modify the title element and add h1, ul, and li tags to the body section as indicated by the following highlighted code:

## Figure 2.15



An unordered list

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>Heading and List</title>
<meta charset="utf-8">
</head>
<body>
<h1>My Favorite Colors</h1>
<ul>
    <li>Blue</li>
    <li>Teal</li>
    <li>Red</li>
</ul>
</body>
</html>
```

Save your file as ul.html. Launch a browser and test your page. It should look similar to the page shown in [Figure 2.15](#). You can compare your work with the solution in the student files (chapter2/ul.html).



## FAQ

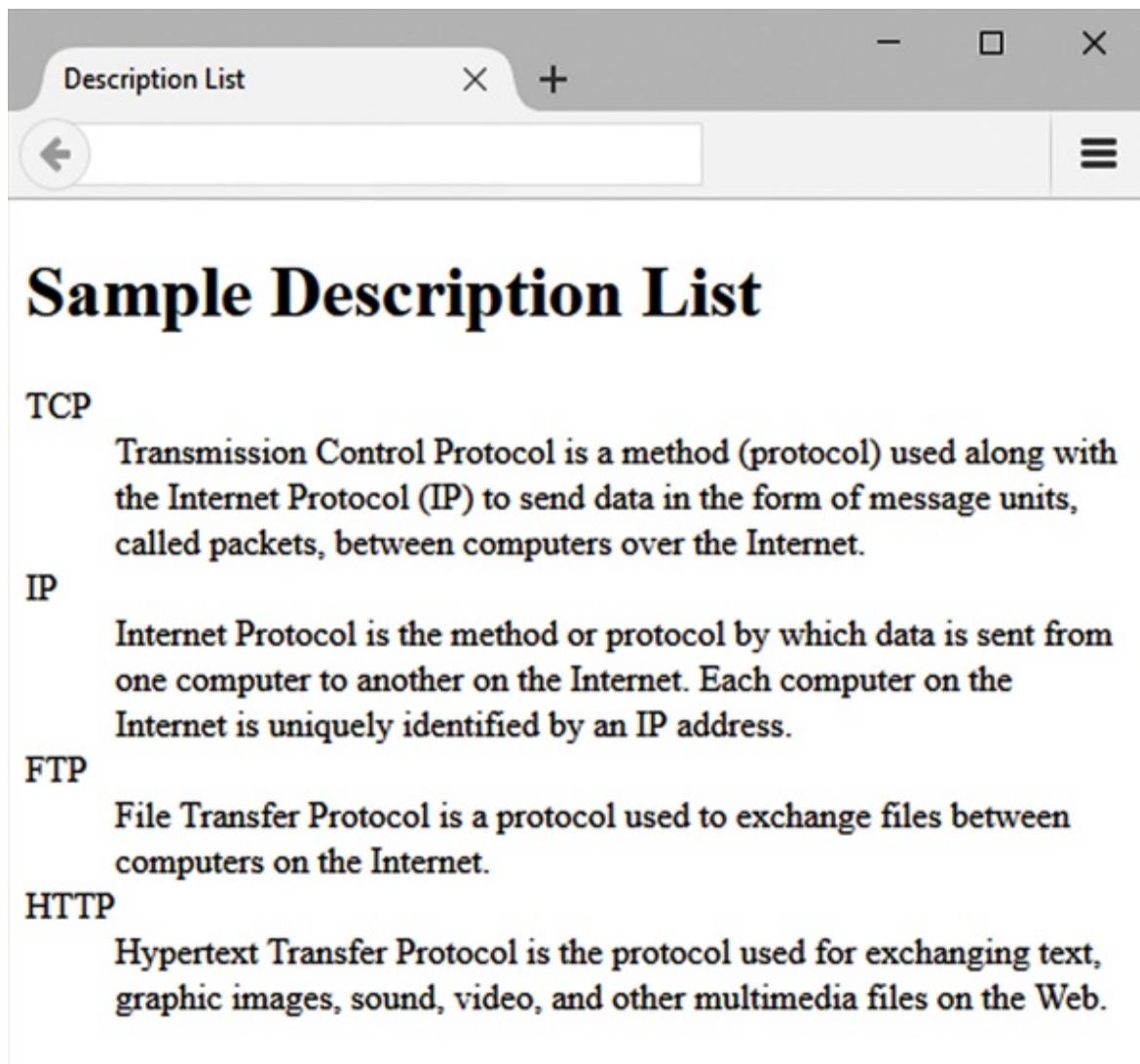
1. Can I change the "bullet" in an unordered list?

Back in the day before HTML5, the type attribute could be included with a <ul> tag to change the default list marker to a square (type="square") or open circle (type="circle"). However, be aware that using the type attribute on an unordered list is considered obsolete in HTML5 because it is decorative and does not convey meaning. No worries, though—you'll learn techniques to configure list markers (bullets) in [Chapter6](#) to display images and shapes.

## 2.14 Description List

HTML5 introduces a new element name, description list, to replace the definition list element (used in XHTML and earlier versions of HTML). A description list is useful for organizing terms and their descriptions. The terms stand out, and their descriptions can be as long as needed to convey your message. Each term begins on its own line at the margin. Each description begins on its own line and is indented. Description lists are also handy for organizing Frequently Asked Questions (FAQs) and their answers. The questions and answers are offset with indentation. Any type of information that consists of a number of corresponding terms and longer descriptions is well suited to being organized in a description list. See [Figure 2.16](#) for an example of a web page that uses a description list.

### Figure 2.16



A description list

[Figure 2.16 Full Alternative Text](#)

Description lists begin with the `<dl>` tag and end with the `</dl>` tag. Each term or name in the list begins with the `<dt>` tag and ends with the `</dt>` tag. Each description begins with the `<dd>` tag and ends with the `</dd>` tag.



## Hands-On Practice 2.8

In this Hands-On Practice, you will use a heading and a description list on the same page. To create the web page shown in [Figure 2.16](#), launch a text editor. Select File > Open to edit the template file located at chapter2/template.html in the student files. Modify the title element and add h1, dl, dd, and dt tags to the body section as indicated by the following highlighted code:

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>Description List</title>
<meta charset="utf-8">
</head>
<body>
<h1>Sample Description List</h1>
<dl>
    <dt>TCP</dt>
        <dd>Transmission Control Protocol is a method (protocol)
    <dt>IP</dt>
        <dd>Internet Protocol is the method or protocol by which
    <dt>FTP</dt>
        <dd>File Transfer Protocol is a protocol used to exchange
    <dt>HTTP</dt>
        <dd>Hypertext Transfer Protocol is the protocol used for e
</dl>
</body>
</html>
```

Save your file as description.html. Launch a browser and test your page. It should look similar to the page shown in [Figure 2.16](#). Don't worry if the word wrap is a little different; the important formatting is that each `<dt>` term should be on its own line and the corresponding `<dd>` description should be indented under it. Try resizing your browser window, and notice how the word wrap on the description text changes. You can compare your work with the solution in the student files (chapter2/description.html).



## FAQ

1. Why is the HTML code in the Hands-On Practice examples indented?

Actually, it doesn't matter to the browser if web page code is indented, but humans find it easier to read and maintain code when it is logically indented. Review the description list created in [Hands-On Practice2.8](#). Notice how the `<dt>` and `<dd>` tags were indented. This makes it easier for you or another web developer to understand the source code in the future. There is no rule as to how many spaces to indent, although your instructor or the organization you work for may have a standard. Consistent indentation helps to create more easily maintainable web pages.



## Checkpoint 2.2

1. Describe the features of a heading element and how it configures the text.
2. Describe the difference between ordered lists and unordered lists.
3. Describe the purpose of the blockquote element.

## 2.15 Special Characters

In order to use special symbols such as quotation marks, the greater-than sign (>), the less-than sign (<), and the copyright symbol (©) in your web page document, you need to use special characters, sometimes called **entity characters**. For example, if you wanted to include a copyright line on your page as follows:

© Copyright 2018 My Company. All rights reserved.

Use the special character code &copy; to display the copyright symbol, as shown in the following code:

&copy; Copyright 2018 My Company. All rights reserved.

Another useful special character code is &nbsp;, which stands for nonbreaking space. You may have noticed that web browsers treat multiple spaces as a single space. If you need a small number of spaces in your text, you may use &nbsp; multiple times to indicate multiple blank spaces. This practice is acceptable if you simply need to tweak the position of an element a little. However, if you find that your web pages contain many &nbsp; special characters in a row, you should use a different method, such as configuring the padding or margin with Cascading Style Sheets (see [Chapters 4](#) and [6](#)). [Table 2.3](#) and [Appendix B](#), “Special Entity Characters,” provide descriptions of special characters and their corresponding code.

### Table 2.3 Common special characters

Character	Entity Name	Code
-----------	-------------	------

“	Quotation mark	&quot;
,	Apostrophe	&#39;
©	Copyright symbol	&copy;
&	Ampersand	&amp;
	Empty space	Nonbreaking space &nbsp;
—	Long dash	&mdash;
	Vertical Bar	&#124;



## Hands-On Practice 2.9

[Figure 2.17](#) shows the web page you will create in this Hands-On Practice. Launch a text editor. Select File > Open to edit the template file located at chapter2/template.html in the student files. Save your file as design.html. Modify the title of the web page by changing the text between the `<title>` and `</title>` tags to “Web Design Steps.”

## Figure 2.17

The screenshot shows a web browser window with a title bar labeled "Web Design Steps". The main content area displays a heading "Web Design Steps" followed by a bulleted list of four items. Each item has a descriptive paragraph. At the bottom of the page, there is a copyright notice.

- **Determine the Intended Audience**  
The colors, images, fonts, and layout should be tailored to the *preferences of your audience*. The type of site content (reading level, amount of animation, etc.) should be appropriate for your chosen audience.
- **Determine the Goals of the Site**  
Some common goals of web sites are: to be informative, to create a personal home page, to establish a corporate web presence, and to do business in e-commerce.
- **Determine the General Content and Create a Site Map**  
The site map is sometimes called a Storyboard. Common organizational structures for Web sites are: hierarchical, linear, and random.
- **Sketch a Tentative Page Layout**  
*Be consistent* in your overall layout — color, typefaces, logo location, navigation bar, etc. Plan your Home Page Layout to avoid scrolling. Plan your Content Page Layout to be consistent, with easy navigation.

Copyright © 2018 Your name. All Rights Reserved.

The design.html web page

### Figure 2.17 Full Alternative Text

The sample page shown in [Figure 2.17](#) contains a heading, an unordered list, and copyright information. Configure the heading “Web Design Steps” as a level 1 heading (`<h1>`) as follows:

```
<h1>Web Design Steps</h1>
```

Now create the unordered list. The first line of each bulleted item is the title of the web design step, which should be strong or stand out from the rest of the text. The code for the beginning of the unordered list is as follows:

```
<ul>
  <li><strong>Determine the Intended Audience</strong><br>
    The colors, images, fonts, and layout should be tailored to the
    <em>preferences of your audience.</em> The type of site content (
```

Now code the entire unordered list in your design.html file. Remember to code the closing `</ul>` tag at the end of the list. Don't worry if your text wraps a little differently; your screen resolution or browser window size may be different from what is displayed in [Figure 2.17](#).

Finally, configure the copyright information with the `small` element. Use the special character `&copy;` for the copyright symbol. The code for the copyright line is as follows:

```
<p><small>Copyright &copy; 2018 Your name. All Rights Reserved.
</small></p>
```

How did you do? Compare your work to the sample in the student files (chapter2/design.html).

## 2.16 Structural Elements

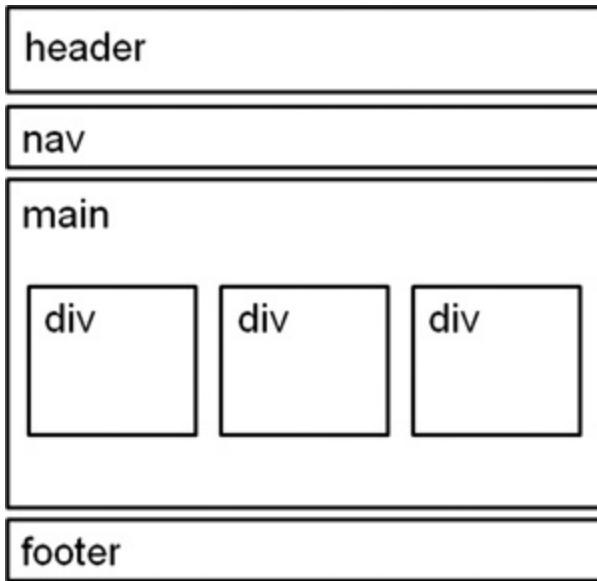
### Div Element

The div element has been used for many years to configure a generic structural area or “division” on a web page as a block display with empty space above and below. A div element begins with a `<div>` tag and ends with a `</div>` tag. Use a div element when you need to format an area of a web page that may contain other block display elements such as headings, paragraphs, unordered lists, and even other div elements. You’ll use Cascading Style Sheets (CSS) later in this book to style and configure the color, font, and layout of HTML elements.

## HTML5 Structural Elements

In addition to the generic div element, HTML5 introduces a number of semantic structural elements that can be used to configure specific areas on a web page. These new HTML5 elements are intended to be used in conjunction with div and other elements to structure web page documents in a more meaningful manner that indicates the purpose of each structural area. You’ll explore three of these new elements in this section: the header element, the nav element, and the footer element. [Figure 2.18](#) shows a diagram of a page (called a wireframe) that indicates how the structure of a web page could be configured with the header, nav, main, div, and footer elements.

### Figure 2.18



Structural elements

# Header Element

The purpose of the header element is to contain the headings of either a web page document or an area within the document such as a section or article (more on the section element and article element in [Chapter 6](#)). The header element begins with the `<header>` tag and ends with the `</header>` tag. The header element is block display and typically contains one or more heading level elements (h1 through h6).

# Nav Element

The purpose of the nav element is to contain a section of navigation links. The block display nav element begins with the `<nav>` tag and ends with the `</nav>` tag.

# Main Element

The purpose of the **main element** is to contain the main content of a web page document. There should be only one main element per web page. The block display main element begins with the `<main>` tag and ends with the `</main>` tag.

## Footer Element

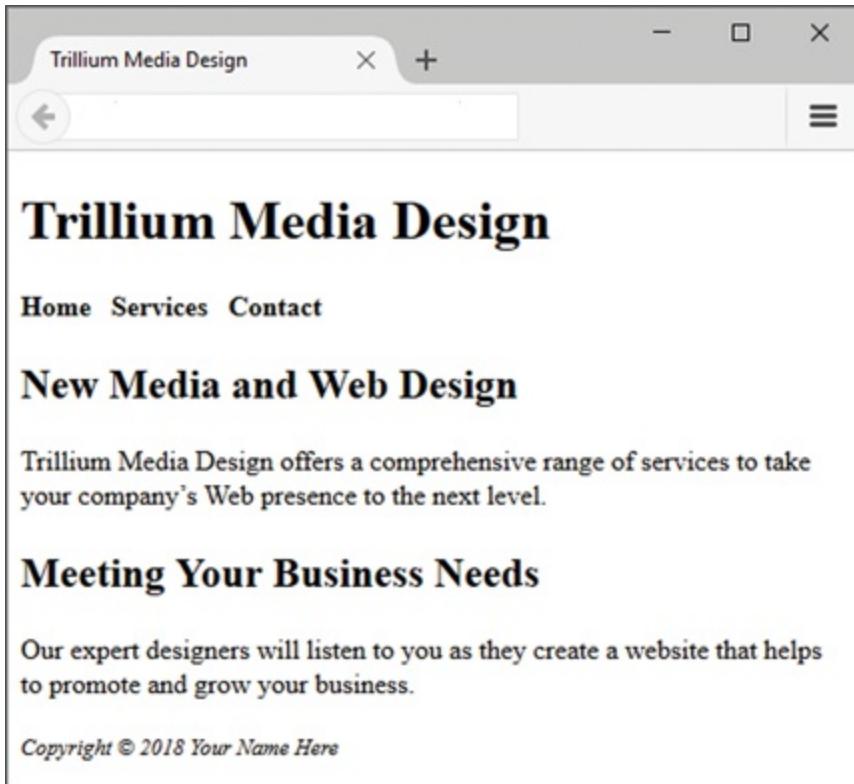
The purpose of the footer element is to contain the footer content of a web page or section of a web page. The block display footer element begins with the `<footer>` tag and ends with the `</footer>` tag.



## Hands-On Practice 2.10

In this Hands-On Practice you will use structural elements as you create the Trillium Media Design home page, shown in [Figure 2.19](#). Launch a text editor, and open the template.html file from the [chapter2](#) folder in the student files. Edit the code as follows:

## Figure 2.19



Trillium home page

Figure 2.19 Full Alternative Text

1. Modify the title of the web page by changing the text between the <title> and </title> tags to Trillium Media Design.
2. Position your cursor in the body section and code the header element with the text, “Trillium Media Design” contained in an h1 element:

```
<header>
  <h1> Trillium Media Design</h1>
</header>
```

3. Code a nav element to contain text that will indicate the main navigation for the website. Configure bold text (use the b element) and use the &nbsp; special character to add extra blank space:

```
<nav>
  <b>Home &nbsp; Services &nbsp; Contact</b>
</nav>
```

4. Code a main element that contains the h2 and paragraph elements:

```
<main>
  <h2>New Media and Web Design</h2>
  <p>Trillium Media Design offers a comprehensive range of se
  <h2>Meeting Your Business Needs</h2>
  <p>Our expert designers will listen to you as they create a
</main>
```

5. Configure the footer element to contain a copyright notice displayed in small font size (use the small element) and italic font (use the i element). Be careful to properly nest the elements as shown here:

```
<footer>
  <small><i>Copyright &copy; 2018 Your Name Here</i></small>
</footer>
```

Save your page as structure.html. Test your page in a browser. It should look similar to [Figure 2.19](#). You can compare your work to the sample in the student files (chapter2/structure.html).

## Practice with Structural Elements

Coding HTML is a skill and skills are best learned by practice. You'll get more practice coding a web page using structural elements in this section.

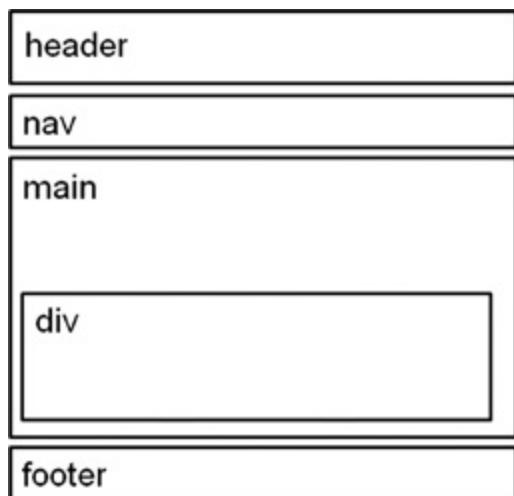


### Hands-On Practice 2.11

In this Hands-On Practice you will use the wireframe shown in [Figure 2.20](#) as

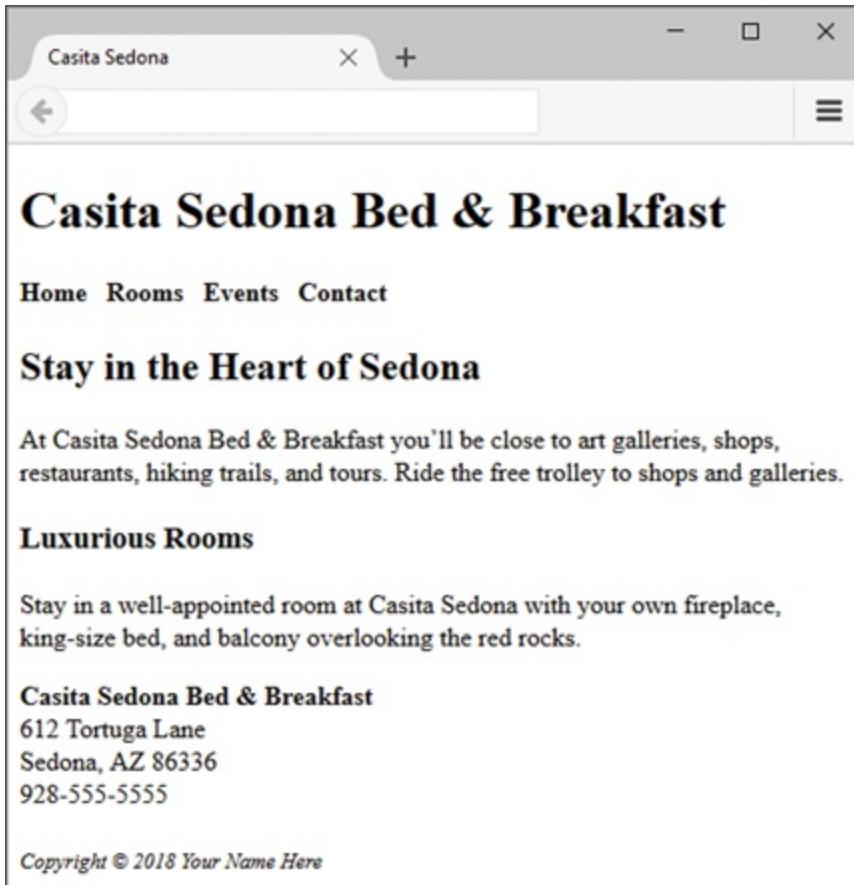
a guide as you create the Casita Sedona Bed & Breakfast web page, shown in [Figure 2.21](#).

## Figure 2.20



Wireframe for Casita Sedona

## Figure 2.21



Casita Sedona web page

### Figure 2.21 Full Alternative Text

Launch a text editor, and open the template.html file from the [chapter2](#) folder in the student files. Edit the code as follows:

1. Modify the title of the web page by changing the text between the `<title>` and `</title>` tags to Casita Sedona.
2. Position your cursor in the body section and code the header element with the text, “Casita Sedona Bed & Breakfast” contained in an `h1` element. Be sure to use the special character & for the ampersand.

```
<header>
  <h1>
```

```
Casita Sedona Bed & Breakfast  
</h1>  
</header>
```

3. Code a nav element to contain text that will indicate the main navigation for the website. Configure bold text (use the b element) and use the &nbsps; special character to add extra blank space:

```
<nav>  
  <b>  
    Home &nbsps;  
    Rooms &nbsps;  
    Events &nbsps;  
    Contact  
  </b>  
</nav>
```

4. Code the content within a main element. Start with the h2 and paragraph elements:

```
<main>  
  <h2>Stay in the Heart of Sedona</h2>  
    <p>At Casita Sedona Bed & Breakfast you'll be close  
      <h3>Luxurious Rooms</h3>  
      <p>Stay in a well-appointed room at Casita Sedona with your  
</main>
```

5. Configure the company name, address, and phone number within a div element. Code the div element *within* the main element before the closing main tag. Use line break tags to display the name, address, and phone information on separate lines and to create extra empty space before the footer.

```
<div>  
  <strong>Casita Sedona Bed & Breakfast</strong><br>  
  612 Tortuga Lane<br>  
  Sedona, AZ 86336<br>  
  928-555-5555<br><br>  
</div>
```

6. Configure the footer element to contain a copyright notice displayed in

small font size (use the small element) and italic font (use the i element). Be careful to properly nest the elements as shown here:

```
<footer>
  <small><i>Copyright © 2018 Your Name Here</i></small>
</footer>
```

Save your page as casita.html. Test your page in a browser. It should look similar to [Figure 2.21](#). You can compare your work to the sample in the student files (chapter2/casita.html). Older browsers (such as Internet Explorer 8 and earlier) do not support the new HTML5 structural elements. In [Chapter 6](#), we'll explore coding techniques that will force older browsers to correctly display HTML5 structural elements. For now, be sure to use a current version of any popular browser to test your pages.



## FAQ

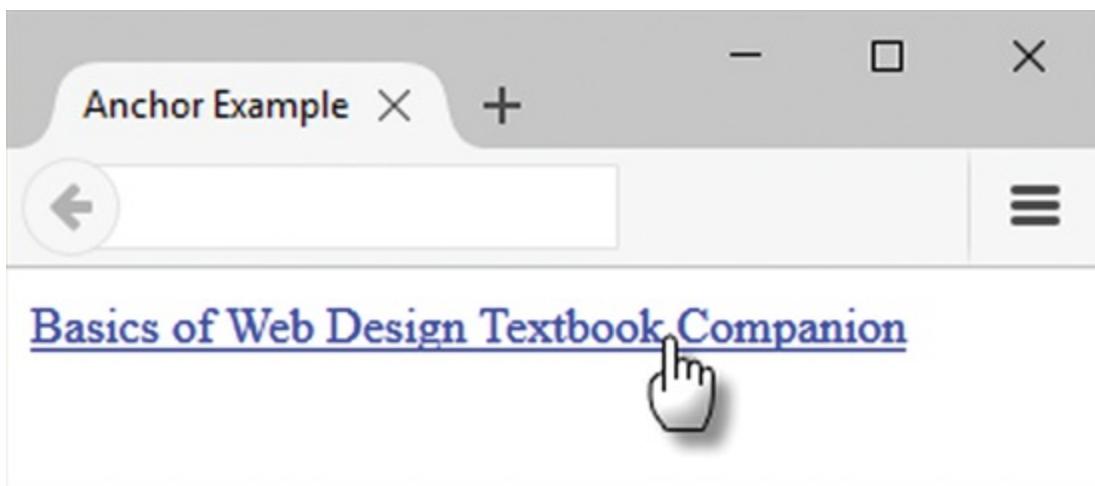
1. Are there other new structural elements in HTML5 that configure areas on web pages?

Yes, one of the characteristics of HTML5 is an emphasis on semantics. While the div element is useful, it is also quite generic. HTML5 offers a variety of special-purpose structural elements, including section, article, header, nav, main, aside, and footer. You'll explore the section, article, and aside elements in [Chapter 7](#).

## 2.17 Anchor Element

Use the anchor element to specify a hyperlink, often referred to as a *link*, to another web page or file that you want to display. Each anchor element begins with an `<a>` tag and ends with a `</a>` tag. The opening and closing anchor tags surround the text to click to perform the hyperlink. Use the `href` attribute to configure the hyperlink reference, which identifies the name and location of the file to access. [Figure 2.22](#) shows a web page document with an anchor tag that configures a hyperlink to this book's website, `http://webdevfoundations.net`.

### Figure 2.22



Sample hyperlink

The code for the anchor tag in [Figure 2.22](#) is as follows:

```
<a href="http://webdevfoundations.net">Web Development & Desi
```

Notice that the `href` value is the URL for the website. The text that is typed between the two anchor tags displays on the web page as a hyperlink and is underlined by most browsers. When you move the mouse cursor over a

hyperlink, the cursor changes to a pointing hand, as shown in [Figure 2.22](#).



## Hands-On Practice 2.12

To create the web page shown in [Figure 2.22](#), launch a text editor. Select File > Open to edit the template file located at chapter2/template.html in the student files. Modify the title element and add anchor tags to the body section as indicated by the following highlighted code:

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>Anchor Example</title>
<meta charset="utf-8">
</head>
<body>
<a href="http://webdevfoundations.net">Web Development & Desi
</body>
</html>
```

Save the document as anchor.html on your hard drive or flash drive. Launch a browser to test your page. It should look similar to the page shown in [Figure 2.22](#). You can compare your work with the solution found in the student files (chapter2/anchor.html).



## FAQ

1. Can images be hyperlinks?

Yes. Although we'll concentrate on text hyperlinks in this chapter, it's also possible to configure an image as a hyperlink. You'll get practice

with image links in [Chapter4](#).

## Absolute Hyperlinks

An absolute hyperlink indicates the absolute location of a resource on the Web. Use absolute hyperlinks when you need to link to resources on other websites. The href value for an absolute hyperlink to the home page of a website includes the `http://` protocol and the domain name. The following hyperlink is an absolute hyperlink to the home page of this book's website:

```
<a href="http://webdevfoundations.net">Web Development & Desi
```

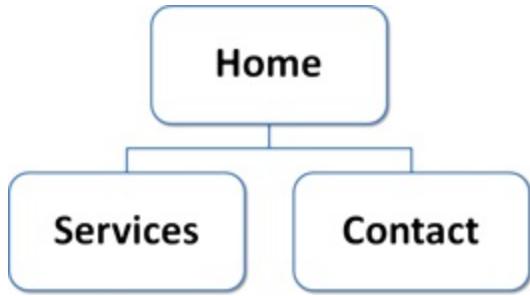
Note that if we want to access a web page other than the home page on the book's website, we could also include a specific folder name and file name. For example, the following anchor tag configures an absolute hyperlink for a file named chapter1.html located in a folder named 9e on this book's website:

```
<a href="http://webdevfoundations.net/9e/chapter1.html">Web Devel
```

## Relative Hyperlinks

When you need to link to web pages within your site, use a relative hyperlink. The href value for a relative hyperlink does not begin with the `http://` and does not include a domain name. For a relative hyperlink, the href value will contain only the file name or file name and folder of the web page you want to display. The hyperlink location is relative to the page currently being displayed. For example, if you were coding a home page (`index.html`) for the website whose site map is illustrated in [Figure 2.23](#) and wanted to link to a page named `contact.html` located in the same folder as `index.html`, you would use the following code sample:

## Figure 2.23



Site map

```
<a href="contact.html">Contact Us</a>
```

## Site Map

A site map represents the structure, or organization, of pages in a website in a visual manner. Each page in the website is represented by a box on the site map. [Figure 2.23](#) displays the site map for a website that contains a Home page and two content pages: a Services page and a Contact page. Review [Figure 2.23](#) and notice that the Home page is at the top of the site map. The second level in a site map shows the other main pages of the website. In this very small three-page website, the other two pages (Services and Contact) are included on the second level. The main navigation of a website usually includes hyperlinks to the pages shown on the first two levels of the site map.



## Hands-On Practice 2.13

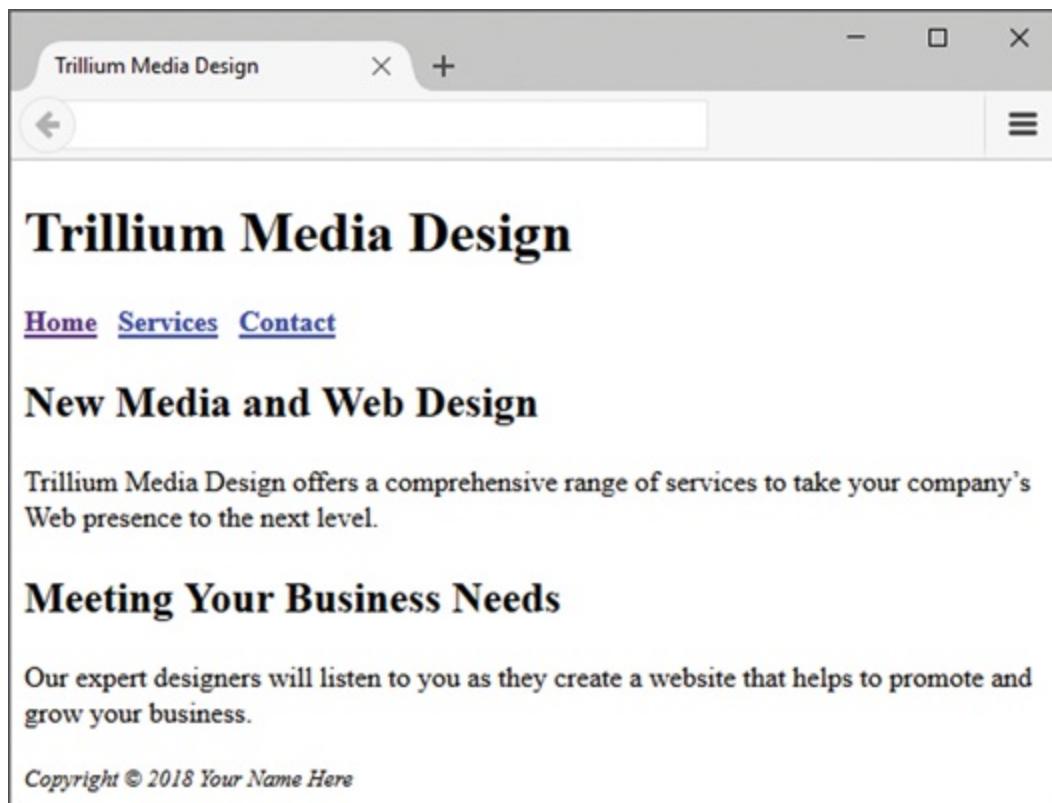
The best way to learn how to code web pages is by actually doing it! Let's practice and create three pages in the website shown in [Figure 2.23](#): home page (index.html) with two content pages: services page (services.html) and contact page (contact.html).

1. **Create a Folder.** If you had printed papers to organize you would

probably store them in a paper folder. Web designers store and organize their computer files by creating a folder on a hard drive (or portable storage such as an SD card or Flash drive) for each website. This helps them to be efficient as they work with many different websites. You will organize your own web design work by creating a new folder for each website and storing your files for that website in the new folder. Use your operating system to create a new folder named mypractice for your new website.

2. **Create the Home Page.** Use the Trillium Media Design web page ([Figure 2.19](#)) from [Hands-On Practice 2.10](#) as a starting point for your new home page (shown in [Figure 2.24](#)). Copy the sample file for [Hands-On Practice 2.10](#) (chapter2/structure.html) into your mypractice folder. Change the file name of structure.html to index.html. It's common practice to use the file name index.html for the home page of a website.

## Figure 2.24



New index.html web page

Launch a text editor, and open the index.html file.

1. The navigation hyperlinks will be located within the nav element. You will edit the code within the nav element to configure three hyperlinks:
  - The text “Home” will hyperlink to index.html
  - The text “Services” will hyperlink to services.html
  - The text “Contact” will hyperlink to contact.html

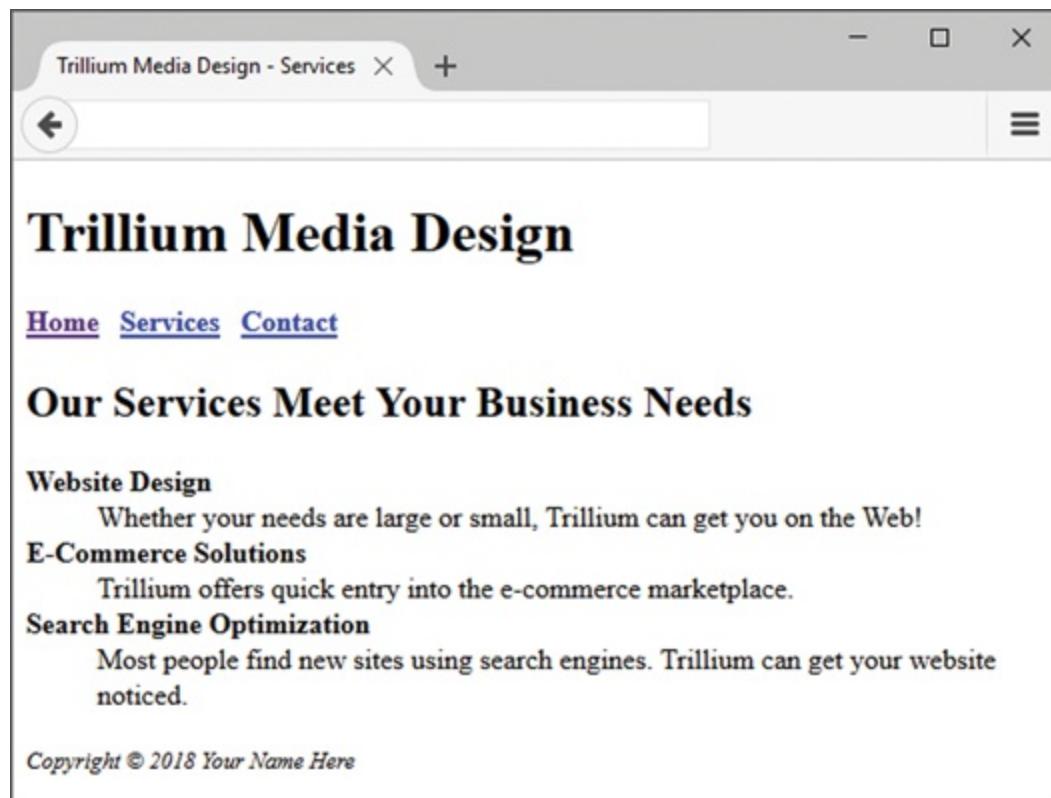
Modify the code within the nav element as follows:

```
<nav>
    <b><a href="index.html">Home</a> &nbsp;
        <a href="services.html">Services</a> &nbsp;
```

```
        <a href="contact.html">Contact</a>
    </b>
</nav>
```

2. Save the index.html file in your mypractice folder. Test your page in a browser. It should look similar to [Figure 2.24](#). You can compare your work to the sample in the student files (chapter2/2.13/index.html).
3. **Create the Services Page.** It is common practice to create a new web page based on an existing page. You will use the index.html file as a starting point for the new services page, shown in [Figure 2.25](#).

## Figure 2.25



The services.html web page

## Figure 2.25 Full Alternative Text

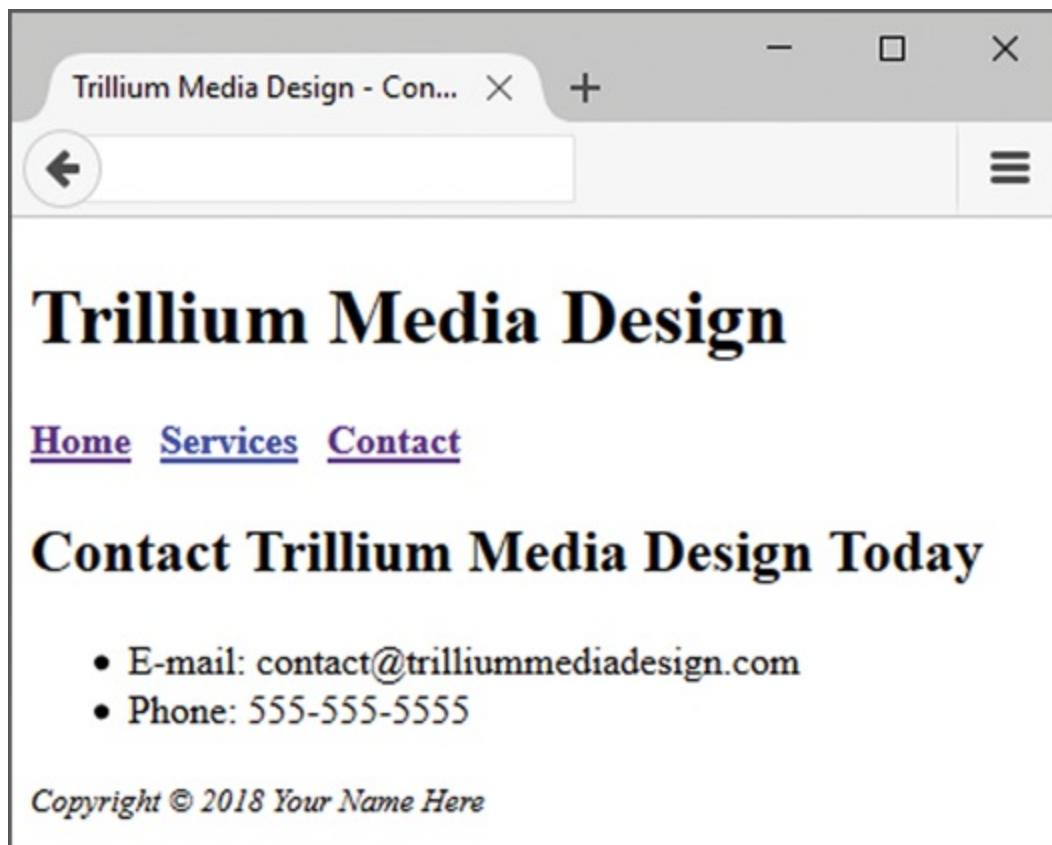
Open your index.html file in a text editor and save the file as services.html. Edit the code as follows:

1. Modify the title of the web page by changing the text between the <title> and </ title> tags to “Trillium Media Design - Services”. In order to create a consistent header, navigation, and footer for the web pages in this website, do not change the code within the header, nav, or footer elements.
2. Position your cursor in the body section and delete the code and text between the opening and closing main tags. Code the main page content (heading 2 and description list) for the services page between the main tags as follows:

```
<h2>Our Services Meet Your Business Needs</h2>
<dl>
    <dt><strong>Website Design</strong></dt>
        <dd>Whether your needs are large or small, Trillium
    <dt><strong>E-Commerce Solutions</strong></dt>
        <dd>Trillium offers quick entry into the e-commerce
    <dt><strong>Search Engine Optimization</strong></dt>
        <dd>Most people find new sites using search engines
            Trillium can get your website noticed.</dd>
</dl>
```

3. Save the services.html file in your mypractice folder. Test your page in a browser. It should look similar to [Figure 2.25](#). You can compare your work to the sample in the student files (chapter2/2.13/services.html).
4. **Create the Contact Page.** Use the index.html file as a starting point for the new Contact page, shown in [Figure 2.26](#). Open your index.html file in a text editor and save the file as contact.html. Edit the code as follows:

## Figure 2.26



The contact.html web page

Figure 2.26 Full Alternative Text

1. Modify the title of the web page by changing the text between the `<title>` and `</ title>` tags to “Trillium Media Design – Contact”. In order to create a consistent header, navigation, and footer for the web pages in this website, do not change the code within the header, nav, or footer elements.
2. Position your cursor in the body section and delete the code and text contained between the opening main tag and the closing main tag. Code the main page content for the contact page between the main tags:

```
<h2>Contact Trillium Media Design Today</h2>
<ul>
```

```
<li>E-mail: contact@trilliummediadesign.com</li>
<li>Phone: 555-555-5555</li>
</ul>
```

3. Save the contact.html file in your mypractice folder. Test your page in a browser. It should look similar to [Figure 2.26](#). Test your page by clicking each link. When you click the “Home” hyperlink, the index.html page should display. When you click the “Services” hyperlink, the services.html page should display. When you click the “Contact” hyperlink, the contact.html page will display. You can compare your work to the sample in the student files (chapter2/2.13/contact.html).



## FAQ

1. What if my relative hyperlink doesn’t work?

Check the following:

- Did you save files in the specified folder?
- Did you save the files with the names as requested? Use Windows File Explorer or Finder (Mac users) to verify the actual names of the files you saved.
- Did you type the file names correctly in the anchor tag’s href attribute? Check for typographical errors.
- When you place your mouse over a link, the file name of a relative link will display in the status bar in the lower edge of the browser window. Verify that this is the correct file name. On many operating systems, such as UNIX or Linux, the use of uppercase and lowercase letters in file names matters—make sure that the file name and the reference to it are in the same case. It’s a good practice to always use lowercase for file names used on the Web.

# E-Mail Hyperlinks

The anchor tag can also be used to create e-mail hyperlinks. An e-mail hyperlink will automatically launch the default mail program configured for the browser. It is similar to an external hyperlink with the following two exceptions:

- It uses `mailto:` instead of `http://`.
- It launches the default e-mail application for the visitor's browser with your e-mail address as the recipient.

For example, to create an e-mail hyperlink to the e-mail address `help@terrymorris.net`, code the following:

```
<a href="mailto:help@terrymorris.net">help@terrymorris.net</a>
```

It is good practice to place the e-mail address both on the web page and within the anchor tag. Not everyone has an e-mail program configured with his or her browser. By placing the e-mail address in both places, you increase usability for all of your visitors.



## Hands-On Practice 2.14

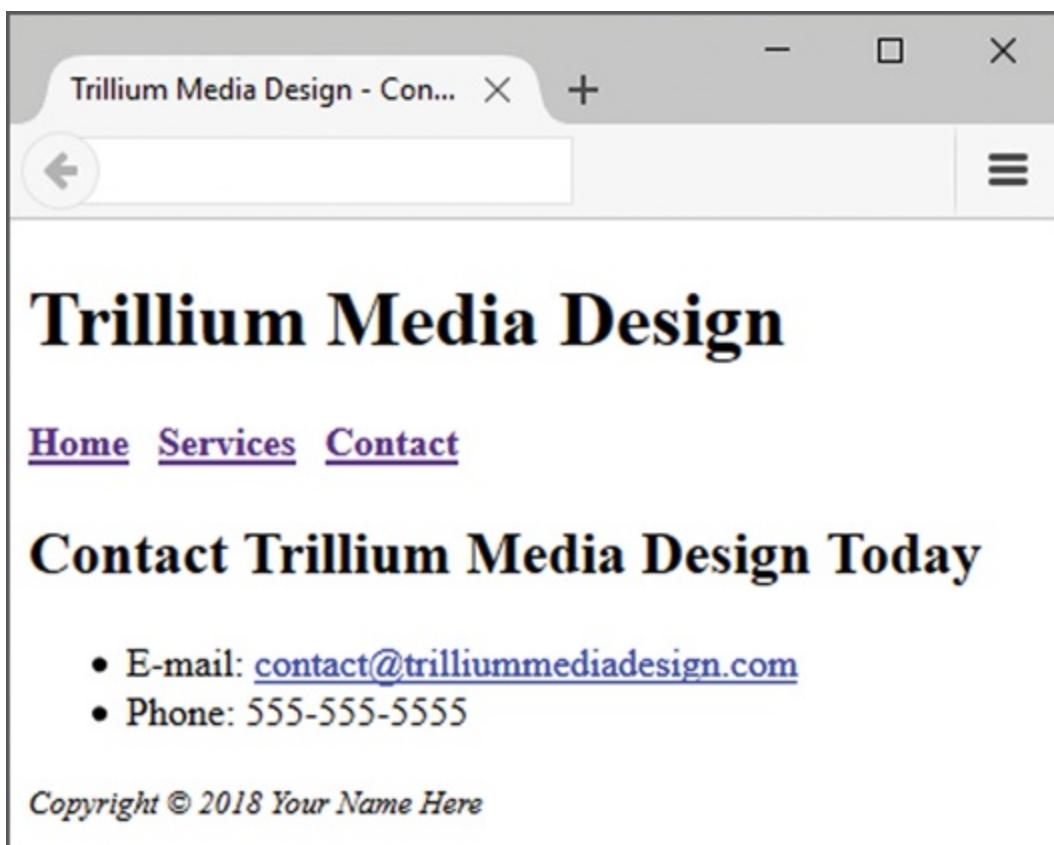
In this Hands-On Practice you will modify the contact page (`contact.html`) of the website you created in [Hands-On Practice 2.13](#) and configure an e-mail link in the page content area. Launch a text editor, and open the `contact.html` file from your `mypractice` folder. This example uses the `contact.html` file found in the student files in the `chapter2/2.13` folder.

Configure the e-mail address in the main content area as an e-mail hyperlink as follows:

```
<li>E-mail:  
<a href="mailto:contact@trilliummediadesign.com">contact@trillium  
</li>
```

Save and test the page in a browser. The browser display should look similar to the page shown in [Figure 2.27](#). You can compare your work with the sample in the student files (chapter2/2.14/contact.html).

## Figure 2.27



An e-mail hyperlink has been configured on the contact page



**FAQ**

1. Won't displaying my actual e-mail address on a web page increase spam?

Yes and no. While it's possible that some unethical spammers may harvest web pages for e-mail addresses, the chances are that your e-mail application's built-in spam filter will prevent your inbox from being flooded with messages. When you configure an easily readable e-mail hyperlink you increase the usability of your website for your visitors in the following situations:

- The visitor may be at a public computer with no e-mail application configured. In this case, when the e-mail hyperlink is clicked, an error message may display, and the visitor will have difficulty contacting you using the e-mail link.
- The visitor may be at a private computer but may prefer not to use the e-mail application (and address) that is configured by default to work with the browser. Perhaps he or she shares the computer with others, or perhaps he or she wishes to preserve the privacy of the default e-mail address.

If you prominently displayed your actual e-mail address in both of these situations, the visitor can still access your e-mail address and use it to contact you (in either their e-mail application or via a web-based e-mail system such as Google's Gmail). The result is a more usable website for your visitors.

## Accessibility and Hyperlinks

Visually challenged visitors who are using a screen reader can configure the software to display a list of the hyperlinks in the document. However, a list of links is useful only if the text describing each link is actually helpful and descriptive. For example, on your college website, a "Search the course schedule" link would be more useful than a link that simply says, "More information."



**Focus on  
Accessibility**



## FAQ

### 1. What are some tips for using hyperlinks?

- Make your link names descriptive and brief to minimize possible confusion.
- Avoid using the phrase “Click here” in your hyperlinks. In the early days of the Web, this phrase was needed because clicking links was a new experience for web users. Now that the Web is a daily part of our lives, this phrase is slightly redundant, and even archaic.
- Try not to bury hyperlinks within large blocks of text; use lists of hyperlinks instead. Be aware that it is more difficult to read web pages than printed pages.
- Be careful when linking to external websites. The Web is dynamic, and it’s possible that the external site may change the name of the page, or even delete the page. If this happens, your link will be broken.



## Checkpoint 2.3

### 1. Describe the purpose of special characters.

2. Describe when to use an absolute link. Is the http protocol used in the href value?
3. Describe when to use a relative link. Is the http protocol used in the href value?

## 2.18 HTML Validation

The W3C's free Markup Validation Service, available at <http://validator.w3.org>, will validate your HTML code and check it for syntax errors. **HTML validation** provides students with quick self-assessment—you can prove that your code uses correct syntax. In the working world, HTML validation serves as a quality assurance tool. Invalid code may cause - browsers to render the pages slower than otherwise.



**VideoNote** HTML Validation

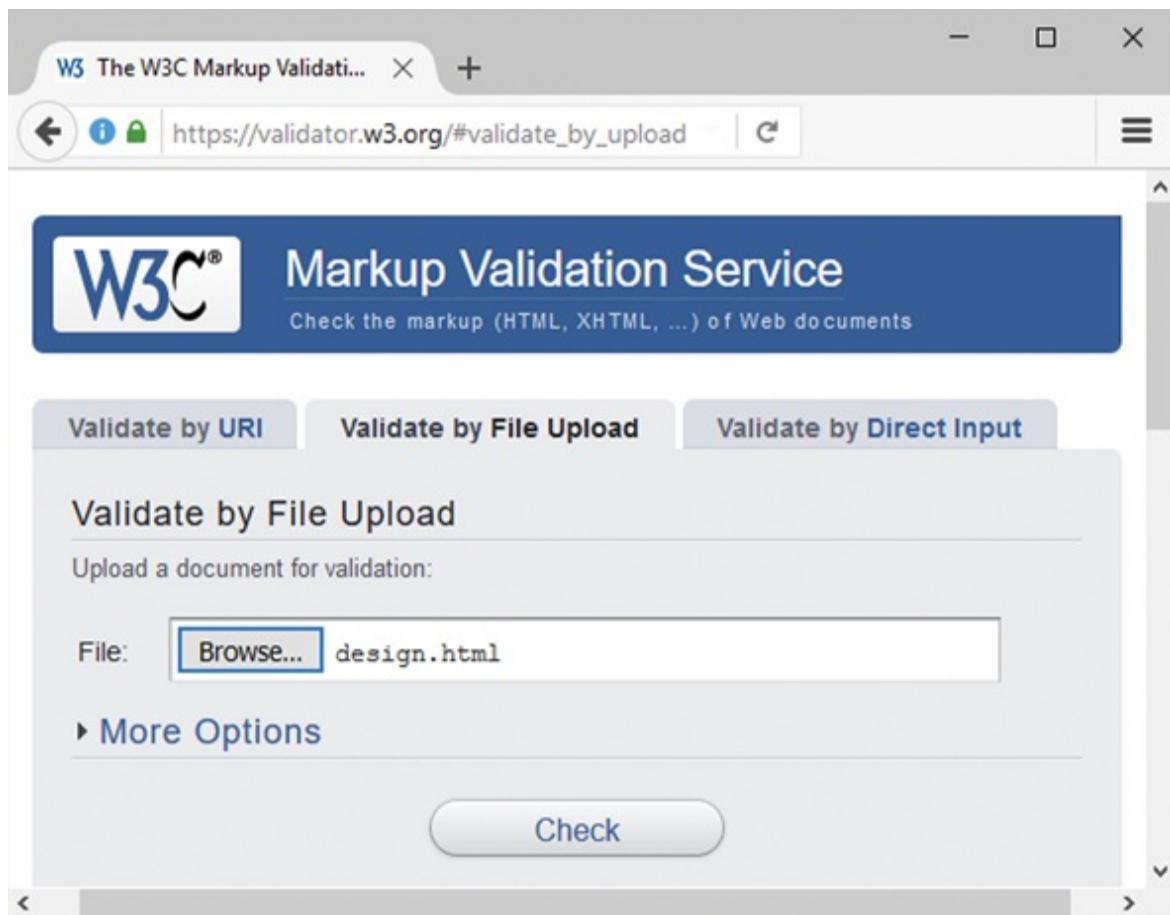


## Hands-On Practice 2.15

In this Hands-On Practice, you will use the W3C Markup Validation Service to validate a web page file. This example uses the page completed in [Hands-On Practice 2.9](#) (located in the student files at chapter2/design.html). Open design.html in a text editor. Add an error to the design.html page by deleting the first closing `</strong>` tag. This modification should generate several error messages.

Next, attempt to validate the design.html file. Launch a browser and visit the W3C Markup Validation Service file upload page at [http://validator.w3.org/#validate\\_by\\_upload](http://validator.w3.org/#validate_by_upload). Click the Browse button, and select the chapter2/design.html file from your computer. Click the Check button to upload the file to the W3C site ([Figure 2.28](#)).

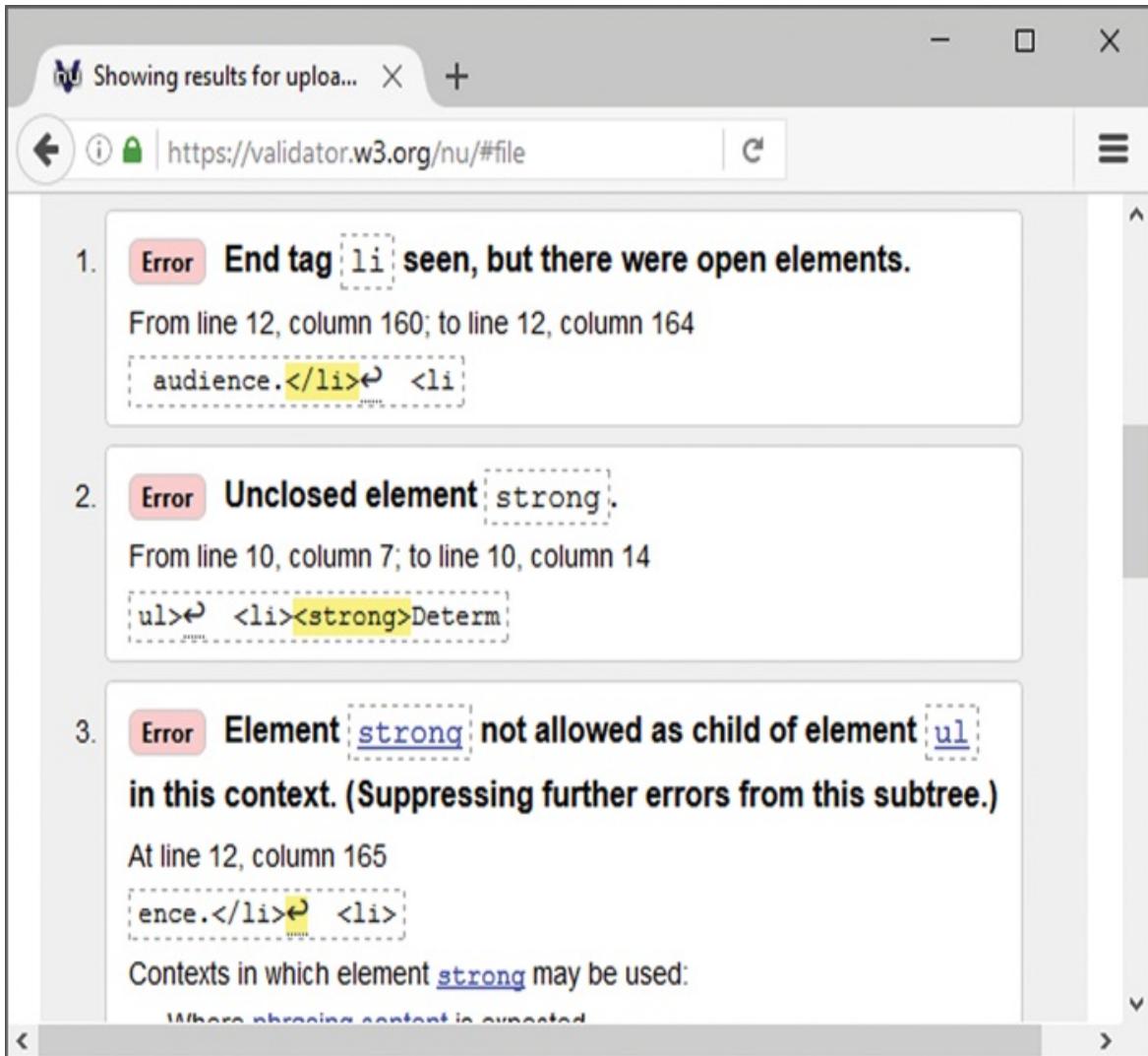
**Figure 2.28**



Validating a page with the W3C Markup Validation Service.  
Screenshots of W3C. Courtesy of W3C (World Wide Web Consortium).

An error page will display. Notice the “Errors found while checking this document” message. You can view the errors by scrolling down the page, as shown in [Figure 2.29](#).

## Figure 2.29



The service indicates errors. Screenshots of W3C. Courtesy of W3C (World Wide Web Consortium).

[Figure 2.29 Full Alternative Text](#)

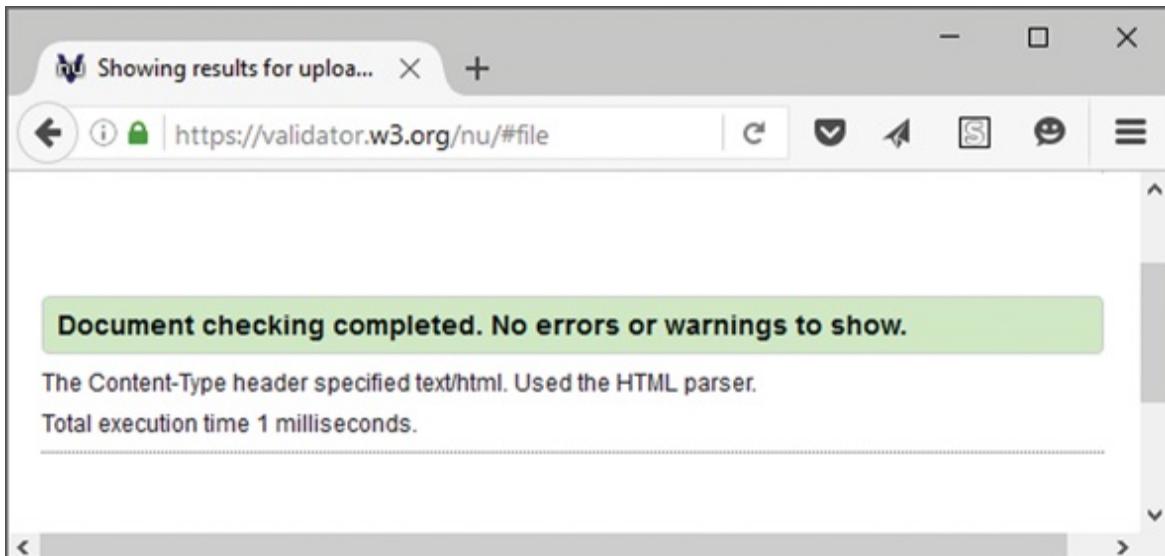
Notice that the first message indicates line 12, which is after the missing closing `</strong>` tag. HTML error messages often point to a line that follows the error. The text of the message, “End tag li seen, but there were open elements,” lets you know that something is wrong. It is up to you to figure out what it is. A good place to start is to check your container tags and make sure they are in pairs. In this case, that is the problem. You can scroll down to view the other errors. However, since multiple error messages are

often displayed after a single error occurs, it is a good idea to fix one item at a time and then revalidate.

Edit the design.html file in a text editor, and add the missing </strong> tag. Save the file. Launch a browser, and visit [http://validator.w3.org/#validate\\_by\\_upload](http://validator.w3.org/#validate_by_upload). Select your file, select More Options, and verify that the Show Source and Verbose Output check boxes are checked. Click the Check button to begin the validation.

Your display should be similar to that shown in [Figure 2.30](#). Notice the “Document checking completed. No errors or warnings to show.” message. This means that your page passed the validation test. Congratulations, your design.html page is valid! You may also notice a warning message, which you can overlook, indicating that the HTML5 conformance checker is in experimental status.

## Figure 2.30



The page has passed the validation test. Screenshots of W3C. Courtesy of W3C (World Wide Web Consortium).

It is good practice to validate your web pages. However, when validating

code, use common sense. Since web browsers still do not completely follow W3C recommendations, there will be situations, such as when adding multimedia to a web page, in which HTML code configured to work reliably across a variety of browsers and platforms will not pass validation.



## FAQ

1. Are there other ways to validate my HTML?

In addition to the W3C validation service, there are other tools that you can use to check the syntax of your code. Explore the HTML5 validator at <http://html5.validator.nu> and the HTML & CSS Validation Service at <http://www.onlinewebcheck.com>.

# Chapter Summary

This chapter has provided an introduction to HTML, XHTML, and HTML5. The basic elements that are part of every web page were demonstrated. HTML elements including div, paragraph, blockquote, header, nav, main, and footer were presented. Additional topics included configuring lists and using special characters, phrase elements, and hyperlinks. You have practiced testing your HTML5 code for valid syntax. If you worked along with the samples in the chapter, you should be ready to create some web pages on your own. The Hands-On Exercises and Web Case Studies that follow will provide some additional practice.

Visit this textbook's website at <http://www.webdevfoundations.net> for links to the URLs listed in this chapter and to view updated information.

## Key Terms

1. [&copy;](#)
2. [&nbsp;](#)
3. [<a>](#)
4. [<abbr>](#)
5. [<b>](#)
6. [<blockquote>](#)
7. [<body>](#)
8. [<br>](#)
9. [<cite>](#)

10. [<code>](#)

11. [<dd>](#)

12. [<dfn>](#)

13. [<div>](#)

14. [<dl>](#)

15. [<dt>](#)

16. [<em>](#)

17. [<footer>](#)

18. [<h1>](#)

19. [<h6>](#)

20. [<head>](#)

21. [<header>](#)

22. [<html>](#)

23. [<i>](#)

24. [<kbd>](#)

25. [<li>](#)

26. [<main>](#)

27. [<mark>](#)

28. [<meta>](#)

29. [<nav>](#)

30. [<ol>](#)
31. [<p>](#)
32. [<samp>](#)
33. [<small>](#)
34. [<strong>](#)
35. [<sub>](#)
36. [<sup>](#)
37. [<title>](#)
38. [<ul>](#)
39. [<var>](#)
40. [align attribute](#)
41. [absolute hyperlink](#)
42. [anchor element](#)
43. [attributes](#)
44. [block display](#)
45. [blockquote element](#)
46. [body element](#)
47. [body section](#)
48. [character encoding](#)
49. [description list](#)

50. [div element](#)
51. [doctype](#)
52. [Document Type Definition \(DTD\)](#)
53. [element](#)
54. [e-mail hyperlinks](#)
55. entity element
56. [eXtensible HyperText Markup Language \(XHTML\)](#)
57. [footer element](#)
58. [head element](#)
59. [head section](#)
60. [header element](#)
61. [heading element](#)
62. [href attribute](#)
63. [HTML5](#)
64. [hyperlink](#)
65. [Hypertext Markup Language \(HTML\)](#)
66. [inline display](#)
67. [lang attribute](#)
68. [left alignment](#)
69. [line break element](#)

70. [main element](#)
71. [markup languages](#)
72. [meta element](#)
73. [nav element](#)
74. [obsolete](#)
75. [ordered list](#)
76. [paragraph elements](#)
77. [phrase elements](#)
78. [relative hyperlink](#)
79. [reversed attribute](#)
80. [self-contained](#)
81. [sitemap](#)
82. [special characters](#)
83. [stand-alone](#)
84. [start attribute](#)
85. [tag](#)
86. [title element](#)
87. [type attribute](#)
88. [unordered list](#)
89. [validation](#)

90. [void element](#)
91. [well-formed](#)
92. [XML \(eXtensible Markup Language\)](#)

## Review Questions

### Multiple Choice

1. Which tag pair configures a structural area on a web page?
  1. <area> </area>
  2. <div> </div>
  3. <cite> </cite>
  4. <strong> </strong>
2. Which tag configures the next element or portion of text to display on a new line?
  1. <line>
  2. <n1>
  3. <br>
  4. <new>
3. Which tag is used to link web pages to each other?
  1. <link> </link>
  2. <hyperlink> </hyperlink>

3. <a> </a>
  4. <body> </body>
4. Which tag pair is used to create the largest heading?
1. <h1> </h1>
  2. <h9> </h9>
  3. <h type="largest"> </h>
  4. <h6> </h6>
5. What is the default horizontal alignment for elements on a web page?
1. center
  2. left
  3. right
  4. wherever you type them in the source code
6. When do you need to use a fully qualified URL in a hyperlink?
1. always
  2. when linking to a web page file on the same site
  3. when linking to a web page file on an external site
  4. never
7. Which of the following is a reason that the text contained by the title tag should be descriptive and include the name of the business or organization?
1. The title is saved by default when a visitor bookmarks a web page.

2. The title may be printed when a visitor prints a web page.
  3. The title may be listed in search engine results.
  4. All of the above are reasons that the text contained by the title tag should be descriptive and include the name of the business or organization.
8. Which type of HTML list will automatically number the items for you?
1. numbered list
  2. ordered list
  3. unordered list
  4. definition list
9. Which of the following is an HTML5 element used to indicate navigational content?
1. main
  2. nav
  3. header
  4. a
10. What does an e-mail link do?
1. automatically sends you an e-mail message with the visitor's e-mail address as the reply-to field
  2. launches the default e-mail application for the visitor's browser, with your e-mail address as the recipient
  3. displays your e-mail address so that the visitor can send you a message later

4. links to your mail server

## Fill in the Blank

11. Use the \_\_\_\_\_ element to configure text to have strong importance and display in a bold font weight.
12. \_\_\_\_\_ can be used to display characters such as the copyright symbol.
13. The <meta> tag can be used to \_\_\_\_\_.
14. The \_\_\_\_\_ is used to place a nonbreaking space on a web page.
15. Use the \_\_\_\_\_ element to configure text to be emphasized and displayed in an italic font style.

## Short Answer

16. Explain why it is good practice to place the e-mail address on the web page and within the anchor tag when creating an e-mail link.

## Apply Your Knowledge

1. Predict the Result. Sketch out and briefly describe the web page that will be created with the following HTML code:

```
<!DOCTYPE html>
<html lang="en">
<head>
    <title>Predict the Result</title>
    <meta charset="utf-8">
</head>
<body>
    <header><h1><i>Favorite Sites</i></h1></header>
    <main>
```

```

<ol>
    <li><a href="http://facebook.com">Facebook</a></li>
    <li><a href="http://google.com">Google</a></li>
</ol>
</main>
<footer>
    <small>Copyright © 2018 Your name here</small>
</footer>
</body>
</html>

```

2. Fill in the Missing Code. The web page defined by the given code should display a heading and a description list, but some HTML tags, indicated by `<_>`, are missing. Fill in the missing code.

```

<!DOCTYPE html>
<html lang="en">
<head>
    <title>Door County Wildflowers</title>
    <meta charset="utf-8">
</head>
<body>
    <header><_>Door County Wild Flowers<_></header>
    <main>
        <dl>
            <dt>Trillium<_>
                <_>This white flower blooms from April through June in
                wooded areas.<_>
            <_>Lady Slipper<_>
                <_>This yellow orchid blooms in June in wooded areas.<
                <_>
        </main>
    </body>
</html>

```

3. Find the Error. All the text on the web page defined by the given code displays in large and bold font typeface. Explain why this is happening.

```

<!DOCTYPE html>
<html lang="en">
<head>
    <title>Find the Error</title>
    <meta charset="utf-8">
</head>

```

```
<body>
  <h1>My Web Page</h1>
  <p>This is a sentence on my web page.</p>
</body>
</html>
```

## Hands-On Exercises

1. Write the HTML to display your name with the largest heading element.
2. Write the HTML to create an absolute link to your school's website.
3. Write the HTML for an unordered list to display the days of the week.
4. Write the HTML for an ordered list that uses uppercase letters to order the items. This ordered list should display the following phrases: wake up, eat breakfast, and go to school.
5. Think of a favorite quotation by someone you admire. Write the HTML code to display the person's name in a heading and the quotation in a blockquote element.
6. Modify the following code snippet to indicate that the term “site map” should have strong importance:

```
<p>A diagram of the organization of a website is called a sit
```

7. Modify the blockquote.html web page you created in Hands-On Practice 2.5. Configure the URL <http://www.w3.org/WAI/> as a hyperlink. Save the file as blockquote2.html.
8. Create a web page that uses a description list to display three network protocols (see [Chapter 1](#)) and their descriptions. Include a hyperlink to a website that provides information about the protocols. Add an appropriate heading to the page. Save the page as network.html.
9. Create a web page about your favorite musical group. Include the name

of the group, the individuals in the group, a hyperlink to the group's website, your favorite three (or fewer if the group is new) album releases, and a brief review of each album.

- Use an unordered list to organize the names of the individuals.
- Use a description list for the names of the albums and your reviews.

Save the page as band.html.

10. Create a web page about your favorite recipe. Use an unordered list for the ingredients and an ordered list to describe the steps needed to prepare the food. Include a hyperlink to a website that offers free recipes. Save the page as recipe.html.

## Web Research

1. There are many HTML5 tutorials on the Web. Use your favorite search engine to discover them. Choose two that are helpful. For each, print out the home page or other pertinent page and create a web page that contains the answers to the following questions:
  1. What is the URL of the website?
  2. Is the tutorial geared toward the beginner level, intermediate level, or both levels?
  3. Would you recommend this site to others? Why or why not?
  4. List one or two concepts that you learned from this tutorial.

## Focus on Web Design

1. You are learning the syntax of HTML5. However, coding alone does not make a web page; design is also very important. Surf the Web and find

two web pages, one that is appealing to you and one that is unappealing to you. Print each page. Create a web page that answers the following questions for each of your examples:

1. What is the URL of the website?
2. Is the page appealing or unappealing? List three reasons for your answer.
3. If the page is unappealing, what would you do to improve it?



## WEBSITE CASE STUDY

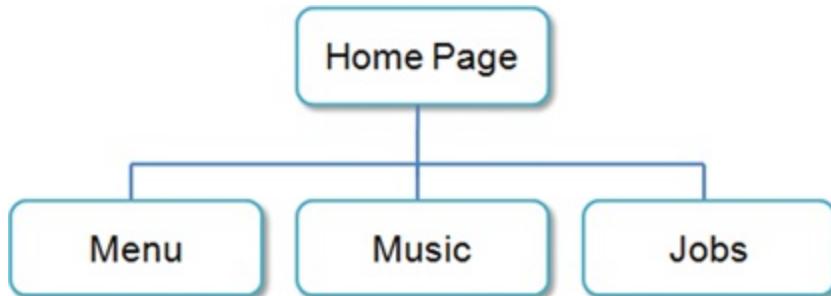
Each of the case studies in this section continues throughout most of the text. This chapter introduces each website scenario, presents the site map, and directs you to create two pages for the site.

## JavaJam Coffee House

Julio Perez is the owner of the JavaJam Coffee House, a gourmet coffee shop that serves snacks, coffee, tea, and soft drinks. Local folk music performances and poetry readings are held a few nights during the week. The customers of JavaJam are mainly college students and young professionals. Julio would like a web presence for his shop that will display his services and provide a calendar for the performances. He would like a home page, menu page, music performance schedule page, and job opportunities page.

A site map for the JavaJam Coffee House website is shown in [Figure 2.31](#). The site map describes the architecture of the website, which consists of a “Home” page with three main content pages: “Menu,” “Music,” and “Jobs.”

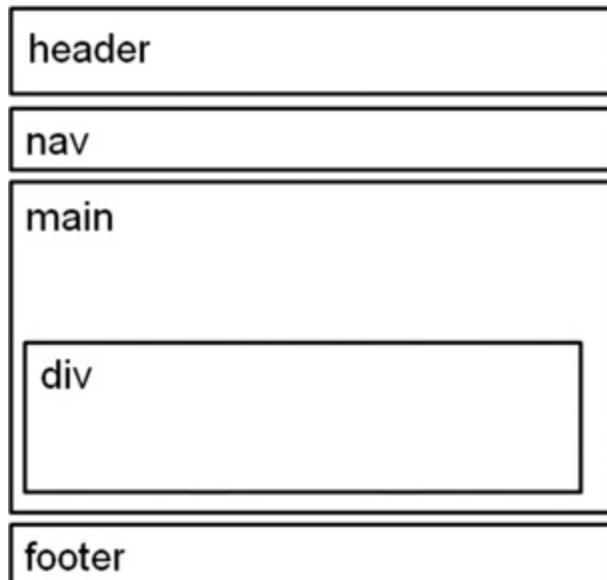
## Figure 2.31



JavaJam site map

[Figure 2.32](#) displays a wireframe sketch of the page layout for the website. It contains a header area, a navigation area, a main content area, and a footer area for copyright information.

## Figure 2.32



JavaJam wireframe

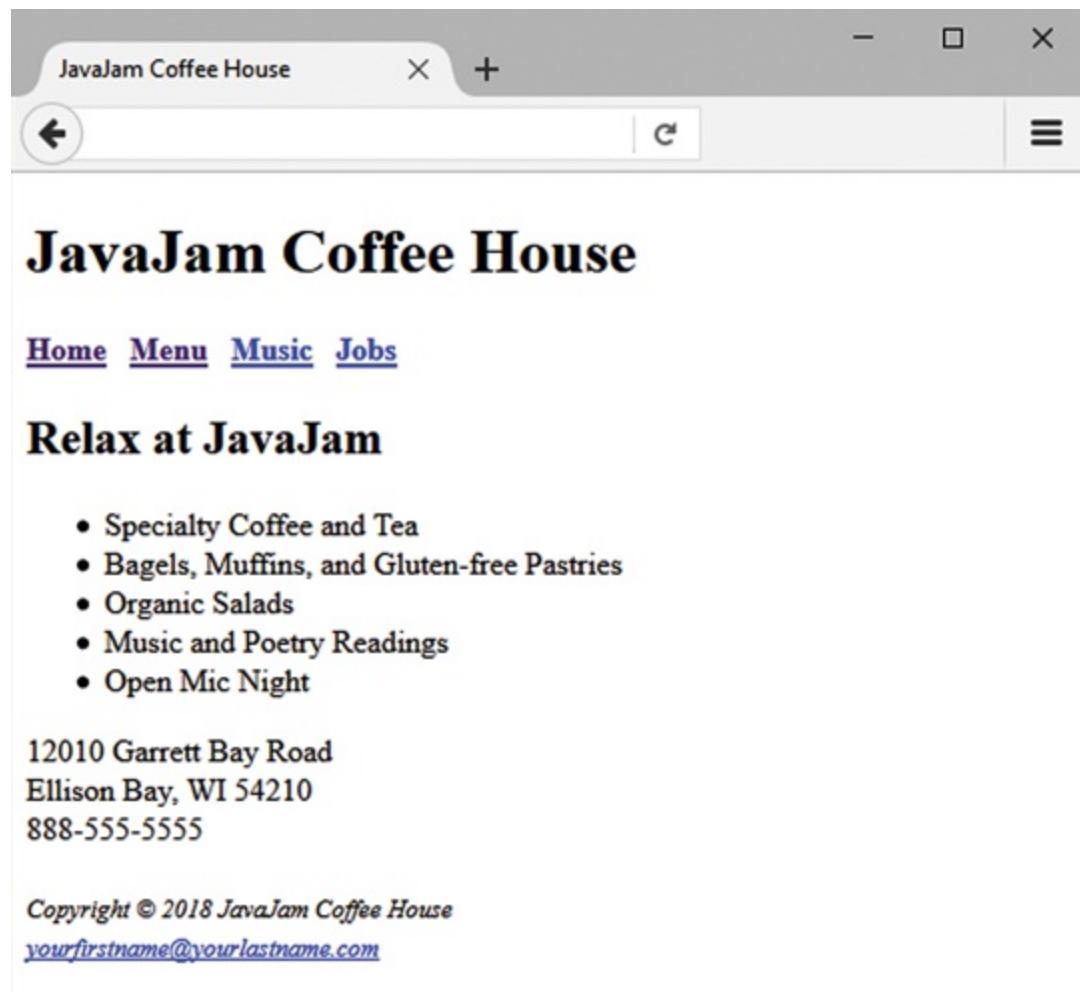
You have three tasks in this case study:

1. Create a folder for the JavaJam website.
2. Create the Home page: index.html.
3. Create the Menu page: menu.html.

## Hands-On Practice Case Study

- Task 1: The Website Folder. Create a folder on your hard drive or portable storage device (thumb drive or SD card) called “javajam” to contain your JavaJam website files.
- Task 2: The Home Page. You will use a text editor to create the Home page for the JavaJam Coffee House website. The Home page is shown in [Figure 2.33](#).

### Figure 2.33



JavaJam index.html

[Figure 2.33 Full Alternative Text](#)

Launch a text editor, and create a web page with the following specifications:

1. **Web Page Title.** Use a descriptive page title. The company name is a good choice for the home page of a business website. On pages other than the home page, the title typically contains both the company name and a word or a phrase that describes the purpose of the page.
2. **Wireframe Header.** Code the header element with the text,

“JavaJam Coffee House” contained within a heading 1 element.

3. **Wireframe Navigation.** Place the following text within a nav element with bold text (use the **<b>** element):

Home Menu Music Jobs

Code anchor tags so that “Home” links to index.html, “Menu” links to menu.html, “Music” links to music.html, and “Jobs” links to jobs.html. Add extra blank spaces between the hyperlinks with the &nbsp; special character as needed.

4. **Wireframe Main Content.** Code the main page content within a main element. Use Hands-On Practice 2.10 as a guide.

1. Code the following text within an h2 element:

Relax at JavaJam

2. Configure the following content in an unordered list:

Specialty Coffee and Tea

Bagels, Muffins, and Gluten-free Pastries

Organic Salads

Music and Poetry Readings

Open Mic Night

3. Code the following address and phone number contact information within a div element. Use line break tags to help you configure this area and add extra space between the phone number and the footer area.

12010 Garrett Bay Road

Ellison Bay, WI 54210

888-555-5555

5. **5. Wireframe Footer.** Configure the following copyright and e-mail link information within a footer element. Format it with small text size (use the `<small>` tag) and italics font style (use the `<i>` tag).

- Copyright © 2018 JavaJam Coffee House
- Place your name in an e-mail link on the line under the copyright.

The page in [Figure 2.33](#) may seem a little sparse, but don't worry; as you gain experience and learn to use more advanced techniques, your pages will look more professional. White space (blank space) on the page can be added with `<br>` tags where needed. Your page does not need to look exactly the same as the sample. Your goal at this point should be to practice and get comfortable using HTML.

Save your page in the javajam folder, and name it index.html.

- Task 3: The Menu Page. Create the Menu page shown in [Figure 2.34](#). A technique that improves productivity is to create new pages based on existing pages so that you can benefit from your previous work. Your new Menu page will use the index.html page as a starting point.

## Figure 2.34



JavaJam menu.html

### Figure 2.34 Full Alternative Text

Open the index.html page for the JavaJam website in a text editor. Select File > Save As, and save the file with the new name of menu.html in the javajam folder. Now you are ready to edit the page.

1. **Web Page Title.** Modify the page title. Change the text contained between the `<title>` and `</title>` tags to the following:

JavaJam Coffee House Menu

2. **Wireframe Main Content.**

1. Delete the Home page content unordered list and contact information.

2. Replace the text in the h2 element with the following:

Coffee at JavaJam

3. Use a description list to add the menu content to the page. Use the `<dt>` tag to contain each menu item name. Configure the menu item name to have strong importance and display in bold font weight with the `<strong>` tag. Use the `<dd>` tag to contain the menu item description. Configure line break tags as needed to display two lines of information within each dd element. The menu item names and descriptions are as follows:

- **Just Java**

- Regular house blend, decaffeinated coffee, or flavor of the day.

- Endless Cup \$3.00

- **Cafe au Lait**

- House blended coffee infused into a smooth, steamed milk.

- Single \$2.00 Double \$4.00

- **Iced Cappuccino**

- Sweetened espresso blended with icy-cold milk and served in a chilled glass.

- Single \$4.75 Double \$6.00

Save your page, and test it in a browser. Test the hyperlink from the menu.html page to index.html. Test the hyperlink

from the index.html page to menu.html. If your links do not work, review your work, paying close attention to these details:

- Verify that you have saved the pages with the correct names in the correct folder.
- Verify your spelling of the page names in the anchor elements.

Test again after you make changes.

## Fish Creek Animal Clinic

Magda Patel is a veterinarian and owner of the Fish Creek Animal Clinic. Her customers are local pet owners who range from children to senior citizens. Magda would like a website to provide information to her current and potential customers. She has requested a home page, a services page, a page for advice from a veterinarian, and a contact page.

A site map for the Fish Creek Animal Clinic website is shown in [Figure 2.35](#). The site map describes the architecture of the website, which consists of a “Home” page with three main content pages: “Services,” “Ask the Vet,” and “Contact.”

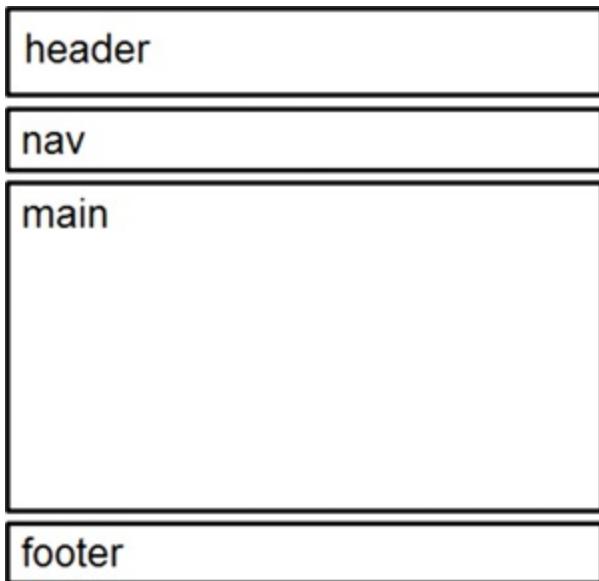
**Figure 2.35**



## Fish Creek site map

[Figure 2.36](#) displays a wireframe sketch of the page layout for the website. It contains a header area, a navigation area, a main content area, and a footer area for copyright information.

## Figure 2.36



## Fish Creek wireframe

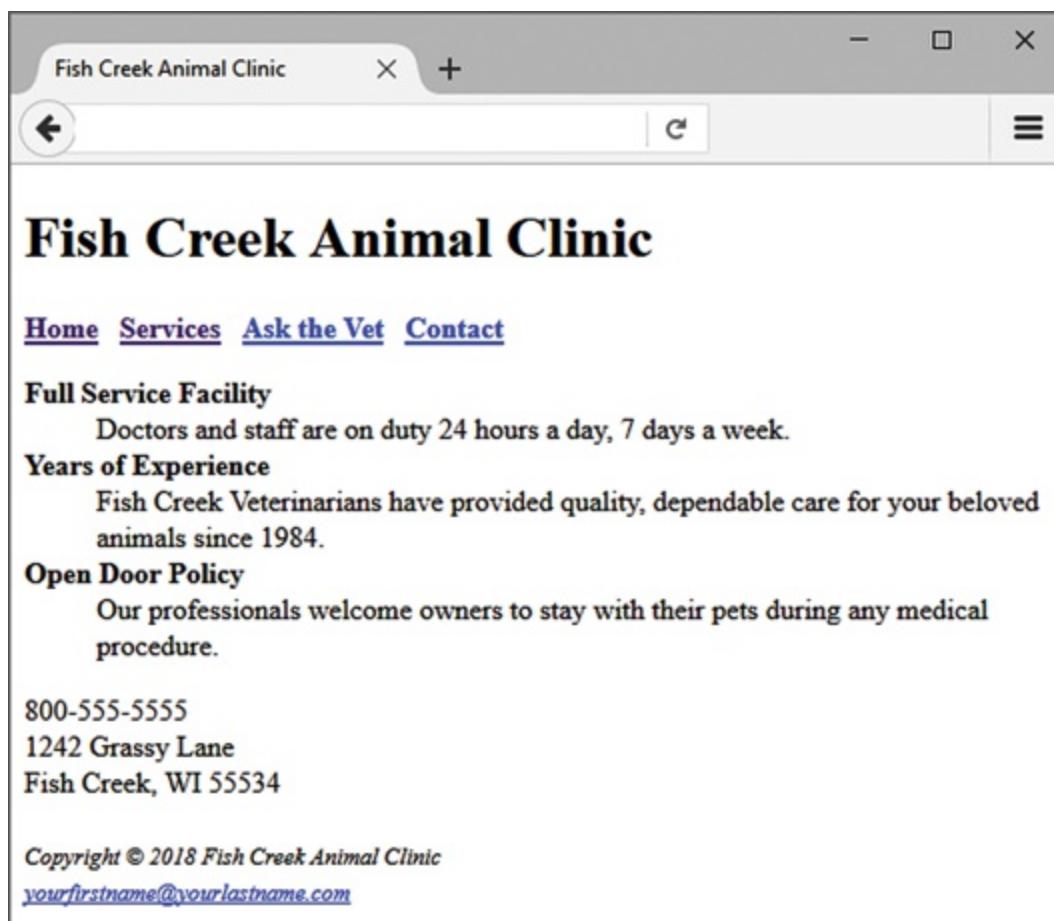
You have three tasks in this case study:

1. Create a folder for the Fish Creek website.
2. Create the Home page: index.html.
3. Create the Services page: services.html.

# Hands-On Practice Case Study

- Task 1: The Website Folder. Create a folder on your hard drive or portable storage device (thumb drive or SD card) called “fishcreek” to contain your Fish Creek website files.
- Task 2: The Home Page. You will use a text editor application to create the Home page for the Fish Creek Animal Clinic website. The Home page is shown in [Figure 2.37](#).

## Figure 2.37



Fish Creek index.html

[Figure 2.37 Full Alternative Text](#)

Launch a text editor, and create a web page with the following specifications:

1. **Web Page Title.** Use a descriptive page title. The company name is a good choice for the home page of a business website. On pages other than the home page, the title typically contains both the company name and a word or a phrase that describes the purpose of the page.
2. **Wireframe Header.** Code the header element with the text, “Fish Creek Animal Clinic” contained within a heading 1 element.
3. **Wireframe Navigation.** Place the following text within a nav element with bold text (use the **<b>** element)
  - Home Services Ask the Vet Contact
  - Code anchor tags so that “Home” links to index.html, “Services” links to services.html, “Ask the Vet” links to askvet.html, and “Contact” links to contact.html. Add extra blank spaces between the hyperlinks with the &nbsp; special character as needed.
4. **Wireframe Main Content.** Code the main page content within a main element. Use Hands-On Practice 2.10 as a guide.
  1. Code the following content in a description list. Configure the text in each dt element to have strong importance and display in bold font weight:
    - **Full Service Facility**
      - Doctors and staff are on duty 24 hours a day, 7 days a week.
    - **Years of Experience**
      - Fish Creek Veterinarians have provided quality, dependable care for your beloved animals since 1984.

- **Open Door Policy**
  - Our professionals welcome owners to stay with their pets during any medical procedure.
2. Configure the following address and phone number contact information within a div element below the description list. Use line break tags to help you format this area.
- 800-555-5555
  - 1242 Grassy Lane
  - Fish Creek, WI 55534
5. **Wireframe Footer.** Code the following copyright and e-mail link information within a footer element. Format it with small text size (use the  tag) and italics font style (use the  *tag).*
- Copyright © 2018 Fish Creek Animal Clinic
  - Place your name in an e-mail link on the line under the copyright.

The page in [Figure 2.37](#) may seem a little sparse, but don't worry; as you gain experience and learn to use more advanced techniques, your pages will look more professional. White space (blank space) on the page can be added with `<br>` tags where needed. Your page does not need to look exactly the same as the sample. Your goal at this point should be to practice and get comfortable using HTML.

Save your page in the fishcreek folder, and name it index.html.

- Task 3: The Services Page. Create the Services page shown in [Figure 2.38](#). A technique that improves productivity is to create new pages based on existing pages so that you can benefit from your previous work. Your new Services page will use the index.html page as a starting point.

# Figure 2.38



## Fish Creek Animal Clinic

[Home](#) [Services](#) [Ask the Vet](#) [Contact](#)

- **Medical Services**  
We offer state-of-the-art equipment and technology.
- **Surgical Services**  
Full range of surgical procedures including orthopedics and emergency surgeries.
- **Dental Care**  
A dental exam can determine whether your pet needs preventive dental care such as scaling and polishing.
- **House Calls**  
The elderly, physically challenged, and multiple pet households often find our in-home veterinary service helpful and convenient.
- **Emergencies**  
At least one of our doctors is on call every day and night.

*Copyright © 2018 Fish Creek Animal Clinic  
[yourfirstname@yourlastname.com](mailto:yourfirstname@yourlastname.com)*

Fish Creek services.html

### [Figure 2.38 Full Alternative Text](#)

Open the index.html page for the Fish Creek website in a text editor. Select File > Save As, and save the file with the new name of services.html in the fishcreek folder. Now you are ready to edit the page.

1. **Web Page Title.** Modify the page title. Change the text contained between the `<title>` and `</title>` tags to the following:
  - Fish Creek Animal Clinic Services

## 2. Wireframe Main Content.

1. Delete the Home page content description list and contact information.
2. Use an unordered list to add the services content to the page. Configure the name of each services category to use bold font weight and have strong emphasis. (Use the **<strong>** tag.) Use line break tags to help you configure this area. The service categories and descriptions are as follows:
  - **Medical Services**
    - We offer state-of-the-art equipment and technology.
  - **Surgical Services**
    - Full range of surgical procedures including orthopedics and emergency surgeries.
  - **Dental Care**
    - A dental exam can determine whether your pet needs preventive dental care such as scaling and polishing.
  - **House Calls**
    - The elderly, physically challenged, and multiple pet households often find our in-home veterinary service helpful and convenient.
  - **Emergencies**
    - At least one of our doctors is on call every day and night.

Save your page, and test it in a browser. Test the hyperlink from the services.html page to index.html. Test the hyperlink from the index.html page to services.html. If your links do not work, review your work, paying close attention to these details:

- Verify that you have saved the pages with the correct names in the correct folder.
- Verify your spelling of the page names in the anchor elements.

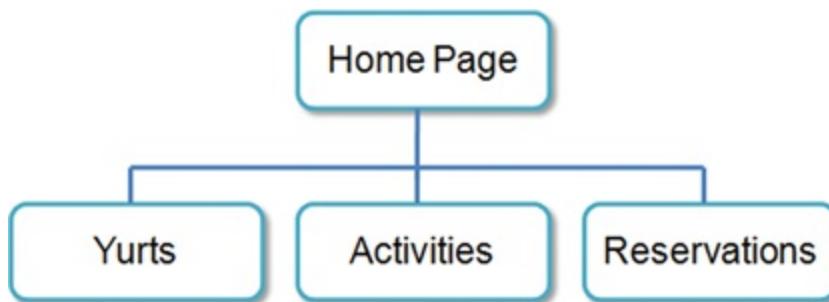
Test again after you make changes.

## Pacific Trails Resort

Melanie Bowie is the owner of Pacific Trails Resort, located on the California North Coast. The resort offers a quiet getaway, with luxury camping in yurts along with an upscale lodge for dining and visiting with fellow guests. The target audience for Pacific Trails Resort is couples who enjoy nature and hiking. Melanie would like a website that emphasizes the uniqueness of the location and accommodations. She would like the website to include a home page, a page about the special yurt accommodations, a reservations page with a contact form, and a page to describe the activities available at the resort.

A site map for the Pacific Trails Resort website is shown in [Figure 2.39](#). The site map describes the architecture of the website, which consists of a “Home” page with three main content pages: “Yurts,” “Activities,” and “Reservations.”

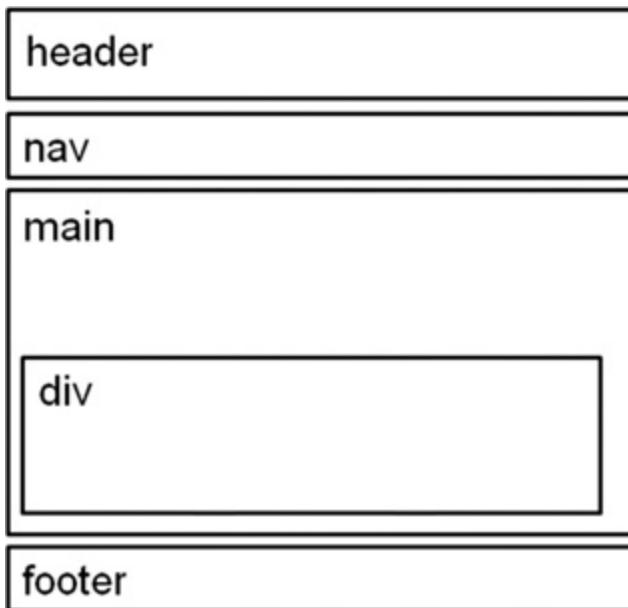
**Figure 2.39**



## Pacific Trails Resort site map

[Figure 2.40](#) displays a wireframe sketch of the page layout for the website. It contains a header area, a navigation area, a main content area, and a footer area for copyright information.

## Figure 2.40



## Pacific Trails Resort wireframe

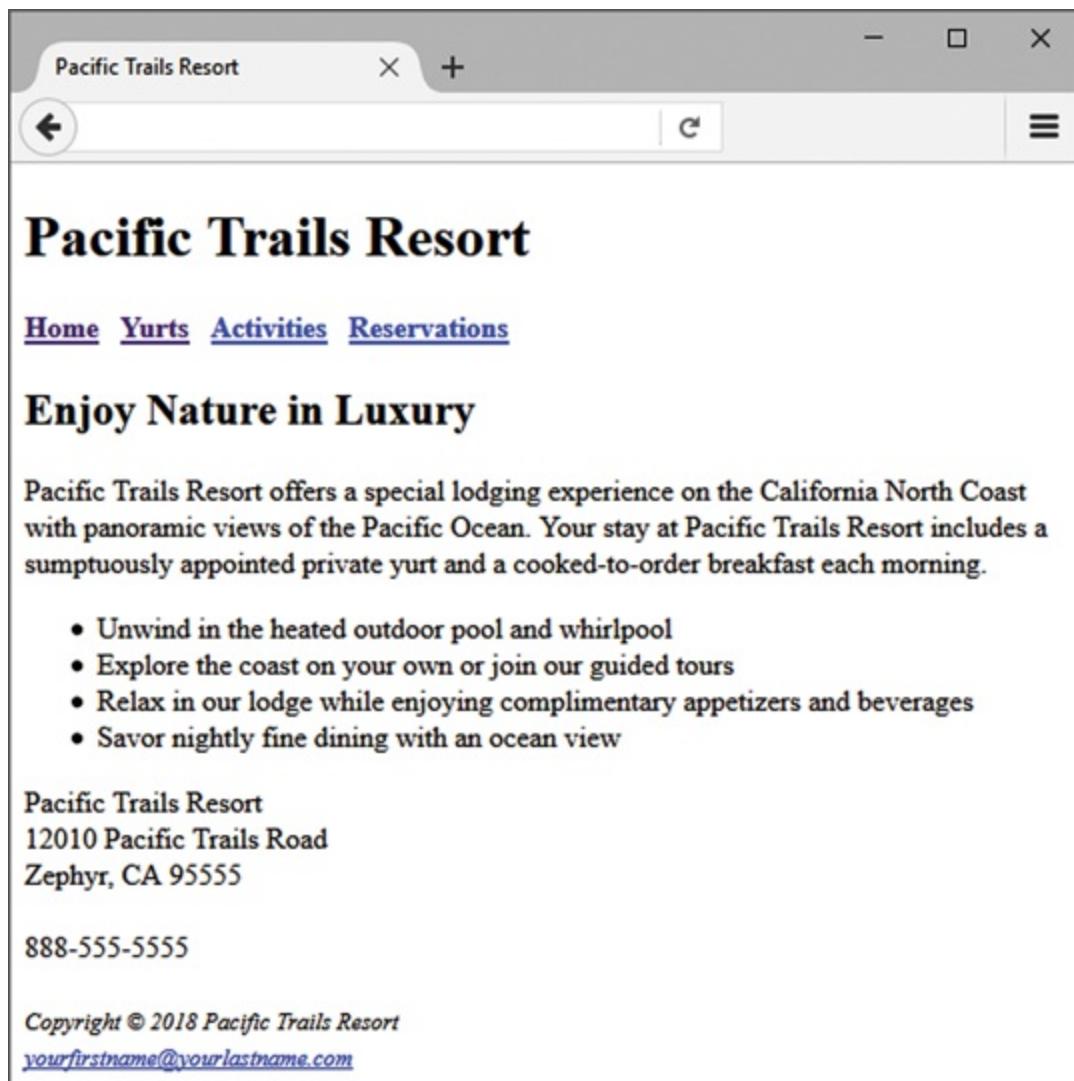
You have three tasks in this case study:

1. Create a folder for the Pacific Trails website.
2. Create the Home page: index.html.
3. Create the Yurts page: yurts.html.

## Hands-On Practice Case Study

- Task 1: The Website Folder. Create a folder on your hard drive or portable storage device (thumb drive or SD card) called “pacific” to contain your Pacific Trails Resort website files.
- Task 2: The Home Page. You will use a text editor to create the Home page for the Pacific Trails Resort website. The Home page is shown in [Figure 2.41](#).

## Figure 2.41



## Pacific Trails Resort index.html

### Figure 2.41 Full Alternative Text

Launch a text editor, and create a web page with the following specifications:

1. **Web Page Title.** Use a descriptive page title. The company name is a good choice for the home page of a business website. On pages other than the home page, the title typically contains both the company name and a word or a phrase that describes the purpose of the page.
2. **Wireframe Header.** Code the header element with the text, “Pacific Trails Resort” contained within a heading 1 element.
3. **Wireframe Navigation.** Place the following text within a nav element with bold text (use the **<b>** element):
  - Home Yurts Activities Reservations
  - Code anchor tags so that “Home” links to index.html, “Yurts” links to yurts.html, “Activities” links to activities.html, and “Reservations” links to reservations.html. Add extra blank spaces between the hyperlinks with the &nbsp; special character as needed.
4. **Wireframe Main Content.** Code the main page content within a main element. Use [Hands-On Practice 2.10](#) as a guide.
  1. Code the following text within an h2 element:
    - Enjoy Nature in Luxury
  2. Configure the following sentences in a paragraph:
    - Pacific Trails Resort offers a special lodging experience on the California North Coast with panoramic views of the Pacific Ocean. Your stay at Pacific Trails Resort

includes a sumptuously appointed private yurt and a cooked-to-order breakfast each morning.

3. Code the following content in an unordered list:
  - Unwind in the heated outdoor pool and whirlpool
  - Explore the coast on your own or join our guided tours
  - Relax in our lodge while enjoying complimentary appetizers and beverages
  - Savor nightly fine dining with an ocean view
4. Configure the following address and phone number contact information within a div element below the unordered list. Use line break tags to help you format this area.
  - Pacific Trails Resort
  - 12010 Pacific Trails Road
  - Zephyr, CA 95555
  - 888-555-5555
5. **Wireframe Footer.** Configure the following copyright and e-mail link information within a footer element. Format it with small text size (use the  tag) and italics font style (use the  *tag).
  - Copyright © 2018 Pacific Trails Resort
  - Place your name in an e-mail link on the line under the copyright.*

The page in [Figure 2.41](#) may seem a little sparse, but don't worry; as you gain experience and learn to use more advanced techniques, your pages will look more professional. White space (blank space) on the page can be added with `<br>` tags where needed. Your page does not

need to look exactly the same as the sample. Your goal at this point should be to practice and get comfortable using HTML.

Save your page in the pacific folder, and name it index.html.

- Task 3: The Yurts Page. Create the Yurts page shown in [Figure 2.42](#). A technique that improves productivity is to create new pages based on existing pages so that you can benefit from your previous work. Your new Yurts page will use the index.html page as a starting point.

## Figure 2.42

The screenshot shows a web browser window with the title bar "Pacific Trails Resort :: Yurts". The main content area displays the following information:

**Pacific Trails Resort**

[Home](#) [Yurts](#) [Activities](#) [Reservations](#)

### The Yurts at Pacific Trails

**What is a yurt?**  
Our luxury yurts are permanent structures four feet off the ground. Each yurt is fully enclosed with canvas walls, a wooden floor, and a roof dome that can be opened.

**How are the yurts furnished?**  
Each yurt is furnished with a queen-size bed with down quilt and gas-fired stove. Your luxury camping experience includes electricity and a sink with hot and cold running water. Shower and restroom facilities are located in the lodge.

**What should I bring?**  
Most guests pack comfortable walking shoes and plan to dress for changing weather with light layers of clothing. It's also helpful to bring a flashlight and a sense of adventure!

*Copyright © 2018 Pacific Trails Resort  
[yourfirstname@yourlastname.com](mailto:yourfirstname@yourlastname.com)*

Pacific Trails Resort yurts.html

[Figure 2.42 Full Alternative Text](#)

Open the index.html page for the Pacific Trails Resort website in a text editor. Select File > Save As, and save the file with the new name of yurts.html in the pacific folder. Now you are ready to edit the page.

1. **Web Page Title.** Modify the page title. Change the text contained between the `<title>` and `</title>` tags to the following:

- Pacific Trails Resort :: Yurts

2. **Wireframe Main Content.**

1. Replace the text in the `h2` element with the following:

The Yurts at Pacific Trails

2. Delete the Home page content paragraph, unordered list, and contact information.
  3. Add the yurts content to the page as a FAQs (frequently asked questions) list by using a description list. Configure each question to have strong importance and bold font weight (use the `<strong>` phrase element) within a `dt` element. Configure each answer within a `dd` element. The text is shown as follows:

- **What is a yurt?**

- Our luxury yurts are permanent structures four feet off the ground. Each yurt is fully enclosed with canvas walls, a wooden floor, and a roof dome that can be opened.

- **How are the yurts furnished?**

- Each yurt is furnished with a queen-size bed with down quilt and gas-fired stove. Your luxury camping

experience includes electricity and a sink with hot and cold running water. Shower and restroom facilities are located in the lodge.

- **What should I bring?**
- Most guests pack comfortable walking shoes and plan to dress for changing weather with light layers of clothing. It's also helpful to bring a flashlight and a sense of adventure!

Save your page, and test it in a browser. Test the hyperlink from the `yurts.html` page to `index.html`. Test the hyperlink from the `index.html` page to `yurts.html`. If your links do not work, review your work, paying close attention to these details:

- Verify that you have saved the pages with the correct names in the correct folder.
- Verify your spelling of the page names in the anchor elements.

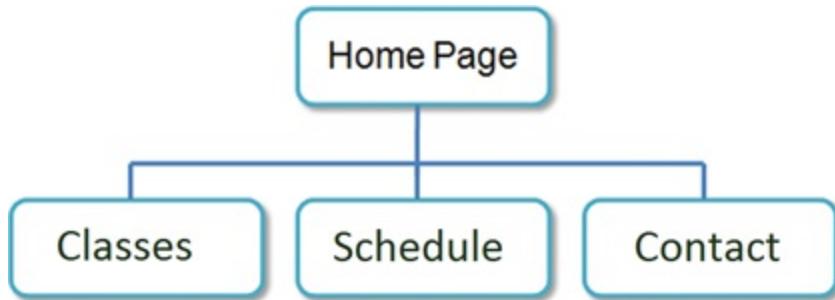
Test again after you make the changes.

## Path of Light Yoga Studio

Path of Light Yoga Studio is a small, recently opened yoga studio. The owner, Ariana Starrweaver, would like a website to showcase her yoga studio and provide information for both new and current students. Ariana would like a home page, a classes page that contains information about the types of yoga classes offered, a schedule page, and a contact page.

A site map for the Path of Light Yoga Studio website is shown in [Figure 2.43](#). The site map describes the architecture of the website, which consists of “Home” page with three main content pages: “Classes,” “Schedule,” and “Contact.”

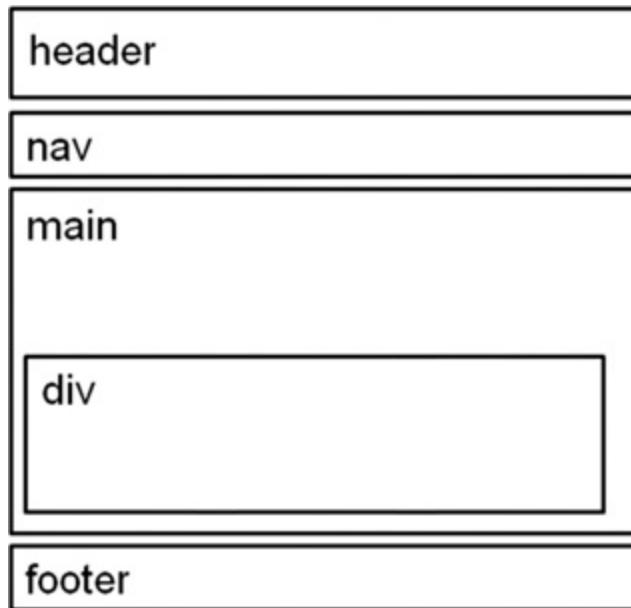
## Figure 2.43



Path of Light Yoga Studio site map

[Figure 2.44](#) displays a wireframe sketch of the page layout for the website. It contains a header area, a navigation area, a main content area, and a footer area for copyright information.

## Figure 2.44



Path of Light Yoga Studio wireframe

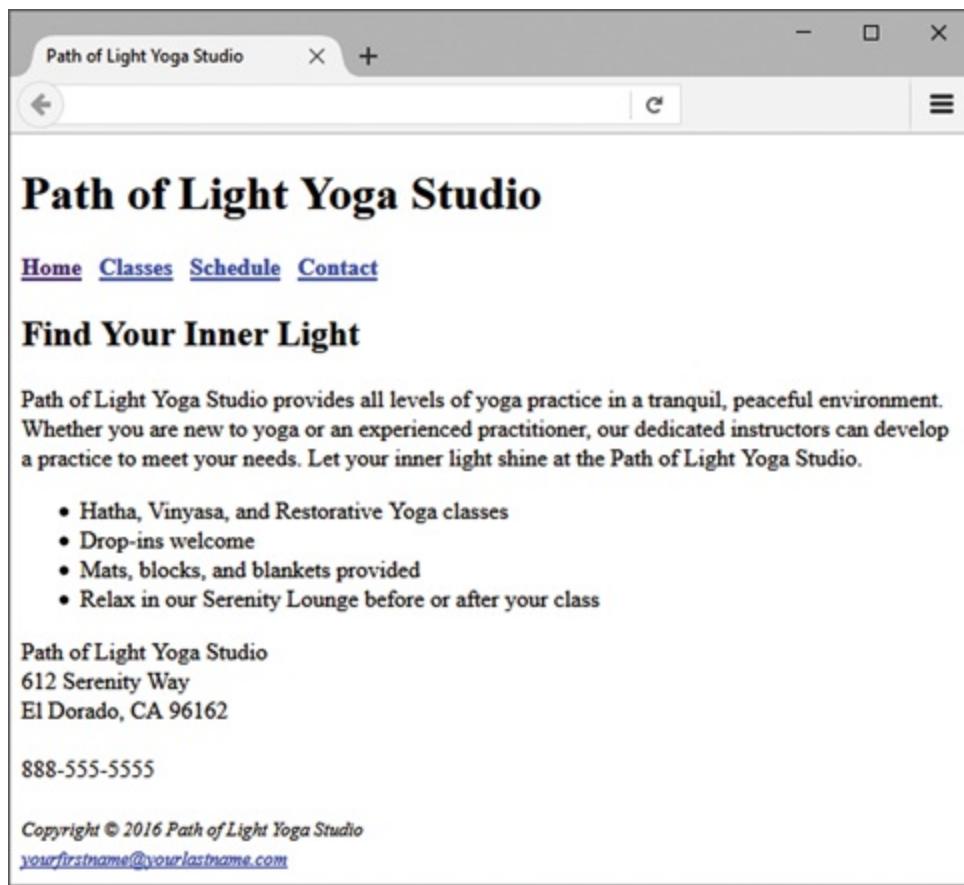
You have three tasks in this case study:

1. Create a folder for the Path of Light Yoga Studio website.
2. Create the Home page: index.html.
3. Create the Classes page: classes.html.

## **Hands-On Practice Case Study**

- Task 1: The Website Folder. Create a folder on your hard drive or portable storage device (thumb drive or SD card) called “yoga” to contain your Path of Light Yoga Studio web page files.
- Task 2: The Home Page. You will use a text editor to create the Home page for the Path of Light Yoga Studio website. The Home page is shown in [Figure 2.45](#).

### **Figure 2.45**



Path of Light Yoga Studio index.html

### Figure 2.45 Full Alternative Text

Launch a text editor, and create a web page with the following specifications:

1. **Web Page Title.** Use a descriptive page title. The company name is a good choice for the home page of a business website. On pages other than the home page, the title typically contains both the company name and a word or a phrase that describes the purpose of the page.
2. **Wireframe Header.** Code the header element with the text, “Path of Light Yoga Studio” contained within a heading 1 element.
3. **Wireframe Navigation.** Place the following text within a nav

element with bold text (use the **<b>** element):

- Home Classes Schedule Contact

Code anchor tags so that “Home” links to index.html, “Classes” links to classes.html, “Schedule” links to schedule.html, and “Contact” links to contact.html. Add extra blank spaces between the hyperlinks with the &nbsp; special character as needed.

4. **Wireframe Main Content.** Code the main page content within a main element. Use Hands-On Practice 2.10 as a guide.

1. Code the following text within an h2 element:

- Find Your Inner Light

2. Configure the following sentences in a paragraph:

Path of Light Yoga Studio provides all levels of yoga practice in a tranquil, peaceful environment. Whether you are new to yoga or an experienced practitioner, our dedicated instructors can develop a practice to meet your needs. Let your inner light shine at the Path of Light Yoga Studio.

3. Configure the following content in an unordered list:

- Hatha, Vinyasa, and Restorative Yoga classes
- Drop-ins welcome
- Mats, blocks, and blankets provided
- Relax in our Serenity Lounge before or after your class

4. Code the following address and phone number contact information within a div element. Use line break tags to help you configure this area and add extra space between the phone number and the footer area.

- Path of Light Yoga Studio
  - 612 Serenity Way
  - El Dorado, CA 96162
  - 888-555-5555
5. **Wireframe Footer.** Configure the following copyright and e-mail link information within a footer element. Format it with small text size (use the  tag) and italics font style (use the *i> tag)*
- Copyright © 2018 Path of Light Yoga Studio
  - Place your name in an e-mail link on the line under the copyright information.
- The page in [Figure 2.44](#) may seem a little sparse, but don't worry; as you gain experience and learn to use more advanced techniques, your pages will look more professional. White space (blank space) on the page can be added with   
 tags where needed. Your page does not need to look exactly the same as the sample. Your goal at this point should be to practice and get comfortable using HTML.
  - Save your page in the yoga folder, and name it index.html.
  - Task 3: The Classes Page. Create the Classes page shown in [Figure 2.46](#). A technique that improves productivity is to create new pages based on existing pages so that you can benefit from your previous work. Your new Classes page will use the index.html page as a starting point.

## Figure 2.46

**Path of Light Yoga Studio**

[Home](#) [Classes](#) [Schedule](#) [Contact](#)

## **Yoga Classes**

**Gentle Hatha Yoga**

Intended for beginners and anyone wishing a grounded foundation in the practice of yoga, this 60 minute class of poses and slow movement focuses on asana (proper alignment and posture), pranayama (breath work), and guided meditation to foster your mind and body connection.

**Vinyasa Yoga**

Although designed for intermediate to advanced students, beginners are welcome to sample this 60 minute class that focuses on breath-synchronized movement — you will inhale and exhale as you flow energetically through yoga poses.

**Restorative Yoga**

This 90 minute class features very slow movement and long poses that are supported by a chair or wall. This calming, restorative experience is suitable for students of any level of experience. This practice can be a perfect way to help rehabilitate an injury.

*Copyright © 2018 Path of Light Yoga Studio  
yourfirstname@yourlastname.com*

Path of Light Yoga Studio classes.html

[Figure 2.46 Full Alternative Text](#)

- Open the index.html page for the Path of Light Yoga Studio website in a text editor. Select File > Save As, and save the file with the new name of classes.html in the yoga folder. Now you are ready to edit the page.
1. **Web Page Title.** Modify the page title. Change the text contained between the <title> and </title> tags to the following:
    - Path of Light Yoga Studio :: Classes
  2. **Wireframe Main Content.**

1. Delete the Home Page content paragraphs, unordered list, and contact information.
2. Configure the following text in the heading 2 element:
  - Yoga Classes
3. Use a description list to configure information about the yoga classes. Configure the name of each class to have strong importance and bold font weight (use the **<strong>** phrase element) within a **dt** element. Configure **<dd>** elements for the class descriptions. The information follows:
  - Gentle Hatha Yoga
  - Intended for beginners and anyone wishing a grounded foundation in the practice of yoga, this 60 minute class of poses and slow movement focuses on asana (proper alignment and posture), pranayama (breath work), and guided meditation to foster your mind and body connection.
  - Vinyasa Yoga
  - Although designed for intermediate to advanced students, beginners are welcome to sample this 60 minute class that focuses on breath-synchronized movement—you will inhale and exhale as you flow energetically through yoga poses.
  - Restorative Yoga
  - This 90 minute class features very slow movement and long poses that are supported by a chair or wall. This calming, restorative experience is suitable for students of any level of experience. This practice can be a perfect way to help rehabilitate an injury.

Save your page and test it in a browser. Test the hyperlink from the classes.html page to index.html. Test the hyperlink from the index.html page to classes.html. If your links do not work, review your work with close attention to these details:

- Verify that you have saved the pages with the correct names in the correct folder.
- Verify your spelling of the page names in the anchor elements.

Test again after you make the changes.

# **3 Configuring Color and Text with CSS**

# Chapter Objectives

In this chapter, you will learn how to . . .

- Describe the evolution of style sheets from print media to the Web
- List advantages of using Cascading Style Sheets
- Configure background and text color on web pages
- Create style sheets that configure common color and text properties
- Apply inline styles
- Use embedded style sheets
- Use external style sheets
- Configure element, class, id, and descendant selectors
- Utilize the “cascade” in CSS
- Validate CSS

Now that you have been introduced to HTML, let’s explore Cascading Style Sheets (CSS). Web designers use CSS to separate the presentation style of a web page from the information on the web page. CSS is used to configure text, color, and page layout. CSS is not new—it was first proposed as a standard by the W3C in 1996. In 1998, additional properties for positioning web page elements were introduced to the language with CSS level 2 (CSS2), which was used for over a decade before reaching official “recommendation” status in 2011. CSS level 3 (CSS3) properties support features such as embedding fonts, rounded corners, and transparency. The CSS specification is divided into modules, each with a specific purpose. These modules move along the approval process independently. The W3C continues to evolve CSS, with proposals for many types of properties and functionality currently

in draft form. This chapter introduces you to the use of CSS on the Web as you explore how to configure color and text.

# **3.1 Overview of Cascading Style Sheets**

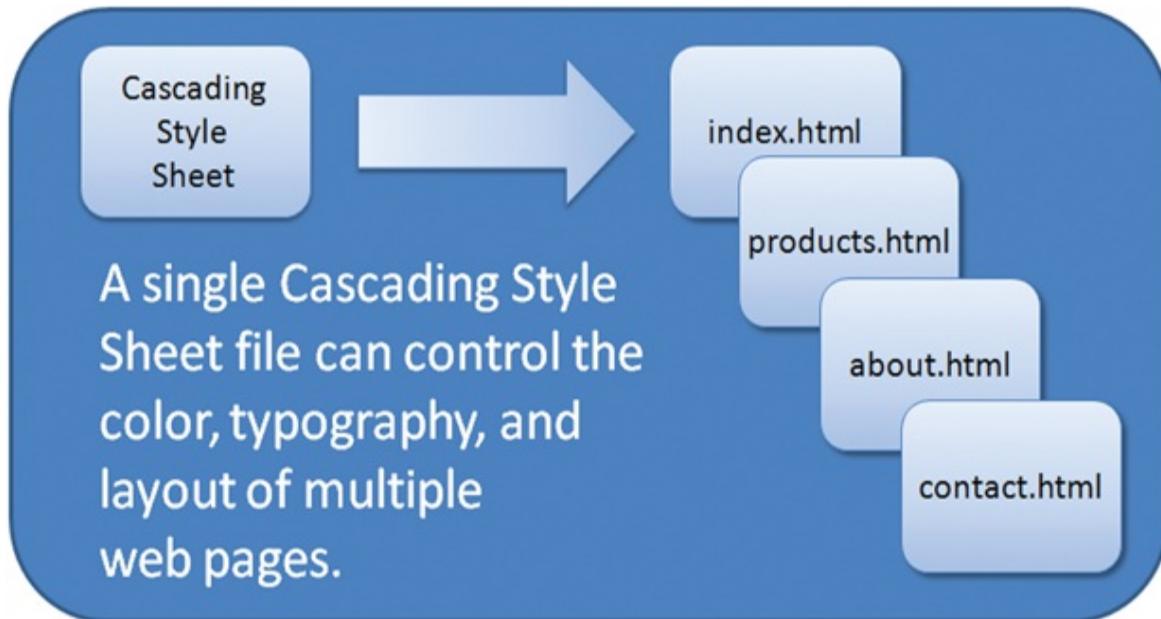
For years, style sheets have been used in desktop publishing to apply typographic styles and spacing instructions to printed media. CSS provides this functionality (and much more) for web developers. CSS allows web developers to apply typographic styles (typeface, font size, and so on) and page layout instructions to a web page. The CSS Zen Garden, <http://www.csszengarden.com>, exemplifies the power and flexibility of CSS. Visit this web site for an example of CSS in action. Notice how the content looks dramatically different depending on the design (CSS style rules) you select. Although the designs on the CSS Zen Garden are created by CSS masters, at some point these designers were just like you—starting out with CSS basics.

CSS is a flexible, cross-platform, standards-based language developed by the W3C. The W3C’s description of CSS can be found at <http://www.w3.org/Style>. Be aware that even though CSS has been in use for many years, it is still considered an emerging technology, and different browsers do not support it in exactly the same way. We concentrate on aspects of CSS that are well supported by popular browsers.

## **Advantages of Cascading Style Sheets**

There are several advantages to using CSS (see [Figure 3.1](#)):

### **Figure 3.1**



The power of a single CSS file

[Figure 3.1 Full Alternative Text](#)

- Typography and page layout can be better controlled. These features include font size, line spacing, letter spacing, indents, margins, and element positioning.
- Style is separate from structure. The format of the text and colors used on the page can be configured and stored separately from the body section of the web page document.
- Styles can be stored. You can store styles in a separate document and associate them with the web page. When the styles are modified, the HTML remains intact. This means, for example, that if your client decides to change the background color of a set of web pages from red to white, you only need to change one file that contains the styles, instead of modifying each web page document.
- Documents are potentially smaller. The formatting is separate from the document; therefore, the actual documents should be smaller.
- Site maintenance is easier. Again, if the styles need to be changed, then it is possible to complete the modifications by changing the style sheet

only.

An issue to be aware of when using CSS is that CSS technology is still not uniformly supported by all browsers. See <http://caniuse.com/#search=css3> for a list of CSS3 features supported by various browsers. This book will focus on aspects of CSS that are well supported by modern browsers and note when differences in syntax are needed.

## Configuring Cascading Style Sheets

Web developers use four methods to incorporate CSS technology: inline, embedded, external, and imported.

- Inline styles are coded in the body of the web page as an attribute of an HTML tag. The style applies only to the specific element that contains it as an attribute.
- Embedded styles (also referred to as internal styles) are defined within a style element in the head section of a web page. These style instructions apply to the entire web page document.
- External styles are coded in a separate text file. This text file is associated with the web page by configuring a link element in the head section.
- Imported styles are similar to external styles in that they can connect styles coded in a separate text file with a web page document. An external style sheet can be imported into embedded styles or into another external style sheet by using the @ import directive.

## CSS Selectors and Declarations

Style sheets are composed of style rules that describe the styling to be applied. Each rule has two parts: a selector and a declaration:

- CSS Style Rule Selector The selector can be an HTML element name, a class name, or an id name. In this section, we will focus on applying styles to element name selectors. We will work with class selectors and id selectors later in this chapter.
- CSS Style Rule Declaration The declaration indicates the CSS property you are setting (such as color) and the value you are assigning to the property.

For example, the CSS rule shown in [Figure 3.2](#) would set the color of the text used on a web page to blue. The selector is the body tag, and the declaration sets the color property to the value of blue.

## Figure 3.2



Using CSS to set the text color to blue

[Figure 3.2 Full Alternative Text](#)

## The background-color Property

The CSS `background-color` property configures the background color of an element. The following style rule will configure the background color of a web page to be yellow. Notice how the declaration is enclosed within braces and how the colon symbol (:) separates the declaration property and the declaration value.

```
body { background-color: yellow }
```

# The color Property

The CSS `color` property configures the text (foreground) color of an element. The following CSS style rule will configure the text color of a web page to be blue:

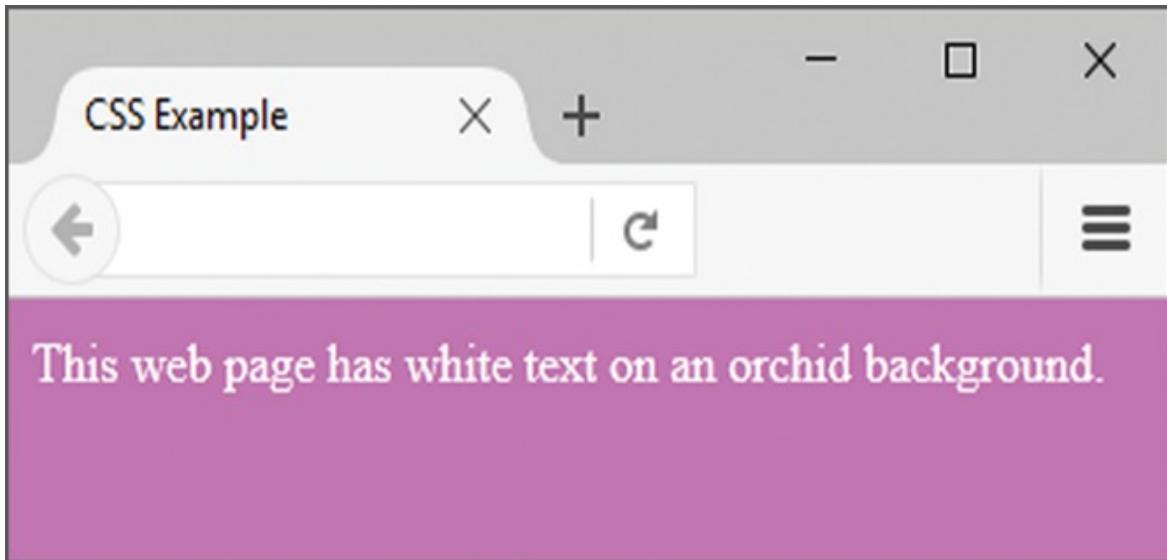
```
body { color: blue }
```

## Configure Background and Text Color

[Figure 3.3](#) displays a web page with a white text and an orchid background. To configure more than one property for a selector, use a semicolon (;) to separate the declarations as follows:

```
body { color: white; background-color: orchid; }
```

## Figure 3.3



A web page with orchid background color and white text color

### [Figure 3.3 Full Alternative Text](#)

The spaces in these declarations are optional. The ending semicolon (;) is also optional, but useful in case you need to add additional style rules at a later time. The following code samples are also valid:

```
body {color:white;background-color:orchid}
body { color: white;
      background-color: orchid; }
body {
      color: white;
      background-color: orchid;
}
```

You might be asking yourself how you would know what properties and values can be used. See the CSS Property Reference in Appendix E for a detailed list of CSS properties. This chapter introduces you to some of the CSS properties commonly used to configure color and text, shown in [Table 3.1](#). In the next sections, we'll take a look at how color is used on web pages.

## Table 3.1 CSS properties introduced in this chapter

Property	Description	Values
background-color	Background color of an element	Any valid color
color	Foreground (text) color of an element	Any valid color
font-family	Name of a font or font family	Any valid font or a font family such as serif, sans-serif, fantasy, monospace, or cursive
font-size	Size of the font	Varies; a numeric value with pt (standard font <b>point</b> sizes) or px ( <b>pixels</b> ) units or the unit em (which corresponds to the width of the uppercase M of the current font); a numeric percentage; and the text values xx-small, x-small, small, medium, large, x-large, and xx-large
font-style	Style of the font	normal, italic, or oblique
font-weight	The “boldness” or weight of the font	Varies; the text values normal, bold, bolder, and lighter and the numeric values 100, 200, 300, 400, 500, 600, 700, 800, and 900

<code>letter-spacing</code>	The space between characters	A numeric value (px or em) or normal (default)
<code>line-height</code>	The spacing allowed for the line of text	It is most common to use a percentage for this value; for example, a value of 200% would correspond to double-spacing.
<code>margin</code>	Shorthand notation to configure the margin surrounding an element	A numeric value (px or em); for example, <code>body {margin: 10px}</code> will set the page margins in the document to 10 pixels. When eliminating the margin, do not use the px or em unit—for example, <code>body {margin:0}</code>
<code>margin-left</code>	Configures the space in the left margin of the element	A numeric value (px or em), auto, or 0
<code>margin-right</code>	Configures the space in the right margin of the element	A numeric value (px or em), auto, or 0
<code>text-align</code>	The alignment of text	center, justify, left, or right
	Determines	

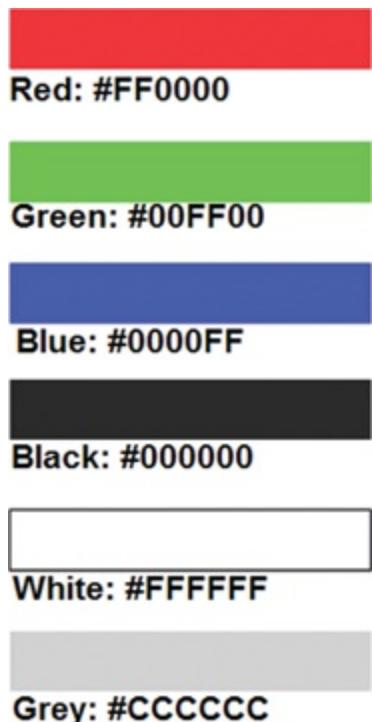
<code>text-decoration</code>	whether text is underlined; this style is most often applied to hyperlinks	The value “none” will cause a hyperlink not to be underlined in a browser that normally processes in this manner
<code>text-indent</code>	Configures the indentation of the first line of text	Numeric value (px or em) or percentage
<code>text-shadow</code>	Configures a drop shadow on the text displayed within an element. This CSS3 property is not supported in all browsers.	Two to four numerical values (px or em) to indicate horizontal offset, vertical offset, blur radius (optional), spread distance (optional), and a valid color value.
<code>text-transform</code>	Configures the capitalization of text	none (default), capitalize, uppercase, or lowercase
<code>white-space</code>	Configures the display of whitespace	normal (default), nowrap, pre, pre-line, or pre-wrap
<code>width</code>	The width of the content of an element	A numeric value (px or em), numeric percentage, or auto (default)

**word-spacing**      The space between words      A numeric value (px or em) or normal (default)

## 3.2 Using Color on Web Pages

Monitors display color as a combination of different intensities of red, green, and blue, a concept known as RGB color. RGB intensity values are numerical from 0 to 255. Each RGB color has three values, one each for red, green, and blue. These values are always listed in the same order (red, green, blue) and specify the numerical value of each color used (see the examples in [Figure 3.4](#)). You will usually use hexadecimal color values to specify RGB color on web pages.

### Figure 3.4



Color swatches and hexadecimal color values

[Figure 3.4 Full Alternative Text](#)

# Hexadecimal Color Values

Hexadecimal is the name for the base-16 numbering system, which uses the characters 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, and F to specify numeric values. Hexadecimal color values specify RGB color with numeric value pairs ranging from 00 to FF (0 to 255 in base 10). Each pair is associated with the amount of red, green, and blue displayed. Using this notation, one would specify the color red as #FF0000 and the color blue as #0000FF. The # symbol signifies that the value is hexadecimal. You can use either uppercase or lowercase letters in hexadecimal color values; #FF0000 and #ff0000 both configure the color red.

Don't worry—you won't need to do calculations to work with web colors. Just become familiar with the numbering scheme. See [Figure 3.5](#) for an excerpt from the color chart at <http://webdevfoundations.net/color>.

## Figure 3.5

#FFFFFF	#FFFFCC	#FFFF99	#FFFF66	#FFFF33	#FFFF00
#FFCCFF	#FFCCCC	#FFCC99	#FFCC66	#FFCC33	#FFCC00
#FF99FF	#FF99CC	#FF9999	#FF9966	#FF9933	#FF9900
#FF66FF	#FF66CC	#FF6699	#FF6666	#FF6633	#FF6600
#FF33FF	#FF33CC	#FF3399	#FF3366	#FF3333	#FF3300
#FF00FF	#FF00CC	#FF0099	#FF0066	#FF0033	#FF0000

Partial color chart

# Web-Safe Colors

Back in the day of 8-bit color monitors, web page color could be problematic and it was important to use one of the 216 web-safe colors, which display in a similar manner on both the Mac and PC platforms. The hexadecimal color values of web-safe colors use the numerals 00, 33, 66, 99, cc, and FF. The 216 web-safe colors make up the Web-Safe Color Palette, shown in Appendix H (also at <http://webdevfoundations.net/color>). Now that most monitors display millions of colors, using web-safe colors is less important. The Web-Safe Color Palette is rather limited, and it is common for today's web designers to choose colors creatively rather than select them only from the palette.

## CSS Color Syntax

CSS syntax allows you to configure colors in a variety of ways:

- color name
- hexadecimal color value
- hexadecimal shorthand color value
- decimal color value (RGB triplet)
- HSL (Hue, Saturation, and Lightness) color value notation new to CSS3; see <http://www.w3.org/TR/css3-color/#hsl-color>

Visit <http://meyerweb.com/eric/css/colors/> to view a chart with examples of configuring color values using different notations. We'll typically use hexadecimal color values in this book. [Table 3.2](#) shows CSS syntax examples that configure a paragraph with red text.

## Table 3.2 CSS color syntax examples

## CSS Syntax

## Color Type

```
p { color: red; }
```

Color name

```
p { color:  
#FF0000; }
```

Hexadecimal color value

```
p { color:  
#F00; }
```

Shorthand hexadecimal (one character for each hexadecimal pair; used only with web-safe colors)

```
p { color:  
rgb(255,0,0); }
```

Decimal color value (RGB triplet)

```
p { color:  
hsl(0, 100%,  
50%); }
```

HSL color values



## FAQ

1. Are there other methods to configure color with CSS?

Yes, the CSS3 Color Module provides a way for web developers to configure not only color but also the transparency of the color with RGBA (Red, Green, Blue, Alpha). and HSLA (Hue, Saturation, Lightness, Alpha) color. Also new to CSS3 is the opacity property, and CSS gradient backgrounds. You'll explore these techniques in [Chapter4](#).

.



# FAQ

1. How do I choose a color scheme for a web page?

There's a lot to consider when you select a color scheme for a website. The colors that you choose set the tone and help to create a web presence for the company or organization that appeals to the target audience. The colors you choose for text and background need to have good contrast in order to be readable. We'll explore techniques for choosing a color scheme in [Chapter5](#).

## 3.3 Inline CSS with the Style Attribute

Recall that there are four methods for configuring CSS: inline, embedded, external, and imported. In this section, we focus on inline CSS using the style attribute.

### The Style Attribute

Inline styles are coded as an attribute on an HTML tag using the style attribute. The value of the style attribute is set to the style rule declaration that you need to configure. Recall that a declaration consists of a property and a value. Each property is separated from its value with a colon (:). The following code will use inline styles to set the text color of an `<h1>` tag to a shade of red:

```
<h1 style="color:#cc0000">This is displayed as a red heading</h1>
```

If there is more than one property, they are separated by a semicolon (;). The following code configures the heading with a red text color and a gray background color:

```
<h1 style="color:#cc0000;background-color:#cccccc">  
This is displayed as a red heading on a gray background</h1>
```



### Hands-On Practice 3.1

In this Hands-On Practice, you will configure a web page with inline styles. The inline styles will specify the following:

- Global body tag styles for an off-white background with teal text. These styles will be inherited by other elements by default. For example:

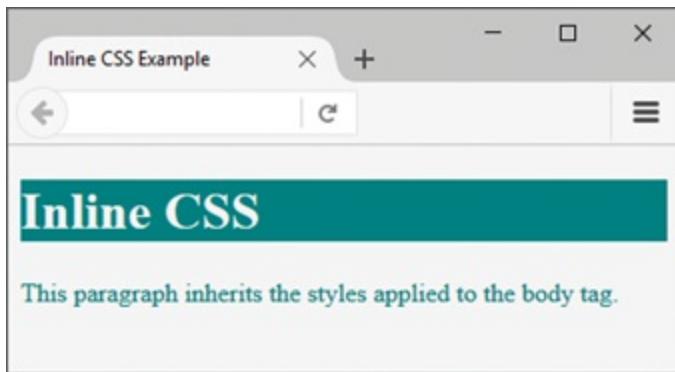
```
<body style="background-color:#F5F5F5;color:#008080;">
```

- Styles for an h1 element with a teal background with off-white text. This style will override the global styles configured on the body element. For example:

```
<h1 style="background-color:#008080;color:#F5F5F5;">
```

A sample is shown in [Figure 3.6](#). Launch a text editor. Select File > Open to edit the template file located at chapter2/template.html in the student files. Modify the title element, and add heading tags, paragraph tags, style attributes, and text to the body section as indicated by the following highlighted code:

## Figure 3.6



Web page using inline styles

### [Figure 3.6 Full Alternative Text](#)

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>Inline CSS Example</title>
<meta charset="utf-8">
</head>
<body style="background-color:#F5F5F5;color:#008080;">
```

```
<h1 style="background-color:#008080;color:#F5F5F5;">Inline CSS</h1>
<p>This paragraph inherits the styles applied to the body tag.</p>
</body>
</html>
```

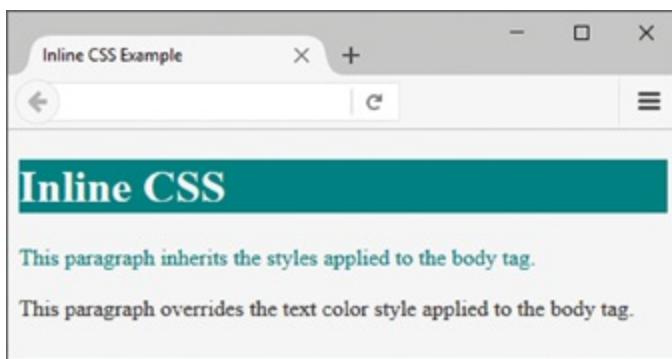
Save the document as inline.html on your hard drive or flash drive. Launch a browser to test your page. It should look similar to the page shown in [Figure 3.6](#). Note that the inline styles applied to the body tag are inherited by other elements on the page (such as the paragraph) unless more-specific styles are specified (such as those coded on the `<h1>` tag). You can compare your work with the solution found in the student files (chapter3/inline.html).

Let's continue and add another paragraph, with the text color configured to be dark gray:

```
<p style="color:#333333">This paragraph overrides the text color
```

Save the document as inlinep.html. It should look similar to the page shown in [Figure 3.7](#). You can compare your work with the solution found in the student files (chapter3/inlinep.html). Note that the inline styles applied to the second paragraph override the global styles applied to the body of the web page.

## Figure 3.7



The second paragraph's inline styles override the global styles configured on the body tag

[Figure 3.7 Full Alternative Text](#)



# FAQ

## 1. Are inline styles recommended?

While inline styles can sometimes be useful, you'll find that you won't use this technique much in practice—it's inefficient, adds extra code to the web page document, and is inconvenient to maintain. However, inline styles can be quite handy in some circumstances, such as when you post an article to a content management system or blog and need to tweak the sitewide styles a bit to help get your point across.

## 3.4 Embedded CSS with the Style Element

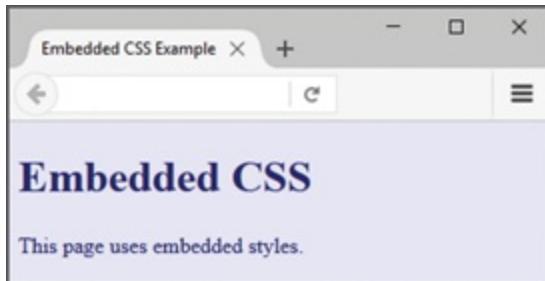
In the previous Hands-On Practice, you added inline styles for one of the paragraphs. To do so, you coded a style attribute on the paragraph element. But what if you needed to configure the styles for 10 or 20 paragraphs instead of just one? Using inline styles, you might be doing a lot of repetitive coding! While inline styles apply to one HTML element, embedded styles apply to an entire web page.

### Style Element

Embedded styles are placed within a style element located in the head section of a web page. The opening `<style>` tag and the closing `</style>` tag contain the list of embedded style rules.

The web page in [Figure 3.8](#) uses embedded styles to set the text color and background color of the web page document with the body element selector. See the example in the student files at chapter3/embed.html. The code follows:

### Figure 3.8



Web page with embedded styles

### Figure 3.8 Full Alternative Text

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>Embedded Styles</title>
<meta charset="utf-8">
<style>
body { background-color: #E6E6FA;
      color: #191970;
}
</style>
</head>
<body>
<h1>Embedded CSS</h1>
<p>This page uses embedded styles.</p>
</body>
</html>
```

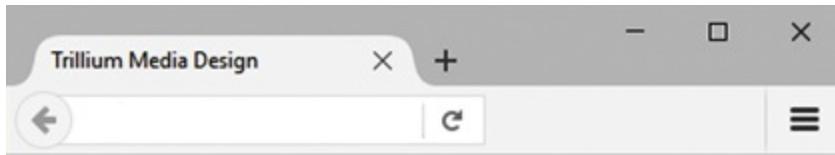
Notice the way the style rules were coded, with each rule on its own line. This formatting is not required for the styles to work, but it makes the styles more readable and easier to maintain than one long row of text. The styles are in effect for the entire web page document because they were applied to the <body> tag using the body element selector.



## Hands-On Practice 3.2

Launch a text editor, and open the starter.html file from the chapter3 folder in the student files. Save your page as embedded.html, and test it in a browser. Your page should look similar to the one shown in [Figure 3.9](#).

### Figure 3.9



# Trillium Media Design

[Home](#) [Services](#) [Contact](#)

## New Media and Web Design

Trillium Media Design offers a comprehensive range of services to take your company's Web presence to the next level. We offer a comprehensive range of services.

- Website Design
- Interactive Animation
- E-Commerce Solutions
- Usability Studies
- Search Engine Optimization

## Meeting Your Business Needs

Our expert designers will listen to you as they create a website that helps to promote and grow your business.

Copyright © 2018 Your Name Here

The web page without any styles

### [Figure 3.9 Full Alternative Text](#)

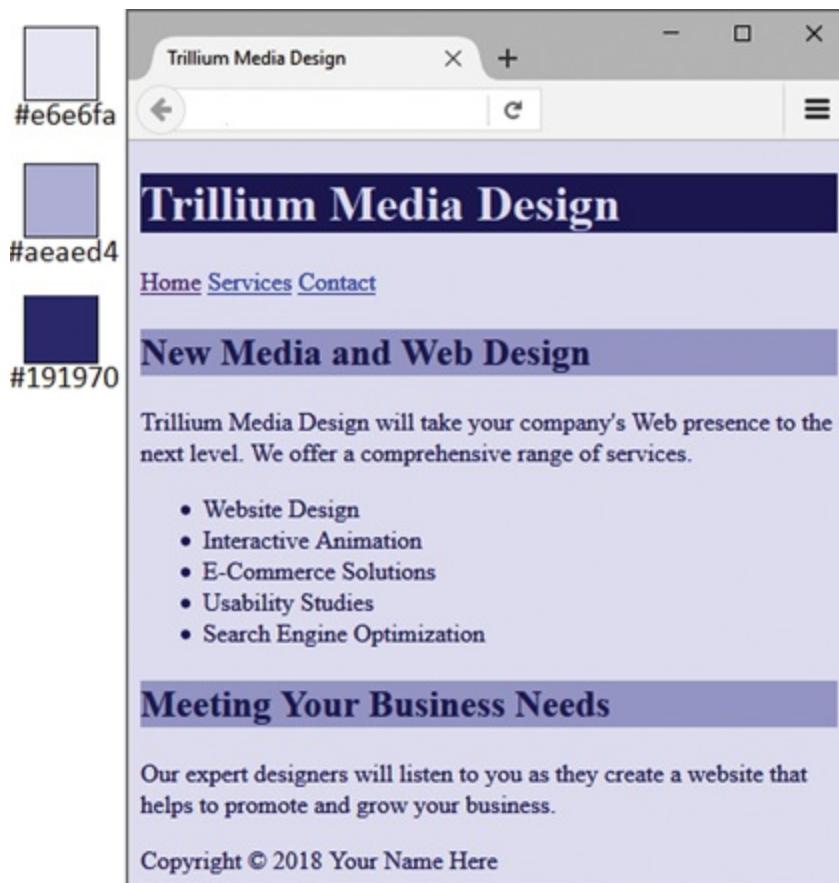
Open the file in a text editor, and view the source code. Notice that the web page code uses the `<header>`, `<nav>`, `<main>`, `<footer>`, `<h1>`, `<h2>`, `<p>`, `<ul>`, and `<li>` elements. In this Hands-On Practice, you will code embedded styles to configure selected background and text colors. You will use the `body` element selector to configure the default background color (#e6e6fa) and default text color (#191970) for the entire page. You will also use the `h1` and `h2` element selectors to configure different background and text colors for the heading areas. Edit the `embedded.html` file in a text editor, and add the following code below the `<title>` element in the head section of the web

page:

```
<style>
body { background-color: #e6e6fa; color: #191970; }
h1 { background-color: #191970; color: #e6e6fa; }
h2 { background-color: #aeaed4; color: #191970; }
</style>
```

Save your file, and test it in a browser. [Figure 3.10](#) displays the web page along with corresponding color swatches. A monochromatic color scheme was chosen. Notice how the repetition of a limited number of colors unifies the design of the web page. View the source code for your page, and review the CSS and HTML code. An example of this web page is in the student files at chapter3/3.2/embedded.html. Note that all the styles were located in a single place on the web page. Since embedded styles are coded in a specific location, they are easier to maintain over time than inline styles. Also, notice that you coded the styles for the h2 element selector only once (in the head section), and *both* of the <h2> elements applied the h2 style. This approach is more efficient than coding the same inline style on each <h2> element. However, it is uncommon for a website to have only one page. Repeating the CSS in the head section of each web page file is inefficient and difficult to maintain. In the next section, you'll use a more productive approach—configuring an external style sheet.

## Figure 3.10



The web page after embedded styles are configured

[Figure 3.10 Full Alternative Text](#)



## 1. My CSS doesn't work; what can I do?

Coding CSS is a detail-oriented process. There are several common errors that can cause the browser not to apply CSS correctly to a web page. With a careful review of your code and the following tips, you should get your CSS working:

- Verify that you are using the colon (:) and semicolon (;) symbols in

the right spots—they are easy to confuse. The colon should separate the properties from their values, while the semicolon should be placed between each property:value configuration.

- Check that you are not using equal (=) signs instead of colons (:) between each property and its value.
- Verify that curly braces ({ and }) are properly placed around the style rules for each selector.
- Check the syntax of your selectors, the selectors' properties, and the property values for correct usage.
- If part of your CSS works and part doesn't, read through the CSS and determine the first rule that is not applied. Often, the error is in the rule above the rule that is not applied.
- Use a validation application to check your CSS code. The W3C has a free CSS code validator at <http://jigsaw.w3.org/css-validator>. The W3C's CSS validator can help you find syntax errors. See Section 3.11 for an overview of how to use this tool to validate your CSS.



## Checkpoint 3.1

1. List three reasons to use CSS on a web page.
2. When designing a page that uses colors other than the default colors for text and background, explain why it is a good reason to configure both the text color and the background color.
3. Describe one advantage to using embedded styles instead of inline styles.

## 3.5 Configuring Text with CSS

In [Chapter 2](#), you discovered how to use HTML to configure some characteristics of text on web pages, including phrase elements such as the `<strong>` element. You have also already configured text color using the CSS `color` property. In this section, you will learn to use CSS to configure font typeface. Using CSS to configure text is more flexible (especially when using an external style sheet, as you will discover later in the chapter) than using HTML elements and is the method preferred by modern web developers.

### The `font-family` Property

The `font-family` property configures font typeface. A web browser displays text using the fonts that have been installed on the user's computer. When a font is specified that is not installed on your web visitor's computer, the default font is substituted. Times New Roman is the default font displayed by most web browsers. [Figure 3.11](#) shows font family categories.

### Figure 3.11

## Font Family

Category	Font Family Description	Font Typeface Examples
serif	Serif fonts have small embellishments on the end of letter strokes; often used for headings.	Times New Roman, Georgia, Palatino
sans-serif	Sans-serif fonts do not have serifs; often used for web page text.	Arial, Tahoma, Helvetica, Verdana
monospace	Fixed-width font; often used for code samples.	Courier New, Lucida Console
cursive	Hand-written style; use with caution; may be difficult to read on a web page.	<i>Lucida Handwriting, Brush Script, Comic Sans MS</i>
fantasy	Exaggerated style; use with caution; sometimes used for headings; may be difficult to read on a web page.	<i>Jokerman, Impact, Papyrus</i>

## Common fonts

[Figure 3.11 Full Alternative Text](#)

The Verdana, Tahoma, and Georgia font typefaces were specifically designed to display well on computer monitors. A common practice is to use a serif font (such as Georgia or Times New Roman) for headings and a sans-serif font (such as Verdana or Arial) for detailed text content. Not every computer has the same fonts installed. See <http://www.ampsoft.net/webdesign1/WindowsMacFonts.html> for a list of web-safe fonts. Create a built-in backup plan by listing multiple fonts and categories for the value of the font-family property. The browser will attempt to use the fonts in the order listed. The following CSS configures the p element selector to display text in Arial (if installed), Helvetica (if installed), or the default installed sans-serif font:

```
p { font-family: Arial, Helvetica, sans-serif; }
```



## Hands-On Practice 3.3

Launch a text editor, and open the starter2.html file from the chapter3 folder in the student files.

Locate the style tags in the head section, and code embedded CSS to style the following:

1. Configure the body element selector to set global styles to use a sans-serif font typeface, such as Verdana or Arial. An example is

```
body { font-family: Verdana, Arial, sans-serif; }
```

2. Configure h2 and h3 element selectors to use a serif font typeface, such as Georgia or Times New Roman. You can configure more than one selector in a styles rule by placing a comma before each new selector. Notice that “Times New Roman” is enclosed within quotation marks because the font name is more than a single word. Code the following style rule:

```
h2, h3 { font-family: Georgia, "Times New Roman", serif; }
```

Save your page as index.html in a folder named kayak3. Launch a browser and test your page. It should look similar to the one shown in [Figure 3.12](#). A sample solution is in the chapter3/3.3 folder.

## Figure 3.12

The screenshot shows a web browser window with the title bar "KayakDoorCounty.net". Below the title bar is a navigation bar with icons for back, forward, search, and menu. The main content area features a large, bold header "KayakDoorCounty.net". Below the header is a menu with links "Home", "Tours", "Reservations", and "Contact". A bold sub-header "Your next adventure is only a paddle away ...." follows. A descriptive text block says "Take a guided kayak tour while you explore the shoreline of scenic Door County." Below this is a section titled "Featured tours this week:" with a bulleted list: "• Cana Island", "• Mink River", and "• Europe Lake". At the bottom of the page is a copyright notice "Copyright © 2018 KayakDoorCounty.net".

The new home page

[Figure 3.12 Full Alternative Text](#)



## FAQ

1. I've heard about "embedding" fonts in order to use special fonts on a web page—what's that all about?

For many years, web designers have been limited to a set of common fonts for text on web pages. CSS3 introduced `@font-face`, which can be used to "embed" other fonts within web pages although you actually provide the location of the font and the browser downloads it. For example, if you own the rights to freely distribute the font named MyAwesomeFont and it is stored in a file myawesomefont.woff in the same folder as your web page, the following CSS will make it available

to your web page visitors:

```
@font-face { font-family: MyAwesomeFont;  
    src: url(myawesomefont.woff) format("woff"); }
```

After you code the @font-face rule, you can apply that font to a selector in the usual way, such as in the following example that configures h1 elements:

```
h1 { font-family: MyAwesomeFont, Georgia, serif; }
```

Current browsers support @font-face but there can be copyright issues. When you purchase a font for use on your own computer you do not necessarily purchase the right to freely distribute it. Visit <http://www.fontsquirrel.com> to browse a selection of commercial-use free fonts available for download and use.

Google Web Fonts provides a collection of free hosted embeddable web fonts. Explore the fonts available at <http://www.google.com/webfonts>. Once you choose a font, all you need to do is:

1. Copy and paste the link tag provided by Google in your web page document. (The link tag associates your web page with a CSS file that contains the appropriate @font-face rule.)
2. Configure your CSS font-family property with the Google web font name.

See the Getting Started guide at [https://developers.google.com/fonts/docs/getting\\_started](https://developers.google.com/fonts/docs/getting_started) for more information. Use web fonts judiciously to conserve bandwidth and avoid applying multiple web fonts to a web page. It's a good idea to use just one web font on a web page along with your typical fonts. This can provide you a way to use an uncommon font typeface in page headings and/or navigation without the need to create graphics for these page areas.

## More CSS Text Properties

CSS provides you with lots of options for configuring the text on your web pages. In this section, you will explore the `font-size`, `font-weight`, `font-style`, `line-height`, `text-align`, `text-decoration`, `text-indent`, `letter-spacing`, `word-spacing`, `text-shadow`, and `text-transform` properties.

## The `font-size` Property

The `font-size` property sets the size of the font. [Table 3.3](#) lists several commonly used categories of font-size values. As you review the table you'll see a wide variety of text and numeric values—there are almost too many choices available. See the notes in [Table 3.3](#) for recommended use.

### Table 3.3 Configuring font size

Value Category	Values	Notes
Text Value	xx-small, x-small, small, medium (default), large, x-large, xx-large	Scales well when text is resized in browser; limited options for text size
Pixel Unit (px)	Numeric value with unit, such as 10 px	Pixel-perfect display depends on screen resolution; may not scale in every browser when text is resized
Point Unit	Numeric value with	Use to configure print version of web page (see <a href="#">Chapter 7</a> ); may

(pt)	unit, such as 10 pt	not scale in every browser when text is resized
Em Unit (em)	Numeric value with unit, such as .75 em	Recommended by W3C; scales well when text is resized in browser; many options for text size
Percentage Value	Numeric value with percentage, such as 75%	Recommended by W3C; scales well when text is resized in browser; many options for text size

The em unit is a relative font unit that has its roots in the print industry, dating back to the day when printers set type manually with blocks of characters. An em unit is the width of a square block of type (typically the uppercase M) for a particular font and type size. On web pages, an em unit corresponds to the width of the font and size used in the parent element (typically the body element). So, the size of an em unit is relative to the font-typeface and default size. Percentage values work in a similar manner to em units. For example, `font-size: 100%` and `font-size: 1em` should render the same in a browser. To compare font sizes on your computer, launch a browser and view chapter3/fonts.html in the student files.

## The `font-weight` Property

The `font-weight` property configures the boldness of the text. Configuring the CSS rule `font-weight: bold;` has a similar effect as the `<strong>` or `<b>` HTML element.

## The `font-style` Property

The `font-style` property typically is used to configure text displayed in italics. Valid values for `font-style` are `normal` (the default), `italic`, and `oblique`. The CSS `font-style: italic;` has the same visual effect in the browser as an `<i>` or `<em>` HTML element.

## The line-height Property

The `line-height` property modifies the default height of a line of text and is often configured with a percentage value. For example, code `line-height: 200%;` to configure text to appear double spaced.

## The text-align Property

HTML elements are left-aligned by default; They begin at the left margin. The CSS `text-align` property configures the alignment of text and inline elements within block display elements such as headings, paragraphs, and divs. The values for the `text-align` property are `left` (default), `right`, and `center`. The following CSS code sample configures an `h1` element to have centered text:

```
h1 { text-align: center; }
```

## The text-indent Property

The CSS `text-indent` property configures the indentation of the first line of text within an element. The value can be numeric (such as a `px`, `pt`, or `em` unit) or a percentage. The following CSS code sample configures the first line of all paragraphs to be indented:

```
p { text-indent: 5em; }
```

## The text-decoration Property

The purpose of the CSS `text-decoration` **property** is to modify the display of text. Commonly used values for the text-decoration property include none, underline, overline, and line-through. Did you ever wonder why some hyperlinks are not underlined? Although hyperlinks are underlined by default, you can remove the underline with the text-decoration property. The following code sample removes the underline on a hyperlink:

```
a { text-decoration: none; }
```

## The `text-transform` Property

The `text-transform` property configures the capitalization of text. Valid values for text-transform are none (default), capitalize, uppercase, or lowercase. The following code sample causes all the text within an h3 element to be displayed in uppercase:

```
h3 { text-transform: uppercase; }
```

## The `letter-spacing` Property

The `letter-spacing` property configures the space between text characters. Valid values for letter-spacing are normal (default) and a numeric pixel or em unit. The following code sample configures extra spacing between characters within an h3 element:

```
h3 { letter-spacing: 3px; }
```

## The `word-spacing` Property

The `word-spacing` property configures the space between words. Valid values for word-spacing are normal (default) and a numeric pixel or em unit. The following code sample configures extra spacing between words within an h3 element:

```
h3 { word-spacing: 2em; }
```

## The white-space Property

The white-space property specifies the way that whitespace (such as a space character, or line feed within code) is displayed by the browser. The default browser behavior is to collapse adjacent whitespace to a single space character. Commonly used values for white-space are normal (default), nowrap (text will not wrap to the next line), and pre (preserves all whitespace in the browser display).

## CSS3 text-shadow Property

The CSS3 text-shadow property adds depth and dimension to text displayed on web pages. Configure a text shadow by coding values for the shadow's horizontal offset, vertical offset, blur radius (optional), and color:

- Horizontal offset. Use a numeric pixel value. Positive value configures a shadow on the right. Negative value configures a shadow on the left.
- Vertical offset. Use a numeric pixel value. Positive value configures a shadow below. Negative value configures a shadow above.
- Blur radius (optional). Configure a numeric pixel value. If omitted, defaults to the value 0 which configures a sharp shadow. Higher values configure more blur.
- Color value. Configure a valid color value for the shadow.

The following code configures a dark gray shadow with 3px horizontal offset, 2px vertical offset, and 5px blur radius:

```
text-shadow: 3px 2px 5px #666;
```



## Hands-On Practice 3.4

Now that you've got a collection of new CSS properties for font and text - configuration, let's try them out. You will use the file from [Hands-On Practice 3.2](#) (see the student files chapter3/3.2/index.html) as a starting point. Launch a text editor, and open the file. You will now code additional CSS styles to configure the text on the page.

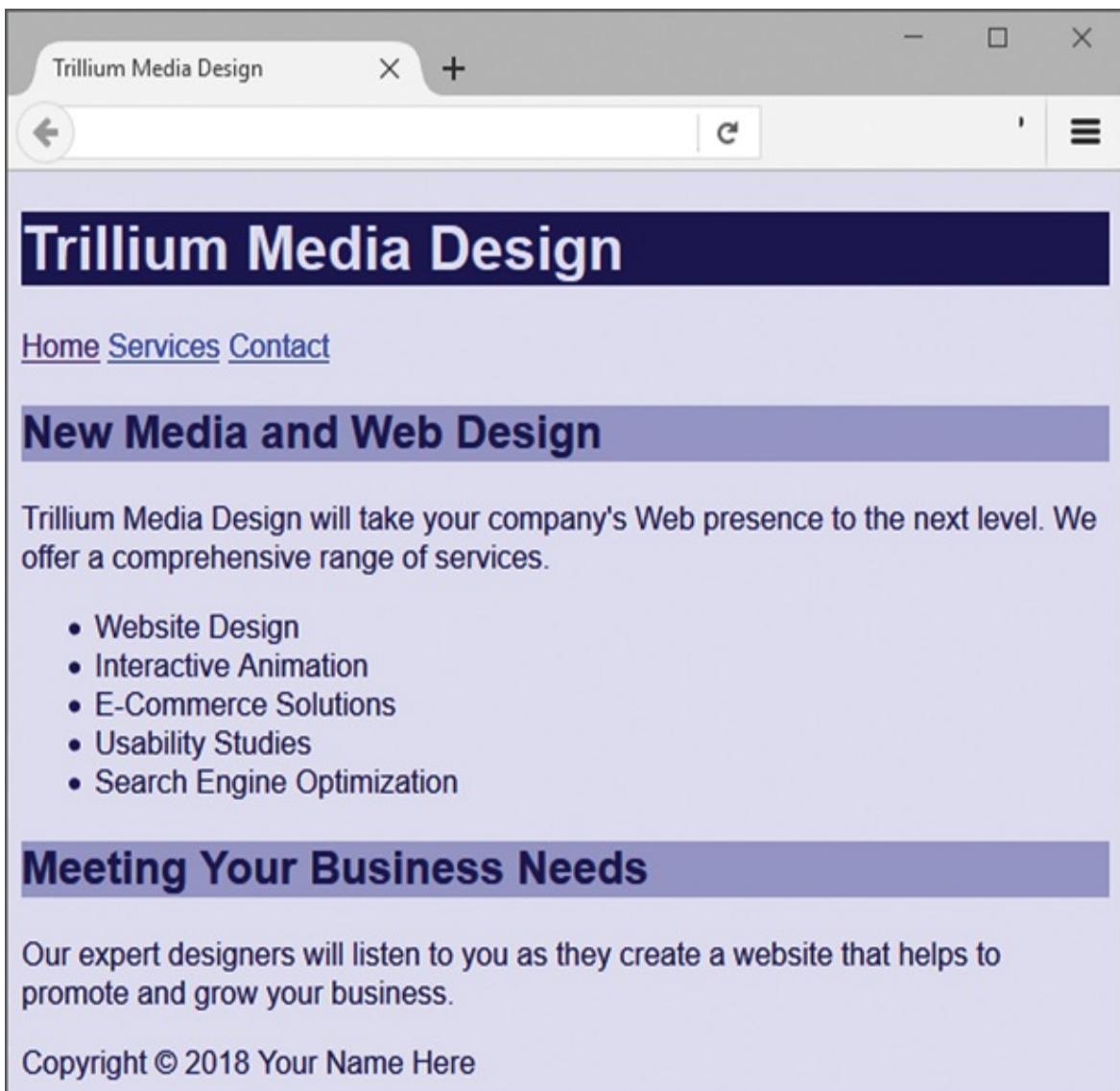
### Set Default Font Properties for the Page

As you have already seen, CSS rules applied to the body selector apply to the entire page. Modify the CSS for the body selector to display text using a sans-serif font. The new font typeface style declaration shown in the following code will apply to the entire web page unless more specific style rules are applied to an element selector (such as h1 or p), a class, or an id (more on classes and ids later):

```
body { background-color: #E6E6FA;  
      color: #191970;  
      font-family: Arial, Verdana, sans-serif; }
```

Save your page as embedded1.html, and test it in a browser. Your page should look similar to the one shown in [Figure 3.13](#). Notice that just a single line of CSS changed the font typeface of all the text on the page!

### Figure 3.13



CSS configures the font on the web page

[Figure 3.13 Full Alternative Text](#)

## Configure the h1 Selector

Now you will configure the `line-height`, `font-family`, `text-indent`, and `text-shadow` CSS properties. Set the `line-height` property to 200%; this will add a bit of empty space above and below the heading text. (In [Chapters 4](#) and [6](#), you will explore other CSS properties, such as the margin, border,

and padding, that are more commonly used to configure space surrounding an element.) Next, modify the h1 selector to use a serif font. When a font name - contains spaces, type quotes as indicated in the code that follows. While it is generally recognized that blocks of text using sans-serif fonts are easier to read, it is common to use a serif font to configure page or section headings. Indent the text 1em unit. Configure a gray (#CCCCCC) text shadow with a 3 pixel vertical offset, 3 pixel horizontal offset, and 5 pixel blur radius.

```
h1 { background-color: #191970;  
    color: #E6E6FA;  
    line-height: 200%;  
    font-family: Georgia, "Times New Roman", serif;  
    text-indent: 1em;  
    text-shadow: 3px 3px 5px #CCCCCC; }
```

Save your page and test it in a browser.

## Configure the h2 Selector

Configure the CSS rule to use the same font typeface as the h1 selector and to display centered text.

```
h2 { background-color: #AEAED4;  
    color: #191970;  
    font-family: Georgia, "Times New Roman", serif;  
    text-align: center; }
```

## Configure the Navigation Area

The navigation links would be more prominent if they were displayed in a larger and bolder font. Code a selector for the nav element that sets the font-size, font-weight, and word-spacing properties.

```
nav { font-weight: bold;  
    font-size: 1.25em;  
    word-spacing: 1em; }
```

# Configure the Paragraphs

Edit the HTML, and remove the line break tag that is after the first sentence of each paragraph; these line breaks look a bit awkward. Next, configure text in paragraphs to display just slightly smaller than the default text size. Use the `font-size` property set to `.90em`. Configure the first line of each paragraph to be indented. Use the `text-indent` property to configure a `3em` indent.

```
p { font-size: .90em;  
    text-indent: 3em; }
```

# Configure the Unordered List

Configure the text displayed in the unordered list to be bold.

```
ul { font-weight: bold; }
```

Save your page as `index.html` in a folder named `trillium3`. Test it in a browser. Your page should look similar to the one shown in [Figure 3.14](#). The student files contain a sample solution at `chapter3/3.4/index.html`. CSS is quite powerful—just a few lines of code significantly changed the appearance of the web page. You may be wondering if even more customization is possible. For example, what if you did not want all the paragraphs to display in exactly the same way? While you could add inline styles to the web page code, that is usually not the most efficient technique. The next section introduces the CSS class and id selectors, which are widely utilized to configure specific page elements.

## Figure 3.14

The screenshot shows a web browser window with the title bar "Trillium Media Design". The main content area displays the website for "Trillium Media Design". At the top, there is a dark blue header with the company name in white. Below the header, a navigation menu includes "Home", "Services", and "Contact". A purple banner below the menu features the text "New Media and Web Design". The main content area contains a paragraph about the company's services and a bulleted list of offerings: "Website Design", "Interactive Animation", "E-Commerce Solutions", "Usability Studies", and "Search Engine Optimization". Another purple banner at the bottom is titled "Meeting Your Business Needs". Below this banner, a paragraph states: "Our expert designers will listen to you as they create a website that helps to promote and grow your business." At the very bottom, a copyright notice reads "Copyright © 2018 Your Name Here".

CSS configures color and text properties on the web page

[Figure 3.14 Full Alternative Text](#)



## FAQ

1. Is there a quick way to apply the same styles to more than one HTML tag or more than one class?

Yes, you can apply the same style rules to multiple selectors (such as HTML elements, classes, or ids) by listing the selectors in front of the style rule. Place a comma between each selector. The following code sample shows the `font-size` of `2em` being applied to both the paragraph and list item elements:

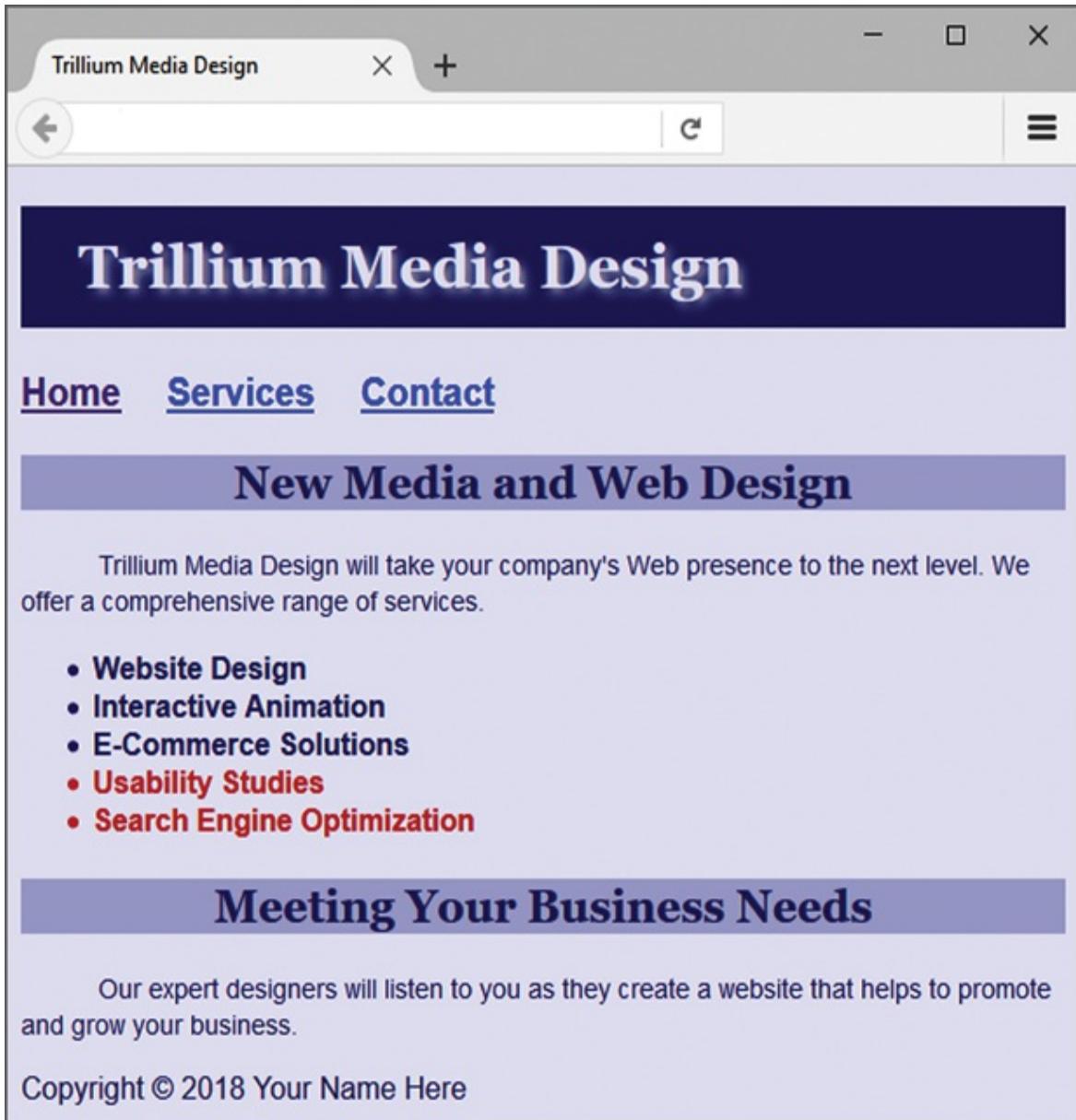
```
p, li { font-size: 2em; }
```

## **3.6 CSS Class, Id, and Descendant Selectors**

### **The Class Selector**

Use a CSS class selector when you need to apply a CSS declaration to certain elements on a web page and not necessarily tie the style to a particular HTML element. See [Figure 3.15](#), and notice that the last two items in the unordered list are displayed in a different color than the others; this is an example of using a class. When setting a style for a class, configure the class name as the selector. Place a dot, or period (.), in front of the class name in the style sheet. The following code configures a class called `feature` in a style sheet with a foreground (text) color set to a medium red:

### **Figure 3.15**



Using a class selector

### Figure 3.15 Full Alternative Text

```
.feature { color: #C70000; }
```

The styles set in the new class can be applied to any element you wish. You do this by using the class attribute, such as `class="feature"`. Do not type the dot in front of the class value in the opening tag where the class is being applied. The following code will apply the feature class styles to two `<li>` elements:

```
<li class="feature">Usability Studies</li>  
<li class="feature">Search Engine Optimization</li>
```

## The Id Selector

Use a CSS id selector to identify and apply a CSS rule uniquely to a *single* area on a web page. Unlike a class selector which can be applied multiple times on a web page, an id may only be applied once per web page. When setting a style for an id, place a hash mark (#) in front of the id name in the style sheet. An id name may contain letters, numbers, hyphens, and underscores. Id names may not contain spaces. The following code will configure an id called **feature** in a style sheet:

```
#feature { color: #333333; }
```

The styles set in the feature id can be applied to any element you wish by using the id attribute, `id="feature"`. Do not type the # in front of the id value in the opening tag. The following code will apply the **feature** id styles to a **div** tag:

```
<div id="feature">This sentence will be displayed using styles co
```

Using CSS with an id selector is similar to using CSS with a class selector. Use an id selector to configure a single element on a web page. Use a class selector to configure one or more elements on a web page.

## The Descendant Selector

Use a CSS descendant selector when you want to specify an element within the context of its container (parent) element. Using descendant selectors can help you to reduce the number of different classes and ids but still allows you to configure CSS for specific areas on the web page. To configure a descendant selector, list the container selector (which can be an element selector, class, or id) followed by the specific selector you are styling. For

example, to specify a green text color for paragraphs located *within* the main element, code the following style rule:

```
main p { color: #00ff00; }
```



## Hands-On Practice 3.5

In this Hands-On Practice, you will use the Trillium Media Design file from [Hands-On Practice 3.4](#) (see the student files chapter3/3.4/index.html) as a starting point and modify the CSS and the HTML in the page to configure the navigation hyperlinks, content area, and page footer area. Launch a text editor, and open the index.html file.

## Configure the Navigation Hyperlinks

Navigation hyperlinks are often displayed on web pages without the default underline by configuring the text-decoration property and applying that property to a descendant selector that targets only the anchor tags in the navigation area. Configure embedded CSS before the closing style tag. Code a descendant selector that specifies the hyperlinks with the nav element and set the text-decoration property.

```
nav a { text-decoration: none; }
```

## Configure the Content Area

Trillium Media Design would like to draw attention to its new usability and search optimization services. Configure embedded CSS before the closing style tag. Create a class named feature that configures the text color to be a

medium dark red (#C70000).

```
.feature { color: #C70000; }
```

Modify the last two items in the unordered list. Add a class attribute to each opening li tag that associates the list item with the feature class as follows:

```
<li class="feature">Usability Studies</li>
<li class="feature">Search Engine Optimization</li>
```

## Configure the Footer Area

Configure embedded CSS before the closing style tag. Code a selector for the footer element that sets the text color, font-size, and font-style properties.

```
footer { color: #333333;
          font-size: .75em;
          font-style: italic; }
```

Modify the HTML and code a yourfirstname@yourlastname.com e-mail hyperlink (refer to [Chapter 2](#)) within the footer element on a line below the copyright information.

Save your file and test it in a browser. Your page should look similar to the image shown in [Figure 3.16](#). See chapter3/3.5/index.html in the student files for a sample solution. Notice how the footer element, class, and nav hyperlinks styles are applied. Although the hyperlinks in the navigation area do not display with an underline, the e-mail hyperlink in the footer area displays with the default underline.

## Figure 3.16

The screenshot shows a web browser window with the title bar "Trillium Media Design". The main content area features a dark blue header with the company name "Trillium Media Design" in white. Below the header is a navigation menu with links for "Home", "Services", and "Contact". A purple banner highlights the service "New Media and Web Design". A descriptive paragraph explains their services, followed by a bulleted list of offerings including Website Design, Interactive Animation, E-Commerce Solutions, Usability Studies, and Search Engine Optimization. Another purple banner at the bottom states "Meeting Your Business Needs". At the very bottom, there is a copyright notice.

Trillium Media Design

Home Services Contact

New Media and Web Design

Trillium Media Design will take your company's Web presence to the next level. We offer a comprehensive range of services.

- Website Design
- Interactive Animation
- E-Commerce Solutions
- Usability Studies
- Search Engine Optimization

Meeting Your Business Needs

Our expert designers will listen to you as they create a website that helps to promote and grow your business.

Copyright © 2018 Your Name Here  
[yourfirstname@yourlastname.com](mailto:yourfirstname@yourlastname.com)

The new home page

Figure 3.16 Full Alternative Text



FAQ

## 1. How do you choose class and id names?

You can choose almost any name you wish for a CSS class or id. However, CSS class names are more flexible and easier to maintain over time if they are descriptive of the structure rather than of specific formatting. For example, a class name of largeBold would no longer be meaningful if the design were changed to display the area differently; however, a structural class name such as item, content, or subheading is meaningful regardless of how the area is configured. Here are more hints for class names:

- Use short but descriptive names.
- Always begin with a letter.
- Avoid spaces in class names.
- Feel free to use numerals, the dash character, and the underscore character in addition to letters.

Be wary of “classitis”—that is, creating a brand new class each time you need to configure text a bit differently. Decide ahead of time how you will configure page areas, code your classes, and apply them. The result will be a more cohesive and better organized web page.

## 3.7 Span Element

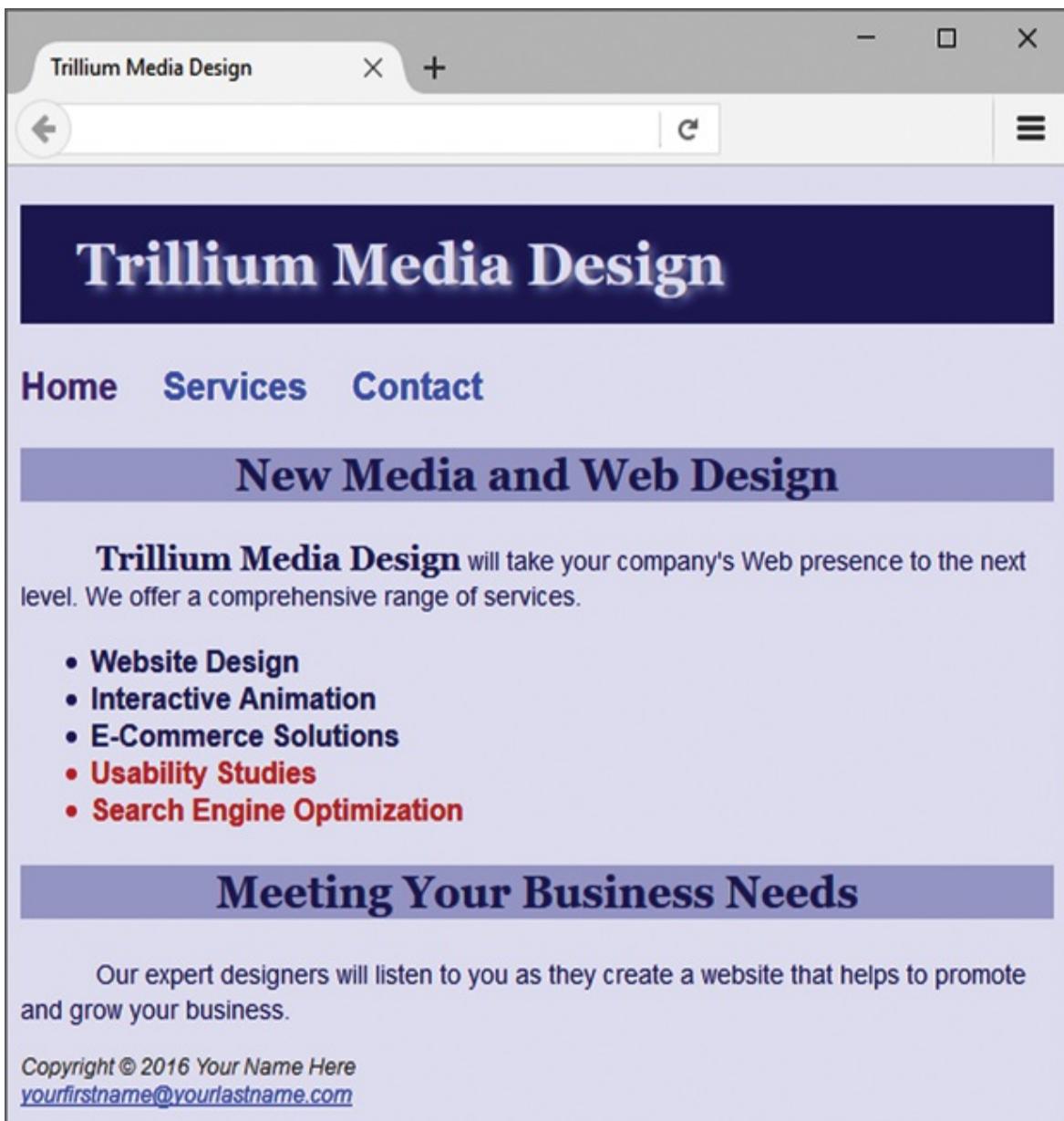
Recall from [Chapter 2](#) that the div element configures a section or division on a web page with empty space above and below. The div element is useful when you need to format a section that is physically separated from the rest of the web page, referred to as a block display. In contrast, the span element defines a section on a web page that is *not* physically separated from other areas; this formatting is referred to as inline display. Use the <span> tag if you need to format an area that is contained within another, such as within a <p>, <blockquote>, <li>, or <div> tag.



### Hands-On Practice 3.6

You will experiment with the span element in this Hands-On Practice by configuring a new class to format the company name when it is displayed within the text on the page and using the span element to apply this class. Use the file from [Hands-On Practice 3.5](#) (see the student files chapter3/3.5/index.html) as a starting point. Open the file in a text editor. Your web page will look similar to the one shown in [Figure 3.17](#) after the changes are complete.

**Figure 3.17**



This web page uses the span element

[Figure 3.17 Full Alternative Text](#)

## Configure the Company Name

View [Figure 3.17](#), and notice that the company name, Trillium Media Design, is displayed in bold and serif font within the first paragraph. You will code

both CSS and HTML to configure this formatting. First, create a new CSS rule above the closing style tag that configures a class called `company` in bold, serif font, and 1.25em in size. The code follows:

```
.company { font-weight: bold;  
            font-family: Georgia, "Times New Roman", serif;  
            font-size: 1.25em; }
```

Next, modify the beginning of the first paragraph of HTML to use the `span` element to apply the class as follows:

```
<p><span class="company">Trillium Media Design</span> will bring
```

Save your file, and test it in a browser. Your page should look similar to the one shown in [Figure 3.17](#). A sample solution (chapter3/3.6/index.html) is in the student files. View the source code for your page, and review the CSS and HTML code. Note that all the styles were located in a single place on the web page. Since embedded styles are coded in a specific location, they are easier to maintain over time than inline styles. Also notice that you needed to code the styles for the `h2` element selector only once (in the head section), and *both* of the `<h2>` elements applied the `h2` style. This approach is more efficient than coding the same inline style on each `<h2>` element. However, it is uncommon for a website to have only one page. Repeating the CSS in the head section of each web page file is inefficient and difficult to maintain. In the next section, you will use a more efficient approach: configuring an external style sheet.

## 3.8 Using External Style Sheets

The flexibility and power of CSS are best utilized when the CSS is external to the web page document. An external style sheet is a text file with a .css file extension that contains CSS style rules. The external style sheet file is associated with a web page by using the link element. This approach provides a way for multiple web pages to be associated with the same external style sheet file. The external style sheet file does not contain any HTML tags; it contains only CSS style rules.



**VideoNote** External Style Sheets

The advantage of external CSS is that styles are configured in a single file. This means that when styles need to be modified, only one file needs to be changed, instead of multiple web pages. On large sites, this approach can save a web developer much time and increase productivity. Let's get some practice with this useful technique.

### Link Element

The link element associates an external style sheet with a web page. It is placed in the head section of the page. The link element is a stand-alone, void tag. When coding in HTML5, two attributes are used with the link element: rel and href.

- The value of the rel attribute is "stylesheet".
- The value of the href attribute is the name of the style sheet file.

Code the following in the head section of a web page to associate the document with the external style sheet named color.css:

```
<link rel="stylesheet" href="color.css">
```



## Hands-On Practice 3.7

Let's practice using external styles. First, you will create an external style sheet. Next, you will configure a web page to be associated with the external style sheet.

### Create an External Style Sheet

Launch a text editor, and type in the following style rules to set the background color of a page to blue and the text color to white. Save the file as color.css.

```
body { background-color: #0000FF; color: #FFFFFF; }
```

[Figure 3.18](#) shows the external color.css style sheet displayed in Notepad. Notice that there is no HTML in this file. HTML tags are not coded within an external style sheet. Only CSS rules (selectors, properties, and values) are coded in an external style sheet.

### Figure 3.18

A screenshot of Microsoft Notepad showing the contents of the file "color.css". The window title is "color.css - Notepad". The menu bar includes File, Edit, Format, View, and Help. The main text area contains the following CSS code:

```
body { background-color: #0000FF;
      color: #FFFFFF; }
```

A vertical scroll bar is visible on the right side of the text area.

The external style sheet color.css. Courtesy of Microsoft

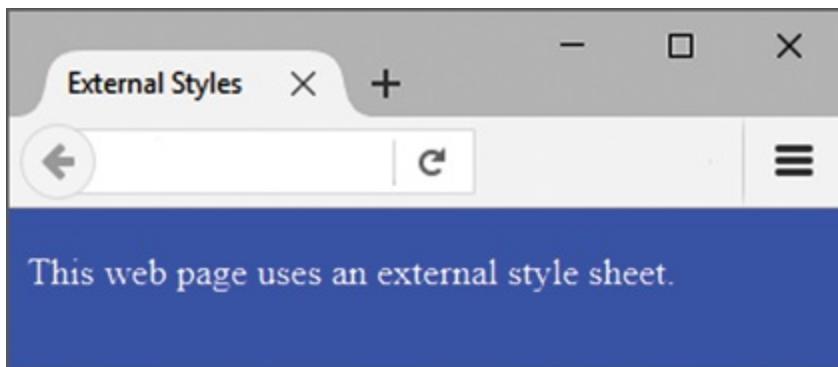
Corporation.

[Figure 3.18 Full Alternative Text](#)

## Configure the Web Page

To create the web page shown in [Figure 3.19](#), launch a text editor and open the template file located at chapter2/template.html in the student files. Modify the title element, add a link tag to the head section, and add a paragraph to the body section as indicated by the following highlighted code:

## Figure 3.19



This page is associated with an external style sheet

[Figure 3.19 Full Alternative Text](#)

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>External Styles</title>
<meta charset="utf-8">
<link rel="stylesheet" href="color.css">
</head>
<body>
<p>This web page uses an external style sheet.</p>
</body>
</html>
```

Save your file as external.html. Launch a browser, and test your page. It should look similar to the page shown in [Figure 3.19](#). You can compare your work with the solution in the student files (chapter3/3.7/external.html). The color.css style sheet can be associated with any number of web pages. If you ever need to change the style of formatting, you need to change only a single file (color.css) instead of multiple files (all of the web pages). As mentioned earlier, this technique can boost productivity on a large site.

The advantage of having only a single file to update is significant for both small and large websites. In the next Hands-On Practice, you will modify the Trillium home page to use an external style sheet.



## Hands-On Practice 3.8

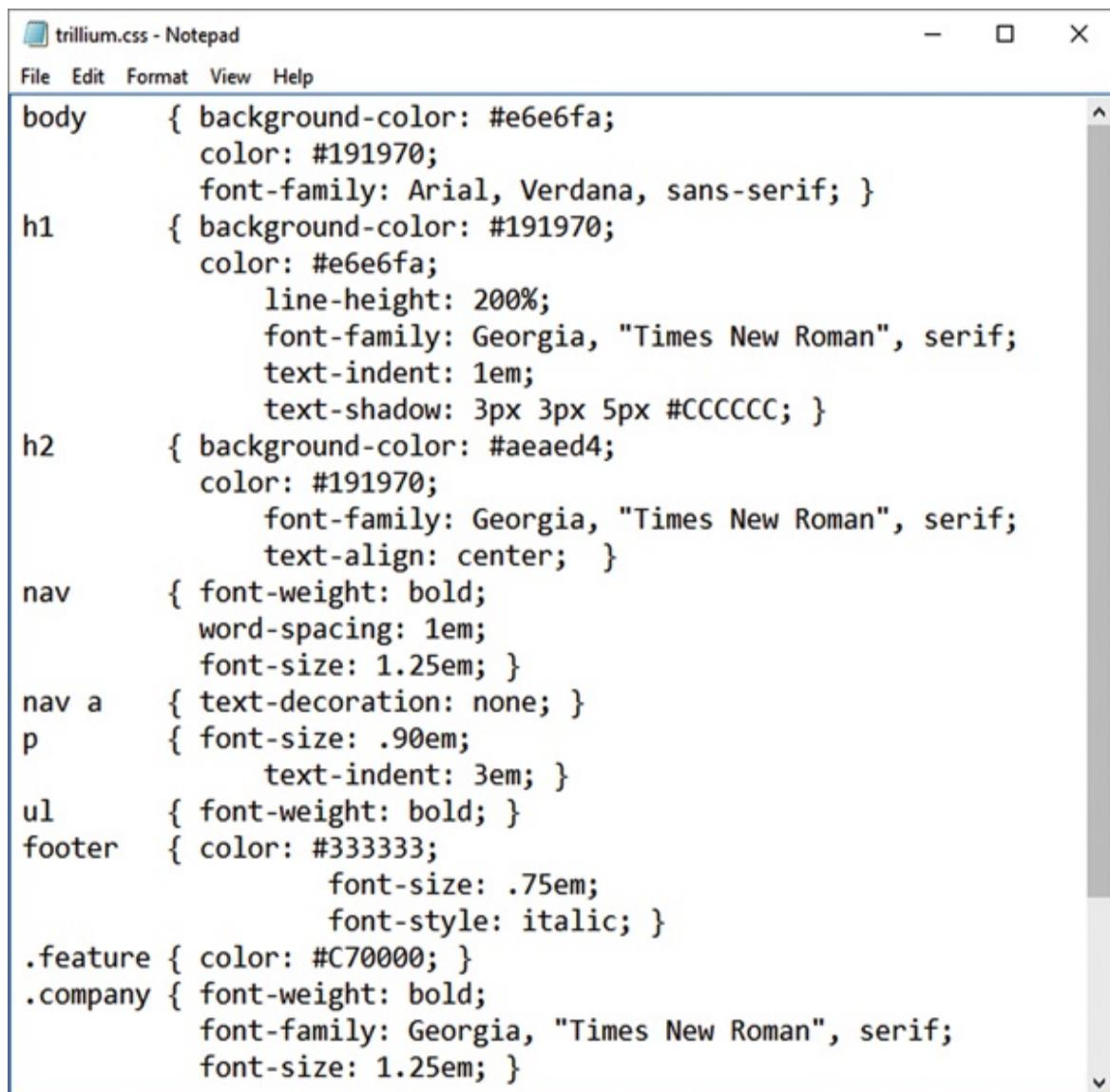
In this Hands-On Practice, you will continue to gain experience using external style sheets as you create the external style sheet file named trillium.css, modify the Trillium home page to use external styles instead of embedded styles, and associate a second web page with the trillium.css style sheet.

Use the file from [Hands-On Practice 3.6](#) (see the student files chapter3/3.6/index.html) as a starting point. Open the file in a browser. The display should be the same as the web page shown in [Figure 3.17](#) from [Hands-On Practice 3.6](#).

Now that you've seen what you're working with, let's begin. Launch a text editor, and save the file as index.html in a folder called trilliumext. You are ready to convert the embedded CSS to external CSS. Select the CSS rules (all the lines of code between, but not including, the opening and closing `<style>` tags). Use Edit > Copy, or press the Ctrl + C keys (Cmd + C keys on a Mac), to copy the CSS code to the clipboard. Now you will place the CSS in a new file. Launch a text editor and create a new file. Use Edit > Paste, or press the Ctrl + V keys (Cmd + V keys on a Mac), to paste the CSS style rules. Save the file as trillium.css. See [Figure 3.20](#) for a screenshot of the new trillium.css

file in Notepad. Notice that there are no HTML elements in trillium.css—not even the <style> element. The file contains CSS rules only.

## Figure 3.20



The screenshot shows a Microsoft Notepad window titled "trillium.css - Notepad". The menu bar includes File, Edit, Format, View, and Help. The main content area displays the following CSS code:

```
body { background-color: #e6e6fa;
      color: #191970;
      font-family: Arial, Verdana, sans-serif; }

h1 { background-color: #191970;
     color: #e6e6fa;
     line-height: 200%;
     font-family: Georgia, "Times New Roman", serif;
     text-indent: 1em;
     text-shadow: 3px 3px 5px #CCCCCC; }

h2 { background-color: #aeaed4;
     color: #191970;
     font-family: Georgia, "Times New Roman", serif;
     text-align: center; }

nav { font-weight: bold;
      word-spacing: 1em;
      font-size: 1.25em; }

nav a { text-decoration: none; }

p { font-size: .90em;
    text-indent: 3em; }

ul { font-weight: bold; }

footer { color: #333333;
         font-size: .75em;
         font-style: italic; }

.feature { color: #C70000; }

.company { font-weight: bold;
            font-family: Georgia, "Times New Roman", serif;
            font-size: 1.25em; }
```

The external style sheet named trillium.css. Courtesy of Microsoft Corporation.

[Figure 3.20 Full Alternative Text](#)

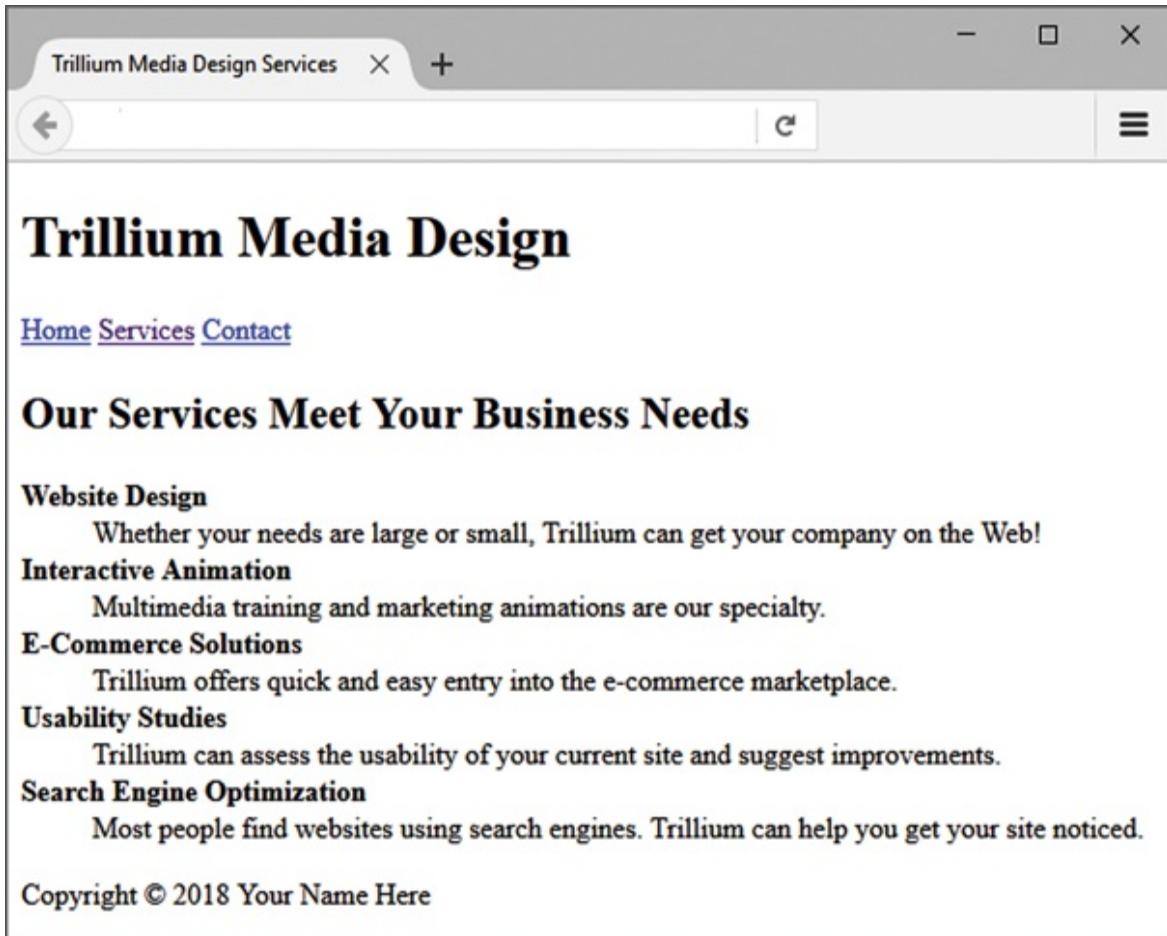
Next, edit the index.html file in a text editor. Delete the CSS code you just copied. Delete the closing `</style>` tag. Replace the opening `<style>` tag with a link element to associate the style sheet named trillium.css. The `<link>` tag code is as follows:

```
<link href="trillium.css" rel="stylesheet">
```

Save the file, and test it in a browser. Your web page should look just like the one shown in [Figure 3.17](#). Although it looks the same, the difference is in the code: The page now uses external, instead of embedded, CSS.

Now, for the fun part—you will associate a second page with the style sheet. The student files contain a services.html page for Trillium at chapter3/services.html. When you display this page in a browser, it should look similar to the one shown in [Figure 3.21](#). Notice that although the structure of the page is similar to the home page, the styling of the text and colors is absent.

## Figure 3.21



The services.html page is not associated with a style sheet

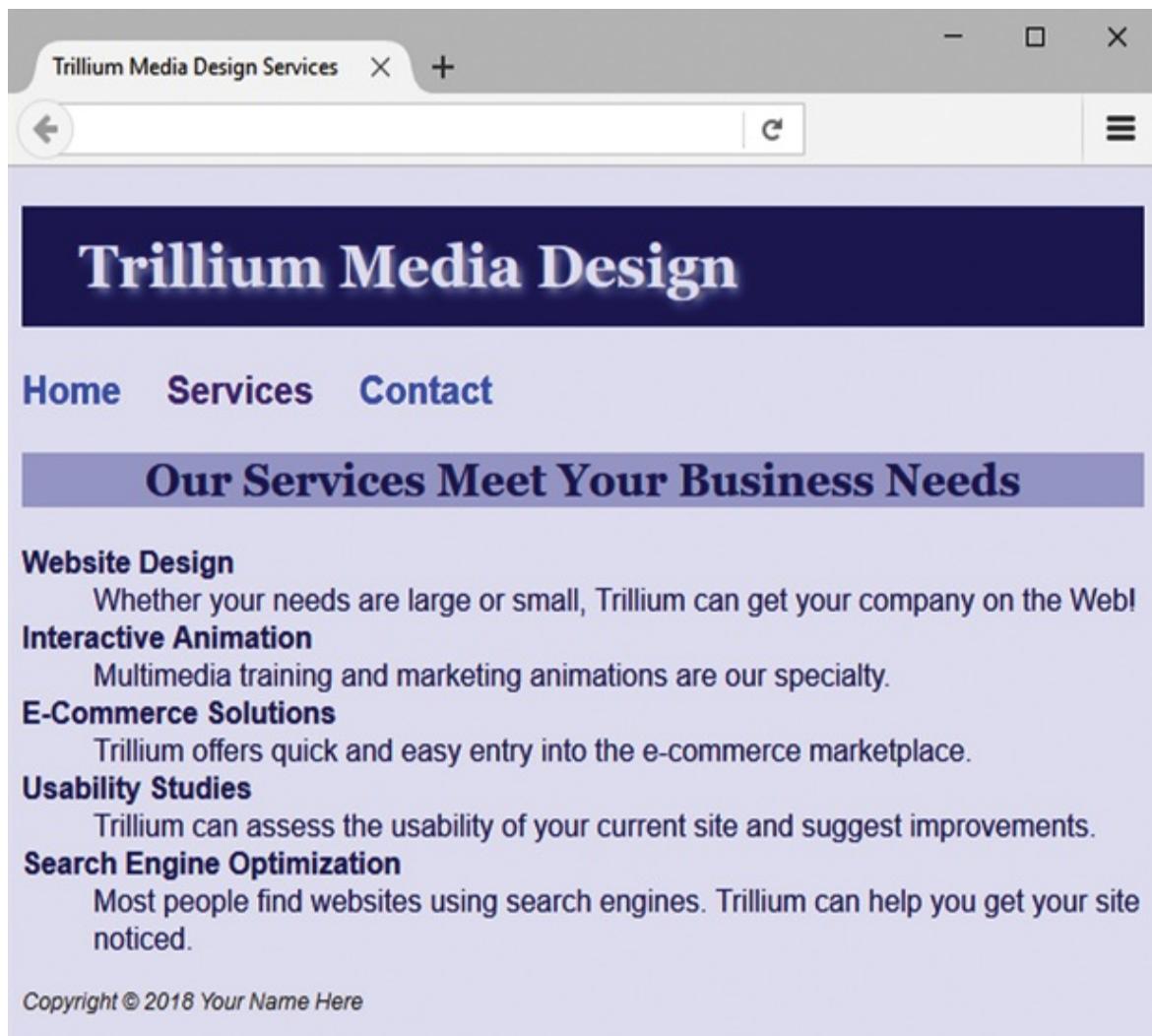
### Figure 3.21 Full Alternative Text

Copy the services.html file to your trilliumext folder. Launch a text editor to edit your services.html file. Code a <link> element to associate the services.html web page with the trillium.css external style sheet. Place the following code in the head section above the closing </head> tag:

```
<link href="trillium.css" rel="stylesheet">
```

Save your file, and test it in a browser. Your page should look similar to [Figure 3.22](#)—the CSS rules have been applied!

## Figure 3.22



The services.html page has been associated with trillium.css

### Figure 3.22 Full Alternative Text

If you click the Home and Services hyperlinks, you can move back and forth between the index.html and services.html pages in the browser. The student files contain a sample solution in the chapter3/3.8 folder.

Notice that when using an external style sheet, if the use of color or fonts on the page ever needs to be changed, modifications are made only to the external style sheet. Think about how this approach can improve productivity on a site with many pages. Instead of modifying hundreds of pages to make a color or font change, only a single file—the CSS external style sheet—needs to be updated. Becoming comfortable with CSS will be important as you

develop your skills and increase your technical expertise.



## Checkpoint 3.2

1. Describe a reason to use embedded styles. Explain where embedded styles are placed on a web page.
2. Describe a reason to use external styles. Explain where external styles are placed and how web pages indicate that they are using external styles.
3. Write the code to configure a web page to associate with an external style sheet called mystyles.css.



## FAQ

1. When designing a new web page or website, how do I begin to work with CSS?

The following guidelines can be helpful when configuring a page using CSS:

- Review the design of the page. Check if common fonts are used. Define global properties (the default for the entire page) for characteristics such as fonts and colors attached to the body element selector.
- Identify typical elements used for organization in the page (such as `<h1>`, `<h2>`, and so on), and declare style rules for these elements if different from the default.

- Identify various page areas such as the header, navigation, footer, and so on. List any special configurations needed for these areas. You may decide to configure classes or ids in your CSS to configure these areas.
- Create one prototype page that contains most of the elements you plan to use and test. Revise your CSS as needed.
- Plan and test. These are important activities when designing a website.

## 3.9 Center HTML Elements with CSS

You learned how to center text on a web page earlier in this chapter—but what about centering the entire web page itself? A popular page layout design that is easy to accomplish with just a few lines of CSS is to center the entire contents of a web page within a browser viewport. The key is to configure a `div` element that contains, or “wraps,” the entire page content. The HTML follows:

```
<body>
<div id="wrapper">
... page content goes here ...
</div>
</body>
```

Next, configure CSS style rules for this container. As will be discussed further in [Chapter 6](#), the **margin** is the empty space surrounding an element. In the case of the `body` element, the margin is the empty space between the page content and the edges of the browser window. As you might expect, the `margin-left` and `margin-right` properties configure the space in the left and right margins, respectively. The margins can be set to 0, pixel units, em units, percentages, or auto. When `margin-left` and `margin-right` are both set to auto, the browser calculates the amount of space available and divides it evenly between the left and right margins. The `width` property configures the width of a block display element. The following CSS code sample sets the width of an `id` named `wrapper` to 960 pixels and centers it:

```
#wrapper { width: 960px;
    margin-left: auto;
    margin-right: auto; }
```

You’ll practice this technique in the next Hands-On Practice.



## Hands-On Practice 3.9

In this Hands-On Practice, you will code CSS properties to configure a centered page layout, using the files from [Hands-On Practice 3.8](#) as a starting point. Create a new folder called trilliumcenter. Locate the chapter3/3.8 folder in the student files. Copy the index.html, services.html, and trillium.css files to your trilliumcenter folder. Open the trillium.css file in a text editor. Create an id named wrapper. Add the margin-left, margin-right, and width style properties to the style rules as follows:

```
#wrapper { margin-left: auto;  
           margin-right: auto;  
           width: 80%; }
```

Save the file.

Open the index.html file in a text editor. Add the HTML code to configure a div element assigned to the id wrapper that “wraps,” or contains, the code within the body section. Save the file. When you test your index.html file in a browser, it should look similar to the page shown in [Figure 3.23](#). The student files contain a sample solution in the chapter3/3.9 folder.

## Figure 3.23

The screenshot shows a web browser window with the title bar "Trillium Media Design". The page content is as follows:

**Trillium Media Design**

**Home Services Contact**

**New Media and Web Design**

**Trillium Media Design** will take your company's Web presence to the next level. We offer a comprehensive range of services.

- Website Design
- Interactive Animation
- E-Commerce Solutions
- Usability Studies
- Search Engine Optimization

**Meeting Your Business Needs**

Our expert designers will listen to you as they create a website that helps to promote and grow your business.

Copyright © 2018 Your Name Here  
[yourfirstname@yourlastname.com](mailto:yourfirstname@yourlastname.com)

The page content is centered within the browser viewport



## FAQ

1. Is there an easy way to add a comment for documentation purposes in CSS?

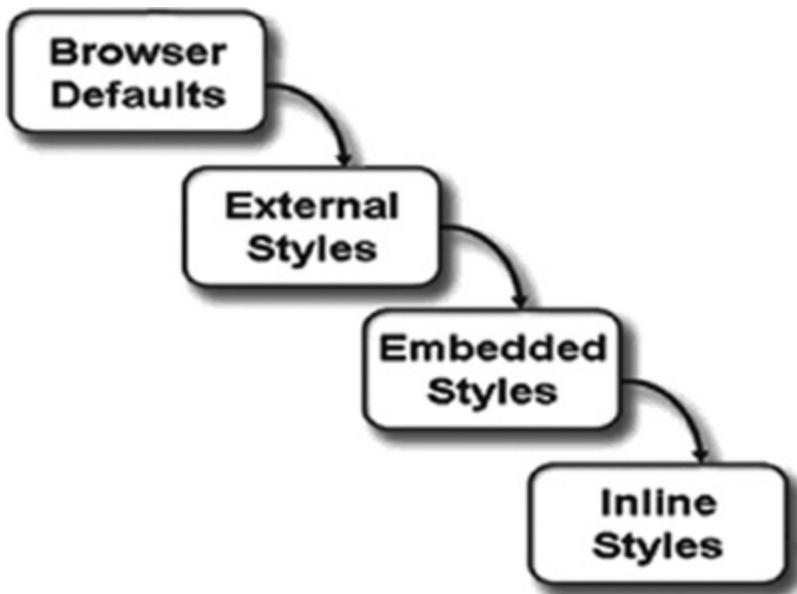
Yes. An easy way to add a comment to CSS is to type "/\*" before your comment and "\*/" after your comment, as shown in the following example:

```
/* Configure Footer */  
footer { font-size: .80em; font-style: italic; text-align: ce
```

## 3.10 The “Cascade”

[Figure 3.24](#) shows the “cascade” (order of precedence) that applies the styles in order from outermost (external styles) to innermost (inline styles). This set of rules allows the sitewide styles to be configured, but overridden when needed by more granular page-specific styles (such as embedded or inline styles).

### Figure 3.24



The “cascade” of Cascading Style Sheets

[Figure 3.24 Full Alternative Text](#)

External styles can apply to multiple pages. The order the styles are coded in the web page matters. When using both external and embedded styles, it is typical practice to code the link element (for external styles) before the style element (for embedded styles). So, when a web page contains both an association with an external style sheet and embedded styles, the external styles will be applied first, and then the embedded styles will be applied. This

approach allows a web developer to override global external styles on selected pages.

If a web page also contains inline styles, any external and embedded styles are applied first as just described, and then the inline styles are applied. This approach allows a web developer to override page-wide styles for particular HTML tags or classes.

Note that an HTML tag or attribute will override styles. For example, a  **tag will override corresponding font-related styles configured for an element. If no attribute or style is applied to an element, the browser's default is applied. However, the appearance of the browser's default may vary by browser, and you might be disappointed with the result. Use CSS to specify the properties of your text and web page elements. Avoid depending on the browser's default.**

In addition to the general cascade of CSS types described previously, the style rules themselves follow an order of precedence. Style rules applied to more local elements (such as a paragraph) take precedence over those applied to more global elements (such as a 

that contains the paragraph).

Let's look at an example of the cascade. Consider the following CSS code:

```
.special { font-family: Arial, sans-serif; }  
p { font-family: "Times New Roman", serif; }
```

The CSS has two style rules: a rule creating a class named `special` that configures text using the Arial (or generic sans-serif) font family, and a rule configuring all paragraphs to use the Times New Roman (or generic serif) font family. The HTML on the page contains a `<div>` with multiple elements, such as headings and paragraphs, as shown in the following code:

```
<div class="special">  
<h2>Heading</h2>  
<p>This is a paragraph. Notice how the paragraph is contained in  
</div>
```

Here is how the browser would render the code:

1. The text contained in the heading is displayed with Arial font because it

is part of the <div> assigned to the `special` class. It inherits the properties from its parent (<div>) class. This is an example of inheritance, in which certain CSS properties are passed down to elements nested within a container element, such as a <div> or <body> element. Text-related properties (font-family, color, etc.) are generally inherited, but box-related properties (margin, padding, width, etc.) are not. See <http://www.w3.org/TR/CSS21/propidx.html> for a detailed list of CSS properties and their inheritance status.

2. The text contained in the paragraph is displayed with Times New Roman font because the browser applies the styles associated with the most local element (the paragraph). Even though the paragraph is contained in (and is considered a child of) the `special` class, the local paragraph style rules takes precedence and are applied by the browser.

Don't worry if CSS and order of precedence seem a bit overwhelming at this point. CSS definitely becomes easier with practice. You will get a chance to practice with the "cascade" as you complete the next Hands-On Practice.



## Hands-On Practice 3.10

You will experiment with the "cascade" in this Hands-On Practice as you work with a web page that uses external, embedded, and inline styles.

1. Create a new folder named `mycascade`.
2. Launch a text editor. Open a new file. Save the file as `site.css` in the `mycascade` folder. You will create an external style sheet that sets the `background-color` of the web page to a shade of yellow (#FFFFCC) and the text color to black (#000000). The code follows:

```
body { background-color: #FFFFCC;  
       color: #000000; }
```

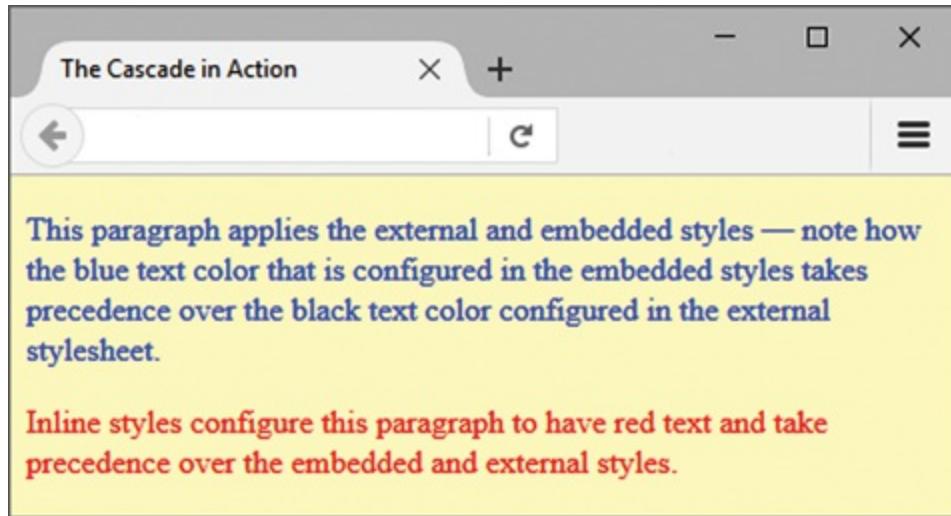
Save and close the site.css file.

3. Open a new file in the text editor, and save it as mypage1.html in the mycascade folder. The web page will be associated with the external style sheet site.css, use embedded styles to set the global text color to blue, and use inline styles to configure the text color of the second paragraph. The file mypage1.html will contain two paragraphs of text. The code follows:

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>The Cascade in Action</title>
<meta charset="utf-8">
<link rel="stylesheet" href="site.css">
<style>
  body { color: #0000FF; }
</style>
</head>
<body>
<p>This paragraph applies the external and embedded styles &m
<p style="color: #FF0000">Inline styles configure this paragr
</body>
</html>
```

Save mypage1.html, and display it in a browser. Your page should look similar to the sample shown in [Figure 3.25](#). The student files contain a sample solution at chapter3/3.10/mypage1.html.

## Figure 3.25



Mixing external, embedded, and inline styles

### Figure 3.25 Full Alternative Text

Take a moment to examine the mypage1.html web page and compare it with its source code. The web page picked up the yellow background from the external style sheet. The embedded style configured the text to be the color blue, which overrides the black text color in the external style sheet. The first paragraph in the web page does not contain any inline styles, so it inherits the style rules in the external and embedded style sheets. The second paragraph contains an inline style of red text color; this setting overrides the corresponding external and embedded styles.

## 3.11 CSS Validation

The W3C has a free Markup Validation Service (<http://jigsaw.w3.org/css-validator>) that will validate your CSS code and check it for syntax errors. CSS validation provides students with quick self-assessment—you can prove that your code uses correct syntax. In the working world, CSS validation serves as a quality assurance tool. Invalid code may cause browsers to render the pages more slowly than they would otherwise.

### CSS Validation



## Hands-On Practice 3.11

In this Hands-On Practice, you will use the W3C CSS Validation Service to validate an external CSS style sheet. This example uses the color.css file completed in [Hands-On Practice 3.7](#) (student files chapter3/3.7/color.css). Locate color.css, and open it in a text editor. Now add an error to the color.css file by finding the body element selector style rule and deleting the first “r” in the background-color property. Add another error by removing the # from the color property value. Save the file.

Next, attempt to validate the color.css file. Visit the W3C CSS Validation Service page at <http://jigsaw.w3.org/css-validator> and select the “by file upload” tab. Click the Browse button and select the color.css file from your computer. Click the Check button. Your display should be similar to that shown in [Figure 3.26](#). Notice that two errors were found. The selector is listed, followed by the reason an error was noted.

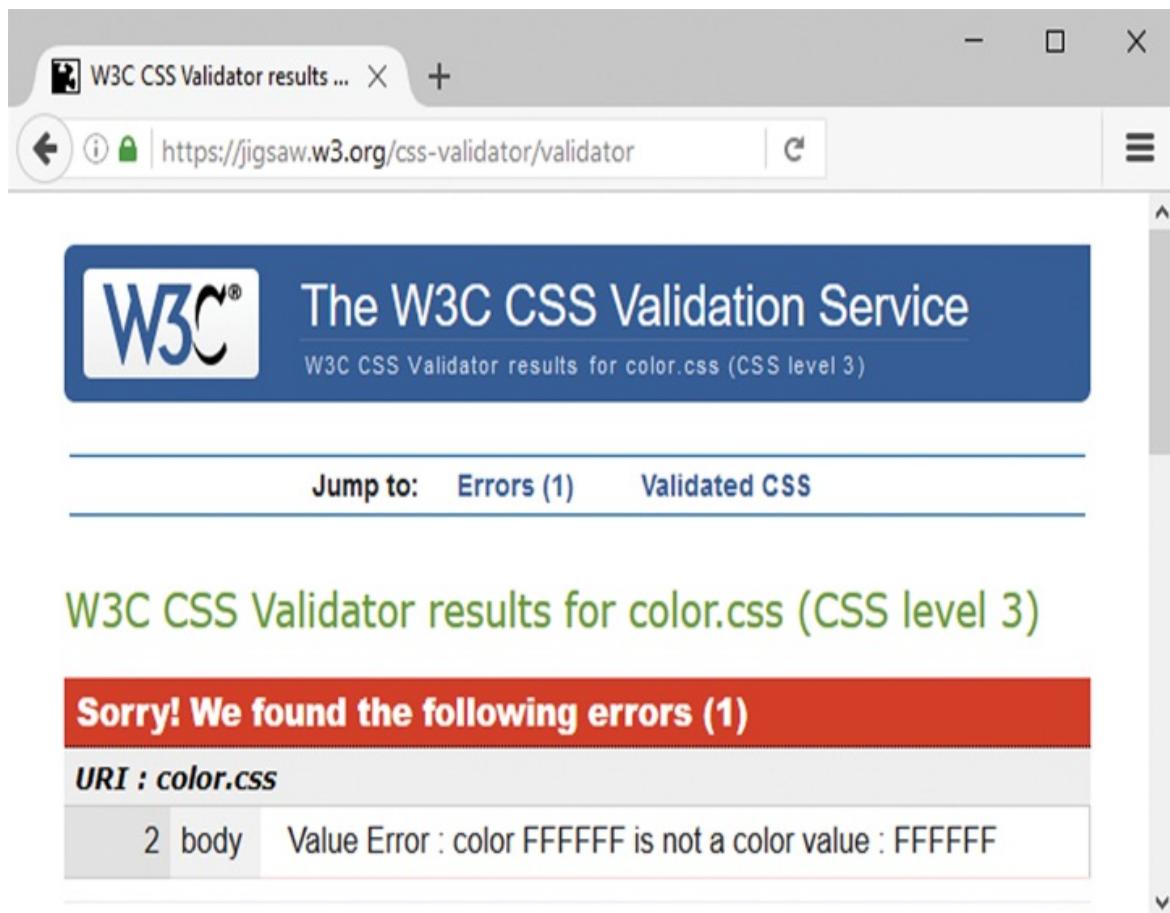
## Figure 3.26



The validation results indicate errors. Screenshots of W3C. Courtesy of W3C (World Wide Web Consortium).

### Figure 3.26 Full Alternative Text

Notice that the first message in [Figure 3.26](#) indicates that the “background-color” property does not exist. This is a clue to check the syntax of the property name. Edit color.css and correct the first error. Test and revalidate your page. Your browser should now look similar to the one shown in [Figure 3.27](#) and should be reporting only one error.



## Figure 3.27

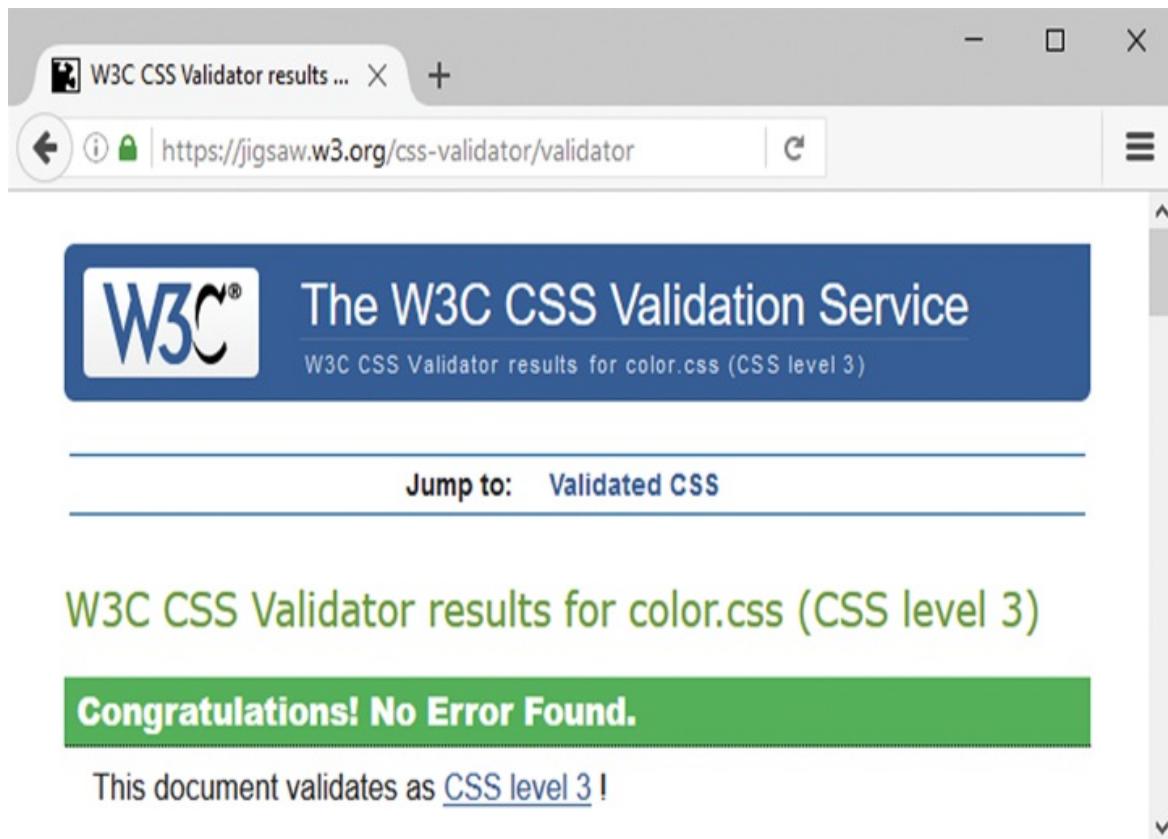
The valid CSS code is displayed below the errors (and warnings, if any). Screenshots of W3C. Courtesy of W3C (World Wide Web Consortium).

[Figure 3.27 Full Alternative Text](#)

The error reminds you that FFFFFF is not a color value; you are expected to already know that you need to add a "#" character to code a valid color value, as in #FFFFFF. Notice how any valid CSS rules are displayed below the error messages. Correct the color value, save the file, and test again.

Your results should look similar to those shown in [Figure 3.28](#). There are no errors listed. The Valid CSS Information contains all the CSS style rules in

color.css. This means your file passed the CSS validation test. Congratulations—your color.css file is valid CSS syntax! It is good practice to validate your CSS style rules. The CSS validator can help you to quickly identify code that needs to be corrected and indicate which style rules a browser is likely to consider valid. Validating CSS code is one of the many productivity techniques that web developers commonly use.



## Figure 3.28

The CSS is valid! Screenshots of W3C. Courtesy of W3C (World Wide Web Consortium).

[Figure 3.28 Full Alternative Text](#)

# Chapter Summary

This chapter has introduced Cascading Style Sheet rules associated with color and text on web pages. There is much more that you can do with CSS, including positioning, hiding and showing page areas, formatting margins, and formatting borders. As you continue your study of web development with this textbook, you will learn about these additional uses. Visit this textbook's website at <http://www.webdevfoundations.net> for examples, information on the resources described in this chapter, and to view updated information.

## Key Terms

1. [<link>](#)
2. [<span>](#)
3. [<style>](#)
4. [background-color property](#)
5. [Cascading Style Sheets \(CSS\)](#)
6. [class attribute](#)
7. [class selector](#)
8. [color property](#)
9. [CSS validation](#)
10. [descendant selector](#)
11. [declaration](#)
12. [em unit](#)

13. [embedded styles](#)
14. [external styles](#)
15. [font-family property](#)
16. [font-size property](#)
17. [font-style property](#)
18. [font-weight property](#)
19. [hexadecimal color values](#)
20. [href attribute](#)
21. [id attribute](#)
22. [id selector](#)
23. [imported styles](#)
24. [inheritance](#)
25. [inline styles](#)
26. [internal styles](#)
27. [letter-spacing property](#)
28. [line-height property](#)
29. [link element](#)
30. [margin-left property](#)
31. [margin-right property](#)
32. [order of precedence](#)

33. [pixels](#)
34. [point](#)
35. [property](#)
36. [rel attribute](#)
37. [RGB color](#)
38. [rule](#)
39. [selector](#)
40. [span element](#)
41. [style attribute](#)
42. [style element](#)
43. [text-align property](#)
44. [text-decoration property](#)
45. [text-indent property](#)
46. [text-shadow property](#)
47. [text-transform property](#)
48. type attribute
49. [Web-Safe Color Palette](#)
50. [Web-Safe Colors](#)
51. [white-space property](#)
52. [width property](#)

53. [word-spacing property](#)

## Review Questions

### Multiple Choice

1. Which of the following is the declaration property used to set the font typeface for an area of a web page?
  1. face
  2. font-family
  3. font-face
  4. size
2. Which of the following is the CSS property used to set the background color of a web page?
  1. bgcolor
  2. background-color
  3. color
  4. none of the above
3. Which of the following describe two components of CSS rules?
  1. selectors and declarations
  2. properties and declarations
  3. selectors and attributes

4. none of the above
4. Which of the following associates a web page with an external style sheet?
  1. `<style rel="external" href="style.css">`
  2. `<style src="style.css">`
  3. `<link rel="stylesheet" href="style.css">`
  4. `<link rel="stylesheet" src="style.css">`
5. Which type of CSS is coded in the body of the web page as an attribute of an HTML tag?
  1. embedded
  2. external
  3. inline
  4. imported
6. Which of the following do you configure to apply a style to only one area on a web page?
  1. group
  2. class
  3. id
  4. none of the above
7. Which of the following can be a CSS selector?
  1. an HTML element name

2. a class name
  3. an id name
  4. all of the above
8. Where do you place the code to associate a web page with an external style sheet?
1. in the external style sheet
  2. in the DOCTYPE of the web page document
  3. in the body section of the web page document
  4. in the head section of the web page document
9. Which of the following configures a background color of #00CED1 for a web page using CSS?
1. body { background-color: #00CED1; }
  2. document { background: #00CED1; }
  3. body { bgcolor: #00CED1; }
  4. document { bgcolor: #00CED1; }
10. Which of the following uses CSS to configure a class called news with red text, large font, and Arial or a sans-serif font?
1. news { color: red;  
font-size: large;  
font-family: Arial,  
sans-serif; }
  2. .news { color: red;  
font-size: large;  
font-family: Arial,  
sans-serif; }

```
3. .news { text: red;  
          font-size: large;  
          font-family: Arial,  
          sans-serif; }  
  
4. #news { text: red;  
          font-size: large;  
          font-family: Arial,  
          sans-serif; }
```

11. Which of the following is true if a web page contains both a link to an external style sheet and embedded styles?
1. Embedded styles will be applied first, and then the external styles will be applied.
  2. The inline styles will be used.
  3. External styles will be applied first, and then the embedded styles will be applied.
  4. The web page will not display.

## Fill in the Blank

12. The \_\_\_\_\_ element is useful for creating areas on a web page that are embedded within paragraphs or other block display elements.
13. The \_\_\_\_\_ CSS property can be used to center text within a block display element.
14. The \_\_\_\_\_ CSS property can be used to indent the first line of text.
15. CSS was first proposed as a standard by the W3C in \_\_\_\_\_.

## Apply Your Knowledge

1. Predict the Result. Draw and write a brief description of the web page that will be created with the following HTML code:

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>Trillium Media Design</title>
<meta charset="utf-8">
<style>
    body { background-color: #000066;
           color: #CCCCCC;
           font-family: Arial, sans-serif; }
    header { background-color: #FFFFFF;
              color: #000066; }
    footer { font-size: 80%;
              font-style: italic; }
</style>
</head>
<body>
<header><h1>Trillium Media Design</h1></header>
<nav>Home <a href="about.html">About</a> <a href="services.ht
Services</a>
</nav>
<p>Our professional staff takes pride in its working relation
<br><br>
<footer>
Copyright © 2018 Trillium Media Design
</footer>
</body>
</html>
```

2. Fill in the Missing Code. Consider the following code, in which some CSS properties and values, indicated by " ", and some HTML tags, indicated by < >, are missing:

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>Trillium Media Design</title>
<meta charset="utf-8">
<style>
    body { background-color: #0066CC;
           color: " "; }
    header { " ": " " }
<_>
<_>
```

```
<body>
<header><h1>Trillium Media Design</h1></header>
    <p>Our professional staff takes pride in its working relat
</body>
</html>
```

The web page corresponding to the code should be configured so that the background and text colors have good contrast. The header area should use Arial. Fill in the missing code.

3. Find the Error. Why won't the page corresponding to the following code display properly in a browser?

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>Trillium Media Design</title>
<meta charset="utf-8">
<style>
    body { background-color: #000066;
           color: #CCCCCC;
           font-family: Arial, sans-serif;
           font-size: 1.2em; }

<style>
</head>
<body>
<header><h1>Trillium Media Design</h1></header>
    <main><p>Our professional staff takes pride in its working
</body>
</html>
```

## Hands-On Exercises

1. Write the HTML for a paragraph that uses inline styles to configure the background color of green and the text color of white.
2. Write the HTML and CSS code for an embedded style sheet that configures a background color of #eaeaea and a text color of #000033.
3. Write the CSS code for an external style sheet that configures the text to be brown, 1.2em in size, and in Arial, Verdana, or a sans-serif font.

4. Write the HTML and CSS code for an embedded style sheet that configures a class called new that is bold and italic.
5. Write the HTML and CSS code for an embedded style sheet that configures links without underlines; a background color of white; text color of black; is in Arial, Helvetica, or a sans-serif font; and has a class called new that is bold and italic.
6. Write the CSS code for an external style sheet that configures a page background color of #FFF8DC; has a text color of #000099; is in Arial, Helvetica, or a sans-serif font; and has an id called new that is bold and italic.
7. Practice with External Style Sheets. In this exercise, you will create two external style sheet files and a web page. You will experiment with linking the web page to the external style sheets and note how the display of the page is changed.
  1. Create an external style sheet (call it format1.css) to format as follows: document background color of white, document text color of #000099, and document font family of Arial, Helvetica, or sans-serif. Hyperlinks should have a background color of gray (#CCCCCC). Configure the h1 selector to use the Times New Roman font with red text color.
  2. Create an external style sheet (call it format2.css) to format as follows: document background color of yellow and document text color of green. Hyperlinks should have a background color of white. Configure the h1 selector to use the Times New Roman font with white background color and green text color.
  3. Create a web page about your favorite movie that displays the movie name in an <h1> tag, a description of the movie in a paragraph, and an unordered (bulleted) list of the main actors and actresses in the movie. The page should also have a hyperlink to a website about the movie. Place an e-mail link to yourself on the web page. This page should be associated with the format1.css file. Save the page as moviecss1.html. Be sure to test your page in more

than one browser.

4. Modify the moviecss1.html page to link to the format2.css external style sheet instead of the format1.css file. Save the page as moviecss2.html and test it in a browser. Notice how different the page looks!
8. Practice with the Cascade. In this exercise, you will create two web pages that link to the same external style sheet. After modifying the configuration in the external style sheet, you will test your pages again and find that they automatically pick up the new style configuration. Finally, you will add an inline style to one of the pages and find that it takes effect and overrides the external style.
  1. Create a web page that includes an unordered list describing at least three CSS properties that can be used to format text. The text “CSS Properties” should be contained within `<h1>` tags. Write the HTML code so that one of the properties is configured to be a class called favorite. Place an e-mail link to yourself on the web page. The web page should be associated with the external style sheet called ex8.css. Save the page as properties.html.
  2. Create an external style sheet (call it ex8.css) to format as follows: document background color of white; document text color of #000099; and document font family of Arial, Helvetica, or sans-serif. Hyperlinks should have a background color of gray (#cccccc). `<h1>` elements should use the Times New Roman font with black text color. The favorite class should use red italic text.
  3. Launch a browser, and test your work. Display the properties.html page. It should use the formatting configured in ex8.css. Modify the web page or the CSS file until your page displays as requested.
  4. Change the configuration of the external style sheet (ex8.css) to use a document background color of black, document text color of white, and `<h1>` text color of gray (#cccccc). Save the file. Launch a browser, and test the properties.html page. Notice how it picks up the new styles from the external style sheet.

5. Modify the properties.html file to use an inline style. The inline style should be applied to the <h1> tag and configure it to have red text. Save the properties.html page, and test in a browser. Notice how the <h1> text color specified in the style sheet is overridden by the inline style.
9. Practice Validating CSS. Choose a CSS external style sheet file to validate; perhaps you have created one for your own website. Otherwise, use an external style sheet file that you worked with in this chapter. Use the W3C CSS validator at <http://jigsaw.w3.org/css-validator>. If your CSS does not immediately pass the validation test, modify it and test again. Repeat this process until the W3C validates your CSS code. Write a one- or two-paragraph summary about the validation process that answers the following questions: Was the CSS validator easy to use? Did anything surprise you? Did you encounter a number of errors or just a few? How easy was it to determine how to correct the CSS file? Would you recommend the validator to other students? Why or why not?

## Web Research

1. This chapter has introduced you to using CSS to configure web pages. Use a search engine to find CSS resources. The following resources can help you get started:
  - <http://www.w3.org/Style/CSS>
  - <https://developer.mozilla.org/en-US/docs/Web/CSS>
  - <http://reference.sitepoint.com/css>

Create a web page that provides a list of at least five CSS resources on the Web. For each CSS resource, provide the URL, website name, and a brief description. Configure text and background colors with good contrast. Place your name in the e-mail address at the bottom of the web page.

2. There is still much for you to learn about CSS. A great place to learn about web technology is the Web itself. Use a search engine to search for CSS tutorials. The following resources can help you get started:

- <http://www.echoecho.com/css.htm>
- <http://www.w3schools.com/css>
- <http://www.noupe.com/css/css-typography-contrast-techniques-tutorials-and-best-practices.html>

Choose a tutorial that is easy to read. Select a section that discusses a CSS technique that was not covered in this chapter. Create a web page that uses this new technique. The web page should provide the URL of your tutorial, the name of the website, and a description of the new technique you discovered. Place your name in the e-mail address at the bottom of the web page.

## Focus on Web Design

1. In this chapter, you have learned how to configure color and text with CSS. In this activity, you will design a color scheme, code an external CSS file for the color scheme, and code an example web page that applies the styles you configured. Use any of the following sites to help you get started with color and web design ideas:

## Psychology of Color

- <http://www.infoplease.com/spot/colors1.html>
- <http://www.empower-yourself-with-color-psychology.com/meaning-of-colors.html>
- <http://www.designzzz.com/infographic-psychology-color-web-designers>

# Color Scheme Generators

- <http://meyerweb.com/eric/tools/color-blend>
- <http://www.colr.org>
- <http://colorsontheweb.com/colorwizard.asp>
- <https://color.adobe.com/create/color-wheel>
- <http://paletton.com>

Complete the following tasks:

1. Design a color scheme. List three hexadecimal color values in addition to neutral colors such as white (#FFFFFF) or black (#000000) in your design.
2. Describe the process you went through as you selected the colors. Describe why you chose these colors. For what type of website would they be appropriate? List the URLs of any resources you used.
3. Create an external CSS file named color1.css that configures font properties, text color, and background color selections for the document, h1 element selector, p element selector, and footer class, using the colors you have chosen.
4. Create a web page named color1.html that shows examples of the CSS style rules.



## WEBSITE CASE STUDY

# Implementing CSS

Each of the case studies in this section continues throughout most of the text. This chapter implements CSS in the websites.

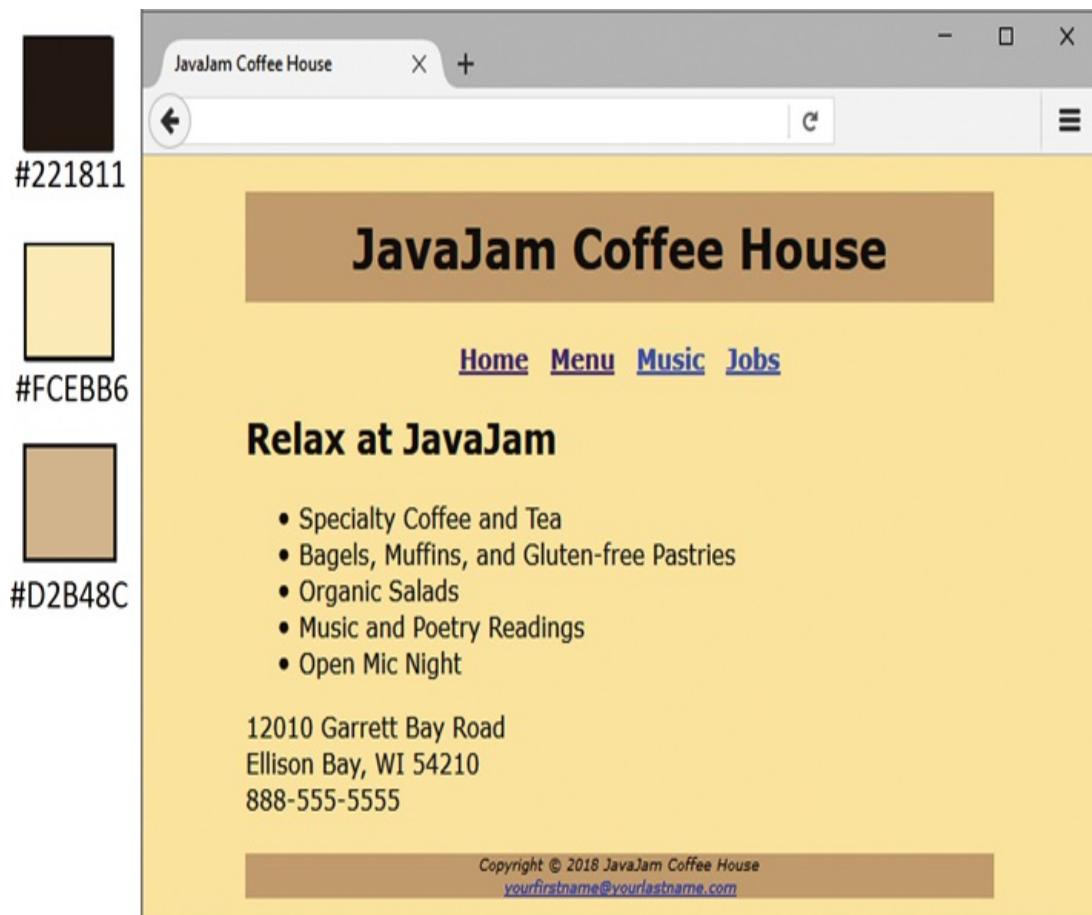
## JavaJam Coffee House

See [Chapter 2](#) for an introduction to the JavaJam Coffee House Case Study. [Figure 2.31](#) shows a site map for the JavaJam website. The Home page and Menu page were created in [Chapter 2](#). You will develop a new version of the website that uses an external style sheet to configure text and color. [Figure 2.32](#) depicts the wireframe page layout.

You have the following tasks:

1. Create a new folder for this JavaJam case study.
2. Create an external style sheet named javajam.css that configures the color and text for the JavaJam website.
3. Modify the Home page to utilize an external style sheet to configure colors and fonts. The new Home page and color swatches are shown in [Figure 3.29](#).

## Figure 3.29



New JavaJam index.html

[Figure 3.29 Full Alternative Text](#)

4. Modify the Menu page to be consistent with the new Home page.
5. Configure centered page layout.

## Hands-On Practice Case

- Task 1: The Website Folder. Create a folder on your hard drive or portable storage device called javajamcss. Copy all the files from your [Chapter 2](#) javajam folder into the javajamcss folder.
- Task 2: The External Style Sheet. You will use a text editor to create an

external style sheet named javajam.css. Code the CSS to configure the following:

1. Global styles for the document (use the body element selector) with background color #FCEBB6; text color #221811; and Verdana, Arial, or any sans-serif font.
2. Styles for the header element selector that configure background color #D2B48C centered text.
3. Styles for the h1 element selector that configure 200% line height.
4. Styles for the nav element selector that configure centered, bold text. *Hint:* Use the CSS `text-align` and `font-weight` properties.
5. Styles for the footer element selector that configure background color #D2B48C, small font size (.60em), italics, and centered text.

Save the file as javajam.css in the javajamcss folder. Check your syntax with the CSS validator (<http://jigsaw.w3.org/css-validator>). Correct and retest if necessary.

- Task 3: The Home Page. Launch a text editor, and open the index.html file. You will modify this file to apply styles from the javajam.css external style sheet as follows:
  1. Add a `<link>` element to associate the web page with the javajam.css external style sheet file.
  2. Configure the navigation area. Remove the `<b>` elements which are no longer needed because you have configured bold text with CSS.
  3. Configure the page footer area. Remove the `<small>` and `<i>` elements—they are no longer needed since CSS is now used to configure the text.

Save the index.html file, and test it in a browser. Your page should look similar to the one shown in [Figure 3.29](#) except that your page content will be left-aligned instead of centered. Don't worry—you'll center your

page layout in Task 5 of this case study.

- Task 4: The Menu Page. Launch a text editor, and open the menu.html file. You will modify this file in a similar manner as you modified the home page: Add the <link> element and configure the navigation and page footer areas. Save and test your new menu.html page. It should look similar to the one shown in [Figure 3.30](#), except for the alignment.

## Figure 3.30



New menu.html page

[Figure 3.30 Full Alternative Text](#)

- Task 5: Center Page Layout with CSS. Modify javajam.css, index.html, and menu.html to configure page content that is centered with 80% width (refer to [Hands-On Practice 3.9](#) if necessary):
  1. Launch a text editor, and open the javajam.css file. Add a style rule for an id named `wrapper` with `width` set to 80%, `margin-right` set to auto, and `margin-left` set to auto.
  2. Launch a text editor, and open the index.html file. Add the HTML code to configure a div element assigned to the id `wrapper` that “wraps,” or contains, the code within the body section. Save and test your index.html page in a browser and you’ll notice that the page content is now centered within the browser viewport as shown in [Figure 3.29](#).
  3. Launch a text editor, and open the menu.html file. Add the HTML code to configure a div element assigned to the id `wrapper` that “wraps,” or contains, the code within the body section. Save and test your menu.html page in a browser and you’ll notice that the page content is now centered within the browser viewport as shown in [Figure 3.30](#).

Experiment with modifying the javajam.css file. Change the page background color, the font family, and so on. Test your pages in a browser. Isn’t it amazing how a change in a single file can affect multiple files when external style sheets are used?

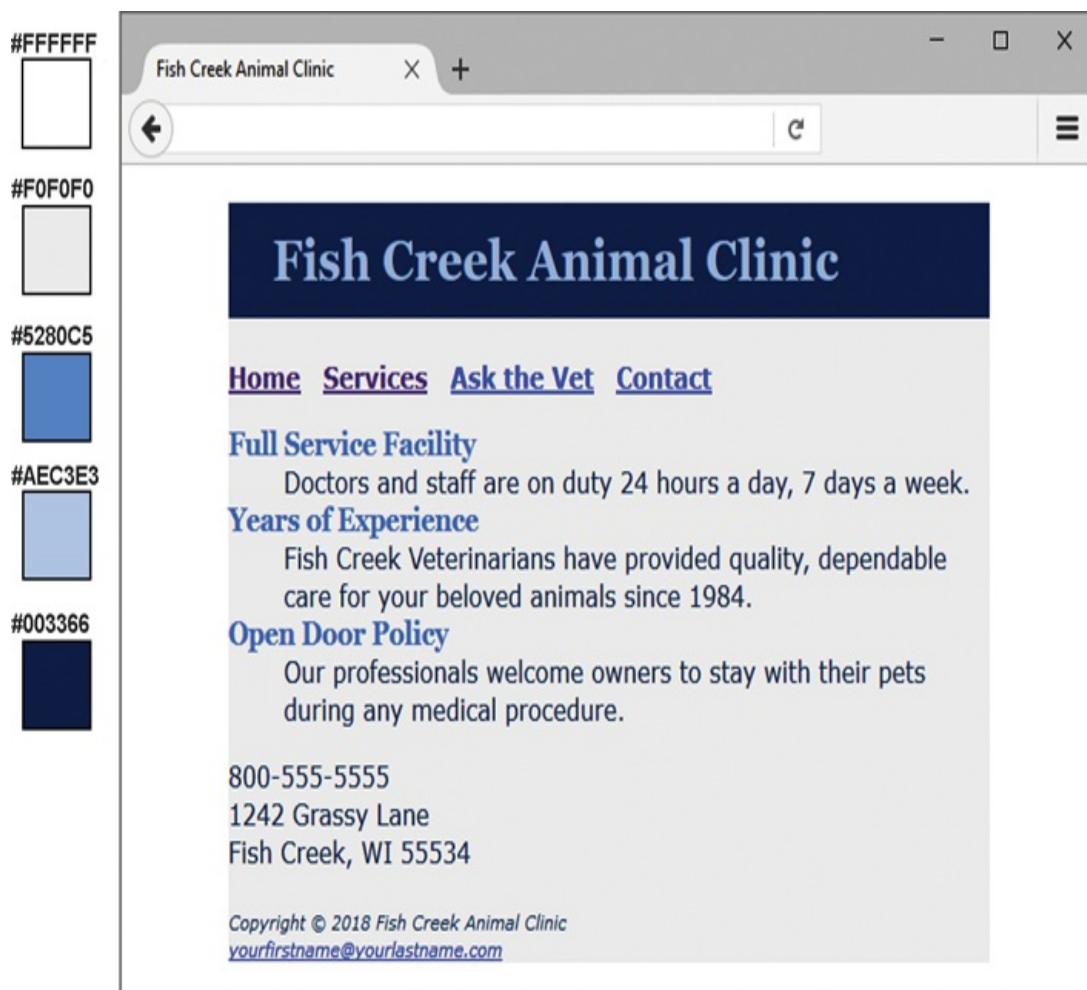
## Fish Creek Animal Clinic

See [Chapter 2](#) for an introduction to the Fish Creek Animal Clinic Case Study. [Figure 2.35](#) shows a site map for the Fish Creek website. The Home page and Services page were created in [Chapter 2](#). You will develop a new version that uses an external style sheet to configure text and color. [Figure 2.36](#) depicts the wireframe page layout.

You have the following tasks:

1. Create a new folder for this Fish Creek case study.
2. Create an external style sheet named fishcreek.css that configures the color and text for the Fish Creek website.
3. Modify the Home page to utilize an external style sheet to configure colors and fonts. The new Home page and color swatches are shown in [Figure 3.31](#).

## Figure 3.31



New Fish Creek index.html

[Figure 3.31 Full Alternative Text](#)

4. Modify the Services page to be consistent with the new Home page.
5. Configure centered page layout.

## Hands-On Practice Case Study

- Task 1: The Website Folder. Create a folder on your hard drive or portable storage device called fishcreekcss. Copy all the files from your [Chapter 2](#) fishcreek folder into the fishcreekcss folder.
- Task 2: The External Style Sheet. You will use a text editor to create an external style sheet named fishcreek.css. Code the CSS to configure the following:
  1. Global styles for the document (use the body element selector) with background color #FFFFFF; text color #003366; and Verdana, Arial, or any sans-serif font.
  2. Styles for the header element selector that configure background color #003366, text color #AEC3E3, and a serif font such as Georgia or Times New Roman.
  3. Styles for the h1 element selector that configure 200% line height and set the text-indent property to 1em.
  4. Styles for the nav element selector that display text in bold.
  5. Styles for the dt element selector that configure #5280C5 text color, size 1.1em font in bold, and a serif font such as Georgia or Times New Roman.
  6. Styles for a class named category with bold font, text color #5380C5, and a serif font such as Georgia or Times New Roman.
  7. Styles for the footer element selector with a small font size (.70em) and italic text.

Save the file as fishcreek.css in the fishcreekcss folder. Check your syntax with the CSS validator (<http://jigsaw.w3.org/css-validator>). Correct and retest if necessary.

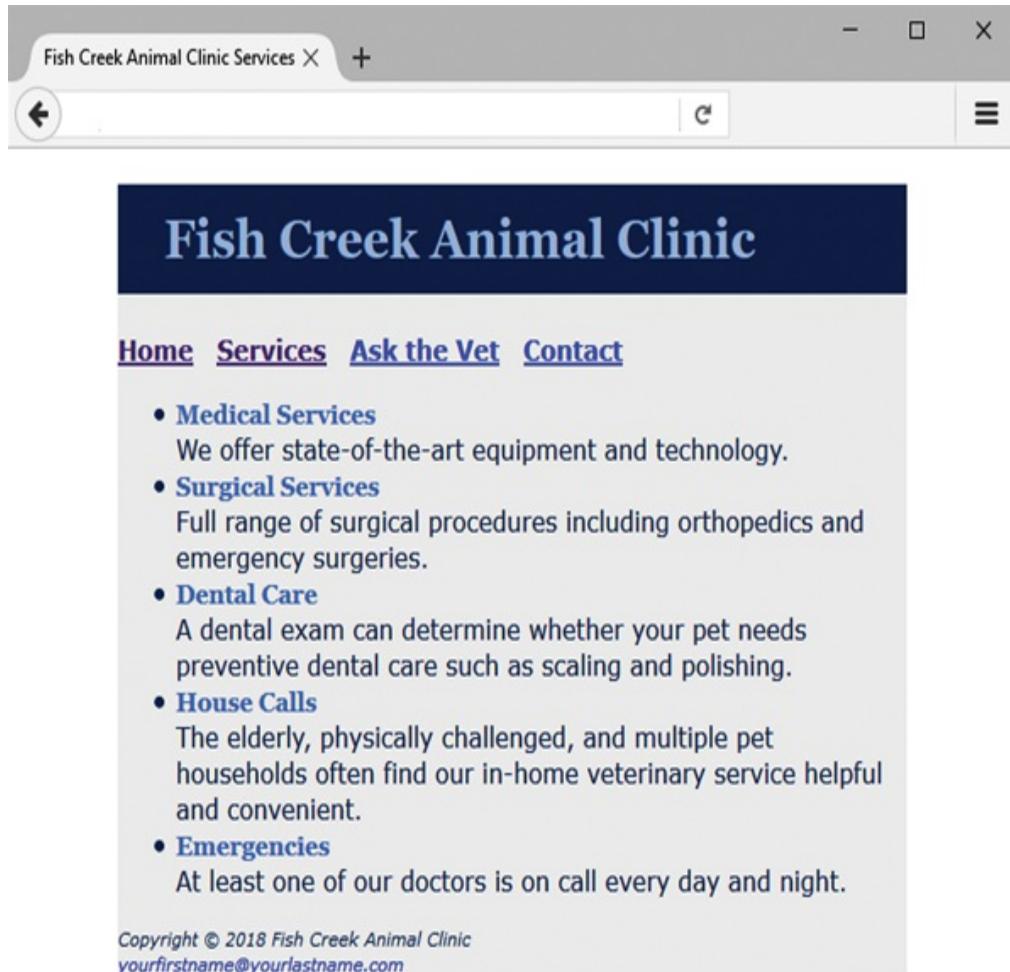
- Task 3: The Home Page. Launch a text editor, and open the index.html file. You will modify this file to apply styles from the fishcreek.css external style sheet as follows:
  1. Add a `<link>` element to associate the web page with the fishcreek.css external style sheet file.
  2. Configure the navigation area. Remove the `<b>` element from the navigation area, because the CSS will configure the bold font style.
  3. Configure the content area. Remove the `<strong>` tags from within each `dt` element, because the CSS will configure the bold font style.
  4. Configure the page footer area. Remove the `<small>` and `<i>` elements—they are no longer needed since CSS is now used to configure the text.

Save the index.html file, and test in a browser. Your page should look similar to the one shown in [Figure 3.31](#), except that the background color and alignment of your page content will be different. Don’t worry—you’ll finish configuring your page layout in Task 5 of this case study.

- Task 4: The Services Page. Launch a text editor, and open the services.html file. You will modify this file in a similar manner: Add the `<link>` element, configure the navigation area and page footer areas, configure the category classes (*Hint:* Use the `<span>` element to contain the name of each service offered), and remove the strong tags.) Save and test your new services.html page. It should look similar to the one shown in [Figure 3.32](#) except for the alignment and background color.
- Task 5: Center Page Layout with CSS. Modify fishcreek.css, index.html, and services.html to configure page content that is centered with 80% width with a light gray background color. Refer to [Hands-On Practice 3.9](#) if necessary.

1. Launch a text editor, and open the fishcreek.css file. Add a style rule for an id named `wrapper` with `width` set to `80%`, `margin-right` set to `auto`, `margin-left` set to `auto`, and background color set to `#F0F0F0`.
2. Launch a text editor, and open the index.html file. Add the HTML code to configure a `div` element assigned to the id `wrapper` that “wraps,” or contains, the code within the `body` section. Save and test your `index.html` page in a browser and you’ll notice that the page content is now centered within the browser viewport as shown in [Figure 3.31](#).
3. Launch a text editor, and open the services.html file. Add the HTML code to configure a `div` element assigned to the id `wrapper` that “wraps,” or contains, the code within the `body` section. Save and test your `services.html` page in a browser and you’ll notice that the page content is now centered within the browser viewport as shown in [Figure 3.32](#).

## **Figure 3.32**



New services.html page

### Figure 3.32 Full Alternative Text

Experiment with modifying the fishcreek.css file. Change the page background color, the font family, and so on. Test your pages in a browser. Isn't it amazing how a change in a single file can affect multiple files when external style sheets are used?

## Pacific Trails Resort

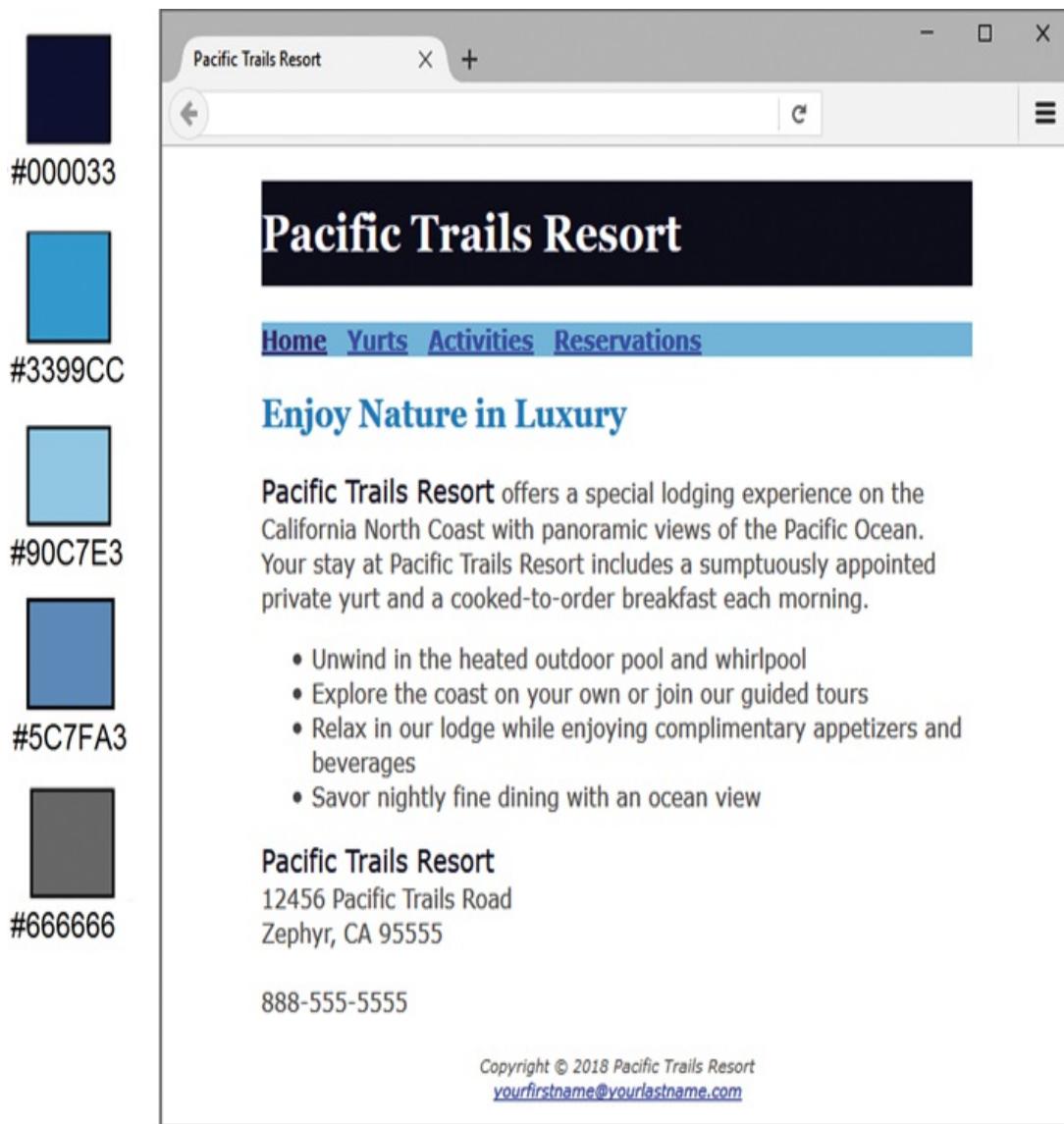
See [Chapter 2](#) for an introduction to the Pacific Trails Resort Case Study. [Figure 2.39](#) shows a site map for the Pacific Trails Resort website. The Home page and Yurts page were created in [Chapter 2](#). You will develop a new

version of this website that uses an external style sheet to configure text and color. [Figure 2.40](#) depicts the wireframe page layout.

You have the following tasks:

1. Create a new folder for this Pacific Trails case study.
2. Create an external style sheet named pacific.css that configures the color and text for the Pacific Trails website.
3. Modify the Home page to utilize an external style sheet to configure colors and fonts. The new Home page and color swatches are shown in [Figure 3.33](#).

## Figure 3.33



New Pacific Trails index.html

[Figure 3.33 Full Alternative Text](#)

4. Modify the Yurts page to be consistent with the new Home page.
5. Configure centered page layout.

## Hands-On Practice Case Study

- Task 1: The Website Folder. Create a folder on your hard drive or portable storage device called pacificcss. Copy all the files from your [Chapter 2](#) pacific folder into the pacificcss folder.
- Task 2: The External Style Sheet. You will use a text editor to create an external style sheet named pacific.css. Code the CSS to configure the following:
  1. Global styles for the document (use the body element selector) with background color #FFFFFF, text color #666666, and Verdana, Arial, or any sans-serif font.
  2. Styles for the header element selector that configure background color #000033, text color #FFFFFF, and Georgia or any serif font.
  3. Styles for the h1 element selector that configure 200% line height.
  4. Styles for the nav element selector that display text in bold and has a sky-blue background color (#90C7E3).
  5. Styles for the h2 element selector that configure medium-blue text color (#3399CC) and Georgia or any serif font.
  6. Styles for the dt element selector that configure dark-blue text color (#000033) and bold font.
  7. Styles for a class named resort that configure dark-blue text color (#000033) and 1.2em font size.
  8. Styles for the footer element selector with a small font size (.70em) and italic, centered text.

Save the file as pacific.css in the pacificcss folder. Check your syntax with the CSS validator (<http://jigsaw.w3.org/css-validator>). Correct and retest if necessary.

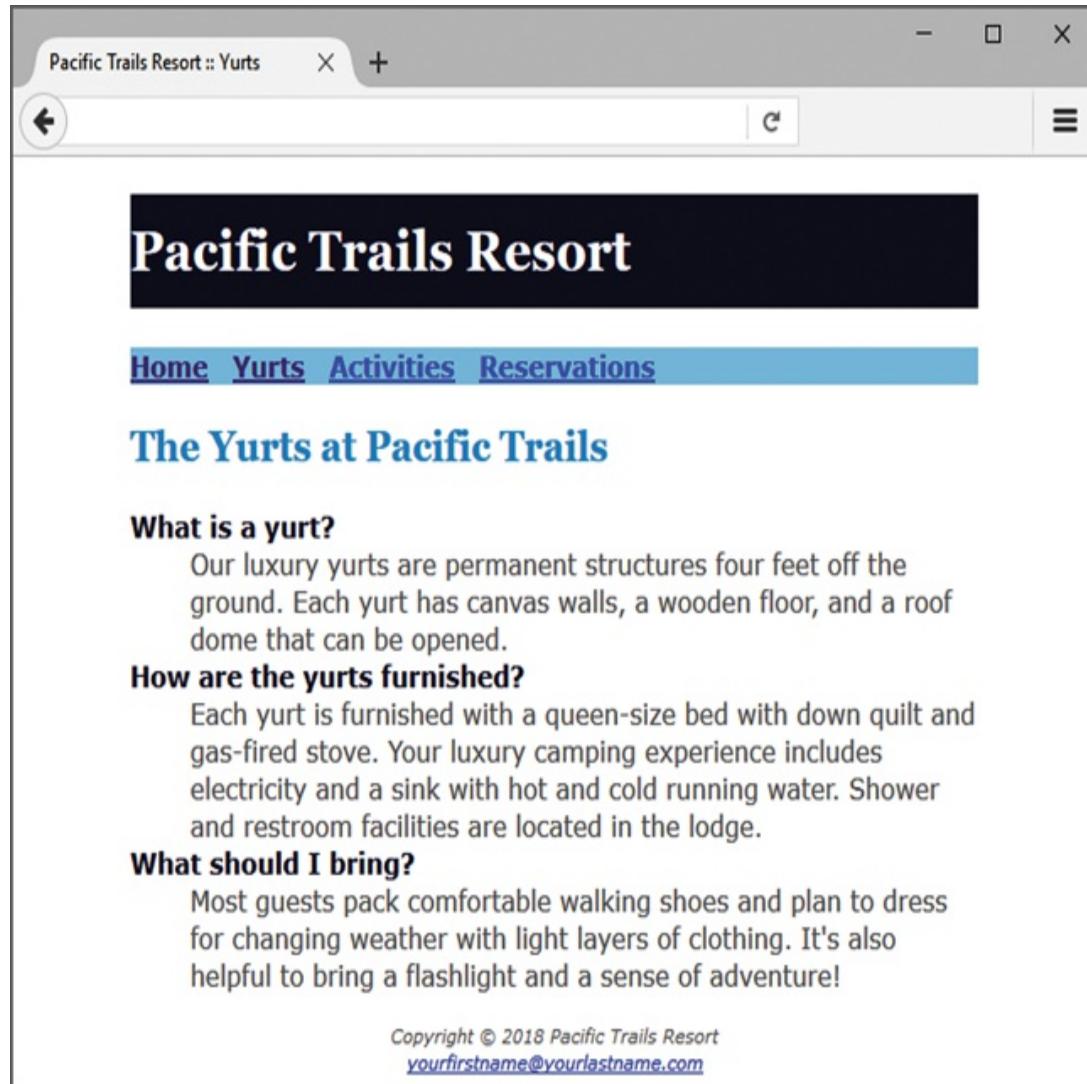
- Task 3: The Home Page. Launch a text editor, and open the index.html file. You will modify this file to apply styles from the pacific.css external style sheet as follows:

1. Add a `<link>` element to associate the web page with the `pacific.css` external style sheet file.
2. Configure the navigation area. Remove the `<b>` element from the navigation area, because the CSS will configure the bold font weight.
3. Find the company name (“Pacific Trails Resort”) in the first paragraph below the `h2`. Configure a span that contains this text. Assign the span element to the `resort` class.
4. Look for the company name (“Pacific Trails Resort”) directly above the street address. Configure a span that contains this text. Assign the span element to the `resort` class.
5. Configure the page footer area. Remove the `<small>` and `<i>` elements—they are no longer needed since CSS is now used to configure the text.

Save the `index.html` file, and test in a browser. Your page should look similar to the one shown in [Figure 3.33](#) except that your page content will be left-aligned instead of indented from the margins. Don’t worry—you’ll configure your page layout in Task 5 of this case study.

- Task 4: The Yurts Page. Launch a text editor, and open the `yurts.html` file. You will modify this file in a similar manner: Add the `<link>` element, configure the navigation area, and configure the page footer area. Delete the strong tags contained within each `dt` element. Save and test your new `yurts.html` page. It should look similar to the one shown in [Figure 3.34](#) except for the alignment.

## Figure 3.34



New yurts.html page

[Figure 3.34 Full Alternative Text](#)

- Task 5: Center Page Layout with CSS. Modify pacific.css, index.html, and yurts.html to configure page content that is centered with 80% width. Refer to [Hands-On Practice 3.9](#) if necessary.
  1. Launch a text editor, and open the pacific.css file. Add a style rule for an id named `wrapper` with `width` set to 80%, `margin-right` set to auto, and `margin-left` set to auto.
  2. Launch a text editor, and open the index.html file. Add the HTML

code to configure a div element assigned to the id wrapper that “wraps,” or contains, the code within the body section. Save and test your index.html page in a browser and you’ll notice that the page content is now centered within the browser viewport as shown in [Figure 3.33](#).

3. Launch a text editor and open the yurts.html file. Add the HTML code to configure a div element assigned to the id wrapper that “wraps,” or contains, the code within the body section. Save and test your yurts.html page in a browser and you’ll notice that the page content is now centered within the browser viewport as shown in [Figure 3.34](#).

Experiment with modifying the pacific.css file. Change the page background color, the font family, and so on. Test your pages in a browser. Isn’t it amazing how a change in a single file can affect multiple files when external style sheets are used?

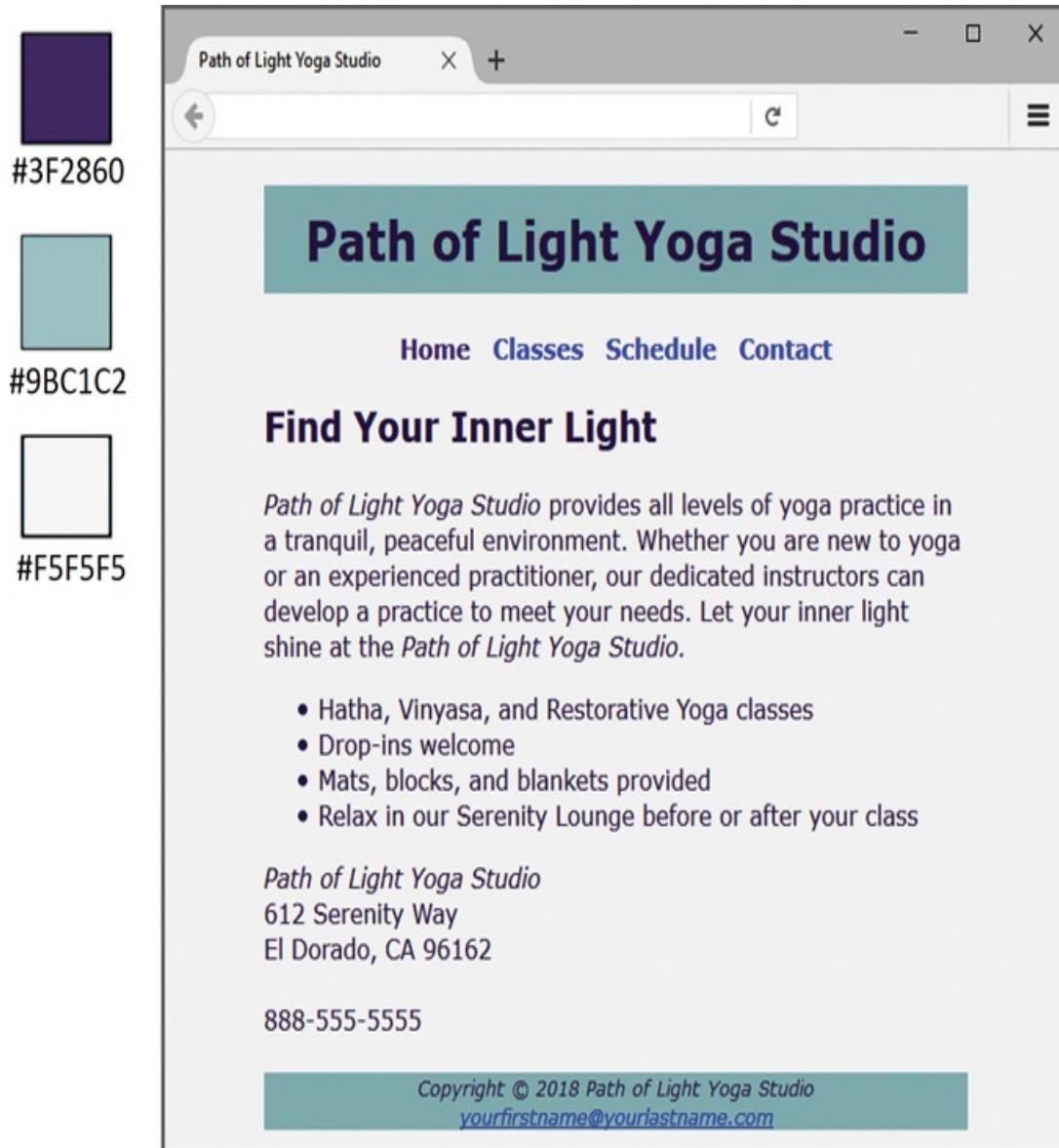
## Path of Light Yoga Studio

See [Chapter 2](#) for an introduction to the Path of Light Yoga Studio Case Study. [Figure 2.43](#) shows a site map for the Path of Light Yoga Studio website. The Home page and Classes page were created in [Chapter 2](#). You will develop a new version of this website that uses an external style sheet to configure text and color. [Figure 2.44](#) depicts the wireframe page layout.

You have the following tasks:

1. Create a new folder for this Path of Light Yoga Studio case study.
2. Create an external style sheet named yoga.css that configures the color and text for the Path of Light Yoga Studio website.
3. Modify the Home page to utilize an external style sheet to configure colors and fonts. The new Home page and color swatches are shown in [Figure 3.35](#).

# Figure 3.35



New Path of Light Yoga Studio index.html

## Figure 3.35 Full Alternative Text

4. Modify the Classes page to be consistent with the new Home page.
5. Configure centered page layout.

# Hands-On Practice Case Study

- Task 1: The Website Folder. Create a folder on your hard drive or portable storage device called `yogacss`. Copy all the files from your [Chapter 2](#) `yoga` folder into the `yogacss` folder.
- Task 2: The External Style Sheet. You will use a text editor to create an external style sheet named `yoga.css`. Code the CSS to configure the following:
  1. Global styles for the document (use the `body` element selector) with background color `#F5F5F5`; text color `#3F2860`; and Verdana, Arial, or any sans-serif font.
  2. Styles for the `header` element that configure background color `#9BC1C2` with centered text.
  3. Styles for the `h1` element selector that configure 200% line height.
  4. Styles for the `nav` element selector that configure centered and bold font.
  5. Styles for the anchor elements within the `nav` area to eliminate the default underline (Hint: use the `nav a` selector).
  6. Styles for a class named `studio` that configures italic text.
  7. Styles for the `footer` element selector with `#9BC1C2` background color, small font size (`.60em`), and italic, centered text.

Save the file as `yoga.css` in the `yogacss` folder. Check your syntax with the CSS validator (<http://jigsaw.w3.org/css-validator>). Correct and retest if necessary.

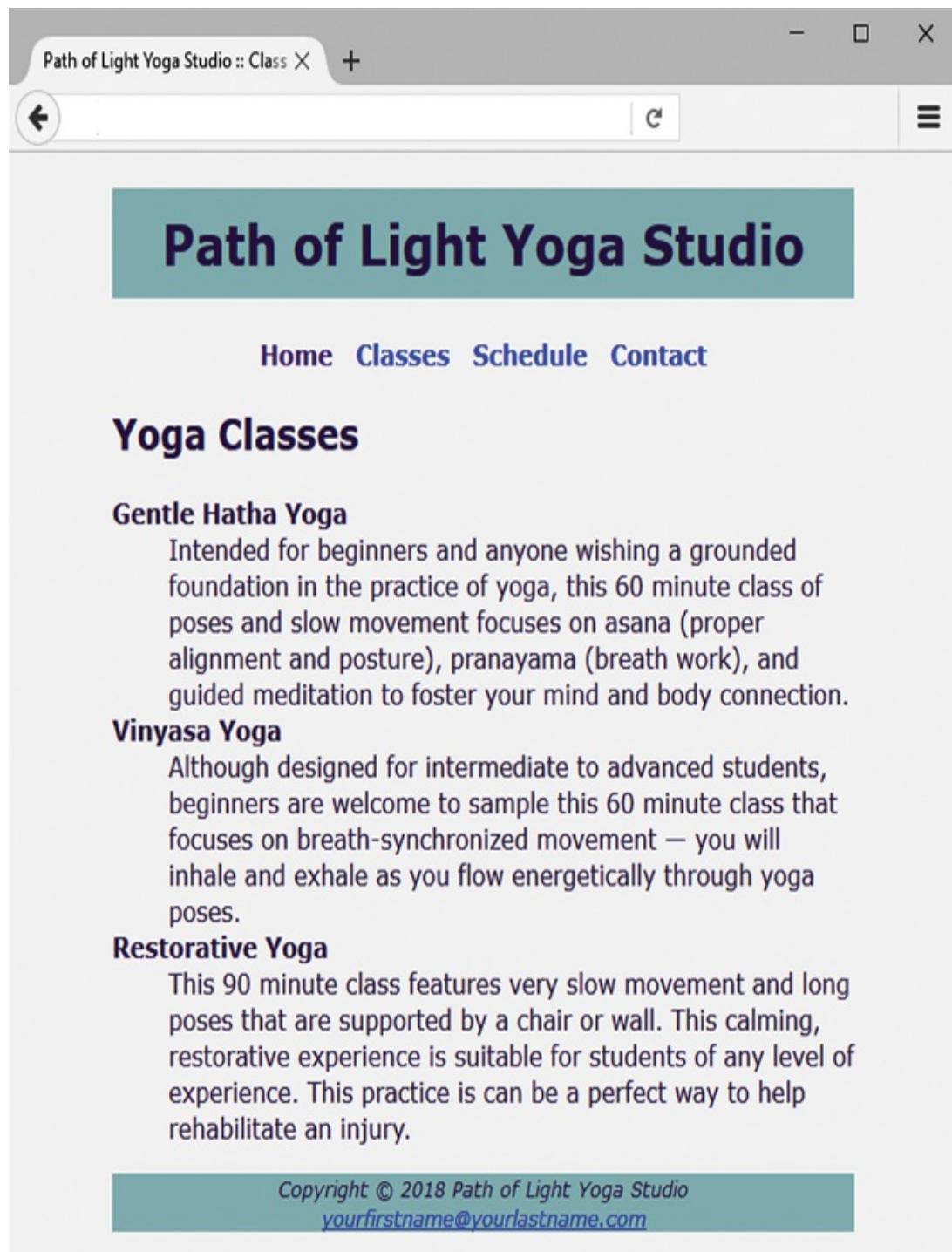
- Task 3: The Home Page. Launch a text editor, and open the `index.html` file. You will modify this file to apply styles from the `yoga.css` external style sheet.

1. Add a `<link>` element to associate the web page with the `yoga.css` external style sheet file.
2. Configure the navigation area. Remove the `<b>` element from the navigation area, because the CSS will configure the bold font style.
3. Look in the main content area for the company name (“Path of Light Yoga Studio”) and configure a `span` element to contain this text each time it appears. Assign each `span` element to the `studio` class.
4. Configure the page footer area. Remove the `<small>` and `<i>` elements—they are no longer needed since CSS is now used to configure the text.

Save the `index.html` file, and test in a browser. Your page should look similar to the one shown in [Figure 3.35](#) except that your page content will be left-aligned instead of indented from the margins. Don’t worry—you’ll configure your page layout in Task 5 of this case study.

- Task 4: The Classes Page. Launch a text editor, and open the `classes.html` file. You will modify this file in a similar manner: Add the `<link>` element, configure the navigation area, and configure the page footer area. Save and test your new `classes.html` page. It should look similar to the one shown in [Figure 3.36](#) except for the alignment.

## Figure 3.36



New classes.html page

### Figure 3.36 Full Alternative Text

- Task 5: Center Page Layout with CSS. Modify yoga.css, index.html,

and classes.html to configure page content that is centered with 80% width. Refer to [Hands-On Practice 3.9](#) if necessary.

1. Launch a text editor, and open the yoga.css file. Add a style rule for an id named wrapper with width set to 80%, margin-right set to auto, and margin-left set to auto.
2. Launch a text editor, and open the index.html file. Add the HTML code to configure a div element assigned to the id wrapper that “wraps,” or contains, the code within the body section. Save and test your index.html page in a browser and you’ll notice that the page content is now centered within the browser viewport as shown in [Figure 3.35](#).
3. Launch a text editor, and open the classes.html file. Add the HTML code to configure a div element assigned to the id wrapper that “wraps,” or contains, the code within the body section. Save and test your classes.html page in a browser and you’ll notice that the page content is now centered within the browser viewport as shown in [Figure 3.36](#)

Experiment with modifying the yoga.css file. Change the page background color, the font family, and so on. Test your pages in a browser. Notice how a change in a single file can affect multiple files when external style sheets are used.

# **4 Visual Elements and Graphics**

# Chapter Objectives

In this chapter, you will learn how to . . .

- Create and format lines and borders on web pages
- Decide when to use graphics and what graphics are appropriate
- Apply the image element to add graphics to web pages
- Optimize an image for web page display
- Configure images as backgrounds on web pages
- Configure images as hyperlinks
- Configure rounded corners, box shadow, text shadow, opacity, and gradients with CSS3
- Configure RGBA color with CSS3
- Configure HSLA color with CSS3
- Use HTML5 elements to caption a figure
- Use the HTML5 meter and progress elements
- Find free and fee-based graphics sources
- Follow recommended web design guidelines when using graphics on web pages

**A key component of a compelling website** is the use of interesting and appropriate graphics. This chapter introduces you to working with visual elements on web pages.

When you include images on your website, it is important to remember that

not all users are able to view them. Some users may have vision problems and need assistive technology such as a screen reader application that reads the web page to them. In addition, search engines send out spiders and robots to walk the web and catalog pages for their indexes and databases; such programs do not access your images. Visitors using a mobile device may have images disabled. As a web developer, strive to create pages that are enhanced by graphical elements, but are usable without them.

# 4.1 Configuring Lines and Borders

Web designers often use visual elements such as lines and borders to separate or define areas on web pages. In this section, you'll explore two coding techniques to configure a line on a web page: the HTML horizontal rule element and the CSS border and padding properties.

## Horizontal Rule Element

A horizontal rule element, `<hr>`, visually separates areas of a page and configures a horizontal line across a web page. Since the horizontal rule element does not contain any text, it is coded as a void tag and not in a pair of opening and closing tags. The horizontal rule element has a new semantic meaning in HTML5, it can be used to indicate a thematic break or change in the content.



### Hands-On Practice 4.1

Open the web page found at chapter4/starter1.html in the student files in a text editor. Add an `<hr>` tag after the opening footer element.

Save your file as hr.html, and test it in a browser. The lower portion of your web page should look similar to the partial screenshot shown in [Figure 4.1](#). Compare your work with the solution in the student files (chapter4/4.1/hr.html). While a horizontal rule can be easily created using HTML, a more modern technique for configuring lines on web pages is to use CSS to configure a border.

# Figure 4.1



The <hr> tag configures a horizontal line

[Figure 4.1 Full Alternative Text](#)

## The border and padding Properties

As you may have noticed when you configured background colors for heading elements in [Chapter 3](#), block display HTML elements form the shape of a rectangular box on a web page. This is an example of the CSS box model, which you will explore in detail in [Chapter 6](#). For now, let's focus on two CSS properties that can be configured for the “box”: the border and padding properties.

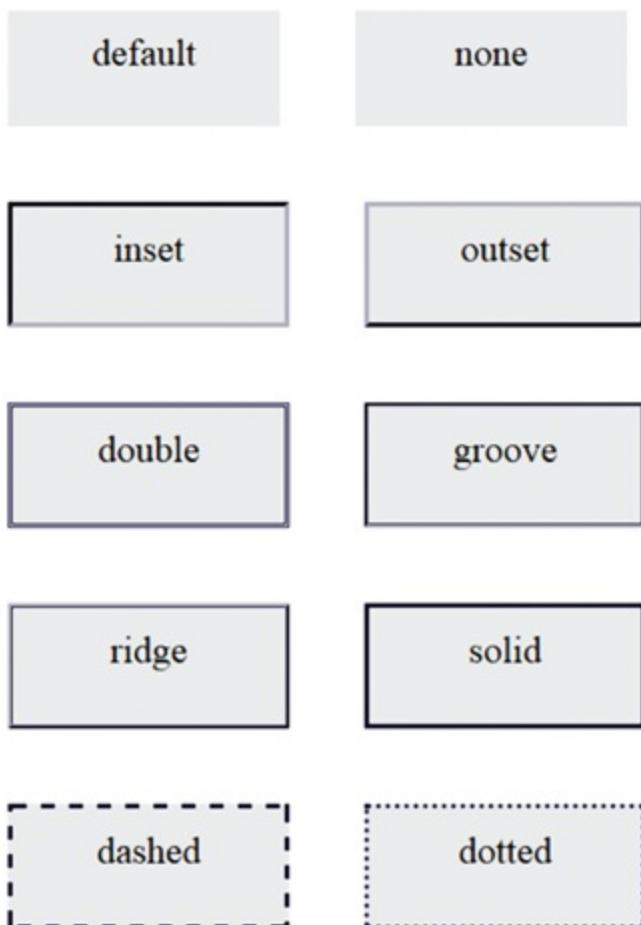
## The border Property

The border property configures the border, or boundary, around an element. By default, the border has a width set to 0 and does not display. You can set the border-width, border-color, and border-style with the border property. And there's more—you can even configure individual settings for the top, right, bottom and left borders using the border-top, border-right, border-bottom, and border-left properties.

## The border-style Property

The `border-style` property configures the type of line displayed in the border. The formatting options include `inset`, `outset`, `double`, `groove`, `ridge`, `solid`, `dashed`, and `dotted`. Be aware that these property values are not all uniformly applied by browsers. [Figure 4.2](#) shows how a recent version of Firefox renders various border-style values.

## Figure 4.2



Examples of the various border-style values rendered by Firefox

### [Figure 4.2 Full Alternative Text](#)

The CSS to configure the borders shown in [Figure 4.2](#) uses a `border-width` of 3 pixels, the value indicated for the `border-style` property, and a `border-color` of `#000000`. For example, the style rule to configure the dashed border

follows:

```
.dashedborder { border-width: 3px;  
                 border-style: dashed;  
                 border-color: #000033; }
```

A shorthand notation allows you to configure all the border properties in one style rule by listing the values of `border-width`, `border-style`, and `border-color`, as in the following example:

```
.dashedborder { border: 3px dashed #000033; }
```

## The padding Property

The `padding` property configures empty space between the content of the HTML element (usually text) and the border. By default, the padding is set to `0`. If you configure a background color for an element, the color is applied to both the padding and the content areas. The `padding` property can be configured with a variety of values, including pixels, em units, and percentages. You'll apply the `padding` and `border` properties in the next Hands-On Practice. You may want to refer to [Table 4.1](#), which presents a description of the CSS properties introduced in this chapter, as you work through the Hands-On Practice exercises.

## Table 4.1 New CSS properties introduced in this chapter

Property	Description	Values
<code>background-attachment</code>	Configures whether the background image attachment	<code>fixed</code> , <code>scroll</code> (default)

	scrolls with the page or is fixed in place	
background-clip	Configures the background painting area.	padding-box, border-box, or content-box
background-image	Background image on an element	To display an image, use <code>url(imagename.gif)</code> , <code>url(imagename.jpg)</code> , or <code>url(imagename.png)</code> . To disable image display, use <code>none</code> (default).
background-origin	Configures the background positioning area.	padding-box, border-box, or content-box
background-position	Position of the background image	Two percentage values or numeric pixel values. The first value configures the horizontal position, and the second configures the vertical position starting from the upper left corner of the container's box. Text values can also be used: <code>left</code> , <code>top</code> , <code>center</code> , <code>bottom</code> , and <code>right</code> .
background-repeat	Controls how the background image will repeat	Text values <code>repeat</code> (default), <code>repeat-y</code> , (vertical repeat), <code>repeat-x</code> (horizontal repeat), and <code>no-repeat</code> (no repeat). The new CSS3 values ( <code>space</code> ,

round) are not supported in all browsers.

		Two percentages, pixel values, auto, contain, or cover. The first value indicates width. The second value indicates height. If only one value is provided, the second value defaults to auto. The value contain causes the background image to be scaled (with aspect ratio intact) to horizontally fill the container. The value cover causes the background image to be scaled (with aspect ratio intact) to vertically fill the container.
background-size	Configures the size of the background image.	
border	Shorthand notation to configure the values for border-width, border-style, and border-color of an element	The values for border-width, border-style, and border-color separated by spaces—for example, border: 1px solid #000000;
border-bottom	Shorthand notation to configure the bottom border of an element	The values for border-width, border-style, and border-color separated by spaces—for example, border-bottom: 1px solid #000000;
border-bottom-radius	Configures rounded corners	One numeric value (px or em) or percentage that configures the radius of

`left-radius` on the bottom left corner of a border.

`border-bottom-right-radius` Configures rounded corners on the bottom right corner of a border.

`border-color` The color of the border around an element Any valid color value

`border-left` Shorthand notation to configure the left border of an element The values for `border-width`, `border-style`, and `border-color` separated by spaces—for example, `border-left: 1px solid #000000;`

`border-radius` Configures rounded corners on an element. One to four numeric values (px or em) or percentages that configure the radius of the corners. If a single value is provided, it configures all four corners. The corners are configured in order of top left, top right, bottom right, and bottom left.

`border-right` Shorthand notation to configure the right border of an element The values for `border-width`, `border-style`, and `border-color` separated by spaces—for example, `border-right: 1px solid #000000;`

border-style	The type of border around an element	Text values double, groove, inset, none (the default), outset, ridge, solid, dashed, dotted, and hidden
border-top	Shorthand notation to configure the top border of an element	The values for border-width, border-style, and border-color separated by spaces—for example, border-top: 1px solid #000000;
border-top-left-radius	Configures a rounded top left corner. This CSS3 property is not supported in all browsers.	One numeric value (px or em) or percentage that configures the radius of the corner.
border-top-right-radius	Configures a rounded top right corner.	One numeric value (px or em) or percentage that configures the radius of the corner.
border-width	The width of a border around an element	A numeric pixel value (such as 1px) or the text values thin, medium, and thick
box-shadow	Configures a drop shadow on an element.	Two to four numerical values (px or em) to indicate horizontal offset, vertical offset, blur radius (optional), and spread distance (optional), and a valid color value. Use the inset keyword to configure an inner shadow.

height	The height of an element	A numeric pixel value or percentage
linear-gradient	Configures a linear blending of shades from one color to another.	Numerous syntax options for starting points of the gradient and color values. For example, the following configures a two-color linear gradient: <code>linear-gradient(#FFFFFF, #8FA5CE);</code>
max-width	Configures a maximum width for an element	A numeric pixel value or percentage
min-width	Configures a minimum width for an element	A numeric pixel value or percentage
opacity	Configures the transparency of an element.	Numeric values between 1 (fully opaque) and 0 (completely transparent). This property is inherited by all child elements.
		<ol style="list-style-type: none"> <li>1. A single numeric value (px or em) or percentage; configure padding on all sides of the element.</li> <li>2. Two numeric values (px or em) or percentages; the first value configures the top and bottom padding, and the second value</li> </ol>

		configures the left and right padding—for example, padding: 2em 1em;
padding	Shorthand notation to configure the amount of padding—the blank space between the element and its border	<p>3. Three numeric values (px or em) or percentages; the first value configures the top padding, the second value configures the left and right padding, the third value configures the bottom padding—for example, padding: 5px 30px 10px;</p> <p>4. Four numeric values (px or em) or percentages; the values configure the padding in the following order: padding-top, padding-right, padding-bottom, padding-left.</p>
padding-bottom	Blank space between an element and its bottom border	A numeric value (px or em) or percentage
padding-left	Blank space between an element and its left border	A numeric value (px or em) or percentage
padding-right	Blank space between an element and its right border	A numeric value (px or em) or percentage

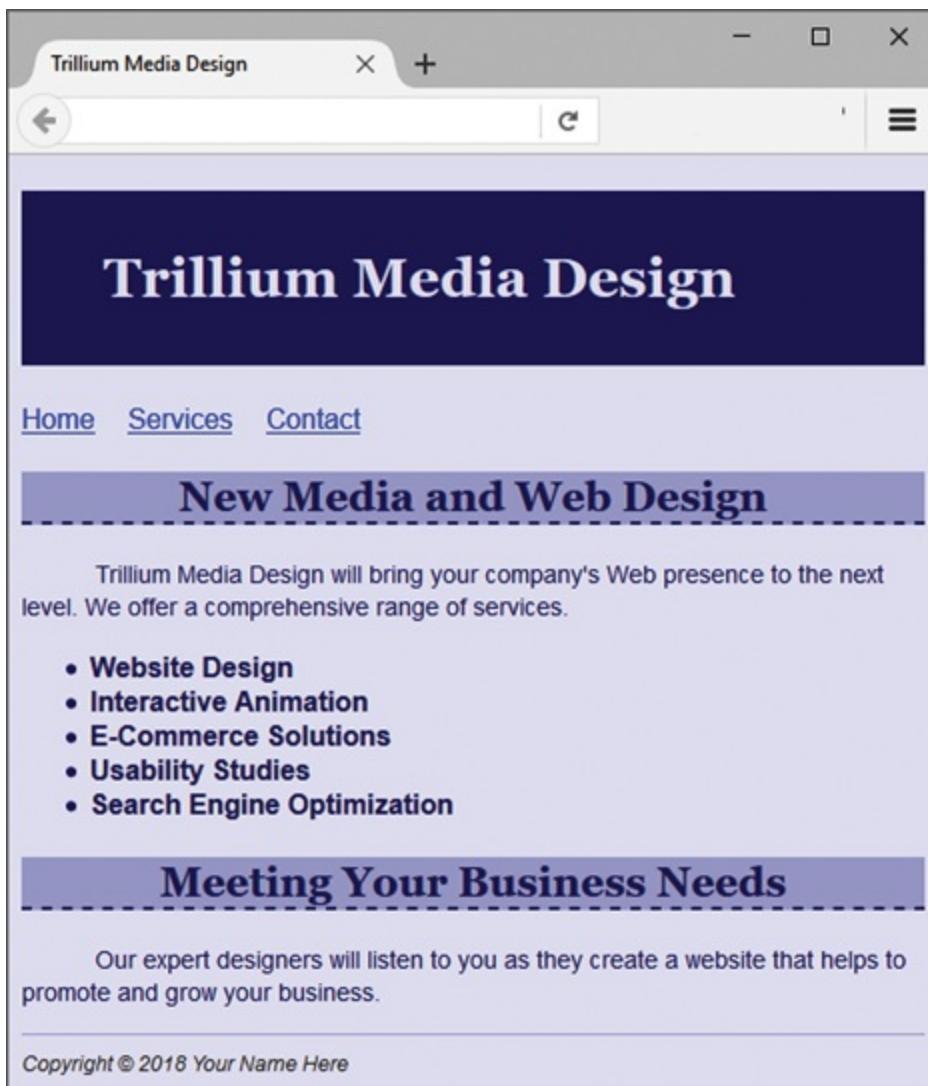
padding-top	Blank space between an element and its top border	A numeric value (px or em) or percentage
radial-gradient	Configures a radial (circular) blending of shades from one color to another.	Numerous syntax options for starting points of the gradient and color values. For example, the following configures a two-color radial gradient: <code>radial-gradient(#FFFFFF, #8FA5CE);</code>



## Hands-On Practice 4.2

In this Hands-On Practice you will work with the border and padding properties. Launch a text editor, and open the web page found at chapter4/starter1.html in the student files. You will modify the CSS style rules for the h1 element selector, h2 element selector, and footer element selector. When you are finished, your page should look similar to the one shown in [Figure 4.3](#).

## Figure 4.3



CSS border and padding properties add visual interest to the page.

### Figure 4.3 Full Alternative Text

Edit the CSS style rules as follows:

1. Code a style for the h1 element selector to set the padding to 1em. The code follows:

```
h1 {padding: 1em;}
```

2. Add a style rule to the h2 element selector to configure a 2-pixel,

dashed, bottom border in the color #191970. The code follows:

```
border-bottom: 2px dashed #191970;
```

3. Add styles to the footer element selector to configure a thin, solid, top border in the color #aeaed4 along with 10 pixels of top padding. Also configure the footer to have gray text. The new style declarations follow:

```
border-top: thin solid #aeaed4;  
padding-top: 10px;  
color: #333333;
```

Save your file as border.html.

Test your page in multiple browsers. Expect your page to look slightly different in various browsers. See [Figure 4.3](#) for a screenshot of the page using Firefox. [Figure 4.4](#) shows the page displayed in Microsoft Edge. The student files contain a sample solution (chapter4/4.2/border.html).

## Figure 4.4

The screenshot shows a Microsoft Edge browser window with the title bar "Trillium Media Design". The main content area displays a website for "Trillium Media Design". The header features a dark blue bar with the company name in white. Below the header is a light purple navigation bar with links for "Home", "Services", and "Contact". A blue banner with the text "New Media and Web Design" is centered above the main content. The main content area contains a paragraph about the company's services and a bulleted list of services: "Website Design", "Interactive Animation", "E-Commerce Solutions", "Usability Studies", and "Search Engine Optimization". Another blue banner below reads "Meeting Your Business Needs". A paragraph states that expert designers will listen to the user to create a website that helps to promote and grow their business. At the bottom of the page is a copyright notice: "Copyright © 2018 Your Name Here".

Microsoft Edge renders the dashed border differently than Firefox.

Screenshots of Microsoft Edge. Copyright by Microsoft Corporation. Courtesy of Microsoft Corporation.



## FAQ

1. web page looks different in some browsers. What can I do?

Do not expect your web pages always to look the same in every browser

and every browser version. Web pages that look slightly different in various browsers are a part of life in the world of web developers.



## Checkpoint 4.1

1. Is it reasonable to try to code a web page that looks exactly the same on every browser and every platform? Explain your answer.
2. Describe what is incorrect with the following CSS code, which causes a web page containing it not to display a border when rendered in a browser:

```
h2 { background-color: #FF0000  
     border-top: thin solid #000000 }
```

3. True or False: CSS can be used to configure visual elements such as rectangular shapes and lines on web pages.

## 4.2 Types of Graphics

Graphics can make web pages compelling and engaging. This section discusses features of graphic files commonly used on the Web: GIF, JPEG, and PNG. A new web graphic format, WebP, is also introduced.

### Graphic Interchange Format (GIF) Images

GIF images are best used for line drawings containing mostly solid tones and simple images such as clip art. The maximum number of colors in a GIF file is 256. GIF images have a .gif file extension. [Figure 4.5](#) shows a logo image created in GIF format.

**Figure 4.5**



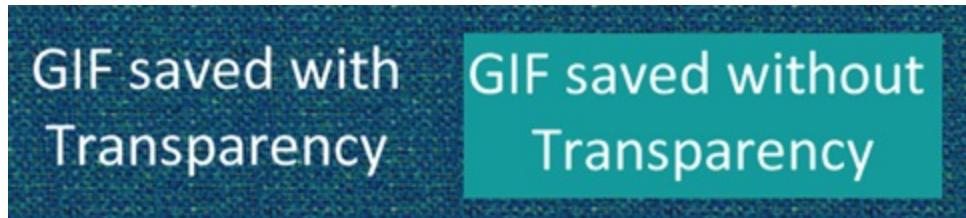
This logo is a GIF

### Transparency

The format GIF89A used by GIF images supports image transparency. In a graphics application, such as the open-source GIMP, one color (typically the background color) of the image can be set to be transparent. The background color (or background image) of the web page shows through the transparent

area in the image. [Figure 4.6](#) displays two GIF images on a blue textured background.

## Figure 4.6



Comparison of transparent and nontransparent GIFs

[Figure 4.6 Full Alternative Text](#)

## Animation

An animated GIF consists of several images or frames, each of which is slightly different. When the frames display on the screen in order, the image appears animated. Animated GIFs can be created in a graphics application such as Adobe Fireworks.

## Compression

Lossless compression is used when a GIF is saved. This means that nothing in the original image is lost and that the compressed image, when rendered by a browser, will contain the same pixels as the original.

## Optimization

To avoid slow-loading web pages, graphic files should be optimized for the Web. Photos taken with a digital camera are too large—in both their

dimensions and their file size—to display well on a web page. **Image optimization** is the process of creating an image with the lowest file size that still renders a good-quality image—balancing image quality and file size. GIF images are typically optimized by using a graphics application to reduce the number of colors in the image. Popular graphics applications used by web developers include Adobe Photoshop and GIMP (<http://gimp.org>).

## Interlacing

Browsers render, or display, web page documents in order, line by line, starting at the top of the document. They display standard images as the files are read in order from top to bottom. The top of a standard image begins to display after 50% of the image has been read by a browser. When a GIF graphic file is created, it can be configured as interlaced. An interlaced image progressively displays and seems to fade in as it downloads. The image first appears fuzzy but gradually becomes clearer and sharper, which can help to reduce the perceived load time of your web page.

## Joint Photographic Experts Group (JPEG) Images

JPEG images are best used for photographs. In contrast to a GIF image, a JPEG image can contain 16.7 million colors. However, JPEG images cannot be made transparent, and they cannot be animated. JPEG images have a .jpg or .jpeg file extension.

## Compression

JPEG images are saved using lossy compression. This means that some pixels in the original image are lost or removed from the compressed file. When a browser renders the compressed image, the display is similar to, but not exactly the same as, the original image.

# Optimization

There are trade-offs between the quality of the image and the amount of compression. An image with less compression will have higher quality and result in a larger file size. An image with more compression will have lower quality and result in a smaller file size. Graphics applications such as Adobe Photoshop, Adobe Lightroom, and GIMP allow you to configure the compression quality and choose the image that best suits your needs.

When you take a photo with a digital camera, the file size is too large for optimal display on a web page. [Figure 4.7](#) shows an optimized version of a digital photo with an original file size of 250KB. The image was optimized using a graphics application set to 80% quality, is now only 55KB, and displays well on a web page.

**Figure 4.7**



A JPEG saved at 80% quality (55KB file size) displays well on a web page

[Figure 4.8](#) was saved with 20% quality and is only 19KB, but its quality is unacceptable. The quality of the image degrades as the file size decreases.

The square blockiness you see in [Figure 4.8](#) is called pixelation and should be avoided.

## Figure 4.8



JPEG saved at 20% quality (19KB file size)

Adobe Photoshop and GIMP are often used by web professionals to optimize images for the Web. Pixlr offers a free, easy-to-use, online photo editor at <http://pixlr.com/editor>. GIMP (<http://www.gimp.org>) is a popular open-source image editor that supports multiple platforms.

Another technique used with web graphics is to display a small version of the image, called a thumbnail image. Often, the thumbnail is configured as an image hyperlink that displays the larger image when clicked. [Figure 4.9](#) shows a thumbnail image.

## Figure 4.9



This small thumbnail image is only 5KB

## Progressive JPEG

When a JPEG file is created, it can be configured as progressive. A progressive JPEG is similar to an interlaced GIF in that the image progressively displays and seems to fade in as it downloads.

## Portable Network Graphic (PNG) Images

PNG images combine the best of GIF and JPEG images and will be a replacement for GIF images in the future. PNG (pronounced “ping”) graphics can support millions of colors, support variable transparency levels, and use lossless compression. PNG images also support interlacing. [Table 4.2](#) summarizes the characteristics of GIF, JPEG, and PNG image files.

## Table 4.2 Overview of common web graphic file types

Image Type	File Extension	Compression	Transparency	Animation	Colors	Properties
GIF	.gif	Lossless	Yes	Yes	256	Interlaced

JPEG	.jpg or .jpeg	Lossy	No	No	Millions Prc
------	------------------	-------	----	----	--------------

PNG	.png	Lossless	Yes	No	Millions Int'l
-----	------	----------	-----	----	----------------

## New WebP Image Format

Google's new WebP image format offers improved lossy compression for photographic images, but it's not yet ready for use in commercial websites. WebP (pronounced "weppy") graphics are currently supported only by the Chrome and Opera browsers. Visit <https://developers.google.com/speed/webp> for more information on this new image format.

## 4.3 Image Element

The image element configures graphics on a web page. These graphics can be photographs, banners, company logos, navigation buttons, and so on; you are limited only by your creativity and imagination.

The image element is a void element and is not coded as a pair of opening and closing tags. The following code example configures an image named logo.gif, which is located in the same folder as the web page:

```
` tag attributes and their values. Commonly used attributes are shown in bold.

### Table 4.3 Attributes of the `<img>` tag

| Attribute | Value                                                                                                                                    |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------|
| align     | right, left (default), top, middle, bottom; obsolete<br>—use the CSS float or position property instead (see <a href="#">Chapter 6</a> ) |

|                 |                                                                                                                                                                                                                   |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>alt</b>      | Text phrase that describes the image                                                                                                                                                                              |
| <b>border</b>   | Image border size in pixels; border="0" prevents the border of an image hyperlink from being displayed; obsolete—use the CSS border property instead                                                              |
| <b>height</b>   | Height of image in pixels                                                                                                                                                                                         |
| <b>hspace</b>   | Amount of space, in pixels, that is blank to the left and right of the image; obsolete—use the CSS padding property instead                                                                                       |
| <b>id</b>       | Text name—alphanumeric, beginning with a letter, no spaces; the value must be unique and not used for other id values on the same web page document                                                               |
| <b>longdesc</b> | URL of a resource that contains an accessible description of a complex image                                                                                                                                      |
| <b>name</b>     | Text name—alphanumeric, beginning with a letter, no spaces; this attribute names the image so that it can be easily accessed by client-side scripting languages such as JavaScript; obsolete—use the id attribute |
| <b>src</b>      | The URL or file name of the image                                                                                                                                                                                 |
| <b>srcset</b>   | New HTML 5.1 attribute that supports the browser display of responsive images (see <a href="#">Chapter 7</a> )                                                                                                    |

|               |                                                                                                                    |
|---------------|--------------------------------------------------------------------------------------------------------------------|
| <b>title</b>  | A text phrase containing advisory information about the image; typically more descriptive than the alt text        |
| <b>vspace</b> | Amount of space, in pixels, that is blank above and below the image; obsolete—use the CSS padding property instead |
| <b>width</b>  | Width of image in pixels                                                                                           |

Notice that several attributes in [Table 4.3](#) are marked as obsolete. Although obsolete in HTML5, they are still valid in XHTML so you may see them coded in existing web pages. As you work through this book, you'll use CSS to re-create the functions of these now-obsolete attributes.

## Accessibility and Images

Use the alt attribute to provide accessibility. Recall from [Chapter 1](#) that Section 508 of the Rehabilitation Act requires the use of accessibility features for new information technology (including websites) associated with the federal government. The alt attribute configures an alternative text description of the image. This alt text is used by the browser in two ways. The browser will display the alt text in the image area before the graphic is downloaded and displayed. Some browsers will also display the alt text as a tool tip whenever a visitor to the web page places the mouse cursor over the image area. Applications such as screen readers will read the text in the alt attribute out loud. A mobile browser may display the alt text instead of the image.



## Focus on Accessibility

Standard browsers such as Firefox and Safari are not the only type of application or user agent that can access your website. Major search engines run programs called spiders or robots; these programs index and categorize websites. They cannot process text within images, but some process the value of the alt attributes in image tags.

The W3C recommends that alt text be no longer than 100 characters. Avoid using the file name or words like picture, image, and graphic as the value of the alt attribute. Instead, use a brief phrase that describes the image. If the purpose of an image, such as a logo, is to display text, then configure the text as the value of the alt attribute.



## Hands-On Practice 4.3

In this Hands-On Practice you will place a logo graphic and a photograph on a web page. Create a new folder called kayakch4. The images used in this Hands-On Practice are located in the student files chapter4/starters folder. Copy the kayakdc.gif and hero.jpg files into your kayakch4 folder. A starter version of the KayakDoorCounty.net Home page is ready for you in the student files. Copy the chapter4/starter2.html file into your kayakch4 folder. Rename the file as index.html. When you complete this Hands-On Practice, your page will look similar to the one shown in [Figure 4.10](#)—with two images. Launch a text editor and open the index.html file.

## Figure 4.10



[Home](#) [Tours](#) [Reservations](#) [Contact](#)

**Your next adventure is only a paddle away ....**



Take a guided kayak tour while you explore the shoreline of scenic Door County.

**Featured tours this week:**

- Cana Island
- Mink River
- Europe Lake

Copyright © 2018 KayakDoorCounty.net

A web page with images

[Figure 4.10 Full Alternative Text](#)

1. Delete the text contained between the h1 opening and closing tags. Code an tag for kayakdc.gif in this area. Remember to include the src, alt, height, and width attributes. Sample code follows:

```

```

2. Code an image tag to display the hero.jpg image below the h2 element.

The image is 500 pixels wide and 350 pixels high. Configure appropriate alt text for the image.

3. Save your page in the kayakch4 folder. Launch a browser and test your page. It should look similar to the one shown in [Figure 4.10](#).

*Note:* If the images did not display on your web page, verify that you have saved the files inside the kayakch4 folder and that you have spelled the file names correctly in the <img> tags. The student files contain a sample solution in the chapter4/4.3 folder. Isn't it interesting how images can add visual interest to a web page?



## FAQ

1. What if I don't know the height and width of an image?

Most graphics applications can display the height and width of an image. If you have a graphics application such as Adobe Photoshop, Adobe Fireworks, or GIMP handy, launch the application and open the image. These applications include options that will display the properties of the image, such as height and width.

If you don't have a graphics application available, you can determine the dimensions of an image using the Firefox browser. Display the image on a web page. Right-click on the image to display the context-sensitive menu. Select a menu option such as Properties or "View Image Info" to view the dimensions (height and width) of the image. (*Warning:* If the height and width are specified on the web page, those values will be displayed even if the image's actual height and width are different.)

## Image Hyperlinks

Writing the code to make an image function as a hyperlink is very easy. To create an **image link** all you need to do is surround your <img> tag with anchor tags. For example, to place a link around an image called home.gif, use the following code:

```
<a href="index.html"></a>
```

A thumbnail image link is a small image configured as an image link with an href attribute value that points to another image file instead of to a web page. For example,

```
<a href="sunset.jpg"></a>
```

To see this in action, launch a browser and view chapter4/thumb.html in the student files.



## Hands-On Practice 4.4

You will add image links to the KayakDoorCounty.net Home page in this Hands-On Practice. You should already have the index.html, kayakdc.gif, and hero.jpg files in your kayakch4 folder. The new graphics used in this Hands-On Practice are located in the student files in the chapter4/starters folder. Copy the home.gif, tours.gif, reservations.gif, and contact.gif files into your kayakch4 folder. View [Figure 4.11](#) to see how your page should look after you are done with this Hands-On Practice.

## Figure 4.11



The new Home page navigation with image links

#### Figure 4.11 Full Alternative Text

Let's get started. Launch a text editor and open index.html. Notice that the anchor tags are already coded—you'll just need to convert the text links to image links!

1. Whenever the main navigation consists of media, such as an image,

some individuals may not be able to see the images (or may have images turned off in their browser). To provide navigation that is accessible to all, configure a set of plain text navigation links in the page footer area. Copy the <nav> element containing the navigation area to the lower portion of the page and paste it within the footer element, above the copyright line.

2. Locate the style tags in the head section and code the following style rules:

1. Configure a green background color for an id named bar:

```
#bar { background-color: #152420; }
```

2. Some browsers display a border around image links by default. Prevent the border display by setting the border property to none for the img element selector:

```
img { border: none; }
```

3. Now, focus on the top navigation area. Code `id="bar"` on the opening nav tag. Next, replace the text contained between each pair of anchor tags with an image element. Use `home.gif` for the link to `index.html`, `tours.gif` for the link to `tours.html`, `reservations.gif` for the link to `reservations.html`, and `contact.gif` for the link to `contact.html`. Be careful not to leave any extra spaces between the img tag and the opening and closing anchor tags. A sample follows:

```
<a href="index.html"> tag for the Home button.



1. What if my images don't display?

The following are common reasons for an image to not display on a web page:

- Is your image *really* in the website folder? Use Windows Explorer or the Mac Finder to double check.
- Did you code the HTML and CSS correctly? Perform W3C CSS and HTML validation testing to find syntax errors that could prevent the image from displaying.

- Does your image have the exact file name that you have used in the CSS or HTML code? Attention to detail and consistency will be very helpful here.



## FAQ

### 1. How should I name my image files?

Guidelines for naming image files:

- Use all lowercase letters.
- Do not use punctuation symbols and spaces.
- Do not change the file extensions (should be .gif, .jpg, .jpeg, or .png).
- Keep your file names short, but descriptive. Here are some examples:
  - i1.gif is probably too short.
  - myimagewithmydogonmybirthday.gif is too long.
  - dogbdy.gif may be just about right.

## 4.4 HTML5 Visual Elements

You'll explore configuring images with captions in this section. In the next Hands-On Practice you'll configure an image and a caption using a div element as a container. Next, you'll explore an approach to configure a image with a caption that implements new HTML5 figure and figcaption elements.



### Hands-On Practice 4.5

In this Hands-On Practice you will configure an image with a caption on a web page. The photo used in this Hands-On Practice is located in the student files chapter4/starters folder. Save the myisland.jpg file in a folder named mycaption.

1. Step 1: Launch a text editor. Select File > Open to edit the template file located at chapter2/template.html in the student files. Modify the title element. Add an image tag to the body section to display the myisland.jpg image as follows:

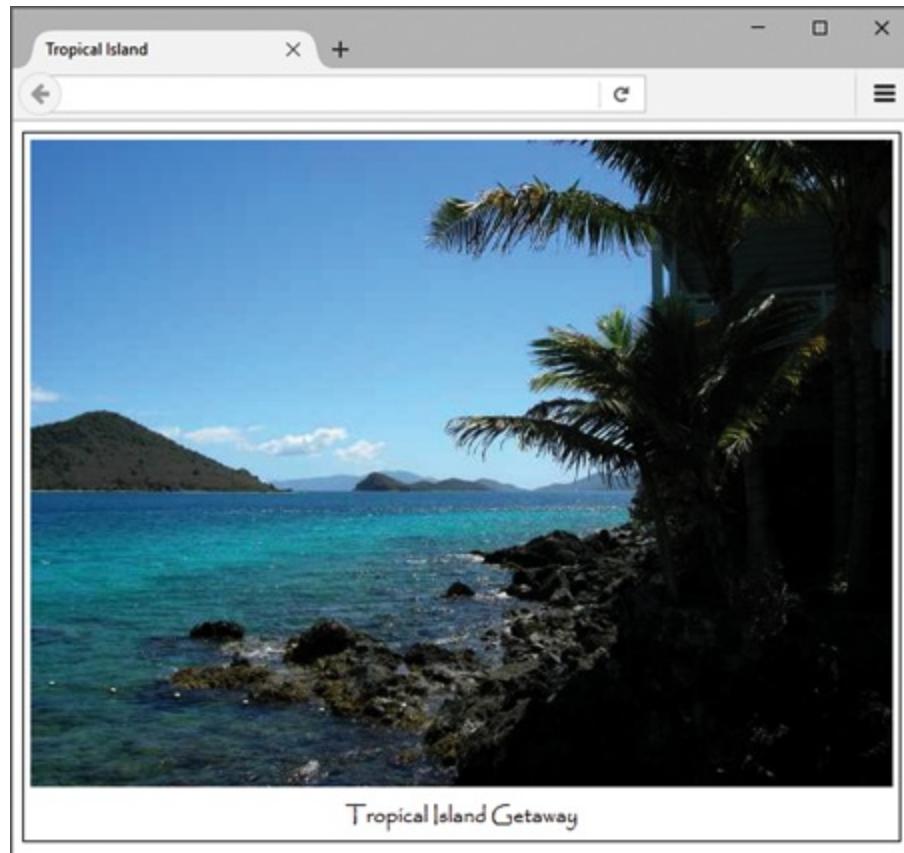
```

#figure { width: 640px;
           border: 1px solid #000000;
           padding: 5px;
           text-align: center;
           font-family: Papyrus, fantasy; }
</style>
```

Edit the body section to add a div to contain the image. Add the text “Tropical Island Getaway” below the image but within the div element. Assign the div to the id named `figure`. Save the file as `index.html` in the

mycaption folder. Launch a browser to test your page. It should look similar to the page shown in [Figure4.13](#). The student files contains a sample solution in the chapter4/4.5 folder.

## Figure 4.13



CSS configures the placement of the border and figure caption

[Figure 4.13 Full Alternative Text](#)

## Figure and Figcaption Elements

The block display `figure` element comprises a unit of content that is self-contained, such as an image, along with one optional `figcaption` element.

The block display `figcaption` element provides a caption for a figure.

You might be wondering why these new HTML5 elements were created when the same design can be configured using a `div` element as a container. The reason is semantics. The `div` element is useful but very generic in nature. When the `figure` and `figcaption` elements are used, the structure of the content is well defined.



## Hands-On Practice 4.6

In this Hands-On Practice you will configure an area on a web page that contains an image with a caption by using the HTML5 `figure` and `figcaption` elements. The graphic used in this Hands-On Practice is located in the student files chapter4/starters folder. Save the `myisland.jpg` file in a folder named `mycaption2`.

1. Step 1: Launch a text editor. Select File > Open to edit the template file located at chapter2/template.html in the student files. Modify the title element. Add an image tag to the body section to display the `myisland.jpg` image as follows:

```

figure { width: 640px; padding: 5px;
          border: 1px solid #000000; }
figcaption { text-align: center;
              font-family: Papyrus, fantasy; }
</style>
```

Edit the body section. Below the image, add a `figcaption` element that contains the following text: “Tropical Island Getaway.” Configure a `figure` element that contains both the image and the `figcaption`. The code follows:

```
<figure>
   Tropical Island Getaway</figcaption>
</figure>
```

Save the file as `index.html` in the `mycaption2` folder. Launch a browser to test your page. It should look similar to the page shown in [Figure4.14](#). The student files contains a sample solution in the `chapter4/4.6` folder.

## Figure 4.14



The HTML5 figure and figcaption elements were used in this web page

[Figure 4.14 Full Alternative Text](#)

## Meter Element

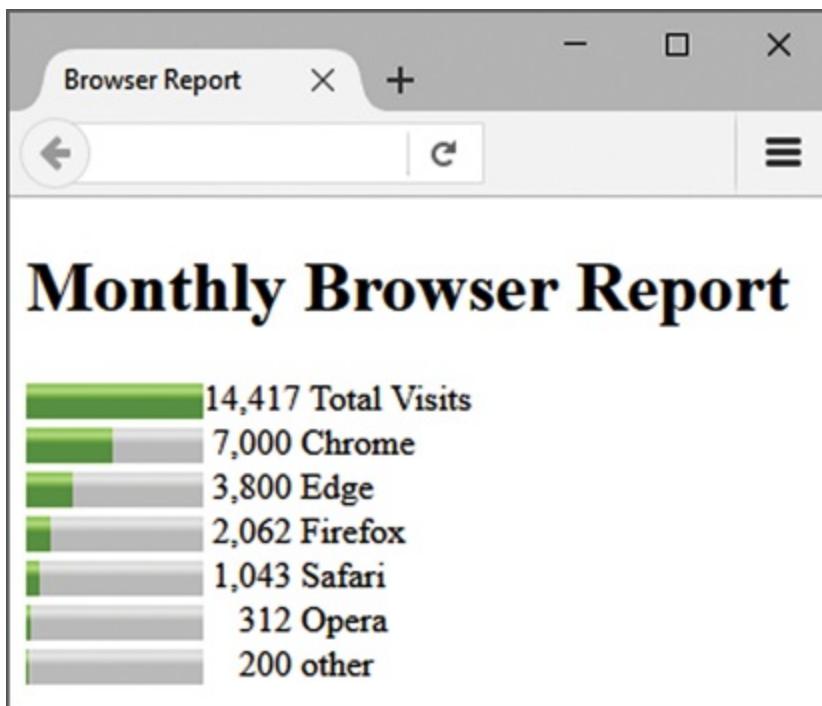
The `meter` element displays a visual gauge of a numeric value within a known range, typically as part of a bar chart. The meter element is configured with several attributes, including `value` (the value displayed), `min` (the lowest value in the range), and `max` (the highest possible value in the range). The following code snippet (student files chapter4/meter.html) configures the

display of a report that shows total visits and the number of visits by users for each browser:

```
<h1>Monthly Browser Report</h1>
<meter value="14417" min="0" max="14417">14417 </meter>14,417 Tot
<meter value="7000" min="0" max="14417">7000</meter> 7,000 Chrome
<meter value="3800" min="0" max="14417">3800</meter> 3,800 Edge<b
<meter value="2062" min="0" max="14417">2062</meter> 2,062 Firefo
<meter value="1043" min="0" max="14417">1043</meter> 1,043 Safari
<meter value="312" min="0" max="14417">312</meter> &nbsp;&nbsp; 3
<meter value="200" min="0" max="14417">200</meter> &nbsp;&nbsp; 2
```

As shown in [Figure 4.15](#), the meter element provides a handy way to display a bar chart on a web page.

## Figure 4.15



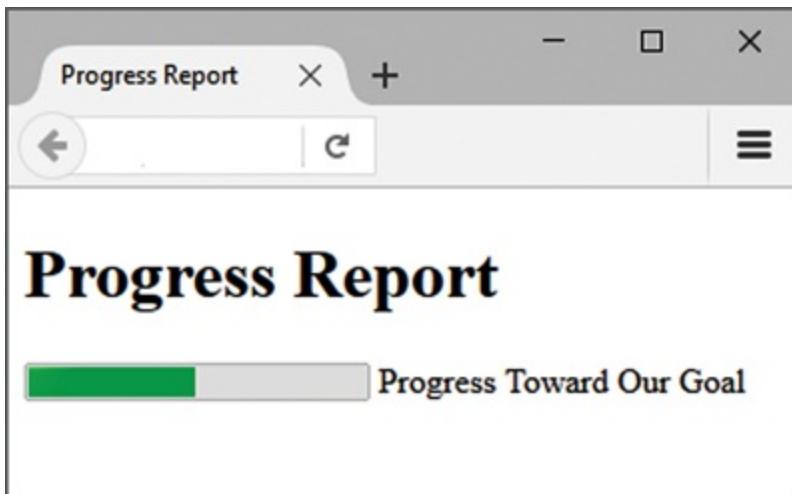
The meter element

[Figure 4.15 Full Alternative Text](#)

# Progress Element

The `progress` element, shown in [Figure 4.16](#), displays a bar that depicts a numeric value within a specified range. The `progress` element is configured with the `value` (the value displayed) and `max` (highest possible value) attributes. Place information for nonsupporting browsers to display between the opening and closing `progress` tags. The following code snippet (student files chapter4/progress.html) shows 50% completion of a task:

## Figure 4.16



The `progress` element

```
<h1>Progress Report</h1>
<progress value="5" max="10">50%</progress>
Progress Toward Our Goal
```

# 4.5 Background Images

Back in [Chapter 3](#), you learned how to configure background color with the CSS `background-color` property. For example, the following CSS code configures the background of a web page to be a soft yellow:

```
body { background-color: #ffff99; }
```



**VideoNote** *CSS Background Images*

## The `background-image` Property

Use the CSS `background-image` property to configure a background image. The following CSS code configures the HTML body selector with a background of the graphic `texture1.png` located in the same folder as the web page file:

```
body { background-image: url(texture1.png); }
```

## Using Both Background Color and a Background Image

You can configure both a background color and a background image. The background color (specified by the `background-color` property) will display first. Next, the image specified as the background will be displayed as it is loaded by the browser.

By coding both a background color and a background image, you provide your visitor with a more pleasing visual experience. If the background image does not load for some reason, the background color will still have the

expected contrast with your text color. If the background image is smaller than the web browser window and the web page is configured with CSS not to automatically tile (repeat the image), the background color of the page will display in areas not covered by the background image. The CSS for a page with both a background color and a background image follows:

```
body { background-color: #99cccc;  
       background-image: url(background.jpg); }
```

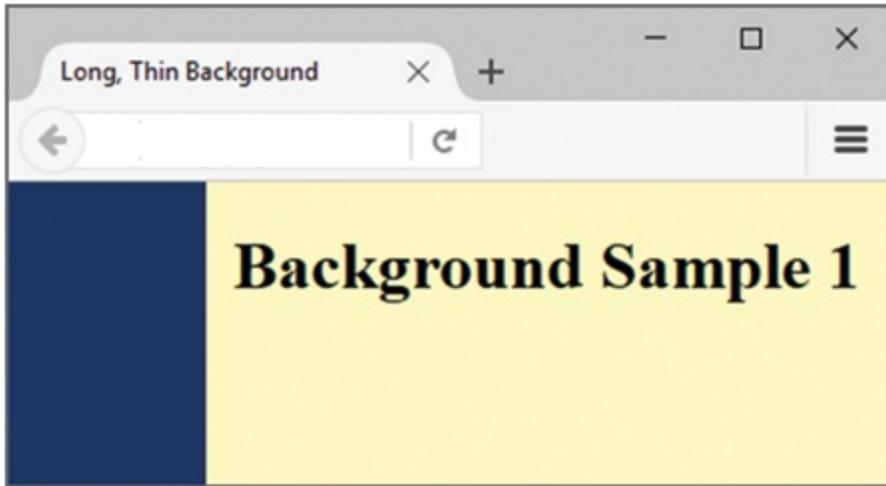
## **Browser Display of a Background Image**

You may think that a graphic created to be the background of a web page would always be about the size of the browser window viewport. However, the dimensions of the background image are often much smaller than the typical viewport. The shape of a background image is often either a thin rectangle or a small rectangular block. Unless otherwise specified in a style rule, browsers repeat, or tile, these images to cover the page's background, as shown in [Figures 4.17](#) and [4.18](#). The images have small file sizes so that they download as quickly as possible.

### **Figure 4.17**

## Background Image

### Web Page with Background Image



A long, thin background image tiles down the page

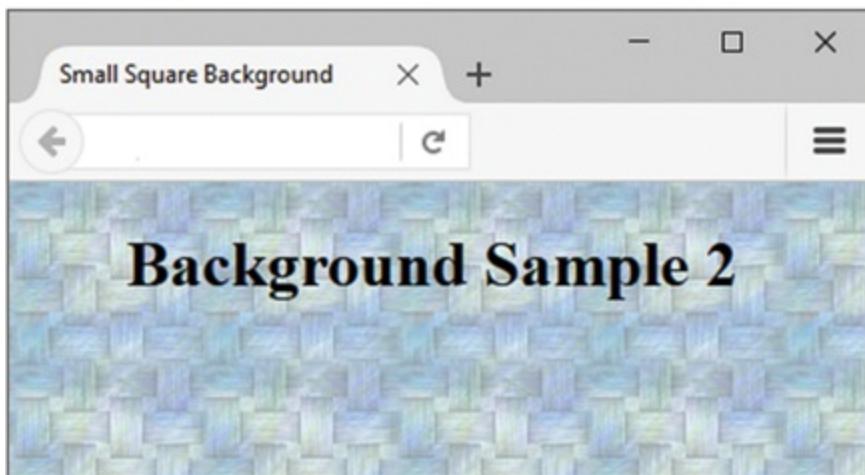
[Figure 4.17 Full Alternative Text](#)

## Figure 4.18

Background Image



Web Page with Background Image



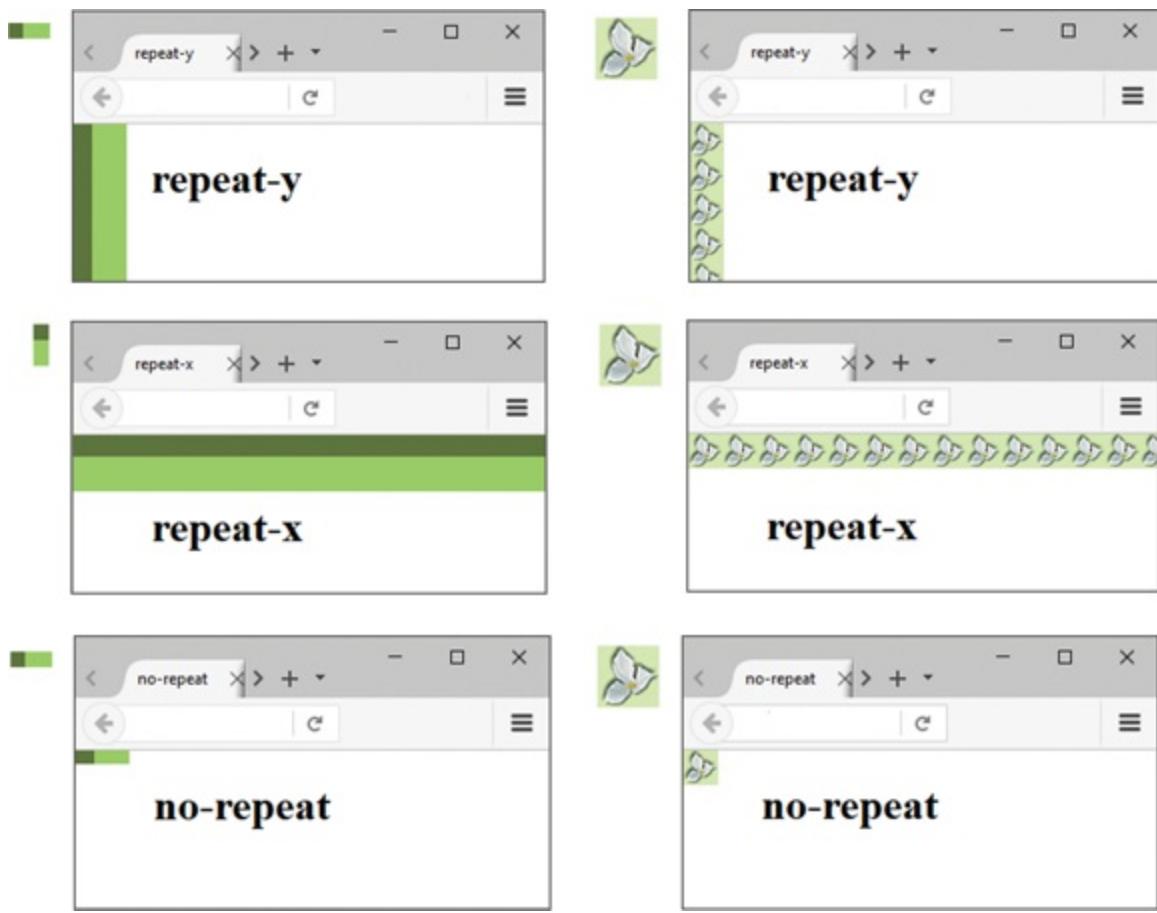
A small rectangular background is repeated to fill the web page window

[Figure 4.18 Full Alternative Text](#)

## The **background-repeat** Property

As just discussed, the default behavior of a browser is to repeat, or tile, background images to cover the entire element's background. This behavior also applies to other elements, such as backgrounds for headings, paragraphs, and so on. You can modify this tiling behavior with the CSS `background-repeat` property. The values for the `background-repeat` property include `repeat` (default), `repeat-y` (vertical repeat), `repeat-x` (horizontal repeat), and `no-repeat` (no repeat). [Figure 4.19](#) provides examples of the actual background image and the result of applying various `background-repeat` property values.

## Figure 4.19



Examples of the CSS `background-repeat` property

[Figure 4.19 Full Alternative Text](#)

CSS3 provides for additional values for the `background-repeat` property that are not yet well supported by browsers:

- `background-repeat: space;`

Repeats the image in the background without clipping (or cutting off) parts of the image by adjusting empty space around the repeated images.

- `background-repeat: round;`

Repeats the image in the background and scales (adjusts) the dimensions of the image to avoid clipping.



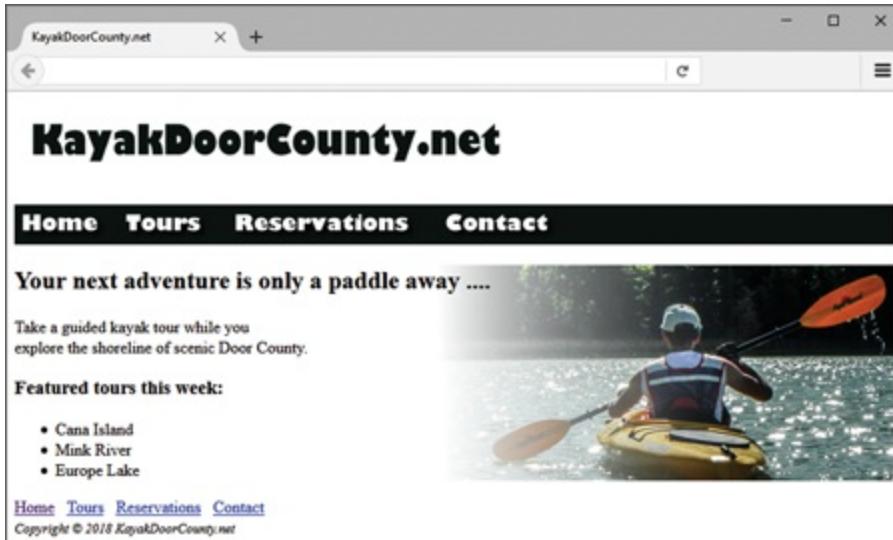
## Hands-On Practice 4.7

Let's practice using a background image. In this exercise, you will use your



files in the kayakch4 folder from [Hands-On Practice 4.4](#) (also see the student files chapter4/4.4 folder) as a starting point. In this Hands-On Practice you will configure the main element selector with a background image that does not repeat. Obtain the heroback.jpg image from the student files chapter4/starters folder. Copy the image into your kayakch4 folder. When you have completed this exercise, your page should look similar to the one shown in [Figure 4.20](#). Launch a text editor and open index.html.

## Figure 4.20



The background image in the <main> area is configured with background-repeat: no-repeat

## [Figure 4.20 Full Alternative Text](#)

1. Locate the style tags in the head section. Code a new style rule for the main element selector to configure the background-image and background-repeat properties. Set the background image to be heroback.jpg. Set the background not to repeat. The main element selector style rules follow:

```
main { background-image: url(heroback.jpg);  
       background-repeat: no-repeat; }
```

2. Remove the img tag that displays the hero.jpg image from the body of the web page.
3. Save your page as index.html. Launch a browser, and test your page. You may notice that the text within the main element is displayed over the background image. In this case, the page would look more appealing if the paragraph did not extend across the background image. Open index.html in a text editor and code a line break tag before the word “explore”.
4. Save and test your page again. It should look similar to the page shown in [Figure 4.20](#) if you are using a browser other than Internet Explorer. The student files contain a sample solution in the chapter4/4.7 folder. Internet Explorer does not support default styles for the HTML5 main element. If you are concerned about the display of your page in Internet Explorer, you can nudge this browser to comply by adding the display: block; declaration (see [Chapter 6](#)) to the styles for the main element selector. An example solution is in the student files (chapter4/4.7/iefix.html).

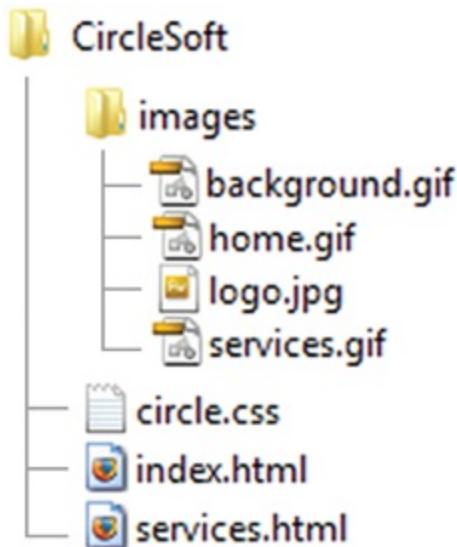


## FAQ

1. What if my images are in their own folder?

It's a good idea to organize your website by placing all your images in a folder. Notice that the CircleSoft website whose file structure is shown in [Figure 4.21](#) contains a folder called images, which contains GIF and JPEG files. To refer to these files in code, you also need to refer to the images folder. The following are some examples:

## Figure 4.21



A folder named “images” contains the graphic files

### [Figure 4.21 Full Alternative Text](#)

- The CSS code to configure the background.gif file from the images folder as the page background follows:

```
body { background-image:  
       url(images/background.gif); }
```

- The HTML to display the logo.jpg file from the images folder follows:

```

```

# The background-position Property

You can specify other locations for the background image besides the default top left location by using the `background-position` property. Valid values for the `background-position` property include percentages; pixel values; or `left`, `top`, `center`, `bottom`, and `right`. The first value indicates horizontal position. The second value indicates vertical position. If only one value is provided, the second value defaults to center. In [Figure 4.22](#), the small flower image has been placed in the background on the right side of the element by using the following style rule:

## Figure 4.22



The flower background image was configured to display on the right side with CSS

[Figure 4.22 Full Alternative Text](#)

```
h2 { background-image: url(flower.gif);  
     background-position: right;  
     background-repeat: no-repeat; }
```

# The background-attachment Property

Use the `background-attachment` property to configure whether the background image remains fixed in place or scrolls along with the page in the browser viewport. Valid values for the `background-attachment` property include `fixed` and `scroll` (the default).



## Checkpoint 4.2

1. Describe the CSS to configure a graphic named circle.jpg to display once in the background of all <h1> elements. Code the CSS.
2. Describe the CSS that configures a file named bg.gif to repeat vertically down the background of a web page. Code the CSS.
3. Explain how the browser will render the web page if you use CSS to configure both a background image and a background color.

## 4.6 More About Images

This section introduces several additional techniques used with images on web pages. Topics discussed include image maps, the favorites icon, image slicing, and CSS Sprites.

### Image Maps

An image map is an image that can be used as one or more hyperlinks. An image map will typically have multiple clickable or selectable areas that link to another web page or website. The selectable areas are called hotspots. Image maps can configure selectable areas in three shapes: rectangles, circles, and polygons. An image map requires the use of the image element, map element, and one or more area elements.

### Map Element

The **map element** is a container tag that indicates the beginning and ending of the image map description. The name attribute is coded to associate the `<map>` tag with its corresponding image. The id attribute must have the same value as the name attribute. To associate a map element with an image, configure the image tag with the `usemap` attribute to indicate which `<map>` to use.

### Area Element

The area element defines the coordinates or edges of the clickable area. It is a void tag that uses the href, alt, title, shape, and coords attributes. The href attribute identifies the web page to display when the area is clicked. The alt attribute provides a text description for screen readers. Use the title

attribute to specify text that some browsers may display as a tooltip when the mouse is placed over the area. The coords attribute indicates the coordinate position of the clickable area. [Table 4.4](#) describes the type of coordinates needed for each shape attribute value.

## Table 4.4 Shape coordinates

Shape Coordinates	Meaning
rect “x1,y1, x2,y2”	The coordinates at point (x1,y1) represent the upper-left corner of the rectangle. The coordinates at point (x2,y2) represent the lower-right corner of the rectangle.
circle “x,y,r”	The coordinates at point (x,y) indicate the center of the circle. The value of r is the radius of the circle, in pixels.
poly “x1,y1, x2,y2, x3,y3”, etc.	The values of each (x,y) pair represent the coordinates of a corner point of the polygon.

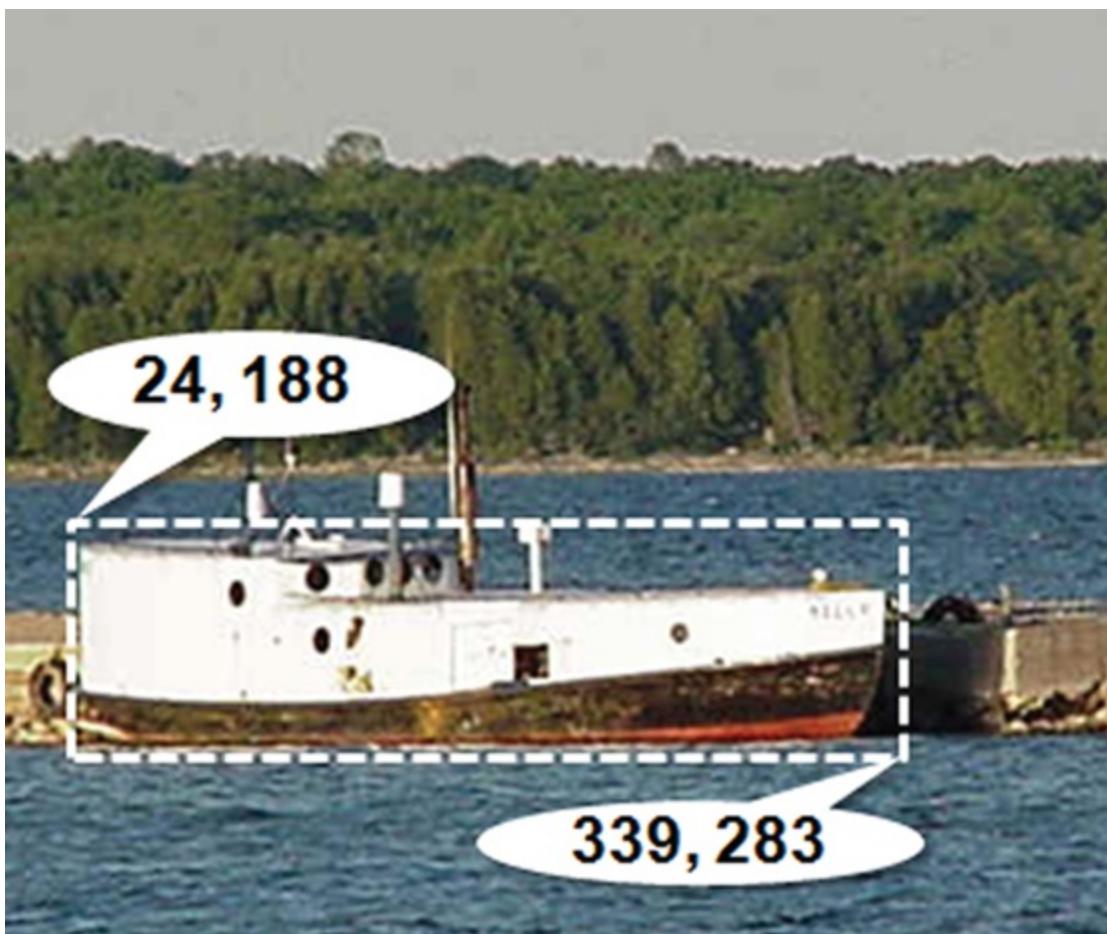
## Exploring a Rectangular Image Map

We'll focus on a rectangular image map. For a rectangular image map, the value of the shape attribute is rect, and the coordinates indicate the pixel positions as follows:

- distance of the upper-left corner from the left edge of the image
- distance of the upper-left corner from the top of the image
- distance of the lower-right corner from the left edge of the image
- distance of the lower-right corner from the top of the image.

[Figure 4.23](#) shows an image of a fishing boat. The dotted rectangle around the fishing boat indicates the location of the hotspot. The coordinates shown (24, 188) indicate that the top-left corner is 24 pixels from the left edge of the image and 188 pixels from the top of the image. The pair of coordinates in the lower-right corner (339, 283) indicates that this corner is 339 pixels from the left edge of the image and 283 pixels from the top of the image. This example is in the student files at chapter4/map.html. The HTML code to - create this image map follows:

## Figure 4.23



Sample image map

[Figure 4.23 Full Alternative Text](#)

```
<map name="boat" id="boat">
    <area href="http://www.fishingdoorcounty.com" shape="rect"
          coords="24, 188, 339, 283" alt="Door County Fishing Boat"
    </map>

- <http://image-maps.com>
- [http://mobilefish.com/services/image\\_map/image\\_map.php](http://mobilefish.com/services/image_map/image_map.php)

## The Favorites Icon

Ever wonder about the small icon you sometimes see in the address bar or tab of a browser? That's a favorites icon, usually referred to as a favicon, which is a square image (either  $16 \times 16$  pixels or  $32 \times 32$  pixels) associated with a web page. The favicon, shown in [Figure 4.24](#), may display in the browser's address bar, tab, or the favorites and bookmarks lists.

**Figure 4.24**



The favorites icon displays in the browser tab and address bar

# Configuring a Favorites Icon

While some versions of early browsers expected the file to be named favicon.ico and to reside in the root directory of the web server, a more modern approach is to associate the favicon.ico file with a web page by using the link element. Recall that in [Chapter 3](#), you coded the <link> tag in the head section of a web page to associate an external style sheet file with a web page file. You can also use the <link> tag to associate a favorites icon with a web page. Three attributes are used to associate a web page with a favorites icon: rel, href, and type. The value of the rel attribute is icon. The value of the href attribute is the name of the image file. The value of the type attribute describes the MIME type of the image—which defaults to image/x-icon for .ico files. The HTML code to associate a favorites icon named favicon.ico to a web page follows:

```
<link rel="icon" href="favicon.ico" type="image/x-icon">
```

You may need to publish your files to the Web (see the FTP tutorial in the Appendix) in order for the favicon to display in Microsoft Edge and Internet Explorer. Other browsers, such as Firefox, display favicons more reliably and also support GIF, JPG, and PNG image formats. Be aware that if you use a .gif, .png, or .jpg as a favorites icon, then the MIME type should be image/ico. For example,

```
<link rel="icon" href="favicon.gif" type="image/ico">
```



## Hands-On Practice 4.8

Let's practice using a favorites icon. Obtain the favicon.ico file from the student files in the chapter4/starters folder. In this exercise, you will use your files in the kayakch4 folder from [Hands-On Practice 4.7](#) (also see the student

files chapter4/4.7 folder) as a starting point.

1. Launch a text editor, and open index.html. Add the following link tag to the head section of the web page:

```
<link rel="icon" href="favicon.ico" type="image/x-icon">
```

2. Save your file. Launch the Firefox browser, and test your page. You should notice the small kayaker image in the Firefox browser tab as shown in [Figure 4.25](#). The student files contain a sample solution in the chapter4/4.8 folder.

## Figure 4.25



The favorites icon displays in the Firefox browser tab



1. How can I create my own favorites icon?

You can create your own favicon with a graphics application, such as GIMP, or with one of the following online tools:

- o <http://favicon.cc>

- <http://www.favicongenerator.com>
- <http://www.freefavicon.com>
- <http://www.xiconeditor.com>

## Image Slicing

Graphic artists and designers can create complex web page images.

Sometimes, parts of these images are better optimized as GIFs than as JPEGs, while other parts of the images may be better optimized as JPEGs than as GIFs. By image slicing the single, complex images into multiple, smaller images, you can optimize all portions for the most efficient display. In addition, there may be times when you plan special mouse rollover effects for parts of a large, complex image. In this case, parts of the image need to be individually accessible to scripting languages, and so the image needs to be sliced. When an image is sliced, it is broken into multiple graphic files. Most graphics applications, such as GIMP and Adobe Photoshop, have features for image slicing that automatically create the HTML for you.

## CSS Sprites

A modern technique to optimize the use of images on web pages is called CSS Sprites. A **sprite** is an image file that contains multiple small graphics that are configured as background images for various web page elements.

The CSS `background-image`, `background-repeat`, and `background-position` properties are used to manipulate the placement of the image.

Having just a single image saves download time, because the browser needs to make only one http request for the combined image instead of many requests for the individual smaller images. You'll work with CSS Sprites in [Chapter 7](#).

## 4.7 Sources and Guidelines for Graphics

### Sources of Graphics

There are many ways to obtain graphics: You can create them using a graphics application, download them from a website which provides them for free, purchase and download them from a graphics website, purchase a graphics collection on a DVD, take digital photographs, scan photographs, scan drawings, or hire a graphic designer to create graphics for you. Adobe Photoshop and GIMP (<http://gimp.org>) are popular graphics applications. Pixlr offers a free, easy-to-use, online photo editor at <http://pixlr.com/editor>. These applications usually include tutorials and sample images to help you get started.



Sometimes you might be tempted to right-click on an image on a web page and download it for use on your own website. Be aware that materials on a website are copyrighted (even if a copyright symbol or notice does not appear) and are not free to use unless the owner of the site permits it. So, contact the owner of an image and request permission for use of a graphic rather than just taking it. If you're using Flickr (<http://flickr.com>) to search for images, select the advanced-search page and check "*Only search within Creative Commons-licensed content.*" Be sure to follow the instructions for attribution when indicated.

There are many websites that offer free and low-cost graphics. Choose a search engine and search for “free graphics”—you’ll get more results than

you have time to view. The following are a few sites that you may find helpful when looking for images:

- Free Images: <http://www.freeimages.com>
- Free Stock Photo Search Engine: <http://www.everystockphoto.com>
- Free Digital Photos: <http://www.freedigitalphotos.net>
- Pixabay: <http://pixabay.com>
- iStockphoto: <http://www.istockphoto.com>

It is also possible to create a banner or button image online. There are a number of sites that offer this feature. Some include advertising with your free image, some offer paid memberships, and others are simply free. Search for “create free online banner” to find sites offering this service. The following are a few useful sites for creating banners and button images:

- LogoCreator: <http://creatr.cc/creatr>
- Cool Text <http://www.cooltext.com>
- Da Button Factory: <http://dabuttonfactory.com>

## Guidelines for Using Images

Images enhance your web page by creating an engaging, interesting user experience. Images can also hurt your web page by slowing down its performance to a crawl and discouraging visitors. This section explores some guidelines for using images on web pages.

## Reuse Images

Once an image from your site is requested for a web page, it is stored in the

cache on your visitor's hard drive. Subsequent requests for the image will use the file from the hard drive instead of another download. This approach results in faster page loads for all pages that use the image. It is recommended that you reuse common graphics such as logos and navigation buttons on multiple pages instead of creating different versions of these common graphics.

## Consider the Size vs. Quality Issue

You can choose among varying levels of image quality when using a graphics application to create or optimize an image. There is a correlation between the quality of the image and the size of the image file: The higher the quality, the larger the file size will be. Choose the smallest file that gives you appropriate quality. You may need to experiment until you get the right match.

## Consider Image Load Time

Be careful when using images on web pages—it takes time for them to load. Optimize the file size and the dimensions of images for efficient web page display.

## Use Appropriate Resolution

Most desktop and laptop web browsers display images at relatively low resolution—typically 96ppi (pixels per inch). Many digital cameras and scanners can create images with much higher resolution. Of course, higher resolution means larger file size. Even though the browser does not display the depth of resolution, more bandwidth is still used for the large file size. Be aware that some devices (such as tablets and smartphones) have high pixel density displays (such as over 400ppi) which can affect the rendering of an image. In [Chapter 7](#), you'll be introduced to configuring flexible, responsive images for multiple devices.

# **Specify Dimensions**

Use accurate height and width attributes on image tags. This will allow the browser to allocate the appropriate space on the web page for the image and load the page faster. Do not try to resize the appearance of an image by modifying the settings of the height and width attributes. While this approach will work, your page will load more slowly, and your image quality may suffer. Instead, use a graphics application to create a smaller or larger version of the graphic when needed.

## **Be Aware of Brightness and Contrast**

Gamma refers to the brightness and contrast of the monitor display. Monitors used with Macintosh and Windows operating systems use a different default gamma setting (Macintosh uses 1.8; Windows uses 2.2). Images that have good contrast on a computer running Windows may look slightly washed out on a Macintosh. Images created on a Macintosh may look darker, with less contrast, when displayed on a computer with a Windows operating system. Be aware that even monitors on the same operating system may have slightly different gamma values than the default for the platform. A web developer cannot control gamma, but should be aware that images will look different on various platforms because of this issue.

## **Accessibility and Visual Elements**

Even though images help to create a compelling, interesting website, remember that not all your visitors will be able to view your images. The Web Accessibility Initiative's WCAG 2.0 includes a number of guidelines for web developers in the use of color and images:



## Focus on Accessibility

- Don't rely on color alone. Some visitors may have color perception deficiencies. Use high contrast between background and text color.
- Provide a text equivalent for every nontext element. Use the `alt` attribute on your image tags.
  - If an image displays text, configure that text as the value of the `alt` attribute.
  - Use `alt=""` for an image that is purely decorative.
- If your site navigation uses image hyperlinks, provide simple text links at the bottom of the page.

Vinton Cerf, the co-inventor of TCP/IP and the former chairman of the Internet Society, said, “The Internet is for everyone.” Follow web accessibility guidelines to ensure that this is true.



## Checkpoint 4.3

1. Search for a site that uses image hyperlinks to provide navigation. List the URL of the page. What colors are used on the image links? If the image links contain text, is there good contrast between the background color and the letters on the image links? Would the page be accessible to a visitor who is sight challenged? How have accessibility issues been addressed? Is the `alt` attribute used to describe the image link? Is there a row of text links in the footer section of the page? Answer these questions and discuss your findings.

2. When configuring an image map, describe the relationship between the image, map, and area tags.
3. True or False: You should save your images using the smallest file size possible.

## 4.8 CSS3 Visual Effects

This section introduces new CSS3 properties that provide visual effects on web pages, including background clipping and scaling, multiple background images, rounded corners, box shadows, text shadows, opacity effects, transparent color with RGBA, transparent color with HSLA, and gradients.

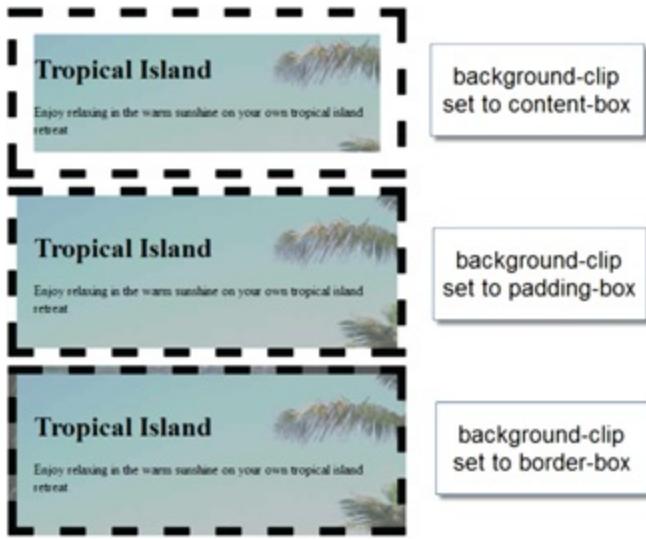
### The CSS3 background-clip Property

The new CSS3 background-clip property confines the display of the background image with the following values:

- content-box (clips the display to the area behind the content)
- padding-box (clips the display to the area behind the content and padding)
- border-box (default; clips the display to the area behind the content, padding, and border; similar to the padding-box property except that the image will display behind a border configured to be transparent)

[Figure 4.26](#) shows div elements configured with different values of the background-clip property. Note that the dashed border is intentionally large in these examples. The student files (chapter4/clip folder) contains an example page.

### Figure 4.26



The CSS3 `background-clip` property

[Figure 4.26 Full Alternative Text](#)

The CSS is shown as follows:

```
.test { background-image: url(myislandback.jpg);  
       background-clip: content-box;  
       width: 400px;  
       padding: 20px;  
       margin-bottom: 10px;  
       border: 1px dashed #000; }
```

## The CSS3 `background-origin` Property

The new CSS3 `background-origin` property positions the background image, using the following values:

- `content-box` (positions relative to the content area)
- `padding-box` (default; positions relative to the padding area)
- `border-box` (positions relative to the border area)

The `background-origin` property is supported by current versions of modern browsers. [Figure 4.27](#) shows `div` elements configured with different values of the `background-origin` property. The sample page is located in the student files (chapter4/origin folder).

## Figure 4.27



The CSS3 `background-origin` property

### [Figure 4.27 Full Alternative Text](#)

The CSS for the first `div` follows:

```
.test { background-image: url(trilliumsolo.jpg);  
       background-origin: content-box;  
       background-repeat: no-repeat;  
       background-position: right top;  
       width: 200px; margin-bottom: 10px;  
       padding: 20px; border: 1px solid #000; }
```

You may have noticed that it's common to use several CSS properties when configuring background images. The properties typically work together. However, be aware that the `background-origin` property has no effect if the

`background-attachment` property is set to the value “fixed”.

# The CSS3 background-size Property

The CSS3 `background-size` property can be used to resize or scale the background image. Valid values for the `background-size` property can be:

- a pair of percentage values (width, height)

If only one percentage value is provided, the second value defaults to `auto` and is determined by the browser.

- a pair of pixel values (width, height)

If only one numeric value is provided, the second value defaults to `auto` and is determined by the browser.

- `cover`

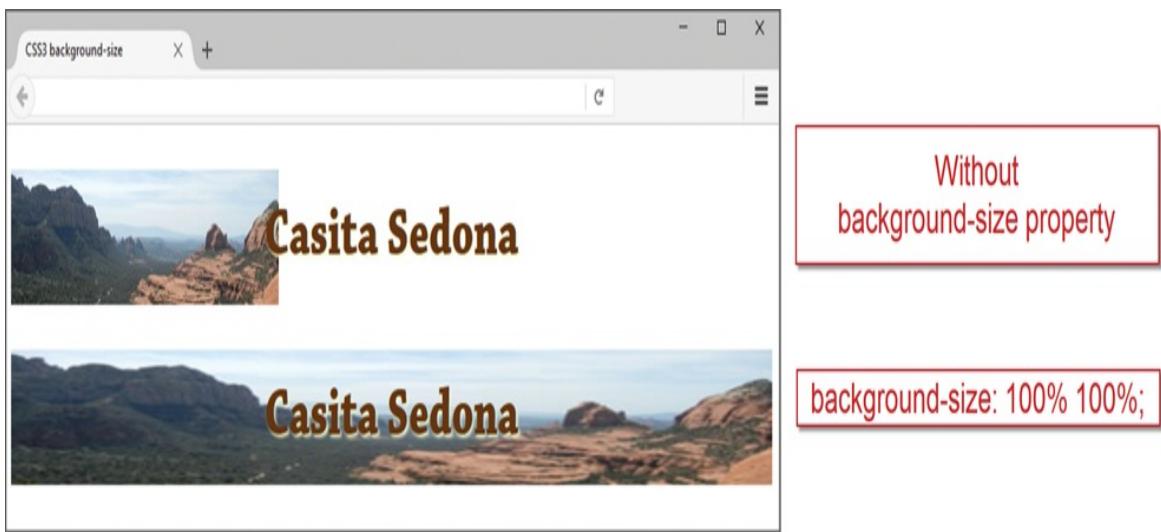
The value `cover` will preserve the aspect ratio of the image as it scales the background image to the *smallest size* for which both the height and width of the image can completely cover the area.

- `contain`

The value `contain` will preserve the aspect ratio of the image as it scales the background image to the *largest size* for which both the height and width of the image will fit within the area.

[Figure 4.28](#) shows two `div` elements that are each configured with the same background image to display without repeating.

## Figure 4.28



Configuring a background image. Screenshots of Mozilla Firefox.  
Courtesy of Mozilla Foundation.

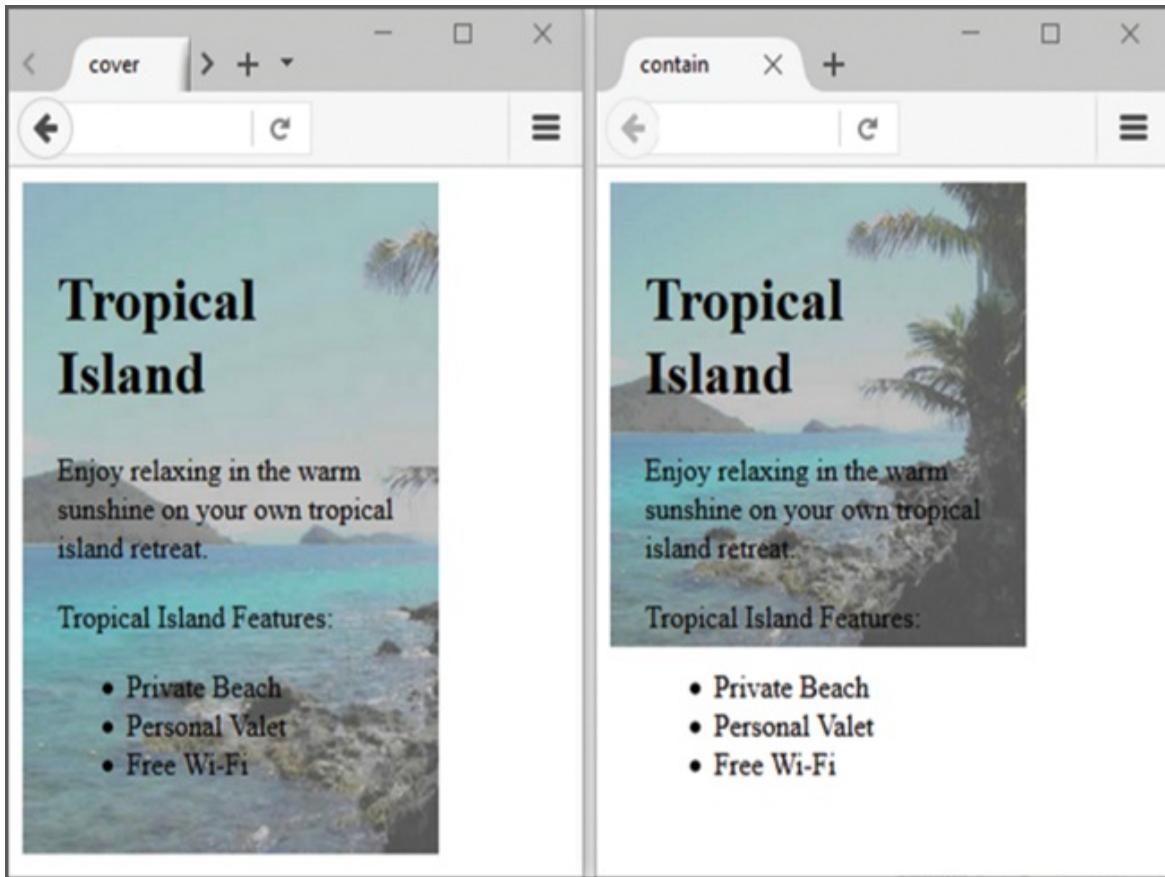
[Figure 4.28 Full Alternative Text](#)

The `background-size` property is not configured for the first div element's background image which only partially fills the space. The CSS for the second div configures the `background-size` to be `100% 100%` so the browser scales and resizes the background image to fill the space. The sample page is located in the student files (chapter4/size/sedona.html). The CSS for the second div follows:

```
#test1 { background-image: url(sedonabackground.jpg);  
        background-repeat: no-repeat;  
        background-size: 100% 100%; }
```

[Figure 4.29](#) demonstrates use of the `cover` and `contain` values to configure the display of a  $500 \times 500$  background image within a 200 pixel wide area on a web page. The web page on the left uses `background-size: cover;` to scale and resize the image to completely cover the area while keeping the aspect ratio of the image intact. The web page on the right uses `background-size: contain;` to scale and resize the image so that both the height and width of the image will fit within the area. Review the sample pages in the student files (chapter4/size/cover.html and chapter4/size/contain.html).

# Figure 4.29



Examples of `background-size: cover;` and `background-size: contain`

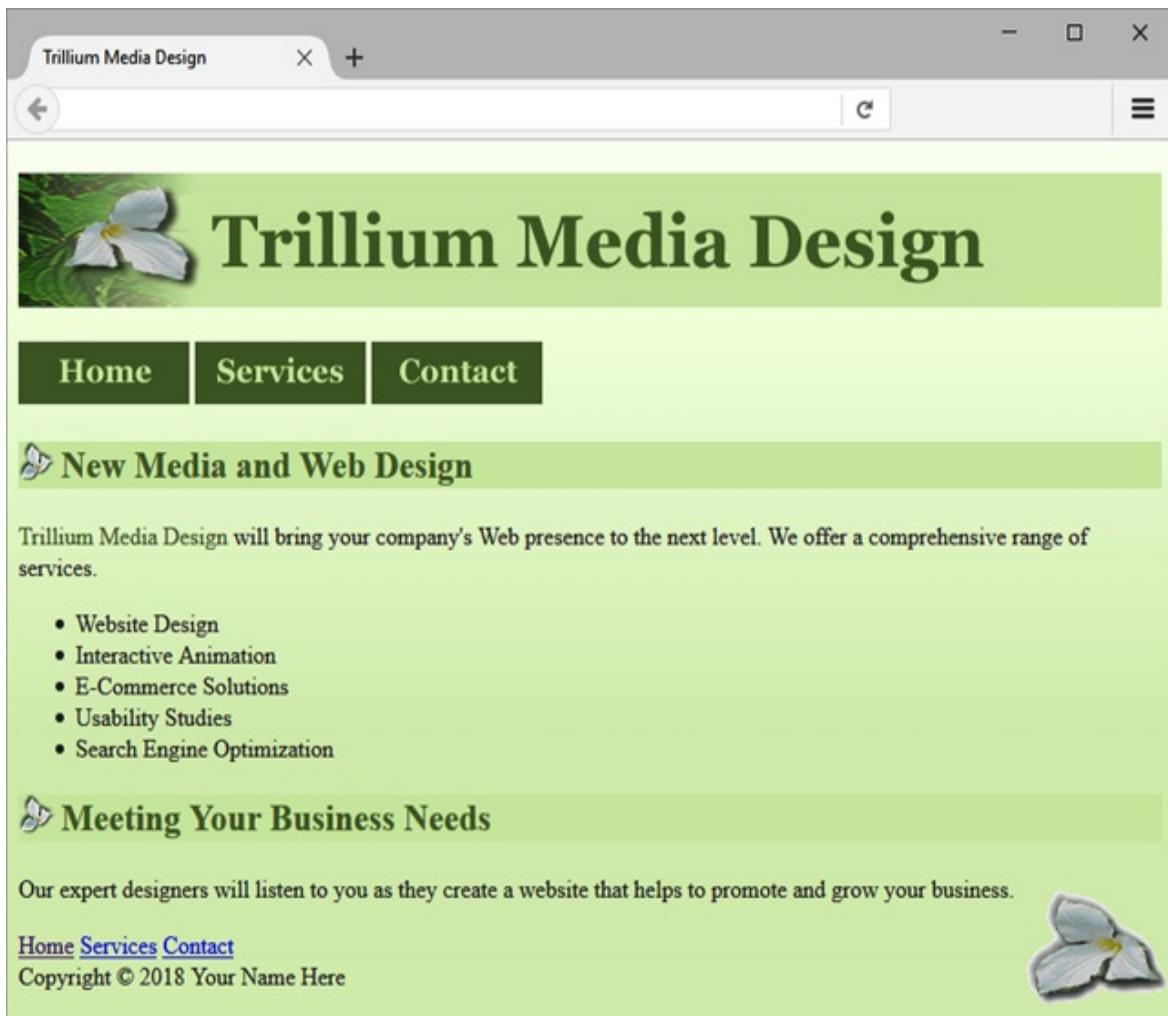
[Figure 4.29 Full Alternative Text](#)

## CSS3 Multiple Background Images

Let's explore applying multiple background images to a web page. [Figure 4.30](#) shows a web page with two background images configured on the body selector: a green gradient image that repeats across the entire browser viewport, and a flower image that displays once in the right footer area. Use the CSS3 `background` property to configure multiple background images. Each image declaration is separated by a comma. You can optionally add

property values to indicate the image's position and whether the image repeats. The background property uses a shorthand notation: Just list the values that are needed for relevant properties such as background-position and background-repeat.

## Figure 4.30



The browser displays multiple background images

[Figure 4.30 Full Alternative Text](#)



## Hands-On Practice 4.9

Let's practice configuring multiple background images. In this Hands-On Practice you will configure the body element selector to display multiple background images on the web page. Create a new folder named trilliumch4. Copy all the files from the student files chapter4/trillstarters folder into your trilliumch4 folder. You'll update the index.html file. Launch a text editor and open index.html.

1. Modify the style rule for the body element selector. Configure a background property to display both the trilliumfoot.gif image and the trilliumgradient.png image. The trilliumfoot.gif image should not repeat and should be displayed in the lower right corner. The body selector style rules are as follows:

```
body { background-color: #f4ffe4; color: #333333;  
       background: url(trilliumfoot.gif) no-repeat right bott  
                   url(trilliumgradient.png); }
```

2. Save your page as index.html. Launch a browser and test your page. Your display should be similar to [Figure 4.30](#). The student files contain a sample solution in the chapter4/4.9 folder.

## CSS3 Rounded Corners

As you've worked with borders and the box model, you may have begun to notice a lot of rectangles on your web pages! CSS3 introduces the border-radius property, which can be used to create rounded corners and soften up those rectangles.



**VideoNote** *Rounded Corners with CSS*

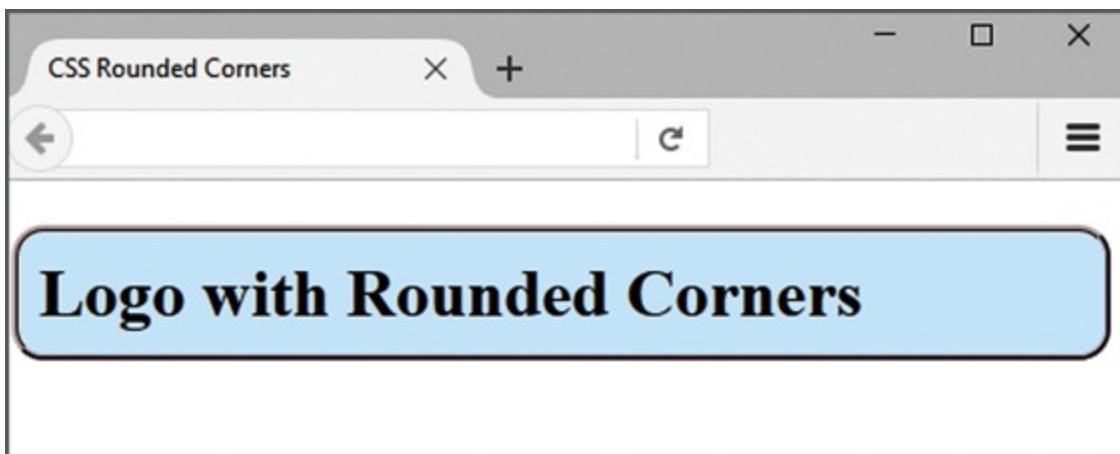
Valid values for the `border-radius` property include one to four numeric values (using pixel or em units) or percentages that configure the radius of the corner. If a single value is provided, it configures all four corners. If four values are provided the corners are configured in order of top left, top right, bottom right, and bottom left. You can configure corners individually with the `border-bottom-left-radius`, `border-bottom-right-radius`, `border-top-left-radius`, and `border-top-right-radius` properties.

CSS declarations to set a border with rounded corners are shown in the next segment of code. If you would like a visible border to display, configure the `border` property. Then set the value of the `border-radius` property to a value below 20px for best results. For example:

```
border: 3px ridge #330000;  
border-radius: 15px;
```

See [Figure 4.31](#) (chapter4/box.html in the student files) for an example of this code in action. Keep in mind that another approach to getting a rounded look is to create a rounded rectangle background image with a graphics application.

## Figure 4.31



Rounded corners were configured with CSS



## Hands-On Practice 4.10

You'll configure a logo header area that uses a background image and rounded borders in this Hands-On Practice. When complete, your web page will look similar to the one shown in [Figure 4.32](#).

**Figure 4.32**

Lighthouse Bistro

Home    Menu    Directions    Contact

**Locally Roasted Free-Trade Coffee**

Indulge in the aroma of freshly ground roast coffee. Specialty drinks are available hot or cold.

**Specialty Pastries**

Enjoy a selection of our fresh-baked, organic pastries, including fresh-fruit muffins, scones, croissants, and cinnamon rolls.

**Lunchtime is Anytime**

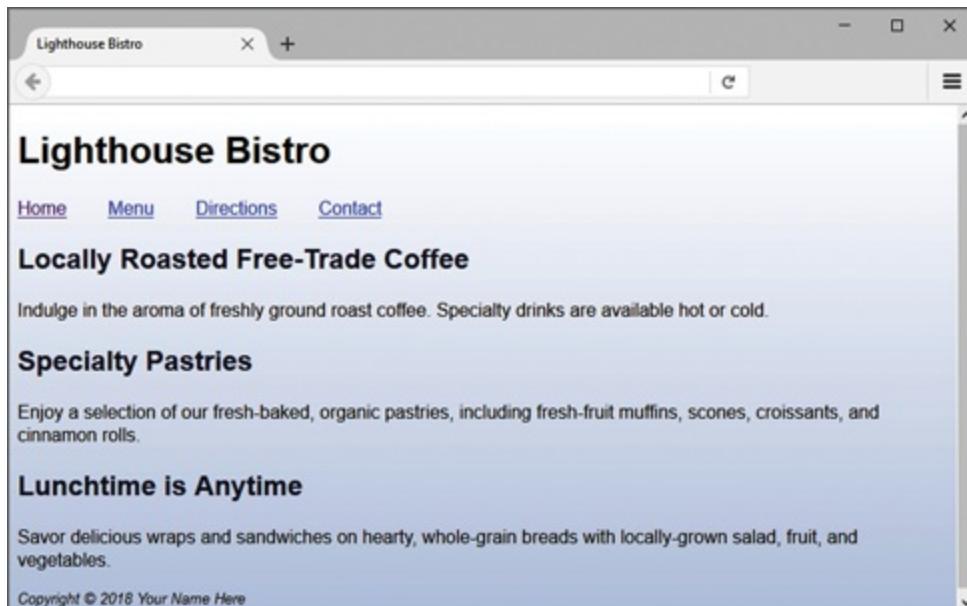
Savor delicious wraps and sandwiches on hearty, whole-grain breads with locally-grown salad, fruit, and vegetables.

Copyright © 2018 Your Name Here

The web page with the logo area configured

1. Create a new folder called borderch4. Copy the lighthouselogo.jpg and the background.jpg files in the chapter4/starters folder to your borderch4 folder. A starter file is ready for you in the student files. Save the chapter4/starter3.html file to your borderch4 folder. Launch a browser to display the starter3.html web page shown in [Figure 4.33](#).

## Figure 4.33



The starter3.html file

2. Launch a text editor, and open the starter3.html file. Save the file as index.html. Edit the embedded CSS, and add the following style declarations to the h1 element selector that will configure the lighthouselogo.jpg image as a background image that does not repeat: height set to 100px, width set to 650px, font size set to 3em, 150px of left padding, 30px of top padding, and a solid dark-blue border (#000033) with a border radius of 15px. The style declarations are as follows:

```
h1 { background-image: url(lighthouselogo.jpg);
```

```
background-repeat: no-repeat;  
height: 100px; width: 650px; font-size: 3em;  
padding-left: 150px; padding-top: 30px;  
border: 1px solid #000033;  
border-radius: 15px; }
```

3. Save the file. When you test your index.html file in a browser, it should look similar to the one shown in [Figure 4.32](#) if you are using a browser that supports rounded corners. Otherwise the logo will have right-angle corners, but the web page will still be usable. Compare your work with the solution in the student files (chapter4/4.10/index.html).

## The CSS3 box-shadow Property

The CSS3 box-shadow property can be used to create a shadow effect on block-display elements such as div and paragraph elements. Configure a box shadow by coding values for the shadow's horizontal offset, vertical offset, blur radius (optional), spread distance (optional), and color:

- Horizontal offset. Use a numeric pixel value. Positive value configures a shadow on the right. Negative value configures a shadow on the left.
- Vertical offset. Use a numeric pixel value. Positive value configures a shadow below. Negative value configures a shadow above.
- Blur radius (optional). Configure a numeric pixel value. If omitted, defaults to the value 0 which configures a sharp shadow. Higher values configure more blur.
- Spread distance (optional). Configure a numeric pixel value. If omitted, defaults to the value 0. Positive values configure the shadow to expand. Negative values configure the shadow to contract.
- Color value. Configure a valid color value for the shadow.

Here's an example that configures a dark-gray drop shadow with 5px horizontal offset, 5px vertical offset, and a 5px blur radius:

```
box-shadow: 5px 5px 5px #828282;
```

Inner Shadow Effect. To configure an inner shadow, include the optional `inset` value. For example:

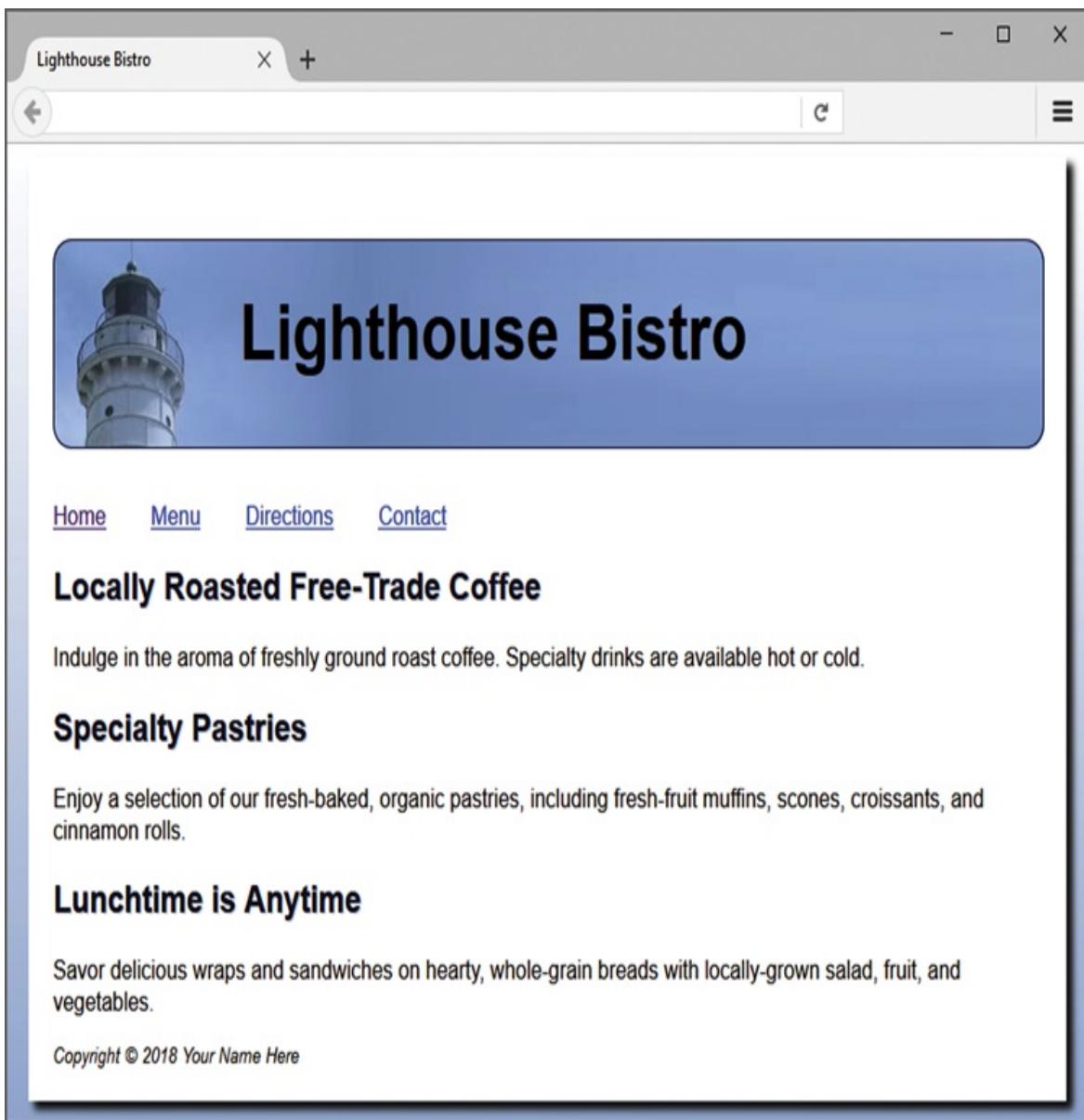
```
box-shadow: inset 5px 5px 5px #828282;
```



## Hands-On Practice 4.11

You'll configure a centered content area and apply the `box-shadow` and `text-shadow` properties in this Hands-On Practice. When complete, your web page will look similar to the one shown in [Figure 4.34](#).

**Figure 4.34**



The centered neutral background along with shadow properties add dimension

[Figure 4.34 Full Alternative Text](#)

Create a new folder called shadowch4. Copy the lighthouselogo.jpg and the -background.jpg files from the chapter4/starters folder to your shadowch4 folder. Launch a text editor, and open the chapter4/4.10/index.html file (shown in [Figure 4.32](#)). Save the file in your shadowch4 folder.

1. Configure the page content to be centered, with an 800-pixel width, a white background, and some padding.
  1. Edit the HTML. Configure a div element assigned to the `id` named `container` that wraps the code within the body section. Code the opening `<div>` tag on a new line after the opening body tag. Code a closing div tag on a new line before the closing body tag.
  2. b. Edit the embedded CSS to configure a new selector, an `id` named `container`. Configure a white background color and padding set to `1.25em`. Recall from [Chapter 3](#) the style declarations that will center the page content. Use the `width`, `min-width`, `max-width`, `margin-left`, and `margin-right` properties as follows:

```
#container { background-color: #ffffff;  
            padding: 1.25em;  
            width: 80%; min-width: 800px; max-width: 960px;  
            margin-right: auto;  
            margin-left: auto; }
```

2. Edit the embedded CSS to add the following style declarations to the `#container` selector to configure a box shadow:

```
box-shadow: 5px 5px 5px #1e1e1e;
```

3. Add the following style declaration to the `h1` element selector to configure a dark-gray text shadow:

```
text-shadow: 3px 3px 3px #666;
```

4. Add the following style declaration to the `h2` element selector to configure a light-gray text shadow with no blur:

```
text-shadow: 1px 1px 0 #ccc;
```

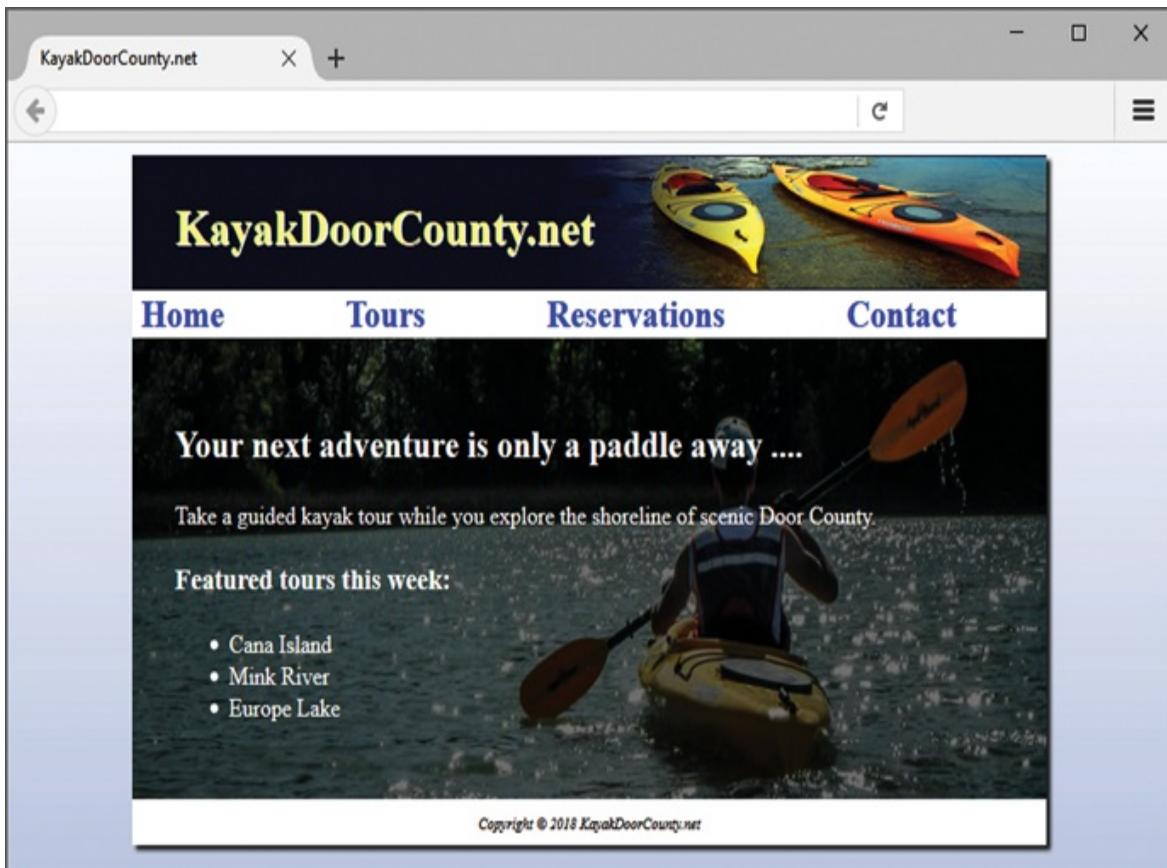
5. Save the file. When you test your `index.html` file in a browser, it should look similar to the one shown in [Figure 4.34](#) if you are using a browser that supports the `box-shadow` and `text-shadow` properties. Otherwise the shadows will not display, but the web page will still be usable. See the student files for a solution (`chapter4/4.11/index.html`).



## Hands-On Practice 4.12

In this Hands-On Practice you will practice your new skills as you configure a web page with centered content and apply CSS properties. When complete, your web page will look similar to the one shown in in [Figure 4.35](#).

### Figure 4.35



CSS drastically changes the look of the web page

[Figure 4.35 Full Alternative Text](#)

Create a new folder called kayakch4a. Copy the background.jpg, heroback2.jpg, and headerbackblue.jpg files from the chapter4/starters folder to your kayakch4 folder. Launch a text editor and open the chapter4/starter2.html file. Save the file in your kayakch4a folder with the name index.html. Modify the file as follows:

1. Center the page content.

1. Configure embedded CSS between the style tags and code a new selector, an id named container with style declarations for the width, margin-left, and margin-right properties as follows:

```
#container { margin-left: auto;  
            margin-right: auto;  
            width: 80%; }
```

2. Edit the HTML. Configure a div element assigned to the id container that “wraps” or contains the code within the body section. Code an opening div tag on a new line after the opening body tag. Assign the div to the id named container.

2. Configure embedded CSS.

1. The body element selector. Configure a declaration to display background.jpg as the background image.

```
body { background-image: url(background.jpg); }
```

2. The container id selector. Add declarations to configure a white background color, 650px minimum width, 1280px maximum width, and a box shadow with a 3px offset in the color #333.

```
#container { margin-left: auto;  
            margin-right: auto;  
            width: 80%;  
            background-color: #FFFFFF;  
            min-width: 650px; max-width: 1280px;  
            box-shadow: 3px 3px 3px #333; }
```

3. The header element selector. Configure declarations to configure #000033 background color, #FF9 text color, a display of the

headerbackblue.jpg image on the right without repeating, 80px height, 5px top padding, 2em left padding, and a text shadow in the color #FFF with a 1px offset.

```
header { background-color: #000033; color:#FF9;
          background-image: url(headerbackblue.jpg);
          background-position: right;
          background-repeat: no-repeat;
          height: 80px;
          padding-top: 5px;
          padding-left: 2em;
          text-shadow: 1px 1px 1px #FFF; }
```

4. The nav element selector. Code declarations to configure bold, 1.5em size, and centered text with 1em word-spacing.

```
nav { word-spacing: 1em;
       font-weight: bold;
       font-size: 1.5em;
       text-align: center; }
```

5. The nav a descendant selector. Code a declaration to eliminate the underline from hyperlinks.

```
nav a { text-decoration: none; }
```

6. The main element selector. Code declarations to configure heroback2.jpg as the background image and set background-size: 100% 100%; Also configure white text (use #FFF) and 2em of padding.

```
main { background-image: url(heroback2.jpg);
        background-size: 100% 100%;
        color: #FFF;
        padding: 2em; }
```

7. The footer element selector. Configure declarations for italic, .80em size centered text with 0.5em of padding.

```
footer { font-style: italic; font-size: .80em;
          text-align: center; padding: 0.5em; }
```

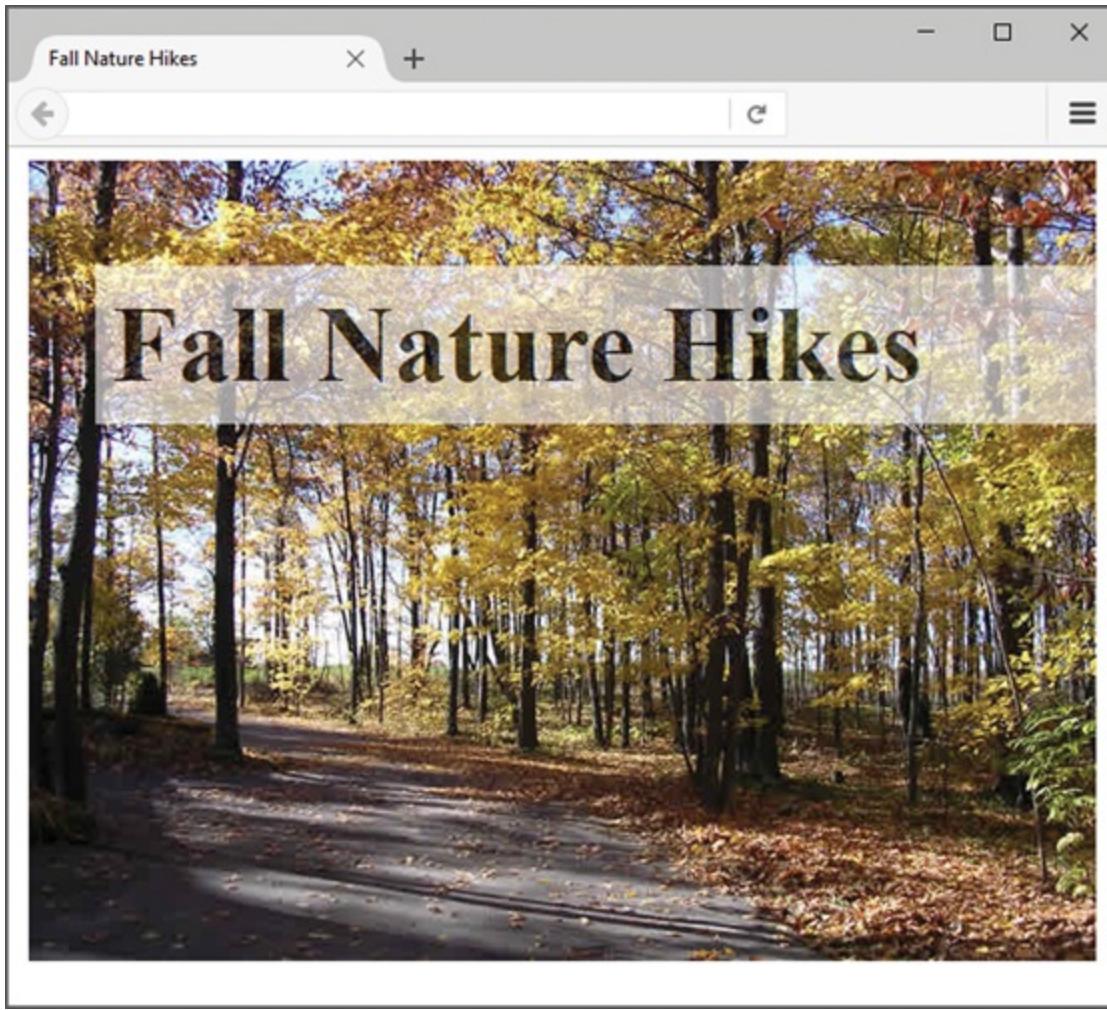
3. Save the file. When you test your index.html file, it should look similar

to the one shown in [Figure 4.35](#). Compare your work with the solution in the student files (chapter4/4.12/index.html).

## The CSS3 opacity Property

The CSS3 opacity property configures the transparency of an element. Opacity values range from 0 (which is completely transparent) to 1 (which is completely opaque and has no transparency). An important consideration when using the opacity property is that this property applies to both the text and the background. If you configure a semi-transparent opacity value for an element with the opacity property, both the background and the text displayed will be semi-transparent. See [Figure 4.36](#) for an example of using the `opacity` property to configure a white background that is only 60% opaque. If you look very closely at [Figure 4.36](#) or view the actual web page (student files chapter4/4.13/index.html), you'll see that both the white background and the black text in the h1 element are semi-transparent. The opacity property was applied to both the background color and to the text color.

## Figure 4.36



The background of the h1 area is transparent

[Figure 4.36 Full Alternative Text](#)



## Hands-On Practice 4.13

In this Hands-On Practice you'll work with the opacity property as you configure the web page shown in [Figure 4.36](#).

1. Create a new folder called opacitych4. Copy fall.jpg file from the chapter4/starters folder to your opacitych4 folder. Launch a text editor

and open the chapter2/template.html file. Save it in your opacitych4 folder with the name index.html. Change the page title to “Fall Nature Hikes”.

2. Let’s create the structure of the web page with a div that contains an h1 element. Add the following code to your web page in the body section:

```
<div id="content">
  <h1>Fall Nature Hikes</h1>
</div>
```

3. Now, add style tags to the head section, and configure the embedded CSS. You’ll create an id named content to display the fall.jpg as a background image that does not repeat. The content id also has a width of 640 pixels, a height of 480 pixels, left and right auto margins (which will center the object in the browser viewport), and 20 pixels of top padding. The code is

```
#content { background-image: url(fall.jpg);
  background-repeat: no-repeat;
  margin-left: auto;
  margin-right: auto;
  width: 640px;
  height: 480px;
  padding-top: 20px;}
```

4. Now configure the h1 element selector to have a white background color with opacity set to 0.6, font size set to 4em, and 10 pixels of padding. Sample code is

```
h1 { background-color: #FFFFFF;
  opacity: 0.6;
  font-size: 4em;
  padding: 10px; }
```

5. Save the file. When you test your index.html file in a browser that supports opacity, it should look similar to the page shown in [Figure 4.36](#). See the student files for a solution (chapter4/4.13/index.html).

## CSS3 RGBA Color

CSS3 supports new syntax for the color property that configures transparent color, called RGBA color. Four values are required: red color, green color, blue color, and alpha (transparency). RGBA color does not use hexadecimal color values. Instead, decimal color values are configured; see the partial color chart in [Figure 4.37](#) and the Web-Safe Color Palette in the Appendix for examples.

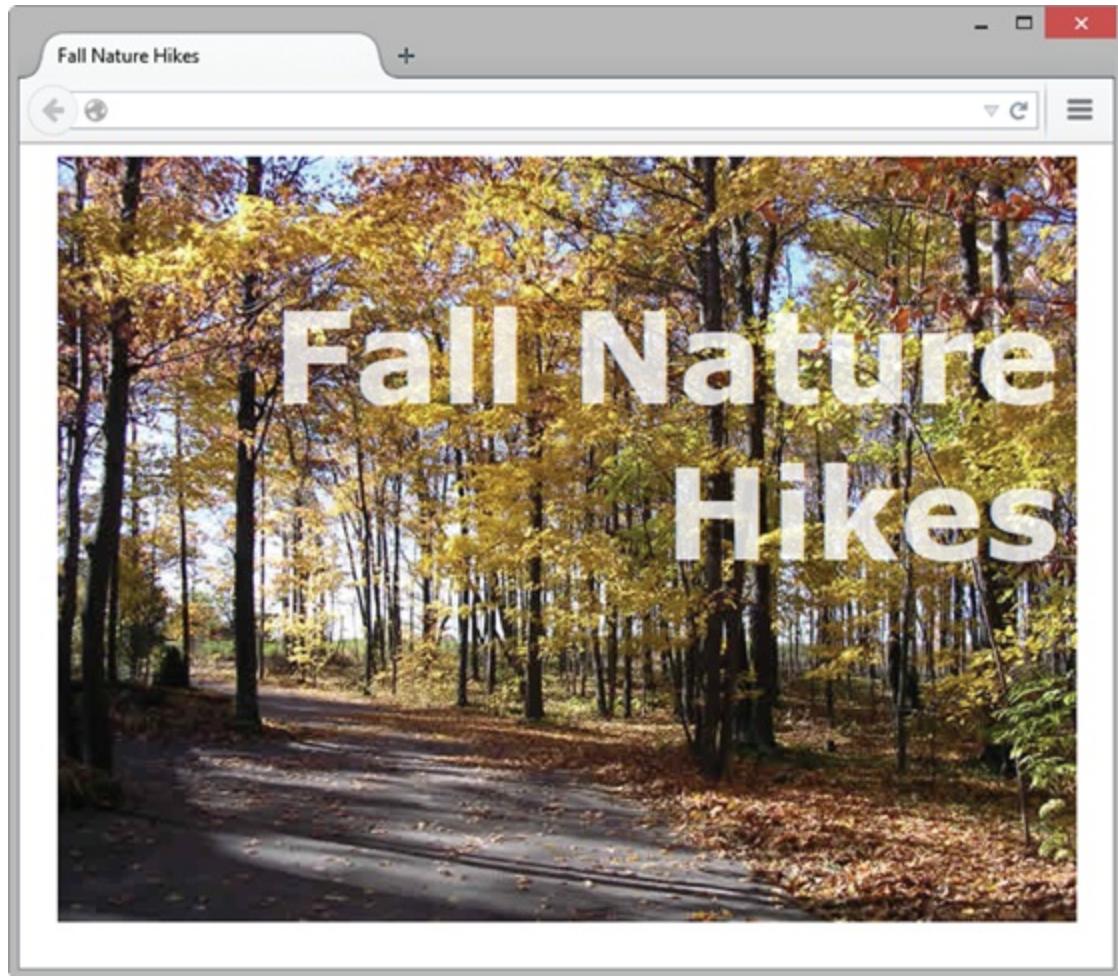
## Figure 4.37

#FFFFFF rgb(255, 255, 255)	#FFFFCC rgb(255, 255, 204)	#FFFF99 rgb(255, 255, 153)	#FFFF66 rgb(255, 255, 102)
#FFFF33 rgb(255, 255, 51)	#FFFF00 rgb(255, 255, 0)	#FFCCFF rgb(255, 204, 255)	#FFCCCC rgb(255, 204, 204)
#FFCC99 rgb(255, 204, 153)	#FFCC66 rgb(255, 204, 102)	#FFCC33 rgb(255, 204, 51)	#FFCC00 rgb(255, 204, 0)
#FF99FF rgb(255, 153, 255)	#FF99CC rgb(255, 153, 204)	#FF9999 rgb(255, 153, 153)	#FF9966 rgb(255, 153, 102)

Hexadecimal and RGB decimal color values

The values for red, green, and blue must be decimal values from 0 to 255. The alpha value must be a number between 0 (transparent) and 1 (opaque). [Figure 4.38](#) shows a web page with the text configured to be slightly transparent.

## Figure 4.38



CSS3 RGBA color configures the transparent text



## FAQ

1. How is using RGBA color different from using the opacity property?

The opacity property applies to both the background and the text within an element. If you would like to specifically configure a semi-transparent background color, code the `background-color` property with RGBA color or HSLA color (described in the next section) values. If you would like to specifically configure semi-transparent text, code the

color property with RGBA color or HSLA color values.



## Hands-On Practice 4.14

In this Hands-On Practice you'll configure transparent text as you code the web page shown in [Figure 4.38](#).

1. Create a new folder called rgbach4. Copy fall.jpg file from the chapter4/starters folder to your rgbach4 folder. Launch a text editor, and open the file you created in the previous Hands-On Practice (also located in the student files chapter4/4.13/index.html). Save the file with the name rgba.html in your rgbach4 folder.
2. Delete the current style declarations for the h1 element selector. You will create new style rules for the h1 selector to configure 10 pixels of right padding and right-aligned sans-serif white text that is 70% opaque, with a font size of 5em. Since not all browsers support RBGA color, you'll configure the color property twice. The first instance will be the standard color value that is supported by all modern browsers; the second instance will configure the RGBA color. Older browsers will not understand the RGBA color and will ignore it. Newer browsers will “see” both of the color style declarations and will apply them in the order they are coded, so the result will be transparent color. The CSS code is

```
h1 { color: #ffffff;  
     color: rgba(255, 255, 255, 0.7);  
     font-family: Verdana, Helvetica, sans-serif;  
     font-size: 5em;  
     padding-right: 10px;  
     text-align: right; }
```

3. Save the file. When you test your rgba.html file in a browser that supports RGBA color, it should look similar to the page shown in [Figure 4.38](#). See the student files for a solution (chapter4/4.14/rgba.html).

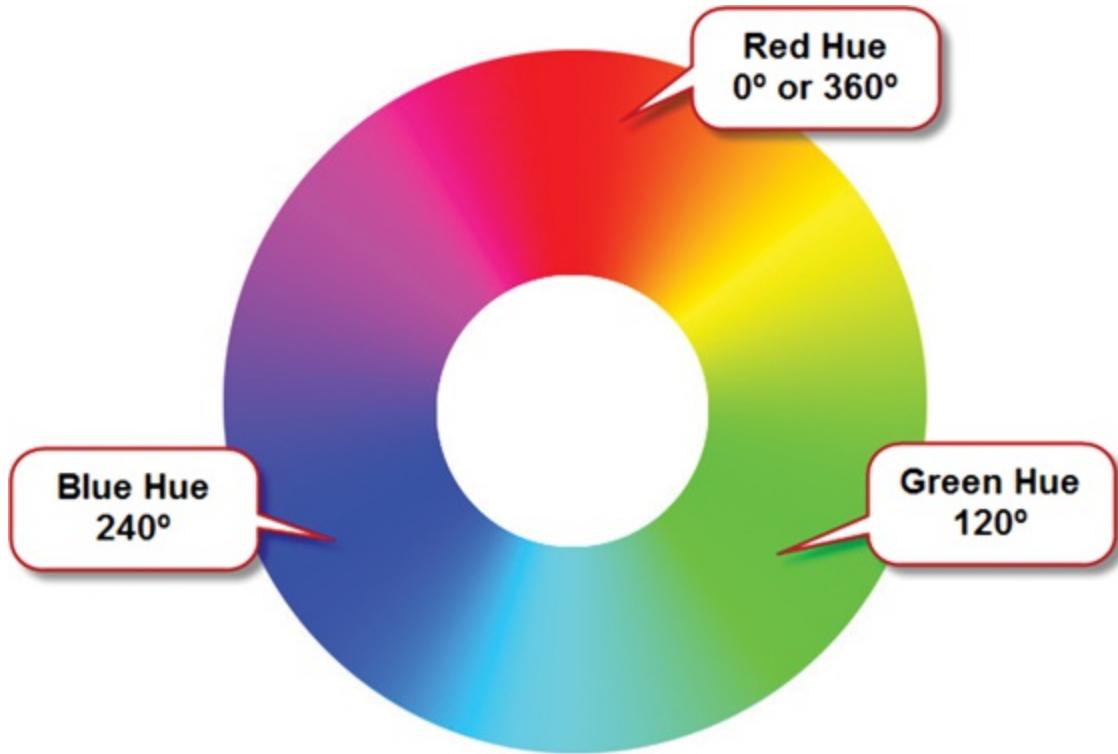
# CSS3 HSLA Color

For many years web designers have configured RGB color using either hexadecimal or decimal values on web pages. Recall that RGB color is based on hardware—the red, green, and blue light that is emitted by computer monitors. CSS3 introduced a new color notation system called HSLA color, based on a color wheel model, which stands for hue, saturation, lightness, and alpha.

## Hue, Saturation, Lightness, and Alpha

When you work with HSLA color, think of a color wheel—a circle of color—with the color red at the top of the wheel as shown in [Figure 4.39](#). Hue is the actual color which is represented by numeric values ranging from 0 to 360 (like the 360 degrees in a circle). For example, red is represented by both the values 0 and 360, green is represented by 120, and blue is represented by 240. Set hue to 0 when configuring black, gray, and white. Saturation configures the intensity of the color and is indicated by a percentage value (full color saturation = 100%, gray = 0%). Lightness determines the brightness or darkness of the color and is indicated by a percentage value (normal color = 50%, white = 100%, black = 0%). Alpha represents the transparency of the color and has a value from 0 (transparent) to 1 (opaque). Note that you can omit the alpha value and use the `hs1` keyword instead of the `hsla` keyword.

## Figure 4.39



A color wheel

[Figure 4.39 Full Alternative Text](#)

## HSLA Color Examples

Configure HSLA color as shown in [Figure 4.40](#) with the following syntax:

**Figure 4.40**

**Red**  
`hsla(360, 100%, 50%, 1.0);`

**Green**  
`hsla(120, 100%, 50%, 1.0);`

**Blue**  
`hsla(240, 100%, 50%, 1.0);`

**Black**  
`hsla(0, 0%, 0%, 1.0);`

**Gray**  
`hsla(0, 0%, 50%, 1.0);`

**White**  
`hsla(0, 0%, 100%, 1.0);`

HSLA color examples

Figure 4.40 Full Alternative Text

`hsla(hue value, saturation value, lightness value, alpha value);`

- Red: `hsla(360, 100%, 50%, 1.0);`
- Green: `hsla(120, 100%, 50%, 1.0);`
- Blue: `hsla(240, 100%, 50%, 1.0);`
- Black: `hsla(0, 0%, 0%, 1.0);`
- Gray: `hsla(0, 0%, 50%, 1.0);`
- White: `hsla(0, 0%, 100%, 1.0);`

According to the W3C, an advantage to using HSLA color is that it is more intuitive to work with than the hardware-oriented RGB color. You can use a

color wheel model to choose colors and generate the hue value from the degree placement on the circle. If you would like to use a tone of a color, which is a color with gray added, vary the saturation value. If you would like to use a shade or tint of a color, use the same hue value, but vary the lightness value to meet your needs. [Figure 4.41](#) shows three shades of cyan blue configured using three different values for lightness: 25% (dark cyan blue), 50% (cyan blue), 75% (light cyan blue).

## Figure 4.41

```
hsla(210, 100%, 25%, 1.0);
```

```
hsla(210, 100%, 50%, 1.0);
```

```
hsla(210, 100%, 75%, 1.0);
```

Shades of cyan blue

### [Figure 4.41 Full Alternative Text](#)

- Dark Cyan Blue:

```
hsla(210, 100%, 25%, 1.0);
```

- Cyan Blue:

```
hsla(210, 100%, 50%, 1.0);
```

- Light Cyan Blue:

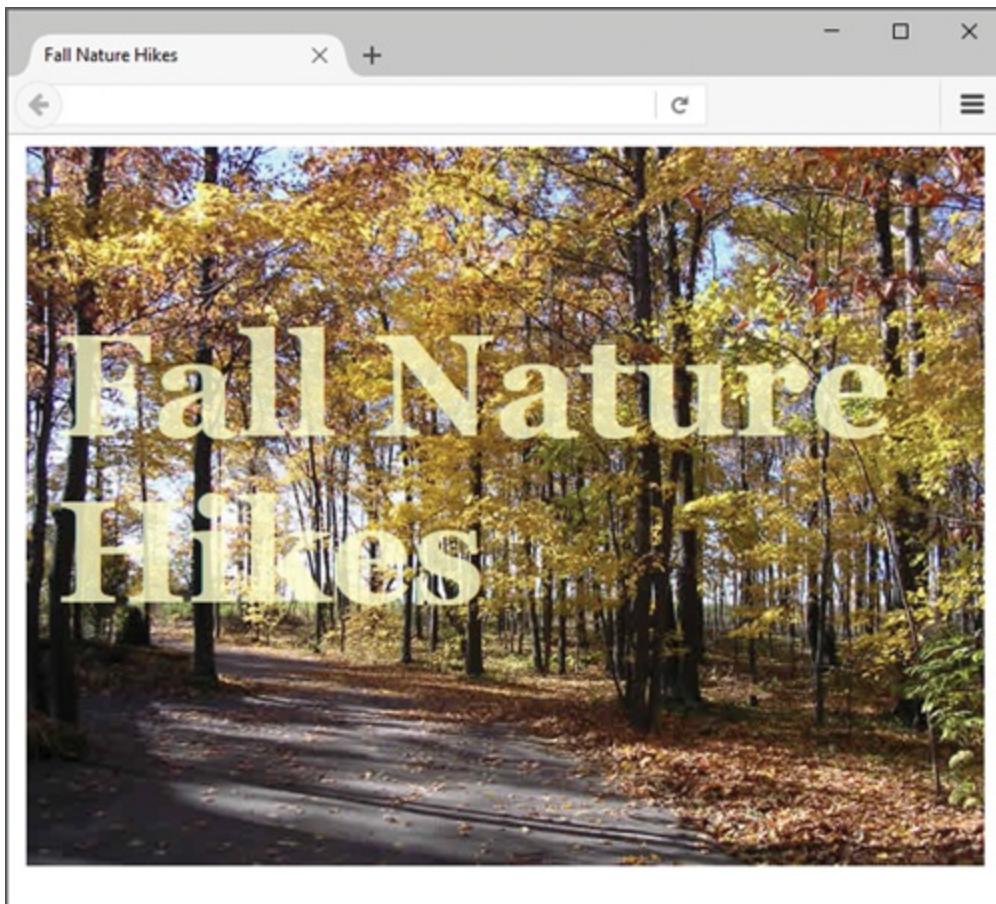
```
hsla(210, 100%, 75%, 1.0);
```



## Hands-On Practice 4.15

In this Hands-On Practice you'll configure light yellow transparent text as you work with the web page shown in [Figure 4.42](#).

**Figure 4.42**



HSLA color

1. Create a new folder called hslach4. Copy fall.jpg file from the chapter4/starters folder to your hslach4 folder. Launch a text editor and open the file you created in the previous Hands-On Practice (also

located in the student files, chapter4/4.14/rgba.html). Save the file with the name hsla.html in your hslach4 folder.

2. Delete the style declarations for the h1 selector. You will create new style rules for the h1 selector to configure 20 pixels of padding and serif light yellow text with a 0.8 alpha value and a font size of 6em. Since not all browsers support HSLA color, you'll configure the color property twice. The first instance will be the standard color value that is supported by all modern browsers; the second instance will configure the HSLA color. Older browsers will not understand the HSLA color and will ignore it. Newer browsers will “see” both of the color style declarations and will apply them in the order they are coded, so the result will be transparent color. The CSS for the h1 selector is

```
h1 { color: #ffcccc;  
     color: hsla(60, 100%, 90%, 0.8);  
     font-family: Georgia, "Times New Roman", serif;  
     font-size: 6em;  
     padding: 20px; }
```

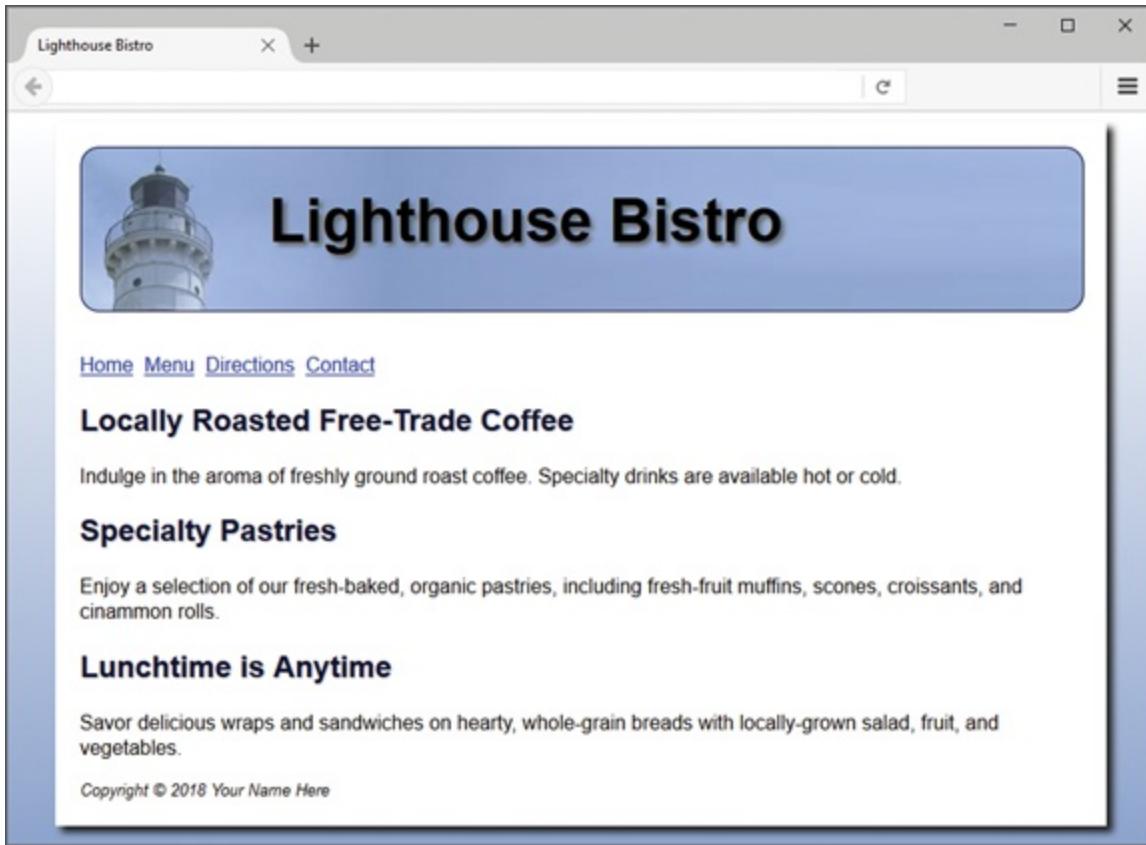
3. Save the file. When you test your hsla.html file in a browser that supports HSLA color it should look similar to the page shown in [Figure 4.42](#). See the student files for a solution (chapter4/4.15/hsla.html).

## CSS3 Gradients

CSS3 provides a method to configure color as a gradient, which is a smooth - blending of shades from one color to another color. A CSS3 gradient background color is defined purely with CSS—no image file is needed! This provides flexibility for web designers, along with a savings in the bandwidth required to serve out gradient background image files.

[Figure 4.34](#) displays a web page with a JPG gradient background image that was configured in a graphics application. The web page shown in [Figure 4.43](#) (available at chapter4/gradient/index.html in the student files) does not use a JPG for the background; CSS3 gradient properties recreated the look of the linear gradient image.

# Figure 4.43



The gradient in the background was configured with CSS3 without an image file

## Linear Gradient Syntax

A linear gradient is a smooth blending of color in a single direction such as from top to bottom or from left to right. To configure a basic linear gradient, code the `linear-gradient` function as the value of the `background-image` property. Indicate the direction of the gradient by coding the keyword phrase “`to bottom`”, “`to top`”, “`to left`” or “`to right`”. Next, list two or more color values to indicate the color stops. The basic format for a two-color linear gradient that blends from white to green follows:

```
background-image: linear-gradient(to bottom, #FFFFFF, #00FF00);
```

# Radial Gradient Syntax

A radial gradient is a smooth blending of color emanating outward from a single point. Code the radial-gradient function as the value of the background-image property to configure a radial gradient. List two or more color values to indicate the color stops. The first color will be displayed by default in the center of the element and gradually blend outward until the second color is displayed. The basic format for a two-color radial gradient that blends from white to blue follows:

```
background-image: radial-gradient(#FFFFFF, #0000FF);
```

## CSS3 Gradients and Progressive Enhancement

The term progressive enhancement is defined by web developer and HTML5 evangelist Christian Heilmann as “starting with a baseline of usable functionality, then increasing the richness of the user experience step by step by testing for support for enhancements before applying them.” In other words, start with a web page that displays well in most browsers and then add new design techniques, such as CSS3 gradients, in a way that enhances the display for visitors who are using browsers that support the new technique. It’s useful to keep progressive enhancement in mind when using CSS3 gradients. Configure a “fallback” background-color property or background-image property which will be rendered by browsers that do not support CSS3 gradients. In [Figure 4.43](#) the background color was configured to be same value as the ending gradient color.



## Hands-On Practice 4.16

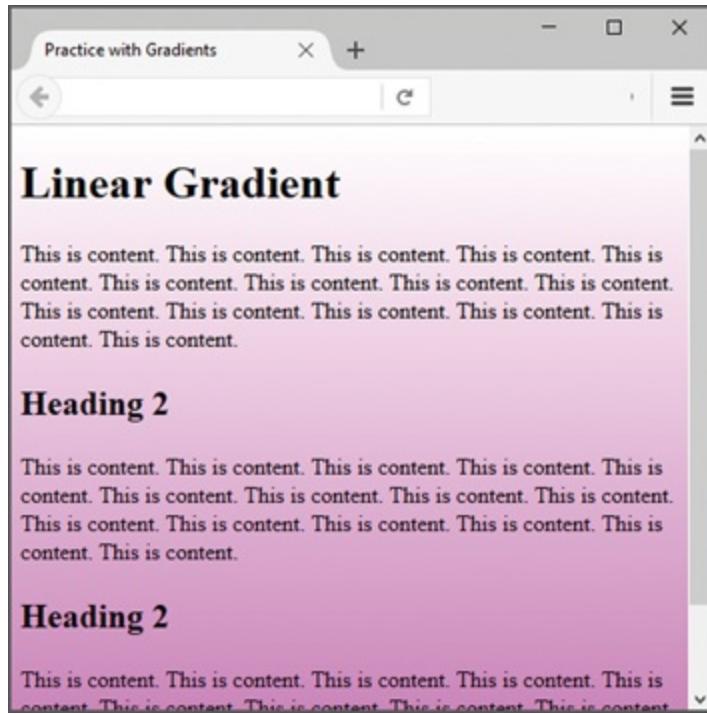
You'll work with CSS gradient backgrounds in this Hands-On Practice. Create a new folder called gradientch4. Copy the chapter4/starter4.html file into your gradientch4 folder. Rename the file index.html. Launch a text editor and open the file.

1. First, you will configure a linear gradient. Code embedded CSS in the head section. Configure the body of the web page to display a fallback orchid background color of #DA70D6 and a linear gradient background that blends white to orchid from top to bottom without repeating:

```
body { background-color: #DA70D6;  
background-image: linear-gradient(to  
bottom, #FFFFFF, #DA70D6);  
background-repeat: no-repeat; }
```

2. Save your file and test it in a modern browser. The display should be similar to the results shown in [Figure 4.44](#). The background gradient displays behind the page content, so scroll down the page to see the full gradient. Compare your work with the solution in the student files (chapter4/4.16/linear.html).

## Figure 4.44



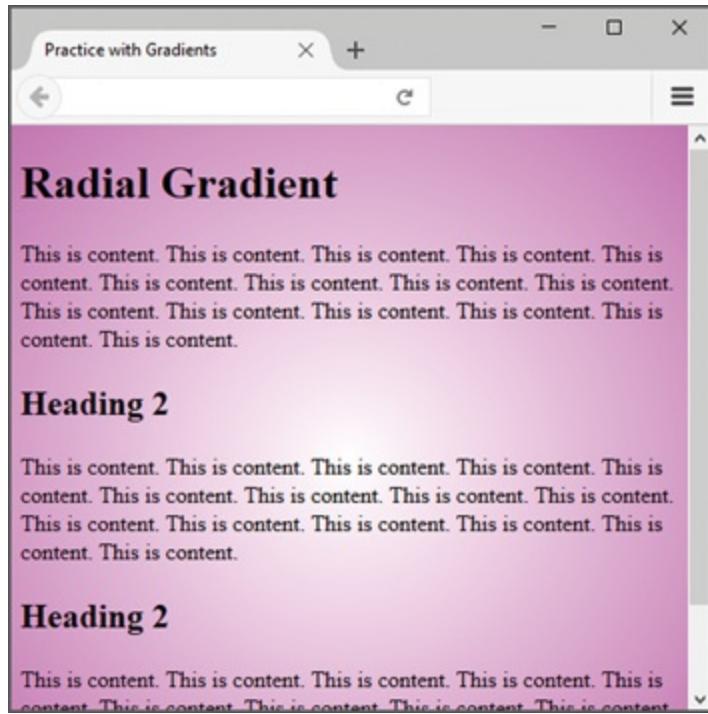
Linear gradient background

3. Next, you will configure a radial gradient. Edit the body section of the web page and code change the text within the h1 element to: Radial Gradient.
4. Edit the CSS and modify the value of the `background-image` property to configure a radial gradient linear gradient that blends white to orchid from center outward without repeating:

```
body { background-color: #DA70D6;  
       background-image:  
           radial-gradient(#FFFFFF, #DA70D6);  
       background-repeat: no-repeat; }
```

5. Save your file and test in in a modern browser. The display should be similar to the results shown in [Figure 4.45](#). Scroll down the page to see the full gradient. Compare your work with the solution in the student files (chapter4/4.16/radial.html).

# Figure 4.45



## Radial gradient background



Visit <http://css-tricks.com/css3-gradients> to delve deeper into CSS3 gradients. Experiment with generating CSS3 gradient code at <http://www.colorzilla.com/gradient-editor>, <http://www.css3factory.com/linear-gradients>, and <http://www.westciv.com/tools/gradients>.

# Chapter Summary

This chapter has introduced the use of visual elements and graphics on web pages. The number-one reason visitors leave web pages is long download times. When using images, be careful to optimize the images for the Web, reducing both the size of the file and the dimensions of the image, in order to minimize download time.

You explored new HTML5 elements and many CSS properties in this chapter. When using the new CSS3 properties and HTML5 elements, be mindful of the concepts of progressive enhancement and accessibility. Verify that the pages display in an acceptable manner even if new techniques are not supported by the browser. Provide text alternatives to images with the alt attribute.

Visit the textbook's website at <http://www.webdevfoundations.net> for examples, the links listed in this chapter, and updated information.

## Key Terms

1. [<figcaption>](#)

2. [<figure>](#)

3. [<hr>](#)

4. [<img>](#)

5. [<meter>](#)

6. [<progress>](#)

7. [alt attribute](#)

8. [animated GIF](#)
9. [area element](#)
10. [aspect ratio](#)
11. [background-attachment property](#)
12. [background-clip property](#)
13. [background-image property](#)
14. [background-origin property](#)
15. [background-position property](#)
16. [background-repeat property](#)
17. [background-size property](#)
18. [border property](#)
19. [border-color property](#)
20. [border-radius property](#)
21. [border-style property](#)
22. [border-width property](#)
23. [box-shadow property](#)
24. [favicon](#)
25. [figcaption element](#)
26. [figure element](#)
27. [gamma](#)

28. [GIF images](#)
29. [gradient](#)
30. [height attribute](#)
31. [hotspots](#)
32. [HSLA color](#)
33. [horizontal rule element](#)
34. [hspace attribute](#)
35. [image element](#)
36. [image link](#)
37. [image map](#)
38. [image optimization](#)
39. [image slicing](#)
40. [interlaced image](#)
41. [JPEG images](#)
42. [linear gradient](#)
43. [lossless compression](#)
44. [lossy compression](#)
45. [max-width property](#)
46. [meter element](#)
47. [min-width property](#)

48. [opacity property](#)
49. [padding property](#)
50. [pixelation](#)
51. [PNG images](#)
52. [progress element](#)
53. [progressive enhancement](#)
54. [progressive JPEG](#)
55. [radial gradient](#)
56. [RGBA color](#)
57. [resolution](#)
58. [sprite](#)
59. [src attribute](#)
60. [srcset attribute](#)
61. [thumbnail image](#)
62. [transparency](#)
63. [usemap attribute](#)
64. [vspace attribute](#)
65. [WebP image format](#)
66. [width attribute](#)

# Review Questions

## Multiple Choice

1. Which of the following graphic types can be made transparent?
  1. GIF
  2. JPG
  3. BMP
  4. PHOTO
2. Which of the following configures empty space between the content of the HTML element (typically text) and the border?
  1. vspace property
  2. padding property
  3. margin property
  4. border property
3. Which of the following creates an image link to the index.html page when the home.gif graphic is clicked?
  1. `<a href="index.html" src="home.gif" alt="Home"></a>`
  2. `<a href="index.html">  </a>`
  3. ``
  4. `<a href="index.html"> <img href="home.gif" alt="Home"> </a>`

4. What is the purpose of coding height and width attributes on an <img> tag?
  1. They are required attributes and must always be included.
  2. They help the browser render the page faster because it reserves the appropriate space for the image.
  3. They help the browser display the image in its own window.
  4. none of the above
5. Which attribute specifies text that is available to browsers and other user agents that do not support graphics?
  1. alt
  2. text
  3. src
  4. none of the above
6. What is the term used to describe a square icon that is associated with a web page and is displayed in the browser address bar or tab?
  1. background
  2. bookmark icon
  3. favicon
  4. logo
7. Which of the following graphic types is best suited to photographs?
  1. GIF
  2. JPG

3. BMP
  4. PHOTO
8. Which CSS property configures the background color?
1. bgcolor
  2. background-color
  3. color
  4. none of the above
9. Which HTML tag configures a horizontal line on a web page?
1. <line>
  2. <br>
  3. <hr>
  4. <border>
10. Which of the following configures a graphic to repeat vertically down the side of a web page?
1. hspace="10"
  2. background-repeat:repeat;
  3. valign="left"
  4. background-repeat: repeat-y;

## Fill in the Blank

11. A background image will automatically be repeated, or , by a web

browser.

12. If your web page uses graphic links, include at the bottom of the page to increase accessibility.
13. A(n) image is a smaller version of a larger image that usually links to the larger image.
14. The CSS3 property configures a drop-shadow effect on an HTML element.
15. The element displays a visual gauge of a numeric value within a known range.

## Apply Your Knowledge

1. Predict the Result. Draw and write a brief description of the web page that will be created with the following HTML code:

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>Predict the Result</title>
<meta charset="utf-8">
</head>
<body>
<header> 
</header>
<nav> Home <a href="about.html">About</a>
<a href="services.html">Services</a>
</nav>
<main><p>Our professional staff takes pride in its working re
</main>
</body>
</html>
```

2. Fill in the Missing Code. This web page contains an image link and should be configured so that the background and text colors have good contrast. The image used on this web page should link to a page called services.html. Some HTML attribute values, indicated by "\_", are

missing. Some CSS style rules, indicated by "\_", are incomplete. The code follows:

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>CircleSoft Design</title>
<meta charset="utf-8">
<style>
body { _:_; color: _; }
</style>
</head>
<body>
<div>
<a href="_">
<br>Enter CircleSoft Design</a>
</div>
</body>
</html>
```

3. Find the Error. This page displays an image called trillium.jpg. The image is 307 pixels wide by 200 pixels high. When this page is displayed, the image does not look right. Find the error. Describe any attributes that you would code in the <img> tag to provide accessibility.
- The code follows:

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>Find the Error</title>
<meta charset="utf-8">
</head>
<body>

</body>
</html>
```

## Hands-On Exercises

1. Write the HTML to place an image called primelogo.gif on a web page.

The image is 100 pixels high by 650 pixels wide.

2. Write the HTML to create an image for the schaumburgthumb.jpg image. It is 100 pixels high by 150 pixels wide. The image should link to a larger image called schaumburg.jpg. There should be no border on the image.
3. Write the HTML to create a nav element that contains three images used as navigation links. [Table 4.5](#) provides information about the images and their associated links.

## Table 4.5

<b>Image Name</b>	<b>Link Page Name</b>	<b>Image Height</b>	<b>Image Width</b>
homebtn.gif	index.html	50	200
productsbtn.gif	products.html	50	200
orderbtn.gif	order.html	50	200

4. Experiment with page backgrounds. Locate the twocolor.gif file in the student files chapter4/starters folder. Design a web page that uses this file as a background image that repeats down the left side of the browser window. Save your file as bg1.html.
5. Experiment with page backgrounds. Locate the twocolor1.gif file in the student files chapter4/starters folder. Design a web page that uses this file as a background image that repeats across the top of the browser window. Save your file as bg2.html.

6. Visit one of your favorite websites. Note the colors used for background, text, headings, images, and so on. Write a paragraph that describes how the site uses color for these elements. Code a web page that uses colors in a similar manner. Save your file as color.html.
7. Practice with CSS.
  1. Write the CSS for an HTML selector footer with the following characteristics: a light-blue background color, Arial font, dark-blue text color, 10 pixels of padding, and a narrow, dashed border in a dark-blue color.
  2. Write the CSS for an id named notice that is configured to 80% width and centered.
  3. Write the CSS to configure a class that will produce a headline with a dotted line underneath it. Choose a color that you like for the text and dotted line.
  4. Write the CSS to configure an h1 element selector with drop-shadow text, a 50% transparent background color, and sans-serif font that is 4em in size.
  5. Write the CSS to configure an id named feature with small, red, Arial font; a white background; a width of 80%; and a drop shadow.
8. Design a new web page about you. Use CSS to configure a background color and text color for the page. Include the following on your web page:
  - Your name
  - A description of your favorite hobbies and activities
  - A photo of yourself (be sure to optimize the image for display on the Web)

Save the page as yourlastname.html.

9. Design a web page that provides a list of resources for free stock photographs. The list should contain at least five different websites. Use your favorite graphic sites, the sites suggested in this chapter, or sites you have found on the Web. Save the page as freegraphics.html.
10. Visit the textbook's website at <http://webdevfoundations.net/9e/chapter4.html> and follow the link to the Adobe Photoshop tutorial. Follow the instructions to create a logo banner. Hand in the printouts described in the tutorial to your instructor.

## Web Research

1. Providing access to the Web for all people is an important issue. Visit the W3C's Web Accessibility Initiative and explore its WCAG 2.0 Quick Reference at <http://www.w3.org/WAI/WCAG20/quickref>. View additional pages at the W3C's site as necessary. Explore the checkpoints that are related to the use of color and images on web pages. Create a web page that uses color, uses images, and includes the information that you discovered.
2. This chapter has introduced you to several new CSS3 properties. Choose one of them to research further. Create an example web page that demonstrates the use of the property. Use one of the following sites as a starting point to determine the current browser support of the property, and include a summary of this information (along with the URLs of the resources you used) in your web page:
  - <http://www.quirksmode.org/css/contents.html>
  - <http://www.findmebyip.com/litmus>
  - <https://caniuse.com/#cats=CSS>

## Focus on Web Design

1. Visit a website that interests you. Print the home page or one other pertinent page from the site. Write a one-page summary and reaction to the website you chose to visit. Address the following topics:
  1. What is the purpose of the site?
  2. Who is the intended audience?
  3. Do you believe the site reaches its audience?
  4. Was this site useful to you? Why or why not?
  5. List the colors and/or graphics that are used on the home page of this website: background, backgrounds of page sections, text, logo, navigation buttons, and so on.
  6. How does the use of color and graphics enhance the website?



## **WEBSITE CASE STUDY**

### **Using Graphics & Visual Elements**

Each of the case studies in this section continues throughout most of the text. In this chapter, we add images to the websites, create a new page, and modify existing pages.

## **JavaJam Coffee House**

See [Chapter 2](#) for an introduction to the JavaJam Coffee House Case Study. [Figure 2.31](#) shows a site map for the JavaJam website. The Home page and Menu page were created in earlier chapters. Using the existing website as a

starting point, you will modify the design of the pages and create a new page, the Music page. You have five tasks in this case study:

1. Create a new folder for this JavaJam case study, and obtain the starter image files.
2. Modify the Home page to display the winding road image as shown in [Figure 4.46](#).

## Figure 4.46



New JavaJam Home page

### [Figure 4.46 Full Alternative Text](#)

3. Modify the Menu page, shown in [Figure 4.47](#), to be consistent with the Home page.

# Figure 4.47



JavaJam menu.html

Figure 4.47 Full Alternative Text

4. Create a new Music page, as shown in [Figure 4.48](#).

# Figure 4.48



JavaJam music.html

[Figure 4.48 Full Alternative Text](#)

5. Modify the style rules in the javajam.css file as needed.



## Hands-On Practice Case

- Task 1: The Website Folder. Create a folder on your hard drive or portable storage device called javajam4. Copy all the files from your [Chapter 3](#) javajamcss folder into the javajam4 folder. Obtain the images used in this case study from the student files. The images are located in the chapter4/casestudystarters/javajam folder. The images are background.gif, greg.jpg, gregthumb.jpg, javajamlogo.jpg, melanie.jpg,

melaniethumb.jpg, mugs.jpg, and windingroad.jpg. Save them in your javajam4 folder.

- Task 2: The Home Page. Launch a text editor, and open the index.html file from your javajam4 folder. Modify the index.html file to look similar to the web page shown in [Figure 4.47](#).
  1. Replace the “Relax at JavaJam” text contained within the h2 element with “Follow the Winding Road to JavaJam.”
  2. Code an img tag for the windingroad.jpg image above the h2 element in the main content area. Be sure to include the alt, height, and width attributes. Also configure the image to appear to the right of the text content by coding the align="right"> attribute on the <img> tag. *Note:* The W3C HTML validator will indicate that the align attribute is invalid. We’ll ignore the error for this case study. In [Chapter 6](#) you’ll learn to use the CSS float property (instead of the align property) to configure this type of layout.
  3. Add a paragraph with the following text below the h2 element:

“We’re a little out of the way, but take a drive down Garrett Bay Road to JavaJam today! Indulge in our locally roasted free-trade coffee and home-made pastries. You’ll feel right at home at JavaJam!”
  4. Configure the text “JavaJam Coffee House features:” within an h3 element below the paragraph and above the unordered list.

Save and test your new index.html page. It will be similar to [Figure 4.46](#), but you’ll notice that a few final touches (including the background image and logo image) are missing; you’ll configure these with CSS in Task 5.

- Task 3: The Menu Page. Launch a text editor, and open the menu.html page from your javajam4 folder. Modify the menu.html file to look similar to the web page shown in [Figure 4.47](#).

1. Code an img tag for the mugs.jpg image above the h2 element in the main content area. Be sure to include the alt, height, and width attributes. Also configure the image to appear to the right of the text content by coding the align="right" attribute on the tag. Note: The W3C HTML validator will indicate that the align attribute is invalid. We'll ignore the error for this case study. In [Chapter 6](#), you'll learn to use the CSS float property (instead of the align property) to configure this type of layout.
2. Add a paragraph with the following text below the h2 element:

“Indulge in our locally roasted free-trade coffee and enjoy the aroma, the smooth taste, the caffeine! Join our Mug Club and get a 10% discount on each cup of coffee you purchase — ask the barista for details.” *Hint:* See [Appendix B](#), “Special Characters,” for the character code to display the em dash (—). Save and test your new menu.html page. It will be similar to [Figure 4.47](#), but missing a few final touches (see Task 5).

- Task 4: The Music Page. Use the Menu page as the starting point for the Music page. Launch a text editor, and open the menu.html file in the javajam4 folder. Save the file as music.html. Modify the music.html file to look similar to the Music page, as shown in [Figure 4.48](#):

1. Change the page title to an appropriate phrase.
2. Delete the image and description list from the page.
3. Configure “Music at JavaJam” as the text within the h2 element.
4. Configure the following as the text within the paragraph element:

“The first Friday night each month at JavaJam is a special night. Join us from 8 pm to 11 pm for some music you won’t want to miss!”

5. The rest of the content in the page will consist of two areas describing music performances. The area describing each music

performance consists of an h4 element, a div assigned to the class named details, and an image link.

## January Music Performance:

- Configure an h4 element with the following text: January
- Code an opening div tag. Assign the div to the class named details.
- Configure the melaniethumb.jpg as an image link to melanie.jpg. Code appropriate attributes on the <img> tag.
- Configure the following text within the div after the image link:

Melanie Morris entertains with her melodic folk style.

## February Music Performance:

- Configure an h4 element with the following text: February
- Code an opening div tag. Assign the div to the class named details.
- Configure the gregthumb.jpg as an image link to greg.jpg. Code appropriate attributes on the <img> tag.
- Configure the following text within the div after the image:

Tahoe Greg is back from his tour. New songs. New stories.

Save the music.html file. If you test your page in a browser, you'll notice that it looks different from [Figure 4.48](#)—you still need to configure style rules.

- Task 5: Configure the CSS. Open javajam.css in a text editor. Edit the

style rules as follows:

1. Modify the body element selector style rules. Configure background.gif as the background image.
2. Modify the style rules for the wrapper id. Configure the background color to be #FEF6C2. Configure a minimum width of 900px (use min-width). Configure a maximum width of 1280px (use max-width). Use the box-shadow property to configure a drop-shadow effect.
3. Modify the header element selector style rules. Remove the text-align declaration. Code a declaration to set the height to 150px. Configure declarations to display the javajamlogo.jpg image as a background image without repeating.
4. Modify the h1 element selector style rules. Remove the line-height declaration. Configure declarations to set the top padding to 45px, left padding to 220px, and font size to 3em.
5. Modify the nav element selector style rules. Configure declarations for 1.5em font size size and 10px of top padding.
6. Code a new style rule to prevent the hyperlinks in the nav area from displaying the default underline. Use `nav a { text-decoration: none; }`
7. Modify the footer element selector style rules. Configure declarations for 10px of bottom padding and a solid 2px top border (use #221811 as the color).
8. Add a new style rule for the h4 element selector that configures a background color (#D2B48C), font size (1.2em), left padding (.5em), and bottom padding (.25em).
9. Add a new style rule for the main element selector to configure 2em of padding on the left, right, and bottom. You may need to nudge Internet Explorer to display the page as intended by adding

the display: block; declaration (see [Chapter 6](#)).

10. Add a new style rule for the class named `details` to add 20% left and right padding. This will configure empty space on either side of the music performance description and image on the `music.html` page.
11. Add a new style rule for the `img` element selector that configures 10px left padding and 10 px right padding.

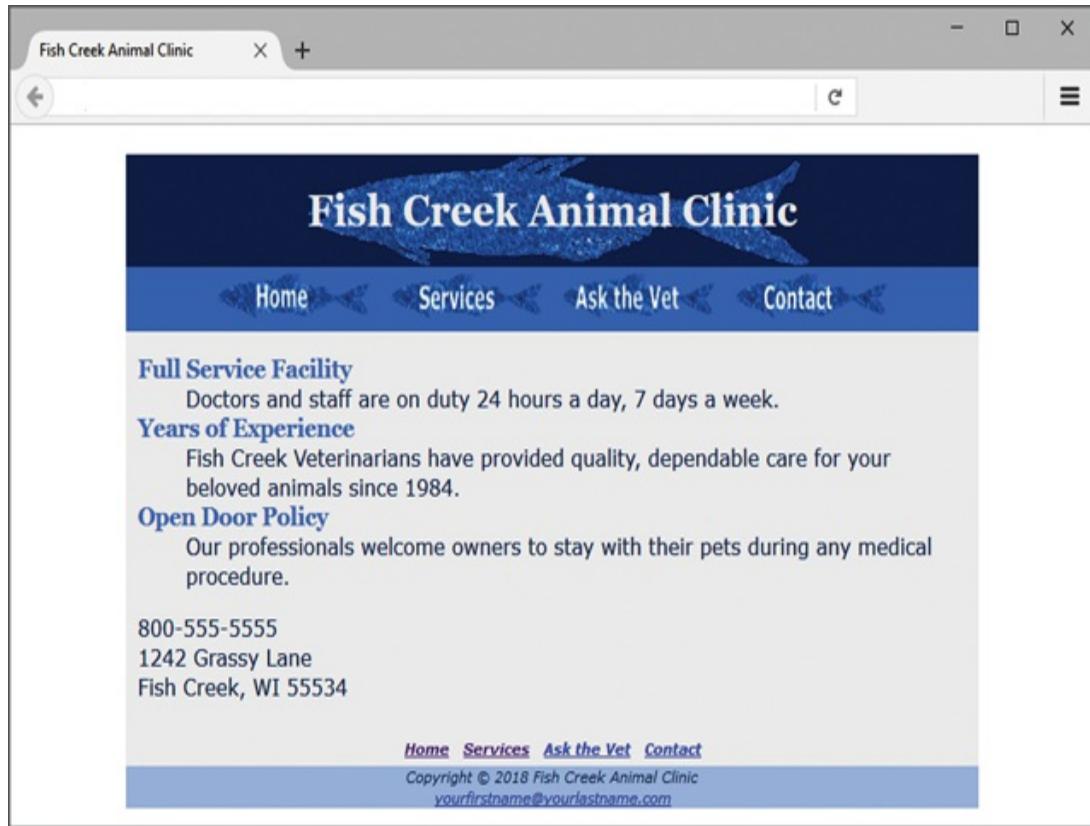
Save the `javajam.css` file. Test your pages (`index.html`, `menu.html`, and `music.html`) in a browser. If your images do not appear or your image links do not work, examine your work carefully. Use Windows Explorer or Mac Finder to verify that the images are saved in your `javajam4` folder. Examine the `src` attribute on the `<img>` tags to be sure you spelled the image names correctly. Another useful troubleshooting technique is to validate the HTML and CSS code. See [Chapters 2](#) and [3](#) for Hands-On Practice exercises that describe how to use these validators.

## Fish Creek Animal Clinic

See [Chapter 2](#) for an introduction to the Fish Creek Animal Clinic Case Study. [Figure 2.35](#) shows a site map for Fish Creek. The Home page and Services page were created in earlier chapters. Using the existing website as a starting point, you will modify the design of the pages and create a new page, the Ask the Vet page. You have five tasks in this case study:

1. Create a new folder for this Fish Creek case study, and obtain the starter image files.
2. Modify the Home page to display a logo image and navigation image links as shown in [Figure 4.49](#).

## Figure 4.49

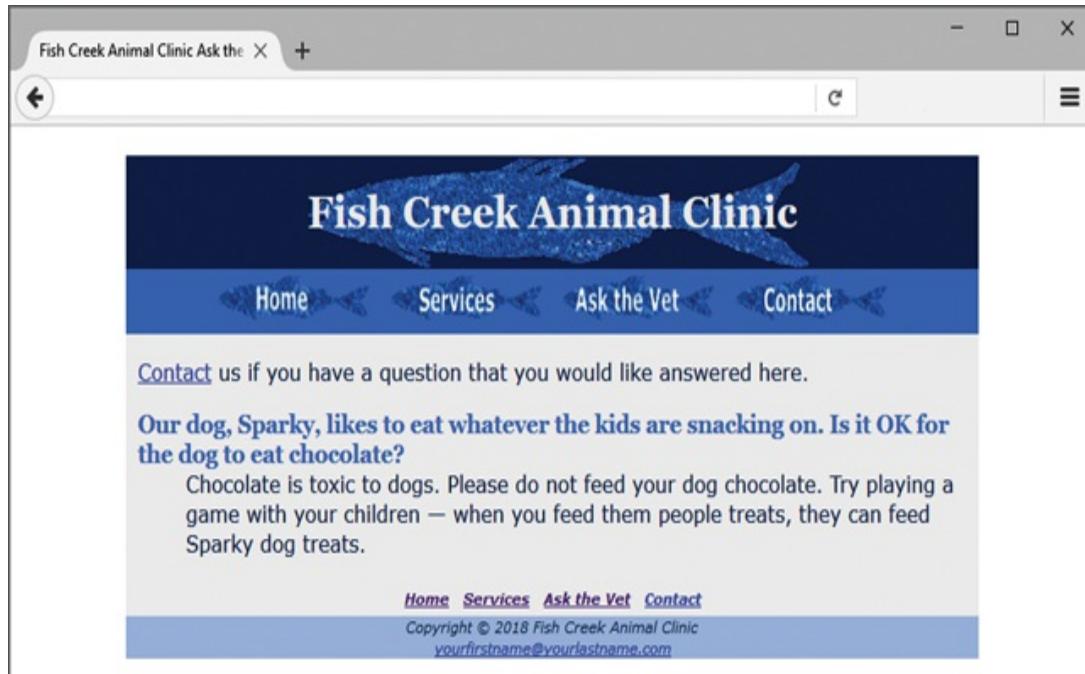


New Fish Creek Home page

[Figure 4.49 Full Alternative Text](#)

3. Modify the Services page to be consistent with the Home page.
4. Create a new Ask the Vet page, as shown in [Figure 4.50](#).

## Figure 4.50



Fish Creek askvet.html

[Figure 4.50 Full Alternative Text](#)

5. Modify the style rules in the fishcreek.css file as needed.



## Hands-On Practice Case

- Task 1: The Website Folder. Create a folder on your hard drive or portable storage device called fishcreek4. Copy all the files from your [Chapter 3](#) fishcreekcss folder into the fishcreek4 folder. Obtain the images used in this case study from the student files. The images are located in the chapter4/casestudystarters/fishcreek folder. The images are fishcreeklogo.gif, home.gif, services.gif, askthevet.gif, and contact.gif. Save the files in your fishcreek4 folder.
- Task 2: The Home Page. Launch a text editor, and open the index.html file from your fishcreek4 folder. Modify the index.html file to look

similar to the web page shown in [Figure 4.49](#).

- Update the navigation area.
  - Since you will be replacing the top navigation with image links, it's a good idea to provide for accessibility by including a set of text navigation links in the footer section of the web page. Copy the nav element, and paste it inside the footer area above the copyright line.
  - Refer to [Figure 4.49](#), and replace the top navigation text hyperlinks with image links. The home.gif should link to index.html. The services.gif should link to services.html. The askthivet.gif should link to askvet.html. The contact.gif should link to contact.html. Use appropriate attributes on the <img> tag: alt, height, and width.

Save and test your new index.html page. It will be similar to [Figure 4.49](#), but you'll notice that the header and navigation areas still need work; you'll configure these with CSS in Task 5.

- Task 3: The Services Page. Launch a text editor, and open the services.html page from your fishcreek4 folder. Configure the navigation areas in a similar way as the home page. Save and test your new services.html page.
- Task 4: The Ask the Vet Page. Use the Services page as the starting point for the Ask the Vet page. Launch a text editor, and open the services.html file in the fishcreek4 folder. Save the file as askvet.html. Modify the askvet.html file to look similar to the Ask the Vet page, as shown in [Figure 4.50](#):
  1. Change the page title to an appropriate phrase.
  2. Delete the unordered list from the page.
  3. The page content consists of a paragraph of text followed by a description list that contains a question and an answer.

1. Configure the text in the paragraph as follows:

Contact us if you have a question that you would like answered here.

2. b. The word “Contact” should link to the contact.html page.
3. c. The description list displays the question and answer. The `<dt>` element configures the question. Assign the `<dt>` element to the `category` class used on the Services page. The `<dd>` element configures the answer. The content of the description list follows:
  - Question: Our dog, Sparky, likes to eat whatever the kids are snacking on. Is it OK for the dog to eat chocolate?”
  - Answer: Chocolate is toxic to dogs. Please do not feed your dog chocolate. Try playing a game with your children — when you feed them people treats, they can feed Sparky dog treats.
4. d. *Hint:* See [Appendix B](#), “Special Characters,” for the character code to display the em dash (—).

Save the askvet.html file. If you test your page in a browser, you’ll notice that it looks different from [Figure 4.50](#)—you still need to configure style rules.

- Task 5: Configure the CSS. Open fishcreek.css in a text editor. Edit the style rules as follows:
  1. Modify the style rules for the `wrapper` id. Configure a minimum width of 700px (use `min-width`).
  2. Modify the style rules for the `header` element selector. Change the text color to `#F0F0F0`. Configure `fishcreeklogo.gif` as a background image that is centered and does not repeat. Configure the text alignment to be centered (use `text-align:center`).

3. Modify the style rules for the h1 element selector. Change the line-height to 250%.
4. Modify the style rules for the nav element selector. Add a new declaration to center the text. Also set the background color to #5280C5 and padding to 5px.
5. Modify the category class to display text with a drop shadow (use text-shadow: 1px 1px 1px #667).
6. Add a new style rule for the img element selector to display no border.
7. Modify the style rules for the footer element selector. Configure centered text and set background color to #AEC3E3.
8. Add a new style rule for the main element selector. Set left and right padding to 10px.
9. Add a new style rule for the navigation in the footer area (use footer nav as the selector) to overrule the previous nav style rule and configure a #F0F0F0 background color.
10. Save the fishcreek.css file. Test your pages (index.html, services.html, and askvet.html) in a browser. Your pages should look similar to [Figures 4.49](#) and [4.50](#) except that you'll see some extra space between the header and navigation area. Let's do something about that. We'll need to use the CSS margin property, which you'll explore in depth in [Chapter 6](#). Open fishcreek.css in a text editor. Modify the style rules for the h1 selector to set the bottom margin to 0 with the following code:

```
margin-bottom: 0;
```

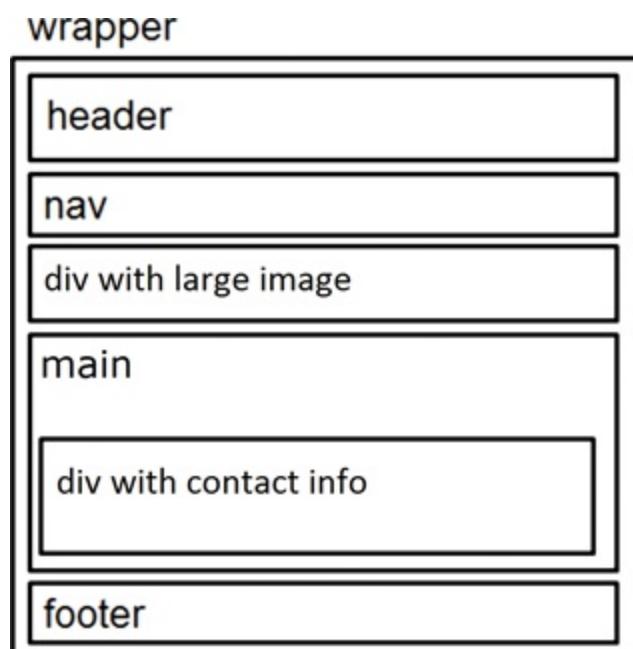
Save the fishcreek.css file. Test your pages (index.html, services.html, and askvet.html) in a browser. The Home page (index.html) should look similar to [Figure 4.49](#). The new Ask the Vet page (askvet.html) should look similar to [Figure 4.50](#). If your images do not appear or your image

links do not work, examine your work carefully. Use Windows Explorer or Mac Finder to verify that the images are saved in your fishcreek4 folder. Examine the `src` attribute on the `<img>` tags to be sure you spelled the image names correctly. Examine your CSS to verify that you have spelled the image names correctly. Another useful troubleshooting technique is to validate the HTML and CSS code. See [Chapters 2](#) and [3](#) for Hands-On Practice exercises that describe how to use these validators.

# Pacific Trails Resort

See [Chapter 2](#) for an introduction to the Pacific Trails Case Study. [Figure 2.39](#) shows a site map for Pacific Trails. The Home page and Yurts page were created in earlier chapters. Using the existing website as a starting point, you will modify the design of the pages to display a large image on each page, as indicated in the wireframe in [Figure 4.51](#). You will also create a new page, the Activities page. You have five tasks in this case study:

## Figure 4.51

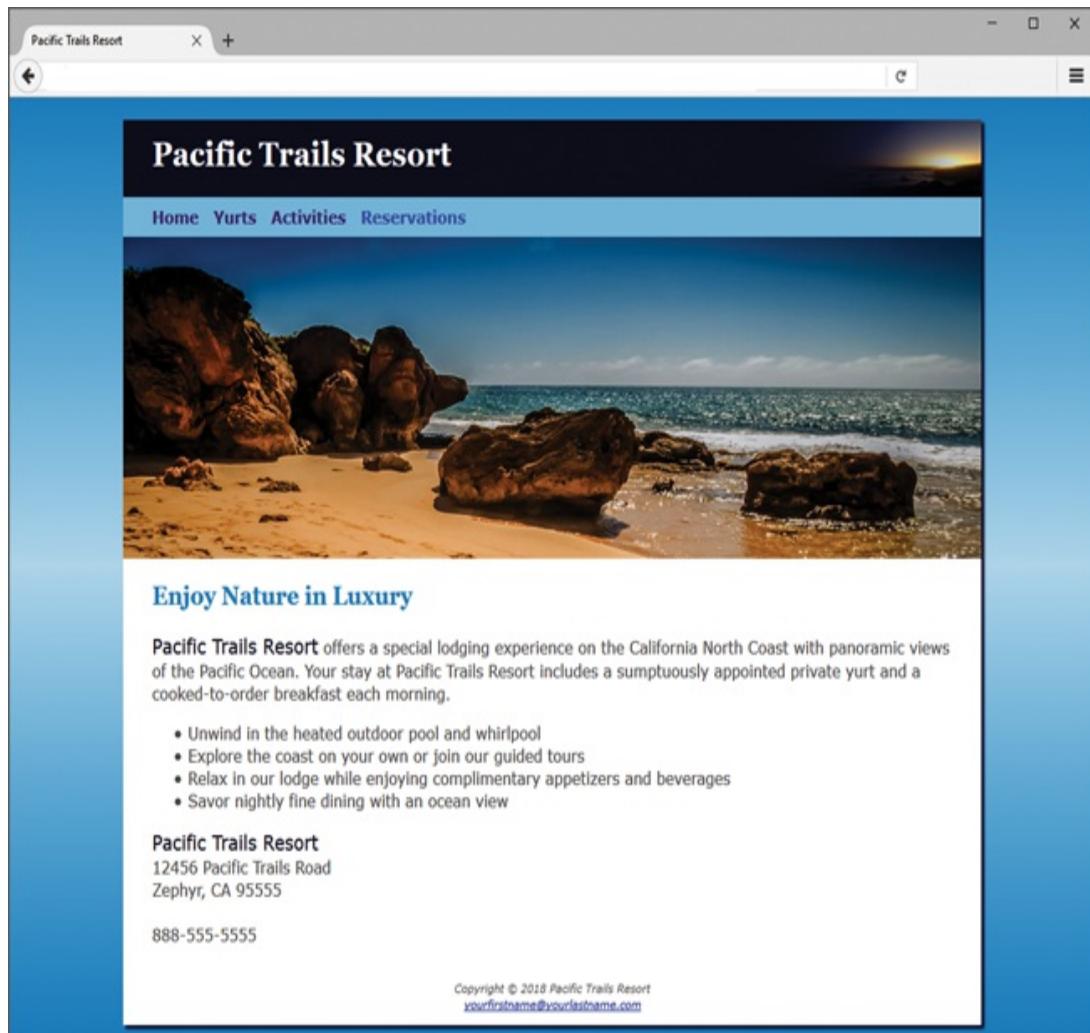


## New Pacific Trails wireframe

### Figure 4.51 Full Alternative Text

1. Create a new folder for this Pacific Trails case study, and obtain the starter image files.
2. Modify the Home page to display a logo image and scenic photograph as shown in [Figure 4.52](#).

## Figure 4.52

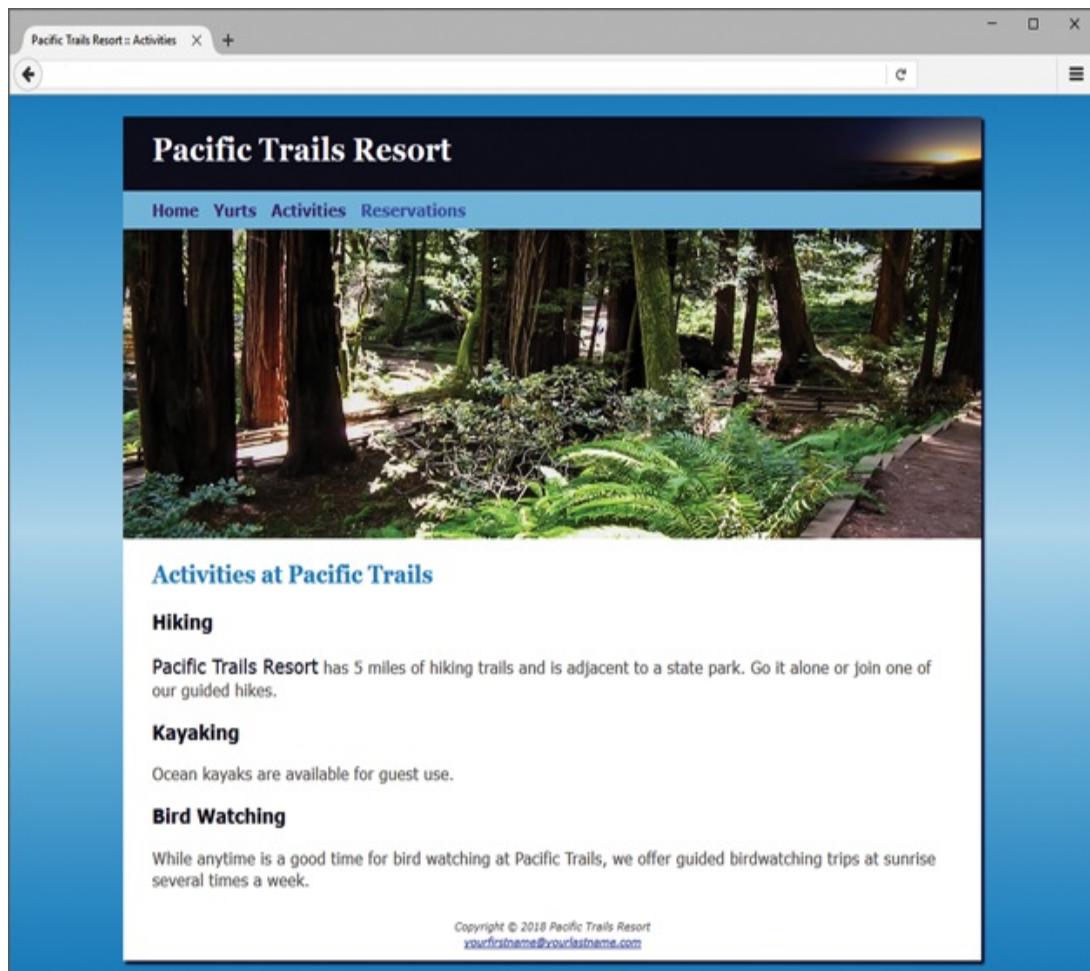


New Pacific Trails Resort Home page

## Figure 4.52 Full Alternative Text

3. Modify the Yurts page to be consistent with the Home page.
4. Create a new Activities page, as shown in [Figure 4.53](#).

# Figure 4.53



Pacific Trails Resort activities.html

## Figure 4.53 Full Alternative Text

5. Modify the style rules in the pacific.css file as needed.



## Hands-On Practice Case

- Task 1: The Website Folder. Create a folder on your hard drive or portable storage device called pacific4. Copy all the files from your [Chapter 3](#) pacificcss folder into the pacific4 folder. Obtain the images used in this case study from the student files. The images are located in the chapter4/casestudystarters/pacific folder. The images are sunset.jpg, coast.jpg, yurt.jpg, and trail.jpg. Save the files in your pacific4 folder.
- Task 2: The Home Page. Launch a text editor, and open the index.html file from your pacific4 folder. Modify the index.html file to look similar to the web page shown in [Figure 4.52](#). Configure a div element to display the coast.jpg image. Code an opening div tag assigned to the id named homehero after the closing nav tag. Next, code a closing div tag. As shown in the wireframe in [Figure 4.51](#), this div is located between the nav element and the main element. There is no HTML or text content for this div. The purpose of this div is to display a large image (configured with CSS in Task 5).

Save and validate your new index.html page. It will not yet be similar to [Figure 4.52](#); you'll configure CSS in Task 5.

- Task 3: The Yurts Page. Launch a text editor, and open the yurts.html page from your pacific4 folder. Configure a div element to display the yurt.jpg image. Code an opening div tag assigned to the id named yurthero after the closing nav tag. Next, code a closing div tag. As shown in the wireframe in [Figure 4.51](#), this div is located between the nav element and the main element. There is no HTML or text content for this div. The purpose of this div is to display a large image (configured with CSS in Task 5). Save and validate your new yurts.html page.
- Task 4: The Activities Page. Use the Yurts page as the starting point for the Activities page. Launch a text editor, and open the yurts.html file in

the pacific4 folder. Save the file as activities.html. Modify the activities.html file to look similar to the Activities page, as shown in [Figure 4.53](#):

1. Change the page title to an appropriate phrase.
2. Change the text in the <h2> to be “Activities at Pacific Trails”.
3. Modify the div assigned to the id `yurthero`. Replace `yurthero` with `trailhero`.
4. Delete the description list from the page.
5. Configure the following text, using h3 tags for the headings and paragraph tags for the sentences:

## Hiking

- Pacific Trails Resort has 5 miles of hiking trails and is adjacent to a state park. Go it alone or join one of our guided hikes.

## Kayaking

- Ocean kayaks are available for guest use.

## Bird Watching

- While anytime is a good time for bird watching at Pacific Trails, we offer guided birdwatching trips at sunrise several times a week.
6. Configure a span element to contain the phrase “Pacific Trails Resort” in the first paragraph on the page. Assign the span to the

class named `resort`.

Save the `activities.html` file. If you test your page in a browser, you'll notice that it looks different from [Figure 4.53](#); you still need to configure style rules.

- Task 5: Configure the CSS. Open `pacific.css` in a text editor. Edit the style rules as follows:
  1. Modify the `body` element selector style rules. Change the background color to `#3399CC`. Configure a CSS gradient with three color stops as the background image as shown here: `background-image: linear-gradient(to bottom, #3399CC, #C2E0F0, #3399CC)`
  2. Modify the style rules for the `wrapper` id. Configure the background color to be `#FFFFFF`. Configure a minimum width of `700px` (use `min-width`). Configure a maximum width of `1024px` (use `max-width`). Use the `box-shadow` property to configure a drop-shadow effect.
  3. Modify the style rules for the `h1` element selector. Configure the `sunset.jpg` as a background image that displays on the right and does not repeat. Set left padding to `2em`. Configure a 72-pixel height (the same height as the background image).
  4. Modify the style rules for the `nav` element selector. Set top, right, and bottom padding to `.5em`. Set left padding to `2em`.
  5. Modify the style rules for the `footer` element selector. Set padding to `1em`.
  6. Add a new style rule for the `h3` element selector to display `#000033` text color.
  7. Add a new style rule for the `main` element selector that configures `2em` of left and right padding. You may need to nudge Internet Explorer to display the page as intended by adding the `display: block;` declaration (see [Chapter 6](#)).

8. Add a new selector for an id named `homehero`. Code declarations to configure 300px height and to display the `coast.jpg` background image to fill the space (use `background-size: 100% 100%;`) without repeating.
9. Add a new selector for an id named `yurthero`. Code declarations to configure 300px height and to display the `yurt.jpg` background image to fill the space (use `background-size: 100% 100%;`) without repeating.
10. Add a new selector for an id named `trailhero`. Code declarations to configure 300px height and to display the `trail.jpg` background image to fill the space (use `background-size: 100% 100%;`) without repeating.
11. Code a new style rule to prevent the hyperlinks in the nav area from displaying the default underline. Use `nav a { text-decoration: none; }`
12. Save the `pacific.css` file. Test your pages (`index.html`, `yurts.html`, and `activities.html`) in a browser. Your pages should look similar to [Figures 4.52](#) and [4.53](#) except that you'll see some extra space between the header and navigation area. Let's do something about that. We'll need to use the CSS margin property, which you'll explore in depth in [Chapter 6](#). Modify the style rules for the `h1` selector to set the bottom margin to 0 with the following code:

```
margin-bottom: 0;
```

Save the `pacific.css` file. Test your pages (`index.html`, `yurts.html`, and `activities.html`) in a browser. The Home page (`index.html`) should look similar to [Figure 4.52](#). The new Activities page (`activities.html`) should look similar to [Figure 4.53](#). If your images do not appear, examine your work carefully. Use Windows Explorer or Mac Finder to verify that the images are saved in your `pacific4` folder. Examine your CSS to be sure you spelled the image names correctly. Another useful troubleshooting technique is to validate the HTML and CSS code. See [Chapters 2](#) and [3](#) for Hands-On Practice exercises that describe how to use these

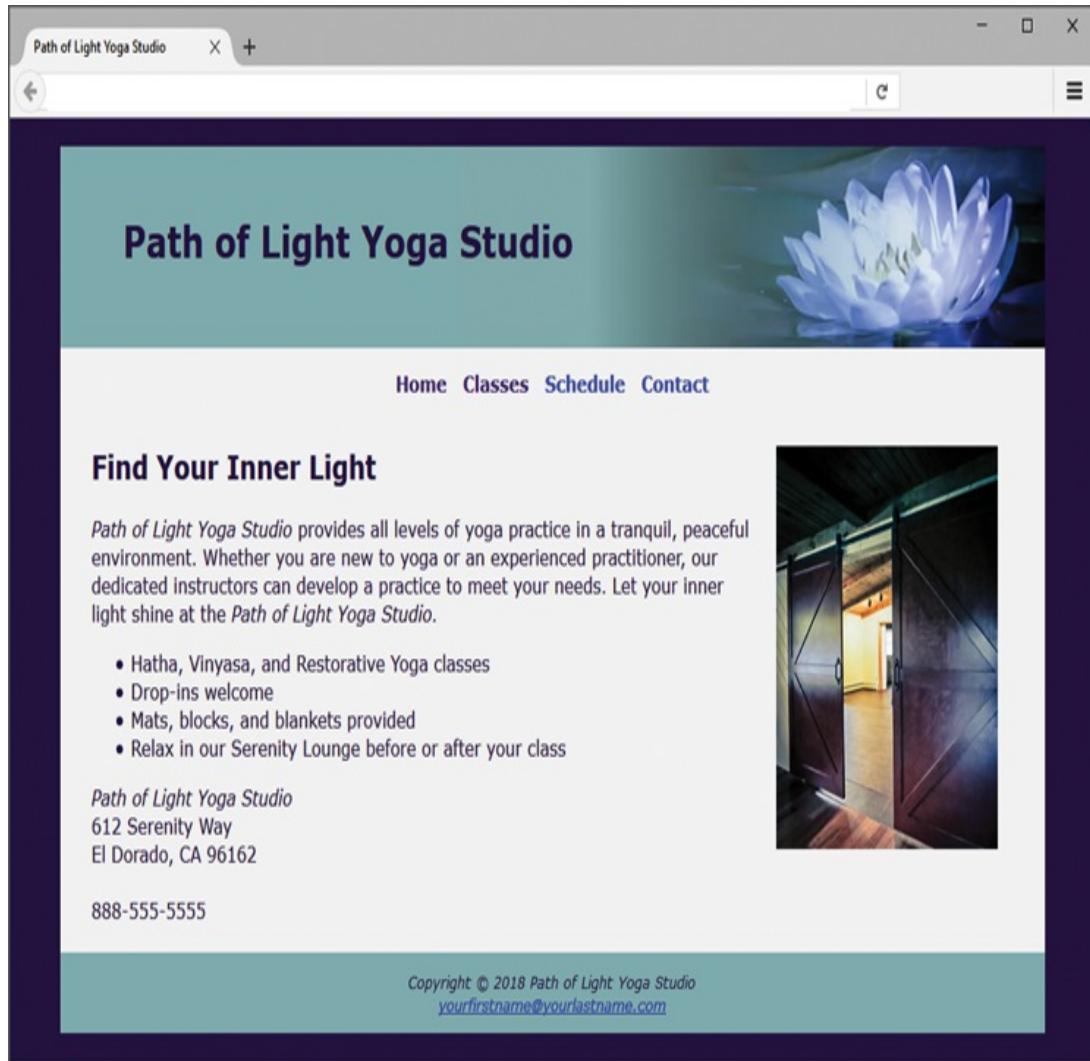
validators.

# Path of Light Yoga Studio

See [Chapter 2](#) for an introduction to the Path of Light Yoga Studio Case Study. [Figure 2.43](#) shows a site map for Path of Light Yoga Studio. The Home page and Classes page were created in earlier chapters. Using the existing website as a starting point, you will modify the design of the pages and create a new page, the Schedule page. You have five tasks in this case study:

1. Create a new folder for this Path of Light Yoga Studio case study, and obtain the starter image files.
2. Modify the Home page to display as shown in [Figure 4.54](#).

## Figure 4.54



Path of Light Yoga Studio Home page

[Figure 4.54 Full Alternative Text](#)

3. Modify the Classes page to display as shown in [Figure 4.56](#).
4. Create a new Schedule page, as shown in [Figure 4.57](#).
5. Modify the style rules in the `yoga.css` file as needed.



## Hands-On Practice Case

- Task 1: The Website Folder. Create a folder on your hard drive or portable storage device called yoga4. Copy all the files from your [Chapter 3](#) yogacss folder into the yoga4 folder. Obtain the images used in this case study from the student files. The images are located in the chapter4/casestudystarters/yoga folder. The images are lilyheader.jpg, yogadoor.jpg, yogalounge.jpg, and yogamat.jpg. Save the files in your yoga4 folder.
- Task 2: The Home Page. Launch a text editor, and open the index.html file from your yoga4 folder. Modify the index.html file to look similar to the web page shown in [Figure 4.54](#).

Code an img tag for the yogadoor.jpg image above the h2 element in the main content area. Be sure to include the alt, height, and width attributes. Also configure the image to appear to the right of the text by coding the align="right" attribute on the <img> tag. Note: The W3C HTML validator will indicate that the align attribute is invalid. We'll ignore the error for this case study. In [Chapter 6](#), you'll learn to use the CSS float property (instead of the align property) to configure this type of layout.

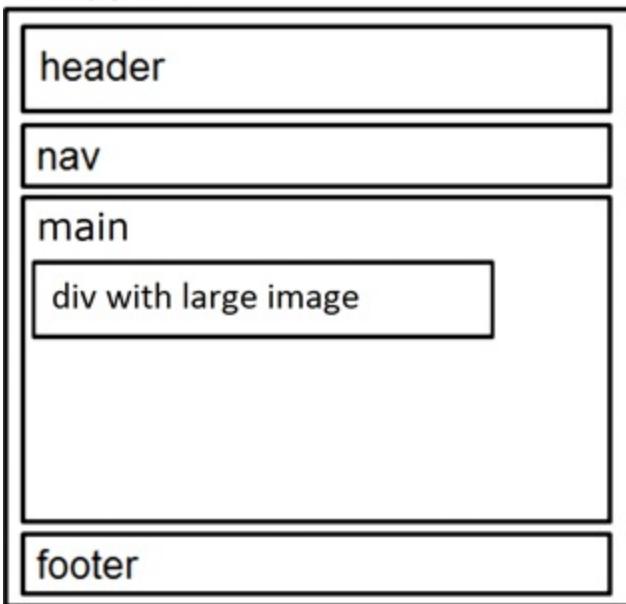
Save and test your new index.html page. It will be similar to [Figure 4.54](#) but you'll notice that a few final touches (including dark page background and lily image in the header) are missing; you'll configure these with CSS in Task 5.

- Task 3: The Classes Page. It's common for the content pages of a website to have a slightly different structure than the home page. The wireframe shown in [Figure 4.55](#) depicts the structure of the Classes and Schedule pages. Launch a text editor, and open the classes.html page from your yoga4 folder. Configure a div element to display the yogamat.jpg image. As shown in the wireframe in [Figure 4.55](#), this div

is located within the main element. Code an opening div tag after the opening main tag. Assign the div to an id named hero. Code an img tag for the yogamat.jpg image. Be sure to include the alt, height, and width attributes. Next, code a closing div tag. Save and test your new classes.html page. If you test your page in a browser, you'll notice that it looks a bit different from [Figure 4.56](#); you still need to configure style rules.

## Figure 4.55

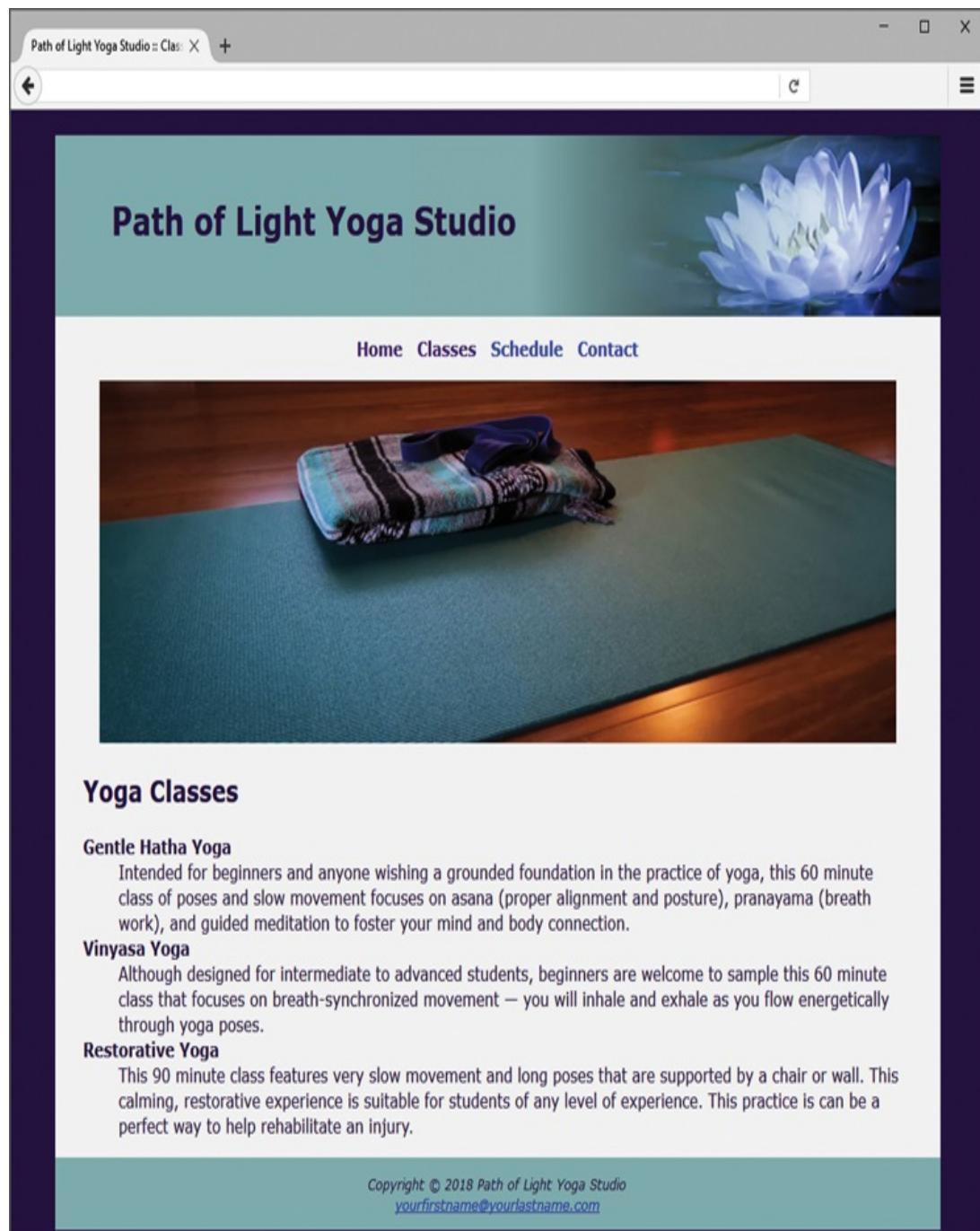
wrapper



New Path of Light Yoga Studio wireframe

[Figure 4.55 Full Alternative Text](#)

## Figure 4.56



## Path of Light Yoga Studio Classes Page

[Figure 4.56 Full Alternative Text](#)

- Task 4: The Schedule Page. Use the Classes page as the starting point for the Schedule page. Launch a text editor, and open the classes.html file in the yoga4 folder. Save the file as schedule.html. Modify your file

to look similar to the Schedule page, as shown in [Figure 4.57](#).

## **Figure 4.57**

Path of Light Yoga Studio :: Schedule

[Home](#) [Classes](#) [Schedule](#) [Contact](#)



## **Yoga Schedule**

Mats, blocks, and blankets provided. Please arrive 10 minutes before your class begins. Relax in our Serenity Lounge before or after your class.

### **Monday – Friday**

- 9:00am Gentle Hatha Yoga
- 10:30am Vinyasa Yoga
- 5:30pm Restorative Yoga
- 7:00pm Gentle Hatha Yoga

### **Saturday & Sunday**

- 10:30am Gentle Hatha Yoga
- Noon Vinyasa Yoga
- 1:30pm Gentle Hatha Yoga
- 3:00pm Vinyasa Yoga
- 5:30pm Restorative Yoga

Copyright © 2018 Path of Light Yoga Studio  
[yourfirstname@yourlastname.com](mailto:yourfirstname@yourlastname.com)

Path of Light Yoga Studio schedule.html

[Figure 4.57 Full Alternative Text](#)

1. Change the title to an appropriate phrase.
2. Modify the img tag to display the yogalounge.jpg image. Configure appropriate alt text.
3. Replace the h2 element text “Yoga Classes” with “Yoga Schedule”.
4. Delete the description list.
5. Configure content for the Schedule page.
  - Configure a paragraph element that contains the following text:
    - Mats, blocks, and blankets provided. Please arrive 10 minutes before your class begins. Relax in our Serenity Lounge before or after your class.
  - Configure an h3 element with the following text:
    - Monday — Friday
  - Configure an unordered list with the following text:
    - 9:00am Gentle Hatha Yoga
    - 10:30am Vinyasa Yoga
    - 5:30pm Restorative Yoga
    - 7:00pm Gentle Hatha Yoga
  - Configure an h3 element with the following text:
    - Saturday & Sunday
  - Configure an unordered list with the following text:
    - 10:30am Gentle Hatha Yoga

- Noon Vinyasa Yoga
- 1:30pm Gentle Hatha Yoga
- 3:00pm Vinyasa Yoga
- 5:30 pm Restorative Yoga

Save the schedule.html file. If you test your page in a browser, you'll notice that it looks different from [Figure 4.57](#); you still need to configure style rules.

- Task 5: Configure the CSS. Open yoga.css in in a text editor. Edit the style rules as follows:
  1. Modify the style rules for the body element selector to configure a very dark background color (#3F2860).
  2. Modify the style rules for the #wrapper id. Configure #F5F5F5 as the background color. Configure a minimum width of 1000px (use `min-width`) and, a maximum width of 1280px (use `max-width`).
  3. Modify the style rules for the header element selector. Remove the `text-align` declaration. Configure lilyheader.jpg as a background image that displays on the right without repeating. Set height to 150px.
  4. Modify the style rules for the h1 element selector. Remove the `line-height` declaration. Configure 50px top padding and 2em left padding.
  5. Modify the style rules for the nav element selector. Configure 1em padding.
  6. Modify the style rules for the footer element selector. Configure 1em padding.
  7. Configure styles for the main element selector. Set left and right padding to 2em. You may need to nudge Internet Explorer to

display the page as intended by adding the display: block; declaration (see [Chapter 6](#)).

8. Configure styles for the img element selector. Set left and right padding to 1em.
9. Configure styles for an id selector named hero. Set text-align to center.

Save the yoga.css file. Test your pages (index.html, classes.html, and schedule.html) in a browser. Your pages should be similar to [Figures 4.54](#), [4.56](#), and [4.57](#). If your images do not appear or your image links do not function, examine your work carefully. Use Windows Explorer or Mac Finder to verify that the images are saved in your yoga folder. Examine the src attributes on the <img> tags to be sure you spelled the image names correctly. Examine your CSS to verify that you have spelled the image names correctly. Another useful troubleshooting technique is to validate the HTML and CSS code. See [Chapters 2](#) and [3](#) for Hands-On Practice exercises that describe how to use these validators.

# **5 Web Design**

# Chapter Objectives

In this chapter, you will learn how to . . .

- Describe the most common types of website organization
- Describe the principles of visual design
- Design for your target audience
- Design clear, easy-to-use navigation
- Improve the readability of the text on your web pages
- Use graphics appropriately on web pages
- Apply the concept of universal design to web pages
- Describe web page layout design techniques
- Apply best practices of web design

**As a website visitor, you have probably found that** certain websites are appealing and easy to use while others seem awkward or just plain annoying. What separates the good from the bad? This chapter discusses recommended web design practices. The topics include site organization, navigation design, page layout design, text design, graphic design, choosing a color scheme, and accessibility considerations.

# **5.1 Design for Your Target Audience**

Whatever your personal preferences, design your website to appeal to your target audience—the people who will use your site. Your intended target audience may be specific, such as children, teenagers, college students, young couples, or seniors, or you may intend your site to appeal to everyone. The purpose and goals of your visitors will vary—they may be casually seeking information, performing research for school or work, comparison shopping, job hunting, and so on. The design of a website should appeal to and meet the needs of the target audience.

For example, the web page shown in [Figure 5.1](#) features compelling graphics and has a different look and feel from the web page displayed in [Figure 5.2](#).

## **Figure 5.1**



The compelling graphic draws you in

## Figure 5.2

The screenshot shows a web browser window with the address bar displaying "TerryMorris.net". The page title is "Web Design & Instructional Technology Resources". A sub-header states: "This page contains links to a selection of the tutorials, case studies, and learning objects that I have created over the years. Please feel free to contact me if you have questions about these materials." Below this, there are three main sections: "Web Design Best Practices Checklist", "Distance Learning Orientation", and "E-Commerce Case Study". Each section has a bullet point followed by a detailed description. To the right of these sections is a sidebar titled "Software Tutorials" containing three more bullet points with descriptions. At the bottom right of the sidebar is a "Learning Objects" section with three bullet points. The overall layout is clean with a blue header and sidebar.

**Web Design & Instructional Technology Resources**

This page contains links to a selection of the tutorials, case studies, and learning objects that I have created over the years. Please feel free to contact me if you have questions about these materials.

**Web Design Best Practices Checklist**

- [Web Design Best Practices Checklist](#)  
A checklist of best practices of web design with the following categories: page layout, browser compatibility, navigation, color and graphics, multimedia, content presentation, functionality, and accessibility.

**Distance Learning Orientation**

- [Distance Learning Orientation Tutorial](#)  
Get students started on the right track for success with this orientation to distance learning with three sections: Learning Online, Computer Skills, and Using Blackboard. The Distance Learning Orientation may be completed in its entirety or students may select the sections that best meets his or her unique needs. Instructors may direct students to complete specific sections of this orientation.

**E-Commerce Case Study**

**Software Tutorials**

- [Adobe Fireworks CSS Tutorial](#)  
This tutorial demonstrates how to create a logo banner image using Adobe Fireworks CS5.
- [Adobe Flash CSS Tutorial](#)  
This tutorial demonstrates how to create an animated logo banner .swf file using Adobe Flash CS5.
- [Adobe Photoshop CSS Tutorial](#)  
This tutorial demonstrates how to create a logo banner image using Adobe Photoshop CS5.

**Learning Objects**

- [Working in Teams](#)  
This brief learning object is useful when introducing team activities within a course.
- [Intro to Universal Design for the Web](#)  
This brief learning object introduces the concept of universal design for web developers.

This text-intensive web page offers numerous choices

The first site engages you, draws you in, and invites exploration. The second site provides you with text-based information so that you can quickly get down to work. The layout, navigation, and even the use of color and text can work together to appeal to your target audience. Keep your target audience in mind as you explore the web design practices in this chapter.

## 5.2 Website Organization

How will visitors move around your site? How will they find what they need? This is largely determined by the website's organization or architecture. There are three common types of website organization:

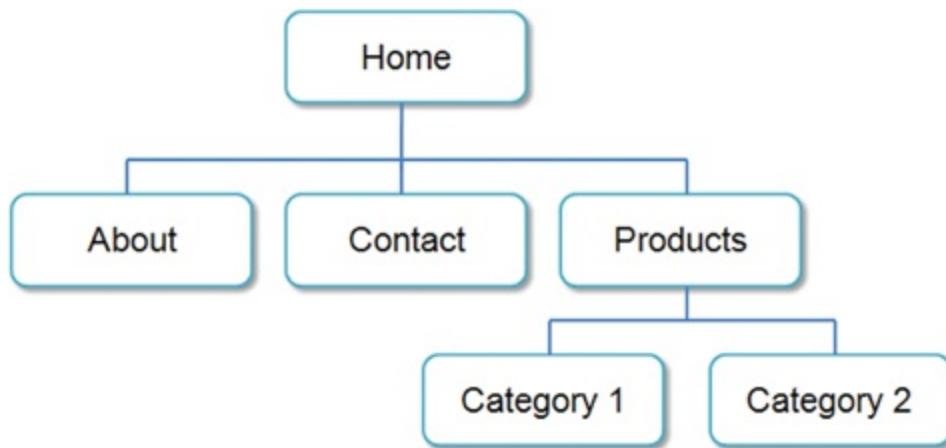
- Hierarchical
- Linear
- Random (sometimes called Web organization)

A diagram of the organization of a website is called a site map. Creating the site map is one of the initial steps in developing a website (more on this in [Chapter 10](#)).

### Hierarchical Organization

Most websites use hierarchical organization. A site map for hierarchical organization, such as the one shown in [Figure 5.3](#), is characterized by a clearly defined home page with links to major site sections. Web pages within sections are placed as needed. The home page and the first level of pages in a hierarchical site map typically indicate the hyperlinks on the main navigation bar of each web page.

### Figure 5.3

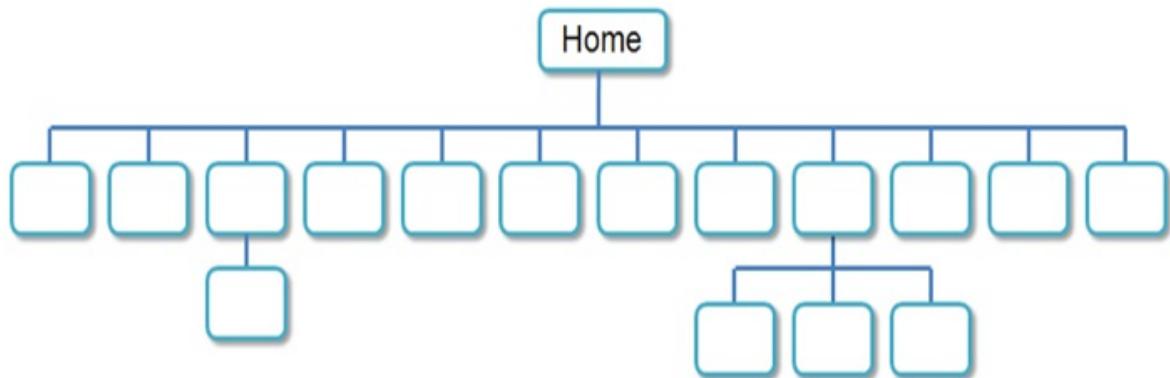


Hierarchical site organization

[Figure 5.3 Full Alternative Text](#)

It is important to be aware of the pitfalls of hierarchical organization. [Figure 5.4](#) shows a site design that is too shallow—there are too many major site sections.

## Figure 5.4



This site design uses a shallow hierarchy

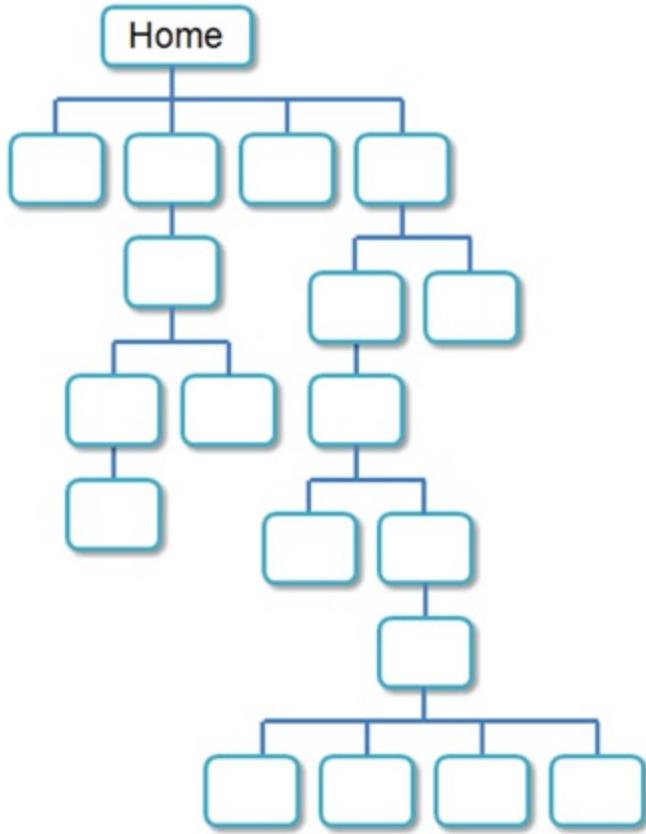
[Figure 5.4 Full Alternative Text](#)

This site design needs to be organized into fewer, easily managed topics or units of information, a process called chunking. In the case of web page

design, each unit of information is a page. Nelson Cowan, a research psychologist at the University of Missouri, found that adults typically can keep about four items or chunks of items (such as the three parts of a phone number 888-555-5555) in their short-term memory (<http://web.missouri.edu/cowann/research.html>). Following this principle, be aware of the number of major navigation links and try to group them into visually separate sections on the page with each group having no more than about four links.

Another pitfall is designing a site that is too deep. [Figure 5.5](#) shows an example of this. The interface design “three-click rule” says that a web page visitor should be able to get from any page on your site to any other page on your site with a maximum of three hyperlinks. In other words, a visitor who cannot get what they want in three mouse clicks will begin to feel frustrated and may leave your site. This rule may be very difficult to satisfy on a large site, but in general, the goal is to organize your site so that your visitors can easily navigate from page to page within the site structure.

## Figure 5.5



This site design uses a deep hierarchy

[Figure 5.5 Full Alternative Text](#)

## Linear Organization

When the purpose of a site or series of pages on a site is to provide a tutorial, tour, or presentation that needs to be viewed sequentially, linear organization, as shown in [Figure 5.6](#), is useful.

## Figure 5.6



Linear site organization

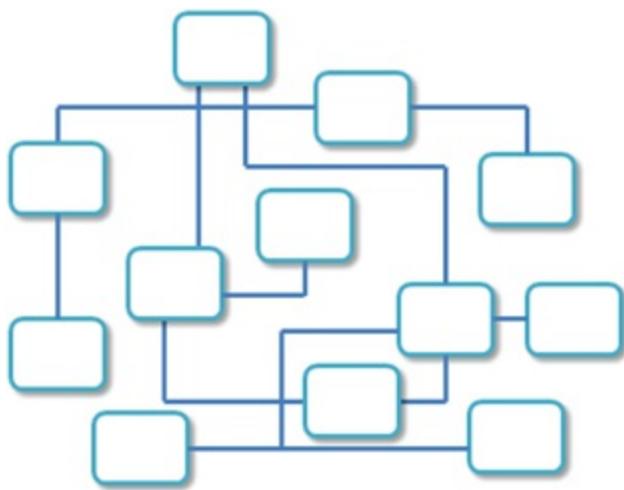
[Figure 5.6 Full Alternative Text](#)

In linear organization, the pages are viewed one after another. Some websites use hierarchical organization in general, but with linear organization in a few small areas.

## Random Organization

Random organization (sometimes called Web organization) offers no clear path through the site, as shown in [Figure 5.7](#). There is often no clear home page and no discernable structure. Random organization is not as common as hierarchical or linear organization and is usually found only on artistic sites or sites that strive to be especially different and original. This type of organization is typically not used for commercial websites.

## Figure 5.7



Random site organization

[Figure 5.7 Full Alternative Text](#)



## FAQ

1. What's a good way to build my site map?

Sometimes it is difficult to begin creating a site map for a website. Some design teams meet in a room with a blank wall and a package of large Post-it® Notes. They write the titles of topics and subtopics needed in the site on the Post-it® Notes. They arrange the notes on the wall and discuss them until the site structure becomes clear and there is consensus within the group. If you are not working in a group, you can try this on your own and then discuss the organization of the website with a friend or fellow student.

## 5.3 Principles of Visual Design

There are four visual design principles that you can apply to the design of just about anything: repetition, contrast, proximity, and alignment. Whether you are designing a web page, a button, a logo, a DVD cover, a brochure, or a software interface, the design principles of repetition, contrast, proximity, and alignment will help to create the “look” (visual aesthetic), of your project and will determine whether your message is effectively communicated.

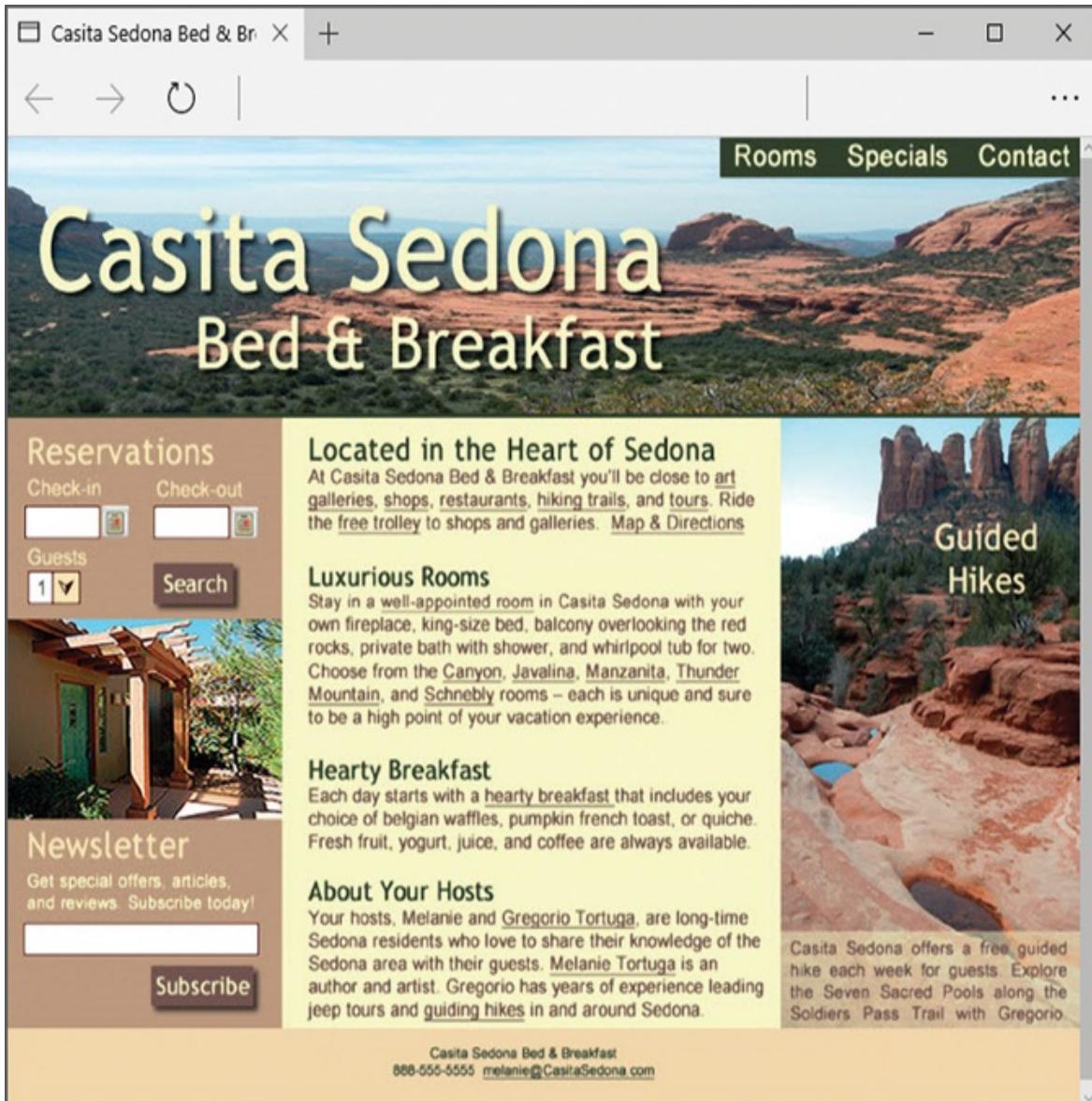


**VideoNote** *Principles of Visual Design*

### Repetition: Repeat Visual Components Throughout the Design

When applying the principle of repetition, the web designer repeats one or more components throughout the page. The repeating aspect ties the work together. [Figure 5.8](#) displays the home page for a bed and breakfast business. The page design demonstrates the use of repetition in a variety of design components, including color, shape, font, and images.

**Figure 5.8**



The design principles of repetition, contrast, proximity, and alignment are applied on this web page.

Figure 5.8 Full Alternative Text

- The photographs displayed on the web page use similar colors (brown, tan, dark green, and off-white) which are repeated in other areas on the web page. Browns are used for background color of the navigation area, call-to-action “Search” and “Subscribe” buttons, and the color of text in the center and right columns. An off-white color is used for the logo text, navigation text, and center column background. The dark green is

used as the background color of the navigation area and also as the topic headings in the center column.

- The call-to-action “Reservations” and “Newsletter” areas have a similar shape and format with heading, content, and button.
- The use of only two font typefaces on the page also demonstrates repetition and helps to create a cohesive look. The website name and page topic headings are configured with Trebuchet font. Other page content uses Arial font.

Whether it is color, shape, font, or image, repetition helps to unify a design.

## **Contrast: Add Visual Excitement and Draw Attention**

To apply the principle of contrast, emphasize the differences between page elements in order to make the design interesting and direct attention. There should be good contrast between the background color and the text color on a web page. If there is too little contrast, the text will be difficult to read.

Notice how the upper right navigation area in [Figure 5.8](#) uses a text color that has good contrast with the dark background color. The left column features a medium dark background that has good contrast with the light off-white text. The middle column features dark text on a medium-light background to provide good visual contrast and easy reading. The dark text in the footer area contrasts well with the medium-light background color.

## **Proximity: Group Related Items**

When designers apply the principle of proximity, related items are placed physically close together. Unrelated items should have space separating them. The placing of Reservations form controls close together gives visual clues to the logical organization of the information or functionality. In [Figure 5.8](#), the horizontal navigation links are all placed in close proximity to each other.

This creates a visual group on the page and makes the navigation easier to use. Proximity is used well on this page to group related elements.

## Alignment: Align Elements to Create Visual Unity

Another principle that helps to create a cohesive web page is alignment. When applying this principle, the designer organizes the page so that each element placed has some alignment (vertical or horizontal) with another element on the page. The page shown in [Figure 5.8](#) also applies this principle. Notice how the page components are vertically aligned in columns of equal height.

Repetition, contrast, proximity, and alignment are four visual design principles that can greatly improve your web page designs. If you apply these principles effectively, your web pages will look more professional and you will communicate your message more clearly. Keep these principles in mind as you design and build web pages.

## 5.4 Design to Provide Accessibility

In [Chapter 1](#), you were introduced to the concept of universal design. Let's take a closer look in this section at how the concept of universal design can apply to web design.



### Who Benefits from Universal Design and Increased Accessibility?

Consider the following scenarios:

- Maria, a young woman in her twenties with physical challenges who cannot manipulate a mouse and who uses a keyboard with much effort: Accessible web pages designed to function without a mouse will help Maria to access content.
- Leotis, a college student who is deaf and wants to be a web developer: Captions for audio/video content and transcripts will provide Leotis access to content.
- Jim, a middle-aged man who has a dial-up Internet connection and is using the Web for personal enjoyment: Alternate text for images and transcripts for multimedia will provide Jim improved access to content.
- Nadine, a mature woman with age-related macular degeneration who has difficulty reading small print: Web pages that are designed so that text can be enlarged in the browser will make it easier for Nadine to read.

- Karen, a college student using a smartphone to access the Web: Accessible content organized with headings and lists will make it easier for Karen to surf the Web on a mobile device.
- Prakesh, a man in his thirties who is legally blind and needs access to the Web in order to do his job: Web pages that are designed to be accessible (which are organized with headings and lists, display descriptive text for hyperlinks, provide alternate text descriptions for images, and are usable without a mouse) will help Prakesh to access content.

All of these individuals benefit from web pages that are designed with accessibility in mind. A web page that is designed to be accessible is typically more usable for all—even a person who has no physical challenges and is using a broadband connection benefits from the improved presentation and organization of a well-designed web page.

## **Accessible Design Can Benefit Search Engine Listing**

Search engine programs (commonly referred to as bots or spiders) walk the Web and follow hyperlinks on websites. An accessible website with descriptive page titles that is well organized with headings, lists, descriptive text for hyperlinks, and alternate text for images is more visible to search engine robots and may result in a better ranking.

## **Accessibility is the Right Thing to Do**

The Internet and the World Wide Web are such a pervasive part of our culture that accessibility is mandated by law in the United States. Section 508 of the Rehabilitation Act requires electronic and information technology,

including web pages, used by federal agencies to be accessible to people with disabilities. At the time this was written, the Section 508 standards were undergoing revision. New proposed Section 508 requirements have been aligned to WCAG 2.0 guidelines and were released for comment in 2015. Visit <http://www.access-board.gov> for current information. The accessibility recommendations presented in this text are intended to satisfy the Section 508 standards and the **Web Content Accessibility Guidelines 2.0 (WCAG 2.0)** recommended by the W3C's **Web Accessibility Initiative (WAI)**. The following four principles are essential to conformance with WCAG 2.0: **Perceivable, Operable, Understandable, and Robust**, referred to by the acronym POUR.

1. Content must be **Perceivable**. Perceivable content is easy to see or hear. Any graphic or multimedia content should be available in a text format, such as text descriptions for images, closed captions for videos, and transcripts for audio.
2. Interface components in the content must be **Operable**. Operable content has navigation forms, or other interactive features that can be used or operated with either a mouse or a keyboard. Multimedia content should be designed to avoid flashing, which may cause a seizure.
3. Content and controls must be **Understandable**. Understandable content is easy to read, organized in a consistent manner, and provides helpful error messages when appropriate.
4. Content should be **Robust** enough to work with current and future user agents, including assistive technologies. Robust content is written to follow W3C recommendations and should be compatible with multiple operating systems, browsers, and assistive technologies such as screen reader applications.

The WCAG 2.0 Quick Reference in Appendix E contains a brief list of guidelines for designing accessible web pages. See <http://www.w3.org/TR/WCAG20/Overview> for a detailed description of the WCAG 2.0 guidelines. These guidelines are segmented into three levels of conformance: Level A, Level AA, and Level AAA. In addition to satisfying the Section 508 guidelines, the accessibility recommendations discussed in

this textbook are also intended to fully satisfy the WCAG 2.0 Level AA (includes Level A) guidelines and partially satisfy the Level AAA guidelines. Visit <http://www.w3.org/WAI/WCAG20/quickref> for an interactive checklist of these guidelines. Developing accessible web pages is an important aspect of web design. The University of Toronto (<http://achecker.ca/checker/index.php>) provides a free accessibility validation service.

As you work through this book, you'll learn to include accessibility features as you create practice pages. You've already discovered the importance of the title tag, heading tags, descriptive text for hyperlinks, and alternate text for images in [Chapters 2, 3, and 4](#). You're well on your way to creating accessible web pages!

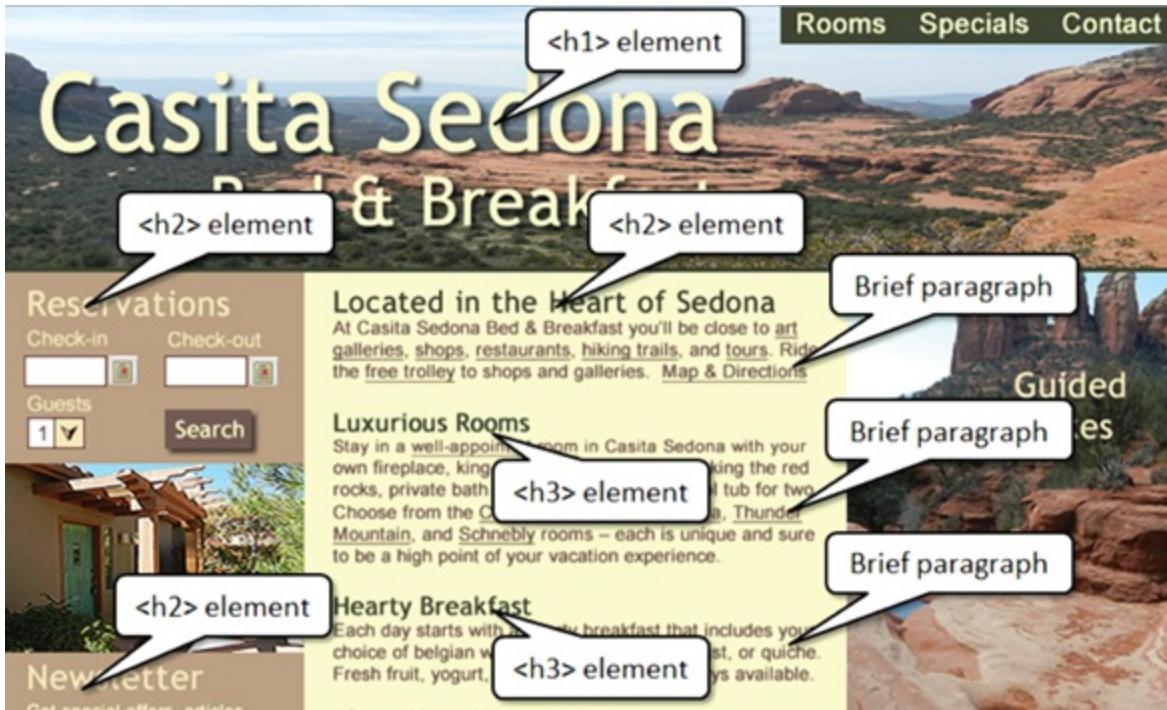
## **5.5 Writing for the Web**

Long-winded sentences and explanations are often found in academic textbooks and romance novels, but they really are not appropriate on a web page. Large blocks of text and long paragraphs are difficult to read on the Web. The following suggestions will help to increase the readability of your web pages.

### **Organize Your Content**

According to web usability expert Jakob Nielsen, people don't really read web pages; they scan them. Organize the text content on your pages to be quickly scanned. Be concise. Use headings, subheadings, brief paragraphs, and unordered lists to organize web page content so that it is easy to read and visitors can quickly find what they need. See [Figure 5.9](#) for an example of organizing web page content with headings, subheadings, and brief paragraphs.

### **Figure 5.9**



The web page content is well organized with headings

[Figure 5.9 Full Alternative Text](#)

## Choosing a Font

Use common font typefaces such as Arial, Verdana, Georgia, or Times New Roman. Remember that the web page visitor must have the font installed on his or her computer in order for that particular font to appear. Your page may look great with Gill Sans Ultra Bold Condensed, but if your visitor doesn't have the font, the browser's default font will be displayed. Explore the list of "browser safe fonts" at <http://www.ampsoft.net/webdesign-1/WindowsMacFonts.html>.

Serif fonts, such as Times New Roman, were originally developed for printing text on paper, not for displaying text on a computer monitor. Research shows that sans serif fonts, such as Arial and Verdana, are easier to read than serif fonts when displayed on a computer screen (see <http://alexpoole.info/blog/which-are-more-legible-serif-or-sans-serif-typefaces> or <http://www.webdesignerdepot.com/2013/03/serif-vs-sans-the>

final-battle for details).

## Font Size

Be aware that fonts display smaller on a Mac than on a PC. Even within the PC platform, the default font size displayed by browsers may not be the same. Consider creating prototype pages of your font size settings to test on a variety of browsers and screen resolution settings.

## Font Weight

**Bold** or *emphasize* important text (use the `<strong>` element for bold and the `<em>` element to configure italics). However, be careful not to bold everything—that has the same effect as bolding nothing.

## Font Color Contrast

Written content is easier to read when there is sufficient contrast between text and background color. While often you can verify sufficient color contrast by viewing a web page, the following online tools are helpful:

- <http://www.dasplankton.de/ContrastA>
- <http://juicystudio.com/services/luminositycontrastratio.php>
- [http://snook.ca/technical/colour\\_contrast/colour.html](http://snook.ca/technical/colour_contrast/colour.html)

## Line Length

Be aware of line length—use white space and multiple columns if possible. Christian Holst at the Baymard Institute (<http://baymard.com/blog/line-length-readability>) describes studies that recommend between 50 and 75

characters per line for readability.

## Alignment

A paragraph of centered text is more difficult to read than left-aligned text.

## Text in Hyperlinks

Hyperlink key words or descriptive phrases; do not hyperlink entire sentences. Avoid use of the words “Click here” in hyperlinks because users know what to do by now. Also, be aware that an increasing number of people are using touch screens so they’ll be selecting or tapping rather than clicking.

## Reading Level

Match the reading level and style of writing to your target audience. Use vocabulary that they will be comfortable with. Juicy Studio offers a free online readability test at <http://juicystudio.com/services/readability.php>.

## Spelling and Grammar

Unfortunately, many websites contain misspelled words. Most web authoring tools such as Adobe Dreamweaver have built-in spell checkers; consider using this feature. Finally, be sure that you proofread and test your site thoroughly. It’s very helpful if you can find web developer buddies—you check their sites and they check yours. It’s always easier to see someone else’s mistake than your own.

## 5.6 Use of Color

You may be wondering how to select colors to display on web pages. The right color scheme can attract and engage your website visitors while a garish color scheme can drive them away. This section introduces several methods for choosing a color scheme.

### Color Scheme Based on an Image

One of the easiest ways to select a color scheme for your website is to start with an existing graphic image, such as a logo or a photograph of nature. If the organization already has a logo, select colors from the logo for use as the basis of your color scheme. Another option is to use a photograph that captures the mood of the website—you can create a color scheme using colors found in the image. [Figure 5.10](#) shows a photograph along with two potential color schemes created by selecting colors from the image. If you are comfortable using a graphic application (such as Adobe Photoshop, GIMP, or <http://pixlr.com/editor>), you can use the color picker tool within the application to determine the colors used in an image. There are also several websites that will generate a color scheme based on a photograph, including

### Figure 5.10



Color Scheme A:



Color Scheme B:



A color scheme selected from a photo

#### Figure 5.10 Full Alternative Text

- <http://www.degraeve.com/color-palette/index.php>
- <http://bighugelabs.com/colors.php>
- <http://www.cssdrive.com/imagepalette>
- <http://www.pictaculous.com>

Even if you use an existing graphic as the basis for a color scheme, it's

helpful to have a working knowledge of color theory, the study of color and its use in design. Let's explore color theory and the color wheel.

# Color Wheel

A color wheel (see [Figure 5.11](#)) is a circle of color depicting the primary colors (red, yellow, and blue), the secondary colors (orange, violet, and green), and the tertiary colors (yellow-orange, red-orange, red-violet, violet-blue, blue-green, and yellow-green). There is no need to restrict your choices to the web-safe color palette.

**Figure 5.11**



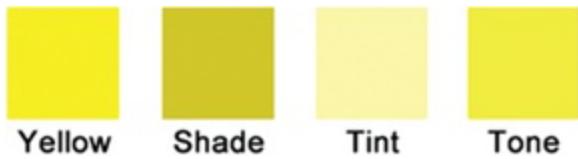
Color wheel

[Figure 5.11 Full Alternative Text](#)

## Shades, Tints, and Tones

Modern monitors can display millions of colors. Feel free to choose a shade, tint, or tone of a color. [Figure 5.12](#) shows four swatches: yellow, a shade of yellow, a tint of yellow, and a tone of yellow. A shade of a color is darker than the original color and is created by mixing the color with black. A tint of a color is lighter than the original color and is created by mixing color with white. A tone of a color has less saturation than the original color and is created by mixing the color with gray.

## Figure 5.12



Yellow with a shade, tint, and tone

[Figure 5.12 Full Alternative Text](#)

Next, let's explore the six commonly used types of color schemes: monochromatic, analogous, complementary, split complementary, triadic, and tetradic.

## Color Scheme Based on the Color Wheel

### Monochromatic Color Scheme

[Figure 5.13](#) shows a monochromatic color scheme which consists of shades, tints, or tones of the same color. You can determine these values yourself, or use an online tool provided by one of the following resources:

## Figure 5.13



Monochromatic color scheme

### [Figure 5.13 Full Alternative Text](#)

- <http://meyerweb.com/eric/tools/color-blend>
- <http://www.colorsontheweb.com/colorwizard.asp> (choose a color and select monochromatic)
- <http://paletton.com> (choose a color and select monochromatic)

## Analogous Color Scheme

To create an **analogous color scheme**, select a main color and the two colors that are adjacent to it on the color wheel. [Figure 5.14](#) displays an analogous color scheme with orange, red-orange, and yellow-orange. When you design a web page with an analogous color scheme, the main color is the most dominant on the web page. The adjacent colors are typically configured as accents.

## Figure 5.14



Analogous color scheme

[Figure 5.14 Full Alternative Text](#)

## Complementary Color Scheme

A complementary color scheme consists of two colors that are opposite each other on the color wheel. [Figure 5.15](#) displays a complementary color scheme with yellow and violet. When you design a web page with a complementary color scheme, choose one color to be the main or dominant color. The other color is considered to be the complement. Configure the complement along with colors adjacent to the dominant color as accents.

### Figure 5.15



Complementary color scheme

[Figure 5.15 Full Alternative Text](#)

## Split Complementary Color Scheme

A split complementary color scheme is comprised of a main color, the color opposite it on the color wheel (the complement), and two colors adjacent to the complement. [Figure 5.16](#) shows a split complementary color scheme with

yellow (main), violet (complementary), red-violet, and blue-violet.

## Figure 5.16



Split complementary color scheme

[Figure 5.16 Full Alternative Text](#)

## Triadic Color Scheme

Choose three colors that are equidistant on the color wheel to create a triadic color scheme. [Figure 5.17](#) displays a triadic color scheme with blue-green (teal), yellow-orange, and red-violet.

## Figure 5.17



Triadic color scheme

[Figure 5.17 Full Alternative Text](#)

## Tetradic Color Scheme

[Figure 5.18](#) shows a tetradic color scheme, which consists of four colors that

are two complementary pairs. For example, the complementary pair yellow and violet along with the complementary pair yellow-green and red-violet make up a tetradic color scheme.

## Figure 5.18



Tetradic color scheme

[Figure 5.18 Full Alternative Text](#)

## Implementing a Color Scheme

When designing a web page with a color scheme, one color is typically dominant. The other colors are configured as accents such as colors for headings, subheadings, borders, list markers, and backgrounds. No matter what your color scheme, you will typically also use neutral colors such as white, off-white, gray, black, or brown. Ensure that the colors you choose for text and background have good contrast. Selecting the best color scheme for your website often takes some trial and error. Feel free to use tints, shades, or tones of the primary, secondary, and tertiary colors. There are so many colors to choose from! The following resources can help you choose a color scheme for your website:

- <http://paletton.com>
- <http://www.colorsontheweb.com/colorwizard.asp>
- <http://color.adobe.com>
- <http://www.colorsinspire.com>

- <http://hslpicker.com>

## Accessibility and Color

While color can help you create a compelling web page, keep in mind that not all of your visitors will see or be able to distinguish between colors. Some visitors will use a screen reader and will not experience your colors, so your information must be clearly conveyed even if the colors cannot be viewed.



Your color choices can be crucial. For example, red text on a blue background, as shown in [Figure 5.19](#), is usually difficult for everyone to read. Also avoid using a red and green color scheme or a brown and purple color scheme because individuals with color-deficient vision may have difficulty differentiating the colors. According to Color Blindness Awareness (<http://www.colourblindawareness.org/>), 1 in 12 men and 1 in 200 women experience some type color blindness. Visit <http://colorfilter.wickline.org> to simulate how a person with a color deficiency experiences the colors on a web page. White, black, and shades of blue and yellow are easier for most people to discern.

**Figure 5.19**

Can you read this easily?

Some color combinations are difficult to read

Choose background and text colors with a high amount of contrast. The

WCAG 2.0 guidelines recommend a contrast ratio of 4.5:1 for standard text. If the text has a large font, the contrast ratio can be as low as 3:1. Jonathan Snook's online Colour Contrast Check at [http://snook.ca/technical/colour\\_contrast/colour.html](http://snook.ca/technical/colour_contrast/colour.html) can help you to verify the contrast level of your text and background colors. When choosing color, it's important to consider the preferences of your target audience. The next sections focus on this aspect of web design.

## Colors and Your Target Audience

Choose colors that will appeal to your target audience. Younger audiences, such as children and preteens, prefer bright, lively colors. The web page shown in [Figure 5.20](#), features bright graphics, lots of color, and interactivity. Examples of websites designed to appeal to children are <http://www.sesamestreet.org/games>, <http://www.nick.com>, and <http://www.usmint.gov/kids>.

### Figure 5.20



A web page intended to appeal to children

[Figure 5.20 Full Alternative Text](#)

Individuals in their late teens and early twenties generally prefer dark background colors with occasional use of bright contrast, music, and dynamic navigation. [Figure 5.21](#) shows a web page designed for this age group. Note how it has a completely different look and feel from the site designed for young children. Examples of websites designed to appeal to young adults are <http://us.battle.net/wow>, <http://twentyonepilots.com>, and <http://www.thresholdrpg.com>.

## Figure 5.21



Many teens and young adults find dark sites appealing

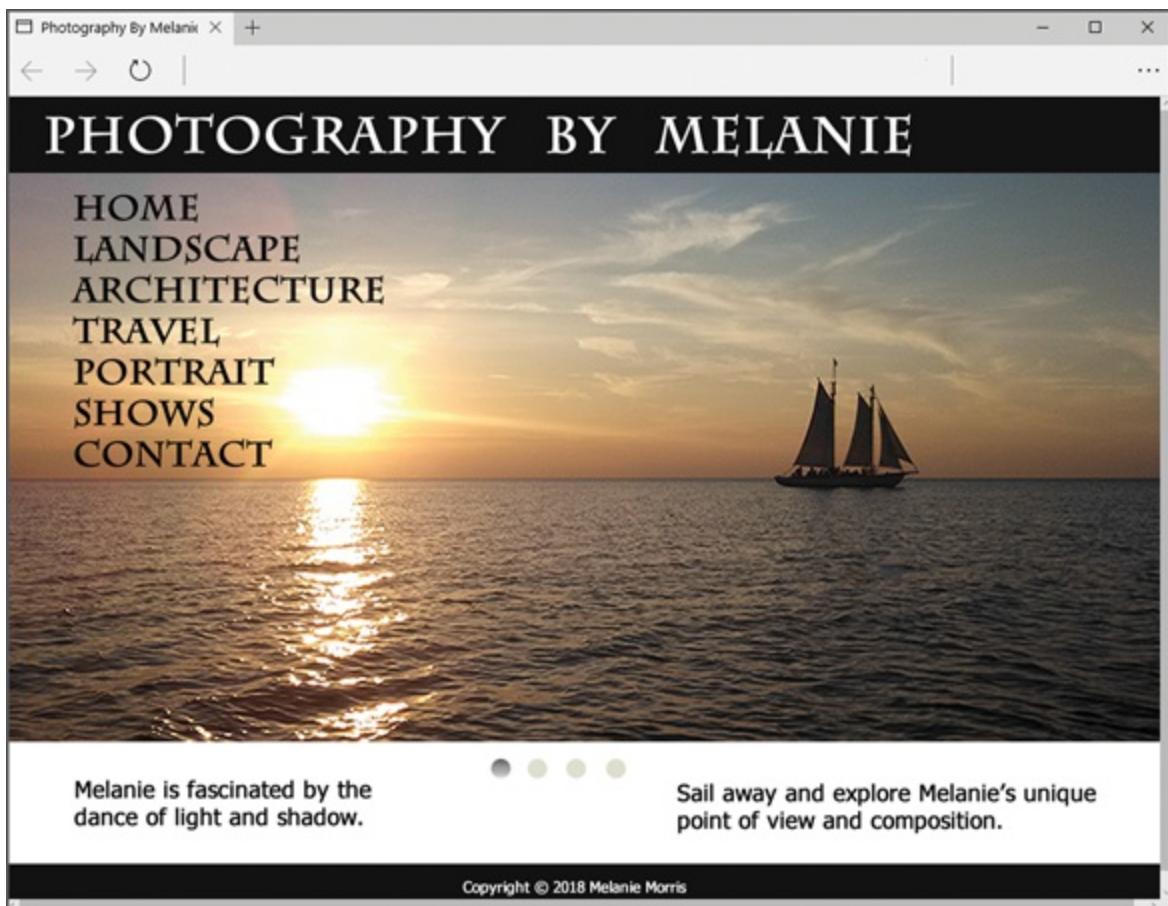
[Figure 5.21 Full Alternative Text](#)

If your goal is to appeal to everyone, follow the example of the popular Amazon.com and eBay.com websites in their use of color. These sites display a neutral white background with splashes of color to add interest and highlight page areas. Use of white as a background color was found to be quite popular by Jakob Nielsen and Marie Tahir in *Home page Usability: 50 Websites Deconstructed*, a book that analyzed 50 top websites. According to this study, 84% of the sites used white as the background color, and 72% used black as the text color. This maximized the contrast between text and background—providing maximum ease of reading.

You'll also notice that websites targeting "everyone" often include compelling visual graphics. The web page shown in [Figure 5.22](#) provides the text content on a white background for maximum contrast while engaging the

visitor with a large graphic, called a **hero**, intended to grab attention and entice the visitor to want to explore the website.

## Figure 5.22



A compelling graphic along with white background for the content area

### Figure 5.22 Full Alternative Text

For an older target audience, light backgrounds, well-defined images, and large text are appropriate. The web page shown in [Figure 5.23](#) is an example of a web page intended for the 55-and-older age group. Examples of websites designed to appeal to older adults are <http://www.aarp.org>, <http://www.theseniornews.com>, and <http://senior.org>.

# Figure 5.23

The screenshot shows a web browser window with the title bar "Senior Moments". The main header features the text "Senior Moments" with a red star icon above the letter "i", and the tagline "55 is the new 30!" below it. A red navigation bar includes links for Home, Travel, Discounts, Healthcare, Medicare, and Contact. The left sidebar lists "Senior Moments is your source for:" followed by a bulleted list: Senior Travel Opportunities, Senior Discounts, Healthcare Information, Medicare Updates, and News for Seniors. The right sidebar features a section titled "Celebrate Life After 55!" with a photo of an elderly couple at an outdoor cafe, and a call-to-action "Send us your Senior Moment photo!". Below these sections is a red banner titled "In The News" containing three news items: "Best Places to Retire", "Top 10 Cruises", and "Active Lifestyles". Each news item has a small thumbnail image and a brief description. At the bottom of the page is a copyright notice: "Copyright © 2016 Senior Moments".

A site designed specifically for the 55-and-older age group

[Figure 5.23 Full Alternative Text](#)



## Checkpoint 5.1

1. List the four basic principles of design. View the home page of your school and describe how each principle is applied.
2. Choose one best practice of writing for the Web. Locate a web page that

demonstrates the use of your chosen best practice. Provide the URL of the web page and describe why you believe the web page exemplifies the best practice.

3. View the following three websites:

- <http://www.walmart.com>
- <http://www.willyporter.com>
- <http://www.sesamestreet.org/muppet>

Describe the target audience for each website. How do their designs differ? How are their designs similar? Do the sites meet the needs of their target audiences? Why or why not?

## 5.7 Use of Graphics and Multimedia

As shown in [Figure 5.1](#), a compelling graphic can be an engaging element on a web page. However, avoid relying on images to convey meaning. Some individuals may not be able to see your images and multimedia—they may be accessing your site with a mobile device or using an assistive technology such as a screen reader to visit your page. You may need to include text descriptions of important concepts or key points that a graphic image or multimedia file conveys. In this section, you'll explore recommended techniques for the use of graphics and multimedia on web pages.

### File Size and Image Dimensions Matter

Keep both the file size and the dimensions of images as small as possible. Try to display only exactly what is needed to get your point across. Use a graphic application to crop an image or create a thumbnail image that links to a larger version of the image.

### Antialiased/Aliased Text in Media

Antialiasing introduces intermediate colors to smooth jagged edges in digital images. Graphic applications such as Adobe Photoshop and GIMP can be used to create antialiased text images. The graphic shown in [Figure 5.24](#) was created using antialiasing. [Figure 5.25](#) displays an image created without antialiasing; notice the jagged edges.

## Figure 5.24

Antialiased

Antialiased text

## Figure 5.25



This graphic was not antialiased: The letter “A” has a jagged look

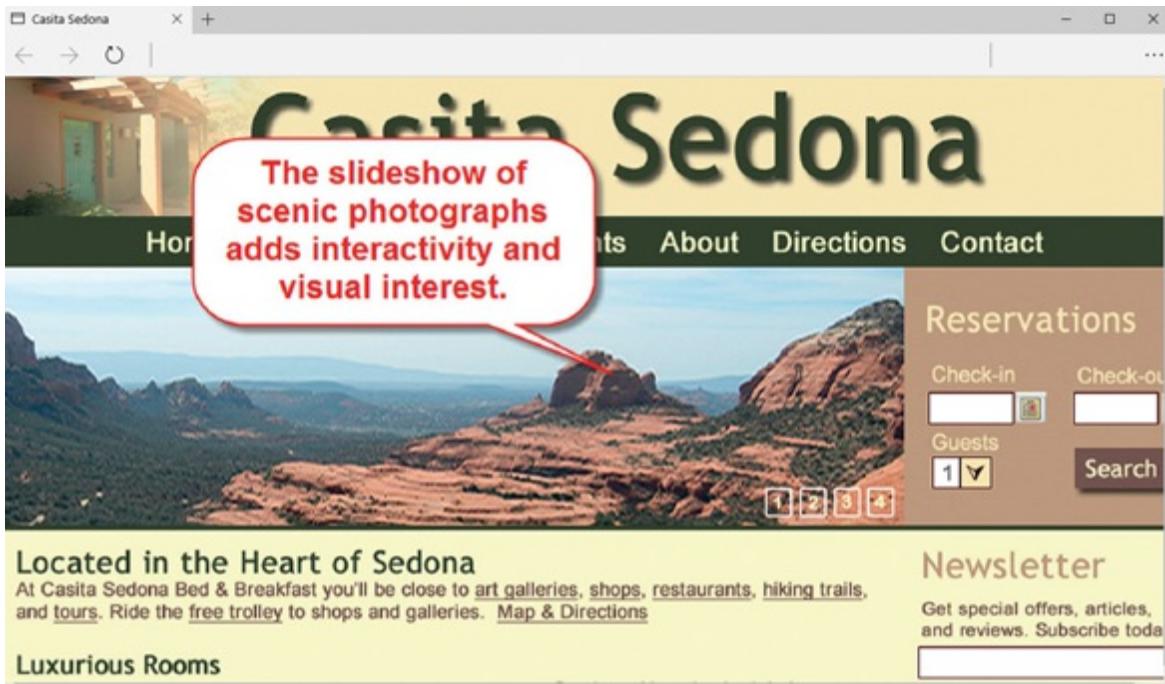
## Use Only Necessary Multimedia

Use animation and multimedia only if it will add value to your site. Limit the use of animated items. Only use animation if it makes the page more effective. Consider limiting how long an animation plays.

In general, younger audiences find animation more appealing than older audiences. The web page shown in [Figure 5.20](#) is intended for children and uses lots of animation. This would be too much animation for a website targeted to adult shoppers. However, a well-done navigation animation or an

animation that describes a product or service could be appealing to almost any target group, as shown in [Figure 5.26](#). You'll work with new CSS3 properties to add animation and interactivity to web pages in [Chapter 11](#).

## Figure 5.26



The slideshow adds visual interest and interactivity

## Provide Alternate Text

As discussed in [Chapter 4](#), each image on your web page should be configured with alternate text. Alternate text may be displayed by mobile devices, displayed briefly when an image is slow to load, and displayed when a browser is configured to not show images. Alternate text is also read aloud when a person with a disability uses a screen reader to access your website.



## Focus on Accessibility

To satisfy accessibility requirements, also provide alternate text equivalents for multimedia, such as video and audio. A text transcript of an audio recording can be useful not only to those with hearing challenges, but also to individuals who prefer to read when accessing new information. In addition, the text transcript may be accessed by a search engine and used when your site is categorized and indexed. Captions help to provide accessibility for video files. See [Chapter 11](#) for more on accessibility and multimedia.

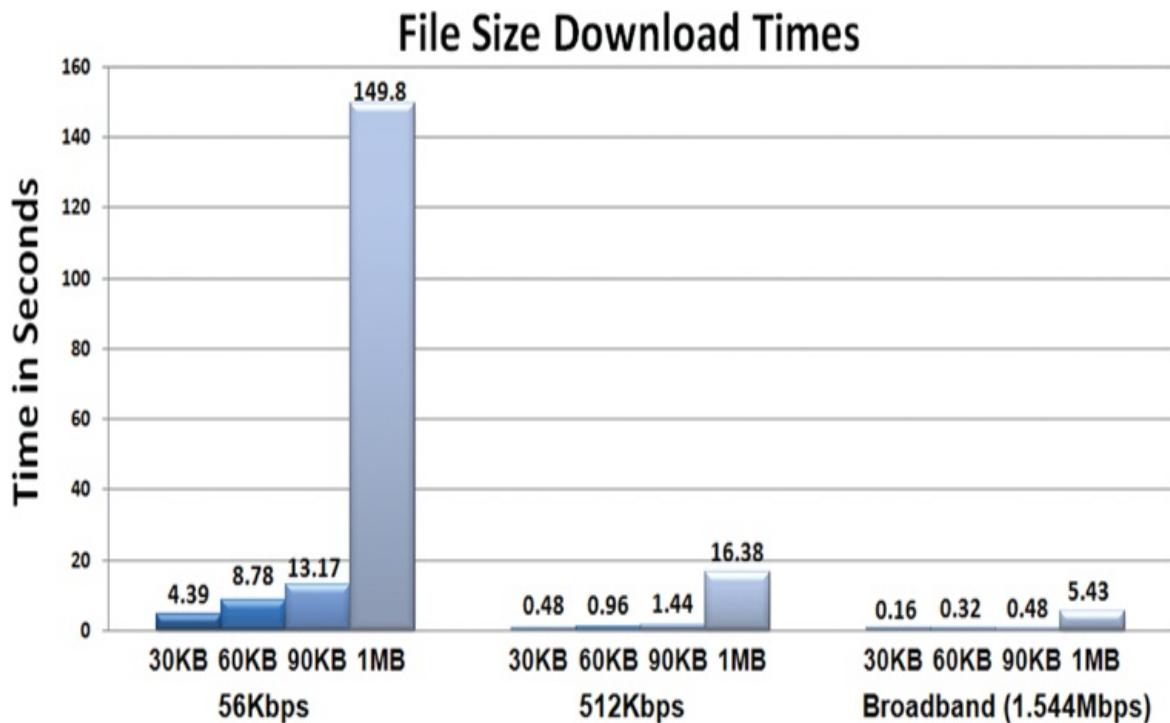
## 5.8 More Design Considerations

### Load Time

The last thing you want to happen is for your visitors to leave your page before it has even finished loading! Make sure your pages load as quickly as possible. Web usability expert Jakob Nielsen reports that visitors will often leave a page after waiting more than 10 seconds. It takes just less than 9 seconds at 56Kbps for a browser to display a web page and associated files of 60KB. It's a good practice to try to limit the total file size of a website's home page and all of its associated images and media files to less than 60KB. However, it's common to go over this recommended limit for content pages when you're sure that your visitors will be interested enough to wait to see what your site is presenting.

According to a recent study by the PEW Research Center's Internet and American Life Project, the percentage of U.S. Internet users with a broadband (cable, DSL, and so on) connection at home is rising. Seventy-three percent of adult Americans have access to broadband at home. Even with the trend of increasing bandwidth available to your visitors, keep in mind that close to 30% of households do not have broadband Internet access. Visit Pew Internet (<http://www.pewinternet.org>) for the most up-to-date statistics. The chart shown in [Figure 5.27](#) compares file sizes and connection speed download times.

### Figure 5.27



File size download times and Internet connection speeds

#### Figure 5.27 Full Alternative Text

One method to help determine whether the **load time** of your page is acceptable is to view the size of your website files in Windows Explorer or Mac Finder. Calculate the total file size of your web page plus all of its associated images and media. If the total file size for a single page and its associated files is more than 60KB and it is likely that your target audience may not be using broadband access, take a closer look at your design. Consider whether you really need to use all of the images to convey your message. The perceived load time is the amount of time that a web page visitor is aware of waiting while your page is loading. Because visitors often leave a website if a page takes too long to load, it is important to shorten their perception of waiting. A common technique is to shorten the perceived loading time by optimizing images, using CSS Sprites (see [Chapter 7](#)), and breaking a long page into multiple smaller pages. Popular web authoring tools such as Adobe Dreamweaver will calculate load time at various transmission speeds.

# Above the Fold

Placing important information above the fold is a technique borrowed from the newspaper industry. When newspapers are placed on counters and in vending machines to be sold, the portion above the fold on the page is viewable. Publishers noticed that more papers were sold when the most important, attention-getting information was placed in this location. You may use this technique to attract visitors to your web pages and to keep them there. Avoid placing important information and navigation on the far right side because this area may not be initially displayed by browsers at some screen resolutions.

# White Space

This term white space is also borrowed from the publishing industry. Placing blank or white space (because paper is usually white) in areas around blocks of text increases the readability of the page. Placing white space around graphics helps them to stand out. Allow for some blank space between blocks of text and images. How much is adequate? It depends—experiment until the page is likely to look appealing to your target audience.

# Avoid Horizontal Scrolling

In order to make it easy for visitors to view and use your web pages, avoid creating pages that are too wide to be displayed in the browser window. These pages require the user to scroll horizontally. Currently, a popular screen resolution is  $1024 \times 768$ . Cameron Moll (<http://www.cameronnoll.com/archives/001220.html>) suggests that the optimal web page width for display at  $1024 \times 768$  screen resolution is 960 pixels. Be mindful that not all of your web page visitors will maximize their browser viewport.

# Browsers

Unless you are designing for an intranet within an organization, expect your website to be visited using a wide variety of browsers. Just because your web page looks great in your favorite browser doesn't automatically mean that all browsers will render it well. A recent survey by Net Market Share (<http://www.netmarketshare.com/>) reports that about 59% of desktop website visitors use Chrome, 18% use Internet Explorer, 11.8% use Firefox, and 6% use Microsoft Edge. The market share of the top four mobile/tablet browsers was reported by Net Market Share: Chrome (54%), Safari (31%), Android Browser (6%), and Opera Mini (4%).

Apply the principle of progressive enhancement. Design the site so that it looks good in browsers commonly used by your target audience and then add enhancements with CSS3 and/or HTML5 for display in modern browsers. Always try to test your pages with the most popular versions of browsers on desktop PC and Mac operating systems. Many web page components, including default text size and default margin size, are different among browsers, browser versions, and operating systems. Also try to test your site on other types of devices such as tablets and smartphones.

# Screen Resolution

Your website visitors will use a variety of **screen resolutions**. A recent survey by Net Market Share (<http://marketshare.hitslink.com/report.aspx?qprid=17>) reported the use of more than 100 different screen resolutions, with the top four being  $1366 \times 768$  (with 30%),  $1920 \times 1080$  (15%),  $1440 \times 900$  (7%), and  $1024 \times 768$  (6%). Mobile use will vary with the purpose of the website, but it is expected to grow as the use of smartphones and tablets increases. Be aware that some smartphones have low screen resolution, such as  $360 \times 640$ . Popular tablet devices offer a higher screen resolution: Apple iPad mini ( $1024 \times 768$ ), Apple iPad Pro ( $2732 \times 2048$ ), Samsung Galaxy Tab ( $1280 \times 800$ ), and Kindle Fire HDX ( $2560 \times 1600$ ). Visit <https://www.browserstack.com/test-on-the-right-mobile-devices> for a list of popular mobile devices. In [Chapter 7](#), you'll explore CSS media queries,

which is a technique for configuring a web page to display well on various screen resolutions.

## **5.9 Navigation Design**

### **Ease of Navigation**

Sometimes web developers are so close to their sites that they can't see the forest for the trees. A new visitor will wander onto the site and not know what to click or how to find the information he or she seeks. Clearly labeled navigation on each page is helpful. For maximum usability, the navigation should be in the same location on each page.

### **Navigation Bars**

Clear navigation bars, either graphic or text based, make it obvious to website users where they are and where they can go next. It's quite common for site-wide navigation to be located either in a horizontal navigation bar placed under the logo (see [Figure 5.28](#)) or in a vertical navigation bar on the left side of the page (see [Figure 5.29](#)). Less common is a vertical navigation bar on the right side of the page because this area can be cut off at lower screen resolutions.

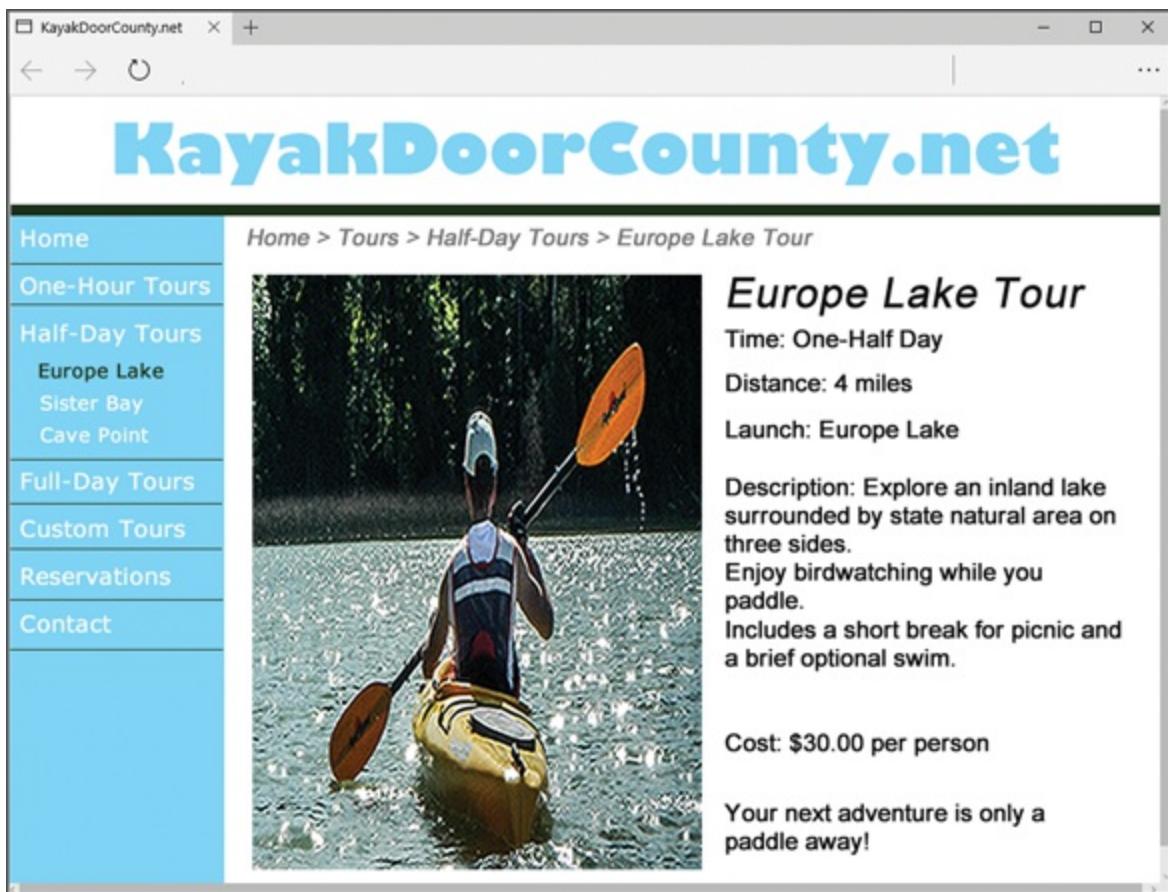
#### **Figure 5.28**



Horizontal text-based navigation

Figure 5.28 Full Alternative Text

## Figure 5.29



Visitors can follow the “breadcrumbs” to replace their steps

[Figure 5.29 Full Alternative Text](#)

## Breadcrumb Navigation

Jakob Nielsen, a well-known usability and web design professional, favors what he calls a **breadcrumb trail** for larger sites, which indicates the path of web pages a visitor has viewed during the current session. [Figure 5.28](#) shows a page with a vertical navigation area in addition to the breadcrumb trail navigation above the main content area that indicates the pages the visitor has viewed during this visit: Home > Tours > Half-Day Tours > Europe Lake Tour. Visitors can easily retrace their steps or jump back to a previously viewed page. This page demonstrates that a website may use more than one type of navigation.

# Using Graphics for Navigation

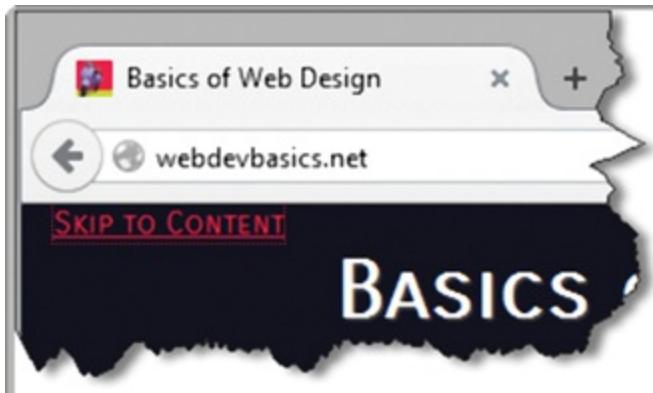
Sometimes graphics are used instead of text to provide navigation, as in the pink navigation buttons on the web page shown in [Figure 5.20](#). The “text” for the navigation is actually stored in image files. Be aware that using graphics for navigation is an outdated design technique—the more modern approach is to configure text navigation with CSS background images. A website with text navigation is more accessible and more easily indexed by search engines. Even when image hyperlinks instead of text hyperlinks provide the main navigation for the site, you can use two techniques that provide for accessibility:

- Configure each image with an alternate text description.
- Configure text hyperlinks in the footer section.

# Skip Repetitive Navigation

Provide a method to skip repetitive navigation links. It is easy for visitors without vision and mobility challenges to scan a web page and quickly focus on the page content. However, long, repetitive navigation bars quickly become tedious to access when utilizing a screen reader or a keyboard to visit a web page. Consider adding a “Skip navigation” or “**Skip to content**” hyperlink before your main navigation bar that links to a named fragment (see [Chapter 7](#)) at the beginning of the content section of your page. [Figure 5.30](#) presents another way to implement the skip navigation feature. Although not immediately visible in the browser, visitors using a screen reader or a keyboard to tab through the page will immediately encounter the “Skip to content” hyperlink near the top of the web page at <http://webdevbasics.net>.

## Figure 5.30



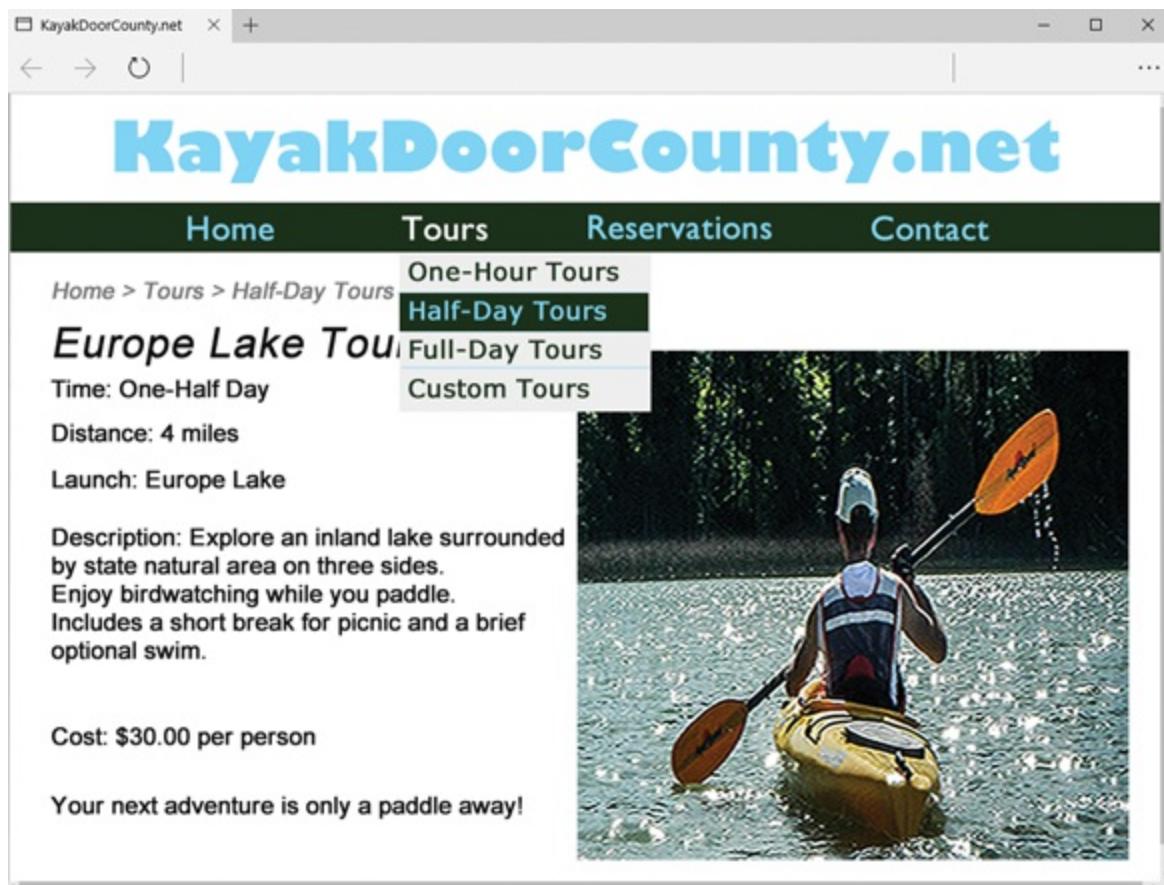
Press the tab key to access the “Skip to content” link for this web page



## Dynamic Navigation

In your experiences visiting websites you’ve probably encountered navigation menus that display additional options when your mouse cursor moves over an item. This is dynamic navigation, which provides a way to offer many choices to visitors while at the same time avoid overwhelming them. Instead of showing all the navigation links all the time, menu items are dynamically displayed (typically using a combination of HTML and CSS) as appropriate. The additional items are made available when a related top-level menu item has focus or is selected. In [Figure 5.31](#), “Tours” has been selected, causing the vertical menu to appear.

**Figure 5.31**



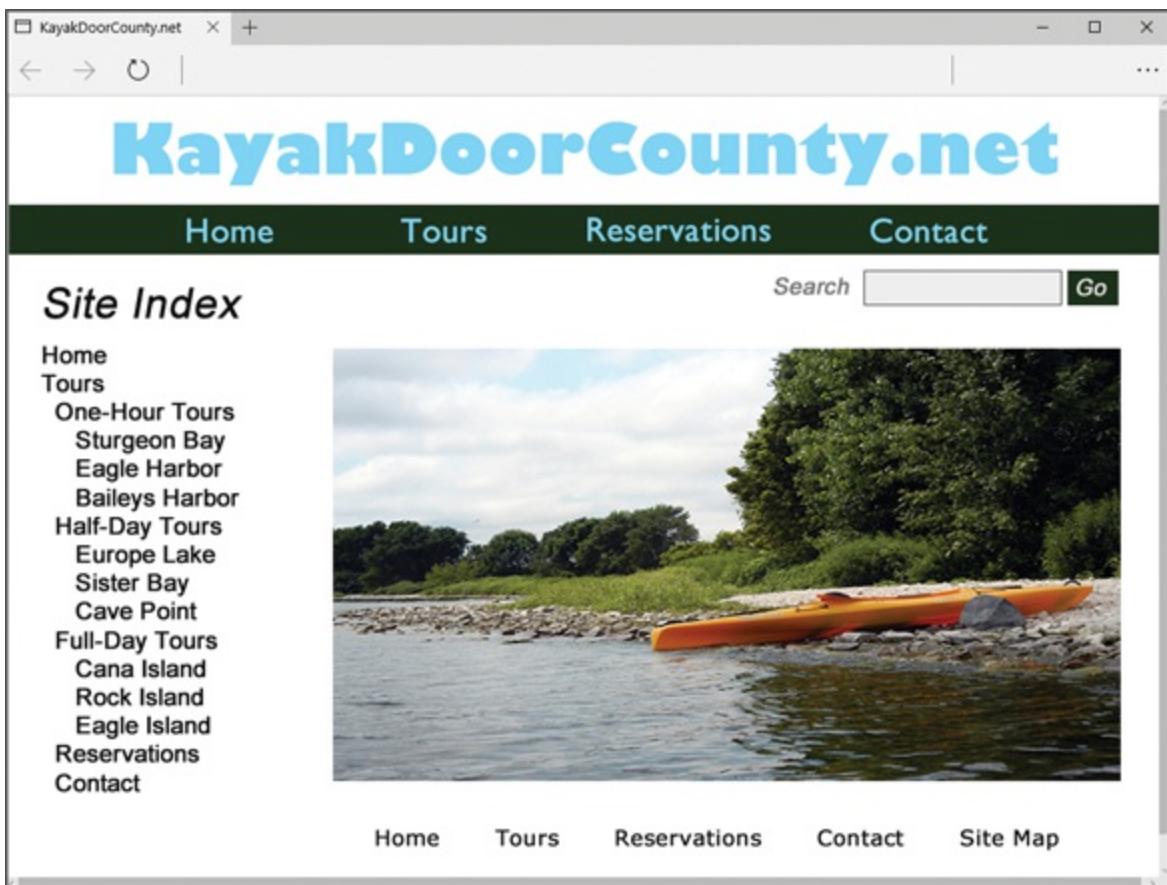
Dynamic navigation with HTML and CSS

[Figure 5.31 Full Alternative Text](#)

## Site Map

Even with clear and consistent navigation, visitors sometimes may lose their way on large websites. A site map, also referred to as a site index, provides an outline of the organization of the website with hyperlinks to each major page. This can help visitors find another route to get to the information they seek, as shown [Figure 5.32](#).

## Figure 5.32



This large site offers a site search and a site map to visitors

[Figure 5.32 Full Alternative Text](#)

## Site Search Feature

Note the search feature on the right side of the web page in [Figure 5.31](#). This **site search** feature helps visitors to find information that is not apparent from the navigation or the site map.

## 5.10 Page Layout Design

### Wireframes and Page Layout

A wireframe is a sketch or diagram of a web page that shows the structure (but not the detailed design) of basic page elements such as the header, navigation, content area, and footer. Wireframes are used as part of the design process to experiment with various **page layouts**, develop the structure and navigation of the site, and provide a basis for communication among project members. Note that the exact content (text, images, logo, and navigation) does not need to be placed in the wireframe diagram—the wireframe depicts the overall structure of the page.

[Figures 5.33](#), [5.34](#), and [5.35](#) show wireframe diagrams of three possible page designs with horizontal navigation. The wireframe in [Figure 5.33](#) is adequate and may be appropriate for when the emphasis is on text information content, but it's not very engaging.

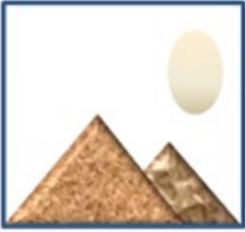
#### Figure 5.33

Header				
Home	Services	Products	About	Contact
<b>Heading</b> Lorem ipsum dolor sit amet, consectetur adipiscing elit. Aliquam laoreet mi sed sapien tristique et cursus lorem venenatis. Curabitur fermentum purus ut odio sodales consectetur interdum purus dictum. Donec ac purus a lectus rutrum auctor quis sed justo. In sed enim eu dui posuere lobortis id eget diam.				
<b>Subheading</b> Maecenas ac lorem et leo sagittis dictum. Nam congue fringilla velit, at bibendum nulla placerat in. Integer dictum tortor sit amet felis placerat sed vehicula nisl lobortis. <ul style="list-style-type: none"><li>• Fusce volutpat enim ut felis tincidunt</li><li>• Non ornare tellus commodo</li><li>• Sed nec diam erat</li></ul> <p>Morbi iaculis libero mi. Integer vel dolor at erat interdum interdum sit amet sit amet ligula. In molestie massa eu sem dapibus et consequat purus pulvinar.</p>				
Footer				

An adequate page layout

[Figure 5.33 Full Alternative Text](#)

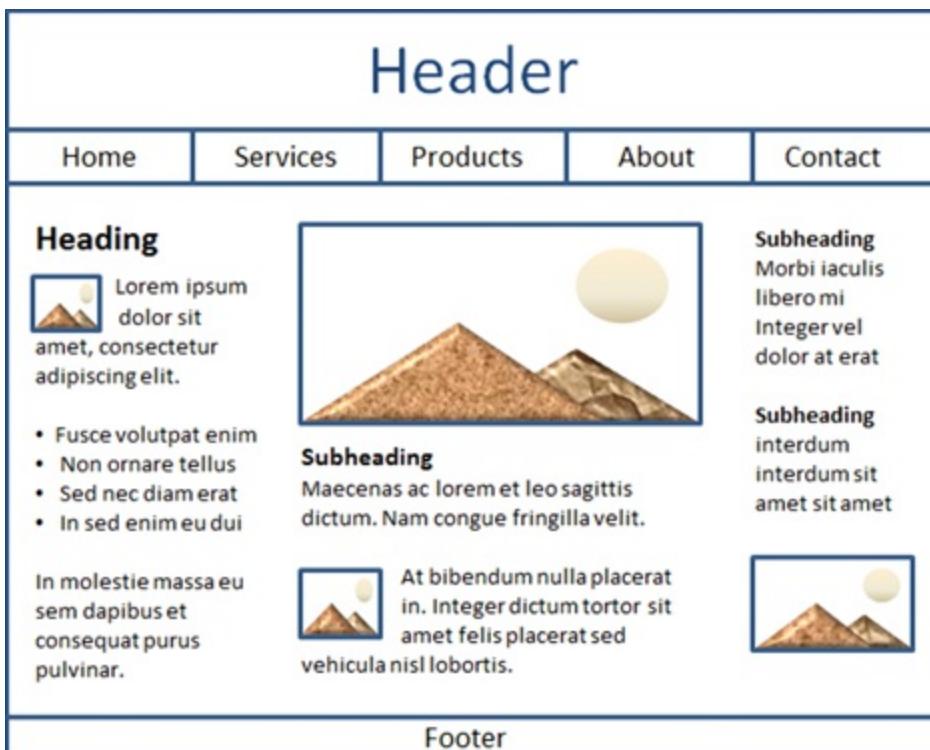
## Figure 5.34

Header				
Home	Services	Products	About	Contact
 <p><b>Heading</b></p> <p>  Lorem ipsum dolor sit amet, consectetur adipiscing elit. Aliquam laoreet mi sed sapien tristique et cursus lorem venenatis.</p>	<p><b>Subheading</b></p> <p>  Maecenas ac lorem et leo sagittis dictum. Nam congue fringilla velit, at bibendum nulla placerat in. Integer dictum tortor sit amet felis placerat sed vehicula nisl lobortis.</p> <ul style="list-style-type: none"> <li>• Fusce volutpat enim ut felis tincidunt</li> <li>• Non ornare tellus commodo</li> <li>• Sed nec diam erat</li> </ul>	<p><b>Subheading</b></p> <p>  Morbi iaculis libero mi. Integer vel dolor at erat interdum interdum sit amet sit amet ligula.</p> <p><b>Subheading</b></p> <p>  In molestie massa eu sem dapibus et consequat purus pulvinar.</p> <p>  Donec ac purus a lectus rutrum auctor quis sed justo.</p>		
Footer				

The image and columns make this page layout more interesting

[Figure 5.34 Full Alternative Text](#)

## Figure 5.35



This wireframe page layout uses images and columns of various widths

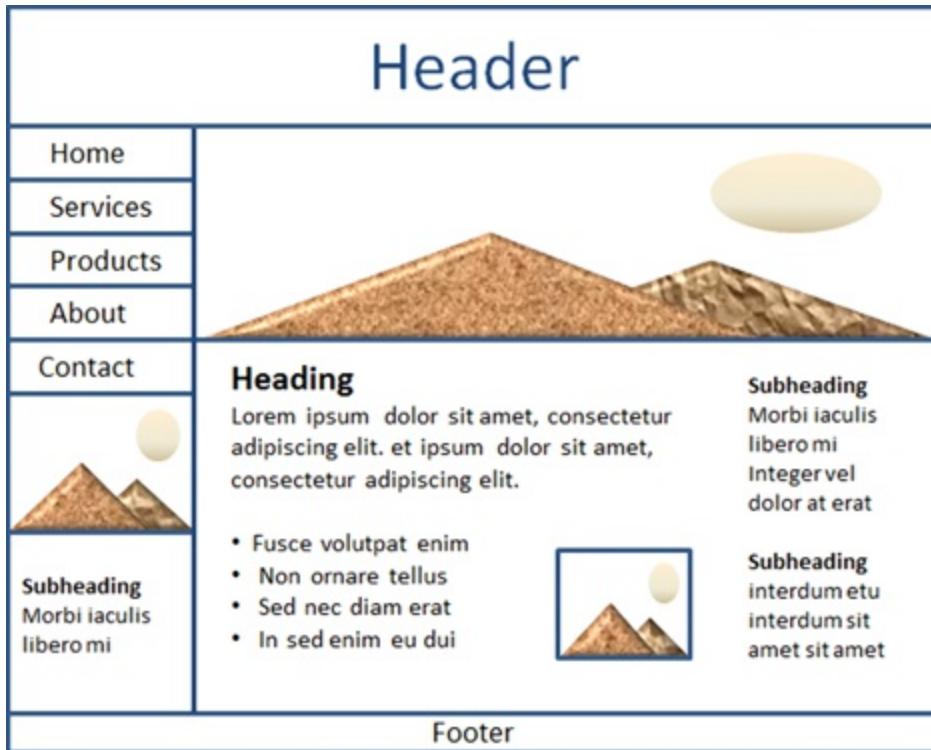
[Figure 5.35 Full Alternative Text](#)

[Figure 5.34](#) shows a diagram of a web page containing similar content formatted in three columns along with an image. This is an improvement, but something is still missing.

[Figure 5.35](#) shows a diagram of the same content but formatted in three columns of varying width with a header area, navigation area, content area (with headings, subheadings, paragraphs, and unordered lists), and a footer area. This is the most appealing layout of the three. Notice how the use of columns and images in [Figures 5.34](#) and [5.35](#) increase the appeal of the page.

The wirefame in [Figure 5.36](#) displays a webpage with a header, vertical navigation area, content area (with headings, subheadings, images, paragraphs, and unordered lists), and a footer area.

# Figure 5.36



Wireframe with vertical navigation

## [Figure 5.36 Full Alternative Text](#)

Often the page layout for the home page is different from the page layout used for the content pages. Even in this situation, a consistent logo header, navigation, and color scheme will produce a more cohesive website. You'll learn to use Cascading Style Sheets (CSS) along with HTML to configure color, text, and layout as you work through this book. In the next section you will explore two commonly used layout design techniques: fixed layout and fluid layout.

# Page Layout Design Techniques

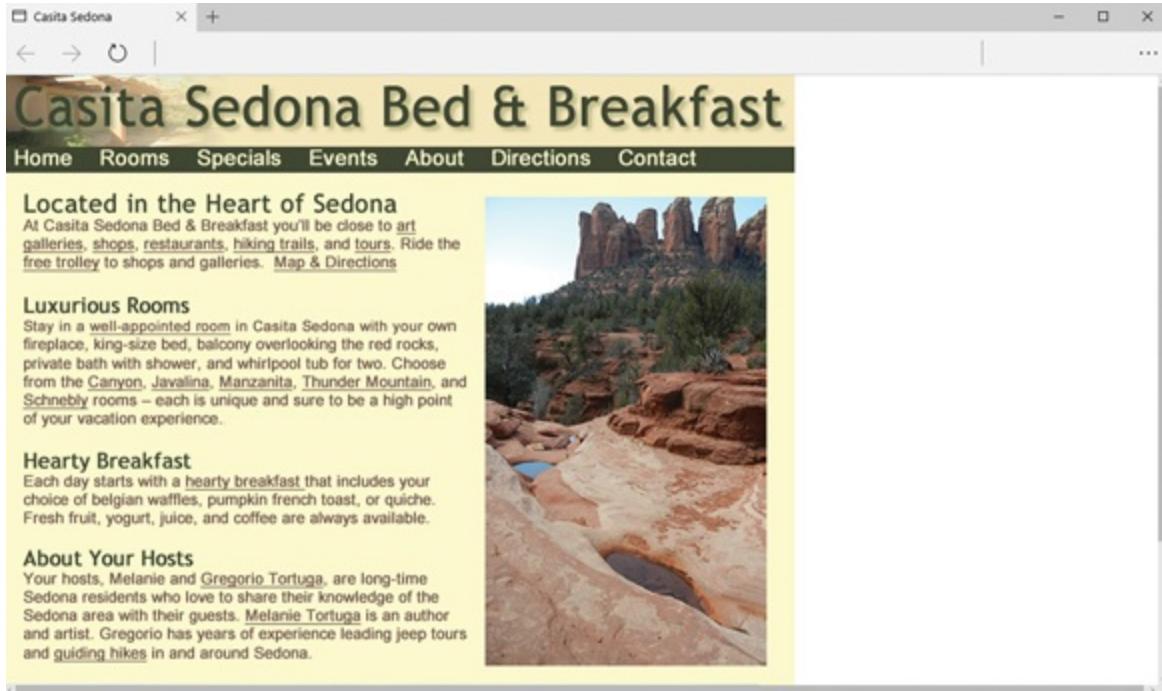
Now that you have been introduced to wireframes as a way to sketch page

layout, let's explore two commonly used design techniques to implement those wireframes: fixed layout and fluid layout.

# Fixed Layout

The fixed layout technique is sometimes referred to as a solid or “ice” design. The web page content has a fixed width and may hug the left margin as shown in [Figure 5.37](#).

## Figure 5.37



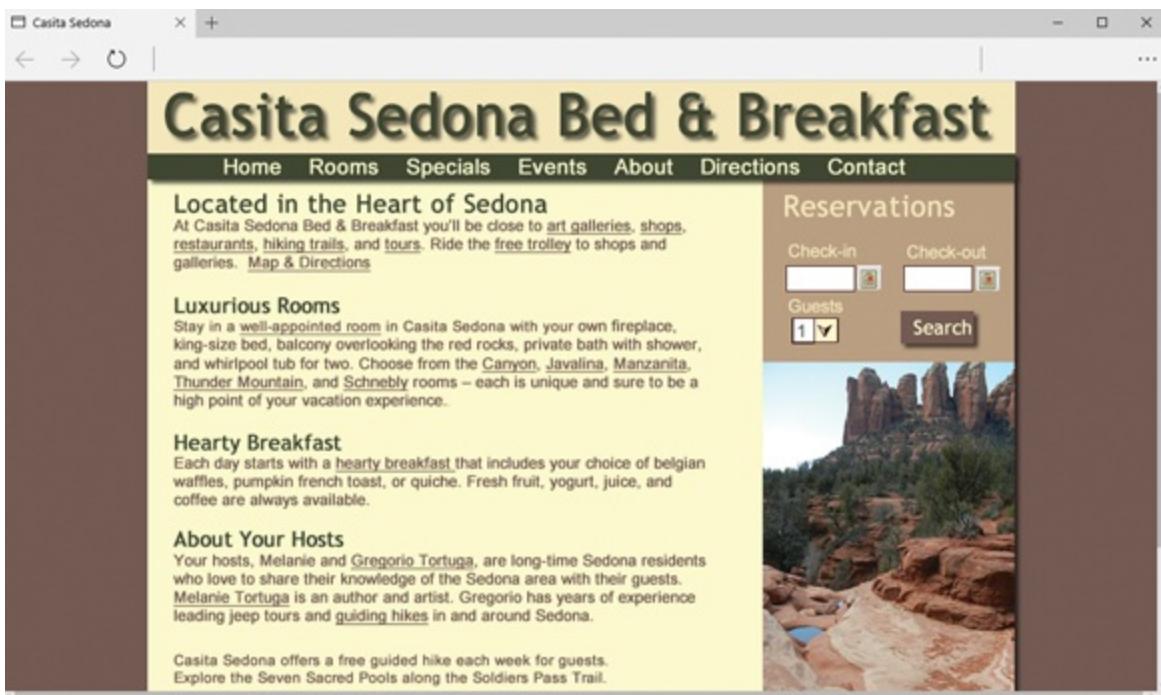
This page is configured with a fixed layout design

### [Figure 5.37 Full Alternative Text](#)

Notice the empty space in the right side of the browser viewport in [Figure 5.37](#). To avoid this unbalanced look, a popular method to create a fixed layout design is to configure the content with a specific width in pixels (such as 960px) and center it in the browser viewport as shown in [Figure 5.38](#). As

the browser is resized, it will expand or contract the left and right margin areas to center the content in the viewport.

## Figure 5.38



This fixed-width centered content is balanced on the page by left and right margins

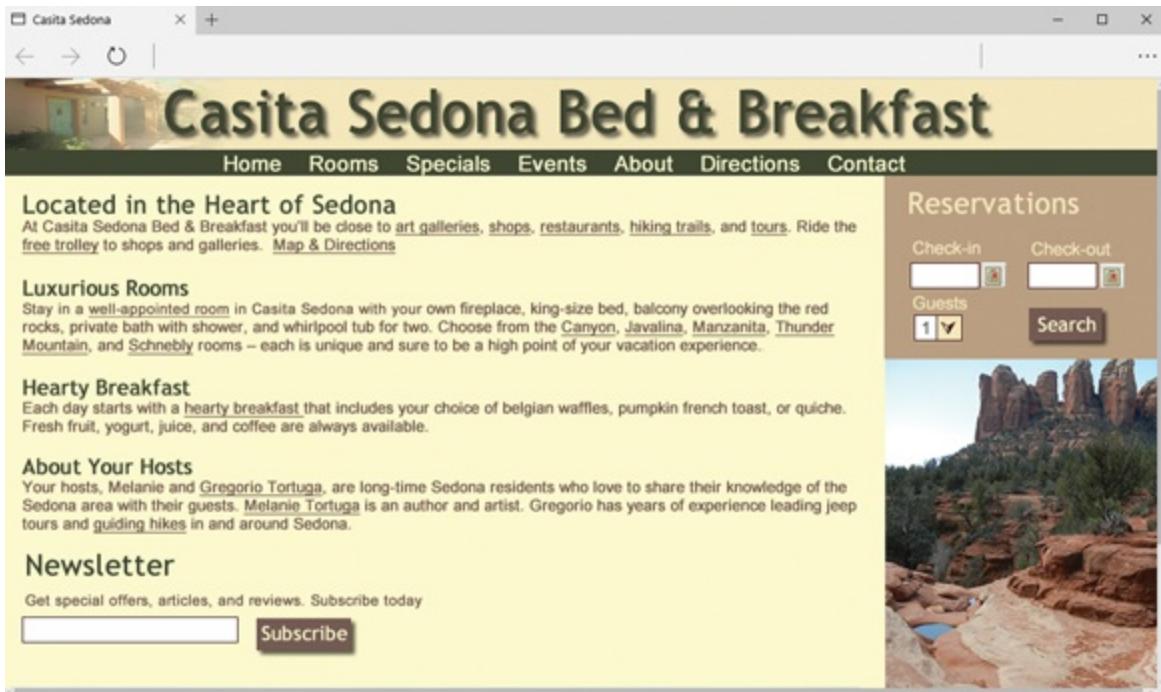
[Figure 5.38 Full Alternative Text](#)

## Fluid Layout

The fluid layout technique, sometimes referred to as a “liquid” layout, results in a fluid web page with content typically configured with percentage values for widths—often taking up 100% of the browser viewport. The content will flow to fill whatever size browser window is used to display it, as shown in [Figure 5.39](#). Other examples of liquid layout can be found at <http://amazon.com> and <http://sears.com>. One disadvantage of liquid layout is that

when displayed in maximized browser viewports using high screen resolutions the lines of text may be quite wide and become difficult to scan and read.

## Figure 5.39

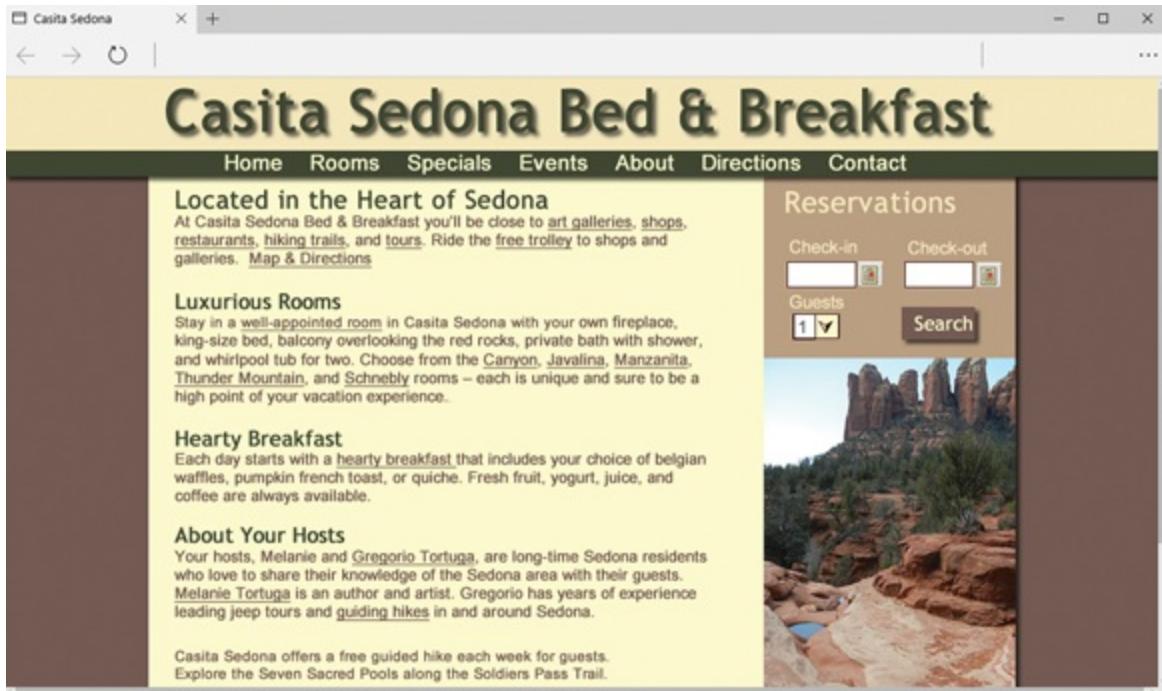


This fluid layout expands to fill 100% of the browser viewport

### [Figure 5.39 Full Alternative Text](#)

[Figure 5.40](#) shows an adaptation of liquid layout that utilizes a 100% width for the header and navigation area along with an 80% width for the centered page content. Compare this to [Figure 5.39](#). The centered content area grows and shrinks as the browser viewport is resized. Readability can be ensured by using CSS to configure a maximum width value for this area.

## Figure 5.40



This fluid layout also has a maximum width value configured for the centered content area

[Figure 5.40 Full Alternative Text](#)

Websites designed using fixed and fluid layout techniques can be found throughout the Web. Fixed-width layouts provide the web developer with the most control over the page configuration but can result in pages with large empty areas when viewed at higher screen resolutions. Fluid designs may become less readable when viewed at high screen resolutions due to the page stretching to fill a wider area than originally intended by the developer. Configuring a maximum width on text content areas can alleviate the text readability issues. Even when using an overall fluid layout, portions of the design can be configured with a fixed width (such as the “Reservations” column on the right side of the web page in [Figures 5.39](#) and [5.40](#)). Whether employing a fixed or fluid layout, web pages with centered content are typically pleasing to view on a variety of desktop screen resolutions.

## 5.11 Design for the Mobile Web

The desktop browser is not the only way that people access websites. Access to the Web from cell phones, smartphones, and tablets makes it possible to always be online. A PEW Research Center study reported that 63% of all Americans use a mobile phone to go online (<http://www.pewinternet.org/fact-sheets/mobile-technology-fact-sheet>). Visit <http://mashable.com/2012/08/22/mobile-trends-ecommerce> for an infographic about trends in mobile device usage. With this growth in mind, it's becoming more important to design web pages that are appealing and usable for your mobile visitors.

## Three Approaches

There are three different approaches to providing a satisfactory mobile experience for your website visitor:

1. Develop a separate mobile site with a .mobi TLD (see [Chapter 1](#) to review TLDs). Visit ebay at <http://ebay.mobi> using a smartphone or tablet to see this in practice.
2. Create a separate website hosted within your current domain that is targeted for mobile users. Visit <http://www.whitehouse.gov> with the mobile version at <http://m.whitehouse.gov> to see this approach in action.
3. Apply techniques of responsive web design (see the next section) by using CSS to configure your current website for display on mobile devices.

## Mobile Device Design Considerations

No matter which approach you choose to use, here are some considerations to keep in mind when designing a mobile website.

- Small screen size. Common mobile phone screen sizes include 320 × 480, 480 × 800, 640 × 960, 640 × 1136, and 750 × 1334. Even on one of the large phones, that's not a lot of pixels to work with!
- Low bandwidth (slow connection speed). Although the use of faster 4G networks is becoming more widespread, many mobile users experience slow connection speeds. Images usually take up quite a bit of bandwidth on a typical website. Depending on the service plan, some mobile web visitors may be paying per kilobyte. Be aware of this and eliminate unnecessary images.
- Font, color, and media issues. Mobile devices may have very limited font support. Configure font size using ems or percentages and configure generic font family names. Some older mobile devices may have very limited color support. Choose colors carefully to maximize contrast. Many mobile devices do not support Adobe Flash media.
- Awkward controls; limited processor and memory. While smartphones with touch controls are becoming more popular, many mobile users will not have access to mouselike controls. Provide keyboard access to assist these users. Although mobile device processing speed and available memory are improving, they still cannot compare to the resources of a desktop computer. While this won't be an issue for the websites you create for the exercises in this text, be mindful of this issue in the future as you continue to develop your skills and create web applications.
- Functionality. Provide easy access to your website's features with prominent hyperlinks or a prominent search button.

## Example Desktop Website and Mobile Website

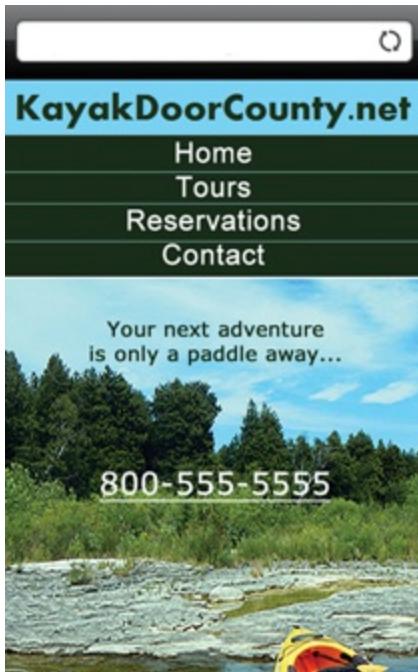
The website shown in [Figures 5.41](#) and [5.42](#) utilizes the second approach—separate websites within the same domain for desktop display and mobile display.

## Figure 5.41



The website in a desktop browser

## Figure 5.42



A mobile version of the website

The desktop site shown in [Figure 5.41](#) features a large graphic and interactive slideshow.

The mobile site shown in [Figure 5.42](#) features a prominent navigation area, phone number, and small background image.

## Mobile Design Quick Checklist

- Be aware of the small screen size and bandwidth issues.
- Configure nonessential content, such as sidebar content, to not display.
- Consider replacing desktop background images with graphics optimized for small screen display.
- Provide descriptive alternate text for images.
- Use a single-column layout for mobile display.

- Choose colors to maximize contrast.

# Responsive Web Design

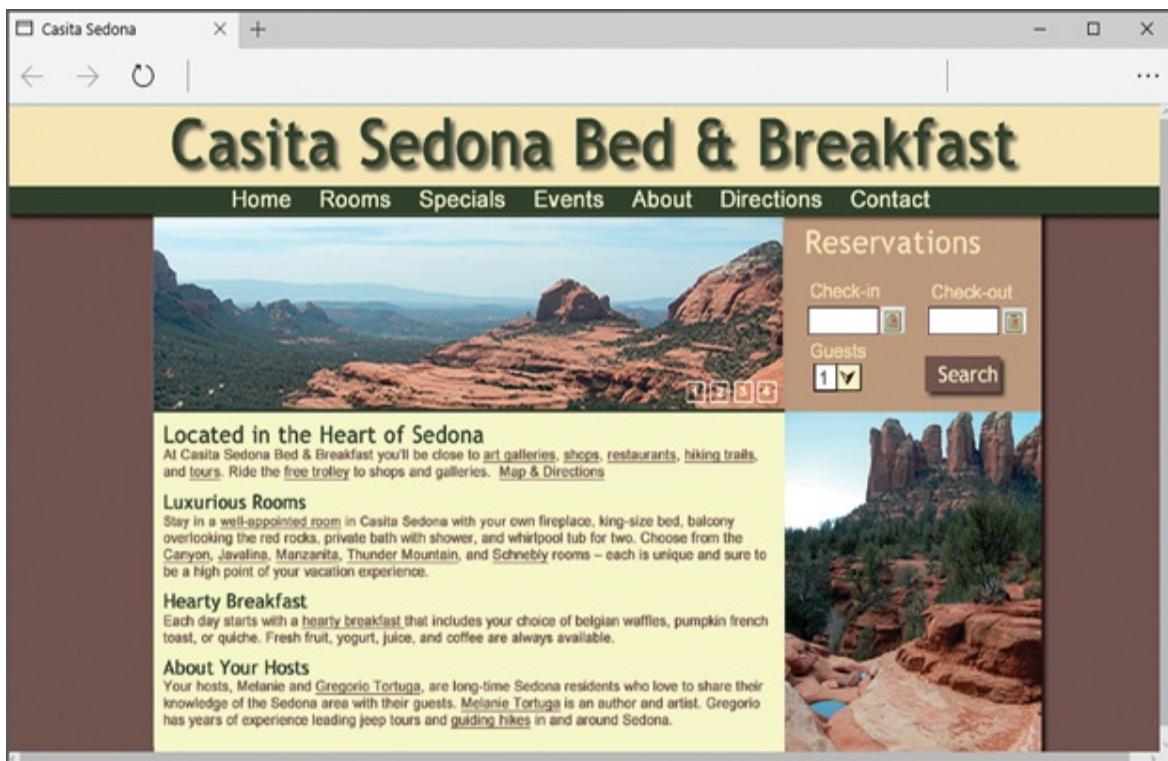
As mentioned earlier in this chapter, a recent survey by Net Market Share reported the use of more than 90 different screen resolutions and that websites are expected to display and function well on desktop browsers, tablets, and smartphones. While you can develop separate desktop and mobile websites, a more streamlined approach is to utilize the same website for all devices. The W3C's One Web initiative refers to the concept of providing a single resource that is configured for optimal display on multiple types of devices.

Responsive web design is a term coined by noted web developer Ethan Marcotte (<http://alistapart.com/article/responsive-web-design>) to describe progressively enhancing a web page for different viewing contexts (such as smartphones and tablets) through the use of coding techniques, including fluid layouts, flexible images, and media queries. In [Chapter 7](#), you'll learn to configure flexible images and code CSS **media queries**, which is a technique for configuring a web page to display well at various screen resolutions.

Visit the Media Queries website (<http://mediaqueri.es>) to view a gallery of sites that demonstrate this method for responsive web design. The screen captures in the Media Queries gallery show web pages at the following screen widths: 320px (smartphone display), 768px (tablet portrait display), 1024px (netbook display and landscape tablet display), and 1600px (large desktop display).

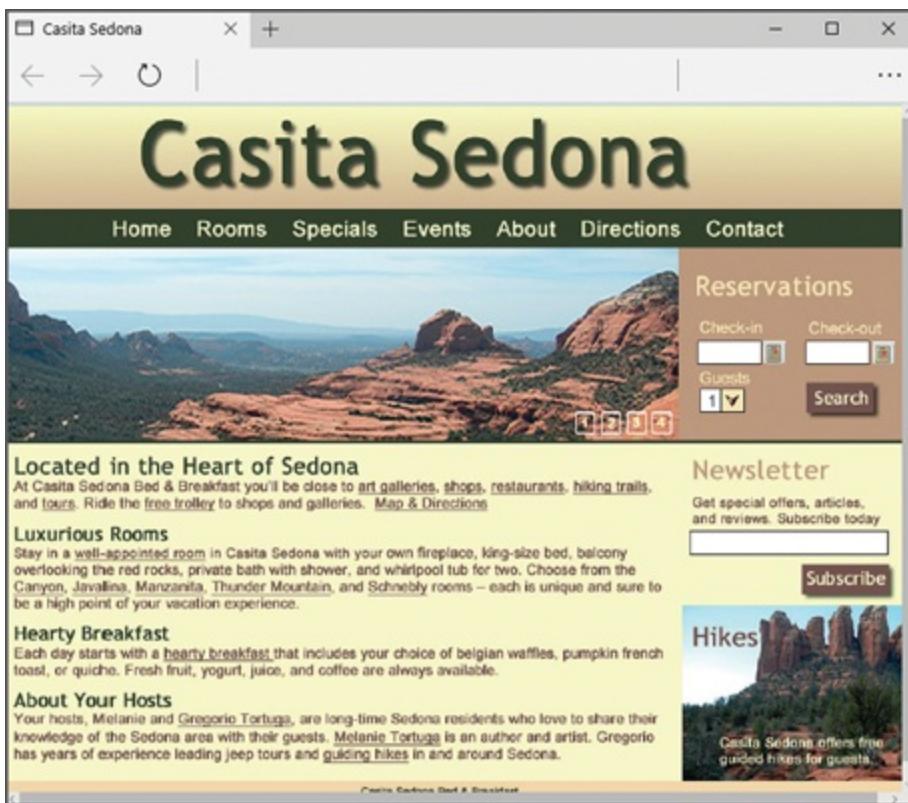
You might be surprised to discover that [Figures 5.43, 5.44, 5.45](#), and [5.46](#) are actually the same web page .html file that is configured with CSS to display differently, depending on the viewport size detected by media queries. [Figure 5.43](#) shows the standard desktop browser display.

## Figure 5.43



Desktop display of the web page

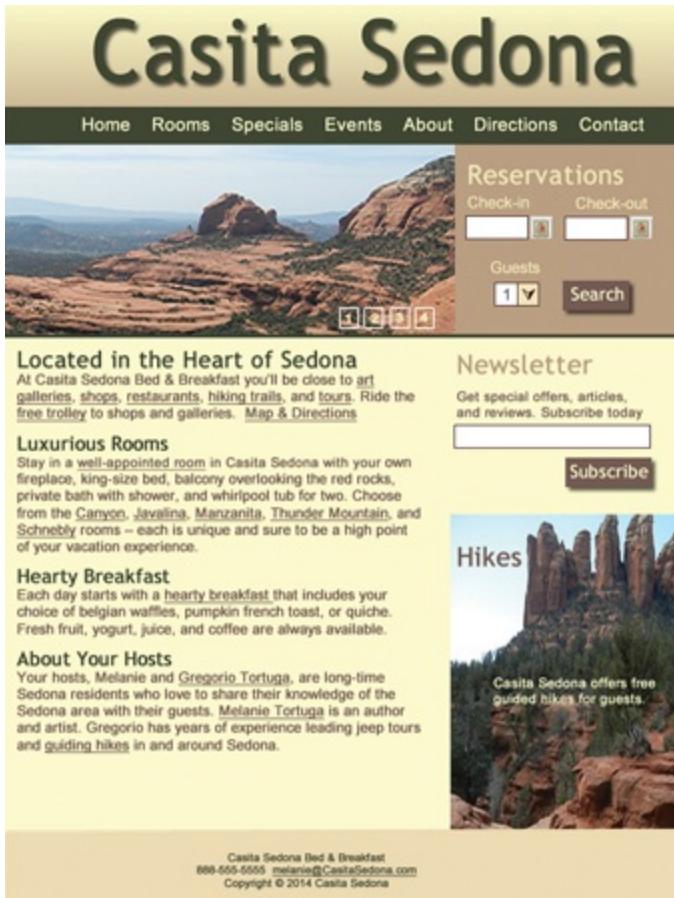
## Figure 5.44



Netbook display of the web page

[Figure 5.44 Full Alternative Text](#)

## Figure 5.45



Portrait orientation tablet display of the web page

[Figure 5.45 Full Alternative Text](#)

## Figure 5.46



Smartphone display of the web page

#### [Figure 5.46 Full Alternative Text](#)

Display for netbooks and tablets using landscape orientation is depicted in [Figure 5.44](#). [Figure 5.45](#) demonstrates how the page would render on a tablet using portrait orientation. [Figure 5.46](#) shows the web page displayed on a mobile device such as a smartphone—note the reduction of the logo area, removal of images, and prominent phone number.

You'll explore how to configure web pages with CSS media queries in [Chapter 7](#).

## 5.12 Web Design Best Practices Checklist

[Table 5.1](#) contains a checklist of recommended web design practices. Use this as a guide to help you create easy-to-read, usable, and accessible web pages.

**Table 5.1 Web design best practices checklist Note: Web Design Best Practices Checklist is copyrighted by Terry Ann Morris, Ed.D. (<http://terrymorris.net/bestpractices>). Used with permission.**

### Page Layout

- 1. Appealing to target audience
- 2. Consistent site header/logo
- 3. Consistent navigation area

- 4. Informative page title that includes the company/organization/site name
  - 5. Page footer area includes copyright, last update, contact e-mail address
  - 6. Good use of basic design principles: repetition, contrast, proximity, and alignment
  - 7. Displays without horizontal scrolling at 1024 × 768 and higher resolutions
  - 8. Balance of text/graphics/white space on page
  - 9. Good contrast between text and background

□ Repetitive information (header/logo and navigation)

  - 10. occupies less than one-quarter to one-third of the browser window at 1024 × 768 resolution
  - 11. Home page has compelling, interesting information above the fold (before scrolling down) at 1024 × 768 resolution
  - 12. Home page downloads within 10 seconds on dial-up connection
  - 13. Viewport meta tag is used to enhance display on smartphones (see [Chapter 7](#))

- Media queries configure responsive page layout for
- ❑ 14. smartphone and tablet display (see [Chapter 7](#))

## **Browser Compatibility**

- ❑ 1. Displays on current versions of Microsoft Edge
- ❑ 2. Displays on current versions of Firefox
- ❑ 3. Displays on current versions of Google Chrome
- ❑ 4. Displays on current versions of Safari
- ❑ 5. Displays on current versions of Internet Explorer
- ❑ 6. Displays on mobile devices (including tablets and smartphones)

## **Navigation**

- ❑ 1. Main navigation links are clearly and consistently labeled

- Navigation is easy to use for target audience
- 2.
- If main navigation uses images, clear text links are in the
- 3. footer section of the page
- If main navigation uses Flash, clear text links are in the
- 4. footer section of the page
- 5. Navigation is structured in an unordered list
- Navigation aids (such as site map, skip to content link, 6. and/or breadcrumbs) are used
- 7. All navigation hyperlinks work

## **Color and Graphics**

- Color scheme is limited to a maximum of three or four
- 1. colors plus neutrals
- 2. Color is used consistently
- 3. Background and text colors have sufficient contrast

- 4. Color is not used alone to convey meaning
- 5. the site
  - Use of color and graphics enhances rather than detracts from
  - Graphics are optimized and do not slow download
    - significantly
  - Each graphic used serves a clear purpose
- 8. replacement
  - Image tags use the alt attribute to configure alternate text
- 9. endlessly repeat
  - Animated images do not distract from the site and do not

### **Multimedia (see [Chapter 11](#))**

- 1. Each audio or video file used serves a clear purpose
- 2. from the site
  - The audio or video files used enhance rather than distract
- 3. file used
  - Captions or transcripts are provided for each audio or video

4. The file size is indicated for audio or video file downloads

5. Hyperlinks to downloads for media plug-ins are provided

6. Animation enhances rather than distracts from the site

7. Animation does not endlessly repeat

## **Content Presentation**

1. Common fonts such as Arial, Verdana, Georgia, or Times New Roman are used

2. Writing techniques for the Web are used: headings, bullet points, brief paragraphs, and so on

3. Fonts, font sizes, and font colors are consistently used

4. If web fonts are configured, no more than one font typeface is used.

5. Content provides meaningful, useful information

6. Content is organized in a consistent manner

- 7. Information is easy to find (minimal clicks)
- 8. Timeliness: The date of the last revision and/or copyright date is accurate
- 9. Content does not include outdated material
- 10. Content is free of typographical and grammatical errors
- 11. Avoids the use of “Click here” when writing text for hyperlinks
- 12. Hyperlinks use a consistent set of colors to indicate visited/nonvisited status
- 13. Alternate text equivalent to content is provided for graphics and media

## **Functionality**

- 1. All internal hyperlinks work
- 2. All external hyperlinks work

- All forms (see [Chapter 9](#)) function as expected
  - 3.
- No JavaScript (see [Chapters 11](#) and [14](#)) errors are generated
  - 4. by the pages

## Accessibility

- 1. When the main navigation consists of images and/or multimedia, the page footer area contains text hyperlinks
- 2. Navigation is structured in an unordered list
- 3. Navigation aids, such as site map, skip navigation link, or breadcrumbs are used
- 4. Color is not used alone to convey meaning
- 5. Text color has sufficient contrast with background color
- 6. Image element use the alt attribute to configure alternate text replacement
- 7. If graphics are used to convey meaning, the alternate text equivalent is provided
- 8. If media is used to convey meaning, the alternate text equivalent is provided

- 9. Captions or transcripts are provided for each audio or video file used
- 10. Attributes designed to improve accessibility, such as alt and title, are used where appropriate
- 11. Use the id and headers attributes to improve the accessibility of table data (see [Chapter 8](#))
- 12. If the site uses frames, frame titles are configured and meaningful content is placed in the no-frames area
- 13. To assist screen readers, the spoken language of the page is indicated with the HTML element's lang attribute



## Checkpoint 5.2

1. View the home page of your school. Use the Web Design Best Practices Checklist ([Table 5.1](#)) to evaluate the page. Describe the results.
2. View your favorite website or a URL provided by your instructor. Maximize and resize the browser window. Decide whether the site uses fixed or fluid design. Adjust the screen resolution on your monitor to a different resolution than you normally use. Does the website look similar or very different? Offer two recommendations for improving the design of the site.

3. List three best practices used when placing graphics on web pages. View the home page of your school. Describe the use of web graphic design best practices on this page.

# Chapter Summary

This chapter introduced recommended web design practices. The choices you make in the use of page layout, color, graphics, text, and media depend on your particular target audience. Developing an accessible website should be the goal of every web developer. Visit the textbook website at <http://www.webdevfoundations.net> for examples, the links listed in this chapter, and updated information.

## Key Terms

- [above the fold](#)
- [alignment](#)
- [analogous color scheme](#)
- [antialiasing](#)
- [breadcrumb trail](#)
- [chunking](#)
- [color theory](#)
- [color wheel](#)
- [complement](#)
- [complementary color scheme](#)
- [contrast](#)
- [fixed layout](#)

- [fluid layout](#)
- [hero](#)
- [hierarchical organization](#)
- horizontal scrolling
- [linear organization](#)
- [load time](#)
- [media queries](#)
- [monochromatic color scheme](#)
- [navigation bars](#)
- [One Web](#)
- [page layouts](#)
- [perceived load time](#)
- [POUR](#)
- [progressive enhancement](#)
- [proximity](#)
- [random organization](#)
- [repetition](#)
- [responsive web design](#)
- [screen resolutions](#)
- [shade](#)

- [site map](#)
- [site search](#)
- [skip to content](#)
- [split complementary color scheme](#)
- [target audience](#)
- [tetradic color scheme](#)
- [tint](#)
- [tone](#)
- [triadic color scheme](#)
- [WAI \(Web Accessibility Initiative\)](#)
- [Web Content Accessibility Guidelines 2.0 \(WCAG 2.0\)](#)
- [white space](#)
- [wireframe](#)

## Review Questions

### Multiple Choice

1. Which of the following is a sketch or blueprint of a web page that shows the structure (but not the detailed design) of basic page elements?
  1. drawing
  2. HTML code

3. site map
  4. wireframe
2. Which of the following is not a web design recommended practice?
1. Design your site to be easy to navigate.
  2. Colorful pages appeal to everyone.
  3. Design your pages to load quickly.
  4. Limit the use of animated items.
3. Which of the following are the three most common methods for organizing websites?
1. horizontal, vertical, and diagonal
  2. hierarchical, linear, and random
  3. accessible, readable, and maintainable
  4. contrast, repetition, and proximity
4. Which of the following are the four principles of the Web Content Accessibility Guidelines?
1. repetition, contrast, proximity, and alignment
  2. perceivable, operable, understandable, and robust
  3. accessible, readable, maintainable, and reliable
  4. hierarchical, linear, random, and sequential
5. Which of the following would a consistent website design *not* have?
1. a similar navigation area on each content page

2. the same fonts on each content page
  3. a different background color on each page
  4. the same logo
6. Which of the following are influenced by the intended or target audience of a site?
  1. the amount of color used on the site
  2. the font size and styles used on the site
  3. the overall look and feel of the site
  4. all of the above
7. Which of the following recommended design practices apply to a website that uses images for its main site navigation?
  1. Provide alternative text for the images.
  2. Place text links at the bottom of the page.
  3. Both a and b.
  4. No special considerations are needed.
8. Which of the following is known as white space?
  1. the empty screen area around blocks of text and images
  2. the background color of white used for a page
  3. configuring the color of the text to be white
  4. none of the above
9. Which of the following should you do when creating text hyperlinks?

1. Create the entire sentence as a hyperlink.
  2. Include the words “Click here” in your text.
  3. Use a key phrase as a hyperlink.
  4. none of the above
10. Which of the following is a color scheme that consists of two colors that are opposite each other on the color wheel?
1. analogous
  2. complementary
  3. split complementary
  4. contrasting

## Fill in the Blank

11. The most common structure used for commercial websites is organization.
12. All browsers and browser versions display web pages in exactly the same way.
13. The is a group whose mission is to create guidelines and standards for web accessibility.

## Short Answer

14. Describe an issue to consider when designing for the mobile Web.
15. Describe one of the four principles of WCAG 2.0.

# Hands-On Exercises

1. Web Design Evaluation. As you read this chapter, you explored web page design, including navigation design techniques and the design principles of repetition, contrast, proximity, and alignment. In this exercise, you'll review and evaluate the design of a website. Your instructor may provide you with the URL of a website to evaluate. If not, choose a website to evaluate from the following list of URLs:
  - <http://www.arm.gov>
  - <http://www.telework.gov>
  - <http://www.dcmm.org>
  - <http://www.sedonalibrary.org>
  - <http://bostonglobe.com>
  - <http://www.alistapart.com>

Visit the website you are evaluating. Write a paper that includes the following information:

1. URL of the website
2. Name of the website
3. Target audience
4. Screenshot of the home page
5. Indicate the type(s) of navigation evident.
6. Describe how the design principles of contrast, repetition, alignment, and contrast are applied. Be specific.
7. Complete the Web Design Best Practices Checklist (see [Table 5.1](#)).

8. Recommend three improvements for the website.
2. Practice creating site maps for the following situations.
  1. Doug Kowalski is a freelance photographer who specializes in nature photography. He often gets contract work shooting photos for textbooks and journals. Doug would like a website that showcases his talents and provides publishers with an easy way to contact him. He would like a home page, a few pages with samples of his nature photographs, and a contact page. Create a site map based on this scenario.
  2. Mary Ruarez owns a business, named Just Throw Me, which sells handcrafted specialty pillows. She currently sells at craft fairs and local gift shops, but would like to expand her business to the Web. She would like a website with a home page, a page that describes her products, a page for each of her seven pillow styles, and an order page. She has been advised that because she is collecting information from individuals, a page describing her privacy policy would be a good idea. Create a site map based on this scenario.
  3. Prakesh Khan owns a dog-grooming business named A Dog's Life. He would like a website that includes a home page, a page about grooming services, a page with a map to his shop, a contact page, and a section that explains how to select a good pet. The content for the part of the website on selecting a pet will be a step-by-step presentation. Create a site map based on this scenario.
3. Practice creating wireframe page layouts for the following situations. Use the style for page layout composition shown in [Figures 5.33 – 5.36](#) where places for logo, navigation, text, and images are indicated. Do not worry about exact wording or exact images.
  1. Create sample wireframe page layouts for Doug Kowalski's photography business, described in 2(a). Create a wireframe layout for the home page. Create another wireframe page layout for the content pages.

2. Create sample wireframe page layouts for the Just Throw Me website described in 2(b). Create a wireframe layout for the home page. Create another wireframe page layout for the content pages.
  3. Create sample wireframe page layouts for the A Dog's Life website described in 2(c). Create a wireframe layout for the home page and the regular content pages. Create another wireframe page layout for the presentation pages.
4. Choose two sites that are similar in nature or have a similar target audience, such as the following:
- Amazon.com (<http://www.amazon.com>) and Barnes & Noble (<http://www.bn.com>)
  - Kohl's (<http://www.kohls.com>) and JCPenney (<http://www.jcpenney.com>)
  - CNN (<http://www.cnn.com>) and MSNBC (<http://www.msnbc.com>)

Describe how the two sites you chose to review exhibit the design principles of repetition, contrast, proximity, and alignment.

5. Choose two sites that are similar in nature or have a similar target audience, such as the following:
  - Crate & Barrel (<http://www.crateandbarrel.com>) Pottery Barn (<http://www.potterybarn.com>)
  - Harper College (<http://goforward.harpercollege.edu>) College of Lake County (<http://www.clcillinois.edu>)
  - Chicago Bears (<http://www.chicagobears.com>) Green Bay Packers (<http://www.packers.com>)

Describe how the two sites you chose to review exhibit web design best practices. How would you improve these sites? Recommend three improvements for each site.

6. How would you design a home page for the following businesses using a fixed layout design? Create a wireframe page layout for the home page.

  1. See 2(a) for the description of Doug Kowalski's photography business.
  2. See 2(b) for the description of Just Throw Me.
  3. See 2(c) for the description of A Dog's Life.
7. How would you design a home page for the following businesses using a flexible layout design? Create a wireframe page layout for the home page.

  1. See 2(a) for the description of Doug Kowalski's photography business.
  2. See 2(b) for the description of Just Throw Me.
  3. See 2(c) for the description of A Dog's Life.
8. Visit the Media Queries website at <http://mediaqueri.es> to view a gallery of sites that demonstrate responsive web design. Choose one of the example responsive websites to explore. Write a one-page paper that includes the following:

  - URL of the website
  - Name of the website
  - Three screenshots of the website (desktop display, tablet display, and smartphone display)
  - Describe the similarities and differences between the three screenshots.
  - Describe two ways in which the display has been modified for smartphones.

- Does the website meet the needs of its target audience in all three display modes? Why or why not? Justify your answer.

# Web Research

1. This chapter introduced techniques that are useful when writing for the Web. Explore this topic further. Visit the resources listed below to get started.

- Writing for the Web: <http://www.useit.com/papers/webwriting>
- Writing Well for the Web:  
<http://www.webreference.com/content/writing>
- Web Writing that Works!: <http://www.webwritingthatworks.com/CGuideJOBAID.htm>
- A List Apart: 10 Tips on Writing the Living Web: <http://www.alistapart.com/articles/writeliving>

If these resources are no longer available, search the Web for information on “writing for the Web.” Read one or more articles. Select five techniques that you would like to share with others. Write a one-page summary of your findings. Include the URLs of your resources.

2. Explore the trend of flat web design, which is a minimalistic design style that avoids the use of 3-D effects such as drop shadows and gradients and, instead, features blocks of color and distinctive typography. Explore this topic further. Visit the resources listed below to get started.

- <http://designmodo.com/flat-design-principles>
- <http://designmodo.com/flat-design-examples>
- <http://psd.fanextra.com/articles/flat-design-trend>
- <http://smashinghub.com/flat-designs-color-trends.htm>

- <http://www.hongkiat.com/blog/flat-design-resources/>

If these resources are no longer available, search the Web for information on “flat web design.” Read one or more articles and visit the example websites that listed in the articles. Search the Web and locate a website that uses flat design. Write a paragraph that includes the URL of the website and describes how the website demonstrates the use of flat web design.

## Focus on Web Design

1. This chapter discusses recommended web design practices. Sometimes it is helpful to learn about good design by examining poor design. Visit Web Pages that Suck (<http://www.webpagesthatsuck.com>) and read about their examples of poor design. Think about some websites that you have visited. Do any of them have similar qualities? Find two websites that use poor web design practices. Write a one-page report that includes an introduction about the design practices that are not followed at the websites, a link to each site, and a description of how each site has practiced poor website design.
2. Visit any of the websites referenced in this chapter that interest you. Write a one-page summary and reaction to the website you chose to visit. Address the following topics:
  - What is the purpose of the site?
  - Who is the intended audience?
  - Do you think the site reaches the intended audience?
  - List three examples of how this website uses recommended web design guidelines.
  - How could this site be improved?
3. In this activity you will design a color scheme, code an external CSS file

for the color scheme, and code an example web page that applies the styles you configured. First, choose a topic for your web page. Explore the resources below to find out about the psychology of color:

- <http://www.infoplease.com/spot/colors1.html>
- <http://precisionintermedia.com/color>
- <http://www.webpagefx.com/blog/web-design/psychology-of-color-infographic/>

Complete the following tasks:

1. Design a color scheme. List three hexadecimal color values in addition to neutrals such as white (#FFFFFF), black, #000000, gray (#EAEAEA or #CCCCCC), and dark brown (#471717) in your design.
2. Describe the process you went through as you selected the colors. Describe why you chose these colors and why they would be appropriate for your website topic. List the URLs of any resources you used.
3. Create an external CSS file named colors.css that configures font properties, text color, and background color selections for the document, h1 element selector, p element selector, and footer class using the colors you have chosen.
4. Create a web page named color1.html that shows examples of the colors configured in the CSS style rules.



## WEBSITE CASE STUDY

# Web Design Best Practices

Each of the following case studies continues throughout most of this textbook. In this chapter, you are asked to analyze the design of the websites.

## JavaJam Coffee House

See [Chapter 2](#) for an introduction to the JavaJam Coffee House case study. [Figure 2.31](#) shows a site map for the JavaJam website. Three pages for this site were created in earlier chapters. In this case study, you will review the site for recommended web design practices.

## Hands-On Practice Case

1. Examine the site map in [Figure 2.31](#). What type of site organization is used for the JavaJam website? Is it the most appropriate organization for the site? Why or why not?
2. Review the recommended web design practices from this chapter. Use the Web Design Best Practices Checklist ([Table 5.1](#)) to evaluate the JavaJam site that you created in earlier chapters. Cite three design practices that have been well implemented. Cite three design practices that could be implemented in a better way. How else would you improve the website?

## Fish Creek Animal Clinic

See [Chapter 2](#) for an introduction to the Fish Creek Animal Hospital case study. [Figure 2.35](#) shows a site map for the Fish Creek website. Three pages for the site were created in earlier chapters. In this case study, you will review the site for recommended web design practices.

## Hands-On Practice Case

1. Examine the site map in [Figure 2.35](#). What type of site organization is used for the Fish Creek website? Is it the most appropriate organization for the site? Why or why not?
2. Review the recommended web design practices from this chapter. Use the Web Design Best Practices Checklist ([Table 5.1](#)) to evaluate the Fish Creek site that you created in earlier chapters. Cite three design practices that have been well implemented. Cite three design practices that could be implemented in a better way. How else would you improve the website?

## Pacific Trails Resort

See [Chapter 2](#) for an introduction to the Pacific Trails Resort case study. [Figure 2.39](#) shows a site map for the Pacific Trails Resort website. Three pages for the site were created in earlier chapters. During this case study, you will review the site for recommended web design practices.

## Hands-On Practice Case

1. Examine the site map in [Figure 2.39](#). What type of site organization is used for the Pacific Trails Resort website? Is it the most appropriate organization for the site? Why or why not?
2. Review the recommended web design practices from this chapter. Use the Web Design Best Practices Checklist ([Table 5.1](#)) to evaluate the Pacific Trails Resort site that you created in earlier chapters. Cite three design practices that have been well implemented. Cite three design practices that could be implemented in a better way. How else would you improve the website?

## Path of Light Yoga Studio

See [Chapter 2](#) for an introduction to the Path of Light Yoga Studio case study. [Figure 2.43](#) shows a site map for the Path of Light Yoga Studio website. Three pages for the site were created in earlier chapters. During this case study, you will review the site for recommended web design practices.

## Hands-On Practice Case

1. Examine the site map in [Figure 2.43](#). What type of site organization is used for the Path of Light Yoga Studio website? Is it the most appropriate organization for the site? Why or why not?
2. Review the recommended web design practices from this chapter. Use the Web Design Best Practices Checklist ([Table 5.1](#)) to evaluate the Path of Light Yoga Studio site you created in earlier chapters. Cite three design practices that have been well implemented. Cite three design practices that could be implemented in a better way. How else would you improve the website?

## Web Project

The purpose of this Web Project case study is to design a website using recommended design practices. Your website might be about a favorite hobby or subject, your family, a church or club you belong to, a company a friend owns, or the company you work for. Your website will contain a home page and at least six (but no more than ten) content pages. Complete the following documents: Topic Approval, Site Map, and Page Layout Design. You will not develop web pages at this point; you will complete that task in later chapters.

## Hands-On Practice Case

1. Web Project Topic Approval. The topic of your website must be approved by your instructor. Provide the following information:

- What is the purpose of the website?

List the reasons you are creating the website.

- What do you want the website to accomplish?

List the goals you have for the website.

Describe what needs to happen for you to consider your website a success.

- Who is your target audience?

Describe your target audience by age, gender, socioeconomic characteristics, and so on.

- What opportunity or issue is your website addressing?

For example, your website might address the opportunity to provide information about a topic to others or create an initial web presence for a company.

- What type of content might be included in your website?

Describe the type of text, graphics, and media you will need for the website. While you should write the text content yourself, you may use outside sources for royalty-free images and multimedia.

Review copyright considerations (see [Chapter 1](#)).

- List the URLs for at least two related or similar websites found on the Web.

2. Web Project Site Map. Use the drawing feature of a word processing program, a graphics application, or a paper and pencil to create a site map of your website that shows the hierarchy of pages and relationships between pages.
3. Web Project Page Layout Design. Use the drawing feature of a word processing program, a graphics application, or paper and pencil to create

wireframe page layouts for the home page and content pages of your site. Unless otherwise directed by your instructor, use the style for page layout composition shown in [Figures 5.33–5.36](#). Indicate where the logo, navigation, text, and images will be located. Do not worry about exact wording or exact images.

# **6 Page Layout**

# Chapter Objectives

In this chapter, you will learn how to . . .

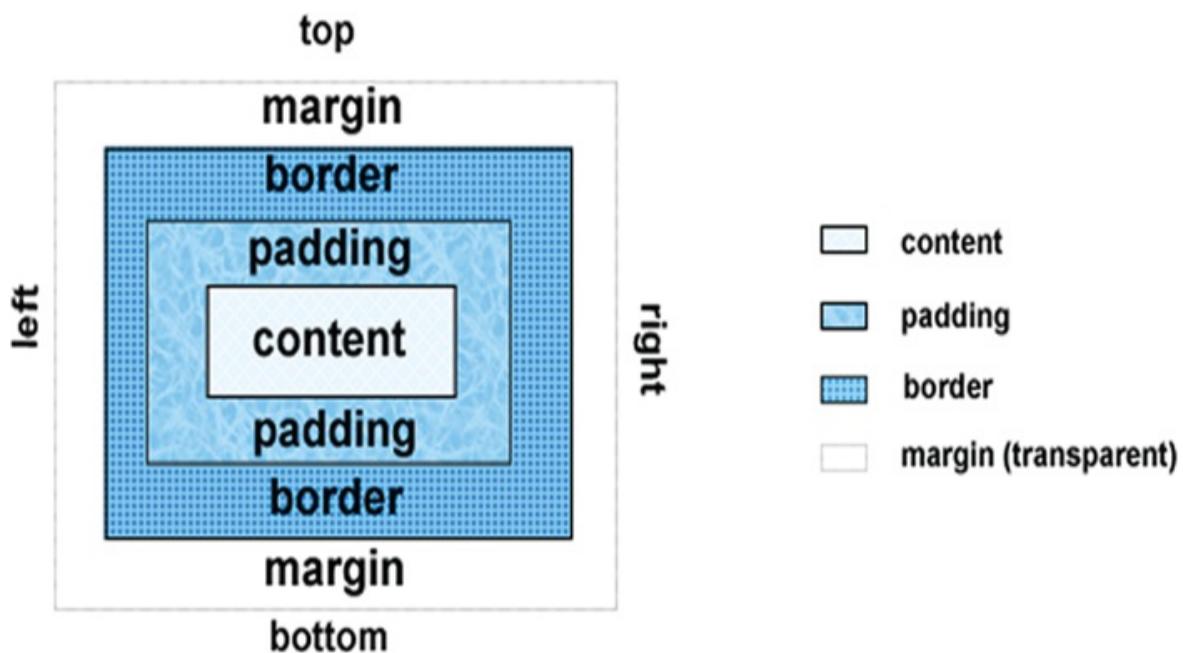
- Describe and apply the CSS Box Model
- Configure margins with CSS
- Configure float with CSS
- Configure positioning with CSS
- Create two-column page layouts using CSS
- Configure navigation in unordered lists and style with CSS
- Add interactivity to hyperlinks with CSS pseudo-classes
- Configure an interactive image gallery
- Configure web pages with HTML5 structural elements, including section, article, and aside
- Configure older browsers to be compatible with HTML5

**You've already configured the centered page layout with CSS.** We'll add to your toolbox of CSS page layout techniques in this chapter, starting with the box model. You'll explore floating and positioning elements with CSS. You'll be introduced to using CSS to add interactivity to hyperlinks with pseudo-classes and use CSS to style navigation in unordered lists. You will practice coding new HTML5 elements that structure web page content.

# 6.1 The Box Model

Each element in a document is considered to be a rectangular box. As shown in [Figure 6.1](#), this box consists of a content area surrounded by padding, a border, and margins. This is known as the box model.

## Figure 6.1



The CSS box model

[Figure 6.1 Full Alternative Text](#)

## Content

The content area can consist of a combination of text and web page elements such as images, paragraphs, headings, lists, and so on. The **visible width** of the element on a web page is the total of the content width, the padding

width, and the border width. However, the `width` property only configures the actual width of the content; it does not include any padding, border, or margin.

## Padding

The **padding** area is between the content and the border. The default padding value is zero. When the background of an element is configured, the background is applied to both the padding and the content areas. Use the `padding` property to configure an element's padding (refer to [Chapter 4](#)).

## Border

The **border** area is between the padding and the margin. The default border has a value of `0` and does not display. Use the `border` property to configure an element's border (refer to [Chapter 4](#)).

## Margin

The **margin** determines the empty space between the element and any adjacent elements. The solid line in [Figure 6.1](#) that contains the margin area does not display on a web page.

## The `margin` Property

Use the `margin` property to configure margins on all sides of an element. The margin is always transparent—the background color of the web page or parent element shows in this area. Browsers have default margin values set for the web page document and for certain elements such as paragraphs, headings, forms, and so on. Use the `margin` property to override the default browser values.

To configure the size of the margin, use a numeric value (px or em) or a percentage. To eliminate the margin, configure it to 0 (with no unit). Use the value auto to indicate that the browser should calculate the margin. In [Chapters 3](#) and [4](#), you used `margin-left: auto;` and `margin-right: auto;` to configure a centered page layout. [Table 6.1](#) shows CSS properties that configure margins.

## Table 6.1 Configuring margins with CSS

Property	Description and Common Values
	Shorthand notation to configure the margin surrounding an element
<code>margin</code>	A numeric value (px or em) or percentage; for example, <code>margin: 10px;</code>
	The value auto causes the browser to automatically calculate the margin for the element
<code>margin</code>	Two numeric values (px or em) or percentages: The first value configures the top margin and bottom margin, and the second value configures the left margin and right margin; for example, <code>margin: 20% 10%;</code>
	Three numeric values (px or em) or percentages: The first value configures the top margin, the second value configures the left margin and right margin, and the third value configures the bottom margin; for example, <code>margin: 10% 20% 5px;</code>
	Four numeric values (px or em) or percentages; the

values configure the margin in the following order:  
`margin-top`, `margin-right`, `margin-bottom`, and  
`margin-left`; for example, `margin: 10% 30px 20% 5%;`

`margin-bottom` Bottom margin; a numeric value (px or em), percentage, or auto

`margin-left` Left margin; a numeric value (px or em), percentage, or auto

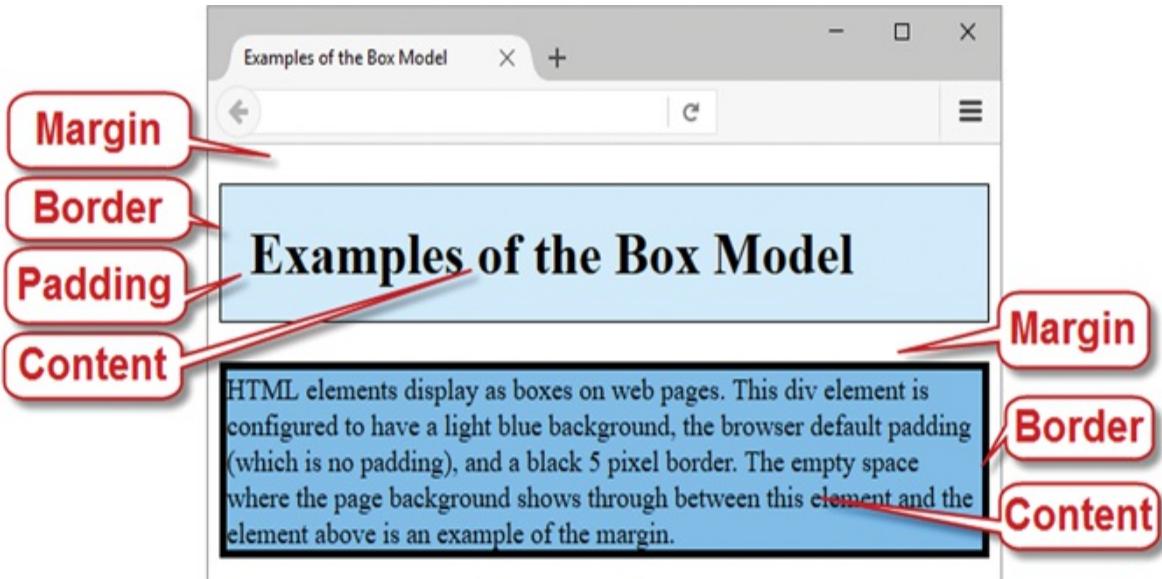
`margin-right` Right margin; a numeric value (px or em), percentage, or auto

`margin-top` Top margin; a numeric value (px or em), percentage, or auto

## The Box Model in Action

The web page shown in [Figure 6.2](#) (chapter6/box.html in the student files) depicts the box model in action with an h1 and a div element.

## Figure 6.2



## Examples of the box model

[Figure 6.2 Full Alternative Text](#)

- The `h1` element is configured to have a light-blue background, 20 pixels of padding (the space between the content and the border), and a black, 1 pixel border.
- The empty space where the white web page background shows through is the margin. When two vertical margins meet (such as between the `h1` element and the `div` element), the browser collapses the margin size to be the larger of the two margin values instead of applying both margins.
- The `div` element has a medium-blue background; the browser default padding (which is no padding); and a black, 5 pixel border.

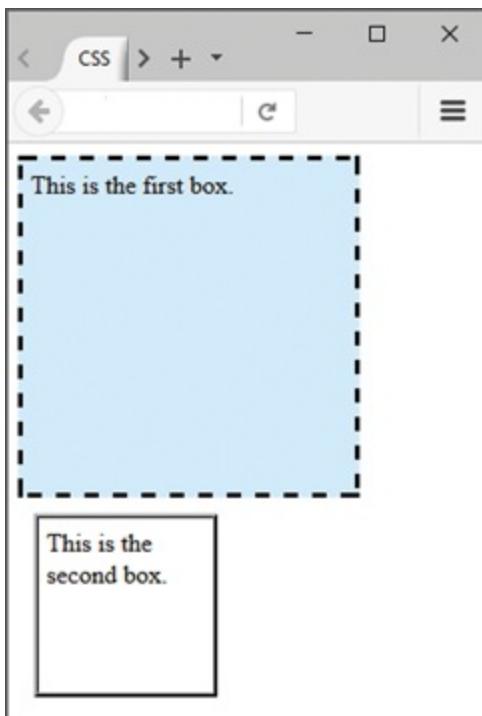
You will get more practice using the box model in this chapter. Feel free to experiment with the box model and the `chapter6/box.html` file.

## 6.2 Normal Flow

Browsers render your web page code line by line in the order it appears in the .html document. This processing is called normal flow. Normal flow displays the elements on the page in the order they appear in the web page source code.

[Figures 6.3](#) and [6.4](#) each display two div elements that contain text content. Let's take a closer look. [Figure 6.3](#) shows a screenshot of two div elements placed one after another on a web page. In [Figure 6.4](#), the boxes are nested inside each other. In both cases, the browser used normal flow (the default) and displayed the elements in the order that they appeared in the source code. As you've worked through the exercises in the previous chapters, you created web pages that the browser has rendered using normal flow.

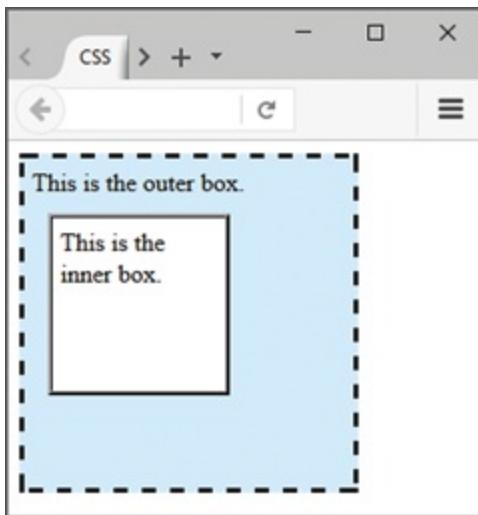
### Figure 6.3



Two div elements

[Figure 6.3 Full Alternative Text](#)

## Figure 6.4



Nested div elements

[Figure 6.4 Full Alternative Text](#)

You'll practice this a bit more in the next Hands-On Practice. Then, later in the chapter, you'll experiment with CSS positioning and float to configure the flow, or placement, of elements on a web page.



## Hands-On Practice 6.1

You will explore the box model and normal flow in this Hands-On Practice as you work with the web pages shown in [Figure 6.3](#) and [Figure 6.4](#).

# Practice with Normal Flow

Launch a text editor and open chapter6/starter1.html in the student files. Save the file with the name box1.html. Edit the body of the web page and add the following code to configure two div elements:

```
<div class="div1">  
This is the first box.  
</div>  
<div class="div2">  
This is the second box.  
</div>
```

Now let's add embedded CSS in the head section to configure the "boxes." Add a new style rule for a class named `div1` to configure a light-blue background, dashed border, width of 200 pixels, height of 200 pixels, and 5 pixels of padding. The code is

```
.div1 { width: 200px;  
height: 200px;  
background-color: #D1ECFF;  
border: 3px dashed #000000;  
padding: 5px; }
```

Create a style rule for a class named `div2` to configure a width and height of 100 pixels, white background color, ridged border, 10 pixel margin, and 5 pixels of padding. The code is

```
.div2 { width: 100px;  
height: 100px;  
background-color: #FFFFFF;  
border: 3px ridge #000000;  
margin: 10px;  
padding: 5px; }
```

Save the file. Launch a browser and test your page. It should look similar to the one shown in [Figure 6.3](#). The student files contain a sample solution (see chapter6/6.1/box1.html).

# Practice with Normal Flow and Nested Elements

Launch a text editor and open your box1.html file. Save the file as box2.html.

Edit the code. Delete the content from the body section of the web page. Add the following code to configure two div elements—one nested inside the other.

```
<div class="div1">  
This is the outer box.  
  <div class="div2">  
    This is the inner box.  
  </div>  
</div>
```

Save the file. Launch a browser and test your page. It should look similar to the one shown in [Figure 6.4](#). Notice how the browser renders the nested div elements: The second box is nested inside the first box because it is coded inside the first div element in the web page source code. This is an example of normal flow. The student files contain a sample solution (see chapter6/6.1/box2.html).

The examples in this Hands-On Practice happened to use two div elements. However, the box model applies to block display HTML elements in general, not just to div elements. You will get more practice using the box model in this chapter.

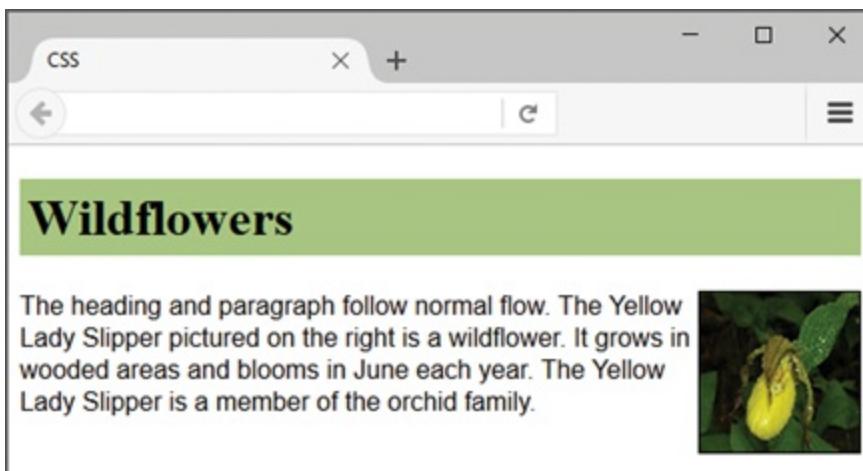
## 6.3 CSS Float

Elements that seem to float on the right or left side of either the browser window or another element are often configured using the **float property**. The browser renders these elements using normal flow and then shifts them to either the right or left as far as possible within their container (usually either the browser viewport or a div element).

- Use `float: right;` to float the element on the right side of the container.
- Use `float: left;` to float the element on the left side of the container.
- Specify a width for a floated element unless the element already has an implicit width, such as an img element.
- Other elements and web page content will flow around the floated element.

[Figure 6.5](#) shows a web page with an image configured with `float: right;` to float on the right side of the browser viewport (see chapter6/float.html in the student files). When floating an image, the margin property is useful to configure empty space between the image and text on the page.

## Figure 6.5



The image is configured to float

### Figure 6.5 Full Alternative Text

View [Figure 6.5](#) and notice how the image stays on the right side of the browser viewport. An id called `y1s` was created that applies the `float`, `margin`, and `border` properties. The attribute `id="y1s"` was placed on the image tag. The CSS is

```
h1 { background-color: #A8C682;  
    padding: 5px;  
    color: #000000; }  
p { font-family: Arial, sans-serif; }  
#y1s { float: right;  
      margin: 0 0 5px 5px;  
      border: 1px solid #000000; }
```

The HTML source code is

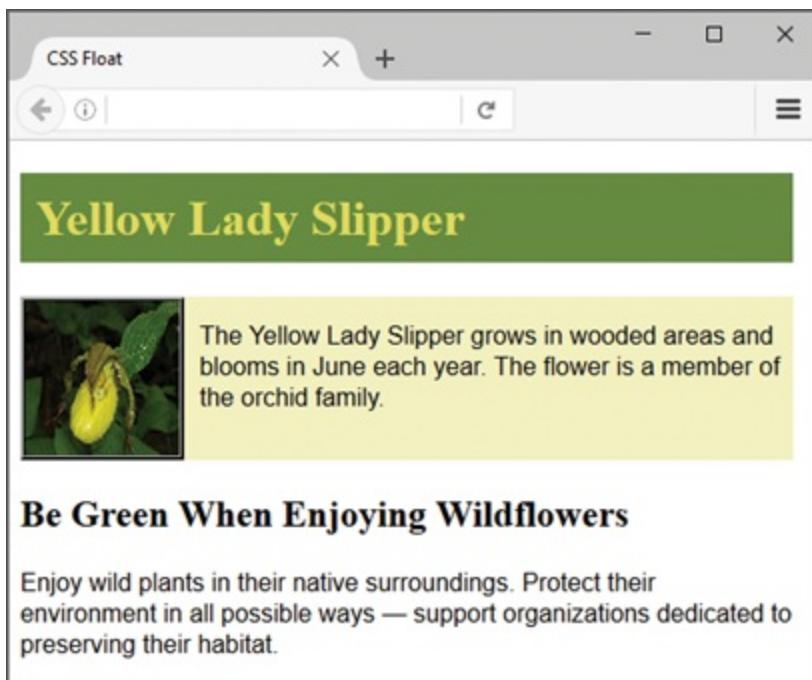
```
<h1>Wildflowers</h1>  


The Yellow Lady Slipper grows in wooded areas and blooms in June
<br class="clearleft">
</div>
```

[Figure 6.7](#) displays a screen shot of this page. Review [Figure 6.6](#) and note two changes: the light background color of the `div` element extends farther

down the page and the h2 element's text begins on its own line under the image.

## Figure 6.7



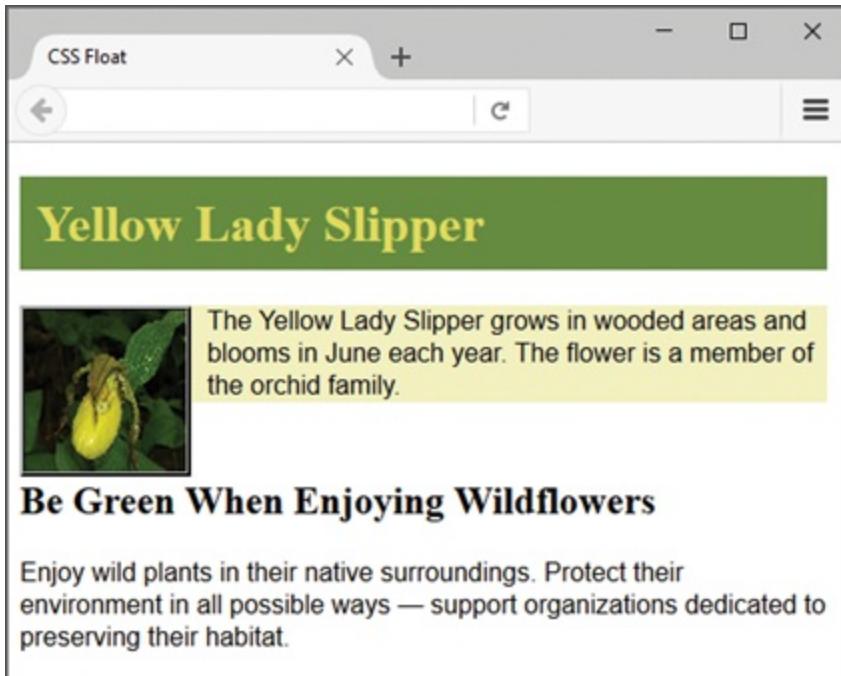
The clear property is applied to a line break tag

[Figure 6.7 Full Alternative Text](#)

## Another Technique to Clear a Float

If you are not concerned about the light background color display, another option is to omit the line break tag and, instead, apply the `clearleft` class to the h2 element, which is the first block display element after the div. This does not change the display of the light background color, but it does force the h2 element's text to begin on its own line, as shown in [Figure 6.8](#) (see chapter6/clear2.html in the student files).

# Figure 6.8



The clear property is applied to the h2 element

[Figure 6.8 Full Alternative Text](#)

## The overflow Property

The **overflow** property is often used to clear a float, although its intended purpose is to configure how content should display if it is too large for the area allocated. See [Table 6.2](#) for a list of commonly used values for the overflow property.

## Table 6.2 The overflow property

Value	Purpose
	Default value; the content is displayed, and if it's too large, the content will overflow and extend outside the area allocated to it
<code>hidden</code>	The content is clipped to fit the area allocated to the element in the browser viewport
<code>auto</code>	The content fills the area allocated to it and, if needed, scrollbars are displayed to allow access to the remaining content
<code>scroll</code>	The content is rendered in the area allocated to it and scrollbars are displayed

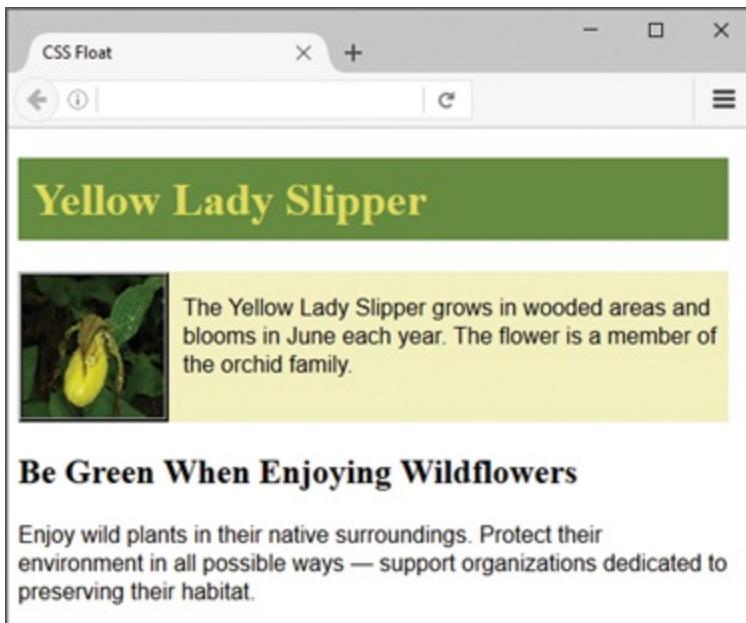
## Clear a Float

Review [Figure 6.6](#) and the code sample (chapter6/6.2/index.html in the student files). Observe the div element, which contains the floated image and first paragraph on the page. Notice that although the div element contains both an image and the first paragraph, the light background color of the div element does not extend as far as expected; it is only visible in the area occupied by the first paragraph. You can use the `overflow` property assigned to the container element to resolve this display issue and clear the float. In this case, we'll apply the `overflow` and `width` properties to the div selector. The CSS to configure the div in this manner is

```
div { background-color: #F3F1BF;
      overflow: auto;
      width: 100%; }
```

This will clear the float. The web page will display as shown in [Figure 6.9](#) (see chapter6/overflow.html in the student files).

## Figure 6.9



The overflow property is applied to the div selector

### [Figure 6.9 Full Alternative Text](#)

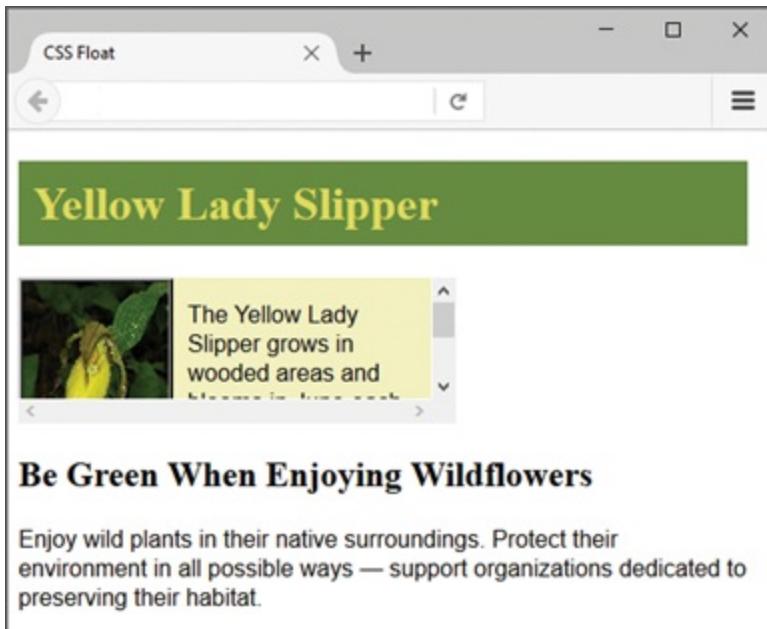
Notice that using the `overflow` property (see [Figure 6.9](#)) and applying the `clear` property to a line break tag (see [Figure 6.7](#)) result in a similar web page display. You may be wondering about which CSS property (`clear` or `overflow`) is the best one to use when you need to clear a float.

Although the `clear` property is widely used, in this example, it is more efficient to apply the `overflow` property to the container element (for example, a `div` element). This will clear the float, avoid adding an extra line break tag, and ensure that the container element expands to enclose the entire floated element. You'll get more practice with the `float`, `clear`, and `overflow` properties as you continue working through this textbook. Floating elements is a key technique for designing multicolumn page layouts with CSS.

# Configure Scrollbars

The web page in [Figure 6.10](#) demonstrates the use of `overflow: auto;` to automatically display scrollbars if the content exceeds the space allocated to it. In this case, the div that contains the paragraph and the floated image was configured with a width of 300px and a height of 100px.

## Figure 6.10



The browser displays scrollbars

[Figure 6.10 Full Alternative Text](#)

See the example web page (chapter6/scroll.html in the student files). The CSS for the div is shown below:

```
div { background-color: #F3F1BF;  
      overflow: scroll;  
      width: 300px;  
      height: 100px; }
```



## Checkpoint 6.1

1. List the components of the box model from innermost to outermost.
2. Describe the purpose of the CSS float property.
3. Which two CSS properties can be used to clear a float?

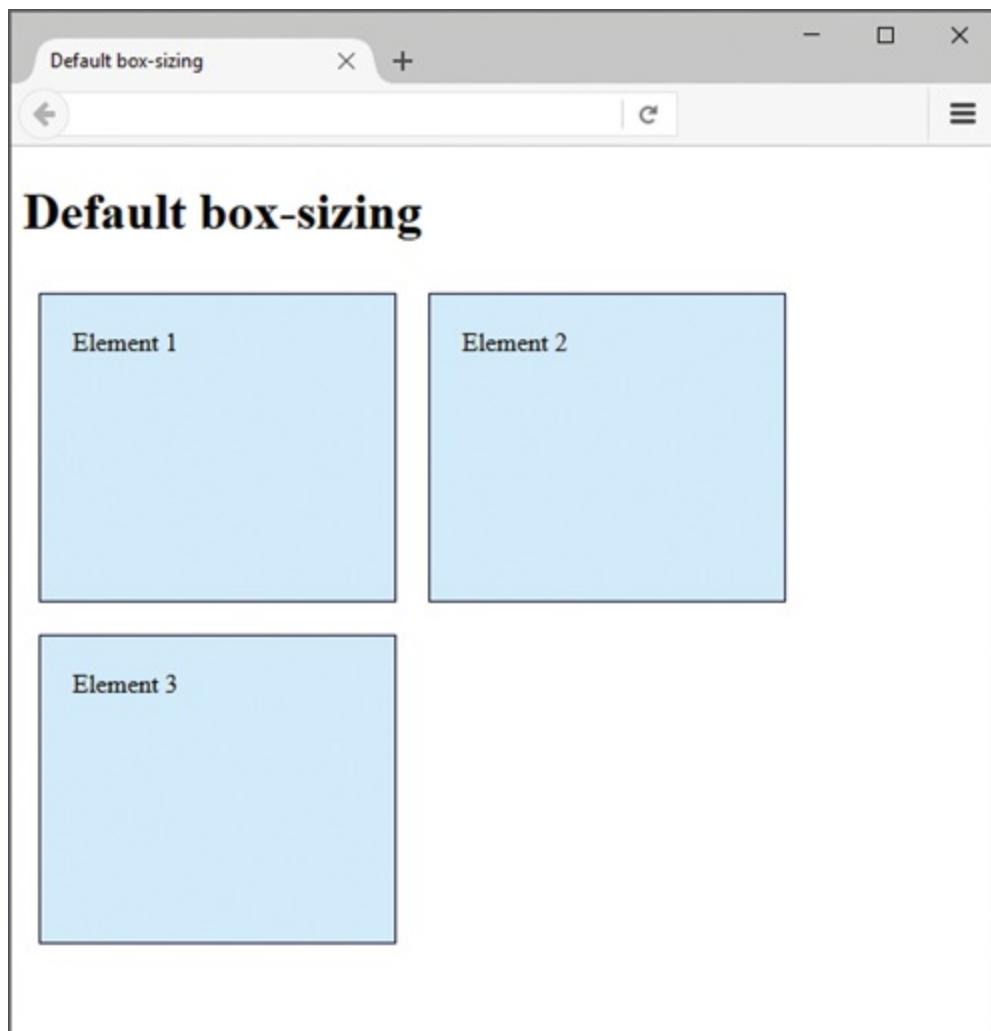
## 6.5 CSS Box Sizing

When you view an element on a web page it's intuitive to expect that the width of an element on a page includes the size of the element's padding and border. However, this isn't the default behavior of browsers. Recall from the box model introduction in Section 6.1 that the `width` property by default only includes the actual width of the content itself within the element and does not also include the width of any padding or border that may exist for the element. The purpose of the `box-sizing` property is to alleviate this issue. The `box-sizing` property causes the browser calculation of the width or height to include the content's actual width or height in addition to the width or height of any padding and border that may exist.

Valid `box-sizing` property values include `content-box` (the default) and `border-box`. Use the `CSS box-sizing: border-box;` declaration to configure the browser to also include the values of the border and padding when calculating the width and height properties of an element.

[Figures 6.11](#) and [6.12](#) show web pages (`boxsizing1.html` and `boxsizing2.html` in the student files `chapter6` folder) that each have floated elements configured with 30% width, 150px height, 20px padding, and 10px margin. The page in [Figure 6.11](#) uses default box-sizing. The page in [Figure 6.12](#) uses box-sizing set to `border-box`. The size of the elements and the placement of the elements on the pages differ. You may notice at first glance that the elements look larger in [Figure 6.11](#). The larger display is because the browser sets the content to 30% width before adding the 20 pixels of padding on each side. The elements are smaller in [Figure 6.12](#). The smaller display is because the browser applies the 30% width to the combination of the padding and the content.

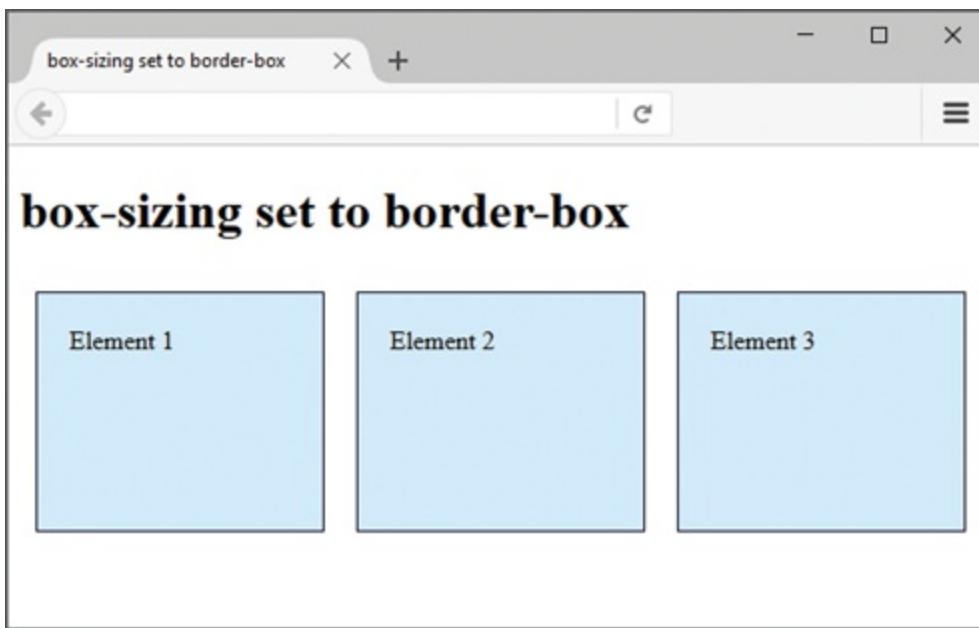
### Figure 6.11



Default box-sizing

[Figure 6.11 Full Alternative Text](#)

## Figure 6.12



box-sizing set to border-box

#### Figure 6.12 Full Alternative Text

Let's take a closer look at the placement of the three floated elements on the page. [Figure 6.11](#) does not display all three elements side-by-side. This web page uses default box-sizing so the browser assigned the 30% width to each element's content only and then added 20 pixels of padding to each side of each element. Due to these calculations, the browser determined there was not enough room in the browser viewport to display all three elements next to each other and the browser dropped the third floated element to the next line. The web page in [Figure 6.12](#) is coded with box-sizing set to border-box which configures the three floated elements to be displayed side-by-side because the browser assigned the 30% width to the combined content and padding areas (including 20 pixels of padding on each side).

It is common practice for web developers to apply border-box box-sizing when they plan to use floated elements or multicolumn layouts. It's also common practice to apply box-sizing by configuring the \* universal selector, which will target all HTML elements. The CSS style rule to apply border-box box-sizing to all elements with the universal selector is

```
* { box-sizing: border-box; }
```

Feel free to experiment with the box-sizing property and the example files (chapter6/boxsizing1.html and chapter6/boxsizing2.html in the student files).

## 6.6 CSS Two-Column Layout

### Your First Two-Column Layout

A common design for a web page is a two-column layout. This is accomplished with CSS by configuring one of the columns to float on the web page. Coding HTML is a skill and skills are best learned by practice. The next Hands-On Practice guides you as you convert a single-column page layout ([Figure 6.13](#)) into your first two-column layout ([Figure 6.14](#)).

**Figure 6.13**



Single-column layout.

[Figure 6.13 Full Alternative Text](#)

**Figure 6.14**



Two-column layout.

[Figure 6.14 Full Alternative Text](#)



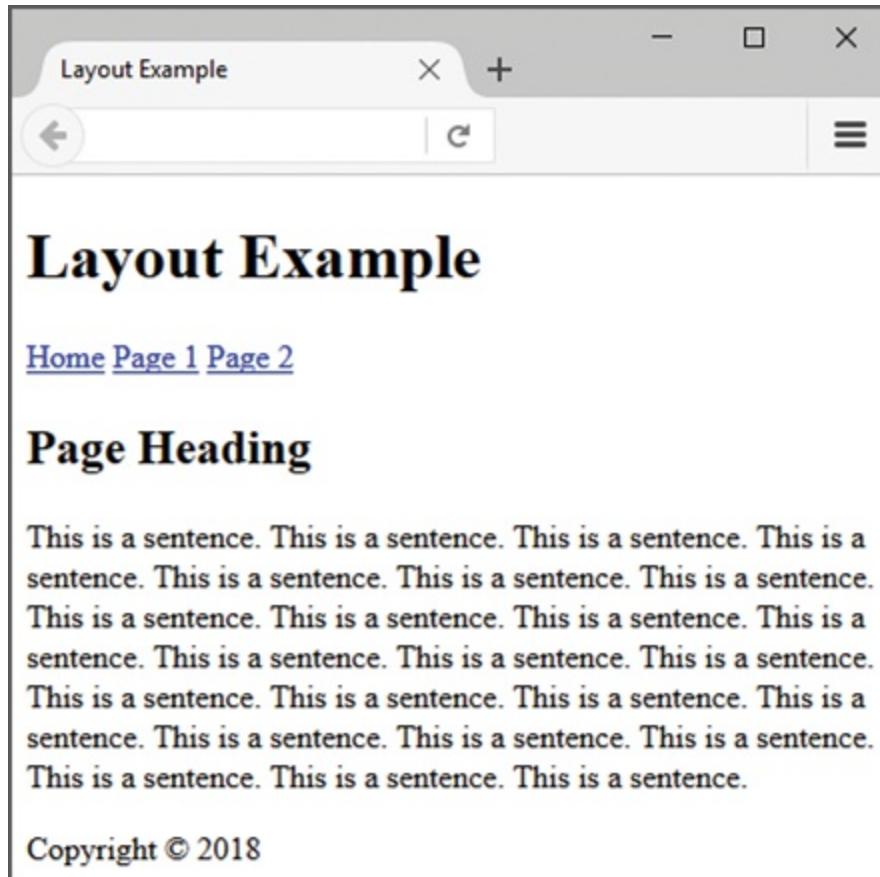
## Hands-On Practice 6.3

1. **Review single-column layout.** Launch a text editor, and open the `singlecol.html` file from the chapter6 folder in the student files. Take a moment to look over the code. Notice the structure of the HTML tags correspond to wireframe in [Figure 6.13](#).

```
<body>
<div id="wrapper">
    <header> </header>
    <nav> </nav>
    <main> </main>
    <footer> </footer>
</div>
</body>
```

Save the file as `index.html`. When you display `index.html` in a browser, your display should be similar to [Figure 6.15](#).

# Figure 6.15



Web page with single-column layout.

## [Figure 6.15 Full Alternative Text](#)

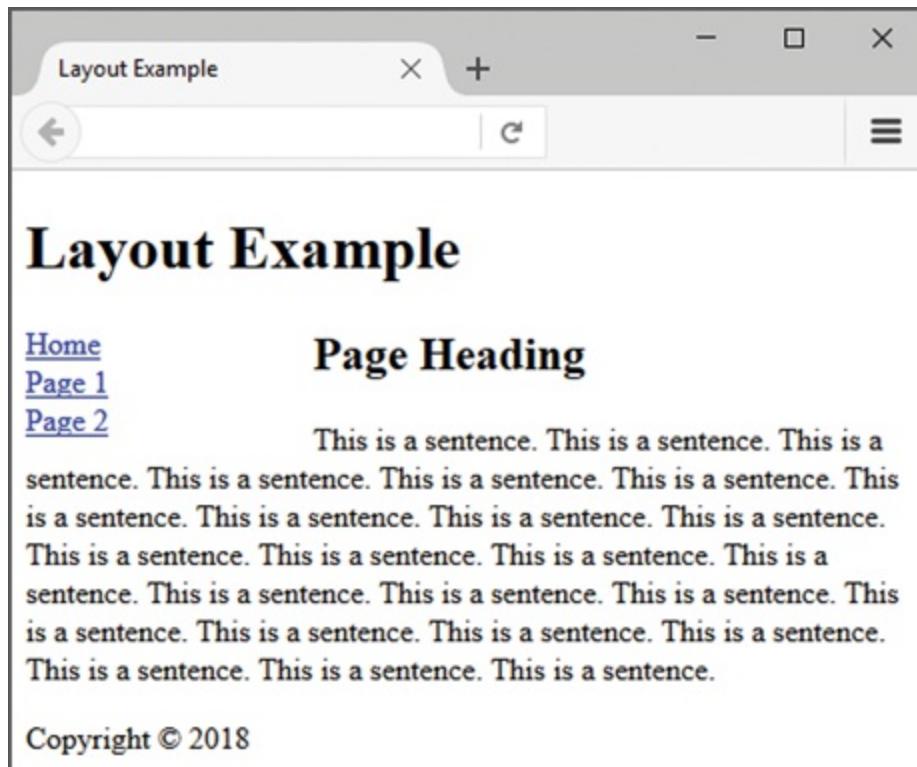
2. **Configure a two-column layout.** Launch a text editor and open the index.html file. You will edit the HTML and CSS to configure a two-column layout as shown in [Figure 6.14](#) wireframe.
  1. Edit the HTML. The single-column navigation is horizontal but the two-column navigation will be displayed in a vertical orientation. Later in this chapter, you'll learn how to configure navigation hyperlinks within an unordered list but for now, a quick adjustment is to code a line break tag after each of the first two hyperlinks in the nav area.

- Configure the float with CSS. Locate the style tags in the head section of the document and code the following style rule as embedded CSS to configure a nav element with a width of 90px that floats to the left.

```
nav { float: left;  
      width: 90px; }
```

Save the file and test it in the Firefox or Chrome browser. Your display will be similar to [Figure 6.16](#). Notice that the content in the main area wraps around the floated nav element.

## Figure 6.16



The nav is floating on the left

### [Figure 6.16 Full Alternative Text](#)

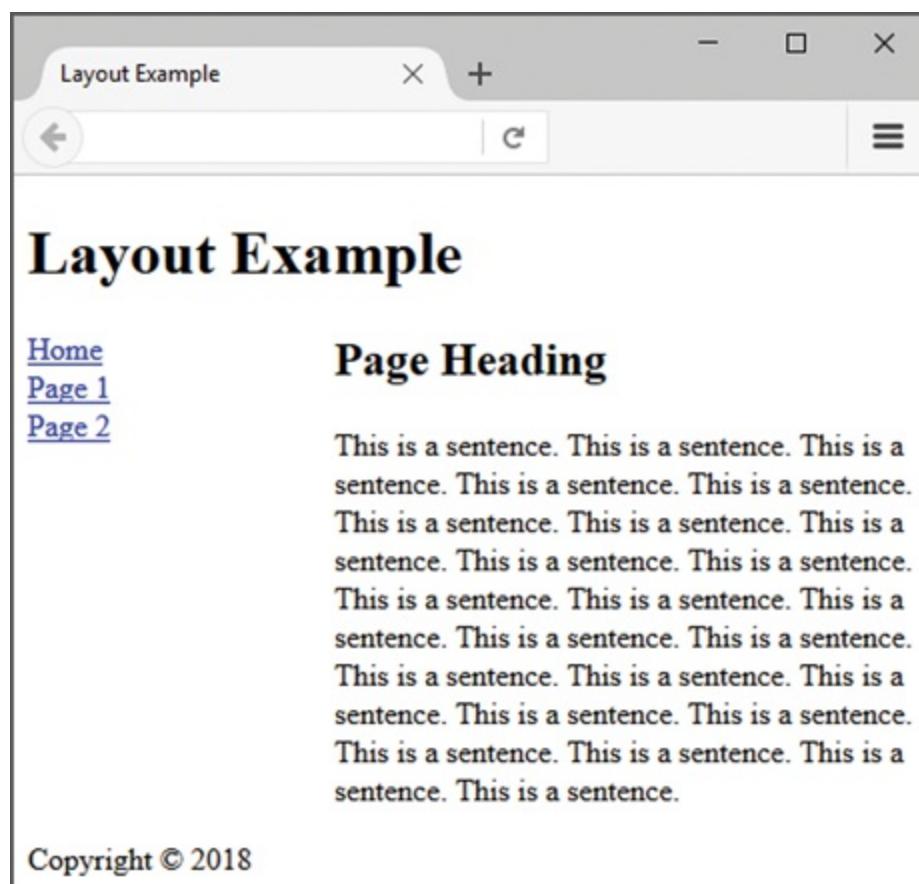
- Configure two columns with CSS. You just configured the nav

element to float on the left. The main element will be in the right-side column and will be configured with a left margin (the same side as the float). To get a two-column look, the value of the margin should be greater than the width of the floated element. Open the index.html file in a text editor and code the following style rule to configure a 100px left margin for the main element.

```
main { margin-left: 100px; }
```

Save the file and test it in the Firefox or Chrome browser. Your display will be similar to [Figure 6.17](#) with a two-column layout.

## Figure 6.17

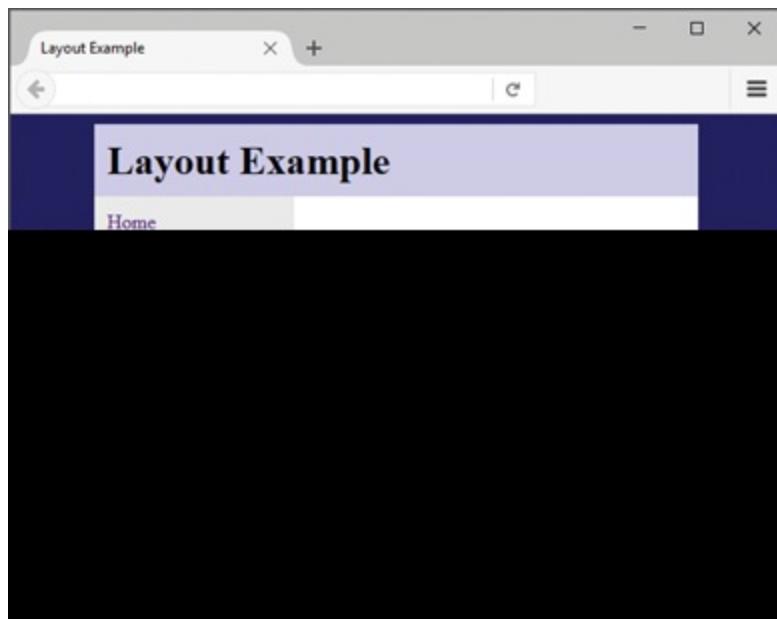


## Two-column layout

### Figure 6.17 Full Alternative Text

4. **Enhance the page with CSS.** Code the following style rules as embedded CSS to create a more appealing web page. When you have completed this step, your page should be similar to [Figure 6.18](#).

## Figure 6.18



Final two-column layout

### Figure 6.18 Full Alternative Text

1. **The body element selector.** Configure a dark background color.

```
body { background-color: #000066; }
```

2. **The wrapper id selector.** Configure 80% width, centered on the page, and a light (#EAEAEA) background color. This background color will display behind child elements (such as the nav element) that do not have a background color

configured.

```
#wrapper { width: 80%;  
          margin-left: auto;  
          margin-right: auto;  
          background-color: #EAEAEA; }
```

3. **The header element selector.** Configure #CCCCFF background color.

```
header { background-color: #CCCCFF; }
```

4. **The h1 element selector.** Configure 0 margin and 10px of padding.

```
h1 { margin: 0;  
     padding: 10px; }
```

5. **The nav element selector.** Edit the style rule and add a declaration for 10 pixels of padding.

```
nav { float: left;  
      width: 90px;  
      padding: 10px; }
```

6. **The main element selector.** Edit the style rule and add a declaration for 10 pixels of padding and #FFFFFF background color.

```
main { margin-left: 100px;  
       padding: 10px;  
       background-color: #FFFFFF; }
```

7. **The footer element selector.** Configure centered, italic text, and a #CCCCFF background color. Also configure the footer to clear all floats.

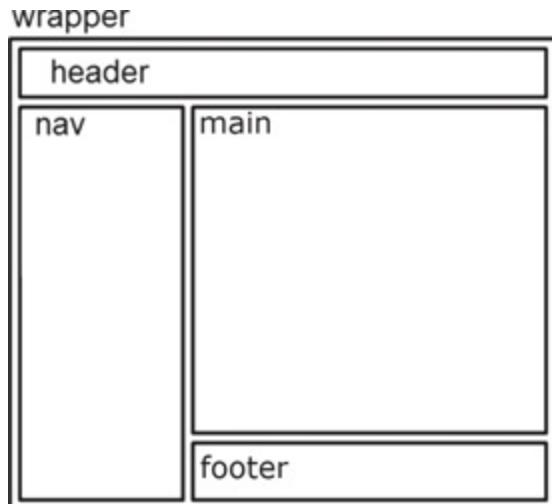
```
footer { text-align: center;  
         font-style: italic;  
         background-color: #CCCCFF;  
         clear: both; }
```

Save your file and test it in the Firefox or Chrome browser. Your display should be similar to [Figure 6.18](#). You can compare your work to the sample in the student files (chapter6/6.3/index.html). Internet Explorer does not support the HTML5 main element. You will need to nudge Internet Explorer to comply by adding the display: block; declaration (introduced later in this chapter) to the styles for the main element selector. An example solution is in the student files (chapter6/6.3/iefix.html).

## Two-Column Layout Example

The web page you coded in Hands-On Practice 6.3 is just one example of a two-column layout design. Let's explore coding the two-column layout with a footer in the right column as shown in [Figure 6.19](#) wireframe. The HTML template for the page layout is

### Figure 6.19



Alternate wireframe

[Figure 6.19 Full Alternative Text](#)

```
<div id="wrapper">
  <header>
    </header>
```

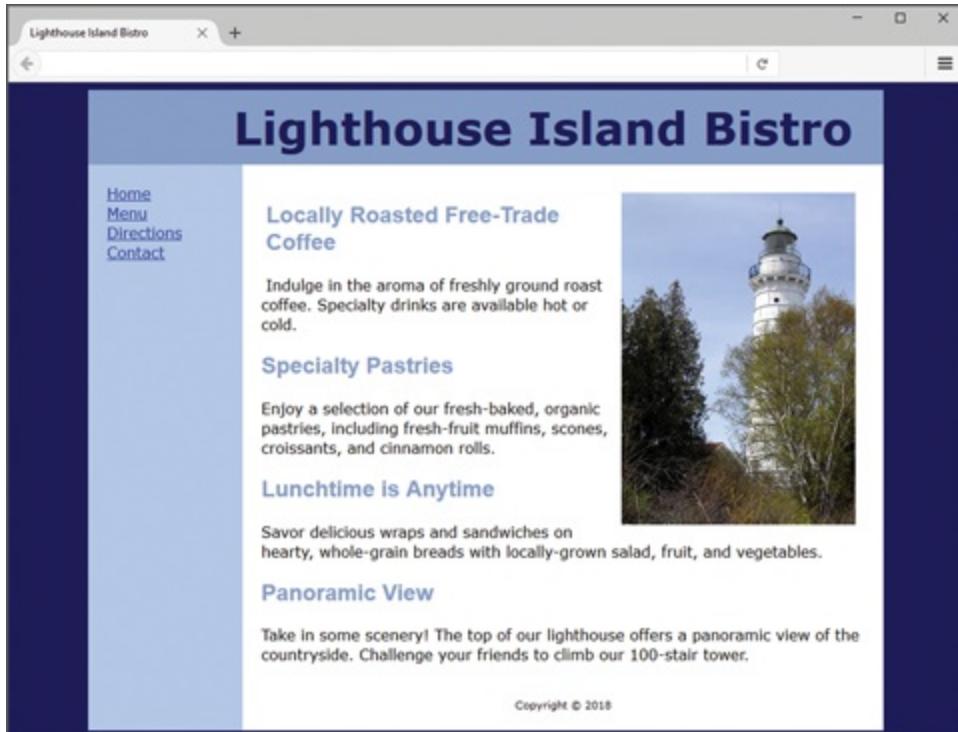
```
<nav>
</nav>
<main>
</main>
<footer>
</footer>
</div>
```

The key CSS configures a floating nav element, a main element with a left margin, and a footer with a left margin.

```
nav { float: left; width: 150px; }
main { margin-left: 165px; }
footer { margin-left: 165px; }
```

The web page shown in [Figure 6.20](#) implements this layout. An example is in the student files, chapter6/layout/twocol.html.

## Figure 6.20



Page with alternate layout

Figure 6.20 Full Alternative Text



## FAQ

1. Does the order of the floated and non-floated elements matter?

A key to coding successful layouts with float is in the HTML—code the element that needs to float BEFORE its companion elements. The browser will shift the floated element over to the side of the browser viewport and display the elements that follow alongside the floated element.



## FAQ

1. Do I have to use a wrapper?

No, you are not required to use a wrapper or container for a web page layout. However, it does make it easier to get the two-column look because the background color of the wrapper div will display behind any of its child elements that do not have their own background color configured. This technique also provides you with the option of configuring a different background color or background image for the page using the body element selector.

## Not Yet Ready for Prime Time

There is one more aspect of the two-column layout web page design to consider before it is ready for “prime time.” The navigation area is a list of

hyperlinks. In order to more closely semantically describe the navigation area, the hyperlinks should be configured in an unordered list. In the next section, you'll learn techniques to configure horizontal and vertical navigation hyperlinks in unordered lists.

## 6.7 Hyperlinks in an Unordered List

One of the advantages of using CSS for page layout involves the use of semantically correct code. Writing semantically correct code means choosing the markup tag that most accurately reflects the purpose of the content. Using the various levels of heading tags for content headings and subheadings or placing paragraphs of text within paragraph tags (rather than using line breaks) are examples of writing semantically correct code. This type of coding is a step in the direction of supporting the Semantic Web. Leading Web developers such as Eric Meyer, Mark Newhouse, Jeffrey Zeldman, and others have promoted the idea of using unordered lists to configure navigation menus. After all, a navigation menu is a list of hyperlinks.

Configuring navigation with a list also helps to provide accessibility. Screen reader applications offer easy keyboard access and verbal cues for information organized in lists, such as the number of items in the list.



### Configure List Markers with CSS

Recall that the default display for an unordered list is to show a disc marker (often referred to as a bullet) in front of each list item. The default display for an ordered list is to show a decimal number in front of each list item. When you configure navigation hyperlinks in an unordered list, you may not always want to see those **list markers**. It's easy to configure them with CSS. Use the `list-style-type` **property** to configure the marker for an unordered or ordered list. See [Table 6.3](#) for common property values.

# Table 6.3 CSS properties for ordered and unordered list markers

Property Description	Value	List Marker Display
list-style-type	none	No list markers display
	disc	Circle
	circle	Open circle
	square	Square
	decimal	Decimal numbers
	upper-alpha	Uppercase letters
	lower-alpha	Lowercase letters
	lower-roman	Lowercase Roman numerals
	Image replacement	The <code>url</code> keyword with parentheses surrounding the file name or path for
	list-style-image	Image displays in front of each

	marker	the image	list item
list-style-type: square;	Configures placement of the list marker	inside	Markers are indented; text wraps under the markers
		outside (default)	Markers have default placement

[Figure 6.21](#) shows an unordered list configured with square markers using the following CSS:

## Figure 6.21

- Website Design
- Interactive Animation
- E-Commerce Solutions
- Usability Studies
- Search Engine Optimization

The unordered list markers are square

```
ul { list-style-type: square; }
```

[Figure 6.22](#) shows an ordered list configured with uppercase letter markers using the following CSS:

## Figure 6.22

- A. Website Design
- B. Interactive Animation
- C. E-Commerce Solutions
- D. Usability Studies
- E. Search Engine Optimization

The ordered list markers use uppercase letters

```
ol { list-style-type: upper-alpha; }
```

## Configure an Image as a List Marker

Use the **list-style-image** property to configure an image as the marker in an unordered or ordered list. In [Figure 6.23](#), an image named trillium.gif was configured to replace the list markers using the following CSS:

### Figure 6.23

-  Website Design
-  Interactive Animation
-  E-Commerce Solutions
-  Usability Studies
-  Search Engine Optimization

The list markers are replaced with an image

```
ul {list-style-image: url(trillium.gif); }
```

## Vertical Navigation with an Unordered List

[Figure 6.24](#) shows the navigation area of a web page (see chapter6/layout/twocolnav.html in the student files) that uses an unordered list to organize the navigation links. The HTML is

## Figure 6.24



Navigation in an unordered list

### [Figure 6.24 Full Alternative Text](#)

```
<ul>
<li><a href="index.html">Home</a></li>
<li><a href="menu.html">Menu</a></li>
<li><a href="directions.html">Directions</a></li>
<li><a href="contact.html">Contact</a></li>
</ul>
```

## Configure with CSS

OK, so now that we're semantically correct, how about improving the visual aesthetic? Let's use CSS to eliminate the list marker. We also need to make sure that our special styles only apply to the unordered list in the navigation area (within the `nav` element), so we'll use a descendant selector. The CSS to configure the list in [Figure 6.25](#) is

## Figure 6.25



The list markers have been eliminated with CSS

[Figure 6.25 Full Alternative Text](#)

```
nav ul { list-style-type: none; }
```

## Remove the Underline with CSS

The **text-decoration** property modifies the display of text in the browser. This property is most often used to eliminate the underline from the navigation hyperlinks with `text-decoration: none;`.

The CSS to configure the list in [Figure 6.26](#) (see chapter6/layout/twocolnav2.html in the student files) that eliminates the underline on the hyperlinks in the navigation area (within the nav element) is

## Figure 6.26



The CSS text-decoration property has been applied

```
nav a { text-decoration: none; }
```

# Horizontal Navigation with an Unordered List

You may be wondering how to use an unordered list for a horizontal navigation menu. The answer is CSS! List items are block display elements. They need to be configured as inline display elements to display in a single line. The CSS `display` property configures how the browser renders, or displays, an element on a web page. See [Table 6.4](#) for a list of commonly used values.

## Table 6.4 The `display` property

Value	Purpose
<code>none</code>	The element will not display
<code>inline</code>	The element will display as an inline element in the same line as the surrounding text and/or elements
<code>inline-block</code>	The element will display as an inline display element adjacent to other inline display elements but also can be configured with properties of block display elements including width and height.
<code>block</code>	The element will display as a block element with a margin above and below

[Figure 6.27](#) shows the navigation area of a web page (see chapter6/layout/vertical.html in the student files) with a horizontal navigation area organized in an unordered list. The HTML is

## Figure 6.27



Navigation in an unordered list

### [Figure 6.27 Full Alternative Text](#)

```
<nav>
<ul>
  <li><a href="index.html">Home</a></li>
  <li><a href="menu.html">Menu</a></li>
  <li><a href="directions.html">Directions</a></li>
  <li><a href="contact.html">Contact</a></li>
</ul>
</nav>
```

## Configure with CSS

The following CSS was applied in this example:

- To eliminate the list marker, apply `list-style-type: none;` to the `ul` element selector:

```
nav ul { list-style-type: none; }
```

- To render the list items horizontally instead of vertically, apply `display: inline;` to the `li` element selector:

```
nav li { display: inline; }
```

- To eliminate the underline from the hyperlinks, apply `text-decoration: none;` to the `a` element selector. Also, to add some space between the hyperlinks, apply `padding-right: 10px;` to the `a` element selector:

```
nav a { text-decoration: none; padding-right: 10px; }
```

## 6.8 CSS Interactivity with Pseudo-Classes

Have you ever visited a website and found that the text hyperlinks changed color when you moved the mouse pointer over them? Often, this is accomplished using a CSS pseudo-class, which can be used to apply a special effect to a selector. The five pseudo-classes that can be applied to the anchor element are shown in [Table 6.5](#).

**Table 6.5 Commonly used CSS pseudo-classes**

Pseudo-Class	When Applied
:link	Default state for a hyperlink that has not been clicked (visited)
:visited	Default state for a visited hyperlink
:focus	Triggered when the hyperlink has keyboard focus
:hover	Triggered when the mouse pointer moves over the hyperlink

`:active` Triggered when the hyperlink is actually clicked



VideoNote

## Interactivity with CSS pseudo-classes

Notice the order in which the pseudo-classes are listed in [Table 6.5](#). Anchor element pseudo-classes *must be coded in this order* (although it's OK to omit one or more of those listed). If you code the pseudo-classes in a different order, the styles will not be reliably applied. It's common practice to configure the `:hover`, `:focus`, and `:active` pseudo-classes with the same styles.

To apply a pseudo-class, write it after the selector. The following code sample will configure text hyperlinks to be red initially. The sample also uses the `:hover` pseudo-class to configure the hyperlinks to change their appearance when the visitor places the mouse pointer over them so that the underline disappears and the color changes.

```
a:link { color: #ff0000; }  
a:hover { text-decoration: none;  
          color: #000066; }
```

[Figure 6.28](#) shows part of a web page that uses a similar technique. Note the position of the mouse pointer over the Print This Page hyperlink. The text color has changed and has no underline.

## Figure 6.28

1. Text hyperlinks are underlined by default.

 [Print This Page](#)

2. The hover pseudo-class is triggered by the mouse. The browser no longer displays the underline below the hyperlink.

 [Print This Page](#) 

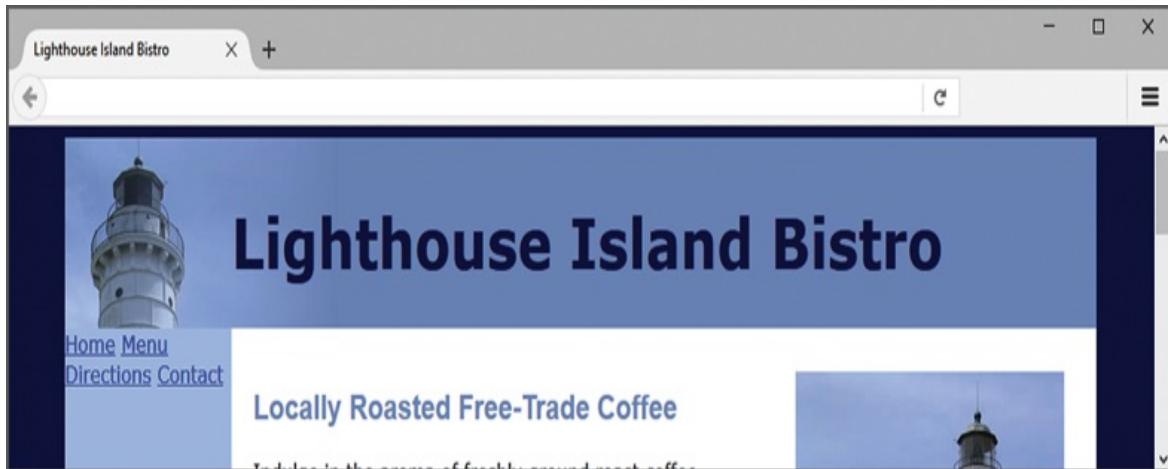
Using the hover pseudo-class



## Hands-On Practice 6.4

You will use pseudo-classes to create interactive hyperlinks in this Hands-On Practice. Create a folder named ch6hover. Copy the lighthouseisland.jpg, lighthouselogo.jpg, and starter.html files from the chapter6 folder in the student files into your ch6hover folder. Display the web page in a browser. It should look similar to [Figure 6.29](#). Notice that the navigation area needs to be configured.

## Figure 6.29



The navigation area needs to be styled in this two-column page layout

[Figure 6.29 Full Alternative Text](#)

Launch a text editor and open starter.html. Save the file as index.html in your ch6hover folder.

1. Review the code for this page, which uses a two-column layout. Examine the nav element and modify the code to configure the navigation in an unordered list.

```
<ul>
  <li><a href="index.html">Home</a></li>
  <li><a href="menu.html">Menu</a></li>
  <li><a href="directions.html">Directions</a></li>
  <li><a href="contact.html">Contact</a></li>
</ul>
```

Let's add CSS to the embedded styles to configure the unordered list elements in the nav element. Eliminate the list marker, set the left margin to 0, and set the padding to 10 pixels.

```
nav ul { list-style-type: none;
          margin-left: 0;
          padding: 10px; }
```

2. Next, configure basic interactivity with pseudo-classes.

- Configure the anchor tags in the nav element to have 10 pixels of padding, use bold font, and display no underline.

```
nav a { text-decoration: none;  
padding: 10px;  
font-weight: bold; }
```

- Use pseudo-classes to configure anchor tags in the nav element to display white (#ffffff) text for unvisited hyperlinks, light-gray (#eaeaea) text for visited hyperlinks, and dark-blue (#000066) text when the mouse pointer hovers over hyperlinks:

```
nav a:link { color: #ffffff; }  
nav a:visited { color: #eaeaea; }  
nav a:hover { color: #000066; }
```

Save your page and test in a browser. Move your mouse pointer over the navigation area and notice the change in the text color. Your page should look similar to [Figure 6.30](#) (see - chapter6/6.4/index.html in the student files).

## Figure 6.30



CSS pseudo-classes add interactivity to the navigation

[Figure 6.30 Full Alternative Text](#)

## CSS Buttons

In addition to configuring an interactive text hyperlink, another use of CSS and pseudo-classes is to configure a hyperlink that looks like a button. This coding technique saves on the bandwidth used by button image files. [Figure 6.31](#) depicts a web page with a “button” configured with CSS instead of with an image.

### Figure 6.31



CSS button

[Figure 6.31 Full Alternative Text](#)



## Hands-On Practice 6.5

In this Hands-On Practice you will explore the CSS button coding technique

and create the web page shown in [Figure 6.31](#). Create a new folder named button. Launch a text editor and open the template file located at chapter2/template.html in the student files. Save the file as index.html in your button folder. Modify the file to configure a web page as indicated:

1. Configure the text, CSS Button, within an h1 element and within the title element.
2. Configure a hyperlink with an anchor tag. Assign the anchor tag to a class named button. Configure the hyperlink to display the text, Sign Up, and link to a file named signup.html.

```
<a class="button" href="signup.html">Sign Up</a>
```

3. Now, let's add embedded CSS. Code a style element in the head section. Configure the following CSS within the style element.

1. Configure the body element selector with text-align: center;
2. Configure the h1 element selector with 2em bottom margin.

```
h1 { margin-bottom: 2em; }
```

3. Configure the button class selector with 60px border radius, 1em padding, #FFFFFF text color, #E38690 background color, Arial or sans-serif font family, 2em size bold font, centered text, and no text decoration. The CSS follows

```
.button { border-radius: 60px;
padding: 1em;
color: #FFFFFF;
background-color: #E38690;
font-family: Arial, sans-serif;
font-size: 2em;
font-weight: bold;
text-align: center;
text-decoration: none; }
```

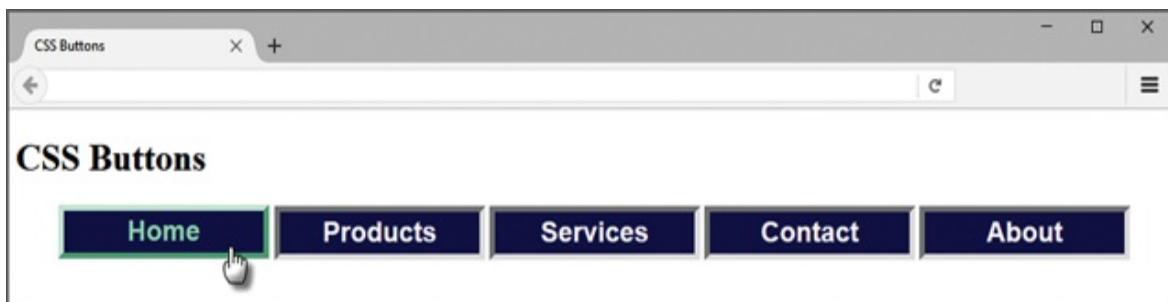
4. Configure the :link, :visited, and :hover pseudo-classes for the button class. The CSS follows

```
.button:link { color : #FFFFFF; }
.button:visited { color : #CCCCCC; }
.button:hover { color : #965251;
                background-color: #F7DEE1; }
```

Save your page and display it in a browser. When you place the cursor over the button you should see the text and background color change. A sample solution is in the student files (chapter6/6.5/button.html).

[Figure 6.32](#) (also in the student files chapter6/6.5/navbuttons.html) demonstrates using the CSS button coding technique to configure a group of horizontal navigation buttons.

## Figure 6.32



Navigation “buttons” configured with CSS

[Figure 6.32 Full Alternative Text](#)

# 6.9 Practice with CSS Two-Column Layout

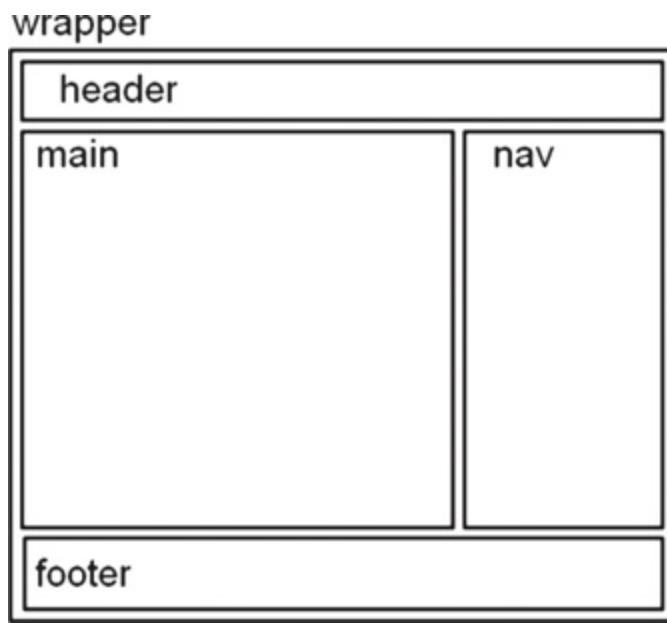
You've had some experience with a two-column layout, organizing navigation links in an unordered list, and configuring CSS pseudo-classes. Let's reinforce these skills with a Hands-On Practice.



## Hands-On Practice 6.6

In this Hands-On Practice, you'll create a new version of the Lighthouse Island Bistro home page with a header spanning two columns, content in the left column, vertical navigation in the right column, and a footer below the two columns. See [Figure 6.33](#) for a wireframe. You will configure the CSS in an external style sheet. Create a folder named ch6practice. Copy the starter2.html, lighthouseisland.jpg, and lighthouselogos.jpg files from the chapter6 folder in the student files into your ch6practice folder.

**Figure 6.33**



Wireframe for a two-column layout with navigation in the right-side column.

[Figure 6.33 Full Alternative Text](#)

1. Launch a text editor and open starter2.html. Save the file as index.html. Add a link element to the head section of the web page that associates this file with an external style sheet named lighthouse.css. A code sample follows.

```
<link href="lighthouse.css" rel="stylesheet">
```

2. Save the index.html file. Launch a text editor and create a new file named lighthouse.css in your ch6practice folder. Configure the CSS for the wireframe sections as follows:

- The universal selector: set the box-sizing property to border-box.

```
* { box-sizing: border-box; }
```

- The body element selector: very-dark-blue background (#00005D) and Verdana, Arial, or the default sans-serif font typeface

```
body { background-color: #00005D;
        font-family: Verdana, Arial, sans-serif; }
```

- The wrapper id: centered, width set to 80% of the browser viewport, minimum width of 960px, maximum width of 1200px, display text in a dark-blue color (#000066), and display a medium-blue (#B3C7E6) background color (*this color will display behind the nav area*)

```
#wrapper { margin: 0 auto;
           width: 80%;
           min-width: 960px; max-width: 1200px;
           background-color: #B3C7E6;
           color: #000066; }
```

- The header element selector: slate-blue (#869DC7) background color; very-dark-blue (#00005D) text color; 150% font size; top, right, and bottom padding of 10px; 155 pixels of left padding; and the lighthouselogo.jpg background image

```
header { background-color: #869DC7;
          color: #00005D;
          font-size: 150%;
          padding: 10px 10px 10px 155px;
          background-repeat: no-repeat;
          background-image: url(lighthouselogo.jpg); }
```

- The nav element selector: float on the right, width set to 200px, display bold text, letter spacing of 0.1 em

```
nav { float: right;
       width: 200px;
       font-weight: bold;
       letter-spacing: 0.1em; }
```

- The main element selector: white background color (#FFFFFF), black text color (#000000), 10 pixels of padding on the top and bottom, 20 pixels of padding on the left and right, display set to block (to prevent an Internet Explorer display issue), and overflow set to auto

```
main { background-color: #ffffff;
        color: #000000;
        padding: 10px 20px; display: block;
        overflow: auto; }
```

- The footer element selector: 70% font size, centered text, 10 pixels of padding, slate-blue background color (#869DC7), and clear set to both

```
footer { font-size: 70%;  
        text-align: center;  
        padding: 10px;  
        background-color: #869DC7;  
        clear: both; }
```

Save the file and display it in a browser. Your display should be similar to [Figure 6.34](#).

## Figure 6.34



Home page with major sections configured using CSS

### [Figure 6.34 Full Alternative Text](#)

- Continue editing the lighthouse.css file to style the h2 element selector and floating image. Configure the h2 element selector with slate-blue text color (#869DC7) and Arial or sans-serif font typeface. Configure the `#floatright` id to float on the right side with 10 pixels of margin.

```
h2 { color: #869DC7;  
    font-family: Arial, sans-serif; }  
#floatright { float: right;  
              margin: 10px; }
```

- Continue editing the lighthouse.css file and configure the navigation bar.
  - The ul element selector: Eliminate the list markers. Set a zero

margin and zero padding.

```
nav ul { list-style-type: none; margin: 0; padding: 0; }
```

- The a element selector: no underline, 20 pixels of padding, medium-blue background color (#B3C7E6), and 1 pixel solid white bottom border

Use `display: block;` to allow the web page visitor to click anywhere on the anchor “button” to activate the hyperlink.

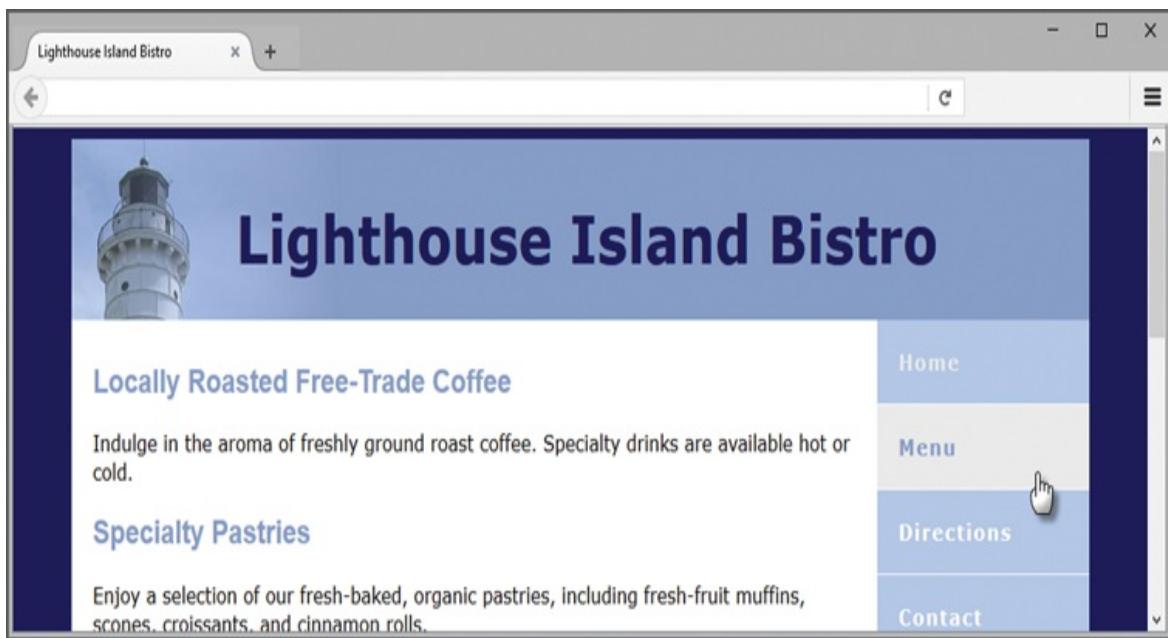
```
nav a { text-decoration: none;  
        padding: 20px;  
        display: block;  
        background-color: #B3C7E6;  
        border-bottom: 1px solid #FFFFFF; }
```

Configure the `:link`, `:visited`, and `:hover` pseudo-classes as follows:

```
nav a:link { color: #FFFFFF; }  
nav a:visited { color: #EAEAEA; }  
nav a:hover { color: #869DC7;  
              background-color: #EAEAEA; }
```

Save your files. Open your `index.html` file in a browser. Move your mouse pointer over the navigation area and notice the interactivity, as shown in [Figure 6.35](#) (see chapter6/6.6/index.html in the student files).

## Figure 6.35



CSS pseudo-classes add interactivity to the page

## 6.10 Header Text Image Replacement

Sometimes a client may have a specific font typeface other than a web-safe font that they would like to use in the header section for the company name. In this situation, it's common for a graphic designer to configure a header banner image that displays the company name in a font that is not web-safe, as shown in [Figure 6.36](#).

**Figure 6.36**



Header banner image with text in Papyrus, a non web-safe font

It is acceptable to display the banner with an image tag or configure the banner as a background image within the header element. However, the text contained in the image is not available to assistive technology such as screen readers and is not immediately visible to search engines.

A popular technique called **Header Text Image Replacement**, described by web designer Chris Coyier at <http://css-tricks.com/header-text-image-replacement>, allows you to configure a header banner image that displays text *and* an h1 element that contains text. The key is that the h1 text does not display within the browser viewport but is available to assistive technology and search engines. It's the best of both worlds, the client's banner image is - displayed and plain text is available to provide for accessibility and search engine optimization.

To apply Header Text Image Replacement:

1. Code the company or website name with the h1 element.
2. Configure styles for the header element; set the header banner image as the background of the header or h1 element.
3. Use the `text-indent` property to configure placement of the h1 text outside of the browser viewport, the declaration `text-indent: -9999px;` is most commonly used.

## Improved Header Text Image Replacement Technique

The Header Text Image Replacement technique works great on desktop and laptop computers. However, there can be a performance issue when web pages using this technique are displayed on mobile devices with slower processors as the browsers actually try to draw a box offscreen that is over 9999 pixels wide. Noted web developer Jeffrey Zeldman shared a method at <http://www.zeldman.com/2012/03/01/replacing-the-9999px-hack-new-image-replacement/> that prevents the performance issues. Set the h1 element selector's `text-indent` to 100% instead of to `-9999px`. Also, configure wrapping and overflow by setting the `white-space` property to `nowrap` and the `overflow` property to `hidden`. You'll practice using this adapted Header Text Image Replacement technique in this Hands-On Practice.



### Hands-On Practice 6.7

Create a folder named `replacech6`. Copy the `starter3.html` file from the `chapter6` folder into the `replace` folder and rename it as `index.html`. Copy the `background.jpg` and `lighthousebanner.jpg` files from `chapter6/starters` into

your replacech6 folder.

Launch a text editor and open index.html.

1. Examine the HTML. Notice that an h1 element with the text “Lighthouse Island Bistro” is present.
2. Edit the embedded styles and configure a style rule for the header element selector with height set to 150 pixels, bottom margin set to 0, and lighthousebanner.jpg as a background image that does not repeat.

```
header { height: 150px;  
         margin-bottom: 0;   
         background-image: url(lighthousebanner.jpg);  
         background-repeat: no-repeat; }
```

Save the file and test in a browser. You’ll see that both the h1 text and the text on the lighthousebanner.jpg image display, as shown in [Figure 6.37](#).

## Figure 6.37



Both the h1 text and the text in the image temporarily display

3. Edit the embedded styles and configure the text-indent, white-space,

and overflow properties for the h1 element selector as follows:

```
h1 { text-indent: 100%;  
     white-space: nowrap;  
     overflow: hidden; }
```

Launch a browser and view index.html as shown in [Figure 6.38](#).

## Figure 6.38



The Header Text Image Replacement technique has been applied to the web page

Although the text coded between the h1 tags no longer displays in the browser viewport, it is available to assistive technologies such as screen readers and to search engines. A suggested solution is in the student files chapter6/6.7 folder.



**Focus on  
Accessibility**

## 6.11 Practice with an Image Gallery

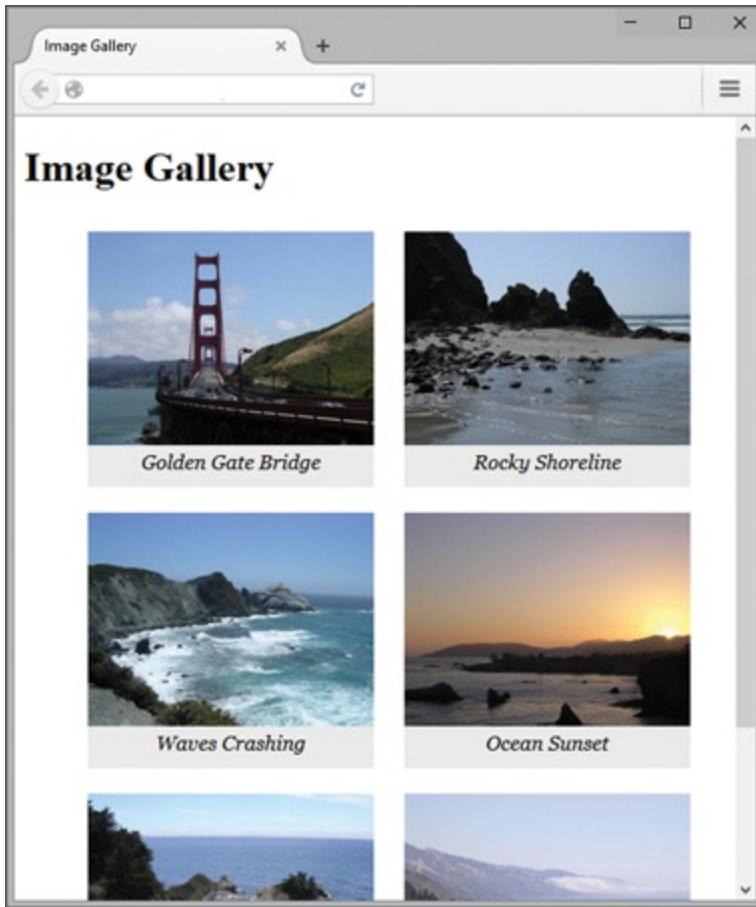
You have previously used an unordered list to configure a list of navigation hyperlinks. Since a bunch of navigation hyperlinks can be considered a list, the unordered list structure is a semantically correct method to code hyperlinks on a web page. Let's apply this coding method to a gallery of images (which is basically a bunch of images) displayed on a web page in the next Hands-On Practice.



### Hands-On Practice 6.8

In this Hands-On Practice you will create the web page shown in [Figure 6.39](#), which displays a group of images with captions.

**Figure 6.39**

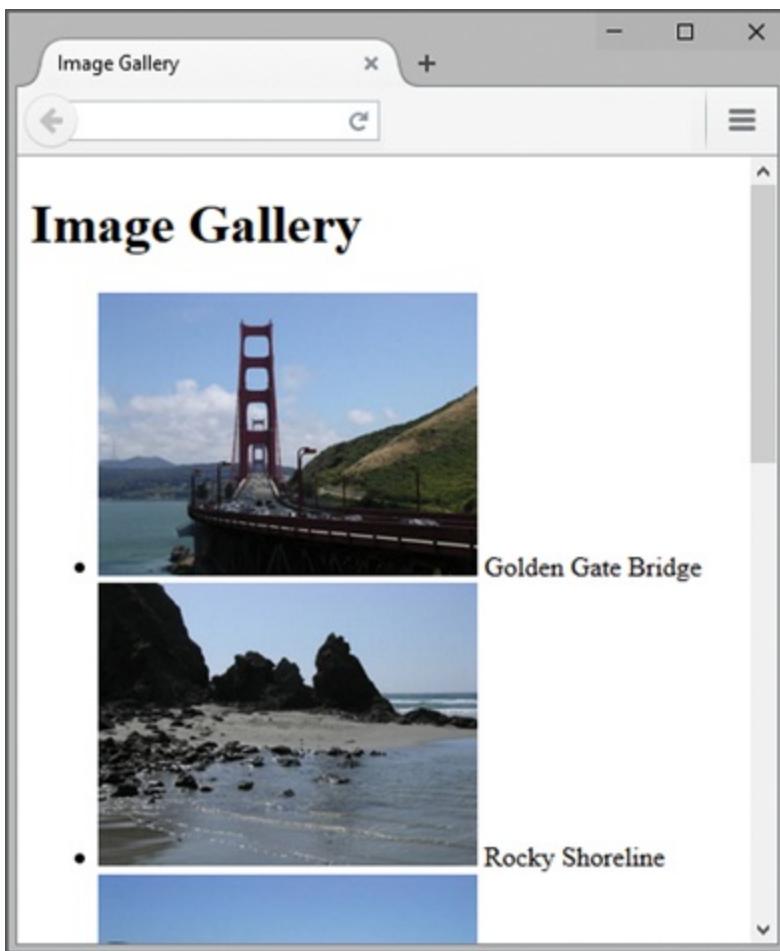


The images float in this web page

You'll configure the images and their captions to fill the available space in the browser viewport. The display will change based on the size of the browser viewport.

[Figure 6.40](#) shows the same web page displayed in a browser that has been resized to be narrower.

## Figure 6.40



The floated images move as the browser is resized

Create a new folder named gallery. Copy the following images from the student files chapter6/starters folder into the gallery folder: photo1.jpg, photo2.jpg, photo3.jpg, photo4.jpg, photo5.jpg, and photo6.jpg.

Launch a text editor and open the template file located at chapter2/template.html in the student files. Save the file as index.html in your gallery folder. Modify the file to configure a web page as indicated:

1. Configure the text, Image Gallery, within an h1 element and within the title element.
2. Configure an unordered list. Code six li elements, one for each image along with a brief text caption. An example of the first li element is

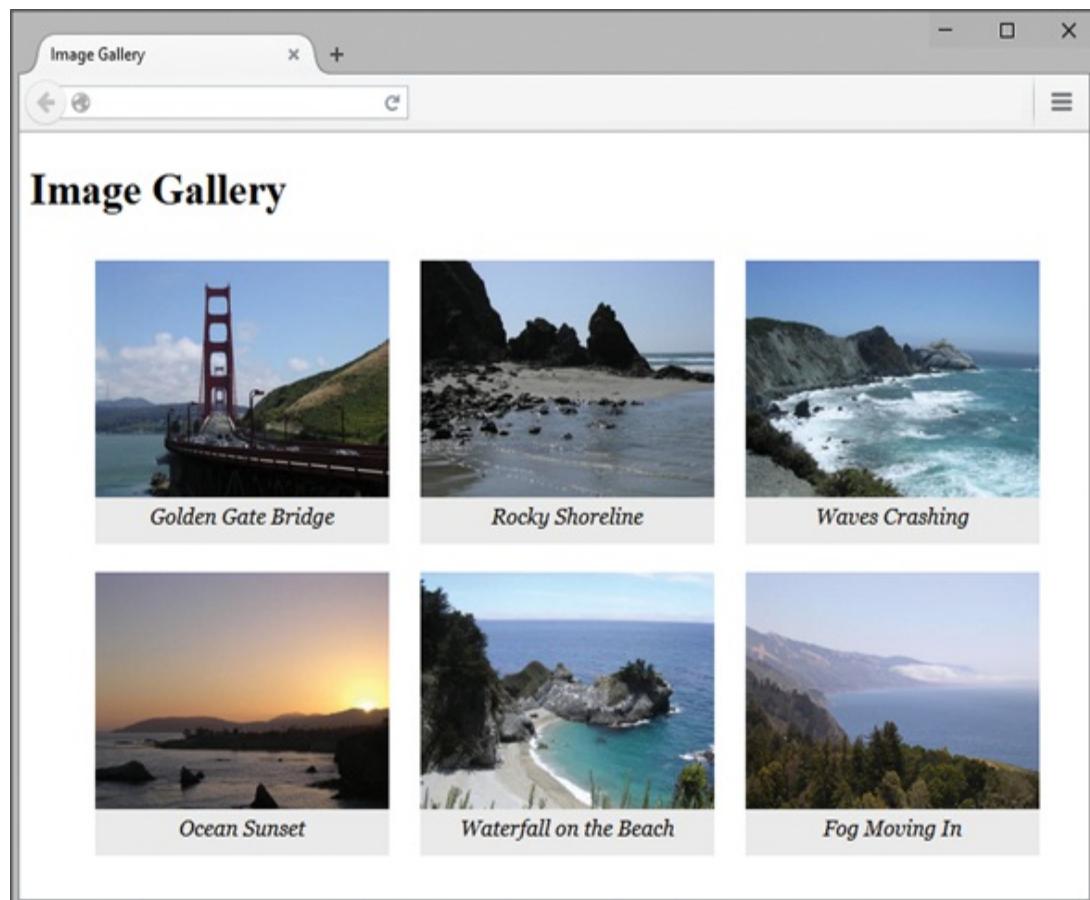
```
<li>
```

```

```

3. Configure all six li elements in a similar manner. Substitute the actual name of each image file for the src values in the code. Write your own descriptive text for each image. Use photo2.jpg in the second image element, photo3.jpg in the third image element, photo4.jpg in the fourth image element, photo5.jpg in the fifth image element, and photo6.jpg in the sixth image element. Save the file. Display your page in a browser. [Figure 6.41](#) shows a partial screen capture.

## Figure 6.41



The web page before CSS

4. Now, let's add embedded CSS. Open your file in a text editor and code a style element in the head section. Configure the ul element selector to not display a list marker. Configure the li element selector with inline-block display. Also set width to 225px, a 10 pixel margin, 10 pixels of bottom padding, light gray (#EAEAEA) background color, centered text, and italic text in the Georgia (or other serif) font. The CSS follows

```
ul { list-style-type: none; }
li { display: inline-block;
    width: 225px;
    padding-bottom: 10px;
    margin: 10px;
    background-color: #EAEAEA;
    text-align: center;
    font-style: italic;
    font-family: Georgia, serif; }
```

5. Save your page and display it in a browser. Experiment with resizing the browser window to see the display change. Compare your work to [Figures 6.39](#) and [6.40](#). A sample solution is in the student files (chapter6/6.8).

# 6.12 Positioning with CSS

You've seen how normal flow causes the browser to render the elements in the order that they appear in the HTML source code. You have also experienced how floating elements can move and shift as the browser viewport is resized. When using CSS for page layout there are situations when you may want more control over the position of an element. The **position** property configures the type of positioning used when the browser renders an element. [Table 6.6](#) lists position property values and their purpose.

## Table 6.6 The position Property

Value	Purpose
<code>static</code>	Default value; the element is rendered in normal flow
<code>fixed</code>	Configures the location of an element within the browser viewport; the element does not move when the page is scrolled
<code>relative</code>	Configures the location of an element relative to where it would otherwise render in normal flow
<code>absolute</code>	Precisely configures the location of an element outside of normal flow

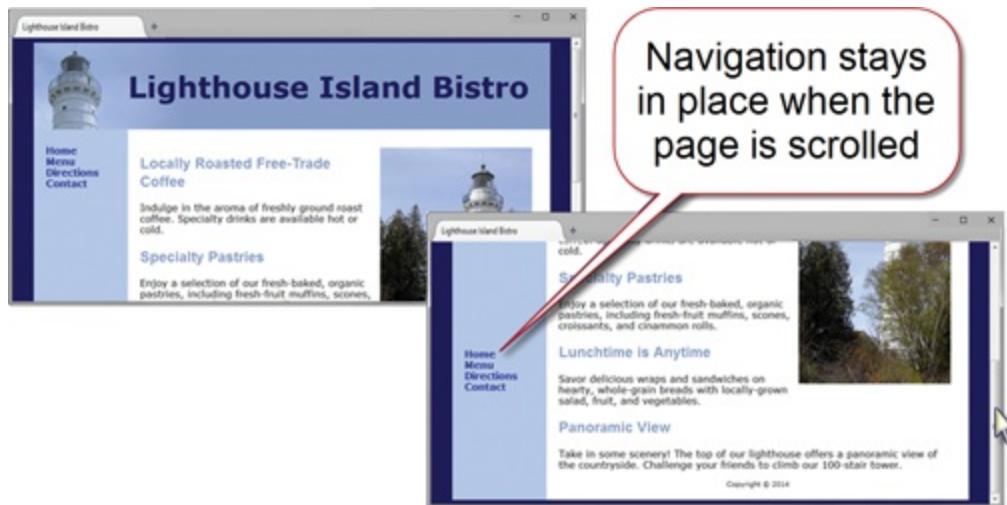
# Static Positioning

Static positioning is the default and causes the browser to render an element in normal flow. As you've worked through the exercises in this book, you have created web pages that the browser rendered using normal flow.

# Fixed Positioning

Use fixed positioning to cause an element to be removed from normal flow and to remain stationary, or “fixed in place,” when the web page is scrolled in the browser viewport. [Figure 6.42](#) shows a web page (see chapter6/fixed.html in the student files) with a navigation area configured with fixed position. The navigation stays in place even though the user has scrolled down the page. The CSS follows:

## Figure 6.42



The navigation is configured with fixed positioning

[Figure 6.42 Full Alternative Text](#)

```
nav { position: fixed; }
```

# Relative Positioning

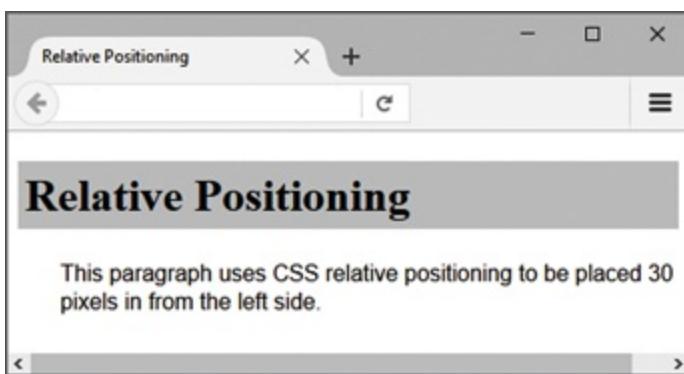
Use relative positioning to change the location of an element slightly, relative to where it would otherwise appear in normal flow. However, the area in normal flow is still reserved for the element and other elements will flow around that reserved space. Configure relative positioning with the `position: relative;` property along with one or more of the following offset properties: `left`, `right`, `top`, `bottom`. [Table 6.7](#) lists the offset properties.

## Table 6.7 The Position Offset Properties

Property	Value	Purpose
<code>left</code>	Numeric value or percentage	The position of the element offset from the left side of the container element
<code>right</code>	Numeric value or percentage	The position of the element offset from the right side of the container element
<code>top</code>	Numeric value or percentage	The position of the element offset from the top of the container element
<code>bottom</code>	Numeric value or percentage	The position of the element offset from the bottom of the container element

[Figure 6.43](#) shows a web page (chapter6/relative.html in the student files) that uses relative positioning along with the **left property** to configure the placement of an element in relation to the normal flow. In this case, the container element is the body of the web page. The result is that the content of the element is rendered as being offset or shifted by 30 pixels from the left where it would normally be placed at the browser's left margin. Notice also how the background-color and padding properties configure the h1 element. The CSS is

## Figure 6.43



The paragraph is configured using relative positioning

### [Figure 6.43 Full Alternative Text](#)

```
P { position: relative;
  left: 30px;
  font-family: Arial, sans-serif; }
h1 { background-color: #cccccc;
  padding: 5px;
  color: #000000; }
```

The HTML source code follows:

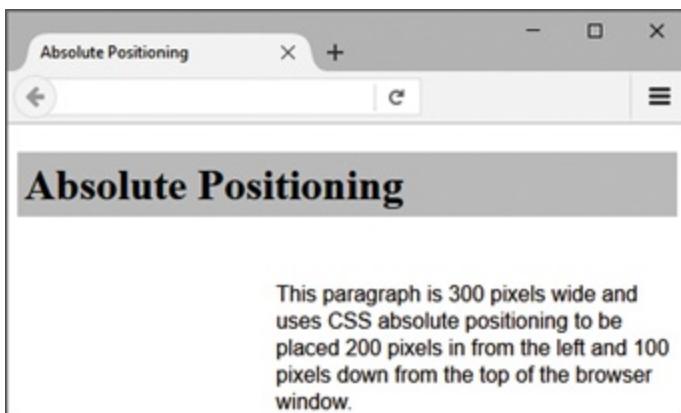
```
<h1>Relative Positioning</h1>
This paragraph uses CSS relative positioning to be placed 30 pixe
```

## Absolute Positioning

Use absolute positioning to precisely specify the location of an element outside of normal flow in relation to its first parent non-static element. If there is no non-static parent element, the absolute position is specified in relation to the body of the web page. Configure absolute positioning with the `position: absolute;` property along with one or more of the offset properties (`left`, `right`, `top`, `bottom`) listed in [Table 6.7](#).

[Figure 6.44](#) depicts a web page that configures an element with absolute positioning to display the content 200 pixels in from the left margin and 100 pixels down from the top of the web page document. An example is in the student files, (chapter6/absolute.html).

## Figure 6.44



The paragraph is configured with absolute positioning

### [Figure 6.44 Full Alternative Text](#)

The CSS is

```
p { position: absolute;
  left: 200px;
  top: 100px;
  font-family: Arial, sans-serif;
  width: 300px; }
```

The HTML source code is

```
<h1>Absolute Positioning</h1>
```

This paragraph is 300 pixels wide and uses CSS absolute positioni

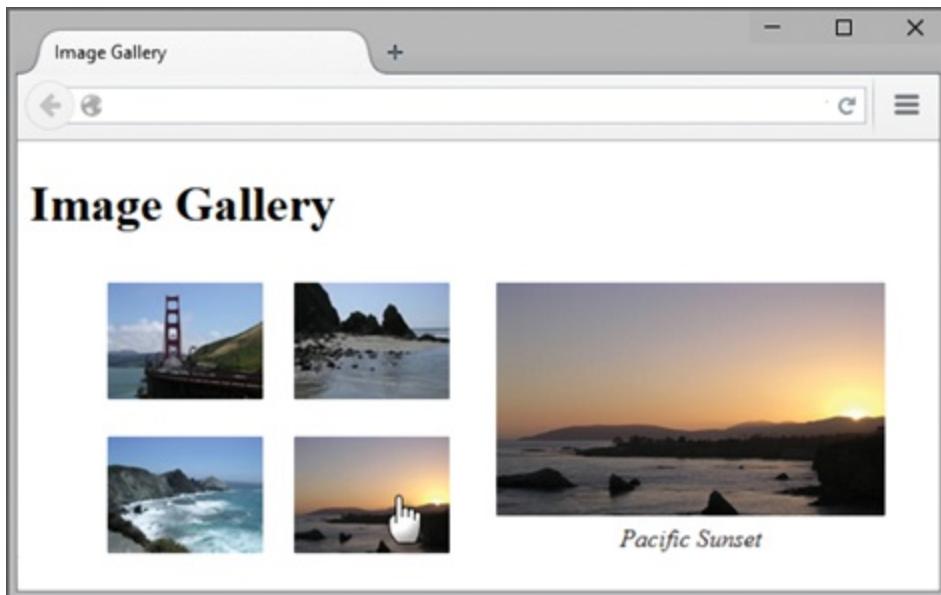
# Practice with Positioning

Recall that the CSS :hover pseudo-class provides a way to configure styles to display when the web page visitor moves the mouse over an element.

You'll use this basic interactivity along with CSS positioning and display properties to configure an interactive image gallery with CSS and HTML.

[Figure 6.45](#) shows the interactive image gallery in action (see chapter6/6.9/gallery.html in the student files). When you place the mouse over a thumbnail image, the larger version of the image is displayed along with a caption. If you click on the thumbnail, the larger version of the image displays in its own browser window.

## Figure 6.45



An interactive image gallery with CSS

[Figure 6.45 Full Alternative Text](#)



## Hands-On Practice 6.9

In this Hands-On Practice, you will create the interactive image gallery web page shown in [Figure 6.45](#). Copy the following images located in the student files chapter6/starters folder into a folder named gallery2: photo1.jpg, photo2.jpg, photo3.jpg, photo4.jpg, photo1thumb.jpg, photo2thumb.jpg, photo3thumb.jpg, and photo4thumb.jpg.

Launch a text editor and modify the chapter2/template.html file to configure a web page as indicated:

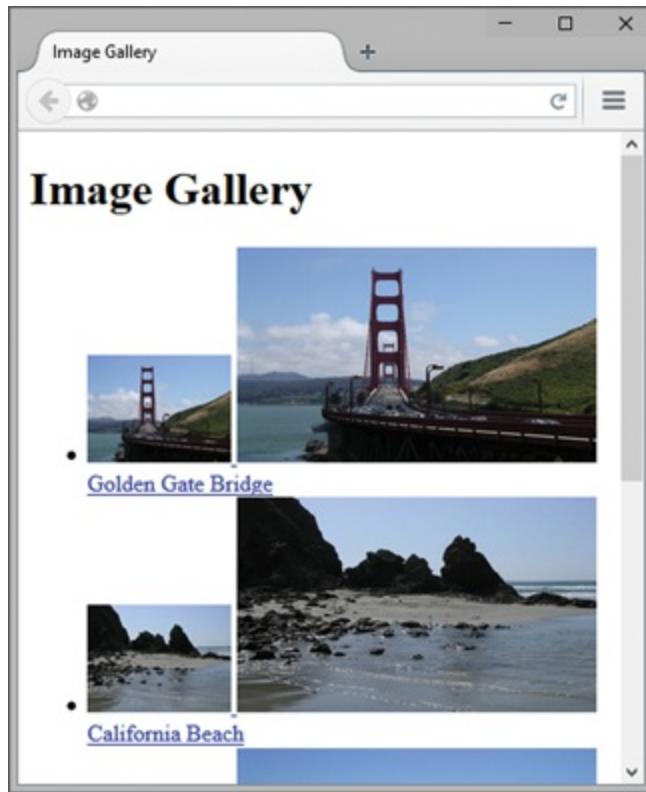
1. Configure the text, Image Gallery, within an h1 element, and within the title element.
2. Code a div assigned to the id named gallery. This div will contain the thumbnail images, which will be configured within an unordered list.
3. Configure an unordered list within the div. Code four li elements, one for each thumbnail image. The thumbnail images will function as image links with a :hover pseudo-class that causes the larger image to display on the page. We'll make this all happen by configuring an anchor element containing both the thumbnail image and a span element that comprises the larger image along with descriptive text. An example of the first li element is

```
<li><a href="photo1.jpg"><span></span></a></li>
```

4. Configure all four li elements in a similar manner. Substitute the actual name of each image file for the href and src values in the code. Write your own descriptive text for each image. Use photo2.jpg and photo2thumb.jpg in the second li element. Use photo3.jpg and photo3thumb.jpg in the third li element. Use photo4.jpg and photo4thumb.jpg for the fourth li element. Save the file as index.html in

the gallery2 folder. Display your page in a browser. You'll see an unordered list with the thumbnail images, the larger images, and the descriptive text. [Figure 6.46](#) shows a partial screen capture.

## Figure 6.46



The web page display before CSS

5. Now, let's add embedded CSS. Open your index.html file in a text editor and code a style element in the head section. The gallery id will use relative positioning instead of the default static positioning. This does not change the location of the gallery but sets the stage to use absolute positioning on the span element in relation to its container (#gallery) instead of in relation to the entire web page document. This won't matter too much for our very basic example, but it would be very helpful if the gallery were part of a more complex web page. Configure embedded CSS as follows:

1. Set the gallery id to use relative positioning.

```
#gallery { position: relative; }
```

2. The unordered list in the gallery should have a width of 250 pixels and no list marker.

```
#gallery ul { width: 250px; list-style-type: none; }
```

3. Configure the list item elements in the gallery with inline display, left float, and 10 pixels of padding.

```
#gallery li { display: inline; float: left; padding: 10px }
```

4. The images in the gallery should not display a border.

```
#gallery img { border-style: none; }
```

5. Configure anchor elements in the gallery to have no underline, #333 text color, and italic text.

```
#gallery a { text-decoration: none; color: #333; font-style: italic; }
```

6. Configure span elements in the gallery not to display initially.

```
#gallery span { display: none; }
```

7. Configure the span elements in the gallery to display *only* when the web visitor hovers the mouse over the thumbnail image link. Set the location of the span to use absolute positioning. Locate the span 10 pixels down from the top and 300 pixels in from the left. Center the text within the span:

```
#gallery a:hover span { display: block; position: absolute; top: 10px; left: 300px; text-align: center; }
```

Save your page and display it in a browser. Your interactive image gallery should work well in modern browsers. Compare your work to [Figure 6.45](#) and the sample in the student files (chapter6/6.9/gallery.html).

# 6.13 CSS Debugging Techniques

Using CSS for page layout requires some patience. It takes a while to get used to it. Fixing problems in code is called **debugging**. This term dates back to the early days of programming when an insect (a bug) lodged inside the computer and caused a malfunction. Debugging CSS can be frustrating and requires patience. One of the biggest issues is that even modern browsers implement CSS in slightly different ways. Browser support changes with each new browser version. Testing is crucial. Expect your pages to look slightly different in various browsers. The following are helpful techniques to use when your CSS isn't behaving properly:

## Verify Correct HTML Syntax

Invalid HTML code can cause issues with CSS. Use the W3C Markup Validation Service at <http://validator.w3.org> to verify the correct HTML syntax.

## Verify Correct CSS Syntax

Sometimes a CSS style does not apply because of a syntax error. Use the W3C CSS Validation Service at <http://jigsaw.w3.org/css-validator> to verify your CSS syntax. Carefully check your code. Many times, the error is in the line *above* the style that is not correctly applied.

## Configure Temporary Background Colors

Sometimes your code is valid but the page is not rendered in the way that you

would expect. If you temporarily assign distinctive background colors such as red or yellow and test again, it should be easier to see where the boxes are ending up.

## Configure Temporary Borders

Similar to the temporary background colors, you could temporarily configure an element with a 3 pixel red solid border. This will really jump out at you and help you recognize the issue quickly.

## Use Comments to Find the Unexpected Cascade

Style rules and HTML attributes configured farther down the page can override earlier style rules. If your styles are misbehaving, try “commenting out” (see below) some styles and test with a smaller group of statements. Then add the styles back in one by one to see where or when the breakdown occurs. Work patiently and test the entire style sheet in this manner.

Browsers ignore code and text that is contained between comment markers. A CSS comment begins with `/*` and ends with `*/`. The comment below is an example of documentation that explains the purpose of a style rule.

```
/* Set Page Margins to Zero */  
body { margin: 0; }
```

Comments can span multiple lines. The following comment begins on the line above the style declaration for the new class and ends on the line below the style declaration for the new class. This causes the browser to skip the new class when applying the style sheet. This technique can be useful for testing when you are experimenting with a number of properties and may need to temporarily disable a style rule.

```
/* temporarily commented out during testing  
.new { font-weight: bold; }
```

*\*/*

A common mistake when using comments is to type the beginning */\** without subsequently typing *\*/* to end the comment. As a result, *everything* after the */\** is treated as a comment by the browser.



## FAQ

### 1. Where can I find out more about CSS?

There are many websites with CSS resources and tutorials, including the following:

- Max Design: Two columns with color  
<http://www.maxdesign.com.au/articles/two-columns/>
- Listamatic: Vertical and horizontal lists with CSS  
<http://css.maxdesign.com.au/listamatic>
- W3C Cascading Style Sheets: <http://www.w3.org/Style/CSS>
- HTML5 and CSS3 Browser Support Chart: <http://caniuse.com>
- CSS3 Click Chart: <http://www.impressivewebs.com/css3-click-chart>
- SitePoint CSS Reference: <http://reference.sitepoint.com/css>

## 6.14 More HTML5 Structural Elements

You've worked with the HTML5 header, nav, main, and footer elements throughout this book. These HTML5 elements are used along with div and other elements to structure web page documents in a meaningful manner that defines the purpose of the structural areas. In this section you'll explore four more HTML5 elements.

# **Section Element**

The purpose of a section element is to indicate a “section” of a document, such as a chapter or topic. This block display element could contain header, footer, section, article, aside, figure, div, and other elements needed to configure the content.

# **Article Element**

The article element is intended to present an independent entry, such as a blog posting, comment, or e-zine article that could stand on its own. This block display element could contain header, footer, section, aside, figure, div, and other elements needed to configure the content.

# **Aside Element**

The aside element indicates a sidebar or other tangential content. This block display element could contain header, footer, section, aside, figure, div, and other elements needed to configure the content.

# **Time Element**

The time element represents a date or a time. An optional `datetime` attribute can be used to specify a calendar date and/or time in machine-readable format. Use YYYY-MM-DD for a date. Use a 24-hour clock and HH:MM for time. See <http://www.w3.org/TR/html-markup/time.html>.



## Hands-On Practice 6.10

In this Hands-On Practice you'll begin with the two-column Lighthouse Island Bistro home page (shown in [Figure 6.30](#)) and apply the section, article, aside, and time elements to create the page with blog postings shown in [Figure 6.47](#).

### Figure 6.47

The screenshot shows a web browser window for "Lighthouse Island Bistro". The header features a lighthouse image and the text "Lighthouse Island Bistro" with the tagline "the best coffee on the coast". A navigation menu on the left includes links for Home, Menu, Directions, and Contact. The main content area has a two-column layout. The left column is titled "Bistro Blog" and contains two entries: "Valentine Wrap" (February 1, 2018) and "New Coffee of the Day Promotion" (January 12, 2018). The right column contains an "aside" box with the text "Watch for the March Madness Wrap next month!". At the bottom, a copyright notice reads "Copyright © 2018".

This page utilizes the new elements

[Figure 6.47 Full Alternative Text](#)

Create a new folder named ch6blog. Copy the index.html and lighthouselogo.jpg files from the student files chapter6/6.4 folder into the ch6blog folder.

Launch a text editor, and open the index.html file. Examine the source code, and locate the header element.

1. Add the tagline “the best coffee on the coast” with a span element within the header element. Your code should look similar to the following

```
<header>
  <h1>Lighthouse Island Bistro</h1>
  <span>the best coffee on the coast</span>
</header>
```

2. Replace the contents of the main element with the following code:

```
<section>
<h2>Bistro Blog</h2>
<aside>Watch for the March Madness Wrap next month!</aside>
<article>
  <header><h3>Valentine Wrap</h3></header>
  <time datetime="2018-02-01">February 1, 2018</time>
  The February special sandwich is the Valentine Wrap &mdash;
</article>
<article>
  <header><h3>New Coffee of the Day Promotion</h3></header>
  <time datetime="2018-01-12">January 12, 2018</time>
  Enjoy the best coffee on the coast in the comfort of your
</article>
</section>
```

3. Edit the embedded CSS for the h1 element selector. Set the h1 bottom margin to 0.
4. Edit the embedded CSS for the h2 element selector. Set font-size to 200%.
5. Configure embedded CSS for the span element selector. Set 20 pixels of left padding, and .80em italic, #00005D color text.
6. Configure embedded CSS for the header element contained within each

article element. Use a descendant HTML selector. Set background color to #FFFFFF, no background image, 90% font size, 0 left padding, and auto height (use `height: auto;`).

7. The aside element contains content that is tangential to the main content. Configure embedded CSS to display the aside element on the right (use `float`) with a 200 pixel width, light gray background color, 20 pixels of padding, 40 pixels of right margin, 80% font size, and a 5px box shadow. Configure a relative position (use `position: relative; top: -40px;`).

Save your file. Display your index.html page in a browser. It should look similar to the page shown in [Figure 6.47](#). A sample solution is in the student files (chapter6/6.10).



## FAQ

1. Now that the W3C has approved HTML5 for Recommendation status, will more changes be made?

HTML5 was placed in Recommendation status by the W3C in late 2014, and is considered to be stable at this time.

However, reaching Recommendation status will not be the end of changes. HTML5 is a living, evolving language. The W3C is already working on HTML5.1—the next version of HTML5! You can review the HTML5.1 draft specification at <http://www.w3.org/TR/html51>. Expect to see changes as the development of HTML5.1 continues such as new elements and even the removal of elements that were newly added to HTML5.

## 6.15 HTML5 Compatibility with Older Browsers

Current versions of Chrome, Firefox, Safari, Edge, and Opera offer good support for the HTML5 elements you've been using. However, not everyone has a recent browser installed on their computer. Some people still use Internet Explorer and earlier versions of other browsers for a variety of reasons. Although this issue will decrease in importance over time as people update their computers, your clients will most likely insist that their web pages are usable to as broad of an audience as possible. The most basic way to provide for backward compatibility of HTML5 with older, outdated browsers is to configure block display with CSS.

### Configure CSS Block Display

Add one style rule to your CSS to inform older browsers to display HTML5 elements such as header, main, nav, footer, section, article, figure, figcaption, and aside as block display (with empty space above and below). Example CSS follows:

```
header, main, nav, footer, section, article, figure, figcaption,  
aside { display: block; }
```

This technique will work well in browsers including Internet Explorer 9 and later versions.



### Hands-On Practice 6.11

In this Hands-On Practice you'll modify the two-column Lighthouse Island

Bistro home page (shown in [Figure 6.47](#)) to ensure backward compatibility with older browsers. Create a new folder named ch6block. Copy the following files from the student files chapter6/6.10 folder into the ch6block folder: index.html and lighthouselogo.jpg.

1. Launch a text editor, and open the index.html file. Examine the source code, and locate the head element and style element.
2. Add the following style declaration to the embedded styles:

```
header, main, nav, footer, section, article, figure, figcaption  
aside { display: block; }
```

3. Save your file. Display your index.html page in a modern browser. It should look similar to the page shown in [Figure 6.47](#). The solution is in the student files chapter6/6.11 folder.



## FAQ

1. Are there other ways to provide backward compatibility for HTML5?

The CSS technique you practiced in this section is just one basic solution to the problem of providing HTML5 backward compatibility in older browsers. You may wish to explore two other methods:

- The HTML5 Shiv (also referred to as the HTML5 Shim) was developed by Remy Sharp (<http://remysharp.com/2009/01/07/html5-enabling-script>) to enable HTML5 support by Internet Explorer 8 and earlier versions. The technique uses conditional comments that are only recognized by Internet Explorer and are ignored by other browsers. The -conditional comments cause Internet Explorer to interpret JavaScript statements that configure the browser to recognize and process CSS for the new HTML5 element selectors.

Sharp initially uploaded the HTML5 Shiv script to Google's code project but it was moved to GitHub at <https://github.com/aFarkas/html5shiv>, where it is maintained by Alexander Farkas. The script is freely available for download and use. No knowledge of JavaScript coding is needed to use the HTML5 Shiv. To apply the HTML5 Shiv you need to download the html5shiv.js file from GitHub into the same folder as your web pages and then include the following code in the head section of each web page:

```
<!--[if lt IE 9]>
<script src="html5shiv.js"></script>
<![endif]-->
```

Visit the textbook's companion website at <http://webdevfoundations.net/9e/chapter6.html> for more information about this technique.

- Modernizr (<http://www.modernizr.com>) is a free JavaScript library that includes the HTML5 Shiv and enables backward compatibility for HTML5 and CSS3 in older browsers by allowing you to check for specific HTML5 and CSS features. Modernizr is a detection tool. It's up to you whether you provide alternate CSS or even your own scripting when an HTML5 or CSS feature is detected. For this reason, it's a good idea to have some experience with JavaScript to fully utilize the power of Modernizr. You can find out more about Modernizr at the following resources:
  - \* <https://modernizr.com/docs>
  - \* <http://www.hongkiat.com/blog/modernizr/>
  - \* <https://www.youtube.com/watch?v=Vq3Hbf53cI0>
  - \* <https://www.youtube.com/watch?v=D5UYPDFvryM>



## Checkpoint 6.2

1. Describe a reason to use HTML5 structural elements instead of div elements for some page areas.
2. Describe one CSS debugging tip that you have found to be helpful.
3. Describe how to choose whether to configure an HTML element selector, create a class, or create an id when working with CSS.

# Chapter Summary

This chapter introduced CSS page layout techniques and additional HTML5 structural elements. Techniques for positioning and floating elements and configuring two-column page layouts were demonstrated. The topic of page layout is very deep and you have much to explore. Visit the resources cited in the chapter to continue learning about this technology.

Visit the textbook website at <http://www.webdevfoundations.net> for examples, the links listed in this chapter, and updated information.

## Key Terms

- [:active](#)
- [:focus](#)
- [:hover](#)
- [:link](#)
- [:visited](#)
- [<article>](#)
- [<aside>](#)
- [<section>](#)
- <time>
- [absolute positioning](#)
- [article element](#)

- [aside element](#)
- [border](#)
- [box model](#)
- [box-sizing property](#)
- [clear property](#)
- [debugging](#)
- [display property](#)
- [fixed positioning](#)
- [float property](#)
- [Header Text Image Replacement](#)
- [left property](#)
- [list markers](#)
- [list-style-image property](#)
- [list-style-type property](#)
- [margin](#)
- [margin property](#)
- [normal flow](#)
- [overflow property](#)
- [padding](#)
- [padding property](#)

- [position property](#)
- [pseudo-class](#)
- [relative positioning](#)
- [section element](#)
- [static positioning](#)
- [text-decoration property](#)
- [time element](#)
- [universal selector](#)
- [visible width](#)
- [width property](#)

## Review Questions

### Multiple Choice

1. Which of the following, from outermost to innermost, are components of the box model?
  1. margin, border, padding, content
  2. content, padding, border, margin
  3. content, margin, padding, border
  4. margin, padding, border, content
2. Which of the following can be used to change the location of an element

slightly in relation to where it would otherwise appear on the page?

1. relative positioning
  2. the float property
  3. absolute positioning
  4. this cannot be done with CSS
3. Which of the following properties can be used to clear a float?
1. float or clear
  2. clear or overflow
  3. position or clear
  4. overflow or float
4. Which of the following configures a class called side to float to the left?
1. .side { left: float; }
  2. .side { float: left; }
  3. .side { float-left: 200px; }
  4. .side { position: left; }
5. Which of the following is the rendering flow used by a browser by default?
1. regular flow
  2. normal display
  3. browser flow
  4. normal flow

6. Which of the following is an example of using a descendant selector to configure the anchor tags within the nav element?
  1. nav. a
  2. a nav
  3. nav a
  4. a#nav
7. Which property and value are used to configure an unordered list item with a square list marker?
  1. list-bullet: none;
  2. list-style-type: square;
  3. list-style-image: square;
  4. list-marker: square;
8. Which of the following causes an element to display as a block of content with white space above and below?
  1. display: none;
  2. block: display;
  3. display: block;
  4. display: inline;
9. Which of the following pseudo-classes is the default state for a hyperlink that has been clicked?
  1. :hover
  2. :link

3. :onclick
  4. :visited
10. Which HTML5 element has the purpose of providing tangential content?
1. article
  2. aside
  3. sidebar
  4. section

## Fill in the Blank

11. Configure a style with a(n) if the style will only apply to one element on a page.
12. If an element is configured with float: right;, the other content on the page will appear to its .
13. The is always transparent.
14. The pseudo-class can be used to modify the display of a hyperlink when a mouse pointer passes over it.
15. Use the HTML5 element to configure an article or blog post that can stand on its own.

## Apply Your Knowledge

1. Predict the Result. Draw and write a brief description of the web page that will be created with the following HTML code:

```
<!DOCTYPE html>
```

```

<html lang="en">
<head>
<title>CircleSoft Web Design</title>
<meta charset="utf-8">
<style>
    h1 { border-bottom: 1px groove #333333;
        color: #006600;
        background-color: #cccccc }
    #goal { position: absolute;
            left: 200px;
            top: 75px;
            font-family: Arial, sans-serif;
            width: 300px; }
    nav a { font-weight: bold; }
</style>
</head>
<body>
<h1>CircleSoft Web Design</h1>
<div id="goal">
Our professional staff takes pride in its working relationships
</div>
<nav>
<ul>
    <li>Home</li>
    <li><a href="about.html">About</a></li>
    <li><a href="services.html">Services</a></li>
</ul>
</nav>
</body>
</html>

```

- Fill in the Missing Code. This web page should be configured as a two-column page layout with a right column (containing the navigation area) that is 150 pixels wide. The right column should have a 1 pixel border. The margin in the left-column main content area needs to allow for space that will be used by the right column. Some CSS selectors, properties, and values, indicated by "\_", are missing. Fill in the missing code.

```

<!DOCTYPE html>
<html lang="en">
<head>
<title>Trillium Media Design</title>
<meta charset="utf-8">
<style>

```

```

nav {   "_": "_";
    width: "_";
    background-color: #cccccc;
    border: "_"; }
header { background-color: #cccccc;
    color: #663333;
    font-size: x-large;
    border-bottom: 1px solid #333333; }
main { margin-right: "_" ; }
footer { font-size: x-small;
    text-align: center;
    clear: "_"; }
    "_" a { color: #000066;
    text-decoration: none; }
ul {list-style-type: "_"; }
</style>
</head>
<body>
<nav>
<ul>
    <li><a href="index.html">Home</a></li>
    <li><a href="products.html">Products</a></li>
    <li><a href="services.html">Services</a></li>
    <li><a href="about.html">About</a></li>
</ul>
</nav>
<main>
<header>
<h1>Trillium Media Design</h1>
</header>
Our professional staff takes pride in its working relationshi
</main>
<footer>
Copyright © 2018 Trillium Media Design<br>
Last Updated on 06/03/18
</footer>
</body>
</html>

```

3. Find the Error. When this page is displayed in a browser, the heading information obscures the floating image and paragraph text. Correct the errors and describe the process that you followed.

```

<!DOCTYPE html>
<html lang="en">
<head>
```

```

<title>CSS Float</title>
<meta charset="utf-8">
<style>
body { width: 500px; }
h1 { background-color: #eeeeee;
    padding: 5px;
    color: #666633;
    position: absolute;
    left: 200px;
    top: 20px; }
p { font-family: Arial, sans-serif;
    position: absolute;
    left: 100px;
    top: 100px; }
#yls { float: right;
        margin: 0 0 5px 5px;
        border: solid; }
</style>
</head>
<body>
<h1>Floating an Image</h1>

</html>

```



## Hands-On Exercises

1. Write the CSS for an id with the following attributes: float to the left of the page, light tan background, Verdana or sans-serif large font, and 20 pixels of padding.
2. Write the CSS to configure a class that will produce a headline with a dotted line underneath it. Choose a color that you like for the text and dotted line.
3. Write the CSS for an id that will be absolutely positioned on a page 20 pixels from the top and 40 pixels from the right. This area should have a light gray background and a solid border.

4. Write the CSS for a class that is relatively positioned. This class should appear 15 pixels in from the left. Configure the class to have a light green background.
5. Write the CSS for an id with the following characteristics: fixed position, light gray background color, bold font weight, and 10 pixels of padding.
6. Write the CSS to configure an image file named myimage.gif as the list marker in an unordered list.
7. Write the CSS to configure an unordered list to display a square list marker.
8. Configure a web page with a list of hyperlinks to your favorite sites. Use an unordered list without any list markers to organize the hyperlinks. Refer to [Chapter 5](#) for color scheme resources. Choose a background color for the web page and a background color for the following states: unvisited hyperlink, hyperlink with a mouse pointer passing over it, and visited hyperlink. Use embedded CSS to configure the background and text colors. Also use CSS to configure the hyperlink's underline to not display when the mouse pointer is passing over it. Save the file as mylinks.html.
9. Use the mylinks.html file you created in 8 as a starting point. Modify the web page to use external rather than embedded CSS. Save the CSS file as links.css.
10. Create an HTML5 web page about one of your favorite hobbies. Choose a hobby and either take a relevant photo or select a relevant royalty-free photo from the Web (refer to [Chapter 4](#)). Decide on a heading for your page. Write one or two brief paragraphs about the hobby. The page must use valid HTML5 syntax and include the following elements: header, article, and footer. Use the figure, figcaption, and img elements to display the photo you have chosen. Include a hyperlink to a website that is relevant to the hobby. Include your name in an e-mail address in the page footer area. Configure the text, color, and layout with embedded CSS. Save the file as myhobby.html.

# Web Research

1. This chapter introduced using CSS to configure web page layout. Use the resources listed in the textbook as a starting point. You can also use a search engine to search for CSS resources. Create a web page that provides a list of at least five CSS resources on the Web. For each CSS resource, provide the URL (configured as a hyperlink), the name of the website, a brief description, and a rating that indicates how helpful it is to beginning web developers.

## Focus on Web Design

1. There is still much for you to learn about CSS. A great place to learn about web technology is on the Web itself. Use a search engine to search for CSS page layout tutorials. Choose a tutorial that is easy to read. Select a section that discusses a CSS technique that was not covered in this chapter. Create a web page that uses this new technique. Consider how the suggested page layout follows (or does not follow) principles of design such as contrast, repetition, alignment, and proximity (see [Chapter 5](#)). The web page should provide the URL of your tutorial (configured as a hyperlink), the name of the website, a description of the new technique you discovered, and a discussion of how the technique follows (or does not follow) principles of design.



## WEBSITE CASE STUDY

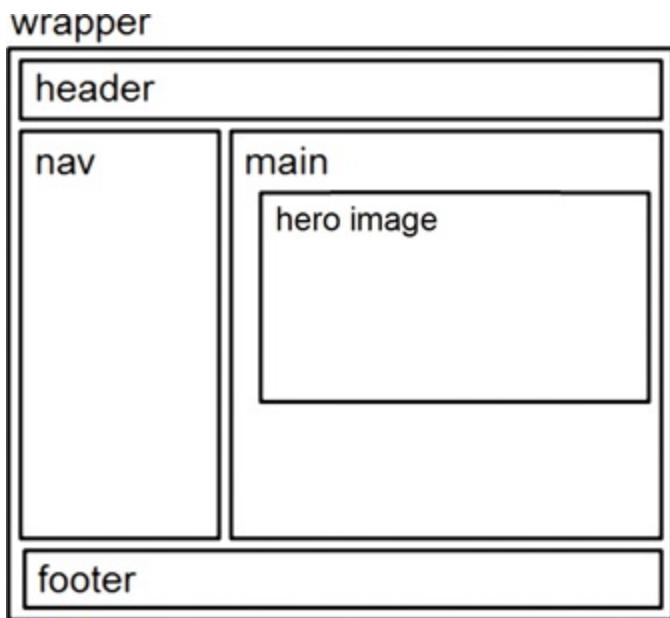
### Implementing a CSS Two-Column Page Layout

Each of the following case studies continues throughout most of the textbook. This chapter implements a CSS two-column page layout in the websites.

# JavaJam Coffee House

See [Chapter 2](#) for an introduction to the JavaJam Coffee House case study. [Figure 2.31](#) shows a site map for the JavaJam. In this case study, you will implement a new two-column CSS page layout for JavaJam. [Figure 6.48](#) shows a wireframe for a two-column page layout with wrapper, header, navigation, main content, hero image, and footer areas.

## Figure 6.48



Wireframe for a two-column page layout for the JavaJam website

### [Figure 6.48 Full Alternative Text](#)

You will modify the external style sheet and the Home, Menu, and Music pages. Use the [Chapter 4](#) JavaJam website as a starting point for this case study. You have five tasks in this case study:

1. Create a new folder for this JavaJam case study.
2. Modify the style rules in the javajam.css file to configure a two-column page layout, as shown in [Figure 6.48](#).
3. Modify the Home page to implement the two-column page layout, as shown in [Figure 6.49](#).

## Figure 6.49



The new JavaJam two-column layout (index.html)

Figure 6.49 Full Alternative Text

4. Modify the Menu page ([Figure 6.50](#)) to be consistent with the Home page.

## Figure 6.50



The new JavaJam Menu page

Figure 6.50 Full Alternative Text

5. Modify the Music page ([Figure 6.51](#)) to be consistent with the Home page.

page.

## Figure 6.51



The new JavaJam Music Page

[Figure 6.51 Full Alternative Text](#)

## Hands-On Practice Case

- Task 1: The Website Folder. Create a folder called javajam6. Copy all of the files from your [Chapter 4](#) javajam4 folder into the javajam6 folder. Copy the heroroad.jpg, heromugs.jpg, and heroguitar.jpg files from the chapter6/starters folder. You will modify the javajam.css file and each web page file (index.html, menu.html, and music.html) to implement the two-column page layout shown in [Figure 6.48](#). See the

new JavaJam Home page, as shown in [Figure 6.49](#).

- Task 2: Configure the CSS. Open javajam.css in a text editor. Edit the style rules as follows:
  1. Configure the universal selector with a box-sizing: border-box style declaration.

```
* { box-sizing: border-box; }
```
  2. Configure id selectors for the hero image on each page.
    1. Configure an id selector named heroroad. Set the background image to heroroad.jpg. Configure 100% background-size and height of 250 pixels.
    2. Configure an id selector named heromugs. Set the background image to heromugs.jpg. Configure 100% background-size and height of 250 pixels.
    3. Configure an id selector named heroguitar. Set the background image to heroguitar.jpg. Configure 100% background-size and height of 250 pixels.
  3. Edit the style rules for the main selector so that the hero image will fill the entire area. Change left padding to 0. Change right padding to 0. Also configure a 200px left margin, 0 top padding, and #FEF6C2 background color.
  4. Since the main content area no longer has any left or right padding, configure descendant selectors to configure style rules for the following elements within the main element: h2, h3, h4, p, div, ul, dl. Set left padding to 3em and right padding to 2em.
  5. Configure the left-column navigation area. Add style declarations to the nav element selector to configure an area that floats to the left and is 200 pixels wide.
  6. Configure the :link, :visited, and :hover pseudo-classes for the

navigation hyperlinks. Use the following text colors: #FEF6C2 (unvisited hyperlinks), #D2B48C (visited hyperlinks), and #CC9933 (hyperlinks with :hover). For example,

```
nav a:link { color: #FEF6C2; }
```

7. You will organize the navigation hyperlinks within an unordered list in later tasks. The navigation area in [Figure 6.49](#) does not show list markers. Code a nav ul descendant selector to configure unordered lists in the navigation area to display without list markers and with 0 left padding.
  8. Modify the wrapper id. Configure a dark background color (#231814) which will display behind the column with the navigation area.
  9. Modify the h4 element selector style rules. View the Music page shown in [Figure 6.51](#) and notice that the <h4> tags are styled differently, with all uppercase text (use `text-transform`), a bottom border, and 0 bottom padding. Also configure a style declaration to clear floats on the left.
  10. Refer to the Music page shown in [Figure 6.51](#) and notice how the images float on the left side of the paragraph description. Configure a new class named `floatleft` that floats to the left with 2em of right and bottom padding.
  11. Modify the style rules for the `details` class and add the `overflow: auto;` style declaration.
  12. Add the following CSS to be compatible with most older browsers:

```
header, nav, main, footer { display: block; }
```

    - Save the `javajam.css` file.
- Task 3: The Home Page. Open `index.html` in a text editor. Edit the code as follows:

1. Configure the left-column navigation area, which is contained within the nav element. Remove any &nbsp; characters that may be present. Code an unordered list to organize the navigation hyperlinks. Each hyperlink should be contained within <li> tags.
2. Remove the img tag for the windingroad.jpg image. Configure a div element assigned to the heroroad id between the opening main tag and the opening h2 tag. There will be no HTML content in this div, which is a container for a background image you configured with CSS in Task 2.

Save the index.html file. It should look similar to the web page shown in [Figure 6.49](#). Remember that validating your HTML and CSS can help you find syntax errors. Test and correct this page before you continue.

- Task 4: The Menu Page. Open menu.html in a text editor. Configure the left-column navigation area and navigation hyperlinks in the same manner as the home page. Remove the img tag for the mugs.jpg image. Configure a div element assigned to the heromugs id between the opening main tag and the opening h2 tag. Save your new menu.html page and test it in a browser. It should look similar to the web page shown in [Figure 6.50](#). Use the CSS and HTML validators to help you find syntax errors.
- Task 5: The Music Page. Open music.html in a text editor. Configure the left-column navigation area and navigation hyperlinks in the same manner as the home page. Configure a div element assigned to the heroguitar id between the opening main tag and the opening h2 tag.

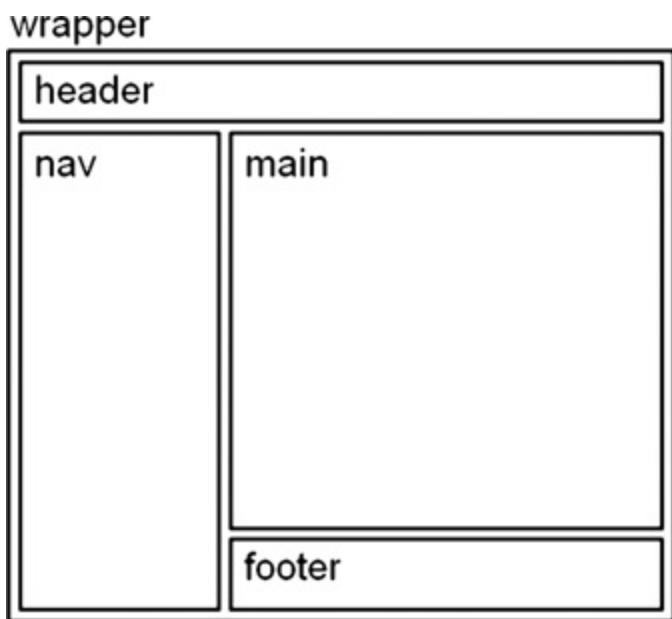
Configure the thumbnail images to float to the left. Add class="floatleft" to the image tag for each thumbnail image. Save your new music.html page and test it in a browser. It should look similar to the web page shown in [Figure 6.51](#). Use the CSS and HTML validators to help you find syntax errors.

In this case study, you changed the page layout of the JavaJam website. Notice that with just a few changes in the CSS and HTML code, you configured a two-column page layout.

# Fish Creek Animal Clinic

See [Chapter 2](#) for an introduction to the Fish Creek Animal Clinic case study. [Figure 2.35](#) shows a site map for Fish Creek. In this case study, you will implement a redesign with a new two-column CSS page layout. [Figure 6.52](#) displays a wireframe for a two-column page layout with wrapper, header, navigation, main content, and footer areas.

## Figure 6.52



Wireframe for a two-column page layout for the Fish Creek website

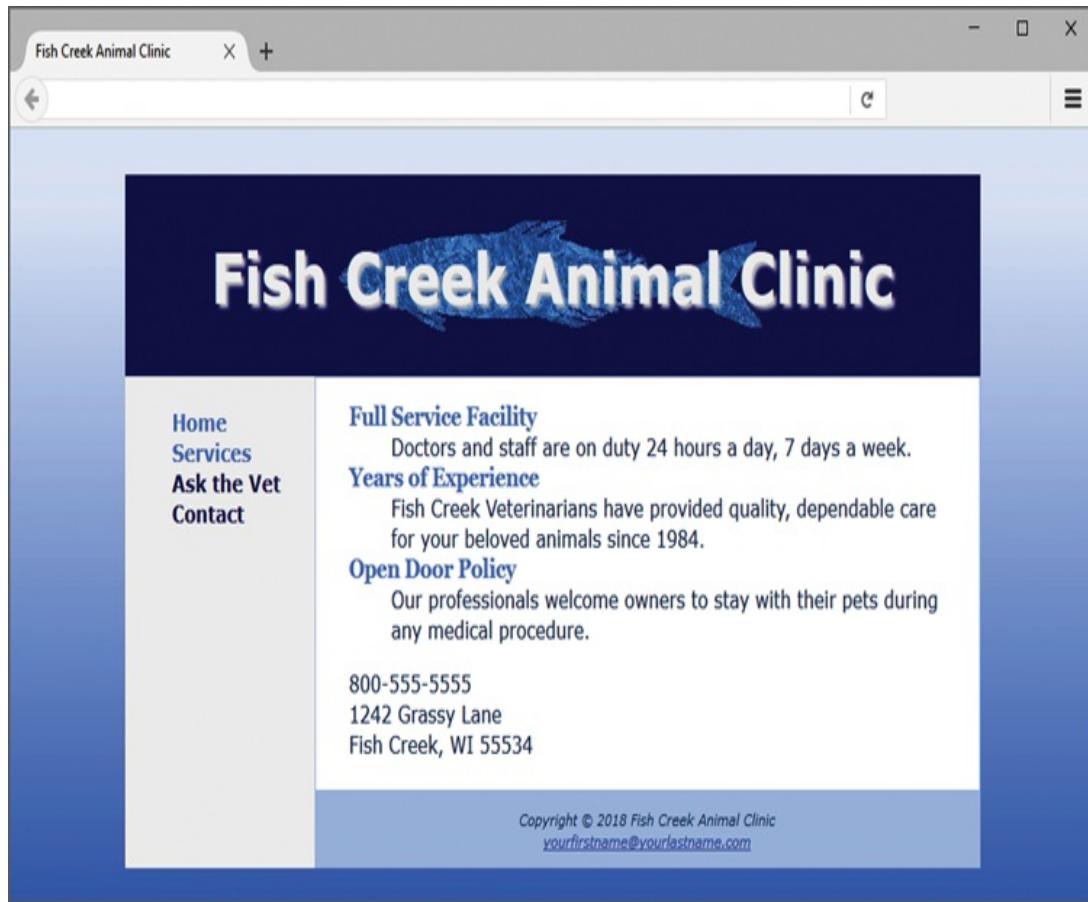
### [Figure 6.52 Full Alternative Text](#)

You will modify the external style sheet and the Home, Services, and Ask the Vet pages. Use the [Chapter 4](#) Fish Creek website as a starting point for this case study. You have five tasks in this case study:

1. Create a new folder for this Fish Creek case study.

2. Modify the style rules in the fishcreek.css file to configure a two-column page layout, as shown in [Figure 6.52](#).
3. Modify the Home page to implement the two-column page layout, as shown in [Figure 6.53](#).

## Figure 6.53



The new Fish Creek two-column home page (index.html)

### [Figure 6.53 Full Alternative Text](#)

4. Modify the Services page to be consistent with the Home page.
5. Modify the Ask the Vet page to be consistent with the Home page.

# Hands-On Practice Case

- Task 1: The Website Folder. Create a folder called fishcreek6. Copy all of the files from your [Chapter 4](#) fishcreek4 folder (except the fishcreeklogo.gif image and the fish navigation images home.gif, services.gif, askvet.gif, and contact.gif) into the fishcreek6 folder. Copy the bigfish.gif and gradientblue.jpg images from the chapter6/starters folder. You will modify the fishcreek.css file and each web page file (index.html, services.html, and askvet.html) to implement the two-column page layout, as shown in [Figure 6.52](#). See the new Fish Creek home page, as shown in [Figure 6.53](#).
- Task 2: Configure the CSS. Open fishcreek.css in a text editor. Edit the style rules as follows:
  1. Configure the universal selector with a box-sizing: border-box style declaration.

```
* { box-sizing: border-box; }
```
  2. Modify the styles for the body element selector. Set the background color to #5280C5. Configure gradientblue.jpg as a background image.
  3. Configure the header element selector. Change the background color to dark-blue (#000066). Remove the font-family style declaration. Change the background image to bigfish.gif with center background-position and no repeats.
  4. Modify the h1 element selector. Add style declarations for 3em font-size, 0.2em padding, and gray text shadow (#CCCCCC).
  5. Configure the left column area. Add new style declarations for the nav element selector to configure an area that floats to the left and is 180 pixels wide. Remove the style declaration for the text-align property. Remove the style declaration for the background color.

6. You will organize the navigation hyperlinks within an unordered list in later tasks. The navigation area in [Figure 6.53](#) does not show list markers. Code a nav ul descendant selector to configure unordered lists in the navigation area to display without list markers.
7. Configure the navigation anchor tags to display no underline.
8. Configure the :link, :visited, and :hover pseudo-classes for the navigation hyperlinks. Use the following text colors: #000066 (unvisited hyperlinks), #5280C5 (visited hyperlinks), and #3262A3 (hyperlinks with :hover). For example,

```
nav a:link { color: #000066; }
```

9. Configure the right column area. Add a new style rule for the main element selector to configure an area with a 180 pixel left margin, left and right padding set to 2em a white background color, and a 1 pixel solid medium blue (#AEC3E3) border.
10. Remove the footer nav descendant selector and style declaration.
11. Configure the footer area. Add style declarations to set 1em of padding and a 180px left margin.
12. Add the following CSS to be compatible with most older browsers:

```
header, nav, main, footer { display: block; }
```

Save the fishcreek.css file.

- Task 3: Modify the Home Page. Open index.html in a text editor and modify the code as follows:
  1. Rework the navigation area. Remove any &nbsp; characters that may be present. Replace the fish image links with text links. Then, code an unordered list to organize the navigation hyperlinks. Each hyperlink should be contained within <li> tags.

2. Remove the nav element and navigation hyperlinks from the footer area.

Save the index.html file. It should look similar to the web page shown in [Figure 6.53](#). Remember that validating your HTML and CSS can help you find syntax errors. Test and correct this page before you continue.

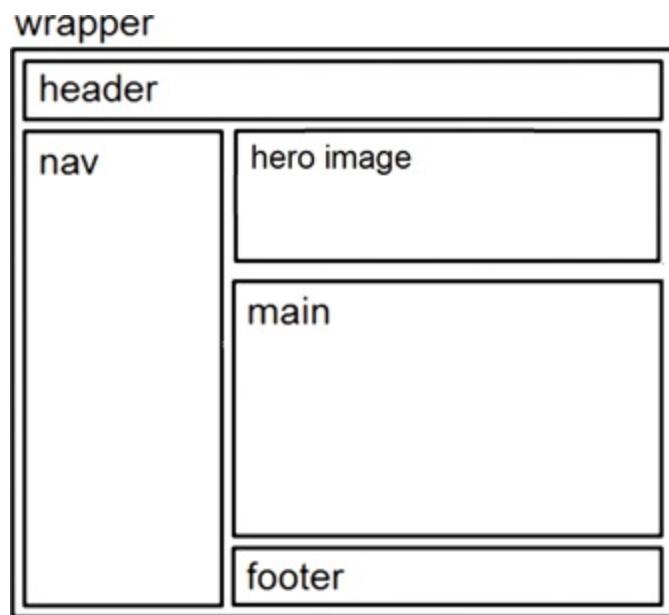
- Task 4: Modify the Services Page. Open services.html in a text editor. Configure the navigation area, navigation hyperlinks, and footer area in the same manner as the home page. Save your new services.html page and test it in a browser. Use the CSS and HTML validators to help you find syntax errors.
- Task 5: Modify the Ask the Vet Page. Open askvet.html in a text editor. Configure the h1, navigation area, navigation hyperlinks, and footer area in the same manner as the home page. Save your new askvet.html page and test it in a browser. Use the CSS and HTML validators to help you find syntax errors.

In this case study, you changed the page layout of the Fish Creek website. Notice that with just a few changes in the CSS and HTML code, you configured a two-column page layout with a completely new visual aesthetic.

## Pacific Trails Resort

See [Chapter 2](#) for an introduction to the Pacific Trails Resort case study. [Figure 2.39](#) shows a site map for Pacific Trails. The pages were created in earlier chapters. In this case study, you will implement a new two-column CSS page layout. [Figure 6.54](#) displays a wireframe for a two-column page layout with wrapper, header, nav, main content, hero image, and footer areas.

## Figure 6.54



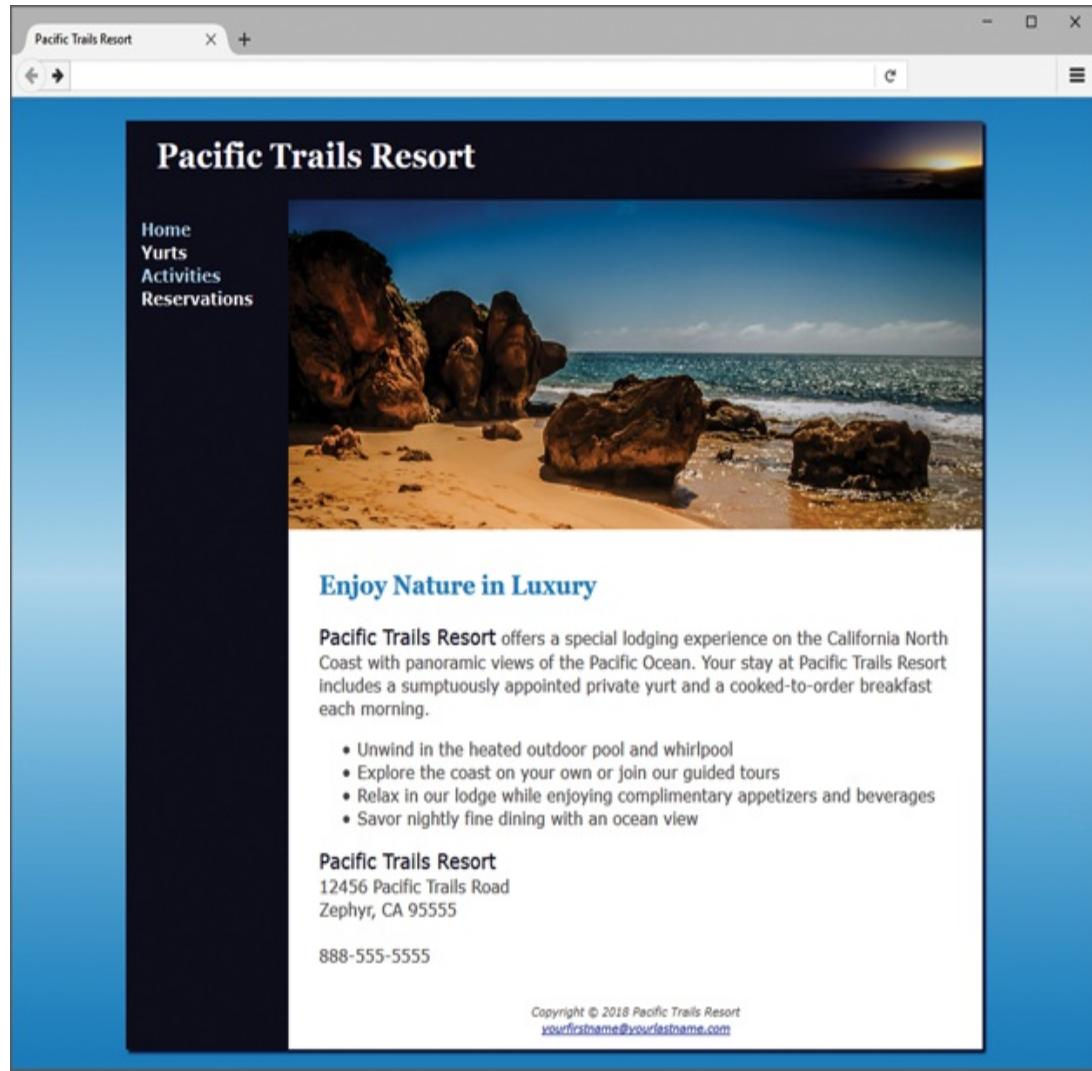
Wireframe for a two-column page layout for the Pacific Trails website

#### [Figure 6.54 Full Alternative Text](#)

You will modify the external style sheet and the Home, Yurts, and Activities pages. Use the [Chapter 4](#) Pacific Trails website as a starting point for this case study. You have five tasks in this case study:

1. Create a new folder for the Pacific Trails case study.
2. Modify the style rules in the pacific.css file to configure a two-column page layout, as shown in [Figure 6.54](#).
3. Modify the Home page to implement the two-column page layout, as shown in [Figure 6.55](#).

## Figure 6.55



The new Pacific Trails two-column home page (index.html)

[Figure 6.55 Full Alternative Text](#)

4. Modify the Yurts page to be consistent with the Home page.
5. Modify the Activities page to be consistent with the Home page.

## Hands-On Practice Case

- Task 1: The Website Folder. Create a folder called pacific6. Copy all of the files from your [Chapter 4](#) pacific4 folder into the pacific6 folder.

You will modify the pacific.css file and each web page file (index.html, yurts.html, and activities.html) to implement the two-column page layout, as shown in [Figure 6.54](#). See the new Pacific Trails home page, as shown in [Figure 6.55](#).

- Task 2: Configure the CSS. Open pacific.css in a text editor. Edit the style rules as follows:
  1. Configure the universal selector with a box-sizing: border-box style declaration.

```
* { box-sizing: border-box; }
```
  2. Modify the `wrapper` id. Change the background color to dark blue (#000033), which will be the background behind the navigation area.
  3. Configure the left-column navigation area. Modify the styles for the `nav` element selector. Keep the style declaration that configures bold text. Remove the background color declaration. The `nav` area will inherit the background color of the `wrapper` id. Add style declarations to configure this area to float to the left with a width of 160 pixels. Also set padding to 0.

```
nav { width: 160px; float: left; padding: 0; }
```
  4. Configure the `:link`, `:visited`, and `:hover` pseudo-classes for the navigation hyperlinks. Use the following text colors: #FFFFFF (unvisited hyperlinks), #C2E0F0 (visited hyperlinks), and #CCCCCC (hyperlinks with `:hover`). For example,

```
nav a:link { color: #FFFFFF; }
```
  5. You will organize the navigation hyperlinks within an unordered list in later tasks. The navigation area in [Figure 6.55](#) does not show list markers. Code a `nav ul` descendant selector to configure unordered lists in the navigation area to display without list - markers. Also configure the unordered list to have 1em left padding.

```
nav ul { list-style-type: none; padding-left: 1em; }
```
  6. Configure the right-column main content area. Modify the styles for the `main` element selector. Set the width to 100% and the margin to auto so that the content is centered.

```
main { width: 100%; margin: auto; }
```

for the main element selector. Add style declarations to configure a white (#FFFFFF) background, 170 pixels of left margin, 1 pixel of top padding, and 1 pixel of bottom padding.

7. Configure each hero image area (#homehero, #yurthero, and #trailhero) with a 170 pixel left margin.
8. Configure the footer area. Add style declarations to set a white (#FFFFFF) background color and a 170px left margin.
9. Add the following CSS to be compatible with most older browsers:

```
header, nav, main, footer { display: block; }
```

Save the pacific.css file.

- Task 3: Modify the Home Page. Open index.html in a text editor. Configure the left-column navigation area, which is contained within the nav element. Remove any &nbsp; characters that may be present. Code an unordered list to organize the navigation hyperlinks. Each hyperlink should be contained within <li> tags.

Save the index.html file. It should look similar to the web page shown in [Figure 6.55](#). Remember that validating your HTML and CSS can help you find syntax errors. Test and correct this page before you continue.

- Task 4: Modify the Yurts Page. Open yurts.html in a text editor. Configure the left-column navigation area and navigation hyperlinks in the same manner as the home page. Save your new yurts.html page and test it in a browser. Use the CSS and HTML validators to help you find syntax errors.
- Task 5: Modify the Activities Page. Open activities.html in a text editor. Configure the left-column navigation area and navigation hyperlinks in the same manner as the home page. Save your new activities.html page and test it in a browser. Use the CSS and HTML validators to help you find syntax errors.

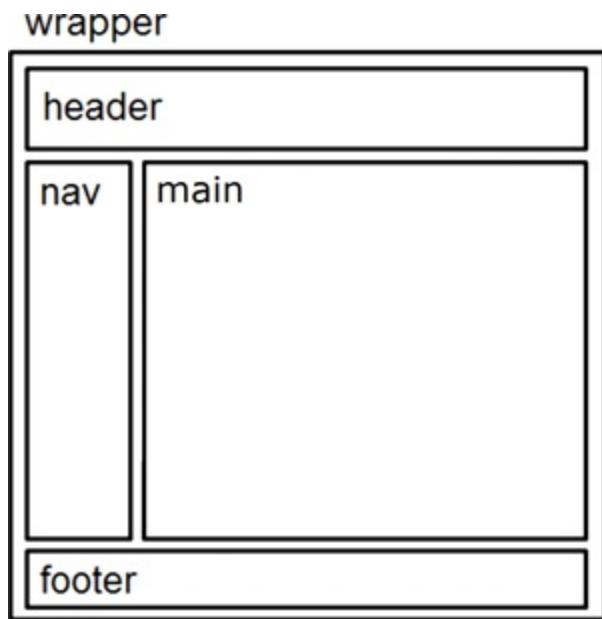
In this case study, you changed the page layout of the Pacific Trails

Resort website. Notice that with just a few changes in the CSS and HTML code, you configured a two-column page layout.

# Path of Light Yoga Studio

See [Chapter 2](#) for an introduction to the Path of Light Yoga Studio case study. [Figure 2.43](#) shows a site map for the Path of Light Yoga Studio. In this case study, you will implement a new two-column CSS page layout for the Path of Light Yoga Studio. [Figure 6.56](#) displays a wireframe for a two-column page layout with a wrapper, header, navigation, main content, and footer area.

## Figure 6.56



Wireframe for a two-column page layout for the Path of Light Yoga Studio website

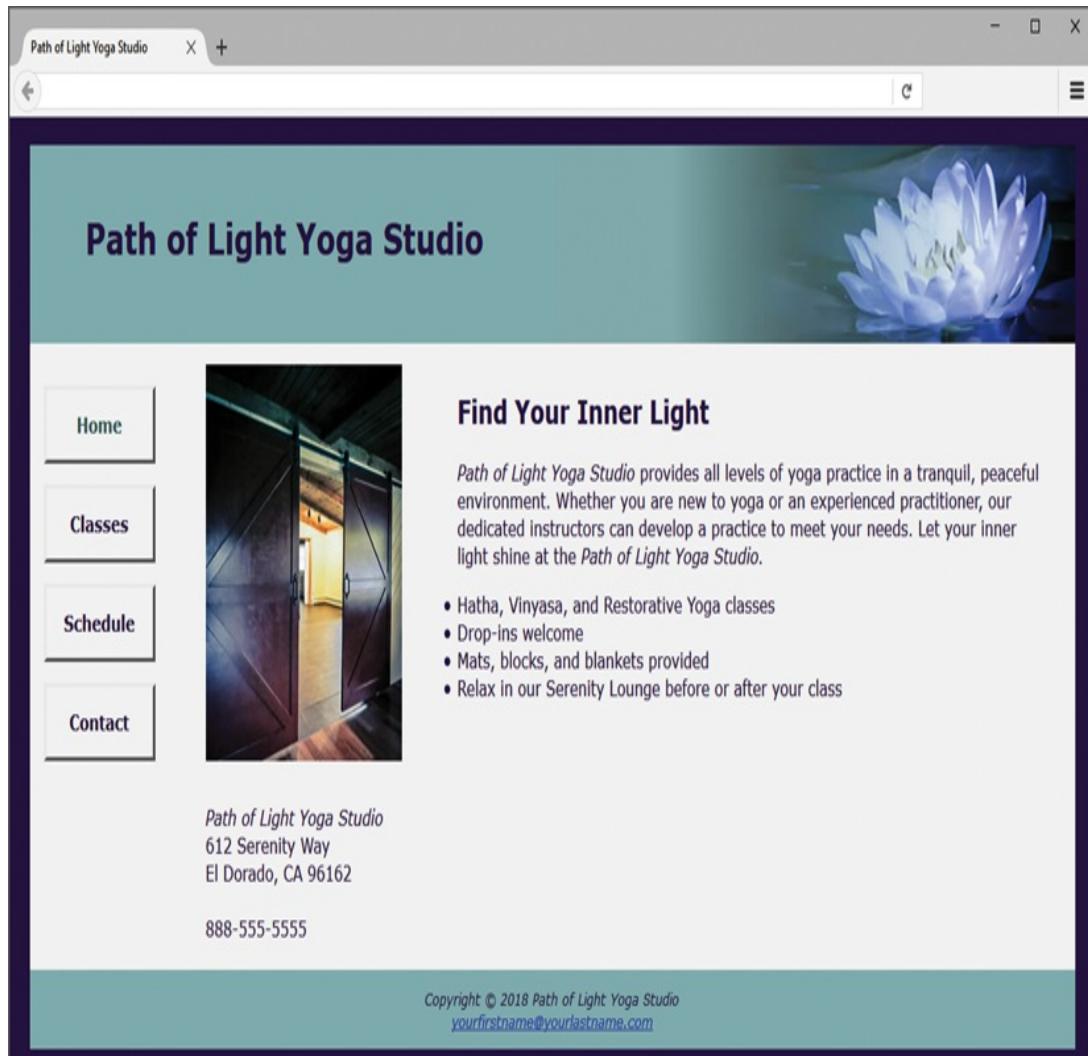
### [Figure 6.56 Full Alternative Text](#)

You will modify the external style sheet and the Home, Classes, and

Schedule pages. Use the [Chapter 4](#) Path of Light Yoga Studio website as a starting point for this case study. You have five tasks in this case study:

1. Create a new folder for the Path of Light Yoga Studio case study.
2. Modify the style rules in the yoga.css file to configure a two-column page layout, as shown in [Figure 6.56](#).
3. Modify the Home page to implement the two-column page layout, as shown in [Figure 6.57](#).

## Figure 6.57

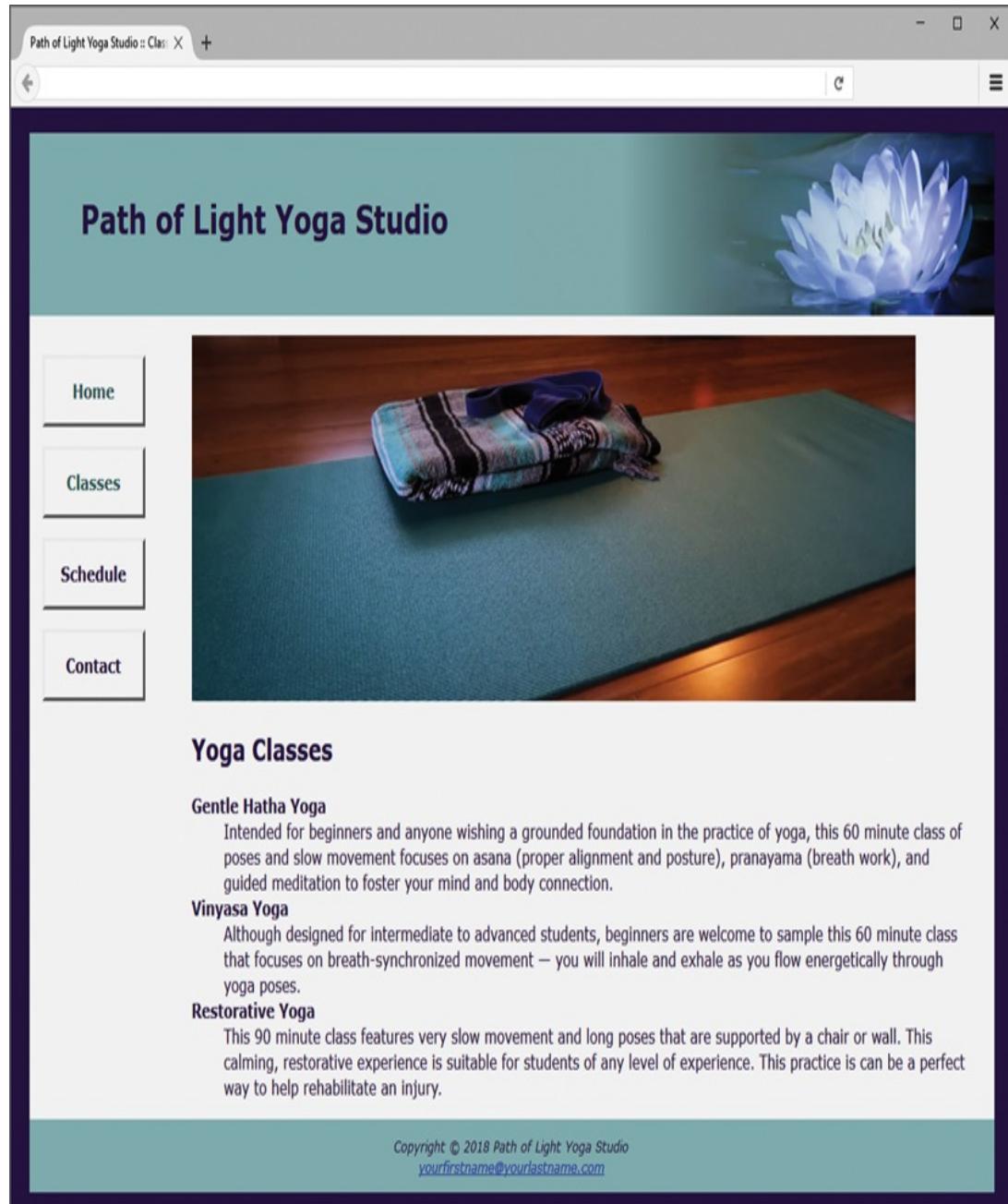


The new Path of Light Yoga Studio two-column home page  
(index.html)

[Figure 6.57 Full Alternative Text](#)

4. Modify the Classes page to implement the two-column page layout, as shown in [Figure 6.58](#).

## **Figure 6.58**



The new Path of Light Yoga Studio two-column Classes page

[Figure 6.58 Full Alternative Text](#)

5. Modify the Schedule page to be consistent with the Classes page.

# Hands-On Practice Case

- Task 1: The Website Folder. Create a folder called yoga6. Copy all of the files from your [Chapter 4](#) yoga4 folder into the yoga6 folder. Copy the yogadoor2.jpg file from the chapter6/starters folder into your yoga6 folder. You will modify the yoga.css file and each web page file (index.html, classes.html, and schedule.html) to implement the two-column page layout shown in [Figure 6.56](#). See the new Path of Light Yoga Studio home page in [Figure 6.57](#).
- Task 2: Configure the CSS. Open yoga.css in a text editor. Edit the style rules as follows:
  1. Configure the universal selector with a box-sizing: border-box style declaration.

```
* { box-sizing: border-box; }
```
  2. Edit the styles for the wrapper id. Change min-width to 1200px. Change max-width to 1480px.
  3. Configure the left-column navigation area. Modify the styles for the nav element selector. Keep the style declarations that configure bold text and padding. Remove the text-align declaration. The nav area will inherit the background color of the wrapper id. Add style declarations to configure this area to float to the left with a width of 160 pixels.
  4. Configure the navigation hyperlinks to look like buttons. We'll set up the CSS in this step.
    1. Edit the styles for the nav a selector. Keep the text-decoration style declaration. Also configure styles to use block display, centered text, bold font, a 3 pixel gray (#CCCCCC) outset border, 1em padding, and a 1em bottom margin.
    2. Configure the :link, :visited, and :hover pseudo-classes for

the navigation hyperlinks. Use the following text colors: #3F2860 (unvisited hyperlinks), #497777 (visited hyperlinks), and #A26100 (hover). Also configure a 3 pixel inset #333333 border for hyperlinks in the hover state.

```
nav a:link { color: #3F2860; }
nav a:visited { color: #497777; }
nav a:hover { color: #A26100; border: 3px inset #333333; }
```

5. You will organize the navigation hyperlinks within an unordered list in later tasks. The navigation area in [Figure 6.57](#) does not show list markers. Code a nav ul descendant selector to configure unordered lists in the navigation area to display without list markers. Also configure the unordered list to have no left padding.
6. Edit the styles for the main element selector. Add new style declarations to configure a 170 pixel left margin and 1em top padding.
7. Remove the img element selector and style declarations.
8. Configure a new class named floatleft that floats to the left with right margin set to 4em.
9. Remove the #hero selector and style declaration.
10. Configure styles for a new class named clear with a clear: both; style declaration.
11. Add the following CSS to be compatible with most older browsers:

```
header, nav, main, footer { display: block; }
```

Save the yoga.css file.

- Task 3: Modify the Home Page. Open index.html in a text editor and modify the code as follows:
  1. Rework the navigation area. Remove any &nbsp; characters that may be present. Configure an unordered list to organize the

navigation hyperlinks. Each hyperlink should be contained within `<li>` tags.

2. Edit the img tag. Remove the `align="right"` attribute. Assign the img tag to the class named floatleft. Change the value of the `src` attribute to `yogadoor2.jpg`.
3. Edit the div element that contains the address information. Assign the div to the class named clear.

Save the index.html file. It should look similar to the web page shown in [Figure 6.57](#). Remember that validating your HTML and CSS can help you find syntax errors. Test and correct this page before you continue.

- Task 4: Modify the Classes Page. Open classes.html in a text editor.

Configure the left-column navigation area and navigation hyperlinks in the same manner as the home page. (Note: Do not delete the `id="hero"` from the HTML. You will use this id in the Chapter 7 Case Study.) Save your new classes.html page and test it in a browser. It should look similar to [Figure 6.58](#). Use the CSS and HTML validators to help you find syntax errors.

- Task 5: Modify the Schedule Page. Open schedule.html in a text editor. Configure the left-column navigation area and navigation hyperlinks in the same manner as the home page. (Note: Do not delete the `id="hero"` from the HTML. You will use this id in the Chapter 7 Case Study.) Save your new schedule.html page and test it in a browser. It should look similar to [Figure 6.58](#). Use the CSS and HTML validators to help you find syntax errors.

In this case study, you changed the page layout of the Path of Light Yoga Studio website. Notice that with just a few changes in the CSS and HTML code, you configured a two-column page layout.

# Web Project

See [Chapter 5](#) for an introduction to the Web Project case study. As you completed the [Chapter 5](#) Web Project case study activities, you completed a Web Project Topic Approval, Web Project Site Map, and Web Project Page Layout Design. In this case study, you will use your design documents as a guide as you develop the pages for your Web Project using CSS in an external style sheet for both formatting and page layout.

## Hands-On Practice Case

1. Create a folder called project. All of your project files and graphics will be organized in this folder and in subfolders as needed.
2. Refer to your Site Map to view the pages that you need to create. Jot down a list of the file names. Add these to the Site Map.
3. Refer to the Page Layout Design. Make a list of the common fonts and colors used on the pages. These may become the CSS you configure for the body element. Note where typical elements used for organization (such as headings, lists, paragraphs, and so on) may be used. You may want to configure CSS for these elements. Identify various page areas such as header, navigation, footer, and so on, and list any special configurations needed for these areas. These will be configured in your CSS. Create an external style sheet, called project.css, which contains these configurations.
4. Using your design documents as a guide, code a representative page for your site. Use CSS to format text, color, and layout. Apply classes and ids where appropriate. Associate the web page to the external style sheet.

Save and test the page. Modify both the web page and the project.css file as needed. Test and modify them until you have achieved the look you want.

5. Using the completed page as a template wherever possible, code the rest of the pages on your site. Test and modify them as needed.

6. Experiment with modifying the project.css file. Change the page background color, the font family, and so on. Test your pages in a browser. Notice how a change in a single file can affect multiple files when external style sheets are used.

# **7 More on Links, Layout, and Mobile**

# Chapter Objectives

In this chapter, you will learn how to . . .

- Code relative hyperlinks to web pages in folders within a website
- Configure a hyperlink to a named fragment internal to a web page
- Configure images with CSS sprites
- Configure a three-column page layout using CSS
- Configure CSS for printing
- Describe mobile design best practices
- Configure web pages for mobile display using the viewport meta tag
- Apply responsive web design techniques with CSS3 media queries
- Apply responsive image techniques including the new HTML5 picture element
- Configure a web page with CSS Flexible Box Layout  
Configure a web page with CSS Grid Layout

Now that you've had some experience coding HTML and CSS, you're ready to explore a variety of techniques in this chapter, including relative - hyperlinks and named fragment hyperlinks, CSS sprites, three-column page - layout, styling for print, styling for mobile browsers, configuring CSS media queries to target mobile devices, configuring responsive images, and exploring CSS Flexible Box Layout and CSS Grid Layout techniques.

# 7.1 Another Look at Hyperlinks

Hyperlinks make the Web a “web” of interconnected information. In this section, you’ll revisit the topic of hyperlinks and explore coding relative links, using the target attribute to open web pages in a new browser window, coding hyperlinks that are internal to a web page, configuring block anchors, and configuring telephone number hyperlinks for use on smartphones.

## More on Relative Linking

As discussed in [Chapter 2](#), a relative hyperlink is used to link to web pages within your site. You’ve been coding relative links to display web pages that are all inside the same folder. There are times when you need to link to files that are located in other folders on your website. Let’s consider a website for a bed and breakfast that features rooms and events. The folder and file listing is shown in [Figure 7.1](#). The main folder for this website is called casita, and the web developer has created separate subfolders—named images, rooms, and events—to organize the site.

## Figure 7.1



The web page files are organized in folders

[Figure 7.1 Full Alternative Text](#)

## Relative Link Examples

Recall that when linking to a file located in the same folder or directory, the value of the href attribute is the name of the file. For example, to link from the home page (index.html) to the contact.html page, code the anchor element as follows:

```
<a href="contact.html">Contact</a>
```

When linking to a file that is inside a folder within the current directory, use both the folder name and the file name in the relative link. For example, to link from the home page (index.html) to the canyon.html page (located in the rooms folder), code the anchor element as follows:

```
<a href="rooms/canyon.html">Canyon</a>
```

As shown in [Figure 7.1](#), the canyon.html page is located in the rooms

subfolder of the casita folder. The home page for the site (index.html) is located in the casita folder. When linking to a file that is up one directory level from the current page, use the “`..`” notation. To link to the home page for the site from the canyon.html page, code the anchor element as follows:

```
<a href=".. /index.html">Home</a>
```

When linking to a file that is in a folder on the same level as the current folder, the href value will use the “`..`” notation to indicate moving up one level; then specify the desired folder. For example, to link to the weekend.html page in the events folder from the canyon.html page in the rooms folder, code the anchor element as follows:

```
<a href=".. /events/weekend.html">Weekend Events</a>
```

Don’t worry if the use of “`..`” notation and linking to files in different folders seems new and different. In most of the exercises in this book, you will code either absolute links to other websites or relative links to files in the same folder. You can explore the example of the bed and breakfast website located in the student files (see chapter7/CasitaExample) to become more familiar with coding references to files in different folders.



## Hands-On Practice 7.1

This hands-on practice provides an opportunity to practice coding hyperlinks to files in different folders. The website you’ll be working with has pages in prototype form: the navigation and layout of the pages are configured, but the specific content has not yet been added. You’ll focus on the navigation area in this Hands-On Practice. [Figure 7.2](#) shows a partial screen shot of the bed and breakfast’s prototype home page with a navigation area on the left side of the page.

## Figure 7.2

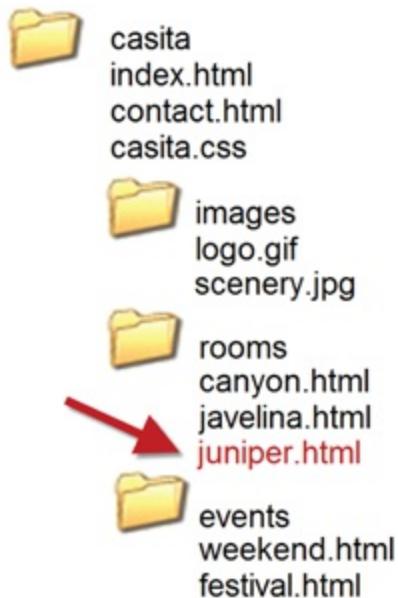


The navigation area

### Figure 7.2 Full Alternative Text

Examine [Figure 7.3](#) and notice the new juniper.html file listed within the rooms folder. You will create a new web page (Juniper Room) named juniper.html and save it in the rooms folder. Then, you will update the navigation area on each existing web page to link to the new Juniper Room page.

## Figure 7.3



New juniper.html file is in the rooms folder

[Figure 7.3 Full Alternative Text](#)

Let's get started.

1. Copy the CasitaExample folder (chapter7/CasitaExample) from the student files. Rename the folder casita.
2. Display the index.html file in a browser and click through the navigation links. View the source code of the pages and notice how the href values of the anchor tags are configured to link to and from files within different folders.
3. Launch a text editor and open the canyon.html file. You'll use this file as a starting point for your new Juniper Room page. Save the file as juniper.html in the rooms folder.
  1. Edit the page title and h2 text. Change “Canyon” to “Juniper”.
  2. Add a new li element in the navigation area that contains a hyperlink to the juniper.html file.

```
<li><a href="juniper.html">Juniper Room</a></li>
```

Place this hyperlink between the Javelina Room and Weekend Events navigation hyperlinks as shown in [Figure 7.4](#). Save the file.

## Figure 7.4



The new navigation area

[Figure 7.4 Full Alternative Text](#)

4. Use the coding for the Canyon and Javelina hyperlinks as a guide as you add the Juniper Room link to the navigation area on each of the following pages:
  - index.html
  - contact.html
  - rooms/canyon.html
  - rooms/javalina.html
  - events/weekend.html
  - events/festival.html

Save all the .html files and test your pages in a browser. The navigation hyperlink to the new Juniper Room page should work from every other page. The hyperlinks on the new Juniper Room page should function well and open other pages as expected. A solution is in the student files (chapter7/7.1 folder).

# Fragment Identifiers

Browsers begin the display of a web page at the top of the document. However, there are times when you need to provide the capability to link to a specific portion of a web page instead of the top. You can accomplish this by coding a hyperlink to a fragment identifier (sometimes called a named fragment or fragment id), which is simply an HTML element assigned to an id attribute.



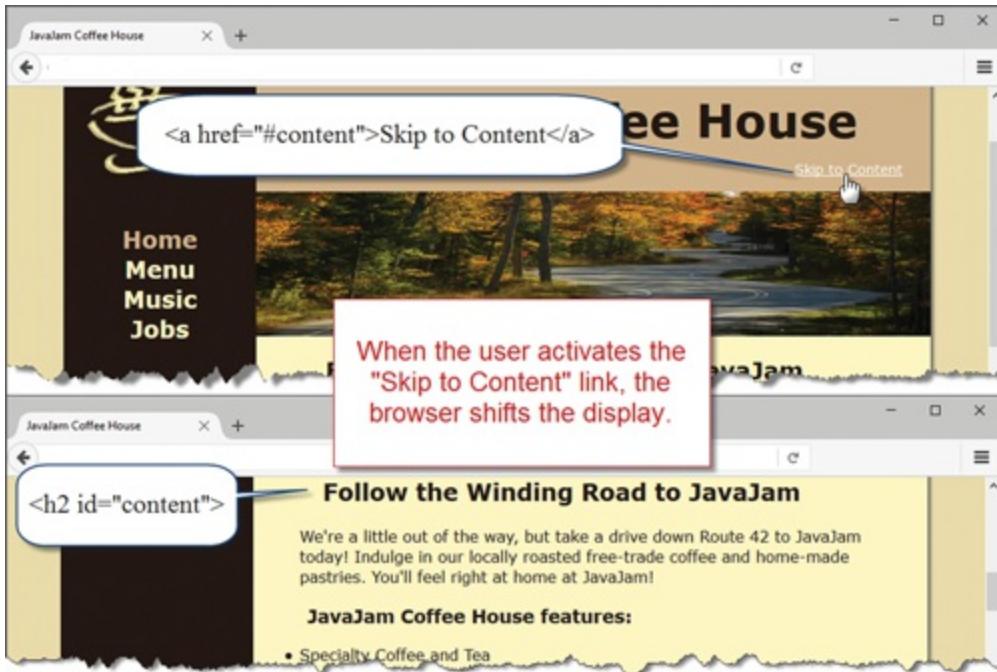
## **VideoNote** *Linking to a Named Fragment*

There are two components to your coding when using fragment identifiers:

1. The tag that identifies the named fragment of a web page: The tag must be assigned to an id. For example, <div id="content">
2. The anchor tag that links to the named fragment on a web page.

Lists of frequently asked questions (FAQs) often use fragment identifiers to jump to a specific part of the page and display the answer to a question. - Linking to a named fragment is often seen on long web pages. You might see a “Back to top” hyperlink that a visitor could select to cause the browser to quickly scroll the page back to the top of the page for easy site navigation. Another use of fragment identifiers helps to provide for accessibility. Web pages may have a fragment identifier to indicate the beginning of the actual page content. When the visitor clicks on the “Skip to content” hyperlink, the browser links to the fragment identifier and shifts focus to the content area of the page. This “Skip to content” or “Skip navigation” link provides a way for screen reader users to skip repetitive navigation links (see [Figure 7.5](#)).

## Figure 7.5



1. Establish the Target. Create the "Skip to content" fragment identifier by configuring an element that begins the page content with an id, for example, `<div id="content">`
2. Reference the Target. At the point of the page where you want to place a hyper-link to the content, code an anchor element. Use the `href` attribute and place a # symbol (called a hash mark) before the name of the fragment identifier. The code for a hyperlink to the named fragment "content" is

```
<a href="#content">Skip to Content</a>
```

The hash mark indicates that the browser should search for an id on the same page. If you forget to type the hash mark, the browser will not look on the same web page; it will look for an external file.

## Legacy Alert.

Older web pages may use the name attribute and refer to named anchors rather than fragment identifiers. This coding technique is obsolete and not valid in HTML5. Named anchors use the name attribute to identify or name the fragment. For example,

```
<a name="content" id="content"></a>
```

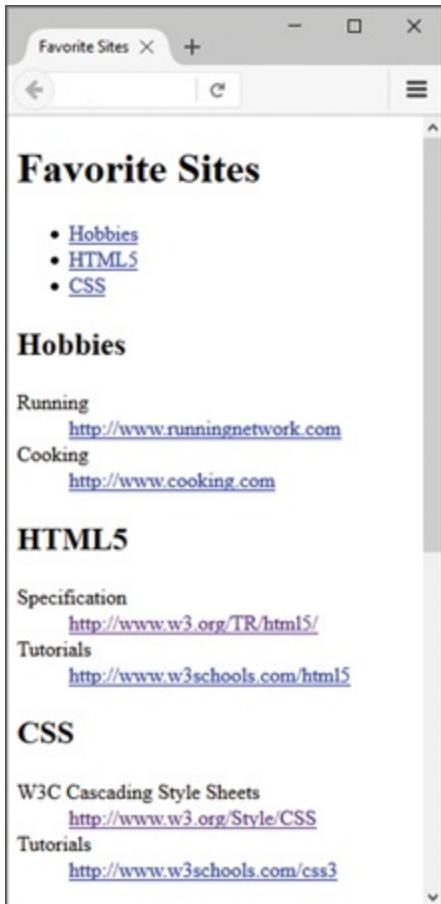


## Hands-On Practice 7.2

You will work with fragment identifiers in this Hands-On Practice. Locate chapter7/starter1.html in the student files. Save the file as favorites.html.

[Figure 7.6](#) shows a screenshot of this web page. Examine the source code and notice that the top portion of the page contains an unordered list with categories of interest (such as Hobbies, HTML5, and CSS) that correspond to the text displayed in the h2 elements below. Each h2 element is followed by a description list of topics and URLs related to that category. It might be helpful to web page visitors if they can click a category item and immediately jump to the page area that has information related to that item. This could be a useful application of linking to fragment identifiers!

## Figure 7.6



You will add hyperlinks to fragment identifiers

[Figure 7.6 Full Alternative Text](#)

Modify the page as follows:

1. Code a named fragment for each h2 element in the definition list. For example, `<h2 id="hobbies">Hobbies</h2>`
2. Add hyperlinks to the items in the unordered list so that each entry will link to its corresponding heading.
3. Add a named fragment near the top of the page.
4. Near the bottom of the favorites.html page, add a hyperlink to return to the top of the page.

Save the file and test it in a browser. Compare your work with the sample found in the student files (chapter7/7.2/favorites.html).

There may be times when you need to link to a named fragment on another web page. To accomplish this, place a “#” followed by the fragment identifier id value after the file name in the anchor tag. So, to link to the “Hobbies” (given that it is a named fragment called “hobbies”) from any other page on the same website, you could use the following HTML:

```
<a href="favorites.html#hobbies">Hobbies</a>
```



## FAQ

1. Why don't some of my hyperlinks to fragment identifiers work?

The web browser fills the browser (viewport) with the web page and will scroll to display the named fragment at the top of the viewport. However, if there is not enough “page” left below the named fragment, the content where the named fragment is located will not be displayed at the top of the browser viewport. The browser tries to do the best it can while still filling the viewport with the web page content. Try adding some blank lines (use the `<br>` tag) or padding to the lower portion of the web page. Save your work and test your hyperlinks.

## The Target Attribute

You may have noticed as you have coded hyperlinks that when a visitor clicks on a hyperlink, the new web page will automatically open in the same browser window. You can configure the target attribute on an anchor tag with `target="_blank"` to open a hyperlink in a new browser window or browser tab. For example,

```
<a href="http://yahoo.com" target="_blank">Yahoo!</a> will open Y
```

Note that you cannot control whether the web page opens in a new window or opens in a new tab; this is dependent upon your visitor's browser configuration. Why not create a test page and try it? The target attribute with the value "\_blank" configures the web page to open in a new browser window or tab.



## Hands-On Practice 7.3

You will work with the target attribute in this Hands-On Practice. Locate chapter7/starter1.html in the student files. Save the file as target.html. Launch a text editor and open the file. Let's practice using the target attribute. Choose one of the external hyperlinks to modify. Configure target="\_blank" so that the hyperlink opens in a new browser window or tab. An example is shown below:

```
<a href="http://www.cooking.com"  
target="_blank">http://www.cooking.com</a>
```

Save the file. Launch a browser and test the file. When you click on the hyperlink that you modified, the new page will display in a new browser window or tab. You can compare your work to the solution in the student files (chapter7/7.3/target.html).

## Block Anchor

It's typical to use anchor tags to configure phrases or even just a single word as a hyperlink. HTML5 provides a new function for the anchor tag—the block anchor. A block anchor can configure one or more elements (even those that display as a block, such as a div, h1, or paragraph) as a hyperlink. See an example in the student files (chapter7/block.html).

# Telephone and Text Message Hyperlinks

If a web page displays a phone number, wouldn't it be handy for a person using a smartphone to be able to tap on the phone number and place a call or send an SMS (Short Message Service) text message? It's very easy to configure a telephone hyperlink or SMS hyperlink for use by smartphones.

According to RFC 3966, you can configure a telephone hyperlink by using a telephone scheme: Begin the href value with tel: followed by the phone number. For example, to configure a telephone hyperlink on a web page for use by mobile browsers, code as follows: <a href="tel:888-555-5555">Call 888-555-5555</a>

RFC 5724 indicates that an SMS scheme hyperlink intended to send a text message can be configured by beginning the href value with sms: followed by the phone number, as shown in the following code:

```
<a href="sms:888-555-5555">Text 888-555-5555</a>
```

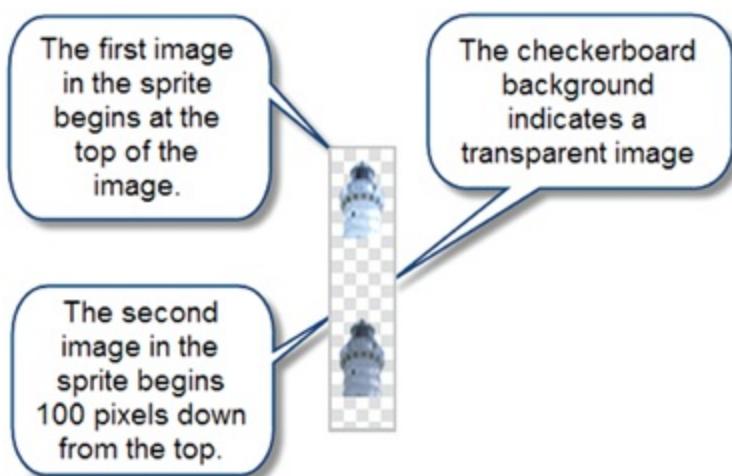
Not all mobile browsers and devices support telephone and text hyperlinks, but expect increased use of this technology in the future. You'll get a chance to practice using the tel: scheme in the [Chapter 7](#) case study.

## 7.2 CSS Sprites

When browsers display web pages, they must make a separate http request for every file used by the page, including .css files and image files such as .gif, .jpg, and .png files. Each http request takes time and resources. As mentioned in [Chapter 4](#), a sprite is an image file that contains multiple small graphics. Using CSS to configure the small graphics combined in the sprite as background images for various web page elements is called CSS sprites, a technique made popular by David Shea (<http://www.alistapart.com/articles/sprites>).

The CSS sprites technique uses the CSS `background-image`, `background-repeat`, and `background-position` properties to manipulate the placement of the background image. The single graphics file saves download time because the browser only needs to make one http request for the combined image instead of many requests for the individual smaller images. [Figure 7.7](#) shows a sprite with two lighthouse images on a transparent background. These images are configured as background images for the navigation hyperlinks with CSS as shown in [Figure 7.8](#). You'll see this in action as you complete the next Hands-On Practice.

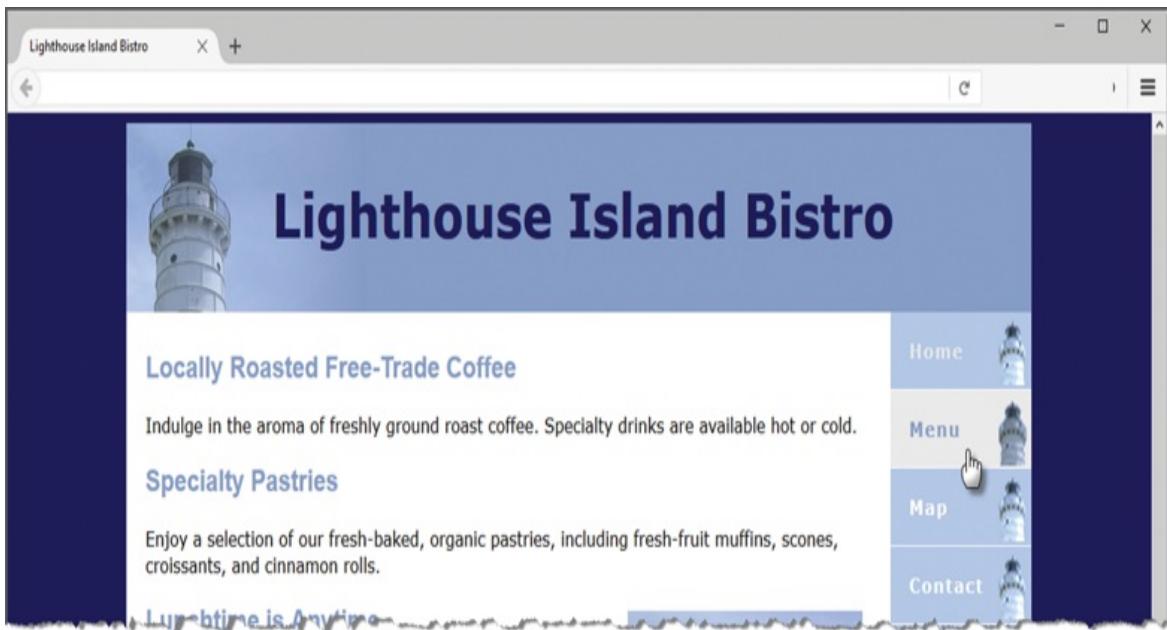
**Figure 7.7**



The sprite consists of two images in a single graphics file

Figure 7.7 Full Alternative Text

## Figure 7.8



Sprites in action

Figure 7.8 Full Alternative Text



## Hands-On Practice 7.4

You will work with CSS sprites in this Hands-On Practice as you create the web page shown in [Figure 7.8](#). Create a new folder named sprites. Locate chapter7/starter2.html in the student files. Copy starter2.html into your sprites folder. Copy the following files from chapter7/starters into your sprites folder: lighthouseisland.jpg, lighthouselogo.jpg, and sprites.gif. The

sprites.gif, shown in [Figure 7.7](#), contains two lighthouse images. The first lighthouse image starts at the top of the graphics file. The second lighthouse image begins 100 pixels down from the top of the graphics file. We'll use the value 100 when we configure the display of the second image.

Launch a text editor and open starter2.html. Save the file as index.html. You will edit the embedded styles to configure background images for the navigation hyperlinks.

1. Configure the background image for navigation hyperlinks. Add the following styles to the nav a selector to set the background image to the sprites.gif with no repeat. The value right in the background-position property configures the lighthouse image to display at the right of the navigation element. The value 0 in the background-position property configures the display at offset 0 from the top (at the very top) so the first lighthouse image displays.

```
nav a { text-decoration: none;
    display: block;
    padding: 20px;
    background-color: #b3c7e6;
    border-bottom: 1px solid #ffffff;
    background-image: url(sprites.gif);
    background-repeat: no-repeat;
    background-position: right 0; }
```

2. Configure the second lighthouse image to display when the mouse pointer passes over the hyperlink. Add the following styles to the nav a:hover selector to display the second lighthouse image. The value right in the background-position property configures the lighthouse image to display at the right of the navigation element. The value -100px in the background-position property configures the display at an offset of 100 pixels down from the top so the second lighthouse image appears.

```
nav a:hover { background-color: #eaeaea;
    color: #869dc7;
    background-position: right -100px; }
```

Save the file and test it in a browser. Your page should look similar to [Figure](#)

7.8. Move your mouse pointer over the navigation hyperlinks to see the background images change. Compare your work with the sample found in the student files (chapter7/7.4/index.html).



## FAQ

### 1. How can I create my own sprite graphics file?

Most web developers use a graphics application such as Adobe Photoshop, Adobe Fireworks, or GIMP to edit images and save them in a single graphics file for use as a sprite. Or, you could use a web-based sprite generator such as the ones listed below:

- CSS Sprites Generator: <http://csssprites.com>
- CSS Sprite Generator: <http://spritegen.website-performance.org>
- SpriteMe: <http://spriteme.org>

If you already have a sprite graphic, check out the online tool at Sprite Cow (<http://www.spritecow.com>) that can generate pixel-perfect background-position property values for a sprite.



## Checkpoint 7.1

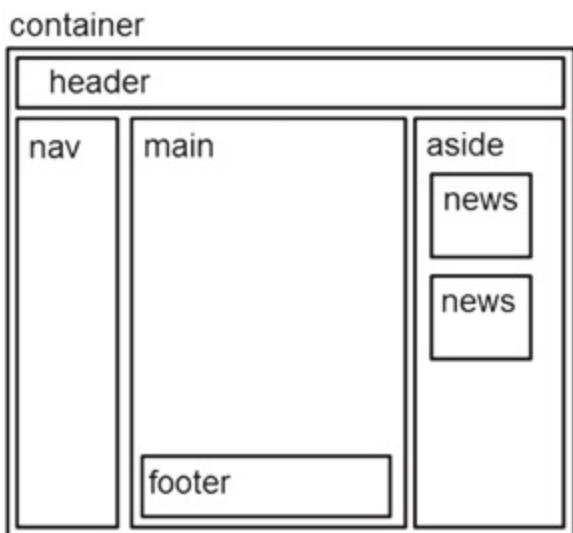
1. Why should you organize the files in a website using folders and subfolders?
2. Which attribute configures a hyperlink to open the file in a new browser window or tab?

3. State an advantage of using CSS sprites in a website.

## 7.3 Three-Column CSS Page Layout

Often a web page layout will consist of a header across the top of the page with three columns below: navigation, main content, and sidebar. If you are thinking about this layout as a series of boxes—you’re thinking correctly for configuring pages using CSS! [Figure 7.9](#) shows a wireframe of this page - layout design. [Figure 7.10](#) shows a web page configured using this design. You will create this page in the next Hands-On Practice.

### Figure 7.9



Wireframe for a three-column page layout

[Figure 7.9 Full Alternative Text](#)

### Figure 7.10

The screenshot shows a web browser window with the title "Door County Wildflowers". The header features a banner image of pink lady's slipper orchids. On the left, a sidebar contains links for Home, Spring, Summer, Fall, and Contact. The main content area has a heading "Door County" and text about the county's diverse ecosystems. It includes two images: a pink lady's slipper and a white trillium. A section titled "Explore the beauty of Door County Wildflowers...." with a descriptive paragraph follows. On the right, there are two sidebar sections: "The Ridges" and "Newport State Park", each with a brief description and a link.

Door County Wildflowers

Skip to Content

# Door County Wildflowers

Home

Spring

Summer

Fall

Contact

## Door County

Wisconsin's Door County Peninsula is ecologically diverse — upland and boreal forest, bogs, swamps, sand and rock beaches, limestone escarpments, and farmlands.

The variety of ecosystems supports a large number of wildflower species.



Explore the beauty of Door County Wildflowers....

With five state parks, tons of county parks, and private nature sanctuaries, Door County is teeming with natural areas for you to stalk your favorite wildflowers.

Copyright © 2016 Door County Wild Flowers

### The Ridges

The Ridges Nature Sanctuary offers wild orchid hikes during the summer months. For more info, visit [The Ridges](#).

### Newport State Park

The [Newport Wilderness Society](#) sponsors free meadow hikes at 9am every Saturday. Stop by the park office to register.

This three-column page layout is designed using CSS

[Figure 7.10 Full Alternative Text](#)



## Hands-On Practice 7.5

In this Hands-On Practice, you will develop your first three-column web page using CSS. The same techniques that you used to configure the two-column page will apply here. Think of the page as a series of elements or boxes. Using a wireframe as a guide, configure the basic page structure with HTML. Then code CSS to configure page areas; use ids or classes when appropriate. Recall that a key technique for creating a two-column web page with left-column navigation is to design the left column to float to the left. A key technique for our three-column page is to code the left column with `float:left` and the right column with `float:right`. The center column occupies the middle of the browser window. Refer to [Figures 7.9](#) and [7.10](#) as you complete this Hands-On Practice.

## Getting Started

Locate the showybg.jpg, plsthumb.jpg, and trillium.jpg files in the chapter7/starters folder in the student files. Create a new folder called wildflowers3. Copy the files to the folder.

# Part 1: Code the HTML

Review [Figures 7.9](#) and [7.10](#). Notice the page elements: a header area with a background image; a left column with a navigation area and an image; a center column with paragraphs of text, headings, and an image that floats to the right; a right column with two news items; and a footer. You will code CSS to configure the layout and other styles. The navigation menu hyperlinks will be configured using an unordered list. As you code the HTML document, you will place the elements on the page and assign id and class values that correspond to the wireframe areas in [Figure 7.9](#). Launch a text editor and type in the following HTML:

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>Door County Wildflowers</title>
<meta charset="utf-8">
</head>
<body>
<div id="container">
<header>
    <span><a href="#content">Skip to Content</a></span>
    <h1>Door County Wildflowers</h1>
</header>
<nav>
    <ul>
        <li><a href="index.html">Home</a></li>
        <li><a href="spring.html">Spring</a></li>
        <li><a href="summer.html">Summer</a></li>
        <li><a href="fall.html">Fall</a></li>
        <li><a href="contact.html">Contact</a></li>
    </ul>
    
</nav>
<aside>
    <h3>The Ridges</h3>
    <p class="news">The Ridges Nature Sanctuary offers wild orch
    <h3>Newport State Park</h3>
    <p class="news">The <a href="http://newportwildernesssociety.o
</aside>
<main id="content">
```

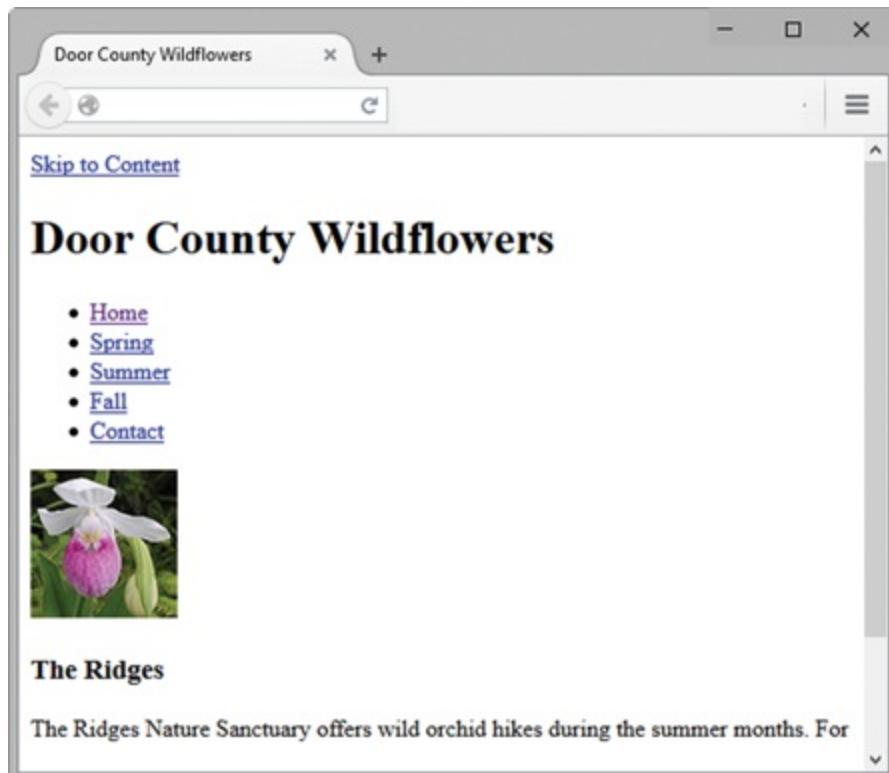
```

<h2>Door County</h2>
<p>Wisconsin 's Door County Peninsula is ecologically div
<p>The variety of ecosystems supports a large number of wildf
Explore the beauty <br>of Door County Wildflowers....</h
<p>With five state parks, tons of county parks, and private na
    <footer> Copyright © 2018 Door County Wild Flowers<br>
    </footer>
</main>
</div>
</body>
</html>

```

Save your page as index.html in your wildflowers3 folder. Test the page in a browser. Your display will not look like [Figure 7.10](#) because you have not yet configured the CSS. The top of your page should look similar to the page shown in [Figure 7.11](#).

# Figure 7.11



The page before CSS is applied

Figure 7.11 Full Alternative Text

# Part 2: Code the Basic CSS

For ease of editing, in this Hands-On Practice, you will code the CSS as embedded styles in the header section of the web page. However, if you were creating an entire website, you would most likely use an external style sheet. Launch a text editor and open index.html. Let's take a moment to consider the areas on the page shown in [Figure 7.10](#): header, left-column navigation area, right-column sidebar area, center column, and footer. The left column will contain a navigation area and a small image. The center column will contain paragraphs, a heading, and a right-floating image. The right column will contain a series of headings and news items. Locate these areas on the sketch in [Figure 7.9](#). Notice also that the same font is used throughout the page and the page begins immediately at the browser margin.

With your file open in a text editor, modify the head section of your document and code a <style> tag. Now let's consider the CSS configuration. Type the CSS in your document as indicated below:

1. Support HTML5 elements in older browsers:

```
header, nav, main, footer, aside { display: block; }
```

2. Configure box-sizing for all HTML elements:

```
* { box-sizing: border-box; }
```

3. Body Element Selector. Set the margin to 0. Configure the background color to #FFFFFF.

```
body { margin:0;  
background-color: #FFFFFF; }
```

4. Container. Configure this area with background (#EEEEEE) and text (#006600) colors, a minimum width of 960 pixels, and a font family of Verdana, Arial, or sans-serif.

```
#container { background-color: #EEEEEE;
```

```
color: #006600;  
min-width: 960px;  
font-family: Verdana, Arial, sans-serif; }
```

5. Header. Configure a background color (#636631) and a background image (position showybg.jpg at the bottom of the element to repeat horizontally). Set the height to 120 pixels, text color to #CC66CC, text alignment to right, no top padding, no bottom padding, 20 pixels left padding, and 20 pixels right padding. Configure a 2 pixel solid black border across the bottom of this area.

```
header { background-color: #636631;  
background-image: url(showybg.jpg);  
background-position: bottom;  
background-repeat: repeat-x;  
height: 120px;  
color: #CC66CC;  
text-align: right;  
padding: 0 20px;  
border-bottom: 2px solid #000000; }
```

6. Left Column. One of the keys to this three-column page layout is that the left navigation column is designed to float to the left of the browser window. Configure a width of 150 pixels.

```
nav { float: left;  
width: 150px; }
```

7. Right Column. One of the keys to this three-column page layout is that the right sidebar column is designed to float to the right of the browser window. Configure a width of 200 pixels.

```
aside { float: right;  
width: 200px; }
```

8. Center. The main content will take up all of the room that is available after the left and right columns float. The content area has a special need for margins because the left and right columns are floating on either side. Set the left margin to 160 pixels, the right margin to 210 pixels, and the remaining margins to 0. Also configure the padding for this area. Set the background (#FFFFFF) and text (#006600) colors.

```
main { margin: 0 210px 0 160px;  
padding: 1px 10px 20px 10px;  
background-color: #FFFFFF;  
color: #006600; }
```

9. Footer. Configure the page footer with very small text that is centered. Configure the background (#FFFFFF) and text (#006600) colors for this area. Set the top padding to 10 pixels. Clear the floated image in the center content area.

```
footer { font-size: .70em;  
text-align: center;  
color: #006600;  
background-color: #FFFFFF;  
padding-top: 10px;  
clear: both; }
```

At this point, you have configured the main elements of the three-column page layout. Code the closing HTML style tag with </style>. Save index.html in the wildflowers3 folder. It's a good idea to open your page in a browser to make sure you are on the right track. It should look similar to the one shown in [Figure 7.12](#). Note that there is still some detail work to do, but you are well on your way!

## Figure 7.12

Door County Wildflowers

Skip to Content

# Door County Wildflowers

• Home  
• Spring  
• Summer  
• Fall  
• Contact



## Door County

Wisconsin's Door County Peninsula is ecologically diverse — upland and boreal forest, bogs, swamps, sand and rock beaches, limestone escarpments, and farmlands.

The variety of ecosystems supports a large number of wildflower species.



**Explore the beauty  
of Door County Wildflowers....**

With five state parks, tons of county parks, and private nature sanctuaries, Door County is teeming with natural areas for you to stalk your favorite wildflowers.

Copyright © 2016 Door County Wild Flowers

## The Ridges

The Ridges Nature Sanctuary offers wild orchid hikes during the summer months. For more info, visit [The Ridges](#).

## Newport State Park

The [Newport Wilderness Society](#) sponsors free meadow hikes at 9am every Saturday. Stop by the park office to register.

The CSS for the basic elements of the three-column layout has been completed

[Figure 7.12 Full Alternative Text](#)

# Part 3: Continue Coding CSS

Now you are ready to continue with your styles. Open index.html in a text editor and position your cursor on a blank line above the closing style tag.

## 1. Header Area.

1. The h1 Element Selector. Notice the extra space above the “Door County Wildflowers” text, which is contained within the `<h1>` tag in the header element. You can reduce this extra space by setting a 0 top margin for the h1 element selector. Also configure left alignment, text shadow, and a font size of 3em for the h1 selector.

```
h1 { margin-top: 0;
      font-size: 3em;
      text-align: left;
      text-shadow: 2px 2px 2px #000000; }
```

2. Skip to Content. Configure the “Skip to Content” hyperlink in the header area with a 0.80em font size. Also configure pseudo-classes for `:link`, `:visited`, `:hover`, `:active`, and `:focus` with text color as shown below.

```
header a {font-size: 0.80em; }
header a:link, header a:visited { color: #ffffff; }
header a:focus, header a:hover { color: #eeeeee; }
```

## 2. Left Navigation Column.

1. Navigation Menu. Configure the unordered list in the nav element selector to provide for a 20 pixel top margin and not to display any list markers.

```
nav ul { margin-top: 20px;
          list-style-type: none; }
```

The navigation links should have no underline (`text-decoration: none`) and a 1.2em font size. Configure pseudo-classes for `:link`,

`:visited, :hover, :active, and :focus` with text color as shown below.

```
nav a { text-decoration: none;  
        font-size: 1.2em; }  
nav a:link { color:#006600;}  
nav a:visited { color: #003300; }  
nav a:focus, nav a:hover { color: #cc66cc; }  
nav a:active { color: #000000; }
```

2. Left Column Image. Configure images in the `nav` element with a margin of 30 pixels.

```
nav img { margin: 30px; }
```

### 3. Main Content.

1. Paragraphs. Configure the main content's paragraph element selector to display with a margin of 20 pixels.

```
main p { margin: 20px; }
```

2. Headings. Configure the `h2` and `h3` element selectors in the main content with the same text color as the logo header text and the same background color as the main body of the page.

```
main h2, main h3 { color: #cc66cc;  
                    background-color: #ffffff; }
```

3. Image Floating at the Right. Create a `floatright` class to use a 10 pixel margin and float to the right.

```
.floatright { margin: 10px;  
              float: right; }
```

4. Right Sidebar Column. This column is contained within the `aside` element.

1. Headings. Configure the `h3` element selector in this area with a 1 pixel black solid bottom border, 2 pixels of padding at the bottom, a 10 pixel margin, 0.90em font size, and the same text color as the

logo header text.

```
aside h3 { padding-bottom: 2px;  
border-bottom: 1px solid #000000;  
margin: 10px;  
font-size: 0.90em;  
color: #cc66cc; }
```

2. News Items. Configure a class called news that uses a small font and has a 10 pixel margin.

```
.news { font-size: 0.80em;  
margin: 10px; }
```

Save index.html in the wildflowers3 folder.

## Part 4: Test the Page

Now that your styles are coded, test the index.html page again. Your page should look similar to the screenshot shown in [Figure 7.10](#). If there are differences, verify the id and class values in your HTML. Also check the syntax of your CSS. You may find the W3C CSS Validation Service at <http://jigsaw.w3.org/css-validator> to be helpful when verifying CSS syntax. The student files contain a copy of this page in the chapter7/7.5 folder.

## 7.4 CSS Styling for Print

Even though the “paperless society” has been talked about for decades, the fact is that many people still love paper and you can expect your web pages to be printed. CSS offers you some control over what gets printed and how the printouts are configured. This is easy to do using external style sheets. Create one external style sheet with the configurations for browser display and a second external style sheet with the special printing configurations. Associate both of the external style sheets to the web page using two link elements. The link elements will utilize the `media` attribute, which indicates the **media type** for which the styles are intended, such as screen display or print display. See a list of media attribute values in [Table 7.1](#).

**Table 7.1 The link element’s media attribute**

Value	Purpose
screen	Default value; Indicates the style sheet that configures the typical browser viewport display on a color computer screen
print	Indicates the style sheet that configures the printed formatting
handheld	Although this value is intended by the W3C to indicate the style sheet that configures display on handheld mobile devices, in practice, the attribute value is not

reliably supported. The next section will describe other methods for configuring the design of mobile web pages.

Modern browsers will use the correct screen or print style sheet, depending on whether they are rendering a screen display or preparing to print a document. Configure the link element for your browser display with `media="screen"`. Configure the link element for your printout with `media="print"`. An example of the HTML follows:

```
<link rel="stylesheet" href="wildflower.css" media="screen">
<link rel="stylesheet" href="wildflowerprint.css" media="print">
```

## Print Styling Best Practices

You might be wondering how a print style sheet should differ from the CSS used to display the web page in a browser. Commonly used techniques for styling print are listed below.

### Hide Non-Essential Content

It's common practice to prevent banner ads, navigation, or other extraneous areas from appearing on the printout. Use the `display: none;` style declaration to hide content that is not needed on a printout of the web page.

### Configure Font Size and Color for Printing

Another common practice is to configure the font sizes on the print style sheet to use pt units. This will better control the text on the printout. You might also consider configuring the text color to black (#000000) and background color to white (#FFFFFF) if you envision the need for visitors to

print your pages often. The default setting on most browsers prevent background colors and background images from printing, but you can prevent background image display in your print style sheet by setting the `background-image` property to the value `none`.

## Control Page Breaks

Use the CSS `page-break-before` or `page-break-after` **properties** to control page breaks when printing the web page. Well-supported values for these properties are `always` (the page break will always occur as designated), `avoid` (if possible, the page break will occur before or after, as designated), and `auto` (default). For example, to configure a page break at a specific point in the document (in this case, right before an element assigned to the class named `newpage`), configure the CSS as shown below:

```
.newpage { page-break-before: always; }
```

## Print URLs for Hyperlinks

Consider whether a person would find it useful to see the actual URL for a resource when reading the printout of your web page. You can use CSS to display the value of the `href` attribute right on the page using two CSS coding techniques: a CSS pseudo-element and the CSS `content` property. The purpose of a CSS pseudo-element is to apply some type of effect to its selector. [Table 7.2](#) lists pseudo-elements and their purpose.

## Table 7.2 CSS 2.1 pseudo-elements

Pseudo-element	Purpose
----------------	---------

:after      Inserts generated content after the selector: Configure the generated content with the content property

:before     Inserts generated content before the selector: Configure the generated content with the content property

:first-letter      Applies styles to the first letter of text

:first-line      Applies styles to the first line of text

Use the CSS content property along with the :after and :before pseudo-elements to generate content. A useful feature of the content property is the attr(x) function, which returns the value of the HTML attribute provided. You can use this to print the URL of a hyperlink (the value of the href attribute). Use quotation marks to contain additional text or characters, such as parentheses. The CSS below will display the URL for each hyperlink in the aside element within parentheses after the text hyperlink.

```
aside a:after { content: " (" attr(href) ") "; }
```

[Figure 7.13](#) shows the print preview of the content page you created in [Hands-On Practice 7.5](#) (see [Figure 7.10](#)). Notice that the print preview includes the navigation area. [Figure 7.14](#) displays an alternate version of the page that uses CSS to prevent the display of the navigation area, configures pt units for font sizes, and prints the URL for the hyperlinks in the sidebar area. You will explore these techniques in the next Hands-On Practice.

## Figure 7.13



Print preview of the page displayed in [Figure 7.10](#).

[Figure 7.13 Full Alternative Text](#)

## Figure 7.14

Door County Wildflowers

Print... Page Setup... Page: 1 of 1 Scale: Shrink To Fit Portrait Landscape Close

Door County Wildflowers

# Door County Wildflowers

---

## Door County

Wisconsin's Door County Peninsula is ecologically diverse — upland and boreal forest, bogs, swamps, sand and rock beaches, limestone escarpments, and farmlands.

The variety of ecosystems supports a large number of wildflower species.



### The Ridges

The Ridges Nature Sanctuary offers wild orchid hikes during the summer months. For more info, visit [The Ridges](http://www.ridgesanctuary.org) (<http://www.ridgesanctuary.org>) .

### Newport State Park

The Newport Wilderness Society (<http://www.newportwildernesssociety.org>) sponsors free meadow hikes at 9am every Saturday. Stop by the park office to register.

**Explore the beauty  
of Door County Wildflowers. . . .**

With five state parks, tons of county parks, and private nature sanctuaries, Door County is teeming with natural areas for you to stalk your favorite wildflowers.

Copyright © 2016 Door County Wild Flowers

Print preview using CSS to configure for printing.

[Figure 7.14 Full Alternative Text](#)



## Hands-On Practice 7.6

In this Hands-On Practice, you will code special styles for use when printing a web page. We will use the Door County Wildflowers index.html page from [Hands-On Practice 7.5](#) as a starting point. [Figure 7.10](#) shows a browser display of the index.html page. You will create a new version of index.html that is associated with two external style sheets: one for the screen display and the other for printing. When you are finished, your printed page should resemble [Figure 7.14](#).

## Getting Started

Create a new folder named wildflowersPrint. Copy index.html, plsthumb.jpg, showybg.jpg, and trillium.jpg from the student files chapter7/7.5 folder into your wildflowersPrint folder.

# **Part 1: Create a Style Sheet for Screen Display**

Launch a text editor and open index.html. Copy all of the style rules between the opening and closing style tags. Use your text editor to create a new file and save it as wildflower.css in your wildflowersPrint folder. Paste the style rules into wildflower.css and save the file.

## Part 2: Edit the HTML

Edit index.html and delete the embedded CSS and style tags. Code a link - element to associate the web page with the external style sheet that you just created (wildflower.css). Add the media attribute with the value of "screen" to the link element for wildflower.css. Code a second link element to invoke an external style sheet called wildflowerprint.css for printing (media="print"). The HTML is as follows:

```
<link rel="stylesheet" href="wildflower.css" media="screen">
<link rel="stylesheet" href="wildflowerprint.css" media="print">
```

Save index.html in the wildflowersPrint folder.

# Part 3: Code the New Style Sheet for Print Display

Launch a text editor and open wildflower.css. Because you want to keep most of the styles for printing, you will modify a copy of the screen display external style sheet. Save wildflower.css as wildflowerprint.css in the wildflowersPrint folder. You will modify several areas on this style sheet, including the container id, h1 element selector, header element selector, nav element selector, main element selector, and the hyperlinks located in the header and aside elements.

1. Modify the h1 element selector so that the printer will use 24 point font size. Remove the text-align property.

```
h1 { margin-top: 0;  
      font-size: 24pt;  
      text-align: left }
```

2. Modify the header element selector style rules. Configure a white background color (#ffffff). Remove the background image declarations. The height property is also not needed because there is no longer a background image. Also remove the text alignment property.

```
header { color: #cc66cc;  
         background-color: #ffffff;  
         border-bottom: 2px solid #000000;  
         padding: 0 20px; }
```

3. Configure the “Skip to Content” hyperlink in the header to not display. Replace all style rules associated with header a with the following:

```
header a { display: none; }
```

4. Configure the navigation area to not display. Remove all style rules associated with nav element selector and add the following:

```
nav { display: none; }
```

5. Remove the styles for the header `a:link`, `header a:visited`, `header a:focus`, and `header a:hover` selectors.
6. Configure the main content area. Modify the style rules for main element selector. Set the left margin to 0, the right margin to 40%, text color to black (#000000), and the font size to 12pt.

```
main { margin: 0 40% 0 0;  
       padding: 1px 10px 20px 10px;  
       font-size: 12pt;  
       background-color: #ffffff;  
       color: #000000; }
```

7. Configure the width of the sidebar area to 40%.

```
aside { float: right;  
        width: 40%; }
```

8. Configure the `news` class. Modify the style rule to configure the font size to 10pt.

```
.news { font-size: 10pt;  
       margin: 10px; }
```

9. Configure the hyperlinks in the sidebar area (the area within the `aside` element) so that the text is not underlined and the URLs are printed in 8pt black font. Add the following CSS:

```
aside a { text-decoration: none; }  
aside a:after { content: "(" attr(href) ") ";  
               font-size: 8pt;  
               color: #000000; }
```

10. Look through the style rules and configure the `background-color` for each `h2` and `h3` element selector to be white (#ffffff).
11. Locate the `#container` selector and remove the `min-width` style declaration.

Save your file in the `wildflowersPrint` folder.

# Part 4: Test Your Work

Test index.html in a browser. Select File > Print > Preview. Your display should look similar to the page shown in [Figure 7.14](#). The font sizes have been configured and the navigation does not display. The URLs appear after the hyperlink text in the sidebar area. The student files contain a solution in the chapter7/print folder.

Note that there is a change in CSS3 syntax, which requires two colons in front of each pseudo-element (for example, CSS3 uses ::after instead of :after). However, we'll stick with the CSS2 pseudo-elements and syntax for now because there is broader browser support.

# 7.5 Designing for the Mobile Web

[Chapter 5](#) introduced you to three methods that can be used to provide access for website visitors who use mobile devices. One option is to design and publish a second website with a .mobi TLD. Another option is to design and publish a separate website within your own domain that is optimized for mobile use. This technique is utilized by the White House at <http://www.whitehouse.gov>. (desktop) and <http://m.whitehouse.gov> (mobile). The third option is to configure one website with separate styles for desktop browser ([Figure 7.15](#)) and mobile ([Figure 7.16](#)) display. Before we focus on coding, let's consider design techniques for the mobile web.

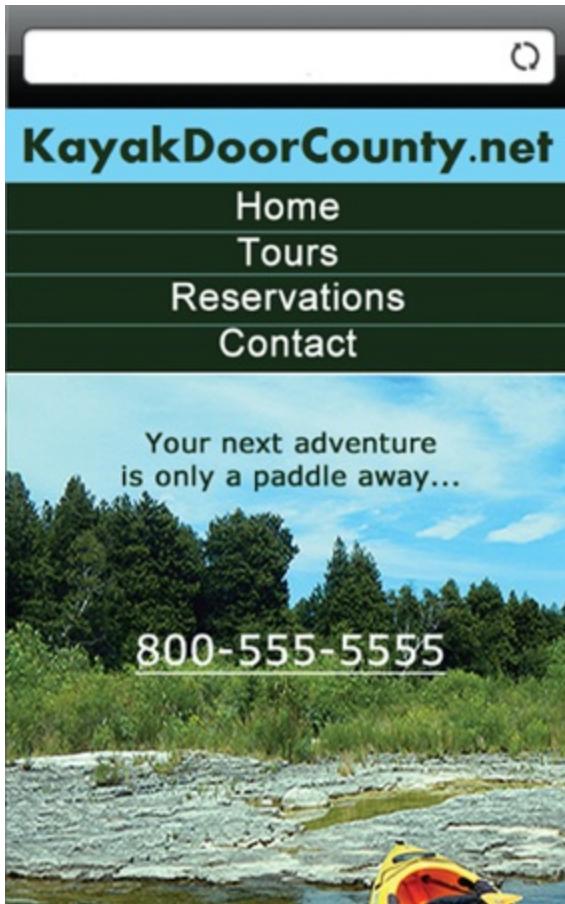
## Figure 7.15



The desktop browser display

[Figure 7.15 Full Alternative Text](#)

## Figure 7.16



The mobile display

[Figure 7.16 Full Alternative Text](#)

## Mobile Web Design Best Practices

Mobile web users are typically on-the-go, need information quickly, and may be easily distracted. A web page that is optimized for mobile access should try to serve these needs. Take a moment to review [Figures 7.15](#) and [7.16](#) and observe how the design of the mobile website addresses the design - considerations discussed in [Chapter 5](#):

- Small screen size. The size of the header area is reduced to accommodate a small screen display.
- Low bandwidth (slow connection speed). Note that a smaller version of

the large image visible in [Figure 7.15](#) is displayed on the mobile version ([Figure 7.16](#)).

- Font, color, and media issues. Common font typefaces are utilized. There is also good contrast between text and background color.
- Awkward controls, and limited processor and memory. The mobile website uses a single-column page layout that facilitates keyboard tabbing and will be easy to control by touch. The page is mostly text, which will be quickly rendered by a mobile browser.
- Functionality. Hyperlinks to popular site features display directly under the header. A phone number is prominently provided.

Let's build on this base of design considerations and expand them.

## Optimize Layout for Mobile Use

A single-column page layout ([Figure 7.17](#)) with a small header, key navigation links, content, and page footer works well for a mobile device display. Mobile screen resolutions vary greatly (for example, 320×240, 360×640, 480×800, 640×690, and 750×1334). W3C recommendations include the following:

### Figure 7.17



Wireframe for a typical single-column mobile page layout

[Figure 7.17 Full Alternative Text](#)

- Limit scrolling to one direction.
- Use heading elements.
- Use lists to organize information (such as unordered lists, ordered lists, and definition lists).
- Avoid using tables (see [Chapter 8](#)) because they typically force both horizontal and vertical scrolling on mobile devices.
- Provide labels for form controls (see [Chapter 9](#)).
- Avoid using pixel units in style sheets.
- Avoid absolute positioning in style sheets.
- Hide content that is not essential for mobile use.

## Optimize Navigation for Mobile Use

Easy-to-use navigation is crucial on a mobile device. The W3C recommends the following:

- Provide minimal navigation near the top of the page.
- Provide consistent navigation.
- Avoid hyperlinks that open files in new windows or pop-up windows.
- Try to balance both the number of hyperlinks on a page and the number of levels of links needed to access information.

## **Optimize Graphics for Mobile Use**

Graphics can help to engage visitors, but be aware of the following W3C recommendations for mobile use:

- Avoid displaying images that are wider than the screen width (assume a 320 pixel screen width on a smartphone display).
- Configure alternate small, optimized background images.
- Some mobile browsers will downsize all images, so images with text may become difficult to read.
- Avoid the use of large graphic images.
- Specify the size of images.
- Provide alternate text for graphics and other non-text elements.

## **Optimize Text for Mobile Use**

It can be difficult to read text on a small mobile device. The following W3C recommendations will aid your mobile visitors.

- Configure good contrast between text and background colors.
- Use common font typefaces.
- Configure font size with em units or percentages.
- Use a short, descriptive page title.

The W3C has published Mobile Web Best Practices 1.0, a list of 60 mobile web design best practices, at <http://www.w3.org/TR/mobile-bp>. Visit [http://www.w3.org/2007/02/mwbp\\_flip\\_cards.html](http://www.w3.org/2007/02/mwbp_flip_cards.html) for flipcards that - summarize the Mobile Web Best Practices 1.0 document.

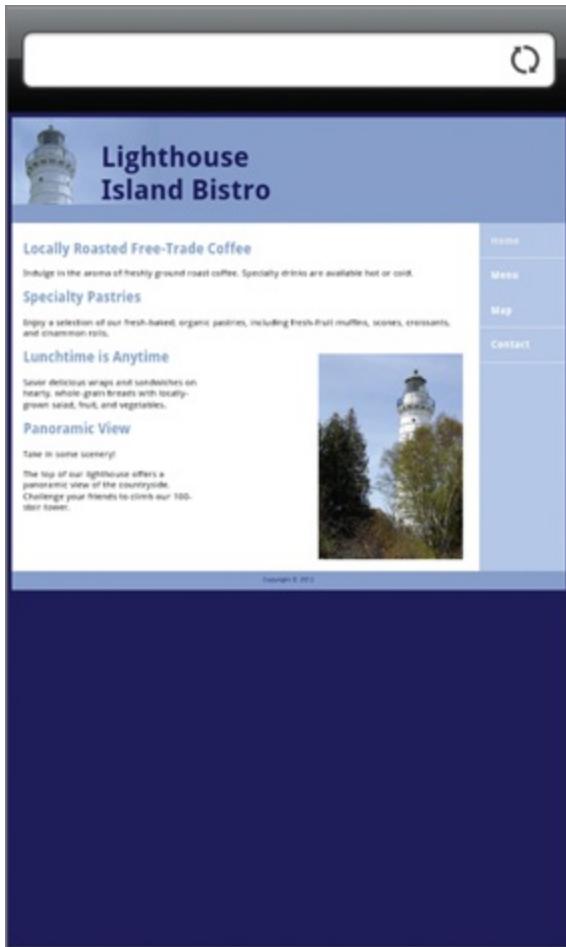
## Design for One Web

The W3C mission of building “One Web” refers to the concept of providing a single resource that is configured for optimal display on multiple types of devices. This is more efficient than creating multiple versions of a web document. With the “One Web” in mind, we’ll next explore using the viewport meta tag and CSS media queries to target and deliver style sheets that are optimized for mobile display to mobile devices.

## 7.6 Viewport Meta Tag

There are multiple uses for meta tags. You've used the meta tag since [Chapter 2](#) to configure the character encoding on a web page. Now, we'll explore the new viewport meta tag, which was created as an Apple extension that helps with displays on mobile devices such as iPhones and Android smartphones by setting the width and scale of the viewport. [Figure 7.18](#) displays a screen shot of a web page displayed on an Android smartphone without the viewport meta tag. Examine [Figure 7.18](#) and notice that the mobile device zoomed out to display the entire web page on the tiny screen. The text on the web page is difficult to read.

**Figure 7.18**



Mobile display of a web page without the viewport meta tag

### Figure 7.18 Full Alternative Text

[Figure 7.19](#) shows the same web page after the viewport meta tag was added to the head section of the document. The code is shown below:

## Figure 7.19



The viewport meta tag helps with mobile displays

[Figure 7.19 Full Alternative Text](#)

```
<meta name="viewport"  
content="width=device-width, initial-scale=1.0">
```

Code the viewport meta tag with the HTML `name="viewport"` and `content` attributes. The value of the HTML `content` attribute can be one or more directives (also referred to as properties by Apple), such as the `device-width` directive and directives that control zooming and scale. [Table 7.3](#) lists viewport meta tag directives and their values.

## Table 7.3 Viewport meta tag

# directives

Directive	Values	Purpose
width	Numeric value or device-width which indicates actual width of the device screen	The width of the viewport in pixels
height	Numeric value or device-height which indicates actual height of the device screen	The height of the viewport in pixels
scale	initial - Numeric multiplier; Set to 1 for 100% initial scale	Initial scale of the viewport
scale	minimum - Numeric multiplier; Mobile Safari default is 0.25	Minimum scale of the viewport
scale	maximum - Numeric multiplier; Mobile Safari default is 1.6	Maximum scale of the viewport
scalable	user-scalable - yes allows scaling, no disables scaling	Determines whether a user can zoom in or out

Now that you've scaled the page to be readable, what about styling it for optimal mobile use? That's where CSS comes into play. You'll explore CSS Media Queries in the next section.

## 7.7 CSS Media Queries

Recall from [Chapter 5](#) that the term **responsive web design** refers to progressively enhancing a web page for different viewing contexts (such as smartphones and tablets) through the use of coding techniques including fluid layouts, flexible images, and media queries.

For examples of the power of responsive web design techniques, review [Figures 5.43, 5.44](#), and [5.45](#), which are actually the same .html web page file that was configured with CSS to display differently, depending on the viewport size detected by media queries. Also visit the Media Queries website at <http://mediaqueri.es> to view a gallery of sites that demonstrate responsive web design. The screen captures in the gallery show web pages displayed with the following browser viewport widths: 320px (smartphone display), 768px (tablet portrait display), 1024px (netbook display and tablet landscape display), and 1600px (large desktop display).

### What's a Media Query?

According to the W3C (<http://www.w3.org/TR/css3-mediaqueries>) a media query is made up of a media type (such as screen) and a logical expression that determines the capability of the device that the browser is running on, such as screen resolution and orientation (portrait or landscape). When the media query evaluates as true, the media query directs browsers to CSS you have coded and configured specifically for those capabilities. Media queries are supported by current versions of popular browsers.

### Media Query Example Using a Link Element

[Figure 7.20](#) shows the same web page as [Figure 7.18](#), but it looks quite

different because of a link element that includes a media query and is associated with a style sheet configured for optimal mobile display on a popular smartphone. The HTML is shown below:

## Figure 7.20



CSS media queries help to configure the page for mobile display

### Figure 7.20 Full Alternative Text

```
<link href="lighthousemobile.css" rel="stylesheet"  
      media="only screen and (max-width: 480px)">
```

The code sample above will direct browsers to an external stylesheet that has been configured for optimal display on the most popular smartphones. The media type value `only` is a keyword that will hide the media query from outdated browsers. The media type value `screen` targets devices with screens. Commonly used media types and keywords are listed in [Table 7.4](#).

## Table 7.4 Media types

Media Type	Value Purpose
all	All devices
screen	Computer screen display of web page
only	Causes older nonsupporting browsers to ignore the media query
print	Printout of web page

In the link element shown above, the `max-width` **media feature** is set to 480px. While there are many different screen sizes for smartphones these days, a maximum width of 480px will target the display size of many popular models. A maximum width of 768px will target many modern large smartphones and small tablets. A media query may test for both minimum and maximum values. For example,

```
<link href="lighthousetablet.css" rel="stylesheet"
      media="only screen and (min-width: 768px) and (max-width: 1
```

## Media Query Example Using an @media Rule

A second method of using media queries is to code them directly in your CSS

using an @media rule. Begin by coding @media followed by the media type and logical expression. Then enclose the desired CSS selector(s) and declaration(s) within a pair of braces. The sample code below configures a different background image specifically for mobile devices with small screens. [Table 7.5](#) lists commonly used media query features.

## Table 7.5 Commonly used media query features

Features	Values	Criteria
max-device-height	Numeric value	The height of the screen size of the output device in pixels is smaller than or equal to the value
max-device-width	Numeric value	The width of the screen size of the output device in pixels is smaller than or equal to the value
min-device-height	Numeric value	The height of the screen size of the output device in pixels is greater than or equal to the value
min-device-width	Numeric value	The width of the screen size of the output device in pixels is greater than or equal to the value
max-height	Numeric value	The height of the viewport in pixels is smaller than or equal to the value;

		(reevaluated when screen is resized)
min-height	Numeric value	The height of the viewport in pixels is greater than or equal to the value; (reevaluated when screen is resized)
max-width	Numeric value	The width of the viewport in pixels is smaller than or equal to the value; (reevaluated when screen is resized)
min-width	Numeric value	The width of the viewport in pixels is greater than or equal to the value; (reevaluated when screen is resized)
orientation or	Portrait landscape	The orientation of the device

```
@media only screen and (max-width: 480px) {
  header { background-image: url(mobile.gif);
}
}
```



## FAQ

1. What values should I use in my media queries?

Web developers often check the `max-width` feature to determine the type of device being used to view a page: smartphone, tablet, and desktop. When choosing values, be aware of the way the navigation and content

display as the viewport narrows and widens. Choose values for your media queries with the web page display in mind.

You'll see many media queries that target smartphones with a maximum width of 480 pixels, but modern smartphones have even higher screen resolutions. Here is a typical media query to target smartphone display which checks for a max-width value of 768 pixels:

```
@media only all and (max-width: 768px) {  
}
```

It's now common practice to configure a tablet display when the width is between 768 pixels and 1024 pixels. For example,

```
@media only all and (min-width: 768px) and (max-width: 1024px)  
}
```

Another approach focuses on responsive display of the content instead of focusing on pixel units and configures the media queries as needed for the content to reflow on a variety of screen sizes with em units. Although it depends on the specific page content and layout, it could be typical to target smartphone display with `max-width: 37.5em`, tablet display with `min-width: 37.5em` and `max-width: 64em`, and desktop display with `min-width: 64em`.

For example, to target a smartphone code:

```
@media only all and (max-width: 37.5em) {  
}
```

Testing on a variety of devices is very useful when configuring media queries. Be flexible and prepared to adjust media query pixel and em values to best display the content of your website on smartphones, tablets, and desktops.

Visit the following resources for more information about media query breakpoints and viewport sizes:

- <http://css-tricks.com/snippets/css/media-queries-for-standard-devices>

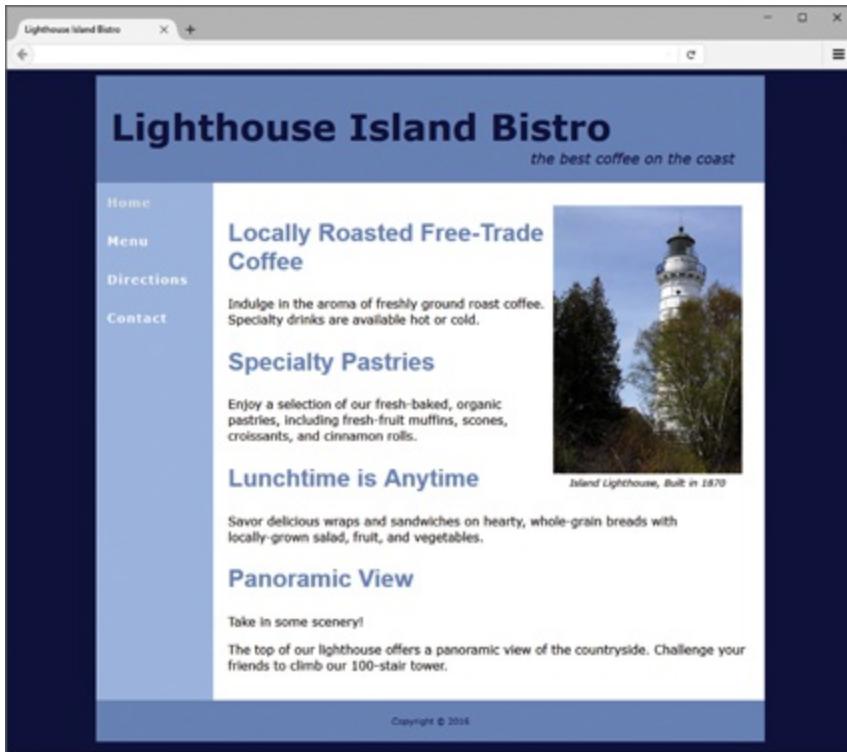
- <http://bradfrost.com/blog/post/7-habits-of-highly-effective-media-queries/>
- <http://viewportsizes.com>
- <https://css-tricks.com/snippets/css/retina-display-media-query/>
- <https://developers.google.com/web/fundamentals/layouts/rwd-fundamentals/how-to-choose-breakpoints>



## Hands-On Practice 7.7

In this Hands-On Practice you'll rework a version of the two-column Lighthouse Island Bistro home page ([Figure 7.21](#)) to display a single-column page when the viewport size is a maximum of 1024 pixels (a typical tablet display) and display a page further optimized for smartphone display when the viewport size is 768 pixels or smaller. Create a folder named query7. Copy the starter3.html file from the chapter7 folder into the query7 folder and rename it index.html. Copy the lighthouseisland.jpg file from the student files chapter7/starters folder into the query7 folder. Launch a browser and view index.html as shown in [Figure 7.21](#). Open index.html in a text editor. Review the embedded CSS and note that the two-column layout is fluid with an 80% width. The two-column look is accomplished by configuring a nav - element that floats to the left.

**Figure 7.21**



The two-column desktop display

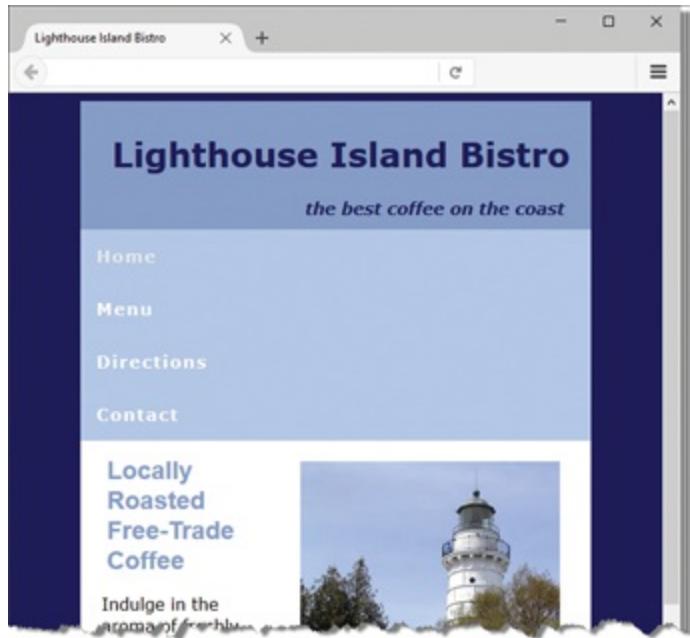
[Figure 7.21 Full Alternative Text](#)

1. Edit the embedded CSS. Add the following @media rule before the ending style tag. The @media rule will configure styles that take effect when the viewport size is 1024 pixels or smaller: eliminate the left margin on the main element and change the float and width properties configured for the nav element selector.

```
@media only screen and (max-width: 1024px) {  
    main { margin-left: 0; }  
    nav { float: none; width: auto; }  
}
```

2. Save the index.html file. Test your file in a desktop browser. When the browser is maximized, the page should look similar to [Figure 7.21](#). When you resize the browser to be smaller (width less than or equal to 1024 pixels), the page should look similar to [Figure 7.22](#) with a single column layout. As you can see, we still have some work to do.

# Figure 7.22



The media query has been applied

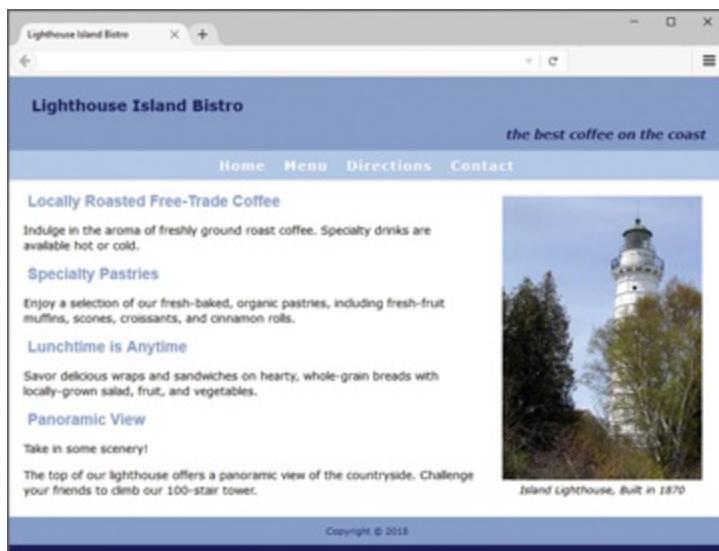
[Figure 7.22 Full Alternative Text](#)

3. Edit the embedded CSS and add style rules within the media query that remove the margin on the body element selector, and expand the wrapper id. Also configure the nav area li elements with inline-block display and padding, the nav area ul elements with centered text, the nav area anchor elements with no border, the h1 and h2 elements with 120% font size, and the p elements with 90% font size.

```
@media only screen and (max-width: 1024px) {  
    body { margin: 0; }  
    #wrapper { width: auto; }  
    main { margin-left: 0; }  
    nav { float: none; width: auto; }  
    nav li { display: inline-block; padding: 0.5em; }  
    nav ul { text-align: center; }  
    nav a { border-style: none; }  
    h1, h2 { font-size: 120%; }  
    p { font-size: 90%; }  
}
```

4. Save the file. Test your file in a desktop browser. When the browser is maximized, the page should look similar to [Figure 7.21](#). When you resize the browser to be smaller (a width less than or equal to 1024 pixels), the page should look similar to [Figure 7.23](#). Continue to resize the web page and notice that the hyperlinks will shift and are not well-aligned. We still have more work to do to optimize the page for display on small mobile devices.

## Figure 7.23



The web page is configured for the width of a typical tablet

### [Figure 7.23 Full Alternative Text](#)

5. Edit the embedded CSS. Add the following @media rule before the ending style tag. The @media rule will further configure the following styles: font-size for h1, h2, and p elements, no display of the figure element (and its child image element), no padding for the nav element and its child ul and li elements, block display for the nav li selector, and block display with a border and padding for the anchor elements in the navigation area. The code follows:

```
@media only screen and (max-width: 768px) {  
    h1, h2 { font-size: 100%; }  
}
```

```

p { font-size: 90%; }
figure { display: none; }
nav, nav ul, nav li { padding: 0; }
nav li { display: block; }
nav a { display: block; padding: 0.5em 0;
         border-bottom: 2px ridge #00005D; }
}

```

6. Save the file. Test your file in a desktop browser. When the browser is maximized, the page should look similar to [Figure 7.21](#). When you resize the browser to be smaller (width equal to or less than 1024 pixels and greater than 768 pixels), the page should look similar to [Figure 7.23](#) with a single column layout. When you resize the browser to be even smaller (width equal to or less than 768 pixels) the page should look similar to [Figure 7.24](#). The web page you've created is an example of applying responsive web design techniques. The student files contain a suggested solution in the chapter7/7.7 folder.

## Figure 7.24



The web page is configured for the width of a typical smartphone

Figure 7.24 Full Alternative Text

## 7.8 Responsive Images

In his book, *Responsive Web Design*, Ethan Marcotte described a flexible image as a fluid image that will not break the page layout as the browser viewport is resized. Flexible images (often referred to as responsive images), along with fluid layouts and media queries, are the components of responsive web design. You will be introduced to several different coding techniques to configure a responsive image in this section.

### Flexible Images with CSS

The most widely supported technique to configure an image as flexible requires a change to the HTML and additional CSS to style the flexible image.

1. Edit the `img` elements in the HTML. Remove the `height` and `width` attributes.
2. Configure the `max-width: 100%;` style declaration in the CSS. If the width of the image is less than the width of the container element, the image will display with its actual dimensions. If the width of the image is greater than the width of the container element, the image will be resized by the browser to fit in the container (instead of hanging out over the margin).
3. To keep the dimensions of the image in proportion and maintain the aspect ratio of the image, Bruce Lawson suggests to also set the `height: auto;` style declaration in the CSS (see <http://brucelawson.co.uk/2012/responsive-web-design-preserving-images-aspect-ratio>).

Background images can also be configured for a more fluid display at various viewport sizes. Although it's common to code a `height` property when configuring a background image with CSS, the result is a somewhat non-

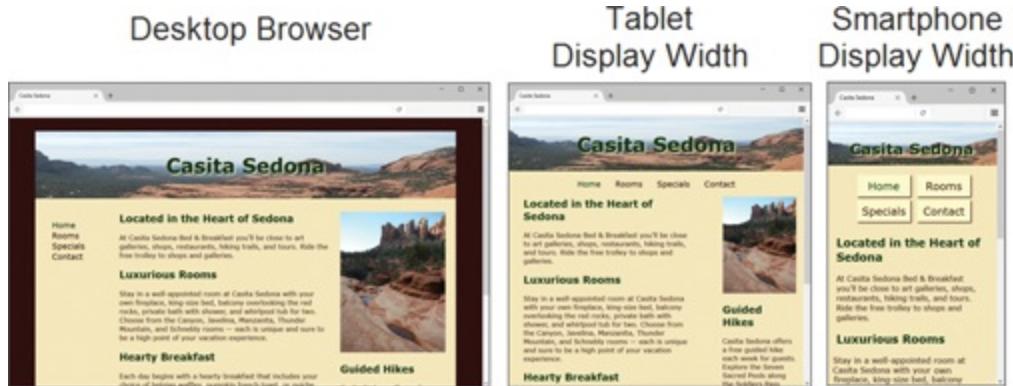
responsive background image. Explore configuring other CSS properties for the container such as font-size, line-height, and padding in percentage values. The background-size: cover; property can also be useful. You'll typically see a more pleasing display of the background image in various-sized viewports. Another option is to configure different image files to use for backgrounds and use media queries to determine which background image is displayed. A disadvantage to this option is that multiple files are downloaded although only one file is displayed. You'll apply flexible image techniques in the next Hands-On Practice.



## Hands-On Practice 7.8

In this Hands-On Practice you'll work with a web page that demonstrates responsive web design. [Figure 7.25](#) depicts the three-column desktop browser display and shows the effects of media queries which are configured to display a two-column page when the viewport size is 1024 pixels or smaller (a tablet display) and display a single-column page optimized for smartphone display when the viewport size is 768 pixels or smaller. You will edit the CSS to configure flexible images.

## Figure 7.25

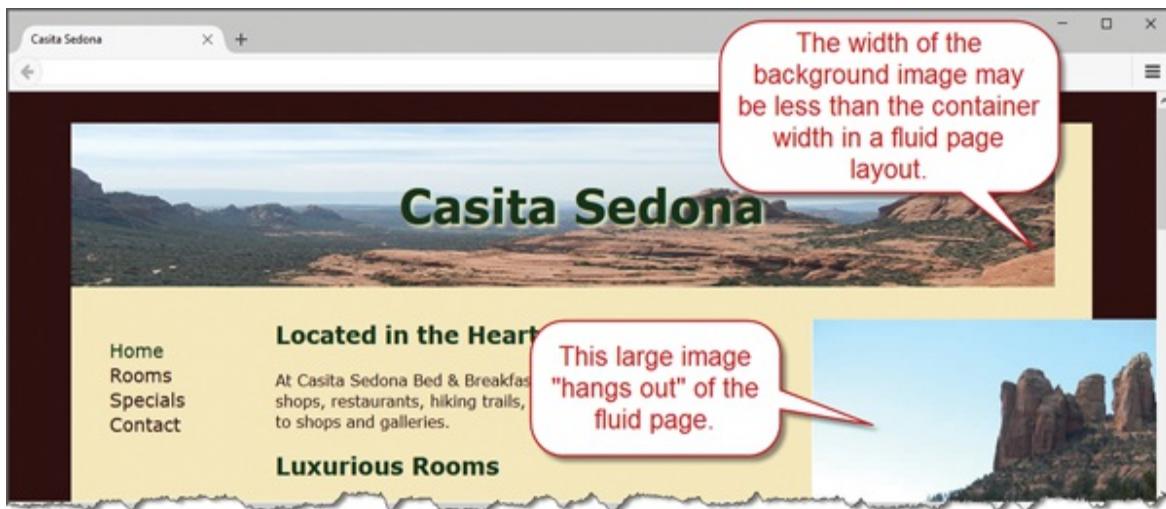


The web page demonstrates responsive web design techniques

## Figure 7.25 Full Alternative Text

Create a folder named flexible7. Copy the starter4.html file from the chapter7 folder into the flexible7 folder and rename it index.html. Copy the following images from the student files chapter7/starters folder into the flexible7 folder: header.jpg and pools.jpg. Launch a browser and view index.html as shown in [Figure 7.26](#). View the code in a text editor and notice that the height and width attributes have already been removed from the HTML. View the CSS and notice that the web page uses a fluid layout with percentage values for widths. Edit the embedded CSS.

## Figure 7.26



The web page before the images are configured to be flexible

## Figure 7.26 Full Alternative Text

1. Locate the h1 element selector. Remove the height style declaration. Add declarations to set the font size to 300%, top padding 5%, bottom padding 5%, 0 left padding, and 0 right padding. The CSS follows:

```
h1 { text-align: center;  
    font-size: 300%;  
    padding: 5% 0;  
    text-shadow: 3px 3px 3px #F4E8BC; }
```

2. Locate the header element selector. Add the `background-size: cover;` declaration to cause the browser to scale the background image to fill the container. The CSS follows:

```
header { background-image: url(header.jpg);  
         background-repeat: no-repeat;  
         background-size: cover; }
```

3. Add a style rule for the img element selector that sets maximum width to 100% and height to the value auto. The CSS follows:

```
img { max-width: 100%;  
      height: auto; }
```

4. Save the index.html file. Test your index.html file in a desktop browser. As you resize the browser window, you'll see your page respond and look similar to the screen captures in [Figure 7.25](#). The web page demonstrates responsive web design with the following techniques: fluid layout, media queries, and flexible images. A suggested solution is in the student files chapter7/7.8 folder.

You just applied basic techniques for configuring flexible, fluid images. These techniques should work well on popular browsers. Next, you'll explore two new HTML5.1 responsive image techniques which offer even more options when designing web pages with responsive images.

## HTML5.1 Picture Element

New to HTML5.1 (<http://www.w3.org/TR/html51>), the purpose of the **picture element** is to provide a method for a browser to display different images depending on specific criteria indicated by the web developer. At the current time the picture element is supported by recent versions of Firefox, Chrome, Opera, Safari, and Edge. Check <http://caniuse.com/picture> for the current level of browser support. The picture element begins with the `<picture>` tag and ends with the `</picture>` tag. The picture element is a container element that is coded along with source elements and a fallback img element to provide multiple image files that can be chosen for display by

the browser.

## Source Element

The source element is a self-contained, or void, tag that is used together with a container element. The picture element is one of several elements (see the video and audio elements in [Chapter 11](#)) that can contain one or more source elements. When used with a picture element, multiple source elements are typically configured to specify different images. Code the source elements between the opening and closing picture tags. [Table 7.6](#) lists attributes of the source element when coded within a picture element container.

## Table 7.6 Attributes of the source element

Attribute	Value
srcset	Required. Provides image choices for the browser in a comma-separated list. Each item can contain the image URL (required), optional maximum viewport dimension, and optional pixel density for high resolution devices.
media	Optional. Media query to specify conditions for browser display.
sizes	Optional. Numeric or percentage value to specify the dimensions of the image display. May be further configured with a media query.

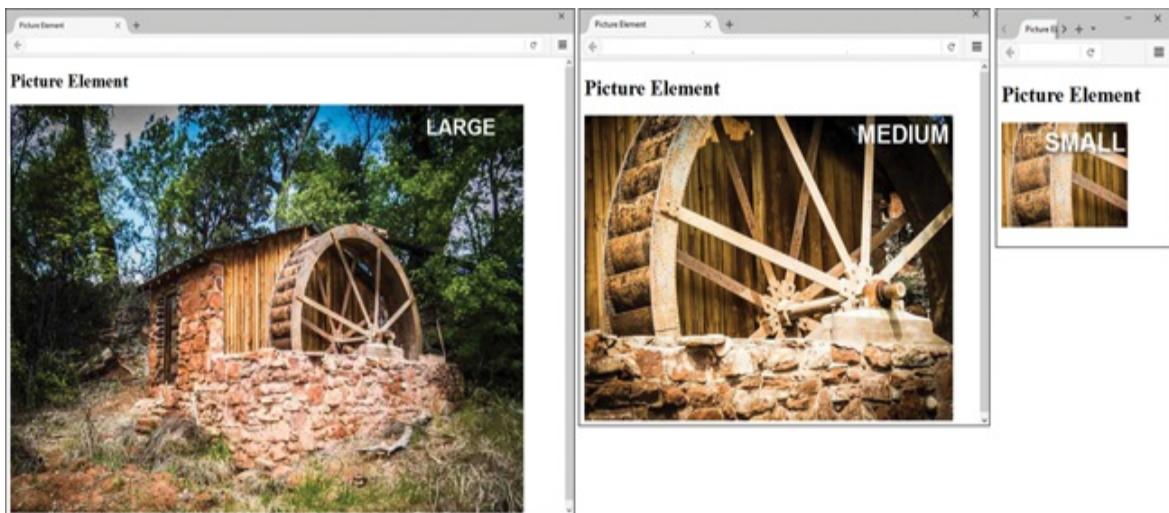
There are many potential ways to configure responsive images with the picture and source elements. We will focus on a basic technique that uses the media attribute to specify conditions for display.



## Hands-On Practice 7.9

In this Hands-On Practice you will configure responsive images with the picture, source, and img elements as you create the page shown in [Figure 7.27](#).

## Figure 7.27



Responsive image with the picture element

### [Figure 7.27 Full Alternative Text](#)

Create a new folder named ch7picture. Copy the large.jpg, medium.jpg, small.jpg, and fallback.jpg files from the chapter7/starters folder into your ch7picture folder. Launch a text editor and open the template file located at

chapter2/template.html in the student files. Save the file as index.html in your ch7picture folder. Modify the file to configure a web page as indicated:

1. Configure the text, Picture Element, within an h1 element and within the title element.
2. Code the following in the body of the web page:

```
<picture>
  <source media="(min-width: 1200px)" srcset="large.jpg">
  <source media="(min-width: 800px)" srcset="medium.jpg">
  <source media="(min-width: 320px)" srcset="small.jpg">
  
</picture>
```

Save your file and test your page in a current version of Firefox or Chrome. Notice how a different image is displayed depending on the width of the browser viewport. If the viewport's minimum width is 1200px or greater, the large.jpg image is shown. If the viewport's minimum width is 800px or greater but less than 1200px, the medium.jpg image is displayed. If the viewport's minimum width is 320px greater but less than 800px, the small.jpg image is shown. If none of these criteria are met, the fallback.jpg image should be displayed. As you test, try resizing and refreshing the browser display. You may need to resize the browser, close it, and launch it again to test for display of the different images. Browsers that do not support the new picture element will process the img tag and display the fallback.jpg image. A suggested solution is in the student files chapter7/7.9 folder.

This Hands-On Practice provided a very basic example of responsive images with the picture element. The picture and element responsive image technique is intended to eliminate multiple image downloads that can occur with CSS flexible image techniques. The browser downloads only the image it chose to display based on the criteria provided.

## HTML5.1 Responsive Img Element Attributes

New to HTML5.1 (<http://www.w3.org/TR/html51>), the new `srcset` and `sizes` attributes have been created for the `img` element. At the current time the new attributes are only supported by recent versions of Firefox, Chrome, Safari, and Opera. Check <http://caniuse.com/srcset> for the current level of browser support.

## The `sizes` Attribute

The purpose of the `img` element's `sizes` attribute is to inform the browser as it processes the `srcset` attribute about how much of the viewport should be used to display the image. The default value of the `sizes` attribute is `100vw`, which indicates 100% of the viewport width is available to display the image. The value of the `sizes` attribute can be a percentage of the viewport width or a specific pixel width (such as `400px`). The `sizes` attribute can also contain one or more media queries along with the width for each condition.

## The `srcset` Attribute

The purpose of the `img` element's `srcset` attribute is to provide a method for a browser to display different images depending on specific criteria indicated by the web developer. The value of the `srcset` attribute provides image choices for the browser in a comma-separated list. Each list item can contain the image URL (required), optional maximum viewport dimension, and optional pixel density for high resolution devices.

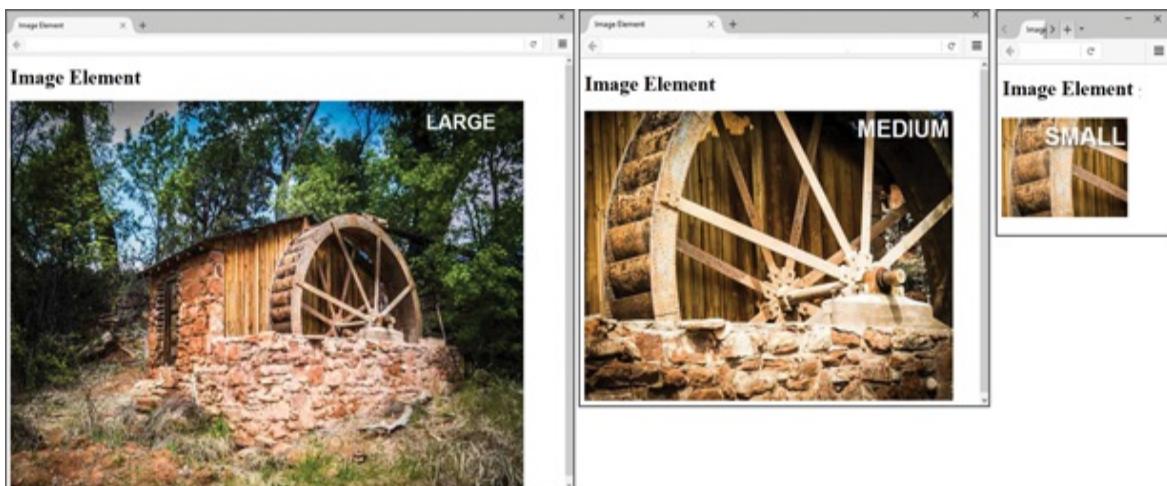
There are many potential ways to configure responsive images with the `img` element, `sizes` attribute, and `srcset` attribute. We will focus on a basic technique that uses the browser viewport dimension to specify conditions for display.



## Hands-On Practice 7.10

In this Hands-On Practice you will configure responsive images with the picture, source, and img elements as you create the page shown in [Figure 7.28](#).

## Figure 7.28



Responsive image with the image element's srcset attribute

### [Figure 7.28 Full Alternative Text](#)

Create a new folder named ch7image. Copy the large.jpg, medium.jpg, small.jpg, and fallback.jpg files from the chapter7/starters folder into your ch7image folder. Launch a text editor and open the template file located at chapter2/template.html in the student files. Save the file as index.html in your ch7image folder. Modify the file to configure a web page as indicated:

1. Configure the text, Img Element, within an h1 element and within the title element.
2. Code the following in the body of the web page:

```

```

Save your file and test your page in a current version of Firefox or Chrome. Notice how a different image is displayed depending on the width of the browser viewport. If the viewport's minimum width is 1200px or greater, the large.jpg image is shown. If the viewport's minimum width is 800px or greater but less than 1200px, the medium.jpg image is displayed. If the viewport's minimum width is 320px greater but less than 800px, the small.jpg image is shown. If none of these criteria are met, the fallback.jpg image should be displayed. As you test, try resizing and refreshing the browser display. You may need to resize the browser, close it, and launch it again to test for display of the different images. Browsers that do not support the image element's new sizes and srcset attributes will ignore these attributes and display the fallback.jpg image. A suggested solution is in the student files chapter7/7.10 folder.

This Hands-On Practice provided a very basic example of responsive images with the img element and new sizes and srcset attributes which (like the picture element responsive image technique) is intended to eliminate multiple image downloads that can occur with CSS flexible image techniques. The browser downloads only the image it chose to display based on the criteria provided.

## Explore Responsive Images

There is so much to learn about responsive image techniques! Visit the following resources to explore the topic of responsive images:

- <http://responsiveimages.org>
- <http://html5hub.com/html5-picture-element>
- <http://www.sitepoint.com/improving-responsive-images-picture-element>
- <https://longhandpixels.net/blog/2014/02/complete-guide-picture-element>
- <http://blog.cloudfour.com/responsive-images-101-part-5-sizes>



## Checkpoint 7.2

1. State an advantage of using CSS to style for print.
2. Describe a design consideration when configuring a web page for mobile display.
3. Describe coding techniques that will configure an image with a flexible display.

## 7.9 Testing Mobile Display

The best way to test the mobile display of a web page is to publish it to the Web and access it from a mobile device. (See the Appendix for an introduction to publishing a website with FTP.) However, not everyone has access to a smartphone. Several options for emulating a mobile display are listed below:

- **Opera Mobile Emulator** (shown in [Figure 7.29](#))

### Figure 7.29



Testing a web page with the Opera Mobile Emulator

[Figure 7.29 Full Alternative Text](#)

- Windows only download; Supports media queries

- <http://www.opera.com/developer/mobile-emulator>
- **Mobile Phone Emulator**
  - Runs in a browser window; Supports media queries
  - <http://www.mobilephoneemulator.com>
- **iPhone Emulator**
  - Runs in a browser window; Supports media queries
  - <http://www.testiphone.com>
- **iPadPeek**
  - Runs in a browser window; Supports media queries
  - <http://ipadpeek.com>

## Testing with a Desktop Browser

If you don't have a smartphone and/or are unable to publish your files to the Web-no worries-as you've seen in this chapter (also see [Figure 7.30](#)) you can approximate the mobile display of your web page using a desktop browser. Verify the placement of your media queries.

## Figure 7.30



Approximating the mobile display with a desktop browser

[Figure 7.30 Full Alternative Text](#)

- If you have coded media queries within your CSS, display your page in a desktop browser and then reduce the width and height of the viewport until it approximates a mobile screen size (such as 320×480).
- If you have coded media queries within a link tag, edit the web page and temporarily modify the link tag to point to your mobile CSS style sheet. Then, display your page in a desktop browser and reduce the width and height of the viewport until it approximates a mobile screen size (such as 320×480).

While you can guess at the size of your browser viewport, the following tools can be helpful:

- **Chris Pederick's Web Developer Extension**

- Available for Firefox and Chrome
- <http://chrispederick.com/work/web-developer>
- *Select Resize > Display Window Size*
- **Viewport Dimensions Extension**
  - Available for Chrome at <https://github.com/CSWilson/Viewport-Dimensions>

Another option for testing your responsive web pages is to use one of the following online tools that provide instant views of your web page in a variety of screen sizes and devices:

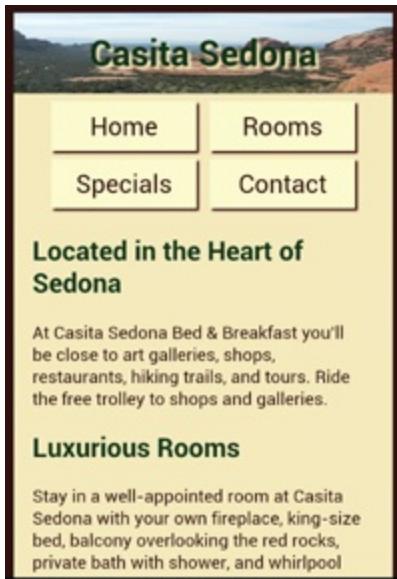
- Am I Responsive <http://ami.responsivedesign.is>
- DevicePonsive <http://deviceponsive.com>
- Screenfly <http://quirktools.com/screenfly>

It's fun to view your responsive website on these browser tools. The true test, however, is to view your web pages on a variety of physical mobile devices.

## For Serious Developers Only

If you are a software developer or information systems major, you may want to explore the SDKs (Software Developer Kits) for the iOS and Android platforms. Each SDK includes a mobile device emulator. [Figure 7.31](#) shows an example screen capture. Visit <http://developer.android.com/sdk/index.html> for information about the Android SDK.

## Figure 7.31



Testing the web page with a smartphone

[Figure 7.31 Full Alternative Text](#)

## Mobile First

This section provided an introduction to mobile web design. The styles for desktop browser viewing were coded and the media queries were constructed to adapt the layout for mobile devices. This is a typical workflow when you need to rework an existing website for mobile device display.

However, if you are designing a new website, there is an alternate approach that was first proposed by Luke Wroblewski. Design the mobile style sheet first and then develop alternate styles for tablet and/or desktop browsers that progressively enhance the design with multiple columns and larger images. You can find out more about this “Mobile First” approach at the following resources:

- <http://www.lukew.com/ff/entry.asp?933>
- <http://www.lukew.com/ff/entry.asp?1137>
- <http://www.techradar.com/news/internet/mobile-web-design-tips->

mobile-should-come-first-719677

## 7.10 CSS Flexible Box Layout

You have used the CSS float property to create the look of two-column and three-column web pages. While the float layout technique is still a common practice, there is a new emerging flexbox layout technique that uses the CSS Flexible Box Layout Module (<https://www.w3.org/TR/css-flexbox-1/>) which is currently in W3C Candidate Recommendation status. The purpose of flexbox is to provide for a flexible layout—elements contained within a flex container can be configured in one dimension (either horizontally or vertically) in a flexible manner with flexible sizing. In addition to changing the horizontal or vertical organization of elements, flexbox can also be used to change the order of display of the elements.

Flexbox is well-supported by popular browsers. Check <http://caniuse.com/flexbox> for the current level of browser support.

## Configure a Flexible Container

To configure an area on a web page that uses flexbox layout, you need to indicate the flex container, which is the element that will contain the flexible area. Use the CSS display property to configure a flex container. The value `flex` indicates a flexible block container. The value `inline-flex` indicates a flexible inline-display container. Elements contained within a flex container are referred to as flex items.

## The `flex-direction` Property

Configure the direction of the flex items with the `flex-direction` property. The value `row` configures a horizontal direction. The value `column` configures a vertical direction. For example, to configure an id named `demo` as a flexible block container with a horizontal flexible flow, code the following CSS:

```
#demo { display: flex;  
flex-direction: row; }
```

## The **flex-wrap** Property

The **flex-wrap** property configures whether flex items are displayed on multiple lines. The default value is `nowrap`, which configures single-line display. The value `wrap` will allow the flex items to display on multiple lines, which could be useful for navigation or for an image gallery.

## The **justify-content** Property

The **justify-content** property configures how the browser should display any extra space that may exist in the flex container. A list of values for the **justify-content** property is available at <http://www.w3.org/TR/css3-flexbox/#justify-content-property>. The value `center` will center the flex items with equal amounts of empty space before and after. The value `space-between` evenly distributes the flex items and allocates empty space between them.

## Configure the Flex Items

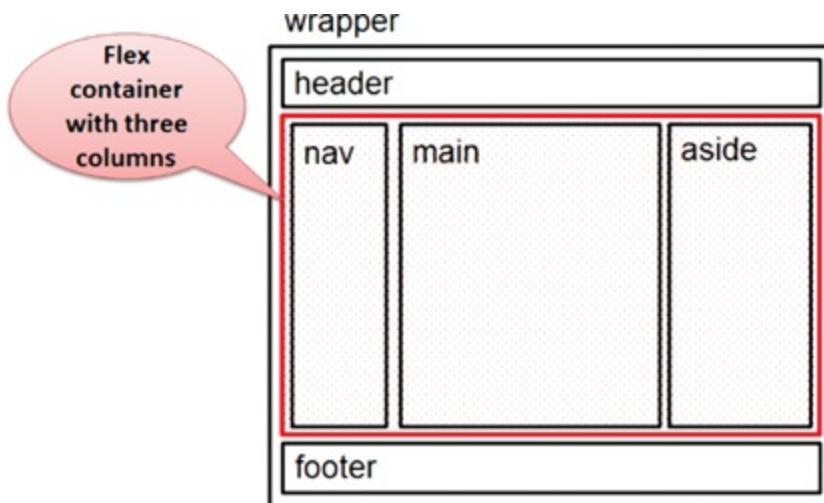
By default, all elements contained within a flex container are flexible in size, are allocated the same amount of display area in the flex container, and display in the same order they are coded in. You can modify the default display with CSS, including the new `flex` and `order` properties.

## The **flex** Property

Use the **flex** property to customize the size of each flex item. The value of the **flex** property does not correspond to a unit of measure but is proportionate to the whole. Values for the **flex** property include both

keywords and positive numbers. See <http://www.w3.org/TR/css3-flexbox/#flex-common> for a list of values commonly used with the flex property. We'll focus on the numeric values in this section. The default value is 1. If you configure an element with `flex: 2;` then it will take up twice as much space within the container element as the others. Since the values work in proportion to the whole, use flex values for companion flex items that add up to 10. Examine the three-column layout in [Figure 7.32](#) and notice how the `nav`, `main`, and `aside` elements are within another element that will serve as a flex container. The CSS to configure the proportion of the flexible area allocated to each column could be as follows:

## Figure 7.32



Three-column page layout with the flex container indicated

### [Figure 7.32 Full Alternative Text](#)

```
nav { flex: 1; }
main { flex: 7; }
aside { flex: 2; }
```

## The order Property

Use the `order` property to display the flex items in a different order than they

are coded. The `order` property accepts numeric values. The default value of the `order` property is 0. To configure an element to display *before* the other flex items within the flex container, set its `order` to -1. Similarly, to configure an element to display *after* the other flex items within the flex container, set its `order` to 1. You'll practice using the `order` property in the next Hands-On Practice.

This section introduced several new CSS properties used with Flexible Box Layout, but there is much more to explore about this powerful new layout technique. Visit the following resources to delve deeper into flexbox:

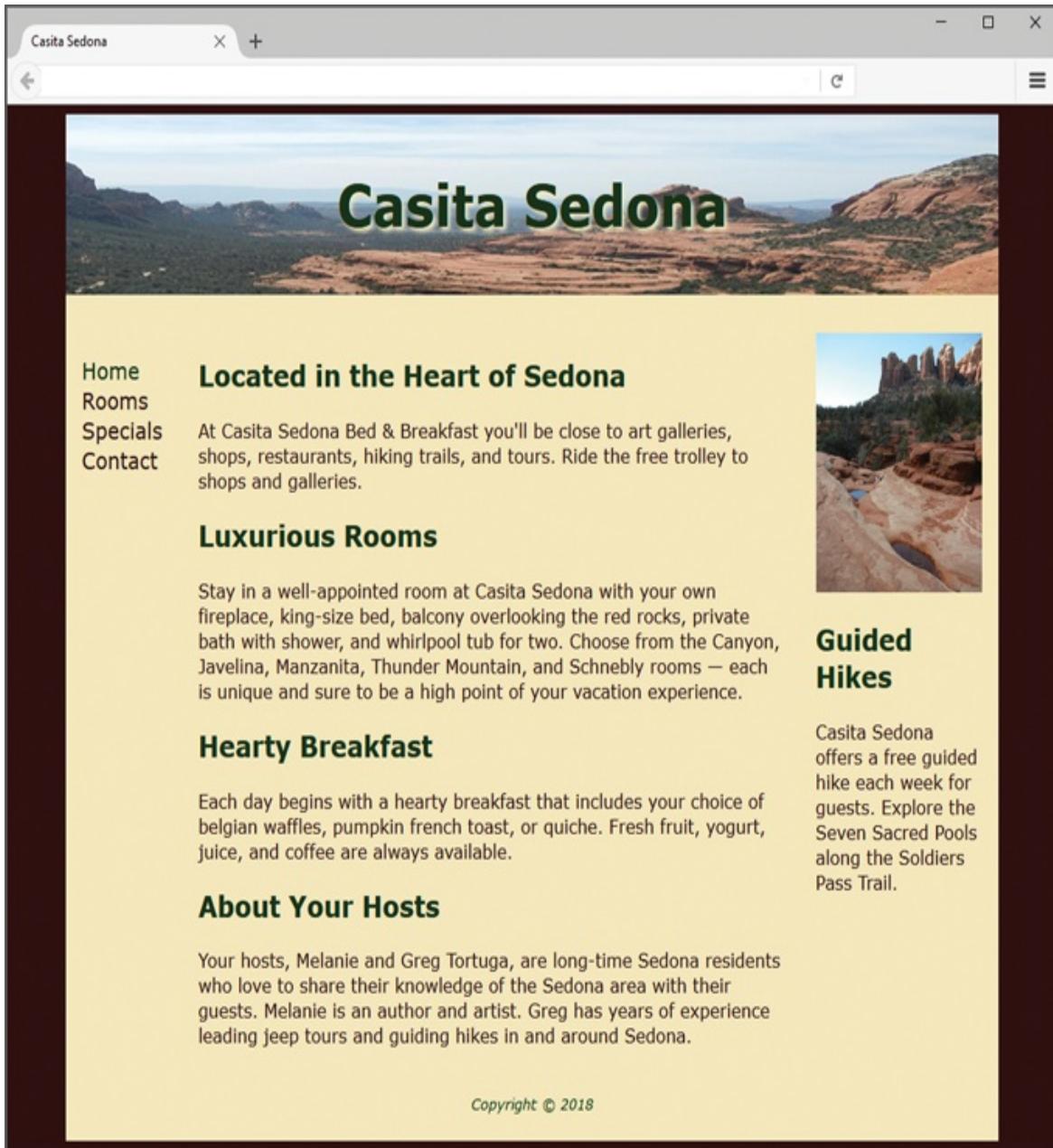
- <http://css-tricks.com/snippets/css/a-guide-to-flexbox>
- <http://demo.agektmr.com/flexbox>
- [https://developer.mozilla.org/en-US/docs/Web/Guide/CSS/Flexible\\_boxes](https://developer.mozilla.org/en-US/docs/Web/Guide/CSS/Flexible_boxes)



## Hands-On Practice 7.11

In this Hands-On Practice you'll use flexbox layout to configure a three-column layout ([Figure 7.32](#)) on a web page and also apply media queries to modify the display for mobile devices. [Figure 7.33](#) shows the three-column desktop browser display.

**Figure 7.33**

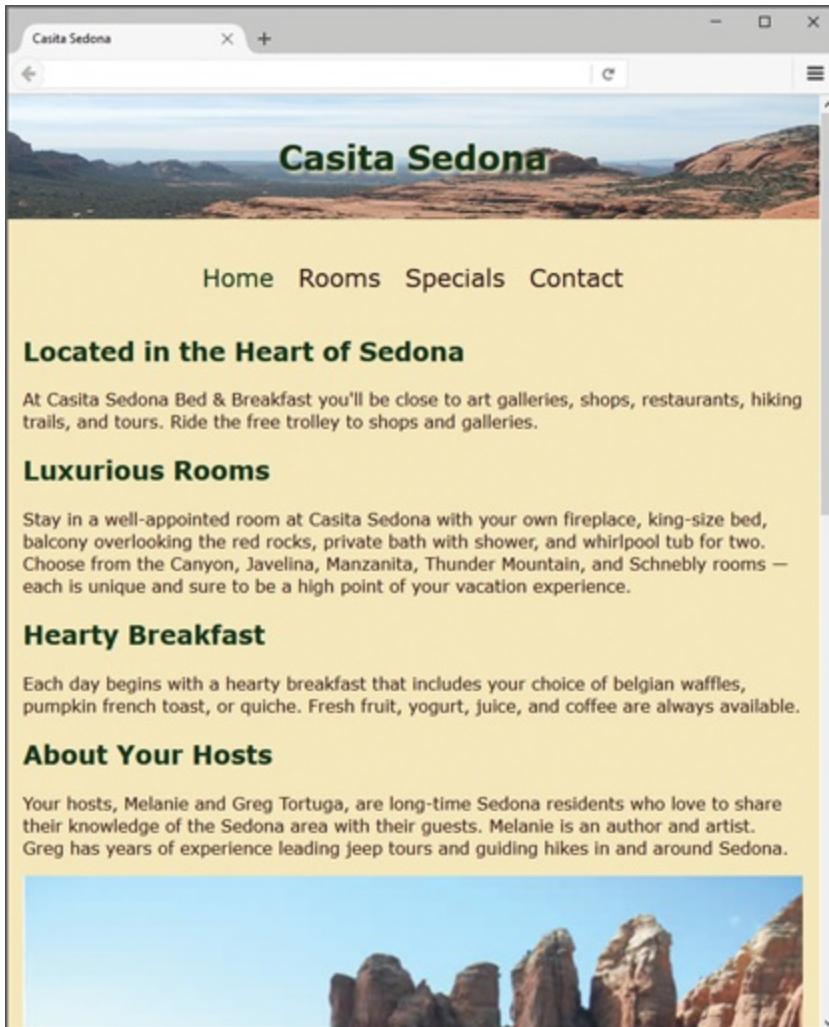


Three-column layout using flexbox

### [Figure 7.33 Full Alternative Text](#)

You'll configure the desktop browser display first and then modify the media queries to configure a single-column tablet display with horizontal navigation ([Figure 7.34](#)) and a single-column smartphone display with navigation reordered to appear above the footer ([Figure 7.35](#)).

# Figure 7.34



Single-column tablet display

[Figure 7.34 Full Alternative Text](#)

# Figure 7.35



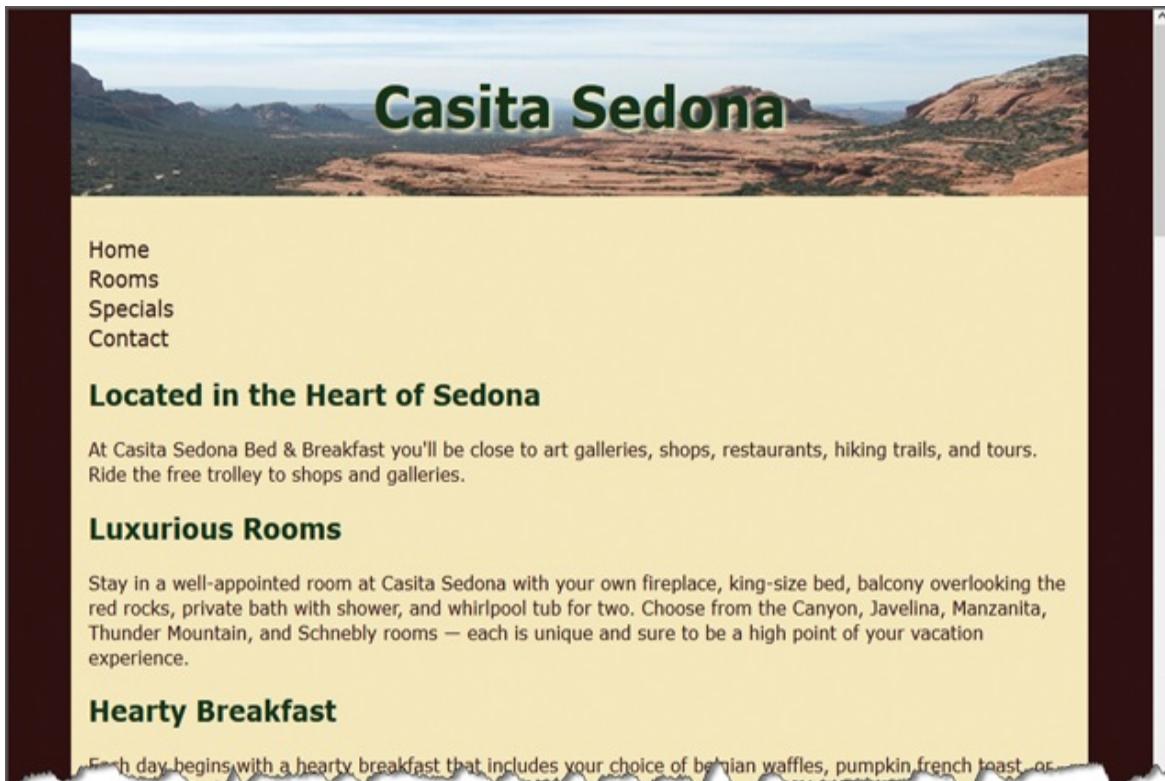
Smartphone display

[Figure 7.35 Full Alternative Text](#)

Create a folder named flexbox7. Copy the starter5.html file from the chapter7 folder into the flexbox7 folder and rename it as index.html. Copy the following images from the student files chapter7/starters folder into the

flexbox7 folder: header.jpg and pools.jpg. When you launch a browser to view the index.html file, it will look similar to [Figure 7.36](#) with a single-column layout.

## Figure 7.36



The web page before the flexbox layout is applied

### [Figure 7.36 Full Alternative Text](#)

1. View the code in a text editor and locate the opening div tag coded above the nav element—this is the beginning of the flexible container. Edit the HTML and assign this div to an id named demo. Notice that three elements are contained within the #demo div: the nav element, the main element, and the aside element. These three elements are flex items.
2. Edit the embedded CSS above the media queries and add styles to

configure the flexible layout:

1. To create a flexible container that displays its flex items in a row, configure an id selector named demo with display set to flex and flex-direction set to row.

```
#demo { display: flex;  
       flex-direction: row; }
```

2. By default, the browser will display the flex items as the same size. The wireframe in [Figure 7.32](#) shows the flex items with different widths. Configure CSS for the nav element, main element, and aside element selectors that set the flex property as follows:

```
nav { flex: 1; }  
main { flex: 7; }  
aside { flex: 2; }
```

3. Save the index.html file and display it in a browser that supports flexbox, such as Firefox, Chrome or Opera. Your display should be similar to [Figure 7.33](#). What an easy way to configure a three column layout! However, if you resize your browser to be smaller, you'll find that we need to make some adjustments for typical tablet and - smartphone display sizes.
4. Open the index.html file in a text editor and locate the first media query, which is for typical tablet display.
  1. Configure the single-column display shown in [Figure 7.34](#) by setting the flex-direction property for the demo id to the value column. Add the following CSS within the first media query:

```
#demo { flex-direction: column; }
```
  2. Review [Figure 7.34](#) and notice that the navigation hyperlinks display in a horizontal manner even though they are structured within an unordered list. To accomplish the horizontal display, configure a nav ul selector with display set to flex, flex-direction set to row, and justify-content set to center. Add the following CSS within the first media query:

```
nav ul { display: flex;  
         flex-direction: row;  
         justify-content: center; }
```

5. Locate the second media query, which is typical for smartphone display. You will add style rules to this media query to further configure the display for small mobile devices.

1. Review [Figure 7.35](#) and note that the navigation now appears above the footer. Recall that the default flex order value is 0. Set the nav element selector's `order` property to the value 1 to cause the navigation to display after the other flex items in the container. Add the following CSS within the second media query:

```
nav { order: 1; }
```

2. Notice also in [Figure 7.35](#) that the navigation is displayed on more than one line. Configure the `nav ul` flex container to use multiple lines by setting the `flex-wrap` property to `wrap`. Add the following CSS within the second media query:

```
nav ul { flex-wrap: wrap; }
```

6. Save the index.html file and display it in a browser that supports flexbox, such as Chrome or Opera. Your desktop display should be similar to [Figure 7.33](#). When you resize your browser to be smaller, the display should be similar to [Figure 7.34](#) or [Figure 7.35](#). A suggested solution is in the student files chapter7/7.11 folder.

## 7.11 CSS Grid Layout

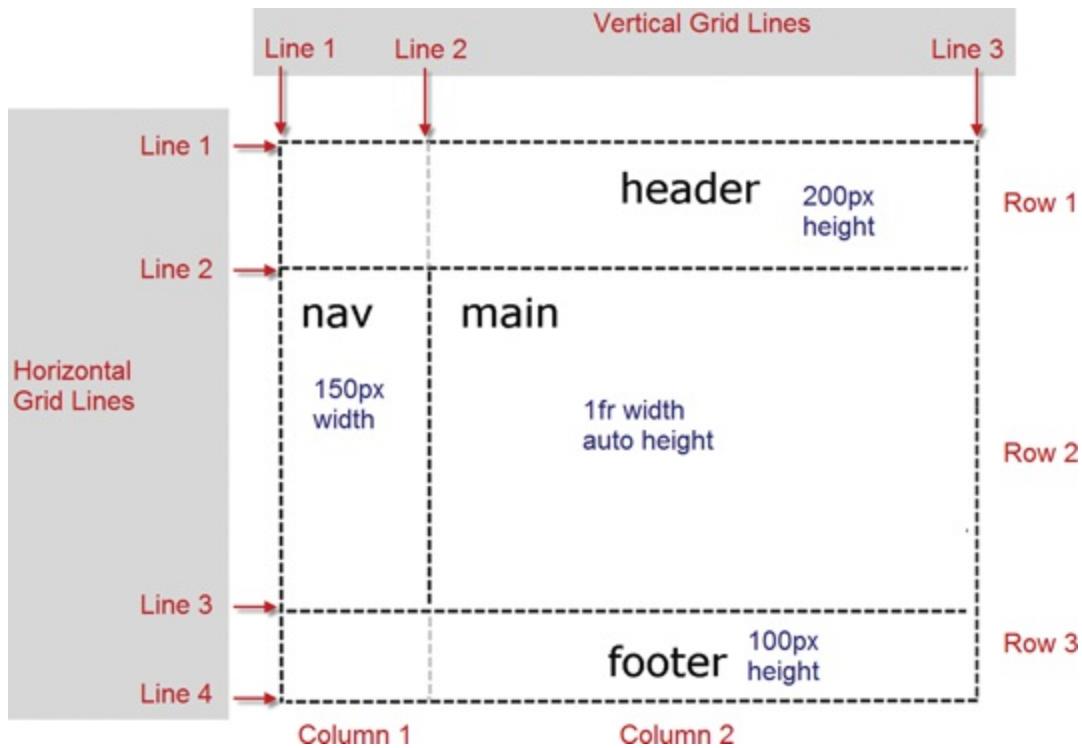
You have used the both the CSS float property and CSS Flexible Box Layout to create the look of multi-column web pages. There is another new emerging layout technique: CSS Grid Layout (<https://www.w3.org/TR/css-grid-1/>) which is currently in W3C Candidate Recommendation status. The purpose of **CSS Grid Layout** is to configure a two-dimensional grid-based layout. The grid can be created as either fixed-size or flexible and contains one or more grid items that can be individually defined as fixed-size or flexible. CSS Grid Layout is optimized for two-dimensional page layout. In addition to configuring grid organization of elements, CSS Grid Layout can also be used to change the order of display of the elements. Check <http://caniuse.com/css-grid> for the current level of browser support. At the time this was written, CSS Grid Layout was supported by several popular browsers, including Firefox, Chrome, and Safari.

### Configure a Grid Container

To configure an area on a web page that uses CSS Grid Layout, you need to define the grid container, which is the element that will contain the grid area. Use the CSS display property to configure a grid container. The value `grid` indicates a block container. The value `inline-grid` indicates an inline-display container.

There are many ways to specify the structure of a grid container. You'll work through an example in the next Hands-On Practice, but let's go over the terminology first. A grid is comprised of horizontal and vertical grid lines that define grid rows and grid columns (generically referred to as tracks). A **grid cell** (which is a grid item), is the intersection of a grid row and a grid column. A grid area is a rectangle that can contain one or more grid items. [Figure 7.37](#) shows a sample grid wireframe for a two-column page layout with grid lines, rows, and columns indicated.

# Figure 7.37 Two-column CSS Grid Layout



[Figure 7.37 Full Alternative Text](#)

## Configure Grid Columns and Rows

A basic method to configure grid rows and columns is to use the `grid-template-columns` and `grid-template-rows` properties to tell the browser how much space to reserve for each row and column in the grid. Values accepted include pixels, percentages, keywords such as `auto`, and flex factor units. The `auto` keyword allocates enough space to hold the content of the grid area. A new unit, `fr`, denotes a flex factor and directs the browser to allocate portions of the remaining space. Use `1fr` to allocate all remaining space. A list of values for the `grid-template-columns` and `grid-template-rows` properties is available at <https://www.w3.org/TR/css-grid-1/#propdef-grid-template->

columns.

The grid wireframe layout shown in [Figure 7.37](#) contains two columns and three rows.

- The header is 200px in height, takes up the first row, and spans two columns.
- The nav is 150px wide and is located in the first column of the second row.
- The main content is located in the second column of the second row and needs to be large enough to hold whatever content is provided. The width of the main content is 1fr and occupies all available space left after the nav element is rendered with a 150px width. The height of the main content is the auto value and will expand to contain whatever content is present.
- The footer is 100px in height, takes up the third row, and spans three columns.

Configure CSS to configure styles for an id named mygrid. Set the display property to grid. Use the grid-template-columns property to set the first column to 150px and the the second column to 1fr. Use the grid-template-rows property to set the first row to 200px, and the second row to auto. The CSS is as follows:

```
#mygrid { display: grid;
    grid-template-columns: 150px 1fr;
    grid-template-rows: 200px auto; }
```

## Configure Grid Items

Once you have declared the grid and coded a template for the columns and rows you need to indicate what elements should be placed in each grid item and grid area. There are a variety of techniques than can be used to configure

grid items. The `grid-row` property configures the area in rows that is reserved for the item in the grid. The `grid-column` property configures the area in columns that is reserved for the item in the grid. A variety of values are accepted by these properties (see <https://www.w3.org/TR/css-grid-1/#typedef-grid-row-start-grid-line>). We will assign the `grid-row` and `grid-column` properties for each grid item with a starting grid line number and an - ending grid line number separated by a / character. For example, the header area begins at vertical grid line 1 and ends at vertical grid line 3 in the first row (the grid track between horizontal grid line 1 and horizontal grid line 2). The CSS to configure the header is:

```
header { grid-row: 1 / 2;  
         grid-column: 1 / 3; }
```

Each grid item shown in [Figure 7.37](#) is configured in a similar manner. Configure the navigation, main, and footer elements with the following CSS:

```
nav { grid-row: 2 / 3;  
      grid-column: 1 / 2; }  
main { grid-row: 2 / 3;  
       grid-column: 2 / 3; }  
footer { grid-row: 3 / 4;  
        grid-column: 1 / 3; }
```

This section has introduced you to one of the many ways that CSS Grid Layout can be used to configure a web page. You'll get some experience using CSS Grid Layout in the next Hands-On Practice. However, there is so much to learn about using this layout technique! Visit the following resources to explore the CSS Grid Layout:

- <https://hackernoon.com/getting-started-with-css-grid-layout-8e00de547daf>
- <http://gridbyexample.com>
- <https://css-tricks.com/snippets/css/complete-guide-grid>
- <https://www.sitepoint.com/seven-ways-you-can-place-elements-using->

## css-grid-layout

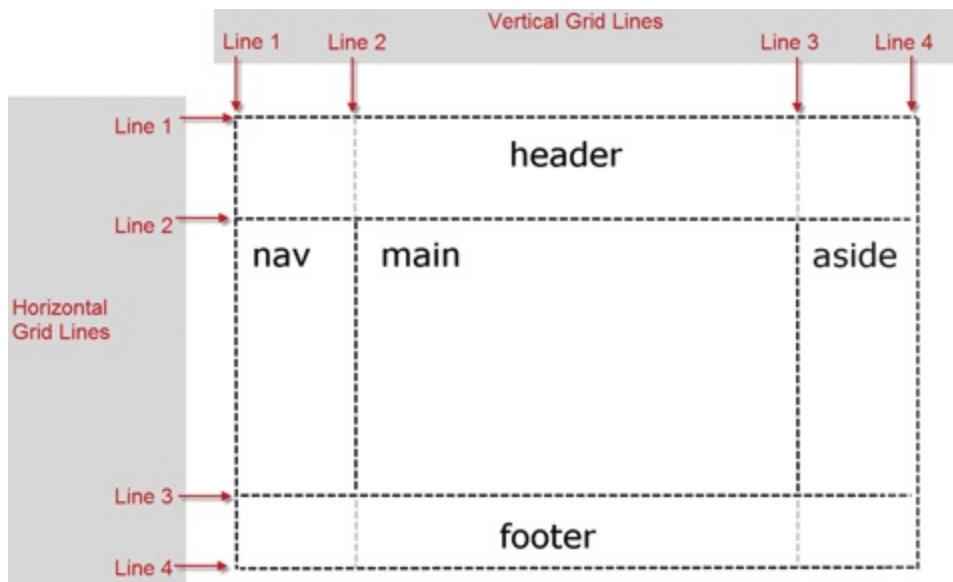
- <https://www.w3.org/TR/css-grid-1/>



## Hands-On Practice 7.12

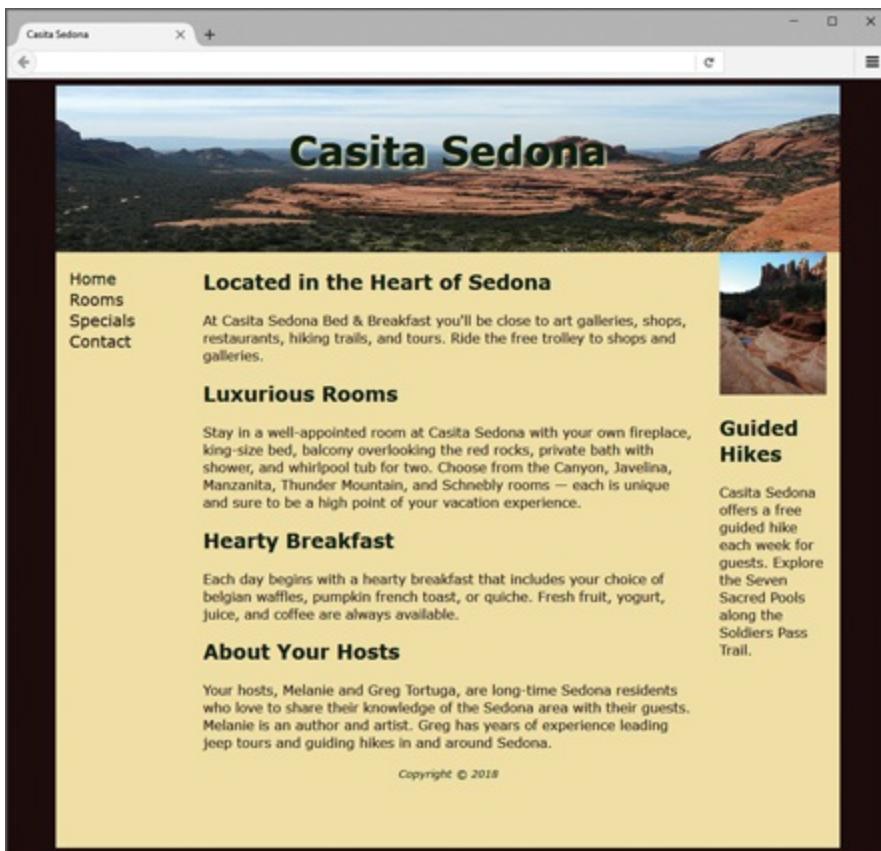
In this Hands-On Practice you'll use CSS Grid Layout to configure a three-column grid layout ([Figure 7.38](#)) on a web page and also apply media queries to modify the display for mobile devices. [Figure 7.39](#) shows the three-column desktop browser display.

## Figure 7.38 Three-column CSS Grid Layout



[Figure 7.38 Full Alternative Text](#)

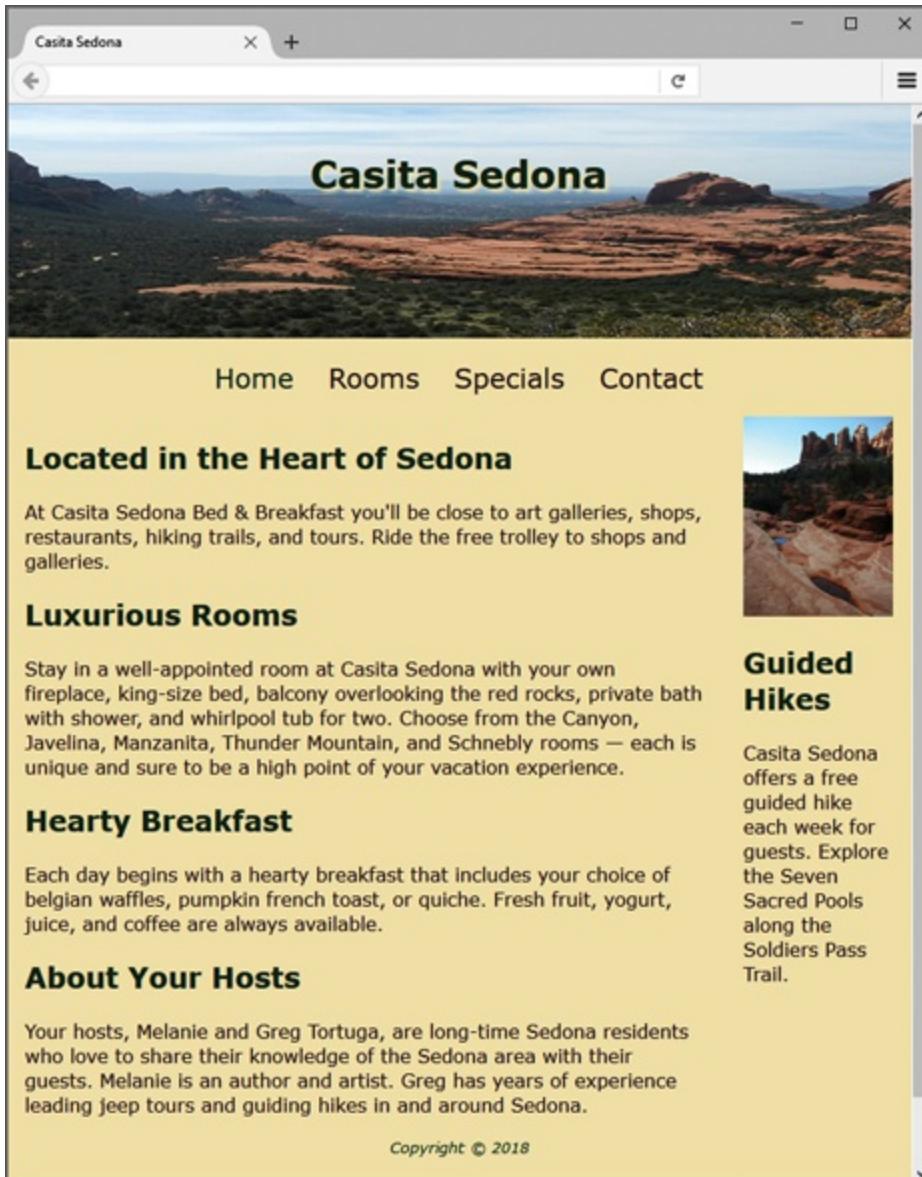
# Figure 7.39 Desktop browser display



[Figure 7.39 Full Alternative Text](#)

You'll configure the desktop browser display first and then modify the media queries to configure a two-column tablet display with horizontal navigation ([Figure 7.40](#)) and a single-column smartphone display with navigation reordered to appear above the footer ([Figure 7.41](#)).

# Figure 7.40 Tablet display



[Figure 7.40 Full Alternative Text](#)

## Figure 7.41 Smartphone display



[Figure 7.41 Full Alternative Text](#)

Create a new folder named grid7. Copy the starter6.html file from the chapter7 folder into the grid7 folder and rename it as index.html. Copy the following images from the student files chapter7/starters folder into the grid7 folder: header.jpg and pools.jpg.

1. Edit the embedded CSS above the media queries and add styles to configure the grid layout.
  1. The div assigned to the wrapper id will contain the grid. As shown in [Figure 7.38](#), the grid contains three columns and three rows.

- The header is 200px in height, takes up the first row, and spans three columns.
- The nav is 160px wide and is located in the first column of the second row.
- The main content is located in the second column of the second row and needs to be large enough to hold whatever content is provided. The width of the main content is 1 fractional unit (takes up all available space after the nav and aside elements.) The height of the main content is the auto value and will expand to contain whatever content is present.
- The aside element is 160px wide and is located in the third column of the second row.
- The footer is 100px in height, takes up the third row, and spans three columns.

Locate the wrapper id selector in the CSS and add styles to configure the grid. Set the `display` property to `grid`. Use the `grid-template-columns` property to set the first column to 160px, the second column to `1fr`, and the third column to 160px. Use the `grid-template-rows` property to set the first row to 200px, the second row to `auto`, and the third row to 100px. The CSS is as follows:

```
display: grid;
grid-template-columns: 160px 1fr 160px;
grid-template-rows: 200px auto 100px;
```

2. Add the following styles to the header element selector to indicate that the header element is placed in the first row (the grid track between horizontal grid lines 1 and 2) and occupies the grid tracks from vertical grid line 1 to vertical grid line 4:

```
grid-row: 1 / 2;
grid-column: 1 / 4;
```

3. Code a nav element selector and configure styles to indicate that the nav element is located in the second row (the track between horizontal grid lines 2 and 3) and occupies the grid track from vertical grid line 1 to vertical grid line 2:

```
grid-row: 2 / 3;  
grid-column: 1 / 2;
```

4. Code a main element selector and configure styles to indicate that the main element is located in the second row (the track between horizontal grid lines 2 and 3) and occupies the grid track from vertical grid line 2 to vertical grid line 3:

```
grid-row: 2 / 3;  
grid-column: 2 / 3;
```

5. Code an aside element selector and configure styles to indicate that the aside element is located in the second row (the track between horizontal grid lines 2 and 3) and occupies the grid track from vertical grid line 3 to vertical grid line 4:

```
grid-row: 2 / 3;  
grid-column: 3 / 4;
```

6. Add the following styles to the footer element selector to indicate that the footer element is placed in the third row (the track between horizontal grid lines 3 and 4) and occupies the grid tracks from vertical grid line 1 to vertical grid line 4:

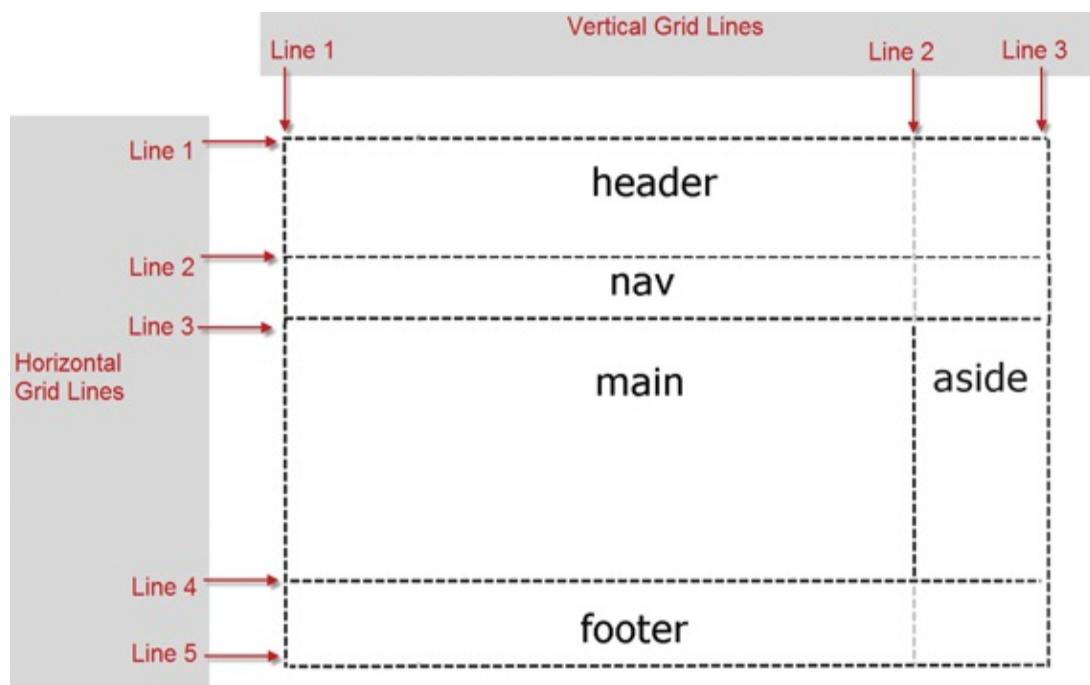
```
grid-row: 3 / 4;  
grid-column: 1 / 4;
```

2. Save the index.html file and display it in a browser that supports CSS Grid Layout, such as Firefox or Chrome. Your display should be similar to [Figure 7.39](#). What an easy way to configure a three column layout! However, if you resize your browser to be smaller, you'll find that we need to make some adjustments for typical tablet and smartphone

display sizes.

3. Prepare to configure mobile displays. [Figure 7.42](#) shows the grid layout wireframe for typical tablet display with four rows and two columns.

## Figure 7.42 CSS Grid Layout for tablets



[Figure 7.42 Full Alternative Text](#)

1. Open the index.html file in a text editor and locate the first media query. Configure the display shown in [Figure 7.40](#) by adding the following CSS within the first media query to declare the new two-column and four-row grid. In this grid you will place the header element in row 1 (the track between horizontal grid lines 1 and 2) from vertical grid line 1 to vertical grid line 3, nav element in row 2 (the track between horizontal grid lines 2 and 3) from vertical grid line 1 to vertical grid line 3, main element in row 3 (the track between horizontal grid lines 3 and 4) from vertical grid line 1 to

vertical grid line 2, aside element in row 3 (the track between horizontal grid lines 3 and 4) from vertical grid line 2 to vertical grid line 3, and the footer element in row 4 (the track between horizontal grid lines 4 and 5) from vertical grid line 1 to vertical grid line 3:

```
#wrapper { grid-template-columns: 1fr 160px;
            grid-template-rows: 200px auto auto 100px; }
header { grid-row: 1 / 2;
          grid-column: 1 / 3; }
nav { grid-row: 2 / 3;
          grid-column: 1 / 3; }
main { grid-row: 3 / 4;
          grid-column: 1 / 2; }
aside { grid-row: 3 / 4;
          grid-column: 2 / 3; }
footer { grid-row: 4 / 5;
          grid-column: 1 / 3; }
```

2. Configure the single-column display shown in [Figure 7.41](#) by adding the following CSS within the second media query to declare the new one-column and five-row grid. In this grid you will place each wireframe component (header, nav ,main, aside, and footer) in its own row. Note how the `grid-row` property is used to change the order of the elements to cause the nav element to display below the aside element and above the footer element.

```
#wrapper { grid-template-columns: auto;
            grid-template-rows: 200px auto auto auto 100px }
header { grid-row: 1 / 2;
          grid-column: 1 / 2; }
nav { grid-row: 4 / 5;
          grid-column: 1 / 2; }
main { grid-row: 2 / 3;
          grid-column: 1 / 2; }
aside { grid-row: 3 / 4;
          grid-column: 1 / 2; }
footer { grid-row: 5 / 6;
          grid-column: 1 / 2; }
```

4. Save the index.html file and display it in a browser that supports CSS

Grid Layout, such as Chrome or Firefox. Your desktop display should be similar to [Figure 7.39](#). When you resize your browser to be smaller, the display should be similar to [Figure 7.40](#) or [Figure 7.41](#). A suggested solution is in the student files chapter7/7.12 folder.



## FAQ

1. Which should I use – CSS Grid Layout or CSS Flexible Box Layout?

CSS Flexible Box Layout was designed for one-dimensional layout of a row or column and can be useful for configuring a portion of a page layout. You used CSS Flexible Box Layout in this manner when you worked through Hands-On Practice 7.11 to display the nav, main, and aside areas horizontally across a web page. CSS Grid Layout was designed specifically for two-dimensional page layout and has many robust features to aid in page layout. This textbook provides an introduction to these two powerful layout tools and there is much more for you to learn about both. Visit <https://www.w3.org/TR/css-flexbox-1/> and <https://www.w3.org/TR/css-grid-1/> for more information.



## FAQ

1. What happens when browsers that don't support CSS Flexible Box Layout or CSS Grid Layout display the web page?

Browsers that don't support flexbox will ignore the new properties and values and most likely display the HTML in the order it was coded. Check <http://caniuse.com/flexbox> for the current level of browser support.

# Chapter Summary

This chapter explored a variety of web development topics, including relative hyperlinks and linking to fragment identifiers, CSS sprites, three-column page layout, styling for print, and styling for mobile devices. Visit the textbook website at <http://www.webdevfoundations.net> for examples, the links listed in this chapter, and updated information.

## Key Terms

- [`<picture>`](#)
- [`:after`](#)
- [`:before`](#)
- [`:first-letter`](#)
- [`:first-line`](#)
- [`@media rule`](#)
- [`content property`](#)
- [`CSS sprite`](#)
- [`directive`](#)
- [`flex container`](#)
- [`flex factor`](#)
- [`flex item`](#)
- [`flex property`](#)

- [flex-direction property](#)
- [flex-wrap property](#)
- [flexbox](#)
- [flexible image](#)
- [fragment identifier](#)
- [grid](#)
- [grid area](#)
- [grid column](#)
- [grid container](#)
- [grid item](#)
- [grid line](#)
- [grid row](#)
- [grid track](#)
- [grid-column property](#)
- [grid-row property](#)
- [grid-template-columns property](#)
- [grid-template-rows property](#)
- [justify-content property](#)
- [media attribute](#)
- [media feature](#)

- [media query](#)
- [media type](#)
- [named fragment](#)
- [One Web](#)
- [order property](#)
- [page-break-after property](#)
- [page-break-before property](#)
- [picture element](#)
- [pseudo-element](#)
- [responsive web design](#)
- [sizes attribute](#)
- [source element](#)
- [sprite](#)
- [srcset attribute](#)
- [target attribute](#)
- [viewport meta tag](#)

## Review Questions

### Multiple Choice

1. Which meta tag is used to configure display for mobile devices?
  1. viewport
  2. handheld
  3. mobile
  4. screen
2. How would you link to the named fragment #jobs on the page employ.html from the home page of the site?
  1. <a href="employ.html#jobs">Jobs</a>
  2. <a name="employ.html#jobs">Jobs</a>
  3. <a link="employ.html#jobs">Jobs</a>
  4. <a href="#jobs">Jobs</a>
3. Which of the following is a container element used to configure responsive images?
  1. display
  2. flex
  3. picture
  4. link
4. Which attribute below can be applied to an anchor tag to open a link in a new browser window?
  1. window
  2. target

3. rel
  4. media
5. Which of the following is the attribute used to indicate whether the style sheet is for printing or screen display?
1. rel
  2. type
  3. media
  4. content
6. Which of the following attributes define a fragment identifier on a page?
1. id
  2. href
  3. fragment
  4. bookmark
7. Which pseudo-element can be used to generate content that precedes an element?
1. :after
  2. :before
  3. :content
  4. :first-line
8. Which of the following is a mobile web design best practice?
1. Configure a multiple-column page layout.

2. Avoid using lists to organize information.
  3. Configure a single-column page layout.
  4. Embed text in images wherever possible.
9. Which of the following font units is recommended for mobile display?
1. pt unit
  2. px unit
  3. em unit
  4. cm unit
10. Which of the following is an image file that contains multiple small graphics?
1. viewport
  2. sprite
  3. background-image
  4. media

## Fill in the Blank

11. \_\_\_\_\_ is an emerging page layout technique optimized for two-dimensional page layout.
12. \_\_\_\_\_ determine the capability of the mobile device, such as browser viewport dimensions and resolution.
13. The concept of \_\_\_\_\_ relates to providing a single resource that is configured for optimal display on multiple types of devices.

14. Provide \_\_\_\_\_ navigation near the top of the page when optimizing for mobile display.
15. When using CSS media queries, code the \_\_\_\_\_ keyword to hide the query from older nonsupporting browsers.

## Apply Your Knowledge

1. Predict the Result. Draw and write a brief description of the web page that will be created with the following HTML code:

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>Predict the Result</title>
<meta charset="utf-8">
<style>
body { background-color: #eaeaea;
      color: #000;
      font-family: Verdana, Arial, sans-serif; }
#wrapper { width: 80%;
            margin: auto;
            overflow: auto;
            min-width: 960px;
            background-color: #d5edb3; }
nav { float: left;
      width: 150px; }
main { margin-left: 160px;
       margin-right: 160px;
       background-color: #ffffff;
       padding: 10px; }
aside { float: right;
        width: 150px;
        color: #000000; }
</style>
</head>
<body>
<div id="wrapper">
<header>
    <h1>Trillium Media Design</h1>
</header>
<nav>
<ul>
```

```

<li><a href="index.html">Home</a></li>
<li><a href="products.html">Products</a></li>
<li><a href="services.html">Services</a></li>
<li><a href="clients.html">Clients</a></li>
<li><a href="contact.html">Contact</a></li>
</ul>
</nav>
<aside>
<main>
<p>Get monthly updates and free offers. Contact <a href="mailto:me@trilliummediadesign.com">Trillium</a> to sign up for our newsletter.</p>
</aside>
<main>
<p>Our professional staff takes pride in its working relation with our clients by offering personalized services that liste to their needs, develop their target areas, and incorporate t items into a website that works. </p>
</main>
</div>
</body>
</html>

```

- Fill in the Missing Code. This web page should be configured so that the left navigation column has a light green background color and floats on the left side of the browser window. Instead, the navigation displays with a white background color. CSS properties and values, indicated by " " (underscore), are missing. Fill in the missing code to correct the error.

```

<!DOCTYPE html>
<html lang="en">
<head>
<title>Fill in the Missing Code</title>
<meta charset="utf-8">
<style>
    body { background-color: #d5edb3;
           color: #000066;
           font-family: Verdana, Arial, sans-serif; }
    nav { float: left;
          width: 120px; }
    main { "_": " ";
           background-color: #ffffff;
           color: #000000;
           padding: 20px; }
</style>

```

```

</head>
<body>
<header>
    <h1>Trillium Media Design</h1>
</header>
<nav>
<ul>
    <li><a href="index.html">Home</a></li>
    <li><a href="products.html">Products</a></li>
    <li><a href="services.html">Services</a></li>
    <li><a href="clients.html">Clients</a></li>
    <li><a href="contact.html">Contact</a></li>
</ul>
</nav>
<main>
<p>Our professional staff takes pride in its working relation with our clients by offering personalized services that listen to their needs, develop their target areas, and incorporate those items into a website that works. </p>
</main>
</body>
</html>

```

3. Find the Error. The page below is intended for the navigation area to display on the right side of the browser window. What needs to be changed to make this happen?

```

<!DOCTYPE html>
<html lang="en">
<head>
<title>Find the Error</title>
<meta charset="utf-8">
<style>
    body { background-color: #d5edb3;
           color: #000066;
           font-family: Verdana, Arial, sans-serif; }
    nav { float: left;
          width: 120px; }
    main { padding: 20px 150px 20px 20px;
           background-color: #ffffff;
           color: #000000; }
</style>
</head>
<body>
<header>
    <h1>Trillium Media Design</h1>

```

```
</header>
<nav>
  <ul>
    <li><a href="index.html">Home</a></li>
    <li><a href="services.html">Services</a></li>
    <li><a href="contact.html">Contact</a></li>
  </ul>
</nav>
<main>
  <p>Our professional staff takes pride in its working relationship with our clients by offering personalized service that listen to their needs, develop their target areas, and incorporate these items into a website that works.</p>
</main>
</body>
</html>
```

## Hands-On Exercises

1. Write the HTML to create a fragment identifier at the beginning of a web page designated by “top”.
2. Write the HTML to create a hyperlink to the named fragment designated by “top”.
3. Write the HTML to associate a web page with an external style sheet named myprint.css to configure a printout.
4. Write the @media rule to target a typical smartphone device and configure the nav element selector with width set to auto.
5. Write the CSS to configure a graphic named mysprite.gif to display as a background image on the left side of a hyperlink. Note that mysprite.gif contains two different images. Configure the image that is located 67 pixels from the top of the mysprite.gif graphic to display.
6. Configure Printing for [Hands-On Practice 7.4](#). Configure special printing for the Lighthouse Island Bistro index.html file created in [Hands-On Practice 7.4](#). This file is in the chapter7/7.4 folder in the student files. Modify the web page so that it is associated with an

external style sheet called lighthouse.css instead of using embedded styles. Save and test your page. Create a new style sheet called myprint.css, which will prevent the navigation from displaying when the page is printed. Modify the index.html page to be associated with this file. Review the use of the media attribute on the link element. Save all files and test your page. Select File > Print > Preview to test the print styles.

7. Extending [Hands-On Practice 7.5](#). In [Hands-On Practice 7.5](#), you created the home page for the Door County Wildflowers website. This file is also available in the chapter7/7.5 folder in the student files. In this exercise, you will create two additional content pages for the Door County Wildflowers site (spring.html and summer.html). Make sure that all CSS is placed in an external style sheet (mywildflower.css). Modify index.html to use this style sheet. The following is some content to include on the new pages:

## Spring Page (spring.html):

- Use the trillium.jpg image (see the chapter7/starters folder in the student files).
- Trillium facts: 8–18 inches tall; perennial; native plant; grows in rich, moist deciduous woodlands; white flowers turn pink with age; fruit is a single red berry; protected flower species

## Summer Page (summer.html):

- Use the yls.jpg image (see the chapter7/starters folder in the student files).
- Yellow Lady's Slipper facts: 4–24 inches tall; perennial; native plant; grows in wet, shaded deciduous woods, swamps, and bogs; an orchid; official flower of Door County

8. Modify the Design of [Hands-On Practice 7.5](#). Locate the index.html page you created in [Hands-On Practice 7.5](#). This file is in the chapter7/7.5 folder in the student files. Recall from [Chapter 5](#) that a web page using fluid layout can have content in the center of the web page with empty margins on either side. Configure the style rules for index.html to display the page in this manner. Choose an appropriate background color to display in the margin area.
9. Create a Mobile Design for [Hands-On Practice 7.5](#). Locate the index.html page you created in [Hands-On Practice 7.5](#). This file is in the chapter7/7.5 folder in the student files. Modify the web page so that it links to an external style sheet (flowers.css) instead of using embedded styles. Modify the index.html page to be associated with this file. Configure the viewport meta tag and CSS media queries for a single-column smartphone mobile display. Save all files and test your page with both a desktop browser and a mobile device or emulator.
10. Practice with CSS Flexible Layout. Locate the index.html page you created in [Hands-On Practice 7.5](#). This file is in the chapter7/7.5 folder in the student files. Modify the HTML and CSS to use the Flexible Box Layout (flexbox) technique to configure the three columns on the web page. Save and test your page in browsers that support flexbox, such as Chrome or Firefox.
11. Practice with CSS Grid Layout. Locate the index.html page you created in [Hands-On Practice 7.5](#). This file is in the chapter7/7.5 folder in the student files. Modify the HTML and CSS to use CSS Grid Layout to configure the page layout. Save and test your page in browsers that support this layout technique, such as Chrome or Firefox.

## Web Research

1. As you read about mobile web design best practices in this chapter, you may have noticed some overlap with techniques that provide for accessibility, such as alternate text and use of headings. Explore the Web Content Accessibility and Mobile Web document at

<http://www.w3.org/WAI/mobile>. Explore related links that interest you. Write a one-page, double-spaced summary that describes areas of overlap and how web developers can support both accessibility and mobile devices.

## Focus on Web Design

1. Take a few moments and visit the CSS Zen Garden at <http://www.csszengarden.com>. Explore the site and note the widely different designs. What thought processes and decisions are needed as a person creates a new design for this site? Visit Sheriar Designs (<http://manisheriar.com/blog/anatomy-of-a-design-process>) or Behind the Scenes of Garden Party (<http://www.bobbyvandersluis.com/articles/garden-party/>) for a behind-the-scenes look at how web developers have approached this task. Reflect on their stories and suggestions. Write a one-page, double-spaced essay that describes ideas about the design process that you'll be able to use as you begin to design websites for personal or professional use. Be sure to include the URL of the resources that you used.



## WEBSITE CASE STUDY Styling for the Mobile Web

Each of the following case studies continues throughout most of the text. This chapter configures the website for display on mobile devices.

## JavaJam Coffee House

See [Chapter 2](#) for an introduction to the JavaJam Coffee House case study. [Figure 2.31](#) shows a site map for the JavaJam website. In this case study, you will configure the website to display in mobile devices using the single-column layout shown in [Figure 7.17](#). You will code media queries for mobile styles; modify the current desktop styles; and update the Home, Menu, and Music pages. Use the [Chapter 6](#) JavaJam website as a starting point for this case study. When you are finished, the website will look the same in desktop browsers (see [Figure 6.49](#)). The mobile display should be similar to [Figure 7.43](#) or [7.44](#). You have seven tasks in this case study:

## Figure 7.43



The smartphone display

[Figure 7.43 Full Alternative Text](#)

## Figure 7.44



A test of the new tablet (or high-resolution smartphone) display in a desktop browser

[Figure 7.44 Full Alternative Text](#)

1. Create a new folder for this JavaJam case study.
2. Modify the Home page to include a viewport meta tag.
3. Modify the Menu page to be consistent with the Home page.
4. Modify the Music page to be consistent with the Home page.
5. Modify the desktop styles in `javajam.css`.

6. Modify javajam.css and code a media query for tablet display.
7. Modify javajam.css and code a media query for typical smartphone display.

## Hands-On Practice Case Study

- Task 1: The Website Folder. Create a folder called javajam7. Copy all the files from your [Chapter 6](#) javajam6 folder into the javajam7 folder. Copy the javajammini.jpg file from the chapter7/starters folder in the student files.
- Task 2: Modify the Home Page. Open index.html in a text editor. Edit the code as follows:
  1. Configure a viewport meta tag that configures the width to the device-width and sets the initial-scale to 1.0.
  2. The home page displays a phone number in the contact information area. Wouldn't it be handy if a person using a smartphone could click on the phone number to call the coffee house? You can make that happen by using tel: in a hyperlink. Configure a hyperlink assigned to an id named mobile that contains the phone number as shown below:

```
<a id="mobile" href="tel:888-555-5555">888-555-5555</a>
```

But wait a minute, a telephone link could confuse those visiting the site with a desktop browser. Code another phone number directly after the hyperlink. Code a span element assigned to an id named desktop around the phone number as shown below:

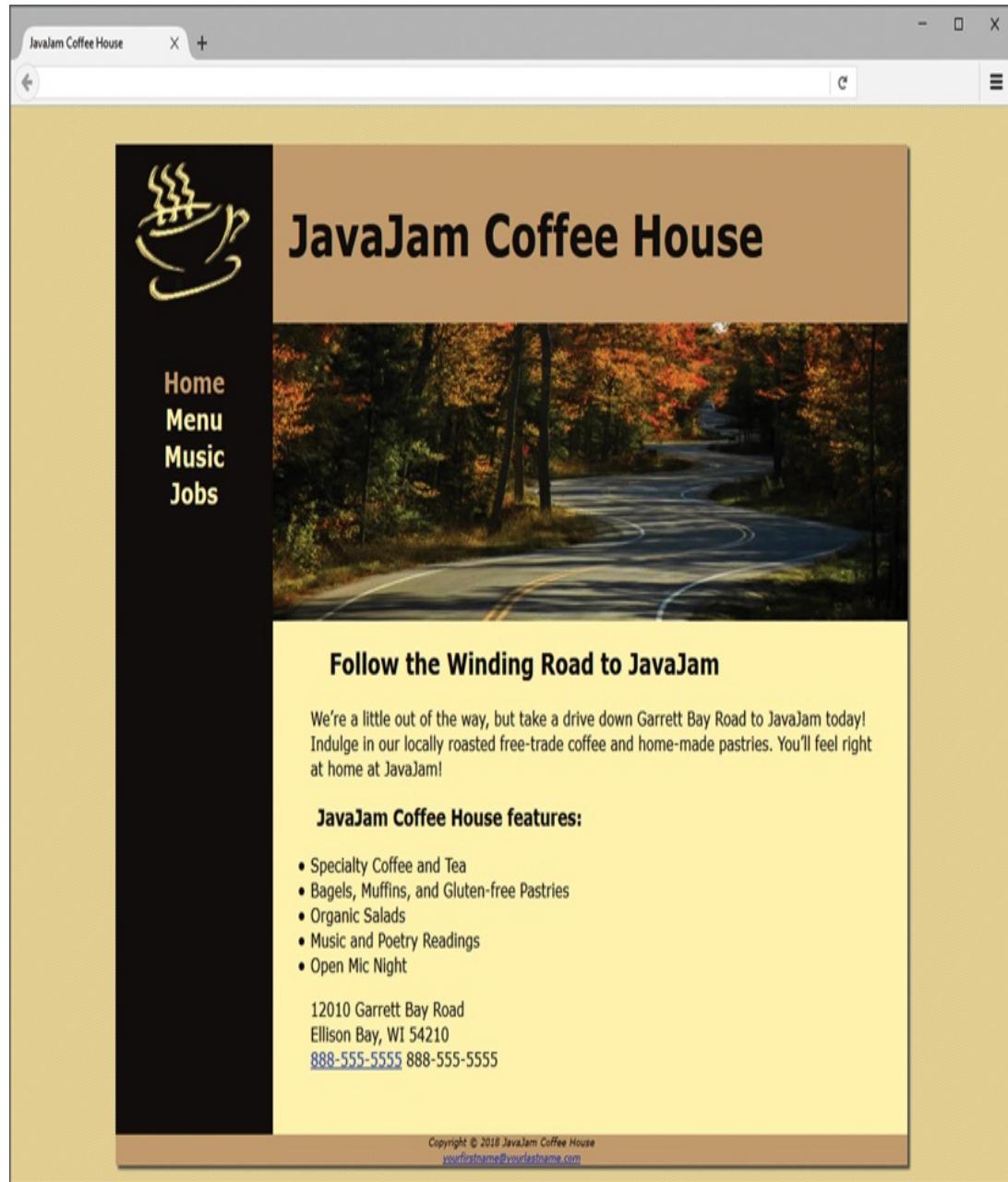
```
<span id="desktop">888-555-5555</span>
```

Don't worry about the two phone numbers that are now on the page. You'll configure CSS in Tasks 5 and 7 to show the appropriate phone number (with or without the telephone link) to

your website visitors.

Save the index.html file. It should look similar to the web page shown in [Figure 7.45](#) when displayed in a desktop browser. Remember that validating your HTML can help you find syntax errors. Test and correct this page before you continue.

## **Figure 7.45**



Temporary desktop browser display before new styles are configured

Figure 7.45 Full Alternative Text

- Task 3: Modify the Menu Page. Open menu.html in a text editor. Add the viewport meta tag in a manner consistent with the home page. Save and test your new menu.html page in a browser. Use the HTML validator to help you find syntax errors.

- Task 4: Modify the Music Page. Open music.html in a text editor. Add the viewport meta tag in a manner consistent with the home page. Save and test your new music.html page in a browser. Use the HTML validator to help you find syntax errors.
- Task 5: Modify the Desktop CSS. Open javajam.css in a text editor. Remember the telephone number hyperlink you created in Task 2? Configure the CSS for the phone number display as shown below:

```
#mobile { display: none; }
#desktop { display: inline; }
```

Save the javajam.css file. Use the CSS validator to help you find syntax errors.

- Task 6: Configure the Tablet CSS. Open javajam.css in a text editor. Edit the style rules as follows:
  1. Code a media query to select for typical tablet device viewport size, such as

```
@media only screen and (max-width: 1024px) {
```
  2. Code the following new styles within the media query:
    1. Configure a body element selector with margin set to 0. Set the background-image property to none.
    2. Configure a wrapper id selector. Set the width to auto, min-width to 0, margin to 0, padding to 0, and box-shadow to none.
    3. Configure the header element selector. Configure a 5px solid #FEF6C2 bottom border.
    4. Configure the h1 element selector. Set top margin to 0, bottom margin to 1em, top padding to 1em, bottom padding to 1em, and 2.5em font size.

5. Configure the nav element selector. The mobile layout uses a single column. Set the float to none, auto width, 0 top padding, 10px margin, and 1.3em font size.
6. Configure the nav li selector. Set display to inline-block.
7. Configure the nav a selector. Set padding to 1em, width to 8em, font weight to bold, and border-style to none.
8. Configure the nav ul selector with 0 padding and margin.
9. Configure the #heroroad, #heromugs, and #heroguitar selectors. Configure 0 margin and 0 padding.
10. Configure the main element selector. Set margin to 0, and font size to 90%.

Save the javajam.css file. Use the CSS validator to help you find syntax errors.

- Task 7: Configure the Smartphone CSS. Open javajam.css in a text editor. Note that any device with a screen max-width of 1024 pixels or less will apply the styles you coded in Task 6. In this task you will code additional styles needed for smaller devices. Edit the style rules as follows:

1. Code a media query to select for typical smartphone device viewport size, such as

```
@media only screen and (max-width: 768px) {
```

2. Code the following new styles within the media query:

1. Configure the header element selector to display an image designed for small mobile devices. Set the background image to javajammini.jpg. Set the height to 128px.
2. Configure the h1 element selector. Set 2em font size, centered

text, and 0 left padding.

3. Configure the nav element selector. Set the margin to 0.
4. Configure the anchor tags in the navigation area. Code a style rule for the nav a selector. Set the display to block, padding to 0.2em, and width to auto. Also configure a 1 pixel bottom border (use #FEF6C2 for the border color).
5. Configure the nav li selector. Set the display to block.
6. Configure the main element selector. Set top padding to 1px.
7. Configure the h2 element selector. Set 0.5em top padding, 0 right padding, 0 bottom padding, and 0.5em left padding. Set the right margin to 0.5em.
8. Configure the details class selector. Set left and right padding to 0.
9. Configure the #heroroad, #heromugs, and #heroguitar selectors. Set the background image to none. Set the height to auto.
10. Configure the floatleft class selector. Set left and right padding to 0.5em.
11. Remember the telephone number hyperlink you created in Task 2? Configure the CSS for the phone number display as shown below:

```
#mobile { display: inline; }  
#desktop { display: none; }
```

Save the javajam.css file. Use the CSS validator to help you find syntax errors.

Display your pages in a desktop browser. The pages should look the same as they did before you started this case study (see [Figure 6.49](#)).

Next, test the mobile display. Display your page and reduce the width of the browser. Your mobile display should be similar to [Figure 7.43](#) or [7.44](#). Select the hyperlinks to view the Menu and Music pages. They should be similar to the home page. JavaJam is mobile!

## Fish Creek Animal Clinic

See [Chapter 2](#) for an introduction to the Fish Creek Animal Clinic case study. [Figure 2.35](#) shows a site map for the Fish Creek website. In this case study, you configure the website to display in mobile devices using the single-column layout shown in [Figure 7.17](#). You will code media queries for mobile styles; modify the current desktop styles; and update the Home, Services, and Ask the Vet pages. Use the [Chapter 6](#) Fish Creek website as a starting point for this case study. When you are finished, the website will look the same in desktop browsers (see [Figure 6.53](#)). The mobile display should be similar to [Figure 7.46](#) or [7.47](#). You have seven tasks in this case study:

### Figure 7.46



The image shows a smartphone displaying the mobile version of the Fish Creek Animal Clinic website. The top navigation bar is dark blue with white text, featuring the clinic's name "Fish Creek Animal Clinic" in a large, bold font. Below the navigation bar, there is a vertical menu on the left side with four items: "Home", "Services", "Ask the Vet", and "Contact". The main content area contains three sections with headings and descriptions: "Full Service Facility" (describing 24-hour, 7-day service), "Years of Experience" (mentioning 35 years since 1984), and "Open Door Policy" (welcoming owners to stay with their pets). At the bottom of the page, there is a light blue footer bar with the copyright notice "Copyright © 2018 Fish Creek Animal Clinic" and an email placeholder "yourfirstname@yourlastname.com".

**Fish Creek Animal Clinic**

**Home**

**Services**

**Ask the Vet**

**Contact**

**Full Service Facility**  
Doctors and staff are on duty  
24 hours a day, 7 days a week.

**Years of Experience**  
Fish Creek Veterinarians have  
provided quality, dependable  
care for your beloved animals  
since 1984.

**Open Door Policy**  
Our professionals welcome  
owners to stay with their pets  
during any medical procedure.

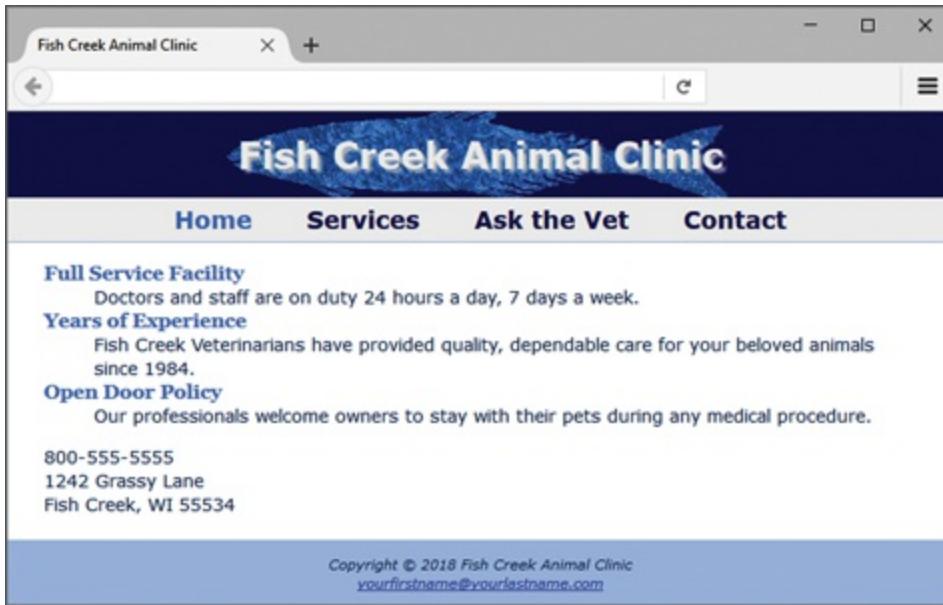
**800-555-5555**  
1242 Grassy Lane  
Fish Creek, WI 55534

Copyright © 2018 Fish Creek Animal Clinic  
[yourfirstname@yourlastname.com](mailto:yourfirstname@yourlastname.com)

The smartphone display

Figure 7.46 Full Alternative Text

## Figure 7.47



A test of the new tablet (or high-resolution smartphone) display in a desktop browser

[Figure 7.47 Full Alternative Text](#)

1. Create a new folder for this Fish Creek case study.
2. Modify the Home page to include a viewport meta tag and an updated header area.
3. Modify the Services page to be consistent with the Home page.
4. Modify the Ask the Vet page to be consistent with the Home page.
5. Modify the desktop styles in fishcreek.css.
6. Modify fishcreek.css and code a media query for tablet device display.
7. Modify fishcreek.css and code a media query for smartphone device display.

## Hands-On Practice Case Study

- Task 1: The Website Folder. Create a folder called fishcreek7. Copy all of the files from your [Chapter 6](#) fishcreek6 folder into the fishcreek7 folder. Copy the *lilfish.gif* file from the chapter7/starters folder in the student files.
- Task 2: Modify the Home Page. Open *index.html* in a text editor. Edit the code as follows:
  1. Configure a viewport meta tag that configures the width to the `device-width` and sets the `initial-scale` to `1.0`.
  2. The home page displays a phone number in the contact information area. Wouldn't it be handy if a person using a smartphone could click on the phone number to call the animal hospital? You can make that happen by using `tel:` in a hyperlink. Configure a hyperlink assigned to an id named `mobile` that contains the phone number as shown below:

```
<a id="mobile" href="tel:800-555-5555">800-555-5555</a>
```

But wait a minute, a telephone link could confuse those visiting the site with a desktop browser. Code another phone number directly after the hyperlink. Code a span element assigned to an id named `desktop` around the phone number as shown below:

```
<span id="desktop">800-555-5555</span>
```

Don't worry about the two phone numbers that are now on the page. You'll configure CSS in Tasks 5 and 7 to show the appropriate phone number (with or without the telephone link) to your website visitors.

Save the *index.html* file. It should look similar to the web page shown in [Figure 6.53](#) (except for temporarily displaying two phone numbers) when displayed in a desktop browser. Remember that validating your HTML can help you find syntax errors. Test and correct this page before you continue.

- Task 3: Modify the Services Page. Open *services.html* in a text editor.

Add the viewport meta tag in a manner consistent with the home page. Save and test your new services.html page in a browser. Use the HTML validator to help you find syntax errors.

- Task 4: Modify the Ask the Vet Page. Open askvet.html in a text editor. Add the viewport meta tag in a manner consistent with the home page. Save and test your new askvet.html page in a browser. Use the HTML validator to help you find syntax errors.
- Task 5: Modify the Desktop CSS. Open fishcreek.css in a text editor. Remember the telephone number hyperlink you created in Task 2? Configure the CSS for the phone number display as shown below:

```
#mobile { display: none; }
#desktop { display: inline; }
```

Save the fishcreek.css file. Use the CSS validator to help you find syntax errors.

- Task 6: Configure the Tablet CSS. Open fishcreek.css in a text editor. Edit the style rules as follows:
  1. Code a media query to select for typical tablet device viewport size, such as

```
@media only screen and (max-width: 1024px) {
```
  2. Code the following new styles within the media query:
    1. Configure a body element selector with margin and padding set to 0. Set the background color to white and the background-image property to none.
    2. Configure a wrapper id selector. Set the width to auto, min-width to 0 and margin to 0.
    3. Configure the h1 element selector. Set margin to 0, font size to 1.8em, and line height to 200%.

4. Configure the nav element selector. The mobile layout uses a single column. Set the float to none, padding to 0, and width to auto.
5. Configure the nav li selector. Set display to inline-block.
6. Configure the nav a selector. Set padding to 1em and font size to 1.2em.
7. Configure the nav ul element selector with centered text, 0 padding, and 0 margin.
8. Configure the main element selector. Set font size to 90%, margin to 0, and left padding to 2em.
9. Configure the footer element selector with 0 margin.

Save the fishcreek.css file. Use the CSS validator to help you find syntax errors.

- Task 7: Configure the Smartphone CSS. Open fishcreek.css in a text editor. Note that any device with a screen max-width of 1024 pixels or less will apply the styles you coded in Task 6. In this task you will code additional styles needed for smaller devices. Edit the style rules as follows:

1. Code a media query to select for typical smartphone device viewport size, such as

```
@media only screen and (max-width: 768px) {  
}
```

2. Code the following new styles within the media query:

1. Configure a header element selector. The bigfish.gif image is too wide to display well on a mobile device. Your design strategy is to configure a smaller image (lilfish. gif) as the header background for mobile display.

2. Configure the h1 element selector. Set font-size to 1.5em and line-height to 120%.
3. Configure the anchor tags in the navigation area. Code a style rule for the nav a selector. Set display to block, padding to 0.2em, and font size to 1em. Also configure a 1 pixel bottom border (use #330000 for the border color).
4. Configure the nav li selector. Set display to block.
5. Configure the nav ul selector. Set text-align to left.
6. Configure a main element selector. Set 1em left padding.
7. Configure a category class selector. While the text-shadow property can work well in the logo header area, it can make content text difficult to read on a mobile device. Set text-shadow to none.
8. Remember the telephone number hyperlink you created in Task 2? Configure the CSS for the phone number display as shown below:

```
#mobile { display: inline; }  
#desktop { display: none; }
```

Save the fishcreek.css file. Use the CSS validator to help you find syntax errors.

Display your pages in a desktop browser. The home page should look similar to [Figure 6.53](#). Next, test the mobile display. Display your page and reduce the width of the browser. Your mobile display should be similar to [Figure 7.36](#) or [7.47](#). Select the hyperlinks to view the Services and Ask the Vet pages. They should be similar to the home page. Fish Creek is mobile!

# Pacific Trails Resort

See [Chapter 2](#) for an introduction to the Pacific Trails Resort case study. [Figure 2.39](#) shows a site map for the Pacific Trails website. In this case study, you will configure the website to display on mobile devices using the single-column layout shown in [Figure 7.17](#). You will code media queries for mobile styles; modify the current desktop styles; and update the Home, Yurts, and Activities pages. Use the [Chapter 6](#) Pacific Trails website as a starting point for this case study. When you have finished, the website will look the same in desktop browsers (see [Figure 6.55](#)). The mobile display should be similar to [Figure 7.48](#) or [7.49](#). You have seven tasks in this case study:

## Figure 7.48

The figure shows a smartphone screen displaying the Pacific Trails Resort website. The top navigation bar is dark blue with white text, featuring the resort's name and four menu items: Home, Yurts, Activities, and Reservations. Below the navigation is a header section with a sunset background image and the text "Enjoy Nature in Luxury". The main content area contains descriptive text about the resort's offerings, a bulleted list of activities, and contact information. At the bottom, there is a copyright notice.

**Pacific Trails Resort**

**Home**

**Yurts**

**Activities**

**Reservations**

**Enjoy Nature in Luxury**

Pacific Trails Resort offers a special lodging experience on the California North Coast with panoramic views of the Pacific Ocean. Your stay at Pacific Trails Resort includes a sumptuously appointed private yurt and a cooked-to-order breakfast each morning.

- Unwind in the heated outdoor pool and whirlpool
- Explore the coast on your own or join our guided tours
- Relax in our lodge while enjoying complimentary appetizers and beverages
- Savor nightly fine dining with an ocean view

**Pacific Trails Resort**  
12456 Pacific Trails Road  
Zephyr, CA 95555

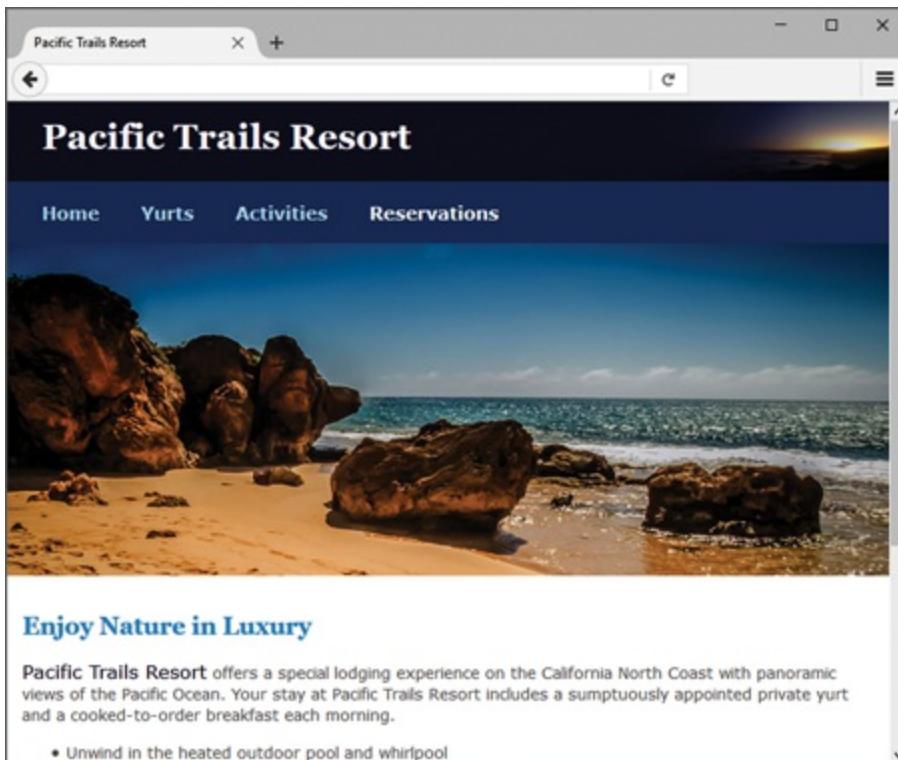
888-555-5555

Copyright © 2018 Pacific Trails Resort  
[yourfirstname@yourlastname.com](mailto:yourfirstname@yourlastname.com)

Smartphone display

Figure 7.48 Full Alternative Text

## Figure 7.49



A test of the new tablet (or high-resolution smartphone) display in a desktop browser

Figure 7.49 Full Alternative Text

1. Create a new folder for this Pacific Trails case study.
2. Modify the Home page to include a viewport meta tag.
3. Modify the Yurts page to be consistent with the Home page.
4. Modify the Activities page to be consistent with the Home page.
5. Modify the desktop styles in pacific.css.

6. Modify pacific.css and code a media query for tablet device display.
7. Modify pacific.css and code a media query for smartphone device display.

## Hands-On Practice Case Study

- Task 1: The Website Folder. Create a folder called pacific7. Copy all of the files from your [Chapter 6](#) pacific6 folder into the pacific7 folder.
- Task 2: Modify the Home Page. Open index.html in a text editor. Edit the code as follows:
  1. Configure a viewport meta tag that configures the width to the `device-width` and sets the `initial-scale` to 1.0.
  2. The home page displays a phone number in the contact information area. Wouldn't it be handy if a person using a smartphone could click on the phone number to call the resort? You can make that happen by using `tel:` in a hyperlink. Configure a hyperlink assigned to an id named `mobile` that contains the phone number as shown below:

```
<a id="mobile" href="tel:888-555-5555">888-555-5555</a>
```

But wait a minute, a telephone link could confuse those visiting the site with a desktop browser. Code another phone number directly after the hyperlink. Code a span element assigned to an id named `desktop` around the phone number as shown here:

```
<span id="desktop">888-555-5555</span>
```

Don't worry about the two phone numbers that are now on the page. You'll configure CSS in Tasks 5 and 7 to show the appropriate phone number (with or without the telephone link) to your website visitors.

Save the index.html file. It should look similar to the web page shown in [Figure 6.55](#) (except for temporarily displaying two phone numbers) when displayed in a desktop browser. Remember that validating your HTML can help you find syntax errors. Test and correct this page before you continue.

- Task 3: Modify the Yurts Page. Open yurts.html in a text editor. Add the viewport meta tag in a manner consistent with the home page. Save and test your new yurts.html page in a browser. Use the HTML validator to help you find syntax errors.
- Task 4: Modify the Activities Page. Open activities.html in a text editor. Add the viewport meta tag in a manner consistent with the home page. Save and test your new activities.html page in a browser. Use the HTML validator to help you find syntax errors.
- Task 5: Modify the Desktop CSS. Open pacific.css in a text editor. Remember the telephone number hyperlink you created in Task 2? Configure the CSS for the phone number display as shown below:

```
#mobile { display: none; }
#desktop { display: inline; }
```

Save the pacific.css file. Use the CSS validator to help you find syntax errors.

- Task 6: Configure the Tablet CSS. Open pacific.css in a text editor. Edit the style rules as follows:
  1. Code a media query to select for typical tablet device viewport size, such as

```
@media only screen and (max-width: 1024px) {
```
  2. Code the following new styles within the media query:
    1. Configure a body element selector with margin and padding set to 0. Set the background-image property to none.

2. Configure a wrapper id selector. Set the width to auto, min-width to 0, margin to 0, and box-shadow to none.
3. Configure the h1 element selector. Set margin to 0.
4. Configure the nav element selector. The mobile layout uses a single column. Set the float to none, width to auto, top padding to 0.01em, bottom padding to 0.01em, left padding to 1em, and right padding to 1em.
5. Configure the nav li selector. Set display to inline-block.
6. Configure the nav a selector. Set right padding to 2em.
7. Configure the main element selector. Set padding to 1em, left margin to 0, and 90% font size.
8. Configure the footer element selector with 0 margin.
9. Configure the #homehero, #yurthero, and #trailhero selectors. Set the left margin to 0.

Save the pacific.css file. Use the CSS validator to help you find syntax errors.

- Task 7: Configure the Smartphone CSS. Create the mobile style sheet based on the desktop style sheet. Open pacific.css in a text editor. Note that any device with a screen max-width of 1024 pixels or less will apply the styles you coded in Task 6. In this task you will code additional styles needed for smaller devices. Edit the style rules as follows:

1. Code a media query to select for typical smartphone device viewport size, such as

```
@media only all and (max-width: 768px) {
```

2. Code the following new styles within the media query:

1. Configure the h1 element selector. Set height to 100%, font size to 1.5em, and left padding to 0.3em.
2. Configure the nav element selector. Set padding to 0.
3. Configure the anchor tags in the navigation area. Code a style rule for the nav a selector. Set display to block, padding to 0.2em, and font size to 1.1em. Also configure a 1 pixel bottom border (use #330000 for the border color).
4. Configure the nav ul selector and set margin and padding to 0.
5. Configure the nav li selector with block display. Set margin and padding to 0.
6. Configure the main element selector. Set 0.1em top padding, 0.6em right padding, 0.1em bottom padding, and 0.4em left padding.
7. Configure the #homehero, #yurthero, and #trailhero selectors to not display. Set display to none.
8. Configure the footer element selector. Set padding to 0.
9. Remember the telephone number hyperlink you created in Task 2? Configure the CSS for the phone number display as shown below:

```
#mobile { display: inline; }  
#desktop { display: none; }
```

Save the pacific.css file. Use the CSS validator to help you find syntax errors.

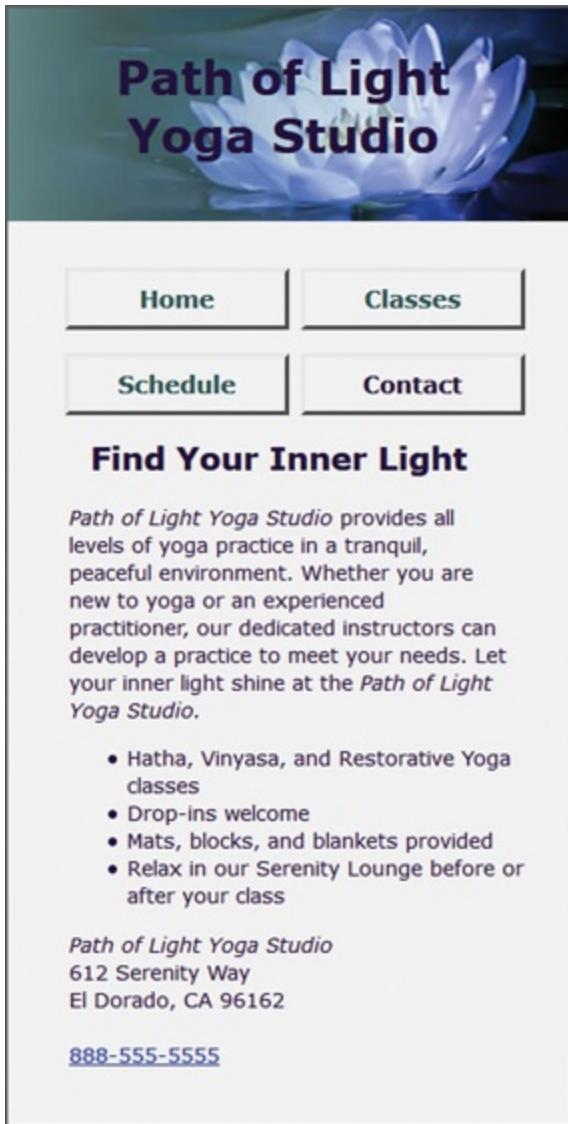
Display your pages in a desktop browser. The pages should look the same as they did before you started this case study (see [Figure 6.55](#)). Next, test the mobile display. Display your page and reduce the width of the browser. Your mobile display should be similar to [Figure 7.48](#) or

[7.49](#). Select the hyperlinks to view the Yurts and Activities pages. They should be similar to the home page. Pacific Trails is mobile!

# Path of Light Yoga Studio

See [Chapter 2](#) for an introduction to the Path of Light Yoga Studio case study. [Figure 2.43](#) shows a site map for the Path of Light Yoga Studio website. In this case study, you will configure the website to display on mobile devices using the single-column layout shown in [Figure 7.17](#). You will code media queries for mobile styles; modify the current desktop styles, and update the Home, Classes, and Schedule pages. Use the [Chapter 6](#) Path of Light Yoga Studio website as a starting point for this case study. When you are finished, the website will look the same (see [Figure 6.57](#)) in desktop browsers. The mobile display should be similar to [Figure 7.50](#) or [7.51](#). You have seven tasks in this case study:

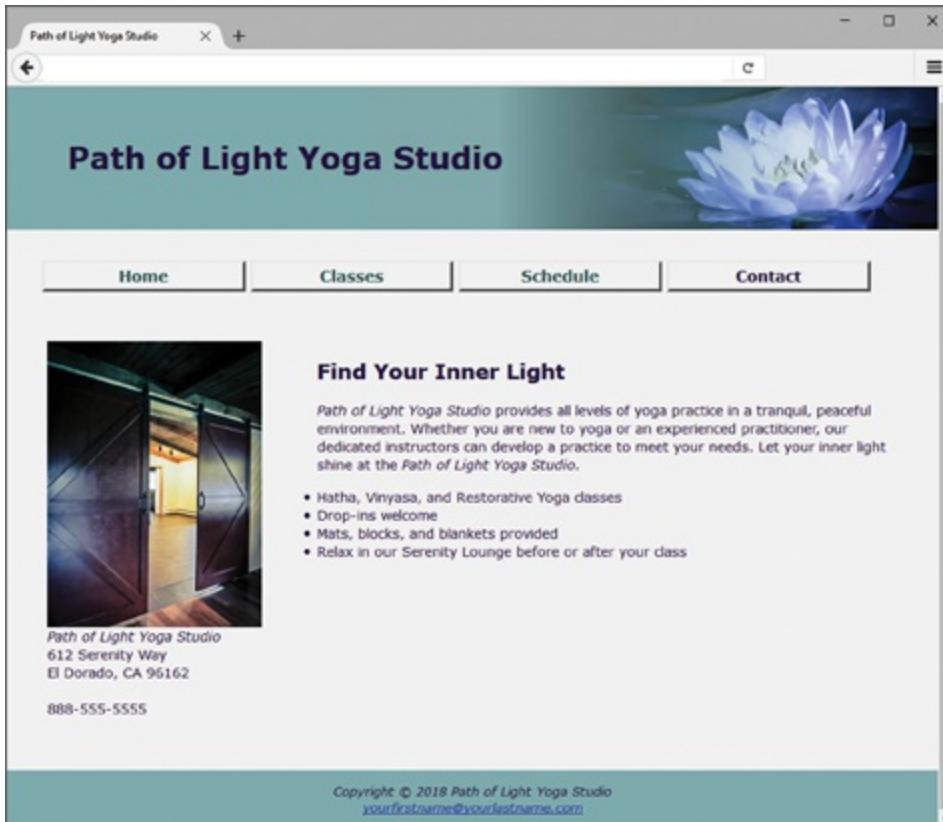
## Figure 7.50



The smartphone display

[Figure 7.50 Full Alternative Text](#)

## Figure 7.51



A test of the new tablet (or high-resolution smartphone) display in a desktop browser

[Figure 7.51 Full Alternative Text](#)

1. Create a new folder for this Path of Light Yoga Studio case study.
2. Modify the Home page to include a viewport meta tag and an updated header area.
3. Modify the Classes page to be consistent with the Home page.
4. Modify the Schedule page to be consistent with the Home page.
5. Modify the desktop styles in `yoga.css`.
6. Modify `yoga.css` and code a media query for tablet device display.
7. Modify `yoga.css` and code a media query for smartphone device display.

# Hands-On Practice Case Study

- Task 1: The Website Folder. Create a folder called `yoga7`. Copy all of the files from your [Chapter 6](#) `yoga6` folder into the `yoga7` folder.
- Task 2: Modify the Home Page. Open `index.html` in a text editor. Edit the code as follows:
  1. Configure a viewport meta tag that configures the width to the `device-width` and sets the `initial-scale` to `1.0`.
  2. The home page displays a phone number in the contact information area. Wouldn't it be handy if a person using a smartphone could click on the phone number to call the company? You can make that happen by using `tel:` in a hyperlink. Configure a hyperlink assigned to an id named `mobile` that contains the phone number as shown below:

```
<a id="mobile" href="tel:888-555-5555">888-555-5555</a>
```

But wait a minute, a telephone link could confuse those visiting the site with a desktop browser. Code another phone number directly after the hyperlink. Code a span element assigned to an id named `desktop` around the phone number as shown below:

```
<span id="desktop">888-555-5555</span>
```

Don't worry about the two phone numbers that are now on the page. You'll configure CSS in Tasks 5 and 7 to show the appropriate phone number (with or without the telephone link) to your website visitors.

Save the `index.html` file. It should look similar to the web page shown in [Figure 6.57](#) (except for temporarily displaying two phone numbers) when displayed in a desktop browser. Remember that validating your HTML can help you find syntax errors. Test and correct this page before you continue.

- Task 3: Modify the Classes Page. Open classes.html in a text editor. Add the viewport meta tag in a manner consistent with the home page. Remove the height and width attributes from the img tag. Save and test your new classes.html page in a browser. Use the HTML validator to help you find syntax errors.
- Task 4: Modify the Schedule Page. Open schedule.html in a text editor. Add the viewport meta tag in a manner consistent with the home page. Remove the height and width from the img tag. Save and test your new schedule.html page in a browser. Use the HTML validator to help you find syntax errors.
- Task 5: Modify the Desktop CSS. Open yoga.css in a text editor. Remember the telephone number hyperlink you created in Task 2? Configure the CSS for the phone number display as shown below:

```
#mobile { display: none; }
#desktop { display: inline; }
```

Save the yoga.css file. Use the CSS validator to help you find syntax errors.

- Task 6: Configure the Tablet CSS. Open yoga.css in a text editor. Edit the style rules as follows:
  1. Code a media query to select for typical tablet device viewport size. such as

```
@media only screen and (max-width: 1024px) { }
```
  2. Code the following new styles within the media query:
    1. Configure a body element selector with margin and padding set to 0.
    2. Configure a wrapper id selector. Set the width to 100%, min-width to 0, margin to 0, and padding to 0.

3. Configure the header element selector. Set top padding to 1px.
4. Configure the h1 element selector. Set top padding to 1em.
5. Configure the nav element selector. The mobile layout uses a single column. Set the float to none, width to auto, and left padding to 2em.
6. Configure the nav a selector. Set padding to 0.2em, left margin to 0.3em, float to left, and width to 23%.
7. Configure the main element selector. Set top and bottom padding to 2.5em, left and right padding to 1em, margin to 0, 90% font size, and clear all floats.
8. Configure the #hero img selector. Code a style declarations to set the width to 100% and the height to auto.
9. Configure the h2, h3, p, and dl element selectors. Set the left and right padding to 2em.
10. Configure the main ul selector. Set left margin to 2em.
11. Configure the floatleft class with 2em left margin and 1em bottom margin.
12. Configure the clear class with 2em left padding.

Save the yoga.css file. Use the CSS validator to help you find syntax errors.

- Task 7: Configure the Mobile CSS. Open yoga.css in a text editor. Note that any device with a screen max-width of 1024 pixels or less will apply the styles you coded in Task 6. In this task you will code additional styles needed for smaller devices. Edit the style rules as follows:
  1. Code a media query to select for typical smartphone device viewport size, such as

```
@media only all and (max-width: 768px) {  
}
```

2. Code the following new styles within the media query:
  1. Configure an h1 element selector. Set the font size to 2em, top padding to 0.25em, left padding to 1.5em and width to 85%. Also configure centered text.
  2. Configure the anchor tags in the navigation area. Configure a style rule for the nav a selector. Set padding to 0.5em, width to 45%, float to left, minimum width to 6em, and left margin to 0.5em.
  3. Configure the main element selector. Set top padding to 0.
  4. Configure the `floatleft` class selector. Set the float property to none. Set display to none.
  5. Configure the `#hero` selector. Set display to none.
  6. Configure the footer element selector. Set padding to 0.5em and margin to 0.
  7. Remember the telephone number hyperlink you created in Task 2? Configure the CSS for the phone number display as shown below:

```
#mobile { display: inline; }  
#desktop { display: none; }
```

Save the `yoga.css` file. Use the CSS validator to help you find syntax errors.

Display your pages in a desktop browser. The pages should look the same as they did before you started this case study (see [Figure 6.57](#)). Next, test the mobile display. Display your page and reduce the width of the browser. Your mobile display should be similar to [Figure 7.50](#) or [7.51](#). Select the hyperlinks to view the Classes and Schedule pages.

They should be similar to the home page. Path of Light Yoga Studio is mobile!

## Web Project

See Chapters 5 and 6 for an introduction to the Web Project case study. In this case study, you configure the website to display in mobile devices using the single-column layout shown in [Figure 7.17](#). You will configure a media query for mobile device display and modify the web pages as needed.

## Hands-On Practice Case Study

1. Modify the style sheet and configure a media query with styles for mobile device display.
2. Modify each web page and configure a viewport meta tag.
3. Display your pages in a desktop browser. The pages should look the same as they did before you started this case study. Next, display your pages in a mobile device or emulator. Your pages should be optimized for mobile display.

# **8 Tables**

# Chapter Objectives

In this chapter, you will learn how to . . .

- Describe the recommended use of a table on a web page
- Create a basic table with the table, table row, table header, and table cell elements
- Configure table sections with the thead, tbody, and tfoot elements
- Increase the accessibility of a table
- Style an HTML table with CSS
- Describe the purpose of CSS structural pseudo-classes

In this chapter you'll become familiar with coding HTML tables to organize information on a web page.

# 8.1 Table Overview

The purpose of a table is to organize information. In the past, before CSS was well supported by browsers, tables were also used to format web page layouts. An HTML table is composed of rows and columns, like a spreadsheet. Each individual table cell is at the intersection of a specific row and column.



## VideoNote Configure a Table

- Each table begins with a `<table>` tag and ends with a `</table>` tag.
- Each table row begins with a `<tr>` tag and ends with a `</tr>` tag.
- Each cell (table data) begins with a `<td>` tag and ends with a `</td>` tag.
- Table cells can contain text, graphics, and other HTML elements.

[Figure 8.1](#) shows a sample table with three rows and three columns. The sample HTML for this table is

## Figure 8.1

A screenshot of a table editor window titled "Table". The window has standard OS X-style controls (minimize, maximize, close). Below the title bar is a toolbar with a back arrow, a forward arrow, and a refresh/circular arrow icon. The main area displays a 3x3 grid of data. The first row contains the column headers "Name", "Birthday", and "Phone". The second row contains the data "Jack" and "5/13" in the first two columns, and "857-555-5555" in the third column. The third row contains the data "Sparky" and "11/28" in the first two columns, and "303-555-5555" in the third column.

Name	Birthday	Phone
Jack	5/13	857-555-5555
Sparky	11/28	303-555-5555

Table with three rows and three columns

### Figure 8.1 Full Alternative Text

```
<table>
  <tr>
    <td>Name</td>
    <td>Birthday</td>
    <td>Phone</td>
  </tr>
  <tr>
    <td>Jack</td>
    <td>5/13</td>
    <td>857-555-5555</td>
  </tr>
  <tr>
    <td>Sparky</td>
    <td>11/28</td>
    <td>303-555-5555</td>
  </tr>
</table>
```

Notice how the table is coded row by row. Also, each row is coded cell by cell. This attention to detail is crucial for the successful use of tables. An example can be found in the student files (chapter8/table1.html).

## Table Element

A table element is a block display element that contains tabular information. The table begins with a **<table>** tag and ends with a **</table>** tag. See [Table 8.1](#) for common attributes of the table element. Notice that most of the attributes listed in [Table 8.1](#) are obsolete in HTML5 and should be avoided. Although these attributes are obsolete in HTML5, as you work with the Web you'll see many web pages coded with earlier versions of HTML and it is useful to be aware of even obsolete attributes. Modern web developers prefer to configure the style of tables with CSS properties instead of with HTML attributes. A prominent attribute that remains in use is the border attribute.

## Table 8.1 Table element

# attributes

Attribute	Value	Purpose
align	left (default), right, center	Horizontal alignment of the table (obsolete in HTML5)
bgcolor	Valid color value	Background color of the table (obsolete in HTML5)
border	0	Default; there is no visible border
	1–100	Visible border with pixel width specified
cellpadding	Numeric value	Specifies the number of pixels of padding between the content of a table cell and its border (obsolete in HTML5)
cellspacing	Numeric value	Specifies the number of pixels of space between the borders of each cell in a table (obsolete in HTML5)
summary	Text	Provides accessibility with a text description that gives an overview of and description the context for the information in the table (obsolete in HTML5)

<code>title</code>	Text	A brief text description that provides an overview of the table; may be displayed by some browsers as a tooltip
<code>width</code>	Numeric value or percentage	Specifies the width of the table (obsolete in HTML5)

## The border Attribute

In earlier versions of HTML (such as HTML4 and XHTML), the purpose of the border attribute was to indicate the presence and the width of a visible table border. The border attribute is used differently in HTML5. When following HTML5 syntax, code `border="1"` to cause the browser to render default borders around the table and table cells, as shown in [Figure 8.1](#). CSS is used to style the border of a table. You'll get practice styling a table with CSS later in the chapter.

## Table Captions

The **caption element** is often used with a table to describe its contents. The caption begins with a `<caption>` tag and ends with a `</caption>` tag. The text contained within the caption element displays on the web page above the table, although you'll see later in the chapter that you can configure the placement with CSS. The table shown in [Figure 8.2](#) uses the caption element to set the table caption to "Bird Sightings". Notice that the caption element is coded on the line immediately after the opening `<table>` tag. An example can be found in the student files (chapter8/table2.html). The HTML for the table is

## Figure 8.2

Bird Sightings	
Name	Date
Bobolink	5/25/10
Upland Sandpiper	6/03/10

The caption for this table is “Bird Sightings”

Figure 8.2 Full Alternative Text

```
<table border="1">
<caption>Bird Sightings</caption>
  <tr>
    <td>Name</td>
    <td>Date</td>
  </tr>
  <tr>
    <td>Bobolink</td>
    <td>5/25/10</td>
  </tr>
  <tr>
    <td>Upland Sandpiper</td>
    <td>6/03/10</td>
  </tr>
</table>
```

## 8.2 Table Rows, Cells, and Headers

### Table Row Element

The table row element configures a row within a table on a web page. The table row begins with a `<tr>` tag and ends with a `</tr>` tag. [Table 8.2](#) shows obsolete attributes of the table row element. Web pages coded with older versions of HTML may use these obsolete attributes. Modern web developers configure alignment and background color with CSS instead of with HTML.

### Table 8.2 Obsolete attributes of the table row element

Attribute	Value	Purpose
align	left (default), right, center	Horizontal alignment of the table (obsolete in HTML5)
bgcolor	Valid color value	Background color of the table (obsolete in HTML5)

### Table Data Element

The table data element configures a cell within a row in a table on a web page. The table cell begins with a `<td>` tag and ends with a `</td>` tag. See [Table 8.3](#) for attributes of the table data cell element. Some attributes are

obsolete and should be avoided. You'll explore configuring table styles with CSS later in the chapter.

## Table 8.3 Attributes of the table data and table header cell elements

Attribute	Value	Purpose
align	left (default), right, center	Horizontal alignment of the table (obsolete in HTML5)
bgcolor	Valid color value	Background color of the table (obsolete in HTML5)
colspan	Numeric value	The number of columns spanned by a cell
headers	The id value(s) of a column or row header cell	Associates the table data cells with table header cells; may be accessed by screen readers
height	Numeric value or percentage	Height of the cell (obsolete in HTML5)
rowspan	Numeric value	The number of rows spanned by a cell

scope	row, col	The scope of the table header cell contents (row or column); may be accessed by screen readers
valign	top, middle (default), bottom	The vertical alignment of the contents of the cell (obsolete in HTML5)
width	Numeric value or percentage	Width of the cell (obsolete in HTML5)

## Table Header Element

The table header element is similar to a table data element and configures a cell within a row in a table on a web page. Its purpose is to configure column and row headings. Text displayed within a table header element is centered and bold. The table header element begins with a `<th>` tag and ends with a `</th>` tag. See [Table 8.3](#) for common attributes of the table header element. [Figure 8.3](#) shows a table with column headings configured by `<th>` tags. The HTML for the table shown in [Figure 8.3](#) is as follows (also see chapter8/table3.html in the student files). Notice that the first row uses `<th>` instead of `<td>` tags.

## Figure 8.3

Name	Birthday	Phone
Jack	5/13	857-555-5555
Sparky	11/28	303-555-5555

Using <th> tags to indicate column headings

```
<table border="1">
  <tr>
    <th>Name</th>
    <th>Birthday</th>
    <th>Phone</th>
  </tr>
  <tr>
    <td>Jack</td>
    <td>5/13</td>
    <td>857-555-5555</td>
  </tr>
  <tr>
    <td>Sparky</td>
    <td>11/28</td>
    <td>303-555-5555</td>
  </tr>
</table>
```



## Hands-On Practice 8.1

In this Hands-On Practice, you will create a web page similar to [Figure 8.4](#) that describes two schools you have attended. Use the caption “School History Table.” The table has three rows and three columns. The first row will have table header elements with the headings School Attended, Years, and Degree Awarded. You will complete the second and third rows with your own information within table data elements.

# Figure 8.4

The screenshot shows a web browser window with a title bar labeled "School History". Below the title bar is a toolbar with a back arrow, forward arrow, and a menu icon. The main content area displays a table with a border. The table has a caption "School History" centered above it. The table structure is as follows:

School Attended	Years	Degree Awarded
Schaumburg High School	2012—2016	High School Diploma
Harper College	2016—2017	Web Developer Certificate

School History Table

## [Figure 8.4 Full Alternative Text](#)

To get started, launch a text editor and open chapter2/template.html in the student files. Save the file as mytable.html. Modify the title element. Use table, table row, table header, table data, and caption elements to configure a table similar to [Figure 8.4](#).

Hints:

- The table has three rows and three columns.
- To configure a border, use border="1" on the <table> tag.
- Use the table header element for the cells in the first row.

Save your file and display it in a browser. A sample solution is found in the

student files (chapter8/ 8.1/index.html).

## 8.3 Span Rows and Columns

You can alter the gridlike look of a table by applying the `colspan` and `rowspan` attributes to table data or table header elements. As you get into more complex table configurations like these, be sure to sketch the table on paper before you start typing the HTML.

### The `colspan` Attribute

The `colspan` attribute specifies the number of columns that a cell will occupy. [Figure 8.5](#) shows a table cell that spans two columns.

### Figure 8.5

This spans two columns	
Column 1	Column 2

Table with a row that spans two columns

#### [Figure 8.5 Full Alternative Text](#)

The HTML for the table is

```
<table border="1">
  <tr>
    <td colspan="2">This spans two columns</td>
  </tr>
  <tr>
    <td>Column 1</td>
    <td>Column 2</td>
  </tr>
```

```
</table>
```

# The rowspan Attribute

The rowspan attribute specifies the number of rows that a cell will occupy. An example of a table cell that spans two rows is shown in [Figure 8.6](#).

## Figure 8.6

This spans two rows	Row 1 Column 2
	Row 2 Column 2

Table with a column that spans two rows

[Figure 8.6 Full Alternative Text](#)

The HTML for the table is

```
<table border="1">
  <tr>
    <td rowspan="2">This spans two rows</td>
    <td>Row 1 Column 2</td>
  </tr>
  <tr>
    <td>Row 2 Column 2</td>
  </tr>
</table>
```

An example of the tables in [Figures 8.5](#) and [8.6](#) can be found in the student files (chapter8/table4.html).



## Hands-On Practice 8.2

You will practice with the `rowspan` attribute in this Hands-On Practice. To create the web page shown in [Figure 8.7](#), launch a text editor and open chapter2/template.html in the student files. Save the file as myrowspan.html. Modify the title element. Use table, table row, table head, and table data elements to configure the table.

**Figure 8.7**

Cana Island Lighthouse	
	Built: 1869
	Automated: 1944
	Tower Height: 65 feet

Practice with the `rowspan` attribute

[Figure 8.7 Full Alternative Text](#)

1. Code the opening `<table>` tag. Configure a border with `border="1"`.
2. Begin the first row with a `<tr>` tag.

3. The table data cell with “Cana Island Lighthouse” spans three rows.  
Code a table data element. Use the `rowspan="3"` attribute.
4. Code a table data element that contains the text “Built: 1869”.
5. End the first row with a `</tr>` tag.
6. Begin the second row with a `<tr>` tag. This row will only have one table data element because the cell in the first column is already reserved for “Cana Island Lighthouse”.
7. Code a table data element that contains the text “Automated: 1944”.
8. End the second row with a `</tr>` tag.
9. Begin the third row with a `<tr>` tag. This row will only have one table data element because the cell in the first column is already reserved for “Cana Island Lighthouse”.
10. Code a table data element that contains the text “Tower Height: 65 feet”.
11. End the third row with a `</tr>` tag.
12. Code the closing `</table>` tag.

Save the file and view it in a browser. A sample solution is found in the student files (chapter8/8.2/index.html). Notice how the “Cana Island Lighthouse” text is vertically aligned in the middle of the cell, which is the default vertical alignment. You can modify the vertical alignment using CSS —see section “8.5 Style a Table with CSS” later in this chapter.

## 8.4 Configure an Accessible Table

Tables can be useful to organize information on a web page, but what if you couldn't see the table and were relying on assistive technology like a screen reader to read the table to you? You'd hear the contents of the table just the way it is coded—row by row, cell by cell. This might be difficult to understand. This section discusses coding techniques to improve the accessibility of tables.

For a simple informational data table like the one shown in [Figure 8.8](#), the W3C Web Accessibility Initiative (WAI) Web Content Accessibility - Guidelines 2.0 (WCAG 2.0) recommend the following:

**Figure 8.8**

Bird Sightings	
Name	Date
Bobolink	5/25/10
Upland Sandpiper	6/03/10

This simple data table uses `<th>` tags and the `caption` element to provide accessibility

[Figure 8.8 Full Alternative Text](#)

- Use table header elements (`<th>` tags) to indicate column or row headings.
- Use the `caption` element to provide a text title or caption for the table.

An example web page is in the student files (chapter8/table5.html). The HTML is

```
<table border="1">
<caption>Bird Sightings</caption>
<tr>
  <th>Name</th>
  <th>Date</th>
</tr>
<tr>
  <td>Bobolink</td>
  <td>5/25/10</td>
</tr>
<tr>
  <td>Upland Sandpiper</td>
  <td>6/03/10</td>
</tr>
</table>
```

However, for more complex tables, the W3C recommends specifically associating the table data cell values with their corresponding headers. The technique that is recommended uses the id attribute (usually in a  tag) to identify a specific header cell and the headers attribute in a  tag. The code to configure the table in [Figure 8.8](#) using headers and ids is as follows (also see chapter8/table6.html in the student files): | |

```
<table border="1">
<caption>Bird Sightings</caption>
<tr>
  <th id="name">Name</th>
  <th id="date">Date</th>
</tr>
<tr>
  <td headers="name">Bobolink</td>
  <td headers="date">5/25/10</td>
</tr>
<tr>
  <td headers="name">Upland Sandpiper</td>
  <td headers="date">6/03/10</td>
</tr>
</table>
```



## Focus on Accessibility



# FAQ

## 1. What about the scope attribute?

The **scope attribute** specifies the association of table cells and table row or column headers. It is used to indicate whether a table cell is a header for a column (`scope="col"`) or row (`scope="row"`). An example of the code for the table in [Figure8.8](#) that uses this attribute is as follows (also see chapter8/table7.html in the student files):

```
<table border="1">
<caption>Bird Sightings</caption>
  <tr>
    <th scope="col">Name</th>
    <th scope="col">Date</th>
  </tr>
  <tr>
    <td>Bobolink</td>
    <td>5/25/10</td>
  </tr>
  <tr>
    <td>Upland Sandpiper</td>
    <td>6/03/10</td>
  </tr>
</table>
```

As you reviewed the code sample in the previous page, you may have noticed that using the `scope` attribute to provide accessibility requires less coding than implementing the `headers` and `id` attributes. However, because of inconsistent screen reader support of the `scope` attribute, the WCAG 2.0 recommendations for coding techniques encourage the use

of headers and id attributes rather than the scope attribute.



## Checkpoint 8.1

1. What is the purpose of using a table on a web page?
2. How is the text contained within a th element displayed by the browser?
3. Describe one coding technique that increases the accessibility of an HTML table.

## 8.5 Style a Table with CSS

Before CSS was well supported by browsers, it was common practice to configure the visual aesthetic of a table with HTML attributes. The modern approach is to use CSS to style a table. In this section, you'll explore using CSS to style the border, padding, alignment, width, height, vertical alignment, and background of table elements. [Table 8.4](#) lists corresponding CSS properties with the HTML attributes used to style tables.

### Table 8.4 CSS properties used to style tables

HTML Attribute	CSS Property
align	To align a table, configure the width and margin properties for the table selector. For example, to center a table with a width of 75% of the container element, use <pre>table { width: 75%;        margin: auto; }</pre>
	To align items within table cells, use text-align
width	width
height	height

`cellpadding` padding

`cellspacing` border-spacing; a numeric value (px or em) or percentage. If you set a value to 0, omit the unit. One numeric value with unit (px or em) configures both horizontal and vertical spacing. Two numeric values with unit (px or em): The first value configures the horizontal spacing and the second value configures the vertical spacing.

`border-collapse` configures the border area. The values are separate (default) and collapse. Use `border-collapse: collapse;` to remove extra space between table and table cell borders.

`bgcolor` background-color

`valign` vertical-align specifies the vertical placement of content. The values are numeric pixel or percentage, baseline (default), sub (subscript), super (superscript), top, text-top, middle, bottom, and text-bottom

`border` border, border-style, border-spacing

`none` background-image

`none` caption-side specifies the placement of the caption. Values are top (default) and bottom



## Hands-On Practice 8.3

In this Hands-On Practice, you will code CSS style rules to configure an informational table on a web page. Create a folder named ch8table. Copy the starter.html file from the chapter8 folder to your ch8table folder. We'll use embedded styles for ease of editing and testing your page. Open the starter.html file in a browser. The display should look similar to the one shown in [Figure 8.9](#).

### Figure 8.9

Lighthouse Island Bistro Specialty Coffee Menu		
Specialty Coffee	Description	Price
Lite Latte	Indulge in a shot of espresso with steamed, skim milk.	\$3.50
Mocha Latte	Choose dark or milk chocolate with steamed milk.	\$4.00
MCP Latte	A luscious mocha latte with caramel and pecan syrup.	\$4.50

This table is configured with HTML

[Figure 8.9 Full Alternative Text](#)

Launch a text editor and open starter.html from your ch8table folder. Locate the style tags in the head section. You will code embedded CSS in this Hands-On Practice. Place your cursor on the blank line between the style tags.

1. Configure the table element selector to be centered, have a dark blue, 5 pixel border, and have a width of 600px.

```
table { margin: auto;
```

```
border: 5px solid #000066;  
width: 600px; }
```

Save the file as menu.html. Open your page in a browser. Notice that there is a border surrounding the entire table but not surrounding each table cell.

2. Configure the td and th element selectors with a border, padding, and Arial or the default sans-serif font typeface.

```
td, th { border: 1px solid #000066;  
padding: 0.5em;  
font-family: Arial, sans-serif; }
```

Save the file and open your page in a browser. Each table cell should now be outlined with a border and should display text in a sans-serif font.

3. Notice the empty space between the borders of the table cells. This empty space can be eliminated with the **border-spacing property**. Add a border-spacing: 0; declaration to the table element selector. Save the file and open your page in a browser.
4. Configure the caption to be displayed with Verdana or the default sans-serif font typeface, bold font weight, 1.2em font size, and 0.5em of bottom padding. Configure a style rule as follows:

```
caption { font-family: Verdana, sans-serif;  
font-weight: bold;  
font-size: 1.2em;  
padding-bottom: 0.5em; }
```

5. Let's experiment and configure background colors for the rows instead of cell borders. Modify the style rule for the td and th element selectors, remove the border declaration, and set border-style to none. The new style rule for the cells is

```
td, th { padding: 0.5em;  
border-style: none;  
font-family: Arial, sans-serif; }
```

6. Create a new class called `altrow` that sets a background color.

```
.altrow { background-color: #EAEAEA; }
```

7. Modify the `<tr>` tags in the HTML. Assign the second and fourth `<tr>` tags to the `altrow` class. Save the file and open your page in a browser. The table area should look similar to the one shown in [Figure 8.10](#).

## Figure 8.10

**Lighthouse Island Bistro Specialty Coffee Menu**

Specialty Coffee	Description	Price
Lite Latte	Indulge in a shot of espresso with steamed, skim milk.	\$3.50
Mocha Latte	Choose dark or milk chocolate with steamed milk.	\$4.00
MCP Latte	A luscious mocha latte with caramel and pecan syrup.	\$4.50

Rows are configured with alternating background colors

[Figure 8.10 Full Alternative Text](#)

Notice how the background color of the alternate rows adds subtle interest to the web page. In this Hands-On Practice, you configured the display of an HTML table using CSS. Compare your work with the sample in the student files (chapter8/8.3/index.html).

## 8.6 CSS3 Structural Pseudo-Classes

In the previous section, you configured CSS and applied a class to every other table row to configure alternating background colors, often referred to as “zebra striping.” You may have found this to be a bit inconvenient and wondered if there was a more efficient method. Well, there is! CSS3 structural pseudo-class selectors allow you to select and apply classes to elements based on their position in the structure of the document, such as every other row. [Table 8.5](#) lists common CSS3 structural pseudo-class selectors and their purpose.

**Table 8.5 Common CSS3 structural pseudo-classes**

Pseudo-class	Purpose
<code>:first-of-type</code>	Applies to the first element of the specified type
<code>:first-child</code>	Applies to the first child of an element (CSS2 selector)
<code>:last-of-type</code>	Applies to the last element of the specified type
<code>:last-child</code>	Applies to the last child of an element
<code>:nth-of-</code>	Applies to the “nth” element of the specified type

**type(n)**

Values: a number, odd, or even

To apply a pseudo-class, write it after the selector. The following code sample will configure the first item in an unordered list to display with red text.

```
li:first-of-type { color: #FF0000; }
```



## Hands-On Practice 8.4

In this Hands-On Practice, you will rework the table you configured in [Hands-On Practice 8.3](#) to use CSS3 structural pseudo-class selectors to configure color.

1. Launch a text editor and open menu.html in your ch8table folder (it can also be found as chapter8/8.3/index.html in the student files). Save the file as menu2.html.
2. View the source code and notice that the second and fourth tr elements are assigned to the altrow class. You won't need this class assignment when using CSS3 structural pseudo-class selectors. Delete class="altrow" from the tr elements.
3. Examine the embedded CSS and locate the altrow class. Change the selector to use a structural pseudo-class that will apply the style to the even-numbered table rows. Replace .altrow with tr:nth-of-type(even) as shown in the following CSS declaration:

```
tr:nth-of-type(even) { background-color: #eaeaea; }
```

4. Save the file and open your page in a browser. The table area should look similar to the one shown in [Figure 8.10](#) if you are using a modern browser that supports CSS3 structural pseudo-classes.

- Let's configure the first row to have a dark blue background (#006) and light gray text (#EAEAEA) with the :first-of-type structural pseudo-class. Add the following to the embedded CSS:

```
tr:first-of-type { background-color: #006;  
                   color: #EAEAEA; }
```

- Save the file and open your page in a browser. The table area should look similar to the one shown in [Figure 8.11](#) if you are using a modern browser that supports CSS3 structural pseudo-classes. A sample solution is available in the student files (chapter8/8.4/index.html).

## Figure 8.11

**Lighthouse Island Bistro Specialty Coffee Menu**

Specialty Coffee	Description	Price
Lite Latte	Indulge in a shot of espresso with steamed, skim milk.	\$3.50
Mocha Latte	Choose dark or milk chocolate with steamed milk.	\$4.00
MCP Latte	A luscious mocha latte with caramel and pecan syrup.	\$4.50

CSS3 pseudo-class selectors style the table rows

[Figure 8.11 Full Alternative Text](#)

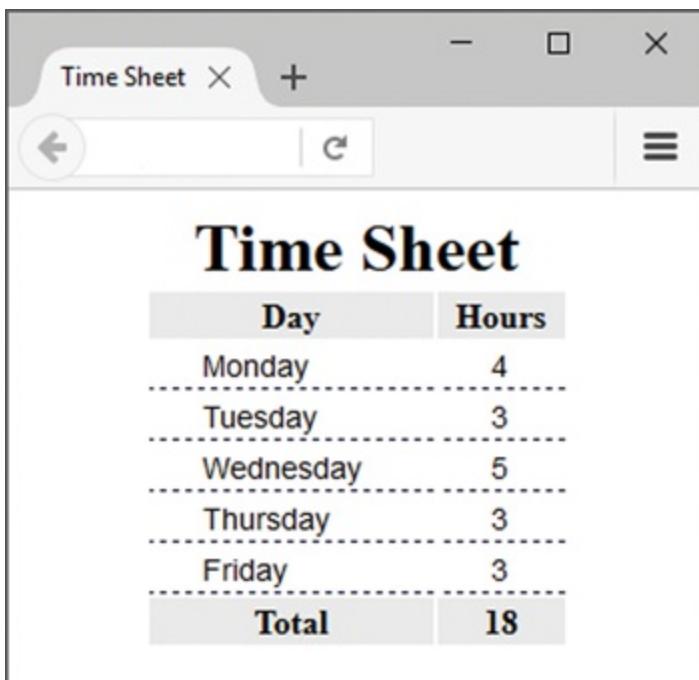
## 8.7 Configure Table Sections

There are a lot of configuration options for coding tables. Table rows can be put together into three types of groups: table head with `<thead>`, table body with `<tbody>`, and table footer with `<tfoot>`.

These groups can be useful when you need to configure the areas in the table in different ways, using either attributes or CSS. The `<tbody>` tag is required if you configure a `<thead>` or `<tfoot>` area, although you can omit either the table head or table footer if you like.

The following code sample (see chapter8/tfoot.html in the student files) configures the table shown in [Figure 8.12](#) and demonstrates the use of CSS to configure a table head, table body, and table footer with different styles.

### Figure 8.12



A screenshot of a mobile application window titled "Time Sheet". The window has a standard OS X-style title bar with a close button. Below the title bar is a navigation bar with a back arrow, a refresh icon, and a menu icon. The main content area is titled "Time Sheet" in large, bold, dark font. Below the title is a table with the following data:

Day	Hours
Monday	4
Tuesday	3
Wednesday	5
Thursday	3
Friday	3
<b>Total</b>	<b>18</b>

CSS configures the `thead`, `tbody`, and `tfoot` element selectors

## Figure 8.12 Full Alternative Text

The CSS styles a centered 200-pixel-wide table with a caption that is rendered in large, bold font; a table head section with a light-gray (#eaeaea) background color; a table body section styled with slightly smaller text (.90em) using Arial or sans-serif font; table body td element selectors set to display with some left padding and a dashed bottom border; and a table footer section that has centered, bold text and a light-gray background color (#eaeaea). The CSS code is

```
table { width: 200px;
        margin: auto; }
caption { font-size: 2em;
          font-weight: bold; }
thead { background-color: #EAEAEA; }
tbody { font-family: Arial, sans-serif;
        font-size: .90em; }
tbody td { border-bottom: 1px #000033 dashed;
           padding-left: 25px; }
tfoot { background-color: #EAEAEA;
        font-weight: bold;
        text-align: center; }
```

The HTML for the table is

```
<table>
<caption>Time Sheet</caption>
  <thead>
    <tr>
      <th id="day">Day</th>
      <th id="hours">Hours</th>
    </tr>
  </thead>
  <tbody>
    <tr>
      <td headers="day">Monday</td>
      <td headers="hours">4</td>
    </tr>
    <tr>
      <td headers="day">Tuesday</td>
      <td headers="hours">3</td>
    </tr>
    <tr>
      <td headers="day">Wednesday</td>
      <td headers="hours">5</td>
```

```
</tr>
<tr>
    <td headers="day">Thursday</td>
    <td headers="hours">3</td>
</tr>
<tr>
    <td headers="day">Friday</td>
    <td headers="hours">3</td>
</tr>
</tbody>
<tfoot>
    <tr>
        <td headers="day">Total</td>
        <td headers="hours">18</td>
    </tr>
</tfoot>
</table>
```

This example demonstrates the power of CSS in styling documents. The `<td>` tags within each table row group element selector (`thead`, `tbody`, and `tfoot`) inherited the font styles configured for their parent group element selector. Notice how a descendant selector configures the padding and border only for `<td>` tags that are contained within (actually, “children of”) the `<tbody>` element. Sample code is located in the student files (chapter8/tfoot.html). Take a few moments to explore the web page code and open the page in a browser.



## Checkpoint 8.2

1. Describe a reason to configure a table with CSS properties instead of HTML attributes.
2. List three elements that are used to group table rows.

# Chapter Summary

This chapter introduces both the HTML techniques used to code tables to organize information and the CSS properties that configure the display of tables on web pages. Visit the textbook website at <http://www.webdevfoundations.net> for examples, the links listed in this chapter, and updated information.

## Key Terms

- [`<caption>`](#)
- [`<table>`](#)
- [`<tbody>`](#)
- [`<td>`](#)
- [`<tfoot>`](#)
- [`<th>`](#)
- [`<thead>`](#)
- [`<tr>`](#)
- [`:first-child`](#)
- [`:first-of-type`](#)
- [`:last-child`](#)
- [`:last-of-type`](#)
- [`:nth\_of\_type`](#)

- [align attribute](#)
- [border attribute](#)
- [border-collapse property](#)
- [border-spacing property](#)
- [caption element](#)
- [caption-side property](#)
- [cell](#)
- [cellpadding attribute](#)
- [cellspacing attribute](#)
- [colspan attribute](#)
- [headers attribute](#)
- [rowspan attribute](#)
- [scope attribute](#)
- [structural pseudo-class selectors](#)
- [summary attribute](#)
- [table element](#)
- [table data element](#)
- [table header element](#)
- [table row element](#)
- [title attribute](#)

- [vertical-align property](#)
- [valign attribute](#)

# Review Questions

## Multiple Choice

1. Which HTML tag pair is used to specify table headings?
  1. <td> </td>
  2. <th> </th>
  3. <head> </head>
  4. <tr> </tr>
2. Which CSS property specifies the background color of a table?
  1. background
  2. bgcolor
  3. background-color
  4. table-color
3. Which HTML tag pair is used to group rows in the footer of a table?
  1. <footer> </footer>
  2. <tr> </tr>
  3. <tfoot> </tfoot>

4. <td> </td>
4. Which HTML element uses a border attribute to display a table with a border?
  1. <td>
  2. <tr>
  3. <table>
  4. <tableborder>
5. Which HTML attribute associates a table data cell with a table header cell?
  1. head
  2. align
  3. headers
  4. th
6. Which CSS property eliminates the space between the borders on table cells?
  1. border-style
  2. border-spacing
  3. padding
  4. cellspacing
7. Which HTML tag pair is used to begin and end a table row?
  1. <td> </td>

2. <tbody> </tbody>
  3. <table> </table>
  4. <tr> </tr>
8. Which of the following is the intended use of tables on web pages?
1. configuring the layout of an entire page
  2. organizing information
  3. forming hyperlinks
  4. configuring a resume
9. Which CSS property specifies the distance between the cell text and the cell border?
1. border-style
  2. padding
  3. border-spacing
  4. cellpadding
10. Which CSS pseudo-class applies to the first element of a specified type?
1. :first-of-type
  2. :first-type
  3. :first-child
  4. :first

## Fill in the Blank

11. The CSS \_\_\_\_\_ property can be used to configure the color and width of a table border.
12. The \_\_\_\_\_ CSS property specifies the vertical alignment of the contents of a cell in a table.
13. Use the \_\_\_\_\_ attribute to configure a table cell to occupy more than one row in the table.
14. \_\_\_\_\_ is an attribute of the td element that associates the table data cell with a table header cell.
15. Use the \_\_\_\_\_ element to provide a brief description of a table that displays on the web page.

## Apply Your Knowledge

1. Predict the Result. Draw and write a brief description of the web page that will be created with the following HTML code:

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>Predict the Result</title>
<meta charset="utf-8">
</head>
<body>
<table>
  <tr>
    <th>Year</th>
    <th>School</th>
    <th>Major</th>
  </tr>
  <tr>
    <td>2014-2018</td>
    <td>Schaumburg High School</td>
    <td>College Prep</td>
  </tr>
  <tr>
    <td>2018-2020</td>
    <td>Harper College</td>
```

```

        <td>Web Development Associates Degree</td>
    </tr>
</table>
</body>
</html>

```

2. Fill in the Missing Code. This web page should have a table with a background color of #cccccc and a border. Some CSS properties and values, indicated by "\_", are missing. Fill in the missing code.

```

<!DOCTYPE html>
<html lang="en">
<head>
<title>CircleSoft Web Design</title>
<meta charset="utf-8">
<style>
table { "": "": "": ""; }
      "": "": "": ""; }
</style>
</head>
<body>
<h1>CircleSoft Web Design</h1>
<table>
<caption>Contact Information</caption>
<tr>
<th>Name</th>
<th>Phone</th>
</tr>
<tr>
<td>Mike Circle</td>
<td>920-555-5555</td>
</tr>
</table>
</body>
</html>

```

3. Find the Error. Why doesn't the table information display in the order it was coded?

```

<!DOCTYPE html>
<html lang="en">
<head>
<title>CircleSoft Web Design</title>
<meta charset="utf-8">
</head>
<body>

```

```

<h1>CircleSoft Web Design</h1>
<table>
<caption>Contact Information</caption>
<tr>
    <th>Name</th>
    <th>Phone</th>
</tr>
<tr>
    <td>Mike Circle</td>
    <td>920-555-5555</td>
</tr>
</table>
</body>
</html>

```

## Hands-On Exercises

1. Write the HTML for a two-column table that contains the names of your friends and their birthdays. The first row of the table should span two columns and contain the following heading: Birthday List. Include at least two people in your table.
2. Write the HTML for a three-column table to describe the courses you are taking this semester. The columns should contain the course number, course name, and instructor name. The first row of the table should use `th` tags and contain descriptive headings for the columns. Use the table row grouping tags `<thead>` and `<tbody>` in your table.
3. Write the HTML for a table with three rows, two columns, and no border. The cell in the first column of each row will contain the name of one of your favorite movies. The corresponding cell in the second column of each row will contain a description of the movie. Configure alternating rows to use the background color `#CCCCCC`.
4. Use CSS to configure a table that has a border around both the entire table and the table cells. Write the HTML to create a table with three rows and two columns. The cell in the first column of each row will contain the name of one of your favorite movies. The corresponding cell in the second column of each row will contain a description of the

movie.

5. Modify the table you created in Hands-On Exercise 8.1 to be centered on the page, use a background color of #CCCC99, and display text in Arial or the browser default sans-serif font. Configure this table using CSS instead of obsolete HTML attributes. Place an e-mail link to yourself on the web page. Save the file as mytable.html.
6. Create a web page about your favorite sports team with a two-column table that lists the positions and starting players. Use embedded CSS to style the table border, background color, and center the table on the web page. Place an e-mail link to yourself on the web page. Save the file as sport8.html.
7. Create a web page about your favorite movie that uses a two-column table containing details about the movie. Use CSS to style the table border and background color. Include the following in the table:
  - Title of the movie
  - Director or producer
  - Leading actor
  - Leading actress
  - Rating (G, PG, PG-13, R, NC-17, NR)
  - A brief description of the movie
  - An absolute link to a review about the movie

Place an e-mail link to yourself on the web page. Save the page as movie8.html.

8. Create a web page about your favorite music album that uses a four-column table. The column headings should be as follows:
  - Group: Place the name of the group and the names of its principal

members in this column.

- Tracks: List the title of each music track or song.
- Year: List the year the album was recorded.
- Links: Place at least two absolute links to sites about the group in this column.

Include an e-mail link to yourself on the web page. Save the page as band8.html.

9. Create a web page about your favorite recipe. Organize the ingredients and directions in a single table. Use two columns for the ingredients. Use a row that spans two columns to contain the instructions for creating your culinary delight. Place an e-mail link to yourself on the web page. Save the page as recipe8.html.

## Web Research

1. Search the Web and find a web page configured with one or more HTML tables. Print the browser view of the page. Print out the source code of the web page. On the printout, highlight or circle the tags related to tables. On a separate sheet of paper, create some HTML notes by listing the tags and attributes related to tables found on your sample page, along with a brief description of their purpose. Hand in the browser view of the page, source code printout, and your HTML notes page to your instructor.

## Focus on Web Design

1. Good artists view and analyze many paintings. Good writers read and evaluate many books. Similarly, good web designers view and scrutinize many web pages. Search the Web and find two web pages, one that is appealing to you and one that is unappealing to you. Print out each page.

Create a web page that answers the following questions for each of your examples:

1. What is the URL of the website?
2. Does this page use tables? If so, for what purpose (page layout, organization of information, or another reason)?
3. Does this page use CSS? If so, for what purpose (page layout, text and color configuration, or another reason)?
4. Is this page appealing or unappealing? List three reasons for your answer.
5. If this page is unappealing, what would you do to improve it?



## WEBSITE CASE STUDY Using Tables

Each of the following case studies continues throughout most of the textbook. This chapter incorporates an HTML table in the case study websites.

### JavaJam Coffee House

See [Chapter 2](#) for an introduction to the JavaJam Coffee House case study. [Figure 2.31](#) shows a site map for JavaJam. Use either the [Chapter 7](#) or [Chapter 6](#) JavaJam website as a starting point for this case study. In this case study, you will modify the Menu page (menu.html) to display information in an HTML table. You will use CSS to style the table. You have three tasks in this case study:

1. Create a new folder for this JavaJam case study.
2. Modify the style sheet (javajam.css) to configure style rules for the new table.
3. Modify the Menu page to use a table to display information as shown in [Figure 8.13](#).

## Figure 8.13



Menu page with a table

[Figure 8.13 Full Alternative Text](#)

## Hands-On Practice Case Study

- Task 1: The Website Folder. Create a folder called javajam8. If you have skipped [Chapter 7](#), copy all the files from your [Chapter 6](#) javajam6 folder into the javajam8 folder. If you have completed [Chapter 7](#), copy all the files from your [Chapter 7](#) javajam7 folder into the javajam8 folder.
- Task 2: Configure the CSS. Modify the external style sheet (javajam.css). Open javajam.css in a text editor. Review [Figure 8.13](#) and note the menu descriptions, which are coded in an HTML table. Add style rules to the javajam.css external style sheet to configure a table that is centered, takes up 90% the width of its container, is configured with 0 border-spacing and a background color. Configure td and th selectors with 10 pixels of padding. Also configure a background color of #D2B48E in alternate rows (use a class or the :nth-of-type pseudo-class to configure odd table rows). Save the javajam.css file.
- Task 3: Modify the Menu Page. Open menu.html in a text editor. The menu descriptions are configured with a description list. Replace the description list with a table that has three rows and two columns. Use th and td elements where appropriate. Configure line breaks as needed for the pricing information. Save your page and test it in a browser. If the page does not display as you intended, review your work, validate the CSS, validate the HTML, modify as needed, and test again.

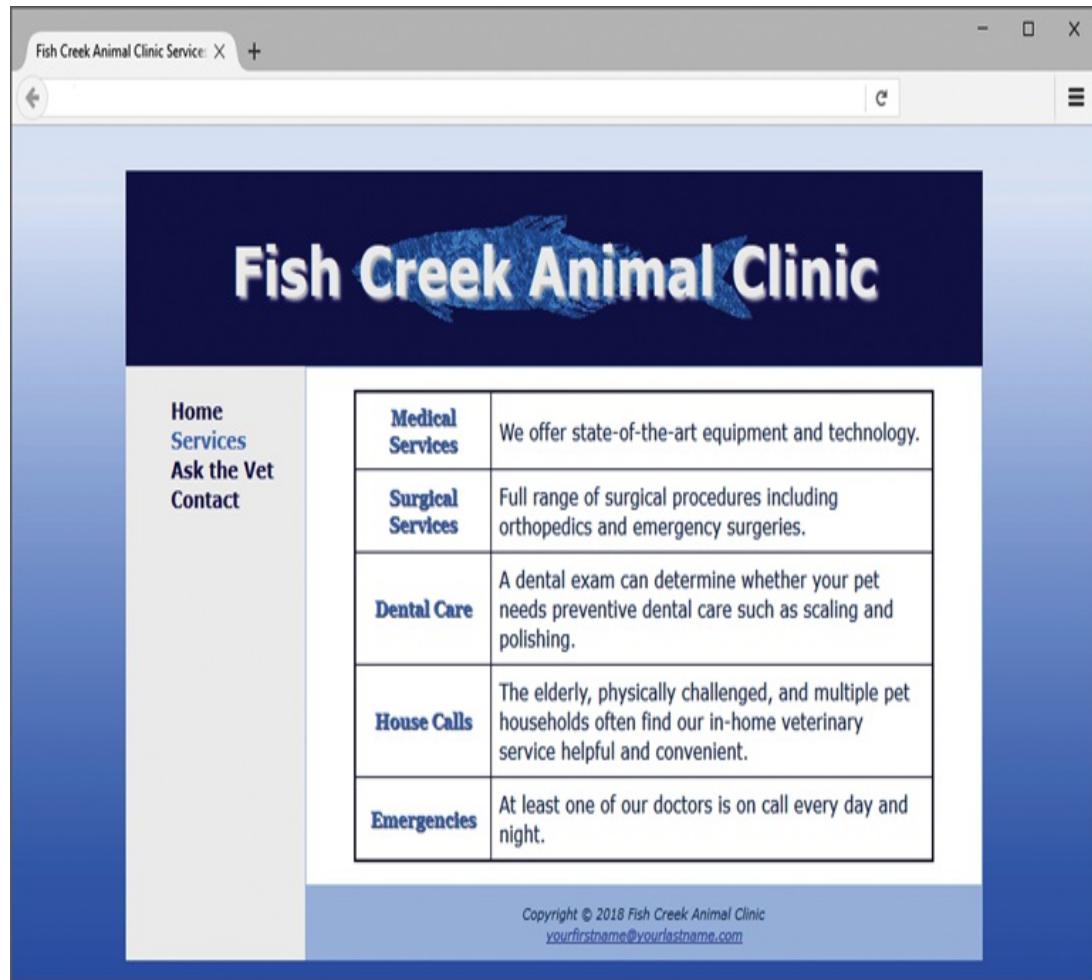
## Fish Creek Animal Clinic

See [Chapter 2](#) for an introduction to the Fish Creek Animal Clinic case study. [Figure 2.35](#) shows a site map for Fish Creek. Use either the [Chapter 7](#) or [Chapter 6](#) Fish Creek website as a starting point for this case study. You will modify the Services page (services.html) to display information in an HTML table. You will use CSS to style the table. You have three tasks in this case study:

1. Create a new folder for this Fish Creek case study.

2. Modify the style sheet (fishcreek.css) to configure style rules for the new table.
3. Modify the Services page to use a table to display information as shown in [Figure 8.14](#).

## Figure 8.14



Services page with a table

[Figure 8.14 Full Alternative Text](#)

## Hands-On Practice Case Study

- Task 1: The Website Folder. Create a folder called fishcreek8. If you have skipped [Chapter 7](#), copy all of the files from your [Chapter 6](#) fishcreek6 folder into the fishcreek8 folder. If you have completed [Chapter 7](#), copy all the files from your [Chapter 7](#) fishcreek7 folder into the fishcreek8 folder.
- Task 2: Configure the CSS. Modify the external style sheet (fishcreek.css). Open fishcreek.css in a text editor. Review [Figure 8.14](#) and note the services descriptions, which are coded in an HTML table. Add style rules to the fishcreek.css external style sheet as indicated:
  1. Configure a table that has a 1em margin and a dark blue, 2 pixel border.
  2. Configure the borders in the table to collapse (use border-collapse: collapse;).
  3. Configure td and th element selectors with 0.5em of padding and a dark blue 1 pixel border.

Save the fishcreek.css file.

- Task 3: Modify the Services Page. Open services.html in a text editor. The services descriptions are configured with an unordered list. Replace the unordered list with a table that has five rows and two columns. Use th and td elements where appropriate. *Hint:* Assign the th element to the category class. Save your page and test it in a browser. If the page does not display as you intended, review your work, validate the CSS, validate the HTML, modify as needed, and test again.

## Pacific Trails Resort

See [Chapter 2](#) for an introduction to the Pacific Trails Resort case study. [Figure 2.39](#) shows a site map for Pacific Trails. Use either the [Chapter 7](#) or [Chapter 6](#) Pacific Trails website as a starting point for this case study. You will modify the Yurts page (yurts.html) to display additional information in

an HTML table. You will use CSS to style the table. You have three tasks in this case study:

1. Create a new folder for this Pacific Trails case study.
2. Modify the style sheet (pacific.css) to configure style rules for the new table.
3. Modify the Yurts page to use a table to display information as shown in [Figure 8.15](#).

## **Figure 8.15**

Pacific Trails Resort :: Yurts

# Pacific Trails Resort

Home  
Yurts  
Activities  
Reservations



## The Yurts at Pacific Trails

**What is a yurt?**  
Our luxury yurts are permanent structures four feet off the ground. Each yurt has canvas walls, a wooden floor, and a roof dome that can be opened.

**How are the yurts furnished?**  
Each yurt is furnished with a queen-size bed with down quilt and gas-fired stove. Your luxury camping experience includes electricity and a sink with hot and cold running water. Shower and restroom facilities are located in the lodge.

**What should I bring?**  
Most guests pack comfortable walking shoes and plan to dress for changing weather with light layers of clothing. It's also helpful to bring a flashlight and a sense of adventure!

### Yurt Packages

A variety of luxury yurt packages are available. Choose a package below and contact us to begin your reservation. We're happy to build a custom package just for you!

Package Name	Description	Nights	Cost per Person
Weekend Escape	Two breakfasts, a trail map, a picnic snack	2	\$450
Zen Retreat	Four breakfasts, a trail map, a pass for daily yoga	4	\$600
Kayak Away	Two breakfasts, two hours of kayak rental daily, a trail map	2	\$500

Copyright © 2018 Pacific Trails Resort  
[yourfirstname@yourlastname.com](mailto:yourfirstname@yourlastname.com)

Yurts page with a table

Figure 8.15 Full Alternative Text

# Hands-On Practice Case Study

- Task 1: The Website Folder. Create a folder called pacific8. If you have skipped [Chapter 7](#), copy all the files from your [Chapter 6](#) pacific6 folder into the pacific8 folder. If you have completed [Chapter 7](#), copy all the files from your [Chapter 7](#) pacific7 folder into the pacific8 folder.
- Task 2: Configure the CSS. Modify the external style sheet (pacific.css). Open pacific.css in a text editor. Add styles to configure the table on the Yurts page as shown in [Figure 8.15](#).
  1. Configure the table. Code a new style rule for the table element selector that configures a centered table with a 1 pixel blue border (#3399CC) and 90% width. Also configure the borders in the table to collapse (use `border-collapse: collapse;`).
  2. Configure the table cells. Code a new style rule for the td and th element selectors that configure 5 pixels of padding and a 1 pixel blue border (#3399CC).
  3. Center the td content. Code a new style rule for the td element selector that centers text (use `text-align: center;`).
  4. Configure the text class. Notice that the content in the table data cells that contain the text description is not centered. Code a new style rule for a class named `text` that will override the td style rule and left-align the text (use `text-align: left;`).
  5. Configure alternate-row background color. The table looks more appealing if the rows have alternate background colors, but it is still readable without them. Apply the `:nth-of-type` CSS3 pseudo-class to configure the even table rows with a light-blue background color (#F5FAFC).
  6. Save the pacific.css file.
- Task 3: Modify the Yurts Page. Open yurts.html in a text editor.

- Configure an h3 element with the following text: “Yurt Packages” after the description list in the main element.
- Below the new h3 element, configure a paragraph with the following text:
  - A variety of luxury yurt packages are available. Choose a package below and contact us to begin your reservation. We’re happy to build a custom package just for you!
- You are ready to configure the table. Code a table below the paragraph with four rows and four columns. Use the table, th, and td elements. Assign the td elements that contain the detailed descriptions to the class named text. The content for the table is as follows.

<b>Package Name</b>	<b>Description</b>	<b>Nights</b>	<b>Cost per Person</b>
Weekend Escape	Two breakfasts, a trail map, a picnic snack	2	\$450
Zen Retreat	Four breakfasts, a trail map, a pass for daily yoga	4	\$600
Kayak Away	Two breakfasts, two hours of kayak rental daily, a trail map	2	\$500

Save your page and test it in a browser. If the page does not display as you intended, review your work, validate the CSS, validate the HTML, modify as needed, and test again.

# Path of Light Yoga Studio

See [Chapter 2](#) for an introduction to the Path of Light Yoga Studio case study. [Figure 2.43](#) shows a site map for Path of Light Yoga Studio. Use either the [Chapter 7](#) or [Chapter 6](#) Path of Light Yoga Studio website as a starting point for this case study. You will modify the Schedule page (schedule.html) to display the class schedule in an HTML table. You will use CSS to style the table. You have three tasks in this case study:

1. Create a new folder for this Path of Light Yoga Studio case study.
2. Modify the style sheet (yoga.css) to configure style rules for the new table.
3. Modify the Schedule page to use a table to display information as shown in [Figure 8.16](#).

## Figure 8.16

Path of Light Yoga Studio :: Schr X +

# Path of Light Yoga Studio

[Home](#)

[Classes](#)

[Schedule](#)

[Contact](#)

## Yoga Schedule

Mats, blocks, and blankets provided. Please arrive 10 minutes before your class begins. Relax in our Serenity Lounge before or after your class.

### Monday – Friday

Time	Class
9:00am	Gentle Hatha Yoga
10:30am	Vinyasa Yoga
5:30pm	Restorative Yoga
7:00pm	Gentle Hatha Yoga

### Saturday & Sunday

Time	Class
10:30am	Gentle Hatha Yoga
Noon	Vinyasa Yoga
1:30pm	Gentle Hatha Yoga
3:00pm	Vinyasa Yoga
5:30pm	Restorative Yoga

Copyright © 2018 Path of Light Yoga Studio  
[yourfirstname@yourlastname.com](mailto:yourfirstname@yourlastname.com)

Schedule page with tables

[Figure 8.16 Full Alternative Text](#)

## Hands-On Practice Case Study

- Task 1: The Website Folder. Create a folder called yoga8. If you have skipped [Chapter 7](#), copy all the files from your [Chapter 6](#) yoga6 folder into the yoga8 folder. If you have completed [Chapter 7](#), copy all the files from your [Chapter 7](#) yoga7 folder into the yoga8 folder.
- Task 2: Configure the CSS. Modify the external style sheet (yoga.css). Open yoga.css in a text editor. Review [Figure 8.16](#) and note the class schedule information, which is coded in two HTML tables. Add style rules to the yoga.css external style sheet to configure the following:
  1. A centered table with 60% width, a 1 pixel purple (#3F2860) border, collapsed borders (use border-collapse: collapse;), and a 1em bottom margin.
  2. A style for the td and th element selectors that configures 5 pixels of padding and a 1 pixel purple border (#3F2860).
  3. Configure alternate-row background color. The table looks more appealing if the rows have alternate background colors, but it is still readable without them. Apply the :nth-of-type CSS3 pseudo-class to configure the even table rows with a #9BC1C2 background color.
  4. A caption element selector with a 1em margin, bold text, and 120% font size.

Save the yoga.css file.

- Task 3: Modify the Schedule Page. Open schedule.html in a text editor. The schedule information currently uses the <h3>, <ul>, and <li> elements. You will rework the page to use two tables to display the

schedule information instead of the h3 and unordered list tags. Use a caption element within each table. Note that the table rows have two columns. Configure “Time” and “Class” table headings within each table. Refer to [Figure 8.16](#).

Save your page and test it in a browser. If the page does not display as you intended, review your work, validate the CSS, validate the HTML, modify as needed, and test again.

## Web Project

See [Chapters 5](#) and [6](#) for an introduction to the Web Project case study. You will modify the design of one of the pages to display information in an HTML table. Use CSS to style the table.

## Hands-On Practice Case Study

1. Choose one of your project web pages to modify. Sketch a design of the table you plan to create. Decide on borders, background color, padding, alignment, and so on.
2. Modify your project’s external CSS file (project.css) to configure the table (and table cells) as needed.
3. Update your chosen web page and add the HTML code for a table.

Save and test the page. Modify both the web page and the project.css file as needed. Test and modify until you have achieved the look you want.

# **9 Forms**

# Chapter Objectives

In this chapter, you will learn how to . . .

- Describe common uses of forms on web pages
- Create forms on web pages using the form, input, textarea, and select elements
- Create forms that provide additional accessibility features using the accesskey and tabindex attributes
- Associate form controls and groups using the label, fieldset, and legend elements
- Create custom image buttons and use the button element
- Use CSS to style a form
- Configure form controls new to HTML5, including the e-mail address, URL, datalist, range, spinner, calendar, and color controls
- Describe the features and common uses of server-side processing
- Invoke server-side processing to handle form data
- Find free server-side processing resources on the Web

Forms are used for many purposes all over the Web. They are used by search engines to accept keywords and by online stores to process e-commerce shopping carts. Websites use forms to help with a variety of functions, including accepting visitor feedback, encouraging visitors to send a news story to a friend or colleague, collecting e-mail addresses for a newsletter, and accepting order information. This chapter introduces a very powerful tool for web developers—forms that accept information from web page visitors.

# 9.1 Overview of Forms

Every time you use a search engine, place an order, or join an online mailing list, you use a form. A form is an HTML element that contains and organizes objects called form controls, including text boxes, check boxes, and buttons, that can accept information from website visitors.

For example, you may have used Google's search form (<http://www.google.com>) many times but never thought about how it works. The form is quite simple; it contains just three form controls: the text box that accepts the keywords used in the search and two search buttons. The "Google Search" button submits the form and invokes a process to search the Google databases and display a results page. The whimsical "I'm Feeling Lucky" button submits the form and displays the top page for your keywords.

[Figure 9.1](#) shows a form that is used to enter shipping information. This form contains text boxes to accept information such as name and address. Select lists (sometimes called drop-down boxes) are used to capture information with a limited number of correct values, such as state and country information.

## Figure 9.1

**Shipping Address**

Name:

Address Line 1:

Address Line 2:

City:

State:  Zip:

Country:

This form accepts shipping information

#### Figure 9.1 Full Alternative Text

When a visitor clicks the continue button, the form information is submitted and the ordering process continues.

Whether a form is used to search for web pages or to order a publication, the form alone cannot do all of the processing. The form needs to invoke a program or script on the web server in order to search a database or record an order. There are usually two components of a form:

1. The HTML form itself, which is the web page user interface
2. The server-side processing, which works with the form data and sends e-mail, writes to a text file, updates a database, or performs some other type of processing on the server

# Form Element

Now that you have a basic understanding of what forms do, let's focus on the HTML code to create a form. The **form element** contains a form on a web page. The `<form>` tag specifies the beginning of a form area. The closing `</form>` tag specifies the end of a form area. There can be multiple forms on a web page, but they cannot be nested inside one another. The form element can be configured with attributes that specify which server-side program or file will process the form, how the form information will be sent to the server, and the name of the form. These attributes are listed in [Table 9.1](#).

## Table 9.1 Attributes of the form element

Attribute	Value	Purpose
action	URL or file name/path of server-side processing script	Required; indicates where to send the form information when the form is submitted; mailto:e-mailaddress will launch the visitor's default e-mail application to send the form information
autocomplete	on off	HTML5 attribute; default value; browser will use autocomplete to fill form fields  HTML5 attribute; browser will not use autocomplete to fill form

	fields
<code>id</code>	Alphanumeric, no spaces; the value must be unique and not used for other id values on the same web page document
<code>method</code>	<p>get post</p> <p>Default value; the value of get causes the form data to be appended to the URL and sent to the web server</p> <p>The post method is more private and transmits the form data in the body of the HTTP response; this method is preferred by the W3C</p>
<code>name</code>	Alphanumeric, no spaces, begins with a letter; choose a form name value that is descriptive but short (for example, OrderForm is better than Form1 or WidgetsRUsOrderForm) Optional; names the form so that it can be easily accessed by client-side scripting languages to edit and verify the form information before the server-side processing is invoked

For example, to configure a form with the name attribute set to the value “order”, using the post method and invoking a script called `demo.php` on your web server, the code is

```
<form name="order" method="post" id="order" action="demo.php">  
. . . form controls go here . . .  
</form>
```

# Form Controls

The purpose of a form is to gather information from a web page visitor. Form controls are the objects that accept the information. Types of form controls include text boxes, scrolling text boxes, select lists, radio buttons, check boxes, and buttons. HTML5 offers new form controls, including those that are customized for e-mail addresses, URLs, dates, times, numbers, and even date selection. HTML elements that configure form controls will be introduced in the following sections.

## 9.2 Input Element Form Controls

The input element is a stand-alone, or void, tag that is used to configure several different types of form controls. The input element is not coded as a pair of opening and closing tags. Use the type attribute to specify the type of form control that the browser should display.

### Text Box

The <input> tag with type="text" configures a text box form control. The text box form control accepts text or numeric information such as names, e-mail addresses, phone numbers, and other text. Common input element attributes for text boxes are listed in [Table 9.2](#). A text box is shown in [Figure 9.2](#).

**Table 9.2 Common text box attributes**

Attribute	Value	Purpose
type	text	Configures a text box
name	Alphanumeric, no spaces, begins with a letter	Names the form element so that it can be easily accessed by client-side scripting languages or by server-side processing; the name should be unique

<code>id</code>	Alphanumeric, no spaces, begins with a letter	Provides a unique identifier for the form element
<code>size</code>	Numeric value	Configures the width of the text box as displayed by the browser; if size is omitted, the browser displays the text box with its own default size
<code>maxlength</code>	Numeric value	Configures the maximum length of data accepted by the text box
<code>value</code>	Text or numeric characters	Assigns an initial value to the text box that is displayed by the browser; accepts information typed in the text box; this value can be accessed by client-side scripting languages and by server-side processing
<code>disabled</code>	<code>disabled</code>	Form control is disabled
<code>readonly</code>	<code>readonly</code>	Form control is for display; cannot be edited
<code>autocomplete</code>	<code>on</code> <code>off</code>	HTML5 attribute; default; browser will use autocomplete to fill the form control  HTML5 attribute; browser will not use autocomplete to fill the form

		control
autofocus	autofocus	HTML5 attribute; browser places cursor in the form control and sets the focus
list	Datalist element id value	HTML5 attribute; associates the form control with a datalist element
placeholder	Text or numeric characters	HTML5 attribute; brief information intended to assist the user
required	required	HTML5 attribute; browser verifies entry of information before submitting the form
accesskey	Keyboard character	Configures a hot key for the form control
tabindex	Numeric value	Configures the tab order of the form control

**Figure 9.2**

## Sample Text Box

E-mail:

The <input> tag with type="text" configures this form element

### Figure 9.2 Full Alternative Text

The code for the text box is shown below:

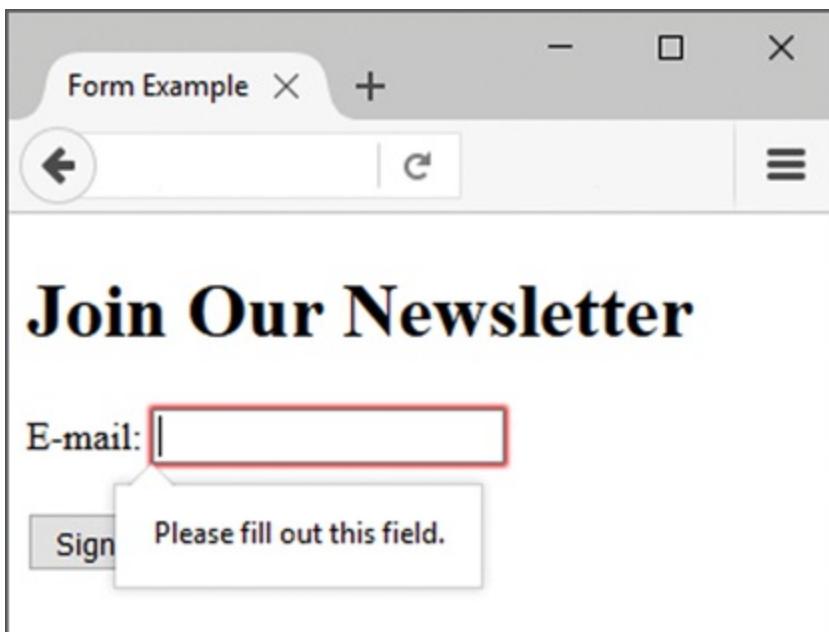
```
E-mail: <input type="text" name="email" id="email">
```

Several attributes are new in HTML5. The new **required attribute** is exciting because it will cause supporting browsers to perform form validation. Browsers that support the HTML5 required attribute will automatically verify that information has been entered in the text box and display an error message when the condition is not met. A code sample is

```
E-mail: <input type="text" name="email" id="email"  
required="required">
```

[Figure 9.3](#) shows an error message automatically generated by Firefox that is displayed after the user clicked the form's submit button without entering information in the required text box. Browsers that do not support HTML5 or the required attribute will ignore the attribute.

## Figure 9.3



The Firefox browser displayed an error message

[Figure 9.3 Full Alternative Text](#)

Although web designers are enthusiastic about the required attribute and other new form-processing functions offered by HTML5, it will be some time before all browsers support these new features. In the meantime, be aware that verification and validation of form information also must be done the old-fashioned way—with client-side or server-side scripting.



## FAQ

1. Why use both the name and id attributes on form controls?

The name **attribute** names the form element so that it can be easily accessed by client-side scripting languages such as JavaScript and by server-side processing languages such as PHP. The value given to a name attribute for a form element should be unique for that form. The **id** attribute is included for use with CSS and access by client-side scripting

languages such as JavaScript. The value of the `id` attribute should be unique to the entire web page document that contains the form.

Typically, the values assigned to the `name` and `id` attributes on a particular form element are the same.

## Submit Button

The submit button form control is used to submit the form. When clicked, it triggers the action method on the form element and causes the browser to send the form data (the name and value pairs for each form control) to the web server. The web server will invoke the server-side processing program or script listed on the form's action property.

The input element with `type="submit"` configures a submit button. For example,

```
<input type="submit">
```

## Reset Button

The reset button form control is used to reset the form fields to their initial values. A reset button does not submit the form.

The input element with `type="reset"` configures a reset button. For example,

```
<input type="reset">
```

A form with a text box, a submit button, and a reset button is shown in [Figure 9.4](#).

## Figure 9.4

## Sample Form

E-mail:

This form contains a text box, a submit button, and a reset button

[Figure 9.4 Full Alternative Text](#)

Common attributes for submit buttons and reset buttons are listed in [Table 9.3](#).

## Table 9.3 Common attributes for submit and reset buttons

Attribute	Value	Purpose
type	submit reset	Configures a submit button Configures a reset button
name	Alphanumeric, no spaces, begins with a letter	Names the form element so that it can be easily accessed by client-side scripting languages (such as JavaScript) or by server-side processing; the name should be unique
	Alphanumeric,	

<code>id</code>	no spaces, begins with a letter	Provides a unique identifier for the form element
<code>value</code>	Text or numeric characters	Configures the text displayed on the button; a submit button displays the text “Submit Query” by default; a reset button displays “Reset” by default
<code>accesskey</code>	Keyboard character	Configures a hot key for the form control
<code>tabindex</code>	Numeric value	Configures the tab order of the form control



## Hands-On Practice 9.1

You will code a form in this Hands-On Practice. To get started, launch a text editor and open chapter2/template.html in the student files. Save the file as form1.html. You will create a web page with a form similar to the example in [Figure 9.5](#).

## Figure 9.5

The screenshot shows a web browser window with a title bar labeled "Form Example". Below the title bar is a toolbar with standard icons for back, forward, and refresh. The main content area contains the text "Join Our Newsletter" in a large, bold, dark font. Below this, there is a label "E-mail:" followed by an empty text input field. At the bottom of the form are two buttons: "Sign Me Up!" and "Reset".

The text on the submit button says “Sign Me Up!”

[Figure 9.5 Full Alternative Text](#)

1. Modify the title element to display the text “Form Example”.
2. Configure an h1 element with the text “Join Our Newsletter”.

You are ready to configure the form area. A form begins with the `<form>` element. Insert a blank line under the heading you just added and type in a `<form>` tag as follows:

```
<form method="get">
```

In your first form, we are using the minimal HTML needed to create the form; we'll begin working with the `action` attribute later in the chapter.

3. To create the form control for the visitor's e-mail address to be entered, type the following code on a blank line below the `form` element:

```
E-mail: <input type="text" name="email" id="email"><br><br>
```

This places the text “E-mail:” in front of the text box used to enter the visitor's e-mail address. The `input` element has a `type` attribute with the

value of text that causes the browser to display a text box. The `name` attribute assigns the name `e-mail` to the information entered into the text box (the `value`) and could be used by server-side processing. The `id` attribute uniquely identifies the element on the page. The `<br>` elements configure line breaks.

4. Now you are ready to add the submit button to the form on the next line. Add a `value` attribute set to “Sign Me Up!”:

```
<input type="submit" value="Sign Me Up!">
```

This causes the browser to display a button with “Sign Me Up!” instead of the default value of “Submit Query”.

5. Add a blank space after the submit button and code a reset button:

```
<input type="reset">
```

6. Next, code the closing form tag:

```
</form>
```

Save `form1.html` and test your web page in a browser. It should look similar to the page shown in [Figure 9.5](#).

You can compare your work with the solution found in the student files (`chapter9/9.1/form.html`). Try entering some information into your form. Try clicking the submit button. Don’t worry if the form redisplays but nothing seems to happen when you click the button—you haven’t configured this form to work with any server-side processing. Connecting forms to server-side processing is demonstrated later in this chapter. The next sections will introduce you to more form controls.

## Check Box

The check box form control allows the user to select one or more of a group of predetermined items. The `input` element with `type="checkbox"` configures

a check box. Common check box attributes are listed in [Table 9.4](#).

## Table 9.4 Common check box attributes

Attribute	Value	Purpose
type	checkbox	Configures a check box
name	Alphanumeric, no spaces, begins with a letter	Names the form element so that it can be easily accessed by client-side scripting languages (such as JavaScript) or by server-side processing; the name should be unique
id	Alphanumeric, no spaces, begins with a letter	Provides a unique identifier for the form element
checked	checked	Configures the check box to be checked by default when displayed by the browser
value	Text or numeric characters	Assigns a value to the check box that is triggered when the check box is checked; this value can be accessed by client-side and server-side processing

disabled	disabled	Form control is disabled
readonly	readonly	Form control is for display; cannot be edited
autofocus	autofocus	HTML5 attribute; browser places cursor in the form control and sets the focus
required	required	HTML5 attribute; browser verifies entry of information before submitting the form
accesskey	Keyboard character	Configures a hot key for the form control
tabindex	Numeric value	Configures the tab order of the form control

[Figure 9.6](#) shows an example with several check boxes. Note that more than one check box can be selected by the user. The HTML is

## Figure 9.6

## Sample Check Box

Choose the browsers you use:

- Google Chrome
- Firefox
- Microsoft Edge

Sample check box

[Figure 9.6 Full Alternative Text](#)

```
Choose the browsers you use: <br>
<input type="checkbox" name="GO" id="GO" value="yes"> Google Chro
<input type="checkbox" name="Firefox" id="Firefox" value="yes"> F
<input type="checkbox" name="Edge" id="Edge" value="yes"> Microso
```

## Radio Button

The radio button form control allows the user to select exactly one (and only one) choice from a group of predetermined items. Each radio button in a group is given the same name attribute and a unique value attribute. Because the name attribute is the same, the elements are identified as part of a group by the browsers and only one may be selected.

The input element with type="radio" configures a radio button. [Figure 9.7](#) shows an example with a radio button group. Note that only one radio button can be selected at a time by the user. Common radio button attributes are listed in [Table 9.5](#). The HTML is

## Figure 9.7

## Sample Radio Button

Select your favorite browser:

- Google Chrome
- Firefox
- Microsoft Edge

Use radio buttons when only one choice is an appropriate response

[Figure 9.7 Full Alternative Text](#)

## Table 9.5 Common radio button attributes

Attribute	Value	Purpose
type	radio	Configures a radio button
name	Alphanumeric, no spaces, begins with a letter	Names the form element so that it can be easily accessed by client-side scripting languages or by server-side processing
id	Alphanumeric, no spaces, begins with a letter	Provides a unique identifier for the form element

	<code>checked</code>	<code>checked</code>	Configures the radio button to be selected by default when displayed by the browser
<code>value</code>	Text or numeric characters		Assigns a value to the radio button that is triggered when the radio button is selected; this should be a unique value for each radio button in a group
	<code>disabled</code>	<code>disabled</code>	Form control is disabled
	<code>readonly</code>	<code>readonly</code>	Form control is for display; cannot be edited
	<code>autofocus</code>	<code>autofocus</code>	HTML5 attribute; browser places cursor in the form control and sets the focus
	<code>required</code>	<code>required</code>	HTML5 attribute; browser verifies entry of information before submitting the form
<code>accesskey</code>	Keyboard character		Configures a hot key for the form control
<code>tabindex</code>	Numeric value		Configures the tab order of the form control

Select your favorite browser:<br>

```
<input type="radio" name="favbrowser" id="favGO" value="GO"> Goog  
<input type="radio" name="favbrowser" id="favFirefox" value="Fire  
<input type="radio" name="favbrowser" id="favEdge" value="Edge">
```

Notice that all the name attributes have the same value: favbrowser. Radio buttons with the same name attribute are treated as a group by the browser. Each radio button in the same group can be uniquely identified by its value attribute. Common radio button attributes are listed in [Table 9.5](#).

## Hidden Input Control

The hidden input control stores text or numeric information, but it is not visible in the browser viewport. Hidden controls can be accessed by both client-side scripting and server-side processing.

The input element with type="hidden" configures a hidden input control. Common attributes for hidden input controls are listed in [Table 9.6](#). The HTML to create a hidden input control with the name attribute set to "sendto" and the value attribute set to an e-mail address is

## Table 9.6 Common hidden input control attributes

Attribute	Value	Purpose
type	hidden	Configures a hidden element
name	Alphanumeric, no spaces, begins with a letter	Names the form element so that it can be easily accessed by client-side scripting languages or by server-side processing; the name should be unique

	Alphanumeric, no spaces, begins with a letter	Provides a unique identifier for the form element
id		
value	Text or numeric characters	Assigns a value to the hidden control; this value can be accessed by client-side scripting languages and server-side processing

disabled disabled      Form control is disabled

```
<input type="hidden" name="sendto" id="sendto" value="order@site.
```

## Password Box

The password box form control is similar to the text box, but it is used to accept information that must be hidden as it is entered, such as a password.

The input element with type="password" configures a password box. When the user types information in a password box, asterisks (or another symbol, depending on the browser) are displayed instead of the characters that have been typed, as shown in [Figure 9.8](#). This hides the information from someone looking over the shoulder of the person typing. The actual characters typed are sent to the server and the information is not really secret or hidden. See [Chapter 12](#) for a discussion of encryption and security.

## Figure 9.8

## Sample Password Box

Password:

The characters secret9 were typed, but the browser does not display them. (Note: Your browser may use a different symbol, such as a stylized circle, to hide the characters.)

[Figure 9.8 Full Alternative Text](#)

A password box is a specialized text box. See [Table 9.2](#) for a list of text box attributes.

The HTML is

```
Password: <input type="password" name="pword" id="pword">
```

## 9.3 Scrolling Text Box

### Textarea Element

The scrolling text box form control accepts free-form comments, questions, or descriptions. The textarea element configures a scrolling text box. The <textarea> tag denotes the beginning of the scrolling text box. The closing </textarea> tag denotes the end of the scrolling text box. Text contained between the tags will display in the scrolling text box area. A sample scrolling text box is shown in [Figure 9.9](#).

**Figure 9.9**

### Sample Scrolling Text Box

Comments:

Enter comments

Scrolling text box

[Figure 9.9 Full Alternative Text](#)

Common attributes for scrolling text boxes are listed in [Table 9.7](#). The HTML is

**Table 9.7 Common scrolling**

# text box attributes

Attribute	Value	Purpose
name	Alphanumeric, no spaces, begins with a letter	Names the form element so that it can be easily accessed by client-side scripting languages or by server-side processing; the name should be unique
id	Alphanumeric, no spaces, begins with a letter	Provides a unique identifier for the form element
cols	Numeric value	Required; configures the width in character columns of the scrolling text box; if cols is omitted, the browser displays the scrolling text box with its own default width
rows	Numeric value	Required; configures the height in rows of the scrolling text box; if rows value is omitted, the browser displays the scrolling text box with its own default height
maxlength	Numeric value	Configures the maximum length of data accepted by the text box

<code>disabled</code>	<code>disabled</code>	Form control is disabled
<code>readonly</code>	<code>readonly</code>	Form control is for display; cannot be edited
<code>autofocus</code>	<code>autofocus</code>	HTML5 attribute; browser places cursor in the form control and sets the focus
<code>placeholder</code>	Text or numeric characters	HTML5 attribute; brief information intended to assist the user
<code>required</code>	<code>required</code>	HTML5 attribute; browser verifies entry of information before submitting the form
<code>wrap</code>	hard or soft	HTML5 attribute; configures line breaks within the information entered
<code>accesskey</code>	Keyboard character	Configures a hot key for the form control
<code>tabindex</code>	Numeric value	Configures the tab order of the form control

Comments:<br><textarea name="comments" id="comments" cols="40" rows="2"> Enter



## Hands-On Practice 9.2

In this Hands-On Practice, you will create a contact form (see [Figure 9.10](#)) with the following form controls: a First Name text box, a Last Name text box, an E-mail text box, and a Comments scrolling text box. You'll use the form you created in [Hands-On Practice 9.1](#) (see [Figure 9.5](#)) as a starting point. Launch a text editor and open chapter9/9.1/form.html in the student files. Save the file as form2.html.

### Figure 9.10

The screenshot shows a window titled "Contact Form". Inside, there's a heading "Contact Us". Below it are four input fields: "First Name:" with a text box, "Last Name:" with a text box, "E-mail:" with a text box, and "Comments:" with a scrollable text area. At the bottom are two buttons: "Contact" and "Reset".

A typical contact form

## Figure 9.10 Full Alternative Text

1. Modify the title element to display the text “Contact Form”.
2. Configure the h1 element with the text “Contact Us”.
3. A form control for the e-mail address is already coded. Refer to [Figure 9.10](#) and note that you’ll need to add text box form controls for the first name and last name above the e-mail form control. Add the following code on new lines below the opening form tag to accept the name of your web page visitor:

```
First Name: <input type="text" name="fname" id="fname"><br><b>
Last Name: <input type="text" name="lname" id="lname"><br><br>
```

4. Now you are ready to add the scrolling text box form control to the form using a `<textarea>` tag on a new line below the e-mail form control. The code is

```
Comments:<br>
<textarea name="comments" id="comments"></textarea><br><br>
```

5. Save your file and display your web page in a browser to view the default display of a scrolling text box. Note that this default display will differ by browser.
6. Let’s configure the `rows` and `cols` attributes for the scrolling text box form control. Modify the `<textarea>` tag and set `rows="4"` and `cols="40"` as follows:

```
Comments:<br>
<textarea name="comments" id="comments" rows="4" cols="40"></
```

7. Next, modify the text displayed on the submit button. Set the value attribute to “Contact”. Save `form2.html` and test your web page in a browser. It should look similar to the page shown in [Figure 9.10](#).

You can compare your work with the solution found in the student files (chapter9/9.2/form.html). Try entering some information into your form. Try clicking the submit button. Don’t worry if the form redisplays but nothing

seems to happen when you click the button—you haven't configured this form to work with any server-side processing. Connecting forms to server-side processing is demonstrated later in this chapter.



## FAQ

### 1. How can I send form information in an e-mail?

Forms usually need to invoke some type of server-side processing to perform functions such as sending e-mail, writing to text files, updating databases, and so on. Another option is to set up a form to send information using the e-mail program configured to work with the web page visitor's browser. In what is sometimes called using a mailto: URL, the `<form>` tag is coded to use your e-mail address in the action attribute:

```
<form method="post" action="mailto:me@webdevfoundations.net">
```

When a form is used in this manner, the web visitor will see a warning message. The warning message presents a nonprofessional image and is not the best way to inspire trust and confidence in your website or business.

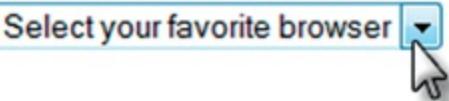
Be aware that a person using a computer may choose to not use the default e-mail application. In this case, filling out a form that uses mailto: URL is a waste of their time. Even if the person using the computer also uses the default e-mail application, perhaps he or she may not want to divulge this particular e-mail address. Perhaps they have another e-mail address that is used for forms and newsletters, and do not want to waste time filling out your form. In either case, the result is an unhappy website visitor. So, while using mailto: URL is easy, it does not always create the most usable web form for your visitors. What's a web developer to do? Use server-side processing (see [Hands-On Practice9.5.](#)) to handle form data instead of mailto: URL.

## 9.4 Select List

The select list form control shown in [Figures 9.11](#) and [9.12](#) is also known by several other names, including select box, drop-down list, drop-down box, and option box. A select list is configured with one select element and multiple option elements.

### Figure 9.11

#### Select List: One Initial Visible Item

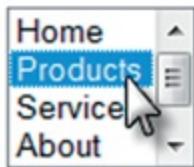


A select list with size set to 1 functions as a drop-down box when the arrow is clicked

[Figure 9.11 Full Alternative Text](#)

### Figure 9.12

#### Select List: Four Items Visible



Because there are more than four choices, the browser displays a

scroll bar

[Figure 9.12 Full Alternative Text](#)

## Select Element

The select element contains and configures the select list form control. The `<select>` tag denotes the beginning of the select list. The closing `</select>` tag denotes the end of the select list. Attributes configure the number of options to display and whether more than one option item may be selected. Common attributes for select elements are listed in [Table 9.8](#).

### Table 9.8 Common select element attributes

Attribute	Value	Purpose
<code>name</code>	Alphanumeric, no spaces, begins with a letter	Names the form element so that it can be easily accessed by client-side scripting languages or by server-side processing; the name should be unique
<code>id</code>	Alphanumeric, no spaces, begins with a letter	Provides a unique identifier for the form element
		Configures the number of choices the browser will display; if set to 1, the

<code>size</code>	Numeric value element functions as a drop-down list (see <a href="#">Figure 9.12</a> ); scroll bars are automatically added by the browser if the number of options exceeds the space allowed
<code>multiple</code>	Configures a select list to accept more than one choice; by default, only one choice can be made from a select list
<code>disabled</code>	Form control is disabled
<code>tabindex</code>	Numeric value Configures the tab order of the form control

## Option Element

The option element contains and configures an option item displayed in the select list form control. The `<option>` tag denotes the beginning of the option item. The closing `</option>` tag denotes the end of the option item. Attributes configure the value of the option and whether they are preselected. Common attributes for option elements are listed in [Table 9.9](#).

## Table 9.9 Common option element attributes

Attribute	Value	Purpose
-----------	-------	---------

<b>value</b>	Text or numeric characters	Assigns a value to the option; this value can be accessed by client-side and server-side processing
<b>selected</b>	<b>selected</b>	Configures an option to be initially selected when displayed by a browser
<b>disabled</b>	<b>disabled</b>	Form control is disabled

The HTML for the select list in [Figure 9.11](#) is

```
<select size="1" name="favbrowser" id="favbrowser">
  <option>Select your favorite browser</option>
  <option value="Edge">Edge</option>
  <option value="Firefox">Firefox</option>
  <option value="Chrome">Chrome</option>
</select>
```

The HTML for the select list in [Figure 9.12](#) is

```
<select size="4" name="jumpmenu" id="jumpmenu">
  <option value="index.html">Home</option>
  <option value="products.html">Products</option>
  <option value="services.html">Services</option>
  <option value="about.html">About</option>
  <option value="contact.html">Contact</option>
</select>
```



## FAQ

1. How does the menu in [Figure 9.12](#) display the selected page?

Well, it doesn't work, yet. It needs JavaScript (see Chapter 14) to check for the selected item and direct the browser to display the new

document. Because it requires JavaScript to work, this type of menu would not be a good choice for your main navigation, but it might be useful for a secondary navigation area.



## Checkpoint 9.1

1. You are designing a website for a client who sells items in a retail store. They want to create a customer list for e-mail marketing purposes. Your client sells to consumers and needs a form that accepts a customer's name and e-mail address. Would you recommend using two input boxes (one for the name and one for the e-mail) or three input boxes (one each for the first name, last name, and e-mail address)? Explain your answer.
2. A question on a survey asks participants to indicate their favorite browsers. Most people will select more than one response. What type of form control would you use to configure this question on the web page? Explain your answer.
3. True or False? In a radio button group, the `value` **attribute** is used by the browser to process the separate radio buttons as a group.

## 9.5 Image Buttons and the Button Element

As you have worked with forms in this chapter, you may have noticed that the standard submit button (see [Figure 9.10](#)) is a little plain. You can make the form control that visitors select to submit the form a bit more compelling and visually interesting in two ways:

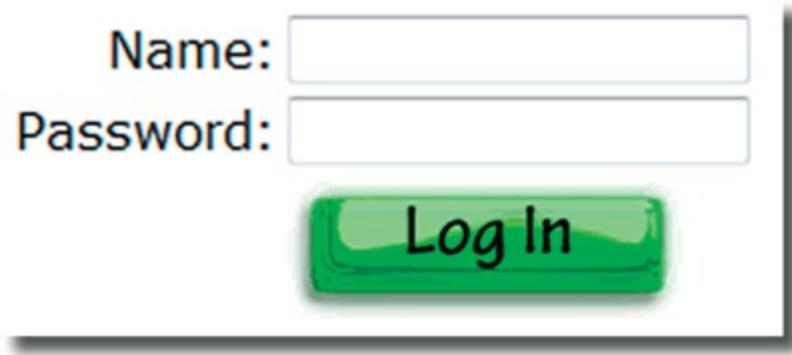
1. Configure an image with the input element.
2. Create a custom image that is configured with the button element.

### Image Button

[Figure 9.13](#) shows an image used in place of the standard submit button. This is called an **image button**. When an image button is clicked or tapped, the form is submitted. The image button is coded using the `<input>` tag along with `type="image"` and a `src` attribute with the value of the name of the image file. For example, to use the image called login.gif as an image button, the HTML code is

```
<input type="image" src="login.gif" alt="Login Button">
```

### Figure 9.13



The web page visitor will select the image button to submit the form

[Figure 9.13 Full Alternative Text](#)

## Button Element

Another way to add more interest to a form is to use the button element, which can be used to configure not only images but also blocks of text as the selectable area that can submit or reset a form. Any web page content that is between the `<button>` and `</button>` tags is configured to be part of the button. Common attributes for button elements are listed in [Table 9.10](#).

## Table 9.10 Common button element attributes

Common Attributes	Values	Purpose
type	submit reset	Functions as a submit button Functions as a reset button

		Functions as a button
button		
name	Alphanumeric, no spaces, begins with a letter	Names the form element so that it can be easily accessed by client-side scripting languages or by server-side processing; the name should be unique
id	Alphanumeric, no spaces, begins with a letter	Provides a unique identifier for the form element
alt	Brief text description of the image	Provides accessibility to visitors who are unable to view the image
value	Text or numeric characters	A value given to a form element that is passed to the form handler

[Figure 9.14](#) shows a form that has an image (signup.gif) configured as a submit button using the button element.

## Figure 9.14



The button element configured as a submit button

[Figure 9.14 Full Alternative Text](#)

The following HTML code creates the button shown in [Figure 9.14](#):

```
<button type="submit">

```

As you visit web pages and view their source code, you will find that the button element is not used as often as the standard submit button or the image button.

# 9.6 Accessibility and Forms



**Focus on  
Accessibility**

In this section, you'll explore techniques to increase the accessibility of form controls, including the label element, fieldset element, legend element, tabindex attribute, and accesskey attribute, which make it easier for individuals with vision and mobility challenges to use your form pages. The use of label, fieldset, and legend elements may increase the readability and usability of the web form for all visitors.

## Label Element



**Focus on  
Accessibility**

The label element is a container tag that associates a text description with a form control. This is helpful to visually challenged individuals who are using assistive technology such as a screen reader to match up the text descriptions on forms with their corresponding form controls. The label element also benefits individuals who have difficulty with fine motor control. Clicking anywhere on either a form control or its associated text label will set the cursor focus to the form control. The `<label>` tag specifies the beginning of the label. The closing `</label>` tag specifies the end of the label.

There are two different methods to associate a label with a form control.

1. The first method places the label element as a container around both the

text description and the HTML form element. Notice that both the text label and the form control must be adjacent elements. The code is

```
<label>E-mail: <input type="text" name="email" id="email"></label>
```

2. The second method uses the `for` attribute to associate the label with a particular HTML form element. This is more flexible and does not require the text label and the form control to be adjacent. The code is

```
<label for="email">E-mail: </label>
<input type="text" name="email" id="email">
```

Notice that the value of the `for` attribute on the label element is the same as the value of the `id` attribute on the input element. This creates the association between the text label and the form control. The input element uses both the `name` and `id` attributes for different purposes. The `name` attribute can be used by client-side scripting and server-side processing. The `id` attribute creates an identifier that can be used by the label element, anchor element, and CSS selectors. The label element does not display on the web page—it works behind the scenes to provide for accessibility.



## Hands-On Practice 9.3

In this Hands-On Practice, you will add the label element to the text box and scrolling text area form controls on the form you created in [Hands-On Practice 9.2](#) (see [Figure 9.10](#)) as a starting point. Launch a text editor and open chapter9/9.2/form.html in the student files. Save the file as form3.html.

1. Locate the text box for the first name. Add a label element to wrap around the input tag as follows:

```
<label>First Name: <input type="text" name="fname" id="fname">
```

2. In a similar manner, add a label element for the last name and the e-mail form controls.

3. Configure a label element to contain the text “Comments”. Associate the label with the scrolling text box form control. The sample code is

```
<label for="comments">Comments:</label><br>
<textarea name="comments" id="comments" rows="4" cols="40"></
```

Save form3.html and test your web page in a browser. It should look similar to the page shown in [Figure 9.10](#)—the label elements do not change the way that the page displays, but a web visitor with physical challenges should find the form easier to use.

You can compare your work with the solution found in the student files (chapter9/9.3/form.html). Try entering some information into your form. Try clicking the submit button. Don’t worry if the form redisplays but nothing seems to happen when you click the button—you haven’t configured this form to work with any server-side processing. Connecting forms to server-side processing is demonstrated later in this chapter.

## Fieldset and Legend Elements

A technique that can be used to create a more visually pleasing form is to group elements of a similar purpose together using the fieldset element, which will cause the browser to render a visual cue, such as an outline or a border, around form elements grouped together within the fieldset. The `<fieldset>` tag denotes the beginning of the grouping. The closing `</fieldset>` tag denotes the end of the grouping.

The legend element provides a text description for the fieldset grouping. The `<legend>` tag denotes the beginning of the text description. The closing `</legend>` tag denotes the end of the text description. The HTML to create the grouping shown in [Figure 9.15](#) is

## Figure 9.15

## Fieldset and Legend

Billing Address

Street:

City:  State:  Zip:

Form controls that are all related to a mailing address

[Figure 9.15 Full Alternative Text](#)

```
<fieldset>
<legend>Billing Address</legend>
<label>Street: <input type="text" name="street" id="street"
    size="54"></label><br><br>
<label>City: <input type="text" name="city" id="city"></label>
<label>State: <input type="text" name="state" id="state" maxlen=
    size="5"></label>
<label>Zip: <input type="text" name="zip" id="zip" maxlength="5"
    size="5"></label>
</fieldset>
```



### Focus on Accessibility

The grouping and visual effect of the fieldset element creates an organized and appealing web page containing a form. Using the fieldset and legend elements to group form controls enhances accessibility by organizing the controls both visually and semantically. The fieldset and legend elements can be accessed by screen readers and are useful tools for configuring groups of radio buttons and check boxes on web pages.



## Hands-On Practice 9.4

In this Hands-On Practice, you will modify the contact form (form3.html) you worked with in [Hands-On Practice 9.3](#) to use the fieldset and legend elements (see [Figure 9.16](#)).

### Figure 9.16

The screenshot shows a web browser window titled "Contact Form". The main content area is titled "Contact Us". Inside, there is a "Customer Information" section enclosed in a **fieldset** element. This section contains three text input fields labeled "First Name:", "Last Name:", and "E-mail:". Below this is a "Comments:" label followed by a large text area for comments. At the bottom of the form are two buttons: "Contact" and "Reset".

The fieldset, legend, and label elements

[Figure 9.16 Full Alternative Text](#)

Launch a text editor and open chapter9/9.3/form.html in the student files. Save the file as form4.html. Perform the following edits:

1. Add an opening <fieldset> tag after the opening <form> tag.
2. Immediately after the opening <fieldset> tag, code a legend element that contains the following text: “Customer Information”.
3. Code the closing </fieldset> tag before the label element for the Comments scrolling text box.
4. Save your file and test your web page in a browser. It should look similar to the one shown in [Figure 9.16](#). You can compare your work with the solution found in the student files (chapter9/9.4/form4.html). You may notice that when you activate the submit button, the form redisplays. This is because there is no action property in the form element. You’ll work with setting the action property in [Section 9.8](#).
5. How about a quick preview of styling a form with CSS? [Figures 9.16](#) and [9.17](#) show the same form elements, but the form in [Figure 9.17](#) is styled with CSS, which gives it the same functionality with increased visual appeal.

## Figure 9.17

The screenshot shows a web browser window titled "Contact Form". Inside, there's a heading "Contact Us". Below it is a "Customer Information" section enclosed in a red-bordered fieldset. This section contains three input fields: "First Name", "Last Name", and "E-mail". Below this is a large text area labeled "Comments". At the bottom are two buttons: "Contact" and "Reset".

The fieldset, legend, and label elements are configured with CSS

[Figure 9.17 Full Alternative Text](#)

Open form4.html in a text editor and add embedded styles to the head section as indicated below:

```
fieldset { width: 320px;
    border: 2px ridge #ff0000;
    padding: 10px;
    margin-bottom: 10px; }
legend { font-family: Georgia, "Times New Roman", serif;
    font-weight: bold; }
label { font-family: Arial, sans-serif; }
```

Save your file as form5.html and test your web page in a browser. It should look similar to the one shown in [Figure 9.17](#). You can compare your work

with the solution found in the student files (chapter9/9.4/form5.html).

## The tabindex Attribute



Some of your website visitors may have difficulty using a mouse and will access your form with a keyboard. The Tab key can be used to move from one form control to another. The default action for the Tab key within a form is to move to the next form control in the order in which the form controls are coded in the web page document. This is usually appropriate. However, if the tab order needs to be changed for a form, use the **tabindex** attribute on each form control.

For each form tag (`<input>`, `<select>`, and `<textarea>`), code a **tabindex** attribute with a numeric value, beginning with 1, 2, 3, and so on in numerical order. The HTML code to configure the customer e-mail text box as the initial position of the cursor is

```
<input type="text" name="Email" id="Email" tabindex="1">
```

If you configure a form control with `tabindex="0"`, it will be visited after all of the other form controls that are assigned a **tabindex** attribute. If you happen to assign two form controls the same **tabindex** value, the one that is coded first in the HTML will be visited first.

You can configure the **tabindex** attribute for anchor tags in a similar manner. The default action for the Tab key and anchor tags is to move from hyperlink to hyperlink in the order they are coded on the page. Use the **tabindex** attribute if you need to modify this behavior.

## The accesskey Attribute



## Focus on Accessibility

Another technique that can make your form keyboard-friendly is the use of the **accesskey** attribute on form controls. You can also configure the accesskey attribute on an anchor tag. Assigning the accesskey attribute a value of one of the characters (a letter or number) on the keyboard will create a hot key that your website visitor can press to move the cursor immediately to a form control or hyperlink.

The method used to access this hot key varies depending on the operating system. Windows users will press the Alt key and the character key. Mac users will press the Ctrl key and the character key. For example, if the form shown in [Figure 9.10](#) had the customer e-mail text coded with accesskey="E", the web page visitor using Windows could press the Alt and E keys to move the cursor immediately to the e-mail text box. The HTML code for this is

```
<input type="text" name="email" id="email" accesskey="E">
```

Note that you cannot rely on the browser to indicate that a character is an access key, also called a hot key. You will have to manually code information about the hot key. A visual cue may be helpful, such as displaying the hot key in bold or by placing a message such as (Alt+E) after a form control or hyperlink that uses a hot key. When choosing accesskey values, avoid combinations that are already used by the operating system (such as Alt+F to display the File menu). Testing hot keys is crucial.



## Checkpoint 9.2

1. Describe the purpose of the fieldset and legend elements.

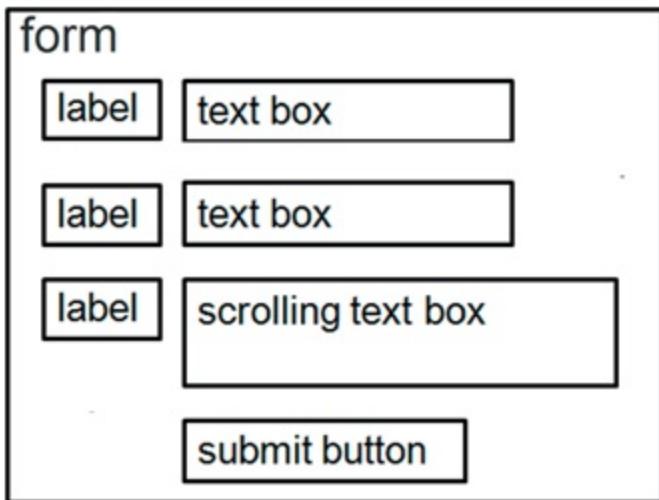
2. Describe the purpose of the accesskey attribute and how it supports accessibility.
3. When designing a form, should you use the standard submit button, an image button, or a button tag? Are these different in the way in which they provide for accessibility? Explain your answer.

## 9.7 Style a Form with CSS

The form in [Figure 9.10](#) (from [Hands-On Practice 9.2](#)) looks a little “messy” and you might be wondering how that can be improved. In the time before CSS was well supported by browsers, web designers always used a table to configure the design of form elements, typically placing the text labels and form field elements in separate table data cells. However, the table approach is outdated, does not provide support for accessibility, and can be difficult to maintain over time. The modern approach is to style the form with CSS.

When styling a form with CSS, the box model is used to create a series of boxes, as shown in [Figure 9.18](#). The outermost box defines the form area. Other boxes indicate label elements and form controls. CSS is used to configure these components.

### Figure 9.18



Wireframe for a form

[Figure 9.18 Full Alternative Text](#)

[Figure 9.19](#) displays a web page with a form configured in this manner (see chapter9/formcss.html in the student files). As you view the following CSS and HTML, note that the label element selector is configured with a 100 pixel width, floats to the left side of the form, and clears any previous left floats. The input and textarea elements have a top margin and are configured with block display. The submit button is assigned to an id with a left margin. The styles result in a well-aligned form.

## Figure 9.19

The screenshot shows a web browser window titled "Contact Form". The main content area has a heading "Contact Us". Below it is a form with three fields: "Name:" followed by an input field, "E-mail:" followed by an input field, and "Comments:" followed by a textarea. At the bottom of the form is a "Submit" button. The entire form is contained within a light gray box.

This form is configured with CSS

### [Figure 9.19 Full Alternative Text](#)

The CSS is

```
form { background-color:#eaeaea;  
      font-family: Arial, sans-serif;  
      padding: 10px; }  
label { float: left;  
       width: 100px;  
       clear: left;
```

```
    text-align: right;
    padding-right: 10px;
    margin-top: 10px; }
input, textarea { margin-top: 10px;
                 display: block; }
#mySubmit { margin-left: 110px; }
```

The HTML code is

```
<form>
  <label for="myName">Name:</label>
  <input type="text" name="myName" id="myName">
  <label for="myEmail">E-mail:</label>
  <input type="text" name="myEmail" id="myEmail">
  <label for="myComments">Comments:</label>
  <textarea name="myComments" id="myComments" rows="2"
            cols="20"></textarea>
  <input id="mySubmit" type="submit" value="Submit">
</form>
```

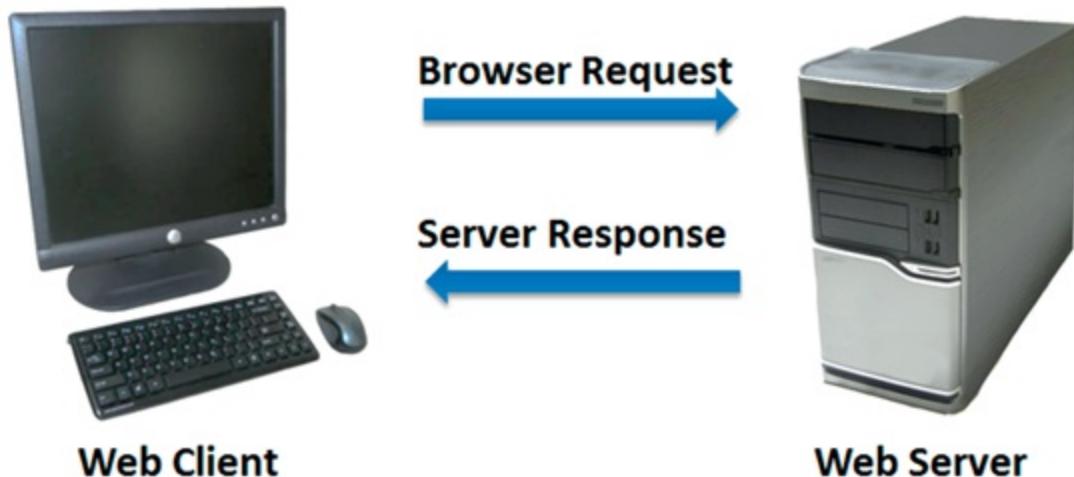
This section provided you with a method to style a form with CSS. Testing the way that different browsers render the form is crucial.

As you've coded and displayed the forms in this chapter, you may have noticed that when you click the submit button, the form just redisplays—the form doesn't do anything. This is because there is no action attribute in the `<form>` tag. The next section focuses on the second component of using forms on web pages—server-side processing.

## 9.8 Server-Side Processing

Your web browser requests web pages and their related files from a web server. The web server locates the files and sends them to your web browser. Then the web browser renders the returned files and displays the requested web pages. [Figure 9.20](#) illustrates the communication between the web browser and the web server.

**Figure 9.20**



The web browser (client) communicates with the web server

[Figure 9.20 Full Alternative Text](#)

Sometimes a website needs more functionality than static web pages, possibly a site search, order form, e-mail list, database display, or other type of interactive, dynamic processing. This is when server-side processing is needed. Early web servers used a protocol called **Common Gateway Interface (CGI)** to provide this functionality. CGI is a protocol, or standard method, for a web server to pass a web page user's request (which is typically initiated through the use of a form) to an application program and to accept

information to send to the user. The web server typically passes the form information to a small application program that is run by the operating system and that processes the data, usually sending back a confirmation web page or message. Perl and C are popular programming languages for CGI applications.

Server-side scripting is a technology by which a server-side script is run on a web server to dynamically generate web pages. Examples of server-side scripting technologies include PHP, Ruby on Rails, Microsoft Active Server Pages, Adobe ColdFusion, Oracle JavaServer Pages, and Microsoft .NET. Server-side scripting differs from CGI in that it uses **direct execution**: The script is run either by the web server itself or by an extension module to the web server.

A web page invokes server-side processing by either an attribute on a form or by a hyperlink (the URL of the script is used). Any form data that exists is passed to the script. The script completes its processing and may generate a confirmation or response web page with the requested information. When invoking a server-side script, the web developer and the server-side programmer must communicate about the form **method** attribute (get or post), form **action attribute** (the URL of the server-side script), and any special form element control(s) expected by the server-side script.

The **method** attribute is used on the form tag to indicate the way in which the name and value pairs should be passed to the server. The method attribute value of **get** causes the form data to be appended to the URL, which is easily visible and not secure. The method attribute value of **post** does not pass the form information in the URL; it passes it in the entity body of the HTTP request, which makes it more private. The W3C recommends the **method="post"** method.

The **action** attribute is used on the **<form>** tag to invoke a server-side script. The **name** attribute and the **value** attribute associated with each form control are passed to the server-side script. The **name** attribute may be used as a variable name in the server-side processing. In the next Hands-On Practice, you will invoke a server-side script from a form.



## ***Connect a Form to Server-Side Processing***



# **Hands-On Practice 9.5**

In this Hands-On Practice, you will configure a form to invoke a server-side script. Please note that your computer must be connected to the Internet when you test your work. When using a server-side script, you will need to obtain some information, or documentation, from the person or organization providing the script. You will need to know the location of the script, whether it requires any specific names for the form controls, and whether it requires any hidden form elements.

A server-side script has been created at the author's website (<http://webdevbasics.net>) for students to use for this exercise. The documentation for the server-side script is listed below:

- Script URL: <http://webdevbasics.net/scripts/demo.php>
- Form method: post
- Script purpose: This script will accept form input and display the form control names and values in a web page. This is a sample script for student assignments. It demonstrates that server-side processing has been invoked. A script used by an actual website would perform a function such as sending an e-mail message or updating a database.

Now you will add the configuration required to use the demo.php server-side processing with a form. Launch a text editor and open formcss.html (see chapter9/formcss.html in the student files). Modify the <form> tag by adding an action attribute with a value of

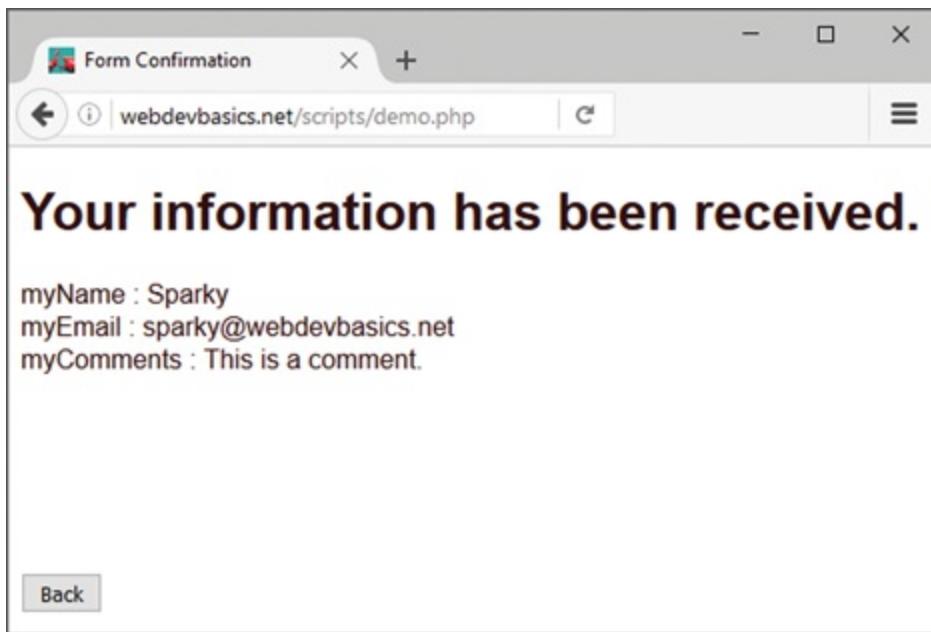
“`http://webdevbasics.net/scripts/demo.php`” and a `method` attribute with a value of “post”. The HTML code for the revised `<form>` tag is

```
<form method="post" action="http://webdevbasics.net/scripts/demo.
```

Save your file as `contact.html` and test your web page in a browser. Your screen should look similar to [Figure 9.19](#). Compare your work with the solution in the student files (chapter9/9.5/contact.html).

Now you are ready to test your form. You must be connected to the Internet to test your form successfully. Enter information in the form controls and click the submit button. You should see a confirmation page similar to the one shown in [Figure 9.21](#).

## Figure 9.21



The server-side script has created this web page in response to the form

### [Figure 9.21 Full Alternative Text](#)

The `demo.php` script creates a web page that displays a message and the form

information that you entered. Where did this confirmation page originate? This confirmation page was created by the server-side script on the `action` attribute in the form element. Sometimes students wonder what code is used in the `demo.php` file. Writing scripts for server-side processing is beyond the scope of this textbook. However, if you are curious, visit <http://webdevfoundations.net/9e/chapter9.html> to see the source code for this script.



## FAQ

1. What do I do if nothing happened when I tested my form?

Try these troubleshooting hints:

- Verify that your computer is connected to the Internet.
- Verify the spelling of the script location in the `action` attribute.
- Attention to detail is crucial!

## Privacy and Forms

You've just learned how to collect information from your website visitors. Do you think that your visitors may want to know how you plan to use the information that you collect? The guidelines that you develop to protect the privacy of your visitors' information is called a privacy policy. Websites either indicate this policy on the form page itself or create a separate page that describes the privacy policy (and other company policies).

If you browse popular sites such as Amazon.com or eBay.com, you'll find links to their privacy policies (sometimes called a privacy notice) in the page footer area. The privacy policy of the Better Business Bureau can be found at <http://www.bbb.org/us/privacy-policy>. Include a privacy notice on your site

to inform your visitors how you plan to use the information that they share with you. The Better Business Bureau offers a sample privacy policy template at <https://www.bbb.org/greater-san-francisco/for-businesses/understanding-privacy-policy/sample-privacy-policy-template>.

## **Server-Side Processing Resources**

### **Sources of Free Remote-Hosted Form Processing**

If your web host provider does not support server-side processing, free remotely hosted scripts may be an option. The script is not hosted on your server so you don't need to worry about installing it or whether your web host provider will support it. The disadvantage is that there may be some advertising displayed. The following are a few sites that offer this service:

- FormBuddy.com: <http://formbuddy.com>
- FormMail: <http://www.formmail.com>
- Master.com: <http://www.master.com>

### **Sources of Free Server-Side Scripts**

To use free scripts, you need to have access to a web server that supports the language used by the script. Contact your web host provider to determine what is supported. Be aware that many free web host providers do not support server-side processing (you get what you pay for!). Visit <http://scriptarchive.com> and <http://php.resourceindex.com> for free scripts and related resources.

# Exploring Server-Side Processing Technologies

Many types of technologies can be used for server-side scripting, form processing, and information sharing:

- PHP: <http://www.php.net>
- Oracle JavaServer Pages Technology:  
<http://www.oracle.com/technetwork/java/javaee/jsp>
- Adobe ColdFusion and Web Applications:  
<http://www.adobe.com/products/coldfusion>
- Ruby on Rails: <http://www.rubyonrails.org>
- Microsoft .NET: <http://www.microsoft.com/net>
- Microsoft Active Server Pages: Active Server Pages:  
<https://msdn.microsoft.com/en-us/library/aa286483.aspx>

Any of these technologies could be a good choice for future study. Web developers often learn the client side first (HTML, CSS, and JavaScript) and then progress to learning a server-side scripting or programming language.



## Checkpoint 9.3

1. Describe server-side processing.
2. Why is communication needed between the developer of a server-side script and the web page designer?

## 9.9 HTML5 Form Controls

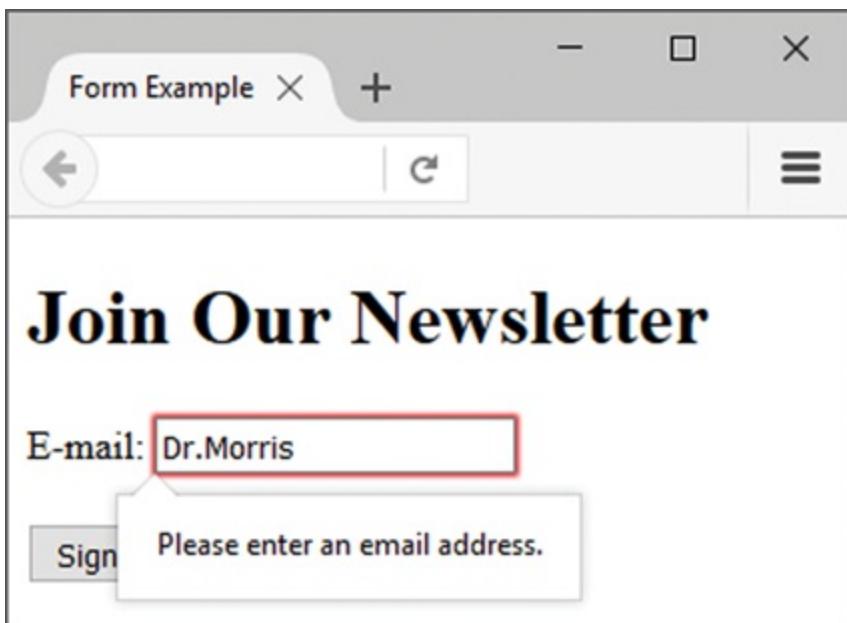
HTML5 offers a variety of new form controls for web developers that provide increased usability with built-in browser edits and validation. Recent versions of popular browsers support the new HTML5 form controls. Browsers that do not support the new input types will display the form controls as text boxes and ignore unsupported attributes or elements. In this section, you'll explore the new HTML5 e-mail address, URL, telephone number, search field, datalist, slider, spinner, calendar, and color form controls.

### E-mail Address Input

The e-mail address input form control is similar to the text box. Its purpose is to accept information that must be in e-mail format, such as "DrMorris2010@gmail.com". The input element with type="email" configures an e-mail address input form control. Only browsers that support the HTML5 email attribute value will verify the format of the information. Other browsers will treat this form control as a text box. Attributes supported by the e-mail address input form control are listed in [Table 9.2](#).

[Figure 9.22](#) (see chapter9/email.html in the student files) shows an error message displayed by Firefox when text other than an e-mail address is entered. Note that the browser does not verify that the e-mail address actually exists, just that the text entered is in the correct format. The HTML is

### Figure 9.22



The browser displays an error message

[Figure 9.22 Full Alternative Text](#)

```
<label for="myEmail">E-mail:</label>
<input type="email" name="myEmail" id="myEmail">
```

## URL Input

The URL input form control is similar to the text box. It is intended to accept any valid type of URL or URI, such as “<http://webdevfoundations.net>”. The input element with `type="url"` configures a URL input form control. Only browsers that support the HTML5 `url` attribute value will verify the format of the information. Other browsers render this form control as a text box. Attributes supported by the URL input form control are listed in [Table 9.2](#).

[Figure 9.23](#) (see chapter9/url.html in the student files) shows an error message displayed by Firefox when text other than a URL is entered. Note that the browser does not verify that the URL actually exists, just that the text entered is in the correct format. The HTML is

## Figure 9.23

The screenshot shows a web browser window titled "Form Example". The main content area has a heading "Share and Collaborate". Below it, there is a label "Suggest a Website:" followed by a text input field containing "google.com". A red box highlights this input field. To the right of the input field is a button labeled "Send Form!". Below the input field is a message box with the text "Please enter a URL." and an exclamation mark icon. The browser's address bar and toolbar are visible at the top.

The browser displays an error message

[Figure 9.23 Full Alternative Text](#)

```
<label for="myWebsite">Suggest a Website:</label>
<input type="url" name="myWebsite" id="myWebsite">
```

## Telephone Number Input

The telephone number input form control is similar to the text box. Its purpose is to accept a telephone number. The input element with `type="tel"` configures a telephone number input form control. An example is in the student files (chapter9/tel.html). Attributes supported by the telephone number input form control are listed in [Table 9.2](#). Browsers that do not support `type="tel"` will render this form control as a text box. The HTML is

```
<label for="mobile">Mobile Number:</label>
<input type="tel" name="mobile" id="mobile">
```

# Search Field Input

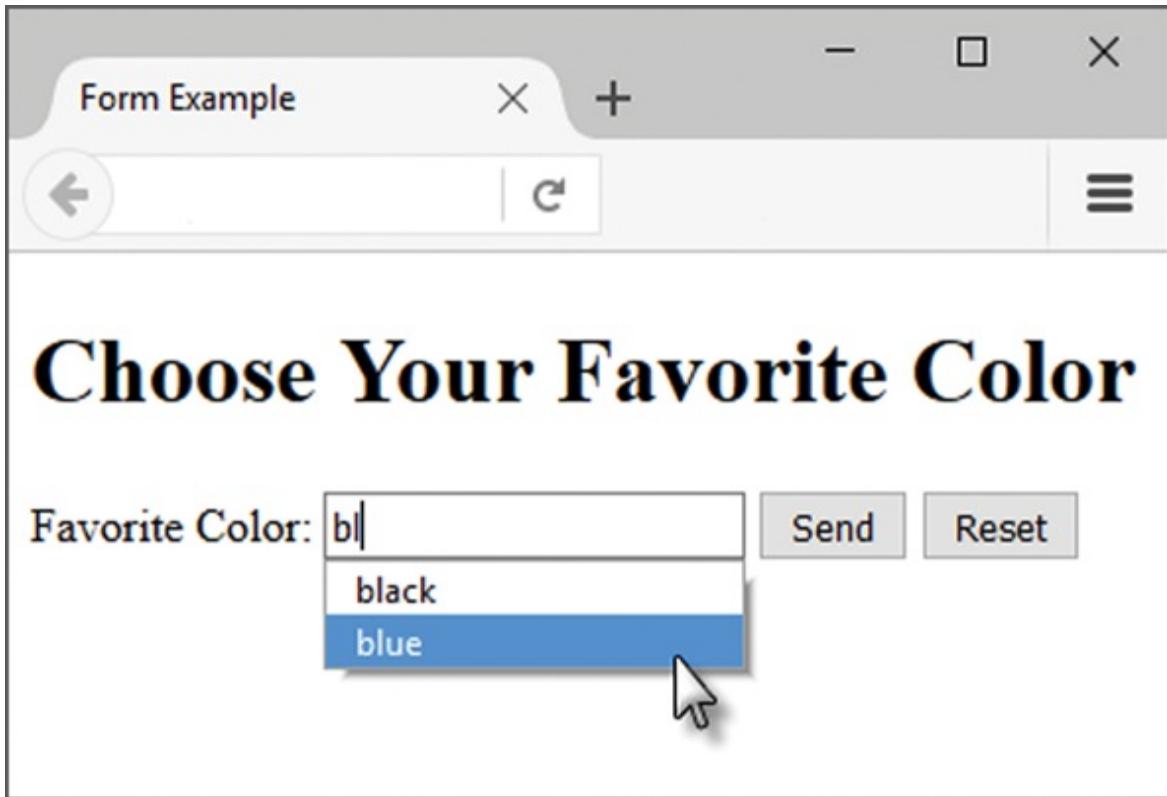
The search field is similar to the text box and is used to accept a search term. The input element with type="search" configures a search field input form control. An example is in the student files (chapter9/search.html). Attributes supported by the search field control are listed in [Table 9.2](#). Browsers that do not support type="search" will render this form control as a text box. The HTML is

```
<label for="keyword">Search:</label>
<input type="search" name="keyword" id="keyword">
```

# Datalist Form Control

[Figure 9.24](#) shows the **datalist form control** in action. Notice how a selection of choices is offered to the user along with a text box for entry. The datalist form control offers a convenient way to offer choices yet provide for flexibility on a form. The datalist is configured using three elements: an input element, the datalist element, and one or more option elements. Only browsers that support the HTML5 datalist element will display and process the datalist items. Other browsers ignore the datalist element and render the form control as a text box.

## Figure 9.24



Firefox displays the datalist form control

[Figure 9.24 Full Alternative Text](#)

The source code for the datalist is available in the student files (chapter9/list.html). The HTML is

```
<label for="color">Favorite Color:</label>
<input type="text" name="color" id="color" list="colors">
<datalist id="colors">
  <option value="red"    label="red">
  <option value="green"   label="green">
  <option value="blue"    label="blue">
  <option value="yellow"   label="yellow">
  <option value="pink"    label="pink">
  <option value="black"   label="black">
</datalist>
```

Notice that the value of the **list** attribute on the input element is the same as the value of the **id** attribute on the datalist element. This creates the association between the text box and the datalist form control. One or more option elements can be used to offer predefined choices to your web page

visitor. The option element's `label` attribute configures the text displayed in each list entry. The option element's `value` attribute configures the text sent to server-side processing when the form is submitted. The web page visitor can choose an option from the list (see [Figure 9.24](#)) or type directly in the text box, as shown in [Figure 9.25](#).

## Figure 9.25

The screenshot shows a web browser window titled "Form Example". The main content area has a heading "Choose Your Favorite Color". Below it is a form with the label "Favorite Color:" followed by a text input field containing the value "melonberry". To the right of the input field are two buttons: "Send" and "Reset". The browser interface includes standard controls like back, forward, and search buttons, as well as a menu icon.

The user can choose to type any value into the text box

## Slider Form Control

The slider form control provides a visual, interactive user interface that accepts numerical information. The `input` element with `type="range"` configures a slider control in which a number within a specified range is chosen. The default range is from 1 to 100. Only browsers that support the HTML5 `range` attribute value will display the interactive slider control, shown in [Figure 9.26](#) (see chapter9/range.html in the student files). Note the position of the slider in [Figure 9.26](#); this resulted in the value 80 being chosen. The nondisplay of the value to the user may be a disadvantage of the slider control. Nonsupporting browsers render this form control as a text box.

# Figure 9.26

The screenshot shows a Firefox browser window with a title bar labeled "Form Example". The main content area contains the heading "Choose A Number" and the instruction "Choose a number between 1 and 100:". Below this is a horizontal range slider with a blue arrowhead pointing to the right, indicating a value between "Low" and "High". At the bottom of the form are two buttons: "Send" and "Reset".

The Firefox browser displays the range form control.

[Figure 9.26 Full Alternative Text](#)

The slider control accepts attributes listed in [Tables 9.2](#) and [9.11](#). The `min`, `max`, and `step` attributes are new. Use the **min attribute** to configure the minimum range value. Use the **max attribute** to configure the maximum range value. The slider controls sets numeric values in increments, or steps, of 1. Use the **step attribute** to configure a value for the incremental steps between values to be other than 1.

## Table 9.11 Additional attributes for slider, spinner, and date/time form controls

<b>Attribute</b>	<b>Value</b>	<b>Purpose</b>
max	Maximum numeric value	HTML5 attribute for range, number, and date/time input controls; specifies a maximum value
min	Minimum numeric value	HTML5 attribute for range, number, and date/time input controls; specifies a minimum value
step	Incremental numeric step value	HTML5 attribute for range, number, and numeric step date/time input controls; specifies a value for incremental steps

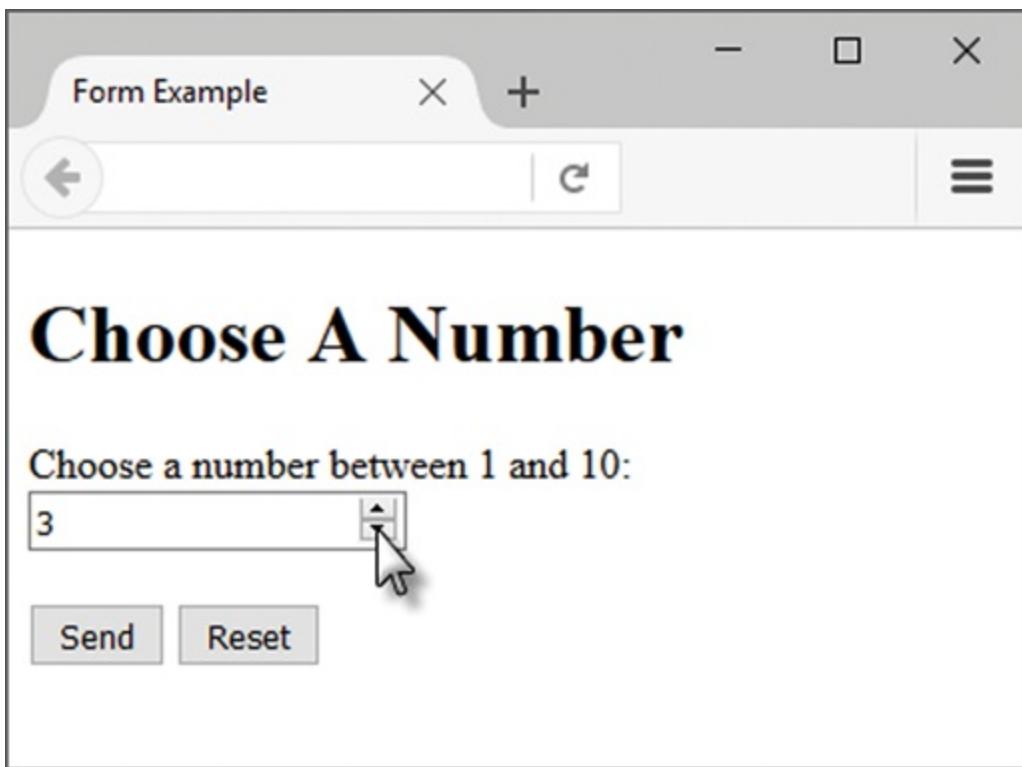
The HTML for the slider control rendered in [Figure 9.26](#) is

```
<label for="myChoice">Choose a number between 1 and 100:</label><
Low <input type="range" name="myChoice" id="myChoice" min="1" max
```

## Spinner Form Control

The **spinner form control** displays an interface that accepts numerical information and provides feedback to the user. The input element with `type="number"` configures a spinner control in which the user can either type a number into the text box or select a number from a specified range. Only browsers that support the HTML5 `number` attribute value will display the interactive spinner control, shown in [Figure 9.27](#) (see chapter9/spinner.html in the student files). Other browsers render this form control as a text box. You should expect increased support in the future.

## Figure 9.27



A spinner control displayed in the Firefox browser

[Figure 9.27 Full Alternative Text](#)

The spinner control accepts attributes listed in [Tables 9.2](#) and [9.11](#). Use the `min` attribute to configure the minimum value. Use the `max` attribute to configure the maximum value. The spinner control sets numeric values in increments, or steps, of 1. Use the `step` attribute to configure a value for the incremental step between values to be other than 1. The HTML for the spinner control displayed in [Figure 9.27](#) is

```
<label for="myChoice">Choose a number between 1 and 10:</label>
<input type="number" name="myChoice" id="myChoice" min="1" max="10" step="2"/>
```

## Calendar Form Control

HTML5 provides a variety of **calendar form controls** to accept date- and time-related information. Use the `input` element and configure the `type` attribute to specify a date or time control. [Table 9.12](#) lists the HTML5

calendar date and time controls.

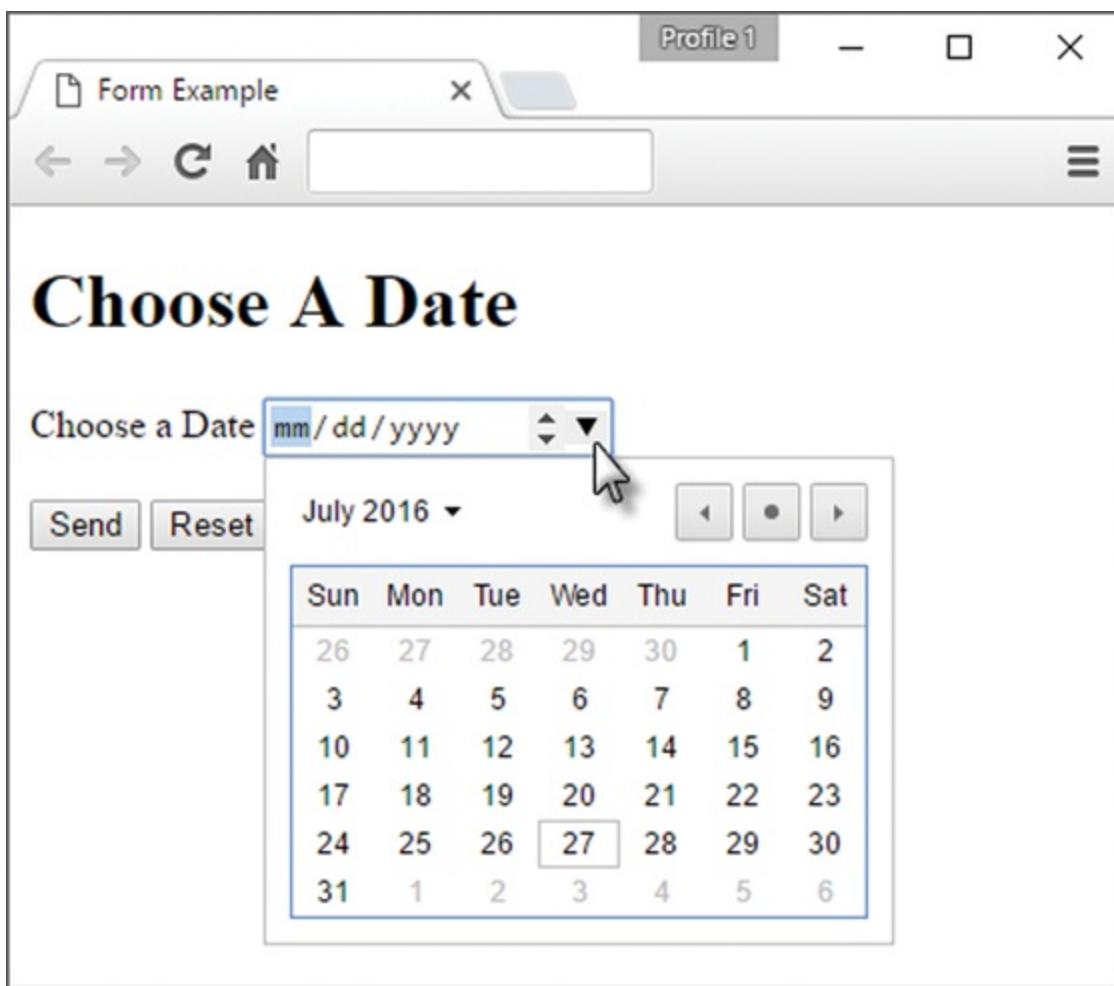
## Table 9.12 Date and time controls

Type Attribute	Purpose Value	Format
date	A date	YYYY-MM-DD  Example: January 2, 2018 is represented by “2018-01-02”
datetime	A date and time with time zone information; note that the time zone is indicated by the offset from UTC time	YYYY-MM-DDTHH:MM:SS-##:##Z  Example: January 2, 2018, at exactly 9:58 a.m. Chicago time (CST) is represented by “2018-01-02T09:58:00-06:00Z”
		YYYY-MM-DDTHH:MM:SS

<code>datetime-local</code>	A date and time without time zone information	Example: January 2, 2018, at exactly 9:58 a.m. is represented by “2018-01-02T09:58:00”
<code>time</code>	A time without time zone information	HH:MM:SS Example: 1:34 p.m. is represented by “13:34:00”
<code>month</code>	A year and month	YYYY-MM Example: January 2018 is represented by “2018-01”
<code>week</code>	A year and week	YYYY-W##, where ## represents the week in the year Example: The third week in 2018 is represented by “2018-W03”

The form in [Figure 9.28](#) (see chapter9/date.html in the student files) uses the input element with `type="date"` to configure a calendar control with which the user can select a date. The HTML is

# Figure 9.28



A date form control displayed in the Firefox browser

[Figure 9.28 Full Alternative Text](#)

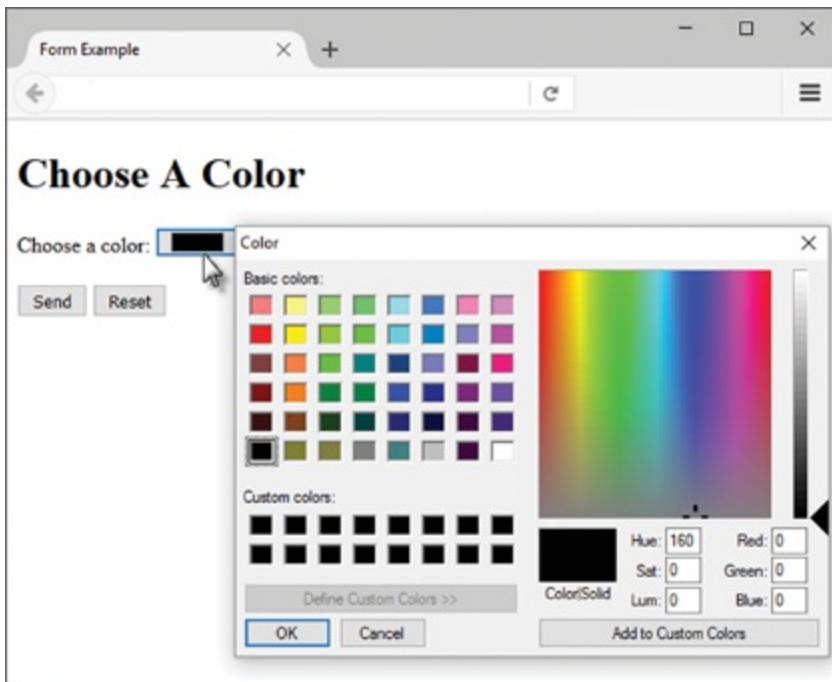
```
<label for="myDate">Choose a Date</label>
<input type="date" name="myDate" id="myDate">
```

The date and time controls accept attributes listed in [Tables 9.2](#) and [9.11](#). At the time this was written, only the Google Chrome, Microsoft Edge, and Opera browsers displayed a calendar interface for date and time controls. Other browsers currently render the **date and time form controls** as a text box, but you should expect increased support in the future.

# Color-well Form Control

The color-well form control displays an interface that offers a color-picker interface to the user. The input element with type="color" configures a control with which the user can choose a color. Only browsers that support the HTML5 color attribute value will display a color-picker interface, shown in [Figure 9.29](#) (see chapter9/color.html in the student files). Other browsers render this form control as a text box.

## Figure 9.29



The Firefox browser supports the color-well form control

[Figure 9.29 Full Alternative Text](#)

The HTML for the color-well form control rendered in [Figure 9.29](#) is

```
<label for="myColor">Choose a color:</label>
<input type="color" name="myColor" id="myColor">
```

In the next Hands-On Practice, you'll get some experience with the new HTML5 form controls.



## Hands-On Practice 9.6

In this Hands-On Practice, you will code HTML5 form controls as you configure a form that accepts a name, e-mail address, rating value, and comments from a website visitor. [Figure 9.30](#) displays the form in the Firefox browser, which supports the HTML5 features used in the Hands-On Practice. Notice that the form is enhanced in Google Chrome, but is still usable in both browsers, demonstrating the concept of progressive enhancement.

**Figure 9.30**

A screenshot of a Firefox browser window displaying a comment form. The window title is "Comment Form". The main content area has a heading "Send Us Your Comments" and a note "Required fields marked with an asterisk \*". It contains four input fields: a text input for "Name" with placeholder "your first and last name", an email input for "E-mail" with placeholder "you@yourdomain.com", a rating slider for "Rating (1 - 10)" set to 5, and a text area for "Comments". A "Submit" button is at the bottom.

The form displayed in the Firefox browser

### Figure 9.30 Full Alternative Text

To get started, launch a text editor and open chapter9/formcss.html in the student files, shown in [Figure 9.19](#). Save the file as form6.html. You will modify the file to create a web page similar to [Figure 9.30](#).

1. Modify the title element to display the text “Comment Form”. Configure the text contained within the h1 element to be “Send Us Your Comments”. Add a paragraph to indicate “Required fields are marked with an asterisk \*.”
2. Modify the embedded styles:
  1. Configure the form element selector to have a minimum width of 400 pixels.
  2. Change the width of the label element selector to 150 pixels.
  3. Change the left margin of #mySubmit to 160 pixels.
3. Modify the form element to submit the form information, using the post method, to the form processor at <http://webdevbasics.net/scripts/demo.php>:

```
<form method="post" action="http://webdevbasics.net/scripts/
```
4. Modify the form controls.
  1. Configure the name, e-mail, and comment information to be required. Use an asterisk to inform your web page visitor about the required fields.
  2. Code type="email" instead of type="input" for the e-mail address.
  3. Use the placeholder attribute (refer to [Table 9.2](#)) to provide hints to the user in the name and e-mail form controls.
  5. Add a slider control (use type="range") to generate a value from 1 to

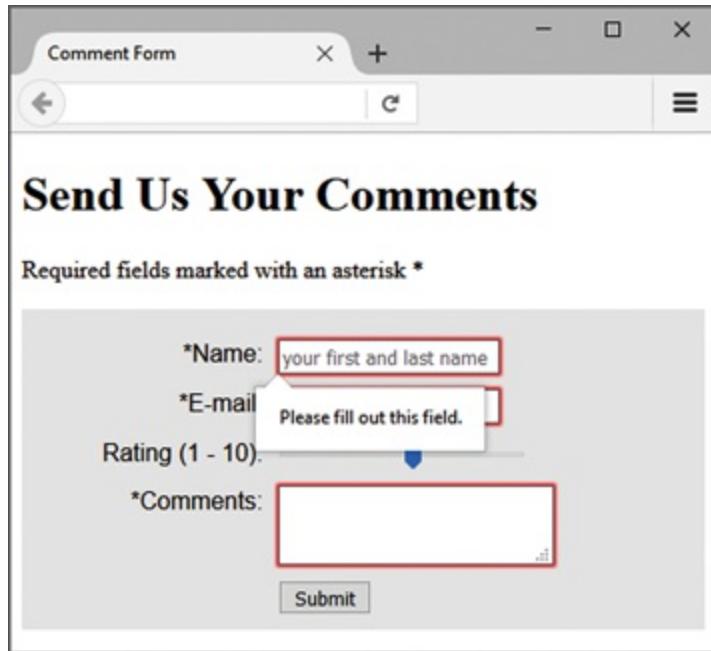
10 for the rating.

The HTML for the form follows:

```
<form method="post" action="http://webdevbasics.net/scripts/d
<label for="myName">*Name:</label>
<input type="text" name="myName" id="myName" required="requ
<label for="myEmail">*E-mail:</label>
<input type="email" name="myEmail" id="myEmail" required="r
<label for="myRating">Rating (1 - 10):</label>
<input type="range" name="myRating" id="myRating" min="1" m
<label for="myComments">*Comments:</label>
<textarea name="myComments" id="myComments" rows="2" cols="
<input id="mySubmit" type="submit" value="Submit">
</form>
```

6. Save form6.html and test your web page in a browser. If you use a browser that supports the HTML5 features used in the form, your page should look similar to [Figure 9.30](#).
7. Try submitting the form without entering any information. [Figure 9.31](#) shows the result when using Firefox. Note the error message which indicates that the name field is required. Compare your work with the solution in the student files (chapter9/9.6/form.html).

## Figure 9.31



The Firefox browser displays an error message

[Figure 9.31 Full Alternative Text](#)

## HTML5 and Progressive Enhancement

Use HTML5 form elements with the concept of progressive enhancement in mind. Nonsupporting browsers will display text boxes in place of form elements that are not recognized. Supporting browsers will display and process the new form controls. This is progressive enhancement in action: Everyone sees a usable form and visitors who are using modern browsers benefit from the enhanced features.

# Chapter Summary

This chapter introduced the use of forms on web pages. You learned how to configure form controls, provide for accessibility, and configure a form to access server-side processing. You also explored new HTML5 form elements. Visit the textbook website at <http://www.webdevfoundations.net> for examples, the links listed in this chapter, and updated information.

## Key Terms

- [`<button>`](#)
- [`<fieldset>`](#)
- [`<form>`](#)
- [`<input>`](#)
- [`<label>`](#)
- [`<legend>`](#)
- [`<option>`](#)
- [`<select>`](#)
- [`<textarea>`](#)
- [`accesskey attribute`](#)
- [`action attribute`](#)
- [`button element`](#)
- [`calendar form controls`](#)

- [check box](#)
- [color-well form control](#)
- [Common Gateway Interface \(CGI\)](#)
- [datalist form control](#)
- [date and time form controls](#)
- [direct execution](#)
- [e-mail address input](#)
- [fieldset element](#)
- [for attribute](#)
- [form](#)
- [form controls](#)
- [form element](#)
- [hidden input control](#)
- [image button](#)
- [input element](#)
- [label element](#)
- [legend element](#)
- [list attribute](#)
- [max attribute](#)
- [method attribute](#)

- [min attribute](#)
- [name attribute](#)
- [option element](#)
- [password box](#)
- [privacy policy](#)
- [radio button](#)
- [required attribute](#)
- [reset button](#)
- [scrolling text box](#)
- [search field](#)
- [select element](#)
- [select list](#)
- [server-side scripting](#)
- [slider form control](#)
- [spinner form control](#)
- [step attribute](#)
- [submit button](#)
- [tabindex attribute](#)
- [telephone number input](#)
- [text box](#)

- [textarea element](#)
- [URL input](#)
- [value attribute](#)

## Review Questions

### Multiple Choice

1. You would like to conduct a survey and ask your web page visitors to vote for their favorite search engine. Which of the following form controls is best to use for this purpose?
  1. check box
  2. radio button
  3. text box
  4. scrolling text box
2. You would like to conduct a survey and ask your web page visitors to indicate the web browsers that they use. Which of the following form controls is best to use for this purpose?
  1. check box
  2. radio button
  3. text box
  4. scrolling text box
3. Which attribute of the form element is used to specify the name and location of the script that will process the form field values?

1. action
  2. process
  3. method
  4. id
4. Choose the HTML tag that would configure a text box with the name "city" and a width of 40 characters.
1. `<input type="text" id="city" width="40">`
  2. `<input type="text" name="city" size="40">`
  3. `<input type="text" name="city" space="40">`
  4. `<input type="text" width="40">`
5. Which of the following form controls would be appropriate for an area that your visitors can use to type in their e-mail address?
1. select list
  2. text box
  3. scrolling text box
  4. label
6. Which of the following form controls would be appropriate for an area that your visitors can use to type in comments about your website?
1. text box
  2. select list
  3. radio button

4. scrolling text box
7. Forms contain various types of \_\_\_\_\_, such as text boxes and buttons, which accept information from a web page visitor.
  1. hidden elements
  2. labels
  3. form controls
  4. legends
8. Which HTML tag would configure a scrolling text box with the name “comments”, 2 rows, and 30 characters?
  1. `<textarea name="comments" width="30" rows="2"></textarea>`
  2. `<input type="textarea" size="30" name="comments" rows="2">`
  3. `<textarea name="comments" rows="2" cols="30"></textarea>`
  4. `<input type="comments" rows="2" name="comments" cols="30">`
9. You would like to accept a number that's in a range from 1 to 25. The user needs visual verification of the number they selected. Which of the following form controls is best to use for this purpose?
  1. spinner
  2. check box
  3. radio button
  4. slider
10. Choose the HTML that would associate a label displaying the text “E-

mail:" with the e-mail text box.

1. E-mail <input type="textbox" name="email" id="email">
2. <label>E-mail: </label><input type="text" name="email" id="email">
3. <label for="email">E-mail: </label>  
<input type="text" name="email" id="emailaddress">
4. <label for="email">E-mail: </label>  
<input type="text" name="email" id="email">

11. What will happen when a browser encounters a new HTML5 form control that it does not support?

1. The computer will shut down.
2. The browser will crash.
3. The browser will display an error message.
4. The browser will display an input text box.

## Fill in the Blank

12. To limit the number of characters that a text box will accept, use the **size** attribute.
13. To group a number of form controls visually on the page, use the **form** element.
14. To cause a number of radio buttons to be treated as a single group, the value of the **name** attribute must be identical.

# Short Answer

15. Describe at least three form controls that could be used to allow a visitor to your web page to select a color.

# Apply Your Knowledge

1. Predict the Result. Draw and write a brief description of the web page that will be created with the following HTML code:

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>Predict the Result</title>
<meta charset="utf-8">
</head>
<body>
<h1>Contact Us</h1>
<form action="myscript.php">
<fieldset><legend>Complete the form and a consultant will con
E-mail: <input type="text" name="email" id="email" size="40">
<br>Please indicate which services you are interested in:<br>
<select name="inquiry" id="inquiry" size="1">
    <option value="development">Web Development</option>
    <option value="redesign">Web Redesign</option>
    <option value="maintain">Web Maintenance</option>
    <option value="info">General Information</option>
</select>
<br>
<input type="submit">
</fieldset>
</form>
<nav><a href="index.html">Home</a>
<a href="services.html">Services</a>
<a href="contact.html">Contact</a></nav>
</body>
</html>
```

2. Fill in the Missing Code. This web page configures a survey form to collect information on the favorite search engine used by web page visitors. The form action should submit the form to the server-side

script, called survey.php. Some HTML tags and their attributes, indicated by `<_>`, are missing. Some HTML attribute values, indicated by `"_"`, are missing.

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>Fill in the Missing Code</title>
<meta charset="utf-8">
</head>
<body>
<h1>Vote for your favorite Search Engine</h1>
<form method="_" action="_">
    <input type="radio" name="_" id="Ysurvey" value="Yahoo"> Ya
    <input type="radio" name="survey" id="Gsurvey" value="Googl
    Google<br>
    <input type="radio" name="_" id="Bsurvey" value="Bing"> Bin
    <_>
</form>
</body>
</html>
```

3. Find the Error. Find the coding errors in the following subscription form:

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>Find the Error</title>
<meta charset="utf-8">
</head>
<body>
<p>Subscribe to our monthly newsletter and receive free coupo
<form action="get" method="newsletter.php">
    <label>E-mail: <input type="textbox" name="email" id="email
    char="40"></label>
    <br>
    <input button="submit"> <input type="rest">
</form>
</body>
</html>
```

## Hands-On Exercises

1. Write the HTML code to create the following:
  1. A text box named user that will be used to accept the user name of web page visitors. The text box should allow a maximum of 30 characters to be entered.
  2. A group of radio buttons that website visitors can check to vote for their favorite month of the year.
  3. A select list that asks website visitors to select their favorite social networking site
  4. A fieldset and legend with the text “Shipping Address” around the following form controls:

AddressLine1, AddressLine2, City, State, ZIP
5. An image called signup.gif as an image button on a form
6. A hidden input control with the name userid
7. A password box form control with the name pword
8. A form tag to invoke server-side processing using <http://webdevbasics.net/scripts/demo.php> and the post method
2. Write the HTML to create a form that accepts requests for a brochure to be sent in the mail. Sketch out the form on paper before you begin.
3. Create a web page with a form that accepts feedback from website visitors. Use the HTML5 input type="email" along with the required attribute to configure the browser to verify the data entered. Also configure the browser to require user comments with a maximum length of 1600 characters accepted. Place your name and e-mail address at the bottom of the page. *Hint:* Sketch out the form on paper before you begin.
4. Create a web page with a form that accepts a website visitor’s name, e-mail, and birthdate. Use the HTML5 type="date" attribute to configure

a calendar control on browsers that support the attribute value. Place your name and e-mail address at the bottom of the page. *Hint:* Sketch out the form on paper before you begin.

5. Write a web page that contains a music survey form similar to the example shown in [Figure 9.32](#).

## Figure 9.32

**Music Survey**

Name:

E-Mail:

Select Your Favorite Types of Music:

Pop  
 Classical  
 Rock  
 Folk  
 Rap  
 Other

Select how often you purchase Music:

Weekly  
 A few CDs each year  
 Monthly  
 Never purchase

Select the locations you listen to Music:

At home  
In the car  
Anywhere

What role does music play in your life?

Sample music survey form

### Figure 9.32 Full Alternative Text

Include the following form controls:

- Text box for name
- E-mail address input form control for the e-mail address
- A scrolling text box that is 60 characters wide and 3 rows high
- A radio button group with at least three choices
- A check box group with at least three choices
- A select box that initially shows three items but contains at least four items
- A submit button
- A reset button
- Use the fieldset and legend elements as shown in [Figure 9.32](#) to configure the display of form areas with radio buttons and checkboxes.

Use a CSS to configure the display of your form. Place your name and e-mail address at the bottom of the page.

## Web Research

1. This chapter mentioned a number of sources of free remotely hosted scripts, including FormBuddy.com (<http://formbuddy.com>), FormMail (<http://www.formmail.com>), and Master.com (<http://master.com>). Visit two of these sites or use a search engine to find other resources for free remotely hosted scripts. Register (if necessary) and examine the website to see exactly what is offered. Most sites that provide remotely hosted scripts have a demo you can view or try. If you have time (or your

instructor asks you to), follow the directions and access a remotely hosted script from one of your web pages. Now that you've at least been through a demo of the product or tried it yourself (even better!), it's time to write your review.

Create a web page that lists the two resource sites you chose and provides a comparison of what they offer. List the following for each website:

- Ease of registration
- Number of scripts or services offered
- Types of scripts or services offered
- Site banner or advertisement
- Ease of use
- Your recommendation

Provide links to the resource sites you reviewed and place your name and e-mail address at the bottom of the page.

2. Search the Web for a web page that uses an HTML form. Print the browser view of the page. Print out the source code of the web page. Using the printout, highlight or circle the tags related to forms. On a separate sheet of paper, create some HTML notes by listing the tags and attributes related to the forms found on your sample page along with a brief description of their purpose.
3. Choose one server-side technology mentioned in this chapter such as PHP, JSP, Ruby on Rails, or ASP.NET. Use the resources listed in the chapter as a starting point, but also search the Web for additional resources on the server-side technology you have chosen. Create a web page that lists at least five useful resources along with information about each that provides the name of the site, the URL, a brief description of what is offered, and a recommended page (such as a tutorial, free script,

and so on). Place your name in an e-mail link on the web page.

## Focus on Web Design

1. The design of a form, such as the justification of the labels, the use of background colors, and even the order of the form elements can either increase or decrease the usability of a form. Visit some of the following resources to explore form design:
  - Web Application Form Design:  
[http://www.uie.com/articles/web\\_forms](http://www.uie.com/articles/web_forms)
  - 7 Common Web Form Design Mistakes to Avoid:  
<http://www.formassembly.com/blog/web-form-design>
  - 10 Tips to a Better Form: <http://particletree.com/features/10-tips-to-a-better-form>
  - Sensible Forms: <http://www.alistapart.com/articles/sensibleforms>
  - Best Practices for Form Design:  
[http://static.lukew.com/webforms\\_lukew.pdf](http://static.lukew.com/webforms_lukew.pdf)

Feel free to search on your own and locate additional resources. Create a web page that lists the URLs of at least two useful resources along with a brief description of the information you found most interesting or valuable. Design a form on the web page that applies what you've just learned in your exploration of form design. Place your name in an e-mail link on the web page.



## WEBSITE CASE STUDY

# Adding a Form

Each of the following case studies continues throughout most of the textbook. This chapter adds a page containing a form that invokes server-side processing to the websites.

## JavaJam Coffee House

See [Chapter 2](#) for an introduction to the JavaJam Coffee House case study. [Figure 2.31](#) shows a site map for the JavaJam site. Use the [Chapter 8](#) JavaJam website as a starting point for this case study. You will create the new Jobs page that contains a form. You have four tasks in this case study:

1. Create a new folder for this JavaJam case study.
2. Modify the style sheet (javajam.css) to configure style rules for the new form.
3. Create the new Jobs page shown in [Figure 9.33](#).

## Figure 9.33



JavaJam Jobs page

[Figure 9.33 Full Alternative Text](#)

4. Configure HTML5 form controls.

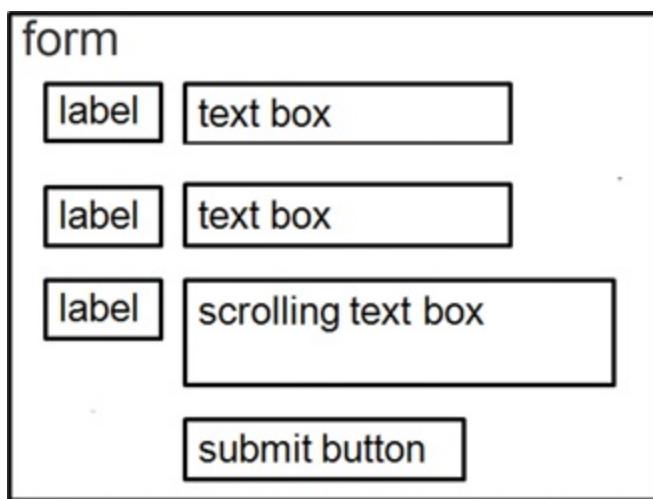
## Hands-On Practice Case Study

- Task 1: The Website Folder. Create a folder called javajam9. Copy all of the files from your [Chapter 8](#) javajam8 folder into the javajam9 folder. Copy the herojobs.jpg from the chapter9/casestudystarters folder

in the student files.

- Task 2: Configure the CSS. Modify the external style sheet (javajam.css). Open javajam.css in a text editor. Review [Figure 9.33](#) and the wireframe in [Figure 9.34](#). Notice how the text labels for the form controls are on the left side of the content area but contain right-aligned text. Notice the empty vertical space between each form control. Configure CSS as indicated below:

## Figure 9.34



Wireframe for the form

### [Figure 9.34 Full Alternative Text](#)

1. Create a form element selector with a style declaration that sets 2em of padding. Configure a label element selector to float to the left with block display. Set the text alignment to right, assign a width of 8em, and set 1em of right padding.
2. Configure the input element and textarea element selectors with block display and 1em of bottom margin.
3. Configure a selector for an id named `mySubmit` that sets the left margin to 9.5em.

4. Configure a selector for an id named `herojobs` with 250px height. Set the background image to `herojobs.jpg`. Also configure `background-size: 100% 100%`.
5. OPTIONAL: If you completed the Chapter 7 Case Study, edit the styles that target smartphone display and configure the `#herojobs` selector to not display.

Save the `javajam.css` file.

- Task 3: Create the Jobs Page. Use the Menu page as the starting point for the Jobs page. Launch a text editor and open `menu.html`. Save the file as `jobs.html`. Modify your `jobs.html` file to look similar to the Jobs page (shown in [Figure 9.33](#)) as follows:
  1. Change the page title to an appropriate phrase.
  2. The Jobs page will contain an `h2`, a paragraph, and a form in the `main` element. Assign the `div` to an id named `herojobs`. Delete the table in the `main` element.
  3. Edit the text within the `h2` element to say "Jobs at JavaJam". Replace the text in the paragraph with the following: "Want to work at JavaJam? Fill out the form below to start your application."
  4. Prepare to code the HTML for the form area. Begin with a `form` element that uses the `post` method and the `action` attribute to invoke server-side processing. Unless directed otherwise by your instructor, configure the `action` attribute to send the form data to `http://webdevbasics.net/scripts/javajam8.php`.
  5. Configure the form control for the Name information. Create a `label` element that contains the text "Name:". Create a text box named `myName`. Use the `for` attribute to associate the `label` element with the form control.
  6. Configure the form control for the E-mail information. Create a `label` element that contains the text "E-mail:". Create a text box

named myEmail. Use the `for` attribute to associate the label element with the form control.

7. Configure the Experience area on the form. Create a label element that contains the text “Experience:”. Create a textarea element named myExperience with `rows` set to 2 and `cols` set to 20. Use the `for` attribute to associate the label element with the form control.
8. Configure the submit button. Code an input element with `type="submit"` and `value="Apply Now"`. Assign the input element to an id named mySubmit.
9. Code an ending `</form>` tag on a blank line after the submit button.

Save your file and test your web page in a browser. It should look similar to the page shown in [Figure 9.33](#). If you are connected to the Internet, submit the form. This will send your form information to the server-side script configured in the form tag. A confirmation page that lists the form information and their corresponding names will be displayed.

- Task 4: Configure HTML5 Form Controls. Get more practice with the new HTML5 elements by modifying the form on the Jobs page to use HTML5 attributes and values. Modify the `jobs.html` file in a text editor.
  1. Add the following sentence to the paragraph above the form: “Required fields are marked with an asterisk (\*).”
  2. Use the `required` attribute to require the name, e-mail, and experience form controls to be entered. Add an asterisk at the beginning of each label text.
  3. Configure the input element for the e-mail address with `type="email"`.

Save your file and display your web page in a browser. Submit the form with missing information or only a partial e-mail address. Depending on the browser’s level of HTML5 support, the browser may perform form

validation and display an error message. [Figure 9.35](#) shows the Jobs page rendered in the Firefox browser with an incorrectly formatted e-mail address.

## Figure 9.35



The Jobs page with HTML5 form controls

#### [Figure 9.35 Full Alternative Text](#)

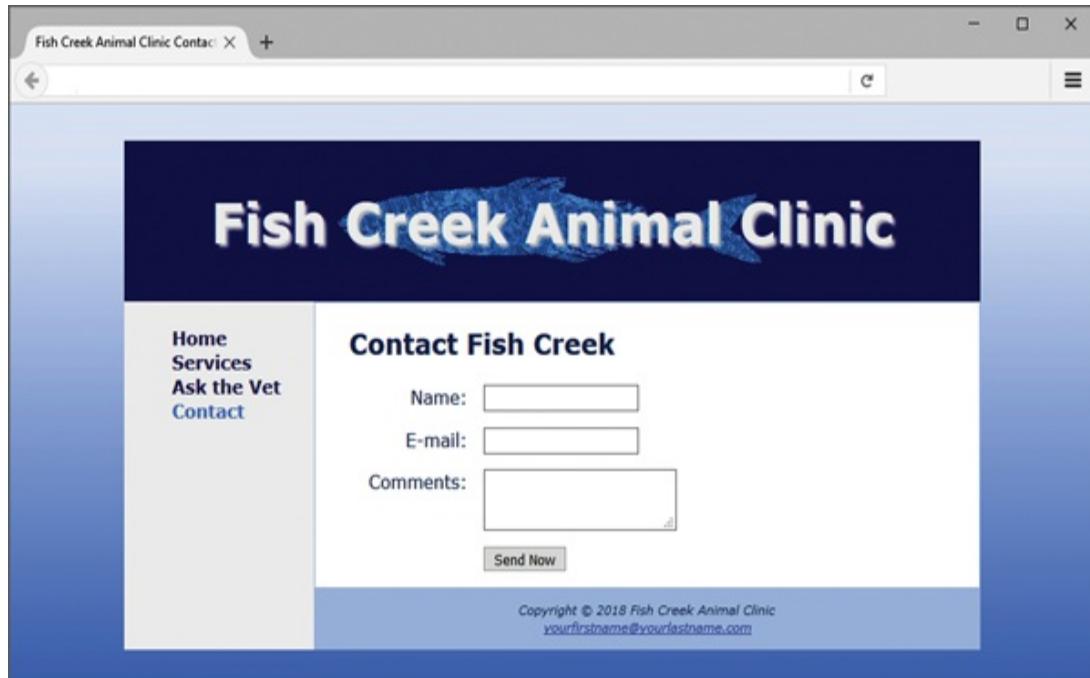
This task provided you with additional practice using the new HTML5 attributes and values.

## Fish Creek Animal Clinic

See [Chapter 2](#) for an introduction to the Fish Creek Animal Clinic case study. [Figure 2.35](#) shows a site map for Fish Creek. Use the [Chapter 8](#) Fish Creek website as a starting point for this case study. You will create the new Contact page that contains a form. You have four tasks in this case study:

1. Create a new folder for this Fish Creek case study.
2. Modify the style sheet (fishcreek.css) to configure style rules for the new form.
3. Create the new Contact page shown in [Figure 9.36](#).

## Figure 9.36



Fish Creek Contact page

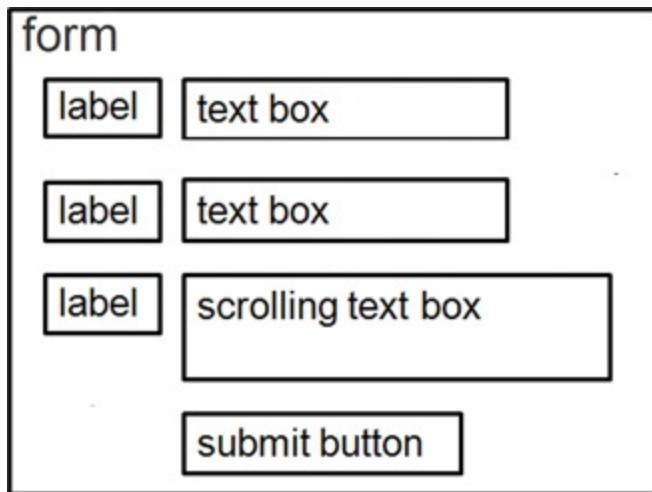
[Figure 9.36 Full Alternative Text](#)

4. Configure HTML5 form controls.

## Hands-On Practice Case Study

- Task 1: The Website Folder. Create a folder called fishcreek9. Copy all of the files from your [Chapter 8](#) fishcreek8 folder into the fishcreek9 folder.
- Task 2: Configure the CSS. Modify the external style sheet (fishcreek.css). Open fishcreek.css in a text editor. Review [Figure 9.36](#) and the wireframe in [Figure 9.37](#). Notice how the text labels for the form controls are on the left side of the content area but contain right-aligned text. Notice the empty vertical space between each form control. Configure CSS as indicated below:

# Figure 9.37



Wireframe for the form

[Figure 9.37 Full Alternative Text](#)

1. Create a label element selector to float to the left with block display. Set the text alignment to right, assign a width of 8em, and set 1em right padding.
2. Configure the input element and textarea element selectors with block display and 1em of bottom margin.
3. Configure an id named mySubmit with a 9.5em left margin.

Save the fishcreek.css file.

- Task 3: Create the Contact Page. Use the Ask the Vet page as the starting point for the Contact page. Launch a text editor and open askvet.html. Save the file as contact.html. Modify your contact.html file to look similar to the Contact page (shown in [Figure 9.36](#)) as follows:
  1. Change the page title to an appropriate phrase.
  2. The Contact page will display a form in the main element. Delete

the paragraph and description list in the main element.

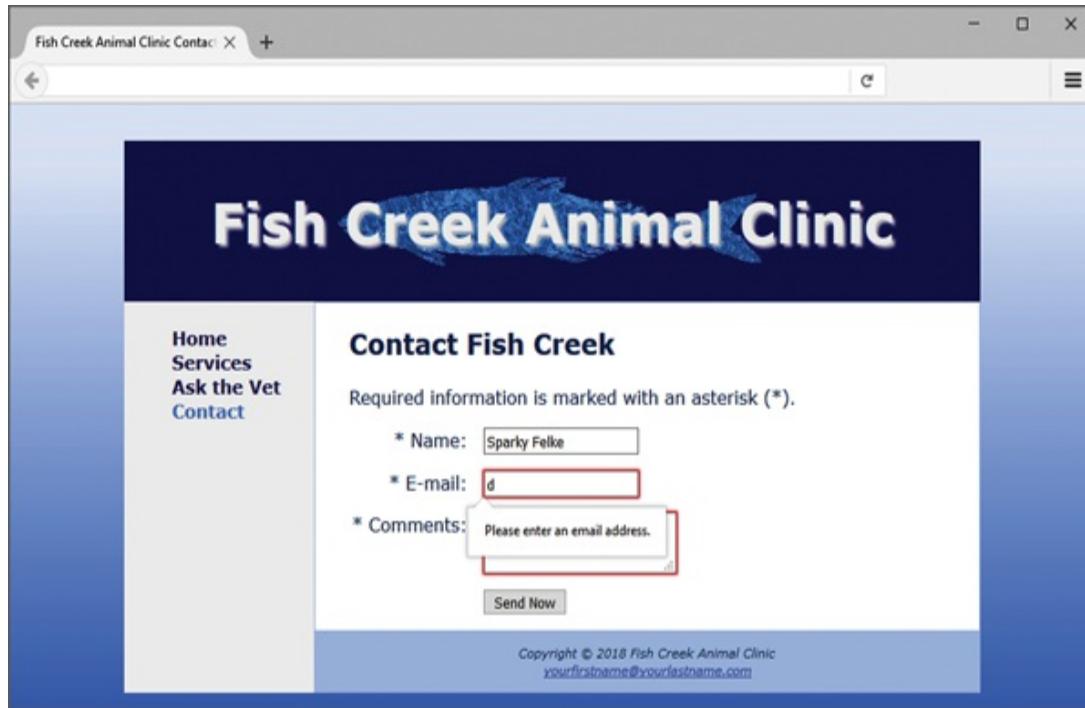
3. Add an h2 element that contains the following text: “Contact Fish Creek”.
4. Prepare to code the HTML for the form area. Begin with a form element that uses the post method and the action attribute to invoke server-side processing. Unless directed otherwise by your instructor, configure the action attribute to send the form data to <http://webdevbasics.net/scripts/fishcreek.php>.
5. Configure the form control for the Name information. Create a label element that contains the text “Name:”. Create a text box named myName. Use the for attribute to associate the label element with the form control.
6. Configure the form control for the E-mail information. Create a label element that contains the text “E-mail:”. Create a text box named myEmail. Use the for attribute to associate the label element with the form control.
7. Configure the Comments area on the form. Create a label element that contains the text “Comments:”. Create a textarea element named myComments with rows set to 2 and cols set to 20. Use the for attribute to associate the label element with the form control.
8. Configure the submit button on the form. Configure “Send Now” to display on the button. Assign the input element to the id named mySubmit.
9. Code an ending </form> tag on a blank line after the submit button.

Save your file and test your web page in a browser. It should look similar to the page shown in [Figure 9.36](#). If you are connected to the Internet, submit the form. This will send your form information to the server-side script configured in the form tag. A confirmation page that lists the form information and their corresponding names will be displayed.

- Task 4: Configure HTML5 Form Controls. Get more practice with the new HTML5 elements by modifying the form on the Contact page to use HTML5 attributes and values. Modify the contact.html file in a text editor.
  1. Add a paragraph above the form with the following sentence: “Required information is marked with an asterisk (\*).”
  2. Use the required attribute to require the name, e-mail, and comments form controls to be entered. Add an asterisk at the beginning of each label text.
  3. Configure the input element for the e-mail address with type="email".

Save your file and display your web page in a browser. Submit the form with missing information or only a partial e-mail address. Depending on the browser’s level of HTML5 support, the browser may perform form validation and display an error message. [Figure 9.38](#) shows the Contact page rendered in the Firefox browser with missing required information.

## Figure 9.38



The Contact page with HTML5 form controls

#### [Figure 9.38 Full Alternative Text](#)

This task provided you with additional practice using the new HTML5 attributes and values.

## Pacific Trails Resort

See [Chapter 2](#) for an introduction to the Pacific Trails Resort case study. [Figure 2.39](#) shows a site map for Pacific Trails. Use the [Chapter 8](#) Pacific Trails website as a starting point for this case study. You will create the new Reservations page that contains a form. You have four tasks in this case study:

1. Create a new folder for this Pacific Trails case study.
2. Modify the style sheet (pacific.css) to configure style rules for the new form.

3. Create the new Reservations page shown in [Figure 9.39](#).

# Figure 9.39

The screenshot shows a web browser window titled "Pacific Trails Resort :: Reservation". The main content area features a blue header with the text "Pacific Trails Resort" and a sunset image. Below the header is a sidebar with links: Home, Yurts, Activities, and Reservations. The main content area has a white background and contains the following form fields:

<b>Reservations at Pacific Trails</b>	
<b>Contact Us</b>	
First Name:	<input type="text"/>
Last Name:	<input type="text"/>
E-mail:	<input type="text"/>
Phone:	<input type="text"/>
Arrival Date:	<input type="text"/>
Nights:	<input type="text"/>
Comments:	<input type="text"/>
<input type="button" value="Submit"/>	

At the bottom of the page, there is a copyright notice: "Copyright © 2018 Pacific Trails Resort" and an email address: [yourfirstname@yourlastname.com](mailto:yourfirstname@yourlastname.com).

Pacific Trails Reservations page

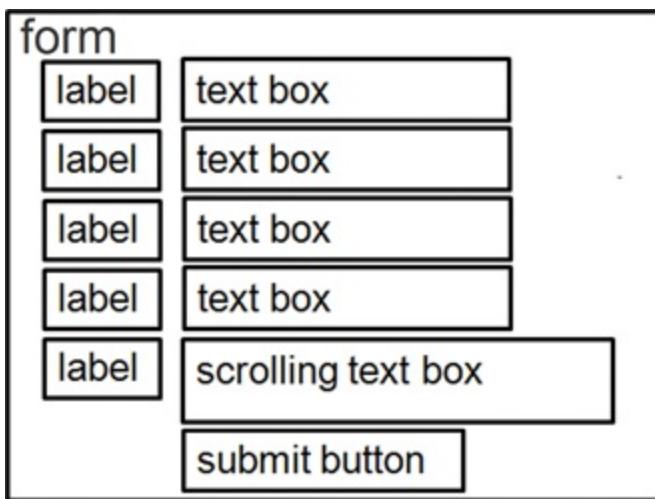
[Figure 9.39 Full Alternative Text](#)

4. Configure HTML5 form controls.

# Hands-On Practice Case Study

- Task 1: The Website Folder. Create a folder called pacific9. Copy all of the files from your [Chapter 8](#) pacific8 folder into the pacific9 folder.
- Task 2: Configure the CSS. Modify the external style sheet (pacific.css). Open pacific.css in a text editor. Review [Figure 9.39](#) and the wireframe in [Figure 9.40](#). Notice how the text labels for the form controls are on the left side of the content area. Notice the empty vertical space between each form control. Configure CSS as indicated below:

## Figure 9.40



Wireframe for the form

[Figure 9.40 Full Alternative Text](#)

1. Create a label element selector to float to the left with block display. Set the width to 8em. Configure 1em right padding.
2. Configure the input element and textarea element selectors with block display and 1em of bottom margin.

3. Configure an id named mySubmit with a 10em left margin.

Save the pacific.css file.

- Task 3: Create the Reservations Page. Use the Home page as the starting point for the Reservations page. Launch a text editor and open index.html. Save the file as reservations.html. Modify your reservations.html file to look similar to the Reservations page (shown in [Figure 9.39](#)) as follows:
  1. Change the page title to an appropriate phrase.
  2. Delete the div assigned to the homehero id.
  3. Delete all HTML tags and content within the main element except for the h2 element and text.
  4. Replace the text contained within the <h2> tags with: “Reservations at Pacific Trails”.
  5. Configure an h3 element on a line under the h2 with the following text: “Contact Us”.
  6. Prepare to code the HTML for the form area. Begin with a form element that uses the post method and the action attribute to invoke server-side processing. Unless directed otherwise by your instructor, configure the action attribute to send the form data to <http://webdevbasics.net/scripts/pacific.php>.
  7. Configure the form control for the First Name information. Create a label element that contains the text “First Name:”. Create a text box named myFName. Use the for attribute to associate the label element with the form control.
  8. Configure the form control for the Last Name information. Create a label element that contains the text “Last Name:”. Create a text box named myLName. Use the for attribute to associate the label element with the form control.

9. Configure the form control for the E-mail information. Create a label element that contains the text “E-mail:”. Create a text box named myEmail. Use the `for` attribute to associate the label element with the form control.
10. Configure the form control for the Phone information. Create a label element that contains the text “Phone:”. Create a text box named myPhone. Use the `for` attribute to associate the label element with the form control.
11. Configure the Comments area on the form. Create a label element that contains the text “Comments:”. Create a textarea element named myComments with `rows` set to 2 and `cols` set to 20. Use the `for` attribute to associate the label element with the form control.
12. Configure the submit button on the form. Configure “Submit” to display on the button. Assign the input element to the id named mySubmit.
13. Code an ending `</form>` tag on a blank line after the submit button.

Save your file and test your web page in a browser. It should look similar to the page shown in [Figure 9.39](#). If you are connected to the Internet, submit the form. This will send your form information to the server-side script configured in the form tag. A confirmation page that lists the form information and their corresponding names will be displayed.

- Task 4: Configure HTML5 Form Controls. Get more practice with the new HTML5 elements by modifying the form on the Reservations page to use HTML5 attributes and values. Modify the `reservations.html` file in a text editor.
  1. Add a paragraph above the form with the following sentence: “Required information is marked with an asterisk (\*).”
  2. Use the `required` attribute to require the first name, last name, e-mail, and comments form controls to be entered. Add an asterisk at

the beginning of each label text.

3. Configure the input element for the e-mail address with type="email".
4. Configure the input element for the phone number with type="tel".
5. Add a calendar form control to process a reservation request date (use type="date").
6. Add a spinner form control to process a value between 1 and 14 to indicate the number of nights for the length of stay (use type="number"). Use the min and max attributes to configure the range of values.

Save your file and display your web page in a browser. Submit the form with missing information or only a partial e-mail address. Depending on the browser's level of HTML5 support, the browser may perform form validation and display an error message. [Figure 9.41](#) shows the Reservations page rendered in the Firefox browser with an incorrectly formatted e-mail address.

## Figure 9.41

The screenshot shows a web browser window for 'Pacific Trails Resort :: Reservation'. The main content area has a blue header with the text 'Pacific Trails Resort' and a sunset image. Below the header, the title 'Reservations at Pacific Trails' is displayed. A sidebar on the left contains links: Home, Yurts, Activities, and Reservations. The main content area is titled 'Contact Us' and includes a note: 'Required information is marked with an asterisk (\*).'. It features several input fields: 'First Name' (Sparky), 'Last Name' (Felke), 'E-mail' (redacted), 'Phone' (redacted with placeholder 'Please fill out this field.'), 'Arrival Date' (06/03/2018), 'Nights' (2), and 'Comments' (Request Yurt #16). A 'Submit' button is at the bottom. At the very bottom of the page, there is copyright information: 'Copyright © 2018 Pacific Trails Resort' and a link 'yourfirstname@yourlastname.com'.

The Reservations page with HTML5 form controls

[Figure 9.41 Full Alternative Text](#)

This task provided you with additional practice using the new HTML5 attributes and values.

## Path of Light Yoga Studio

See [Chapter 2](#) for an introduction to the Path of Light Yoga Studio case study. [Figure 2.43](#) shows a site map for Path of Light Yoga Studio. Use the

[Chapter 8](#) Path of Light Yoga Studio website as a starting point for this case study. You will create the new Contact page that uses a form. You have four tasks in this case study:

1. Create a new folder for this Path of Light Yoga Studio case study.
2. Modify the style sheet (yoga.css) to configure style rules for the new form.
3. Create the Contact page shown in [Figure 9.42](#).

## Figure 9.42

The screenshot shows a web browser window for the 'Path of Light Yoga Studio' website. The title bar reads 'Path of Light Yoga Studio :: Contact'. The main content area has a teal header with the text 'Path of Light Yoga Studio' and a purple lotus flower image on the right. Below the header is a sidebar with buttons for 'Home', 'Classes', 'Schedule', and 'Contact', where 'Contact' is highlighted. The main content area is titled 'Contact Path of Light Yoga Studio'. It contains three input fields: 'Name:' with an empty input box, 'E-mail:' with an empty input box, and 'Comments:' with a text area. A 'Send Now' button is located below the comments field. At the bottom of the page is a teal footer with the text 'Copyright © 2018 Path of Light Yoga Studio' and 'yourfirstname@yourlastname.com'.

Path of Light Yoga Studio Contact page

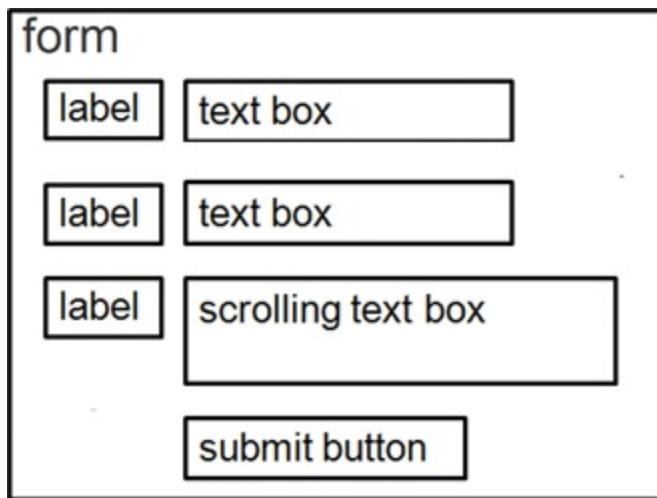
[Figure 9.42 Full Alternative Text](#)

4. Configure HTML5 form controls.

# Hands-On Practice Case Study

- Task 1: The Website Folder. Create a folder called `yoga9`. Copy all of the files from your [Chapter 8](#) `yoga8` folder into the `yoga9` folder.
- Task 2: Configure the CSS. Modify the external style sheet (`yoga.css`). Open `yoga.css` in a text editor. Review [Figure 9.42](#) and the wireframe in [Figure 9.43](#). Notice how the text labels for the form controls are on the left side of the content area but contain right-aligned text. Notice the empty vertical space between each form control. Configure CSS as indicated below:

## Figure 9.43



Wireframe for the form

[Figure 9.43 Full Alternative Text](#)

1. Create a label element selector to float to the left with block display. Set the text alignment to right, font-weight to bold, assign a width of 10em, and configure 1em right padding.
2. Configure the input element and textarea element selectors with

block display and 2em of bottom margin.

3. Configure an id named mySubmit with a 12em left margin.
4. Configure the form element selector with 3em padding.

Save the yoga.css file.

- Task 3: Create the Contact Page. Use the Home page as the starting point for the Contact page. Launch a text editor and open index.html. Save the file as contact.html. Modify your contact.html file to look similar to the Contact page (shown in [Figure 9.42](#)) as follows:
  1. Change the page title to an appropriate phrase.
  2. The Contact page will display a form in the main element. Delete all HTML and content within the main element except for the h2 element and its text.
  3. Change the text in the h2 element to “Contact Path of Light Yoga Studio”.
  4. Prepare to code the HTML for the form area. Begin with a form element that uses the post method and the action attribute to invoke server-side processing. Unless directed otherwise by your instructor, configure the action attribute to send the form data to <http://webdevbasics.net/scripts/yoga.php>.
  5. Configure the form control for the Name information. Create a label element that contains the text “Name:”. Create a text box named myName. Use the for attribute to associate the label element with the form control.
  6. Configure the form control for the E-mail information. Create a label element that contains the text “E-mail:”. Create a text box named myEmail. Use the for attribute to associate the label element with the form control.
  7. Configure the Comments area on the form. Create a label element

that contains the text “Comments:”. Create a textarea element named myComments with rows set to 2 and cols set to 20. Use the for attribute to associate the label element with the form control.

8. Configure the submit button on the form. Configure “Send Now” to display on the button. Assign the input element to the id named mySubmit.
9. Code an ending </form> tag on a blank line after the submit button.

Save your file and test your web page in a browser. It should look similar to the page shown in [Figure 9.42](#). If you are connected to the Internet, submit the form. This will send your form information to the server-side script configured in the form tag. A confirmation page that lists the form information and their corresponding names will be displayed.

- Task 4: Configure HTML5 Form Controls. Get more practice with the new HTML5 elements by modifying the form on the Contact page to use HTML5 attributes and values. Modify the contact.html file in a text editor.
  1. Add a paragraph above the form with the following sentence: “Required information is marked with an asterisk (\*).”
  2. Use the required attribute to require the name, e-mail, and comments form controls to be entered. Add an asterisk at the beginning of each label text.
  3. Configure the input element for the e-mail address with type="email".

Save your file and display your web page in a browser. Submit the form with missing information or only a partial e-mail address. Depending on the browser’s level of HTML5 support, the browser may perform form validation and display an error message. [Figure 9.44](#) shows the Contact page rendered in the Firefox browser with missing required information.

# Figure 9.44

The screenshot shows a web browser window for 'Path of Light Yoga Studio'. The title bar says 'Path of Light Yoga Studio :: Contact'. The main content area has a teal header with the text 'Path of Light Yoga Studio' and a blue water lily image. Below the header is a sidebar with links: Home, Classes, Schedule, and Contact (which is highlighted). The main content area is titled 'Contact Path of Light Yoga Studio' and includes a note: '\* Required information is marked with an asterisk (\*).'. It features three input fields: a text field for Name ('Sparky'), an email field for E-mail ('sp'), and a text area for Comments with placeholder text 'Please enter an email address.' A red border surrounds the comments field, indicating it is required. At the bottom is a 'Send Now!' button and a copyright notice: 'Copyright © 2018 Path of Light Yoga Studio yourfirstsurname@yourlastsurname.com'.

Contact page with HTML5 form controls

## Figure 9.44 Full Alternative Text

This task provided you with additional practice using new HTML5 attributes and values.

# Web Project

See [Chapters 5](#) and [6](#) for an introduction to the Web Project case study. You will either add a form to an existing page in your website or create a new page that contains a form. Use CSS to style the form.

# Hands-On Practice Case Study

1. Choose one of your project web pages to contain the form. Sketch a design of the form you plan to create.
2. Modify your project's external CSS file (project.css) to configure the form areas as needed.
3. Update your chosen web page and add the HTML code for the form.
4. The form element should use the post method and action attributes to invoke server-side processing. Unless directed otherwise by your instructor, configure the action attribute to send the form data to <http://webdevbasics.net/scripts/demo.php>.

Save and test the page. If you are connected to the Internet, submit the form. This will send your form information to the server-side script configured in the form element. A confirmation page that lists the form information and their corresponding names will be displayed.

# **10 Web Development**

# Chapter Objectives

In this chapter, you will learn how to . . .

- Describe the skills, functions, and job roles needed to develop a successful web project
- Utilize the stages in the standard System Development Life Cycle
- Identify other common system development methodologies
- Apply the System Development Life Cycle to the development of web projects
- Identify opportunities and determine goals during the Conceptualization phase
- Determine information topics and site requirements during the Analysis phase
- Create the site map, page layout, prototype, and documentation as part of the Design phase
- Complete the web pages and associated files during the Production phase
- Verify the functionality of the website and use a test plan during the Testing phase
- Obtain client approval and launch a website
- Modify and enhance the website during the Maintenance phase
- Compare the goals of the website to the results as part of the Evaluation phase

- Find the right web hosting provider for your website
- Choose a domain name for your website

This chapter discusses the skills needed for successful large-scale project development and introduces you to common web development methods, choosing a domain name, and options for hosting a website.

# **10.1 Successful Large-Scale Project Development**

Large-scale projects are not completed by only one or two individuals. They are created by a group of people working together as a team. The job roles of project manager, information architect, marketing representative, copywriter, editor, content manager, graphic designer, database administrator, network administrator, and web developer/designer are usually needed for large projects. In smaller companies or organizations, each person can wear many hats and juggle his or her job roles. For a smaller-scale project, one of the web developers may double as the project manager, web designer, graphic designer, database administrator, and/or information architect. It is important to realize that each project is unique; each has its own needs and requirements. Choosing the right people to work on a web project team can make it or break it.

## **Project Job Roles**

### **Project Manager**

The project manager oversees the website development process and coordinates team activities. The project manager creates the project plan and schedule. This individual is accountable for reaching project milestones and producing results. Excellent organizational, managerial, and communication skills are required.

### **Information Architect**

The information architect clarifies the mission and goals of the site; assists in

determining the functionality of the site; and is instrumental in defining the site organization, navigation, and labeling. Web developers and/or the project manager sometimes take on this role.

## User Experience Designer

User experience (UX) is the user's interaction with a product, application, or website. A user experience designer, referred to as a **UX designer**, focuses on the user's interaction with the website. The UX designer may be involved with prototypes, conduct usability testing, and in some cases may work with information architecture. In a small project the project manager, web developer, or web designer may also take on the role of a UX designer.

## Marketing Representative

The marketing representative handles the organization's marketing plan and goals. He or she works with the web designers to create a web presence, or a look and feel, that aligns with the marketing goals of the organization. The marketing representative also helps to coordinate the website with other media used for marketing, such as print, radio, and television marketing.

## Copywriter and Editor

The copywriter prepares and evaluates copy. When material from existing brochures, newsletters, and white papers will be used on the website, it must be repurposed or reworked for the web media. An editor may work with the copywriter to check the text for correct grammar and consistency.

## Content Manager

The content manager participates in the strategic and creative development

and enhancement of the website. He or she oversees changes in content. The skill set of a successful content manager includes editing, copywriting, marketing, technology, and communications. The person in this dynamic job role must be able to facilitate change.

## Graphic Designer

The graphic designer determines the appropriate use of color and graphics on the site, designs wireframes and page layouts, creates logos and graphic images, and optimizes images for display on the Web.

## Database Administrator

A database administrator is needed if the site accesses information stored in databases. Database administrators create databases, create procedures to maintain databases (including backup and recovery), and control access to databases.

## Network Administrator

The network administrator configures and maintains the web server, installs and maintains system hardware and software, and controls access security.

## Web Developer/Web Designer

The job titles of web developer and web designer are often used interchangeably, but typically a web developer has more of a coding and scripting focus and a web designer has more of a design and graphics focus. The **web designer** writes HTML and CSS code and may fulfill some graphic designer job duties, such as determining the appropriate use of color, designing wireframes and page layouts, creating logos and graphics, and

optimizing images for display on the Web. The web developer, sometimes referred to as a **front-end web developer**, writes HTML, CSS, and client-side scripting such as JavaScript. Some web developers may specialize in writing server-side scripting with database access. Typically, there are multiple web designers and web developers assigned to a large project, each with his or her area of expertise.

## Project Staffing Criteria

Whether the project is large or small, finding the right people to work on it is crucial. When selecting staff for a project, consider each individual's work experience, portfolio, formal education, and industry certifications.

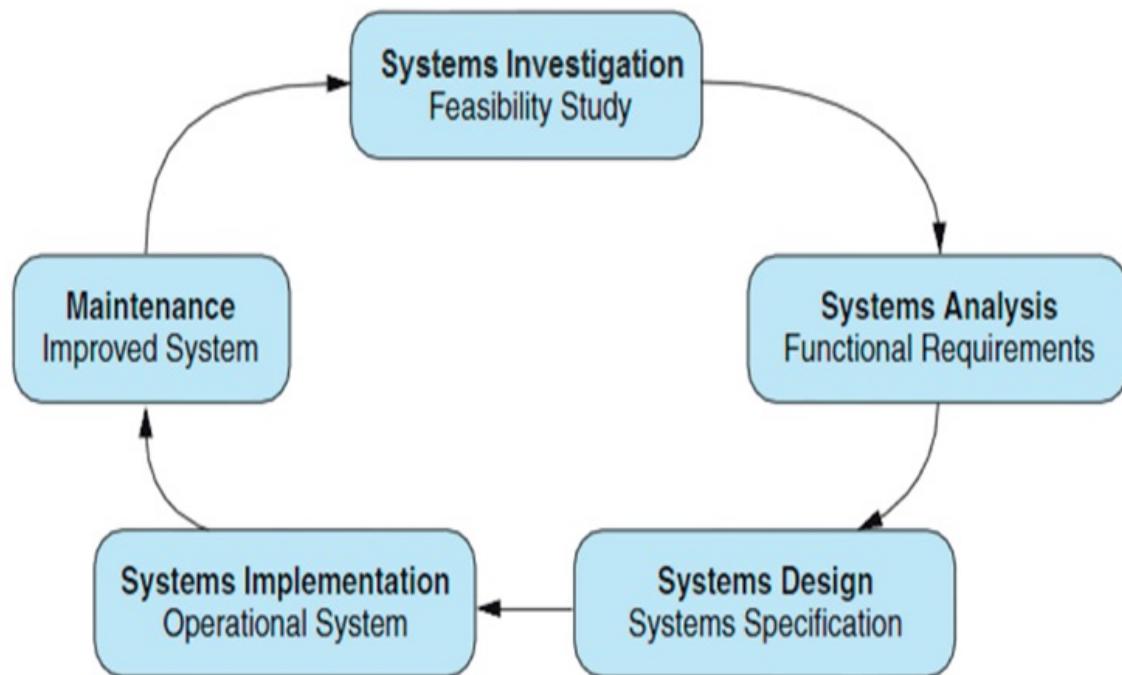
Another option for staffing a web project (or developing an entire website) is to outsource the project—that is, hire another company to do the work for you. Sometimes portions of a project are outsourced, such as graphics creation, multimedia animation, or server-side scripting. When this option is chosen, communication between the project manager and the external organization is crucial. The outsourcing team needs to be aware of the project goals and deadlines.

Large or small, developed in-house or outsourced, the success of a website project depends on planning and communication. Formal project development methodology is used to coordinate and facilitate the planning and communication needed for a successful web project.

## 10.2 The Development Process

Large corporate and commercial websites don't just happen. They are carefully built, usually by following a project development methodology. A methodology is a step-by-step plan that encompasses the life cycle of a project from start to finish. It comprises a series of phases, each having specific activities and deliverables. Most modern methodologies have their roots in the System Development Life Cycle (SDLC), a process that has been used for several decades to build large-scale information systems. The SDLC comprises a set of phases, sometimes called steps or stages. Each phase is usually completed before beginning the activities in the next phase. The basic phases of the standard SDLC (see [Figure 10.1](#)) are systems investigation, systems analysis, systems design, systems implementation, and maintenance.

**Figure 10.1**



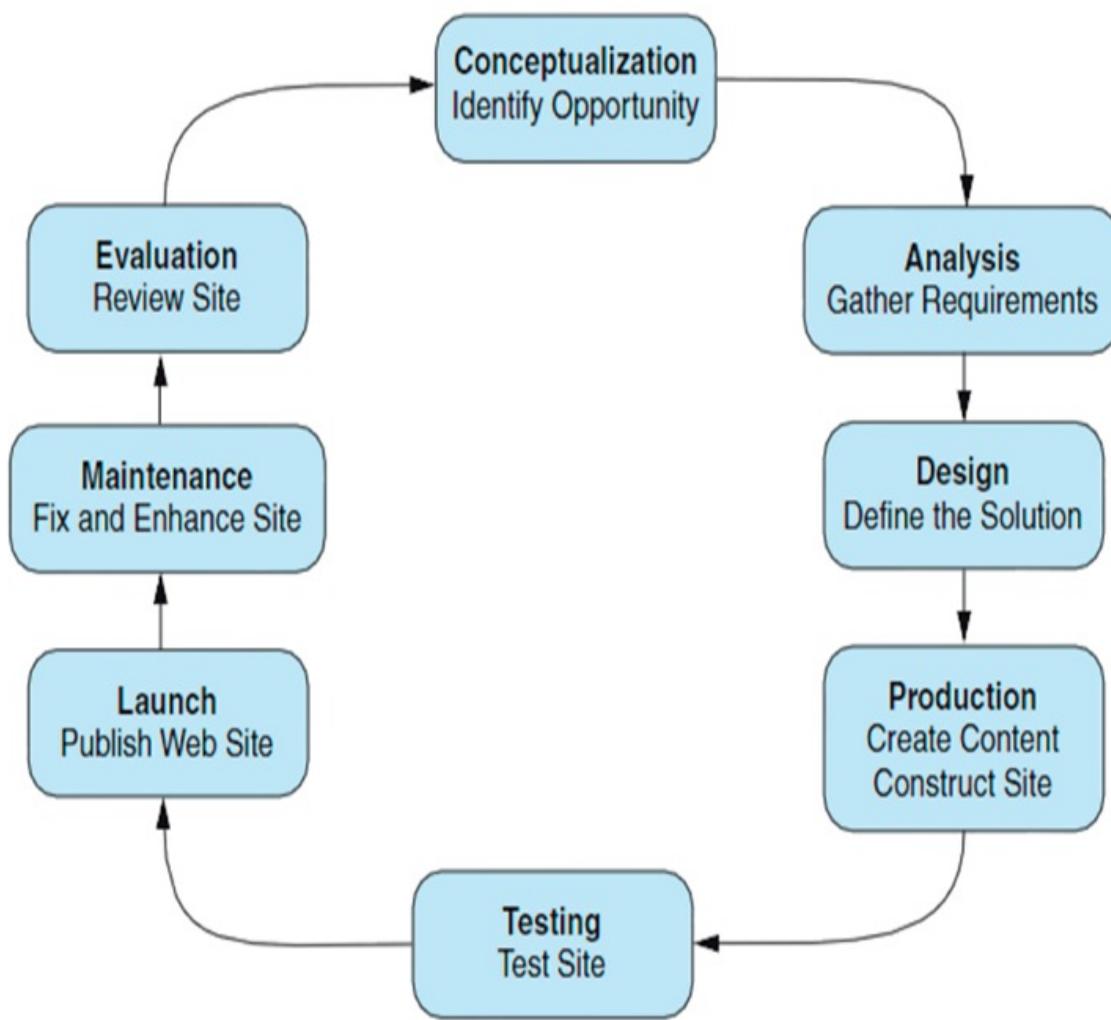
## The System Development Life Cycle (SDLC)

### Figure 10.1 Full Alternative Text

Websites are often developed using a variation of the SDLC that is modified to apply to web projects. Large companies and web design firms usually create their own special methodology for use on projects. The Website Development Cycle is a guide to successful web project management. Depending on the scope and complexity of a particular project, some steps can be completed in a single meeting; other steps can take weeks or months.

The Website Development Cycle, shown in [Figure 10.2](#), usually consists of the following steps: Conceptualization, Analysis, Design, Production, Testing, Launch, Maintenance, and Evaluation.

## Figure 10.2



## The Website Development Cycle

[Figure 10.2 Full Alternative Text](#)



## FAQ

1. What about other development methodologies?

The development methodology presented in this chapter is a version of

the traditional SDLC modified for website development. Other development methods include the following:

- Prototyping. A small working model is created and shown to the client. It is continually revised by the developer until it is usable for the intended purpose. This method can easily be included in the Website Development Cycle during the Design phase.
- Spiral System Development. This is excellent for very-large-scale or phased projects where it is important to reduce risk. Small portions of the project are completed one after another in a spiral system of development.
- Joint Application Development (JAD). This type of development focuses on group meetings and collaboration between the users and developers of a website or system. It is generally used only with in-house development.
- Agile Software Development. This development methodology is viewed as innovative in that it stresses responsiveness based on generating and sharing knowledge within a development team and with the client. The philosophy emphasizes code over documentation and results in the project being developed in many small, iterative steps.
- Organization-Specific Development Methodologies. Large companies and web development firms often create their own version or interpretation of a site development methodology to be used for projects.

An important aspect of website development is that you are never finished—your site needs to be kept fresh and up-to-date, there will be errors or omissions that need to be corrected, and new components and pages will be needed. The first step is to decide why the website is needed in the first place.

# Conceptualization

What opportunity or issue is the site addressing? What is the motivation for the site? Perhaps your client owns a retail store and wishes to sell products over the Internet. Perhaps your client's competitor just launched a website and your client needs to create one just to keep up. Perhaps you have a great idea that will be the next eBay!

Because the focus of your work is to make the site usable and appealing to your target audience, you must determine the site's intended audience. It is crucial to be aware of who your audience is and what their preferences are.

Another task during conceptualization is to determine the site's long-term and short-term goals or mission. Perhaps a short-term goal is simply to publish a home page. Perhaps a long-term goal is for 20% of a company's product sales to be made on the website or you may simply want a certain number of website visitors each month. Whatever they are, it is better if the objectives are measurable. Decide how you will measure the success (or - failure) of your website.

Determining the purpose and goals of a site is usually done with the cooperation of the client, project manager, and information architect. In a formal project environment, a document that details the results of this step is created and then approved by the client before development can proceed.

## Analysis

The Analysis phase involves meetings and interviews with key client personnel. Analysis is usually completed by the project manager, information architect or other analyst, and the client's marketing representative and related personnel. The network administrator and database administrator may be interviewed depending on the scope of the project. Common tasks completed during the Analysis phase are as follows:

- Determine Information Topics. Organize the information to be presented on the site into categories and create a hierarchy. These information topics will be used later as a starting point for developing the site navigation.

- Determine Functionality Requirements. State what the site will do, not how it will do it. For example, state that “the site will accept credit card orders from customers,” not “the site will perform order processing using PHP to look up each price and sales tax information in MySQL databases and use real-time credit card verification supplied by somewebsite.com.” Note the difference in the level of detail in these functionality requirements.
- Determine Environmental Requirements. What environmental requirements, such as hardware, operating system, memory capacity, screen resolution, and bandwidth, will your site visitors use? What type of hardware and software requirements will the web server need?
- Determine Content Requirements. Does content already exist in another format (for example, brochures, catalogs, white papers)? Determine who is responsible for creating and repurposing the content for the site. Does the client company or marketing department have any content requirements that must be met? For example, is there a specific visual aesthetic or corporate branding component that must be present on the site?
- Compare the Old Approach to the New Approach. Perhaps you are not creating a new website, but modifying an existing one. What benefits or added value will the new version provide?
- Review Your Competitors’ Sites. A careful review of your competitors’ web presence will help you design a site that will stand out from the crowd and be more appealing to your shared customer base. Note the good and bad components of these sites.
- Estimate Costs. Create an estimate of the costs and time involved to create the site. A formal project plan is often created or modified at this point. Often, an application such as Microsoft Project is used to estimate costs and plan project schedules.
- Do a Cost/Benefit Analysis. Create a document that compares the costs and benefits of the site. Measurable benefits are the most useful and most appealing to clients. In a formal project environment, a document

that details the results of this cost/benefit analysis must be approved by the client before the team can proceed.

# Design

Once everyone knows what is needed, it is time to determine how it can be accomplished. The Design phase involves meetings and interviews with key client personnel. Design tasks are usually completed by the project manager, information architect or other analyst, graphic designer(s), senior web developer(s), and the client's marketing representative and related personnel. Common tasks during the Design phase include the following:

- Choose a Site Organization. As discussed in [Chapter 5](#), common website organizational forms are hierarchical, linear, and random. Determine which is best for the project site and create a site map.
- Design the Prototype. As a starting point, sketch out the design on paper. Sometimes it's useful to sketch within an empty browser frame (see sketch.doc in the student files chapter10 folder). Often, a graphics application is used to create sample web page mock-ups, or wireframes. These can be shown to clients as a prototype, or working model, of the system for approval. They can also be shown to focus groups for usability testing.
- Design a Page Layout. Determine the visual aesthetic and layout with wireframes and sample page mock-ups. Items such as the site color scheme, the size of logo graphics, button graphics, and text should be determined. Using the page layout design and site map, create sample layouts for the home page and content pages. Use a graphic application to create mock-ups of these pages to get a good idea of how the site will function. If you use a web authoring tool at this early stage, you run the risk of your manager or client thinking that you already have the site half done and insisting on early delivery.
- Document Each Page. While this may seem unnecessary, lack of content is a frequent cause of website project delays. Prepare a content

sheet for each page, such as the one shown in [Figure 10.3](#) (see chapter10/contentsheet.doc in the student files), which describes the functionality of the document, text and graphic content requirements, source of content, and approver of content.

## Figure 10.3

<b>Content Documentation</b>	
<b>Page Title:</b>	
<b>File Name:</b>	
<b>Purpose of Page</b>	
<b>Suggested Graphic Elements</b>	
<b>Other Special Features</b>	
<b>Information Needs</b>	
<b>Information Sources</b>	
<hr/>	
<b>Content Providers</b>	
<i>List name, e-mail, and phone number of each content provider</i>	
<b>File Format of Content</b>	
<b>Date Required:</b>	
<b>Date Provided:</b>	
<b>Content Approval</b> _____	

Sample content sheet

### [Figure 10.3 Full Alternative Text](#)

The site map and page design prototypes are usually approved by the client before the team can progress to the Production phase.

# Production

During production, all the previous work comes together (hopefully) in a usable and effective website. During the Production phase, the web designers and web developers are on the critical path—their work must be completed as scheduled or the project will be late. The other project members are consulted, as needed, for clarification and approval. Common tasks of the Production phase include the following:

- Choose a Web Authoring Tool. The use of a web authoring tool, such as Adobe Dreamweaver, can greatly increase productivity. Specific productivity aids include designer notes, page templates, task management, and web page check-in and check-out to avoid overlapping page updates. The use of an authoring tool will serve to standardize the HTML used in the project pages. Any standards related to indentation, comments, and so on should be determined at this time.
- Organize Your Site Files. Consider placing images and media in their own folder. Also, place server-side scripts in a separate folder. Determine naming conventions for web pages, images, and media.
- Develop and Individually Test Components. During this task, the graphic designers and web developers create and individually test their contributions to the site. As the images, web pages, and server-side scripting are developed, they are individually tested. This is called unit testing. On some projects, a senior web developer or the project manager will review the components for quality and standards compliance.

Once all components have been created and unit tested, it's time to put them together and begin the Testing phase.

# Testing

The components should be published to a test web server. This test web server should have the same operating system and web server software that

the production (actual) web server will be using. Some common site testing considerations follow:

- Test on Different Browsers and Browser Versions. It is very important to test your pages on commonly used browsers and versions of those browsers.
- Test with Different Screen Resolutions. Although, as a web developer, you may use a very high screen resolution, not everyone uses  $2560 \times 1440$  screen resolution. The most commonly used screen resolutions at the time of this writing are  $1366 \times 768$ ,  $1920 \times 1080$ , and  $1024 \times 768$ . Be sure to test your web pages on various resolutions—you might be surprised at the results.
- Test Using Different Bandwidths. If you live and work in a metropolitan area, everyone you know may have broadband access to the Internet. However, many people still use dial-up connections to access the Web. It is important to test your site on both slow and fast connections. Images that look great over your school's T3 line may load very slowly over a mobile hotspot.
- Test from Another Location. Be sure to test your website using a computer other than the one the website was developed on, in order to simulate the web page visitor's experience more closely.
- Test Using Mobile Devices. Mobile use of the Web is increasing all the time—test your site on one or more of the currently popular smartphones. Visit <https://www.browserstack.com/test-on-the-right-mobile-devices> for a list of popular mobile devices. See [Chapter 7](#) for mobile web testing tools.
- Test, Test, Test. There is no such thing as too much testing. Humans make mistakes. It is much better for you and your team to find the errors than for your client to point them out to you when they review the website.

Does this sound like a lot to keep track of? It is. That's why it's a good idea to create a test plan, which is a document that describes what will be tested on

each page of a website. A sample test plan for a web page, shown in [Figure 10.4](#) (see chapter10/testplan.pdf in the student files), can help you organize your testing as you check your document in different browsers and screen resolutions. The document validation section covers content, links, and any forms or scripting that are required for the page. Search engine optimization meta tags are discussed in [Chapter 13](#). However, at this point, you should be able to verify that the page title is descriptive and includes the company or organization's name. Testing your page using different bandwidths is important because web pages that take too long to download are often abandoned.

## Figure 10.4

Web Page Document Test Plan											
File Name:									Date:		
Page Title:									Tester:		
Browser Compatibility											
	1024x768	1366x768	1920x1080	Other	PC	Mac	Linux	Images Disabled	CSS Disabled	Other	Notes
Internet Explorer (Version #)											
Microsoft Edge (Version #)											
Firefox (Version #)											
Safari (Version #)											
Opera (Version #)											
Chrome (Version #)											
JAWS Screen Reader											
Tablet (Device Name)											
Smartphone (Device Name)											
Other											
Document Validation											Search Engine Optimization
	Pass	Fail	Notes								Notes
HTML Validation											Meta tag (description)
CSS Validation											Keywords in page title
Check Spelling											Keywords in headings
Check for Required Content											Keywords in content
Check for Required Graphics											Other
Check alt Attributes											Download Time Check
Test Hyperlinks											Time
Accessibility Testing											Notes
Form Processing											56.6Kbps
Scripting/Dynamic Effects											128Kbps
Usability Testing											512Kbps
Other											T1/DS1 (1.544Mbps)
Notes											Other

Sample test plan

[Figure 10.4 Full Alternative Text](#)

## Automated Testing Tools and Validators

The web authoring tool you use for your project will provide some built-in site reporting and testing features. Web authoring applications such as Adobe Dreamweaver provide functions such as spell-check, link checks, and load time calculations. Each application has unique features. Dreamweaver's

reporting includes link checking, accessibility, and code validation. There are other automated testing tools and validators available. The W3C Markup Validation Service (<http://validator.w3.org>) can be used to validate both HTML and XHTML. Test CSS for proper syntax using the W3C CSS Validation Service (<http://jigsaw.w3.org/css-validator>). Analyze the download speed of your page using the Web Page Analyzer (<http://www.websiteoptimization.com/services/analyze>).

## Accessibility Testing

**Accessible** web pages can be used by all individuals, including those with visual, hearing, mobility, and cognitive challenges. As you've worked through this book, accessibility has been an integral part of your web page design and coding rather than an afterthought. You've configured headings and subheadings, navigation within unordered lists, images with alternate text, and associations between text and form controls. These techniques all increase the accessibility of a web page.



## Web Accessibility Standards

- Section 508 of the Rehabilitation Act. Section 508 (<http://www.access-board.gov/sec508/guide/1194.22.htm>) requires electronic and information technology, including web pages, that are used by U.S. federal agencies to be accessible to people with disabilities. The U.S. Access Board released a revision of Section 508 requirements (referred to as the Section 508 Refresh) in January 2017. The Section 508 refresh updates Section 508 requirements to harmonize with WCAG 2.0 Success Criteria.

- Web Content Accessibility Guidelines (WCAG 2.0). WCAG 2.0 (<http://www.w3.org/TR/WCAG20>) considers an accessible web page to be perceivable, operable, and understandable for people with a wide range of abilities. The page should be robust enough to work with a variety of browsers and other user agents, such as assistive technologies (for example, screen readers) and mobile devices. The guiding principles of WCAG 2.0 are known as POUR:

1. Content must be **Perceivable**.
2. Interface components in the content must be **Operable**.
3. Content and controls must be **Understandable**.
4. Content should be **Robust** enough to work with current and future user agents, including assistive technologies.

Prove your compliance with accessibility standards by performing accessibility testing on your site. A complete list of WCAG 2.0 Success Criteria is provided at <https://www.w3.org/WAI/WCAG20/quickref>. As a starting point, go through the Easy Checks listed at <https://www.w3.org/WAI/eval/preliminary>. There are a variety of automated accessibility checkers available. WebAIM Wave (<http://wave.webaim.org>) and ATRC AChecker (<http://www.achecker.ca/checker>) are two popular free online accessibility evaluation tools. The Web Developer Extension (<http://chrispederick.com/work/web-developer>) is a browser toolbar that can be used to assess accessibility of a web page.

It's important not to rely completely on automated tests—you'll want to review the pages yourself. For example, while an automated test can check for the presence of an alt attribute, it takes a human to critically think and decide whether the text of the alt attribute is an appropriate description for a person who cannot view the image.

## Usability Testing

**Usability** is the measure of the quality of a user's experience when interacting with a website. It's about making a website that is easy, efficient, and pleasant for your visitors. Usability.gov (<http://www.usability.gov/what-and-why/usability-evaluation.html>) describes factors that affect the user's experience:

- Intuitive Design. How easy is it for a new visitor to understand the organization of the site? Is the navigation intuitive for a new user?
- Ease of Learning. How easy is it to learn to use the website? Does a new visitor consider it easy to learn to perform basic tasks on the website or is he or she frustrated?
- Efficiency of Use. How do experienced users perceive the website? Once they are comfortable, are they able to complete tasks efficiently and quickly or are they frustrated?
- Memorability. When a visitor returns to a website, does he or she remember enough to use it productively or is the visitor back at the beginning of the learning curve (and frustrated)?
- Error Frequency and Severity. Do website visitors make errors when navigating or filling in forms on the website? Are they serious errors? Is it easy to recover from errors or are visitors frustrated?
- Subjective Satisfaction. Do users like using the website? Are they satisfied? Why or why not?

Testing how actual web page visitors use a website is called **usability testing**. It can be conducted at any phase of a website's development and is often performed more than once. A usability test is conducted by asking users to complete tasks on a website, such as placing an order, looking up the phone number of a company, or finding a product. The exact tasks will vary depending on the website being tested. The users are monitored while they try to perform these tasks. They are asked to think out loud about their doubts and hesitations. The results are recorded and discussed with the web design team. Often, changes are made to the navigation and page layouts based on these tests. Perform the small-scale usability test in [Hands-On Exercise 5](#) at

the end of this chapter to become more familiar with this technique.

If usability testing is done early in the development phase of a website, it may use the paper page layouts and site map. If the development team is struggling with a design issue, sometimes a usability test can help to determine which design idea is the better choice. When usability is done during a later phase, such as the Testing phase, the actual website is tested. This can lead to confirmation that the site is easy to use and well designed, to last minute changes in the website, or to a plan for website enhancements in the near future.

## Launch

Your client—whether another company or another department in your organization—needs to review and approve the test website before the files are published to the live site. Sometimes this approval takes place at a face-to-face meeting. Other times, the test URL is given to the client and the client e-mails approval or requested changes.

Once the test website has been approved, it is published to your live production website (this is called a launch). If you think you are finished, think again! It is crucial to test all site components after publishing to make sure the site functions properly in its new environment. Marketing and promotional activities for the website (see [Chapter 13](#)) usually take place at this time.

## Maintenance

A website is never finished. There are always errors or omissions that were overlooked during the development process. Clients usually find many new uses for a website once they have one and request modifications, additions, and new sections (this is called site maintenance). At this point, the project team identifies the new opportunity or enhancement and begins another loop through the development process.

Other types of updates needed may be relatively small—perhaps a link is broken, a word is misspelled, or a graphic needs to be changed. These small changes are usually made as soon as they are noticed. The question of who makes the changes and who approves them is often a matter of company policy. If you are a freelance web developer, the situation is more straightforward—you will make the changes and your client will approve them.

## Evaluation

Remember the goals set for the website in the Conceptualization phase? During the evaluation phase, it's time to review them and determine whether your website meets them. If not, consider how you can enhance the site and begin another loop through the development process.



### Checkpoint 10.1

1. Describe the role of the project manager.
2. Explain why many different roles are needed on a large-scale web project.
3. List three different techniques used to test a website. Describe each technique in one or two sentences.

## 10.3 Domain Name Overview

A crucial part of establishing an effective web presence is choosing a domain name; it serves to locate your website on the Internet. If your business or organization is new, then it's often convenient to select a domain name while you are deciding on a company name. If your organization is well established, choose a domain name that relates to your existing business presence. Although many domain names have already been purchased, there are still a lot of available options.



**VideoNote** Choosing a Domain Name

### Choosing a Domain Name

- **Describe Your Business.** Although there is a long-standing trend to use “fun” words as domain names (for example, yahoo.com, google.com, bing.com, woofoo.com, and so on), think carefully before doing so. Domain names for traditional businesses and organizations are the foundation of the organization’s web presence and should include the business name or purpose.
- **Be Brief, If Possible.** While most people find new websites with search engines, some of your website visitors will type your domain name in a browser. A shorter domain name is preferable to a longer one—it’s easier for your visitors to remember.
- **Avoid Hyphens (-).** Using the hyphen character (commonly called a dash) in a domain name makes it difficult to pronounce the name. Also, someone typing your domain name may forget the dash and end up at a competitor’s site! If you can, avoid the use of dashes in a domain name.
- **There’s More Than .com.** While the .com top-level domain name

(TLD) is still the most popular for commercial and personal websites, consider also registering your domain name with other TLDs, such as .biz, .net, .us, .mobi, and so on. Commercial businesses should avoid the .org TLD, which is the first choice for nonprofit organizations. You don't have to create a website for each domain name that you register. You can arrange with your domain name registrar (for example, Register.com [<http://www.register.com>]) for the extra domain names to point visitors to the domain name where your website is located. This is called domain name redirection.

- Brainstorm Potential Keywords. Think about words that a potential visitor might type into a search engine when looking for your type of business or organization. This is the starting point for your list of keywords. If possible, work one or more keywords into your domain name (but still keep it as short as possible).
- Avoid Trademarked Words or Phrases. The U.S. Patent and Trademark Office (USPTO) defines a trademark as a word, phrase, symbol, or design, or a combination of words, phrases, symbols, or designs, that identifies and distinguishes the source of the goods of one party from those of others. A starting point in researching trademarks is the USPTO Trademark Electronic Search System (TESS); visit <http://tess2.uspto.gov>. See <http://www.uspto.gov> for more information about trademarks.
- Know the Territory. Explore the way your potential domain name and keywords are already used on the Web. It's a good idea to type your potential domain names (and related words) into a search engine to see what may already exist.
- Verify Availability. Check with one of the many domain name registrars to determine whether your domain name choices are available. A few of the many sites that offer domain name registration services are listed below:
  - Register.com: <http://www.register.com>
  - Network Solutions: <http://www.networksolutions.com>

- GoDaddy.com: <http://www.godaddy.com>

Each of these sites offers a search feature that provides you with a way to determine whether a potential domain name is available, and if it is owned, who owns it. Often the domain name is already taken. If that's the case, the sites listed previously will provide you with alternate suggestions that may be appropriate. Don't give up; a domain name is out there waiting for your business.

## Registering a Domain Name

Once you've found your perfect domain name, don't waste any time in registering it. The cost to register a domain name varies, but it is quite reasonable. There are numerous opportunities for discounts with multiyear packages or bundled web hosting services. It's perfectly okay to register a domain name even if you are not ready to publish your website immediately. There are many companies that provide domain name registration services, as listed previously. When you register a domain name, your contact information (your name, phone number, mailing address, and e-mail address) will be entered into the WHOIS database and is available to anyone unless you choose the option for private registration. While there is usually a small annual fee for **private registration**, it shields your personal information from unwanted spam and curiosity seekers.

Obtaining a domain name is just one part of establishing a web presence. You also need to host your website somewhere. The next section introduces you to the factors involved in choosing a web host.

# **10.4 Web Hosting**

Where is the appropriate place for your web project to “live”? Choosing the most appropriate web hosting provider for your business or client could be one of the most important decisions you make. A good web hosting service will provide a robust, reliable home for your website. A poor web hosting service will be a source of problems and complaints. Which would you prefer?

## **Web Hosting Providers**

A web hosting provider is an organization that offers storage for your website files along with the service of making them available on the Internet. Your domain name, such as `webdevfoundations.net`, is associated with an IP address that points to your website on the web server at the web hosting provider. It is common for web hosting providers to charge a setup fee in addition to the monthly hosting fee.

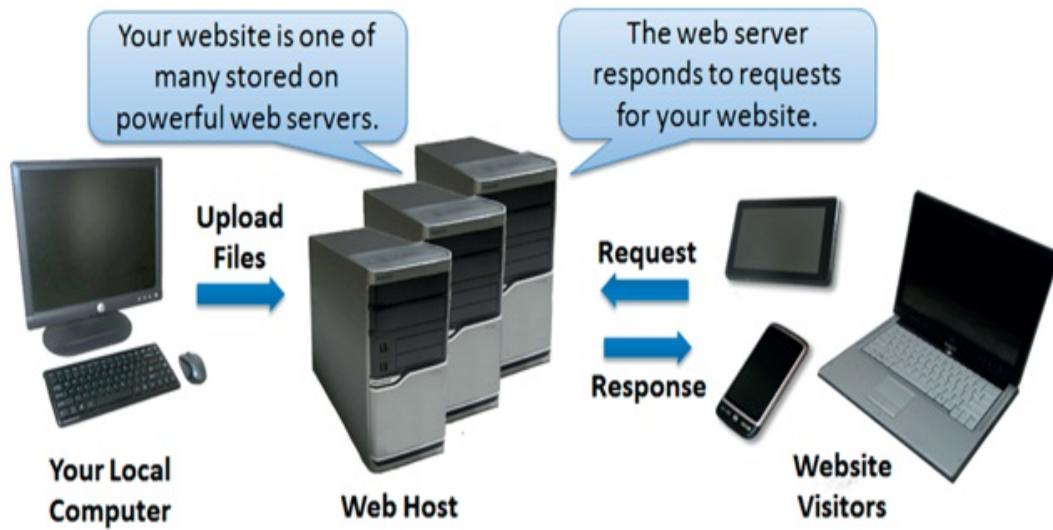
Hosting fees vary widely. The cheapest hosting company is not necessarily the one to use. Never consider using a free web hosting provider for a business website. These free sites are great for kids, college students, and hobbyists, but they are unprofessional. The last thing you or your client wants is to be perceived as unprofessional or not serious about the business at hand. As you consider different web hosting providers, try contacting their support phone numbers and e-mail addresses to determine just how responsive they really are. Word of mouth, web searches, and online directories such as [Hosting Review](http://www.hosting-review.com) (<http://www.hosting-review.com>) are all resources in your quest for the perfect web hosting provider.

## **Types of Web Hosting**

- Virtual Hosting, or shared hosting, is a popular choice for small websites

([Figure 10.5](#)). The web hosting provider's physical web server is divided into a number of virtual domains and multiple websites are set up on the same computer. You have the authority to update files in your own website space, while the web hosting provider maintains the web server computer and Internet connectivity.

## Figure 10.5



Virtual web hosting

[Figure 10.5 Full Alternative Text](#)

- **Dedicated Hosting** is the rental and exclusive use of a computer and connection to the Internet that is housed on the web hosting company's premises. A dedicated server is usually needed for a website that could have a considerable amount of traffic, such as tens of millions of hits a day. The server can usually be configured and operated remotely from the client's company, or you can pay the web hosting provider to administer it for you.
- **Co-Located Hosting** uses a computer that your organization has purchased and configured. Your web server is housed and connected to the Internet at the web host's physical location, but your organization

typically administers this computer.

# 10.5 Choosing a Virtual Host

A number of factors to consider when choosing a web host have been discussed, including bandwidth, disk storage space, technical support, and the availability of e-commerce packages. For a handy list of these factors and others to consider in your quest for a virtual web host, review the web host checklist shown in [Table 10.1](#).

## Table 10.1 Web host checklist

Operating System	<input type="checkbox"/> UNIX <input type="checkbox"/> Linux <input type="checkbox"/> Windows	Some web hosts offer a choice of these platforms. If you need to integrate your website with your business systems, choose the same operating system for both.
Web Server	<input type="checkbox"/> Apache <input type="checkbox"/> IIS	These two web server applications are the most popular. Apache usually runs on a UNIX or Linux operating system. Internet Information Services (IIS) is bundled with selected versions of Microsoft Windows.
Bandwidth	<input type="checkbox"/> GB per month <input type="checkbox"/> Charge for overage	Some web hosts carefully monitor your data transfer bandwidth and charge you for overages. While unlimited bandwidth is great, it is not always available. A typical low-traffic website may transfer between 100 and 500MB per month. A medium-traffic site should be okay with

about 20GB of data transfer bandwidth per month.

Technical Support	<input type="checkbox"/> E-mail <input type="checkbox"/> Chat <input type="checkbox"/> Forum <input type="checkbox"/> Phone	Review the description of technical support on the web host's site. Is it available 24 hours a day, 7 days a week? E-mail or phone a question to test it. If the organization is not responsive to you as a prospective customer, be leery about the availability of its technical support later.
Service Agreement	<input type="checkbox"/> Uptime guarantee <input type="checkbox"/> Automatic monitoring	A web host that offers a Service Level Agreement (SLA) with an uptime guarantee shows that they value service and reliability. The use of automatic monitoring will inform the web host technical support staff when a server is not functioning.
Disk Space	<input type="checkbox"/> GB	Many virtual hosts routinely offer several gigabytes of disk storage space. If you have a small site that is not graphics-intensive, you may never even use 100MB of disk storage space.
E-mail	<input type="checkbox"/> Mailboxes <input type="checkbox"/> FTP Access	Most virtual hosts offer multiple e-mail boxes per site. These can be used to filter messages (customer service, technical support, general inquiries, and so on).  A web host that offers FTP access will allow you the most flexibility. Others

Uploading Files	<input type="checkbox"/> Web-based File Manager	only allow updates through a web-based file manager application. Some web hosts offer both options.
Canned Scripts	<input type="checkbox"/> Form processing	Many web hosts supply canned, pre-written scripts to process form information.
Scripting Support	<input type="checkbox"/> PHP <input type="checkbox"/> .NET <input type="checkbox"/> Other	If you plan to use server-side scripting on your site, determine which, if any, scripting is supported by your web host.
Database Support	<input type="checkbox"/> MySQL <input type="checkbox"/> SQL Server	If you plan to access a database with your scripting, determine which, if any, database is supported by your web host.
E-Commerce Packages	<input type="checkbox"/>	If you plan to enter into ecommerce (see <a href="#">Chapter 12</a> ), it may be easier if your web host offers a shopping cart package. Check to see if one is available.
Scalability	<input type="checkbox"/> Scripting <input type="checkbox"/> Database <input type="checkbox"/> E-commerce	You probably will choose a basic (low-end) plan for your first website. Note the scalability of your web host: Are there other available plans with scripting, database, e-commerce packages, and additional bandwidth or disk space as your site grows?

	<input type="checkbox"/> Daily	Most web hosts will back up your files regularly. Check to see how often the backups are made and if they are accessible to you. Be sure to make your own site backups as well.
Backups	<input type="checkbox"/> Periodic	
	<input type="checkbox"/> No backups	
	<input type="checkbox"/> Raw log file	The web server log contains useful information about your visitors, how they find your site, and what pages they visit. Check to see if the log is available to you. Some web hosts provide reports about the log. See <a href="#">Chapter 13</a> for more information on web server logs.
Site Statistics	<input type="checkbox"/> Log reports	
	<input type="checkbox"/> No log access	
Domain Name	<input type="checkbox"/> Required to register with host	Some web hosts offer a package that includes registering your domain name. However, you will retain control of your domain name account if you register it yourself.
	<input type="checkbox"/> OK to register on your own	
Price	<input type="checkbox"/> \$ setup fee	Price is last in this list for a reason. Do not choose a web host based on price alone—the old adage “you get what you pay for” is definitely true here. It is not unusual to pay a one-time setup fee and then a periodic fee—monthly, quarterly, or annually.
	<input type="checkbox"/> \$ per month	



## FAQ

1. Why do I care about knowing which operating system my web hosting provider uses?

Knowing the operating system used by your web hosting provider is important because it can help you with troubleshooting your website. Often, students' websites work great on their own PC (usually with a Windows-based operating system) but fall apart (with broken links and images that do not load) after being published on a free web server that uses a different operating system.

Some operating systems, such as Windows, treat uppercase and lowercase letters in exactly the same way. Other operating systems, such as UNIX and Linux, consider uppercase and lowercase letters to be different. This is called being **case-sensitive**. For example, when a web server running on a Windows operating system receives a request generated by an anchor tag coded as `<a href="Index.html">Home</a>`, it will return a file named with any combination of uppercase or lowercase letters. File names such as Index.html, index.html, and INDEX.HTML can all be used. However, when the request generated by the same anchor tag is received by a web server running on a UNIX system (which is case-sensitive), the file would only be found if it were really saved as Index.html. If the file were named index.html, a 404 Not Found error would result. This is a good reason to be consistent when naming files; consider always using lowercase letters for file names.



## Checkpoint 10.2

1. Describe the type of web host that would meet the needs of a small

company for its initial web presence.

2. What is the difference between a dedicated web server and a co-located web server?
3. Explain why price is not the most important consideration when choosing a web host.

# Chapter Summary

This chapter introduced the System Development Life Cycle and its application to web development projects. The job roles related to website development were discussed. The chapter also included an introduction to choosing a domain name and a website host provider. Visit the textbook website at <http://www.webdevfoundations.net> for examples, the links listed in this chapter, and updated information.

## Key Terms

- [accessibility testing](#)
- [accessible](#)
- [analysis](#)
- [automated testing](#)
- [case sensitive](#)
- [co-located hosting](#)
- [conceptualization](#)
- [content manager](#)
- [content requirements](#)
- [copywriter](#)
- [cost-benefit analysis](#)
- [database administrator](#)

- [dedicated hosting](#)
- [dedicated web server](#)
- [design](#)
- [domain name](#)
- [domain name redirection](#)
- [domain name registrars](#)
- [editor](#)
- [environmental requirements](#)
- [evaluation](#)
- [front-end web developer](#)
- [functionality requirements](#)
- [graphic designer](#)
- [information architect](#)
- [information topics](#)
- [keywords](#)
- [launch](#)
- [maintenance](#)
- [marketing representative](#)
- [network administrator](#)
- [phases](#)

- [private registration](#)
- [production](#)
- [project manager](#)
- [Service Level Agreement \(SLA\)](#)
- [System Development Life Cycle \(SDLC\)](#)
- [test plan](#)
- [testing](#)
- [trademark](#)
- [unit testing](#)
- [user experience designer](#)
- [usability](#)
- [usability testing](#)
- [UX designer](#)
- [validators](#)
- [virtual hosting](#)
- [web designer](#)
- [web developer](#)
- [web hosting provider](#)
- [web presence](#)
- [web server](#)

# **Review Questions**

## **Multiple Choice**

1. In which phase is a prototype of the website often created?
  1. Design phase
  2. Conceptualization phase
  3. Production phase
  4. Analysis phase
2. Which of the following are included in the role of an information architect?
  1. being instrumental in defining the site organization, navigation, and labeling
  2. attending all meetings and collecting all information
  3. managing the project
  4. none of the above
3. What is the purpose of private registration for a domain name?
  1. It protects the privacy of your website.
  2. It is the cheapest form of domain name registration.
  3. It protects the privacy of your contact information.
  4. none of the above
4. Which methodology is often used by web project teams?

1. the SDLC
  2. a derivative of the SDLC that is similar to the one discussed in this chapter
  3. a methodology that is decided as the project is built
  4. no development methodology is necessary
5. Which of the following should be included when testing a website?
1. checking all of the hyperlinks within the site
  2. viewing the site in a variety of web browsers
  3. viewing the site in a variety of screen resolutions
  4. all of the above
6. What do team members do during the Analysis phase of a website project?
1. determine what the site will do—not how it will be done
  2. determine the information topics of the site
  3. determine the content requirements of the site
  4. all of the above
7. Which of the following occurs during the Production phase?
1. A web authoring tool is often used.
  2. The graphics, web pages, and other components are created.
  3. The web pages are individually tested.
  4. all of the above

8. Which of the following occurs during the Evaluation phase?
  1. The goals for the site are reviewed.
  2. The web designers are evaluated.
  3. The competition is evaluated.
  4. none of the above
9. Which of the following is true about domain names?
  1. It is recommended to register multiple domain names that are redirected to your website.
  2. It is recommended to use long, descriptive domain names.
  3. It is recommended to use hyphens in domain names.
  4. There is no reason to check for trademarks when you are choosing a domain name.
10. Which web hosting option is appropriate for the initial web presence of an organization?
  1. dedicated hosting
  2. free web hosting
  3. virtual hosting
  4. co-located hosting

## Fill in the Blank

11. can be described as testing how actual web page visitors use a website.
12. The determines the appropriate use of graphics on the site and creates

and edits graphics.

13. The operating system(s) treat uppercase and lowercase letters differently.

## Short Answer

14. Why should the websites of competitors be reviewed when designing a website?
15. Why should you try to contact the technical support staff of a web hosting provider before you become one of its customers?

## Hands-On Exercises

1. Skip this exercise if you have completed [Hands-On Practice 2.15](#) in [Chapter 2](#). In this exercise, you will validate a web page. Choose one of the web pages that you have created. Launch a browser and visit the W3C Markup Validation Service (<http://validator.w3.org>). Click on the Validate by File Upload tab. Click the Browse button, select a file from your computer, and click the Check button to upload the file to the W3C site. Your page will be analyzed and a Results page will be generated that shows a report of violations of the doctype that is used by your web page. The error messages display the offending code along with the line number, column number, and a description of the error. Don't worry if your web page does not pass the validation the first time. Many well-known websites have pages that do not validate—even Yahoo! (<http://www.yahoo.com>) had validation errors at the time this was written. Modify your web page document and revalidate it until you see a message that states. "Document checking completed. No errors or warnings to show".

You can also validate pages directly from the Web. Try validating the W3C's home page (<http://www.w3.org>), Yahoo! (<http://www.yahoo.com>), and your school's home page. Visit the W3C

Markup Validation Service (<http://validator.w3.org>) and notice the Validate by URI area. Enter the URL of the web page you would like to validate in the Address text box. Click the Check button and view the results. Experiment with the character encoding and doctype options. The W3C's page should pass the validation. Don't worry if the other pages do not validate. Validation is not required for web pages. However, web pages that pass the validation should display well in most browsers. (Note: If you have published pages to the web, try validating one of them instead of your school's home page.)

2. Run an automated accessibility test on the home page of your school's website. Use both the WebAIM Wave (<http://wave.webaim.org>) and ATRC AChecker (<http://www.achecker.ca/checker>) automated tests. Describe the differences in the way these tools report the results of the test. Did both tests find similar errors? Write a one-page report that describes the results of the tests. Include your recommendations for improving the website.
3. The Web Page Analyzer (<http://www.websiteoptimization.com/services/analyze>) calculates download times for a web page and associated assets, along with providing suggestions for improvement. Visit this site and test your school's home page (or a page assigned by your instructor). After the test is run, a web page speed report will display file sizes and include suggestions for improvement. Print out the browser view of this results page and write a one-page report that describes the results of the test and your own recommendations for improvement.
4. The Dr. Watson site (<http://watson.addy.com>) offers free web page validation. Visit this site and test your school's home page (or a page assigned by your instructor). After the test is run, a report is displayed with categories such as server response, estimated download speed, syntax and style analysis, spell-check, link verification, images, search engine compatibility (see [Chapter 13](#)), site link popularity (see [Chapter 13](#)), and source code. Print out the browser view of this results page and write a one-page report that describes the results of the test and your own recommendations for improvement.

5. Perform a small-scale usability test with a group of other students. Decide who will be the typical users, the tester, and the observer. You will perform a usability test on your school's website.
- The typical users are the test subjects.
  - The tester oversees the usability test and emphasizes that the users are not being tested; the website is being tested.
  - The observer takes notes on the user's reactions and comments.
1. Step 1 The tester welcomes the users and introduces them to the website that they will be testing.
  2. Step 2 For each of the following scenarios, the tester introduces the scenario and questions the users as they work through the task. The tester should ask the users to indicate when they are in doubt, confused, or frustrated. The observer takes notes.
    - Scenario 1: Find the phone number of the contact person for the web development program at your school.
    - Scenario 2: Determine when to register for the next semester.
    - Scenario 3: Find the requirements for earning a degree or certificate in web development or a related area.
  3. Step 3 The tester and the observer organize the results and write a brief report. If this were a usability test for a website that you were developing, the development team would meet to review the results and discuss the necessary improvements to the site.
  4. Step 4 Hand in a report with your group's usability test results. Complete the report using a word processor. Write no more than one page about each scenario. Write one page of recommendations for improving your school's website.

*Note:* For more information on usability testing, see  
<http://www.usability.gov/how-to-and-tools/methods/running->

usability-tests.html and Keith Instone's classic presentation at <http://instone.org/files/KEI-Howtotest-19990721.pdf>. Another good resource is Steven Krug's book, *Don't Make Me Think*.

6. See the description of usability testing in [Hands-On Exercise 5](#). In a small group, perform usability tests on two similar websites, such as the following:
  - Barnes and Noble (<http://www.bn.com>) and Powell's Books (<http://powells.com>)
  - AccuWeather.com (<http://acuweather.com>) and Weather Underground (<http://www.wunderground.com>)
  - Runner's World (<http://www.runnersworld.com>) and Cool Running (<http://www.coolrunning.com>)

Select and list three scenarios to test. Decide who will be the users, the tester, and the observer. Follow the steps listed in [Hands-On Exercise 5](#).

7. Pretend that you are on a job interview. Choose a role on a web project team that interests you. In three or four sentences, describe why you would be an excellent addition to a web development team in that role.

## Web Research

1. This chapter discussed options for hosting websites. In this research exercise, you will search for web hosting providers and report on three that meet the following criteria:
  - Support PHP and MySQL.
  - Offer e-commerce capabilities.
  - Provide at least 1GB disk space.

Use your favorite search engine to find web hosting providers or visit

web host directories such as Hosting Review (<http://www.hosting-review.com>) and HostIndex.com (<http://www.hostindex.com>). The web server survey results provided by Netcraft (<http://uptime.netcraft.com/perf/reports/Hosters>) may also be useful. Create a web page that presents your findings. Include links to your three web hosting providers. Your web page should include a table of information such as the setup fees, monthly fees, domain name registration costs, amount of disk space, type of e-commerce package, and cost of e-commerce package. Use color and graphics appropriately on your web page. Place your name and e-mail address at the bottom of your web page.

2. This chapter discussed the different job functions that are needed to develop large websites. Choose a job role that interests you. Search for information about available jobs in your geographical area. Search for technology jobs with your favorite search engine or visit a job site such as Monster.com (<http://www.monster.com>), Dice (<http://www.dice.com>), Indeed (<http://www.indeed.com>), or CareerBuilder.com (<http://www.careerbuilder.com>) and search for your desired location and job type. Find three possible job positions that interest you and report on them. Create a web page that includes a brief description of the job role you have chosen, a description of the three available positions, a description of the types of experience and/or educational background required for the positions, and the salary range (if available). Use color and graphics appropriately on your web page. Place your name and e-mail address at the bottom of your web page.

## Focus on Web Design

1. The U.S. Department of Health and Human Services provides a collection of researched-based usability guidelines at <https://webstandards.hhs.gov/guidelines/>. The website suggests guidelines for a variety of topics organized into chapters, including navigation, text appearance, scrolling and paging, writing content, usability testing, and accessibility. Choose one chapter topic that interests you. Read the chapter. Note four guidelines that you find

intriguing or useful. In a one-page report, describe why you chose the chapter topic and the four guidelines you noted.



## WEBSITE CASE STUDY

### Testing Phase

This case study continues throughout the rest of the text. In this chapter, you will test the Web Project case study.

## Web Project

See [Chapter 5](#) for an introduction to the Web Project. In this chapter, you will develop a test plan for the project. You will review the documents created in the previous chapters' Web Project and create a test plan.

## Hands-On Practice Case Study

- Part 1: Review the Design Documents and Completed Web Pages. Review the Topic Approval, Site Map, and Page Layout Design documents that you created in the [Chapter 5](#) Web Project. Review the web pages that you have created and/or modified in the [Chapter 6](#) through [Chapter 9](#) Web Project activities.
- Part 2: Prepare a Test Plan. See [Figure 10.4](#) for a sample test plan document (chapter10/testplan.pdf in the student files). Create a test plan document for your website, including CSS validation, HTML validation, and accessibility testing.

- Part 3: Test Your Website. Implement your test plan and test each page that you have developed for your Web Project. Record the results. Create a list of suggested improvements.
- Part 4: Perform Usability Testing. Describe three scenarios that typical visitors to your site may encounter. Using [Hands-On Exercise 5](#) as a guide, conduct a usability test for these scenarios. Write a one-page report about your findings. What improvements would you suggest for the website?

# **11 Web Multimedia and Interactivity**

# Chapter Objectives

In this chapter, you will learn how to . . .

- Describe the purpose of plug-ins, helper applications, media containers, and codecs
- Describe the types of multimedia files used on the Web
- Configure hyperlinks to multimedia files
- Configure audio and video on a web page with HTML5 elements
- Configure a Flash animation on a web page
- Describe features and common uses of Java applets
- Create an interactive drop down navigation menu with CSS
- Configure the CSS3 transform and transition properties
- Configure an interactive widget with the HTML5 details and summary elements
- Describe features and common uses of JavaScript
- Describe the purpose of HTML5 APIs such as geolocation, web storage, offline web applications, and canvas
- Describe features and common uses of Ajax
- Describe features and common uses of jQuery
- Locate Flash, Java applets, JavaScript, Ajax, and jQuery resources on the Web

Video and sounds on your web pages can make them more interesting and

informative. In this chapter, you'll work with multimedia and interactive elements on web pages.

You began to work with **interactivity** in [Chapter 6](#) when you used CSS pseudo-classes to respond to mouse movements over hyperlinks. You'll expand your CSS skill set as you configure an interactive drop down navigation menu and explore CSS3 transition and transform properties. Adding the right touch of interactivity to a web page can make it engaging and compelling for your visitors.

Technologies commonly used to add interactivity to web pages include Flash, Java applets, JavaScript, Ajax, and jQuery. This chapter introduces you to these techniques. Each of these topics is explored more fully in other books; each technology could be the sole subject of an entire book or college course. As you read this chapter and try the examples, concentrate on learning the features and capabilities of each technology, rather than trying to master the details.

# 11.1 Plug-Ins, Containers, and Codecs

Web browsers are designed to display web pages and GIF, JPG, and PNG images, among others. When the **media** is not one of these types, the browser searches for a plug-in or helper application that is configured to display the file type. If it cannot find a plug-in or helper application (which runs in a separate window from the browser) on the visitor's computer, the web browser offers the visitor the option of saving the file to their computer. Several commonly used plug-ins are listed as follows:

- **Adobe Flash Player** (<http://www.adobe.com/products/flashplayer>). The Flash Player displays SWF files. These can contain audio, video, and animation, along with interactivity.
- **Adobe Shockwave Player** (<http://www.adobe.com/products/shockwaveplayer>). The Shockwave Player displays high-performance multimedia created using the Adobe Director application.
- **Adobe Reader** (<https://get.adobe.com/reader>). Adobe Reader is commonly used to display information stored in PDF format, such as printable brochures, documents, and white papers.
- **Java Runtime Environment** (<http://www.java.com/en/download/manual.jsp>). The Java Runtime Environment (JRE) is used to run applications and applets utilizing Java technology.
- **Windows Media Player** (<http://windows.microsoft.com/en-us/windows/download-windows-media-player>). The Windows Media Player plug-in plays streaming audio, video, animation, and multimedia presentations on the Web.

The plug-ins and helper applications listed previously have been used on the Web for many years. What is new about HTML5 audio and video is that it is native to the browser; no plug-ins are needed. When working with native HTML5 audio and video, you need to be aware of the container (which is designated by the file extension) and the codec (which is the algorithm used to compress the media). There is no single codec that is supported by popular browsers. For example, the H.264 codec requires licensing fees and is not supported by the Firefox and Opera web browsers, which support royalty-free Vorbis and Thora codecs. See <http://www.jwplayer.com/html5/> for more information of browser support of HTML5 video.

Explore [Table 11.1](#) and [Table 11.2](#), which list common media file extensions, the container file type, and a description with codec information (if applicable for HTML5).

## Table 11.1 Common audio file types

Extension	Container	Description
.wav	Wave	Created by Microsoft; standard on the PC platform; also supported on the Mac platform.
.aiff and .aif	Audio Interchange	Popular audio file format on the Mac platform; also supported on the PC platform.
.mid	Musical Instrument Digital	Contains instructions to recreate a musical sound rather than a digital recording of the

	Interface (MIDI)	sound itself; a limited number of types of sounds can be reproduced.
.au	Sun UNIX Sound File	Older type of sound file that generally has poorer sound quality than the newer audio file formats.
.mp3	MPEG-1 Audio Layer-3	Popular for music files because of the MP3 codec, which supports two channels and advanced compression.
.ogg	OGG	Open-source audio file format (see <a href="http://www.vorbis.com">http://www.vorbis.com</a> ) that uses the Vorbis codec.
.m4a	MPEG-4 Audio	Audio-only MPEG-4 format that uses the Advanced Audio Coding (AAC) codec; supported by QuickTime, iTunes, and mobile devices such as the iPod and iPad.

## Table 11.2 Common video file types

Extension	Container	Description
.mov	QuickTime	Created by Apple and initially used on the Mac platform, it is also supported by

Windows.

.avi	Audio Video Interleaved	Microsoft's original standard video format for the PC platform.
.flv	Flash Video	Flash-compatible video file container; supports the H.264 codec.
.wmv	Windows Media Video	Streaming video technology developed by Microsoft; the Windows Media Player supports this file format.
.mpg	MPEG	Developed under the sponsorship of the Moving Picture Experts Group (MPEG) ( <a href="http://www.chiariglione.org/mpeg">http://www.chiariglione.org/mpeg</a> ); supported on both Windows and Mac platforms.
.m4v and .mp4	MPEG-4	MPEG-4 (MP4) codec and H.264 codec; played by QuickTime, iTunes, and mobile devices such as the iPod and iPad.
.3gp	3GPP Multimedia	H.264 codec; a standard for delivery of multimedia over third-generation, high-speed wireless networks.
.ogv or .ogg	OGG	Open-source video file format (see <a href="http://www.theora.org">http://www.theora.org</a> ) that uses the Theora codec.

.webm

WebM

Open media file format (see  
<http://www.webmproject.org>) that uses the  
VP8 and VP9 video codecs and the  
Vorbis audio codec.

# 11.2 Getting Started with Audio and Video

As you read this chapter, you'll explore different ways to provide audio and video for your website visitors, including providing a hyperlink, the embed element, and the HTML5 audio and video elements. We'll get started with the easiest method, which is coding a hyperlink.

## Provide a Hyperlink

The easiest way to give your website visitors access to an audio or a video file is to create a simple hyperlink to the file. For example, the code to hyperlink to a sound file named WDFpodcast.mp3 is

```
<a href="WDFpodcast.mp3">Podcast Episode 1</a> (MP3)
```

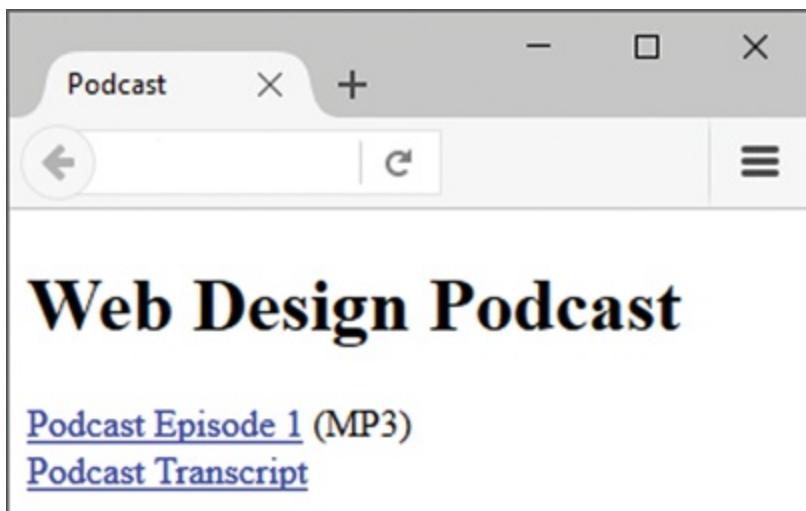
When your website visitor clicks on the hyperlink, the plug-in for MP3 files that is installed on the computer typically will display embedded in a new browser window or tab. Your web page visitor can then use the plug-in to play the sound. If your website visitor right-clicks on the hyperlink, the media file can be downloaded and saved.



### Hands-On Practice 11.1

In this Hands-On Practice, you will create a web page similar to [Figure 11.1](#) that contains an h1 tag and a hyperlink to an MP3 file. The web page will also provide a hyperlink to a text transcript of that file to provide for accessibility. It's useful to your web page visitors to also indicate the type of file (such as an MP3) and, optionally, the size of the file to be accessed.

# Figure 11.1



The default MP3 player will launch in the browser when the visitor clicks on Podcast Episode 1

## Figure 11.1 Full Alternative Text

Copy the podcast.mp3 and podcast.txt files from the chapter11/starters folder in the student files and save them to a folder named podcast. Use the chapter2/template.html file as a starting point and create a web page with the heading “Web Design Podcast”, a hyperlink to the MP3 file, and a hyperlink to the text transcript. Save your web page as podcast2.html and display it in a browser. Test your web page in different browsers, using different versions. When you click on the MP3 hyperlink, an audio player (whichever player or plug-in is configured for the browser) will launch to play the file. When you click on the hyperlink for the text transcript, the text will display in the browser. Compare your work to chapter11/11.1/index.html in the student files.



**FAQ**

## 1. How can I make a podcast?

**Podcasts** are audio files on the web that may take the format of an audio blog, radio show, or interview. There are three steps in publishing a podcast:

1. Record the podcast. Audacity is a free cross-platform digital audio editor (available at <http://sourceforge.net/projects/audacity> for both Windows and Mac). You can use Audacity to record your voice for a podcast and mix in music loops to add interest. Once the WAV file is created, the LAME encoder (<http://lame.sourceforge.net>) or a similar application can be used to convert to an MP3 format.
2. Upload the podcast. Upload the MP3 to your website. If your web host does not permit MP3 files, an alternative is to upload to a site that accepts audio files at no cost such as Internet Archive (<http://www.archive.org>).
3. Make the podcast available. The most straightforward method is to code a hyperlink to the audio file. The hyperlink allows website visitors to access the podcast MP3 file, but does not make the podcast available for subscription. If you would like to provide a way for your visitors to subscribe to your podcasts, you will need to create an RSS feed. An **RSS feed** for a podcast is an XML file that lists information about your podcast. With a bit of patience, you can code your own RSS feed using a text editor (see Stephen Downes's website at <http://www.downes.ca/cgi-bin/page.cgi?post=56> or Robin Good's website at [http://www.masternewmedia.org/news/2006/03/09/how\\_to\\_create\\_a\\_podcast\\_rss\\_feed](http://www.masternewmedia.org/news/2006/03/09/how_to_create_a_podcast_rss_feed)). However, a number of websites, such as FeedBurner (<http://feedburner.google.com>), and FetchRSS (<http://fetchrss.com/>), provide a service that generates and hosts the RSS feed for you. After the RSS feed is uploaded to the Web (either your own or the RSS feed generator's site), you can code a link to the RSS file. Apple provides instructions for submitting your podcast to iTunes at <http://apple.com/itunes/podcasts/specs.html>. Web visitors using

software such as Apple's iTunes or a free RSS feed reader website such as Feedreader (<http://feedreader.com>) can locate and automatically download your podcast.

## Working with Multimedia on the Web

### More About Audio Files

There are a number of ways that you can obtain audio files. You can record your own sounds, download sounds or music from a free site, record music from a CD, or purchase a DVD of sounds. There are some ethical issues related to using sounds and music created by others. You may only publish sounds or music that you have created yourself or for which you have obtained the rights (sometimes called a license) to publish. When you purchase a CD or DVD, you have not purchased the rights for publishing to the Web. Contact the owner of the copyright to request permission to use the music.



#### Focus on Ethics

There are many sources of audio files on the Web. Some offer free files, such as Loopasonic (<http://www.loopasonic.com>). Others, like AudioBlocks (<http://www.audioblocks.com>), sell subscriptions to download royalty-free audio files. An interesting resource for free sound is the Flash Kit site (<http://www.flashkit.com>); click on the Sound FX link. While this site is intended for Adobe Flash developers, the sound files can be used without Flash.

Audio files can be quite large and it is important to be aware of the amount of

time required to download them for play. If you decide to use an audio file on a web page, make it as brief as possible. If you are recording your own audio files, be aware that the sampling rate and bit depth will affect the file size. A sampling rate is a value related to the number of digital sound samples taken per second when the sound is recorded. It is measured in kilohertz (kHz). Common sampling rates vary from 8 kHz (AM radio quality sound or sound effects) to 44.1 kHz (music CD quality sound). As you would expect, a sound recorded at 44.1 kHz has a much larger file size than a sound recorded at 8 kHz. Bit depth or resolution is another factor in audio file size. A sound recorded with 8-bit resolution (useful for a voice or other simple sounds) will have a smaller file size than a sound recorded using 16-bit resolution (music CD quality).

The Windows and Mac operating systems contain audio recording utilities. Audacity is a free cross-platform digital audio editor (available at <http://sourceforge.net/projects/audacity> for both Windows and Mac).

## More About Video Files

Just as with audio files, there are a number of ways that you can obtain video files, including recording your own, downloading videos, purchasing a DVD that contains videos, or searching for video files on the Web. Be aware that there are ethical issues related to using videos that you did not create yourself. You must obtain the rights or license to publish videos created by other individuals before publishing them on your website.



Many digital cameras and smartphones have the capability to take still photographs as well as short MP4 movies. This can be an easy way to create short video clips. Digital video cameras and webcams record digital videos. Once you have created your video, software such as Adobe Premiere

(<http://www.adobe.com/products/premiere.html>), Apple iMovie (<http://www.apple.com/imovie>), or Nero Video (<http://www.nero.com/enu/products/nero-video>) can be used to edit and configure your video masterpiece. Many digital cameras and smartphones provide the ability record to videos and immediately upload them to YouTube to share with the world. You'll work with a YouTube video in [Chapter 13](#).

## Multimedia and Accessibility Issues

Provide alternate content for the media files you use on your website in transcript, caption, or printable PDF format. Provide a text transcript for audio files such as podcasts. Often, you can use the podcast script as the basis of the text transcript file that you create as a PDF and upload to your website. Provide captions for video files. Applications such as Media Access Generator (MAGpie) can add captioning to videos. See the National Center for Accessible Media's website ([http://ncam.wgbh.org/invent\\_build/web\\_multimedia/tools-guidelines/magpie](http://ncam.wgbh.org/invent_build/web_multimedia/tools-guidelines/magpie)) for the most up-to-date information on the application. When you upload a video to YouTube (<http://www.youtube.com>), captions can be automatically generated (although you'll probably want to make some corrections). You can also create a transcript or text captions for an existing YouTube video (see <https://support.google.com/youtube/topic/3014331?rd=1>).



## Browser Compatibility Issues

As you completed the Hands-On Practice, you may have encountered playback issues in various browsers. Playing audio and video files on the

Web depends on the plug-ins installed in your visitor's web browsers. A page that works perfectly on your home computer may not work for all visitors; it depends on the configuration of the computer. Some visitors will not have the plug-ins properly installed. Some visitors may have file types associated with incorrect plug-ins or incorrectly installed plug-ins. Some visitors may be using low bandwidth and have to wait an overly long time for your media file to download. Are you detecting a pattern here? Sometimes media on the Web can be problematic.

In a response to these browser plug-in compatibility issues and in an effort to reduce reliance on a proprietary technology like Adobe Flash, HTML5 introduces new audio and video elements that are native to the browser. However, because HTML5 is not supported by older browsers, web designers are wise to coding a fallback option, such as coding a hyperlink to the media file or displaying a Flash version of the multimedia. You'll work with HTML5 audio and video later in this chapter, but first, let's explore Adobe Flash.

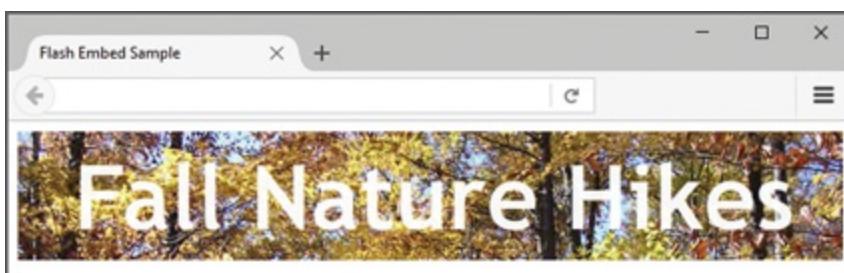
## 11.3 Adobe Flash

**Flash** multimedia content can add visual interest and interactivity to web pages with slideshows, animations, and other multimedia effects. The Adobe Flash and Adobe Animate CC applications can be used to create Flash multimedia content. Flash animation may be interactive—it can be scripted, with a language called ActionScript, to respond to mouse clicks, accept information in text boxes, and invoke server-side processing. Flash can also be used to play audio and video files. Flash multimedia files are stored in a .swf file extension and require the Flash Player browser plug-in.

## HTML5 Embed Element

The embed element is a self-contained, or void, element whose purpose is to provide a container for external content (such as Flash) that requires a plug-in or player. Although used for many years to display Flash on web pages, the embed element was never an official W3C element until HTML5. One of the design principles of HTML5 is to “pave the cowpaths”—to smooth the way for valid use of techniques that, although supported by browsers, were not part of the official W3C standard. [Figure 11.2](#) (also in the student files at chapter11/flashembed.html) shows a web page using an embed element to display a Flash .swf file. The attributes of the embed element commonly used with Flash media are listed in [Table 11.3](#).

### Figure 11.2



The embed element was used to configure the Flash media

[Figure 11.2 Full Alternative Text](#)

## Table 11.3 Embed element attributes

Attribute	Description and Value
src	File name of the Flash media (SWF file)
height	Specifies the height of the object area in pixels
type	The MIME type of the object; use <code>type="application/x-shockwave-flash"</code>
width	Specifies the width of the object area in pixels
bgcolor	Optional; hexadecimal value for the background color of the Flash
quality	Optional; describes the quality of the media, usually set to “high”
title	Optional; specifies a brief text description that may be displayed by browsers or assistive technologies

wmode	Optional; set to “transparent” to configure a transparent background in supporting browsers
-------	---------------------------------------------------------------------------------------------

The following code configures the Flash SWF file shown in [Figure 11.2](#):

```
<embed type="application/x-shockwave-flash"
       src="fall15.swf"
       width="640"
       height="100"
       quality="high"
       title="Fall Nature Hikes">
```

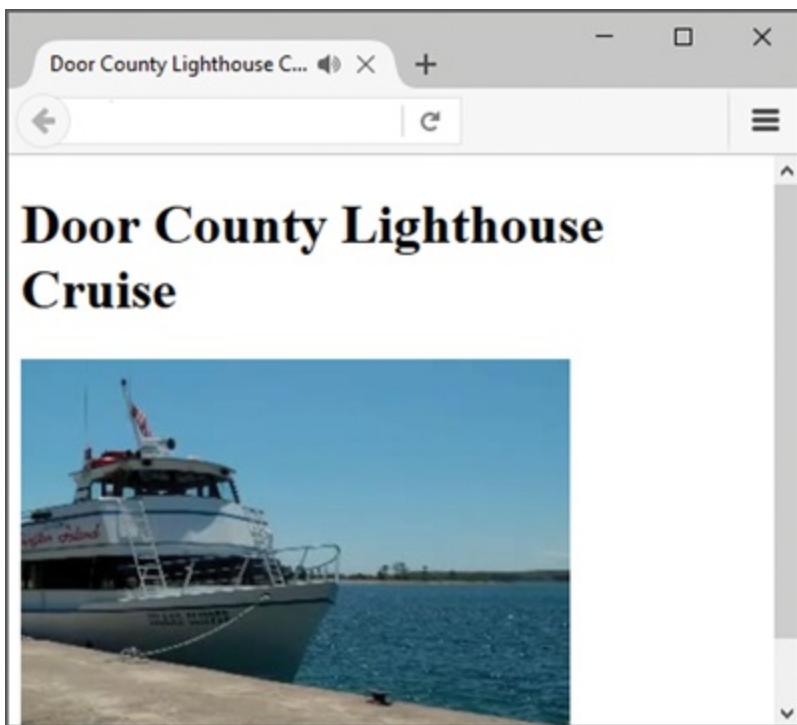
Notice the value of the title attribute in the previous code. The descriptive text could be accessed by assistive technologies such as a screen reader.



## Hands-On Practice 11.2

In this Hands-On Practice, you will launch a text editor and create a web page that displays a Flash slide show of photographs. Your web page will look like the one shown in [Figure 11.3](#).

## Figure 11.3



Flash slide show of images configured with the embed element

### Figure 11.3 Full Alternative Text

Create a folder called embed. Copy the lighthouse.swf file from the chapter11/starters folder in the student files and save it in your embed folder. Use the chapter2/template.html file as a starting point and create a web page with the heading “Door County Lighthouse Cruise” and an embed element to display a Flash file named lighthouse.swf that is 320 pixels wide and 240 pixels high. The code is

```
<embed type="application/x-shockwave-flash"  
       src="lighthouse.swf" quality="high"  
       width="320" height="240"  
       title="Door County Lighthouse Cruise">
```

Save your web page as index.html in the embed folder and test it in a browser. Compare your work to chapter11/11.2/index.html in the student files.

## Flash Resources

There are many sources of free Flash animation, Adobe Animate CC tutorials, and Flash tutorials on the Web. In addition to resources at the Adobe site (<https://helpx.adobe.com/animate/tutorials.html>), the following websites contain tutorials and information about Flash animation:

- Flash Kit: <http://flashkit.com>
- Red Ventures: <https://stories.rvcreatives.com/animate-cc-animation-for-web-designers-c320f5f4230e>
- envatotuts+: <https://webdesign.tutsplus.com/tutorials/a-web-designers-guide-to-adobe-animate-cc--cms-28240>

As you visit these and other Flash resource sites, keep in mind that some Flash media is copyrighted. Obtain permission from the creator of the media before using it on your site and follow any instructions for giving credit to the source. Some sites allow personal use of their Flash media for free, but require licenses for commercial use.



**Focus on  
Ethics**



## FAQ

### 1. Can Adobe Animate CC do more than create Flash media?

Yes! Adobe Animate CC, the newest version of the Adobe Flash Professional application, can export animations and interactions in a variety of formats, including Flash .swf files, HTML5 Canvas, and Scalable Vector Graphics. You'll be introduced to HTML5 Canvas and Scalable Vector Graphics later in this chapter.



## FAQ

1. What will happen if the browser my web page visitor uses does not support Flash?

If you used the code in this section to display Flash media on a web page and your visitor's browser does not support Flash, the browser typically will display a message about the need for a missing plug-in. The code in this section passes W3C HTML5 conformance checks and is the minimum code required to display Flash media on a web page.

Be aware that users of mobile devices will not be able to view your Flash multimedia. The lack of mobile support and the development of other technologies to provide multimedia and interactive web content has contributed to a decrease in the use of Flash (.swf) media on web pages. At the time this was written, the Flash Player was still installed on most desktop browsers. However, Adobe has announced that it will drop support of the Flash Player after 2020. Mobile devices and modern desktop browsers support the new HTML5 video and audio elements, which are introduced next in this chapter. You'll also explore the potential of the HTML5 canvas element, CSS3 transform property, and CSS3 transition property later in this chapter.



## Checkpoint 11.1

1. List three common web browser plug-ins and describe their use.
2. Describe the issues involved with adding media such as audio or video to a web page.

3. Describe a disadvantage of using Flash on a web page.

# 11.4 HTML5 Audio and Video Elements

The HTML5 audio and video elements enable browsers to natively play media files without the need for browser plug-ins. When working with native HTML5 audio and video, you need to be aware of the **container** (which is designated by the file extension) and the **codec** (which is the algorithm used to compress the media). Refer to [Table 11.1](#) and [Table 11.2](#), which list common media file extensions, the container file type, and a description with codec information (if applicable for HTML5). Let's get started using the HTML5 audio element.

## Audio Element

The HTML5 audio element supports native play of audio files in the browser without the need for plug-ins or players. The audio element begins with the <audio> tag and ends with the </audio> tag. [Table 11.4](#) lists the attributes of the audio element.

### Table 11.4 Audio element attributes

Attribute	Value	Usage
src	File name	Optional; audio file name
type	MIME	Optional; the MIME type of the audio file,

	<code>type</code>	such as audio/mpeg or audio/ogg
	<code>autoplay</code>	Optional; indicates whether audio should start playing automatically; use with caution
	<code>controls</code>	Optional; indicates whether controls should be displayed; recommended
<code>loop</code>	<code>loop</code>	Optional; indicates whether audio should be played over and over
<code>preload</code>	none, metadata, auto	Optional; values: none (no preload), metadata (only download media file metadata), and auto (download the media file)
<code>title</code>	Text description	Optional; specifies a brief text description that may be displayed by browsers or assistive technologies

You'll need to supply multiple versions of the audio file because of the browser support of different codecs. Plan to supply audio files in at least two different containers, including OGG and MP3. It is typical to omit the `src` and `type` attributes from the audio tag and, instead, configure multiple versions of the audio file with the source element.

## Source Element

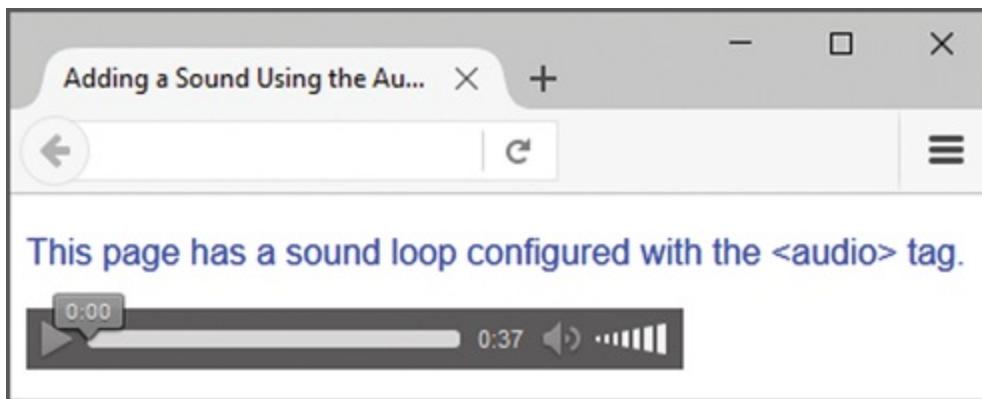
The source element is a self-contained, or void, tag that specifies a media file and a MIME type. The `src` attribute identifies the file name of the media file.

The type attribute indicates the MIME type of the file. Code type="audio/mpeg" for an MP3 file. Code type="audio/ogg" for audio files using the Vorbis codec. Configure a source element for each version of the audio file. Place the source element before the closing audio tag.

## HTML5 Audio on a Web Page

The following code sample configures the web page shown in [Figure 11.4](#) (see chapter11/audio.html in the student files) to display a controller for an audio file:

### Figure 11.4



The Firefox browser supports the HTML5 audio element.

[Figure 11.4 Full Alternative Text](#)

```
<audio controls="controls">
    <source src="soundloop.mp3" type="audio/mpeg">
    <source src="soundloop.ogg" type="audio/ogg">
        <a href="soundloop.mp3">Download the Audio File</a> (MP3)
</audio>
```

Current versions of popular browsers support the HTML5 audio element. The controls displayed by each browser are different.

Review the previous code and note the hyperlink placed between the second

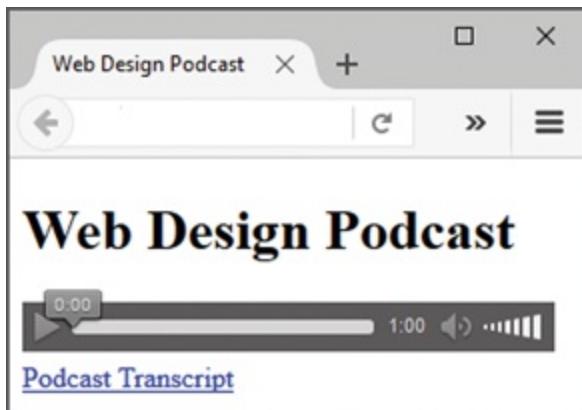
source element and the closing audio tag. Any HTML elements or text placed in this area is rendered by browsers that do not support the HTML5 audio element. This is referred to as fallback content; if the audio element is not supported, the MP3 version of the file is made available for download.



## Hands-On Practice 11.3

In this Hands-On Practice, you will launch a text editor and create a web page (see [Figure 11.5](#)) that displays an audio control to play a podcast.

### Figure 11.5



Using the audio element to provide access to a podcast

#### [Figure 11.5 Full Alternative Text](#)

Copy the podcast.mp3, podcast.ogg, and podcast.txt files from the chapter11/starters folder in the student files and save them to a folder named audio5. Use the chapter2/template.html file as a starting point and create a web page with the heading “Web Design Podcast”, an audio control (use the audio element and two source elements), and a hyperlink to the podcast.txt transcript file. Configure a hyperlink to the MP3 file as the fallback content.

The code for the audio element is

```
<audio controls="controls">
  <source src="podcast.mp3" type="audio/mpeg">
  <source src="podcast.ogg" type="audio/ogg">
  <a href="podcast.mp3">Download the Podcast</a> (MP3)
</audio>
```

Save your web page as index.html in the audio5 folder and display it in a browser. Test your web page in different browsers, using different versions. When you click on the hyperlink for the text transcript, the text will display in the browser. Compare your work to chapter11/11.3/index.html in the student files.



## FAQ

1. How can I convert an audio file to the Ogg Vorbis codec?

The open-source Audacity application supports Ogg Vorbis. See <http://sourceforge.net/projects/audacity> for download information. If you're looking for a free Web-based converter, you can upload and share an audio file at the Internet Archive (<http://www.archive.org>) and an OGG format file will automatically be generated.

# Video Element

The HTML5 video element supports native play of video files in the browser without the need for plug-ins or players. The video element begins with the `<video>` tag and ends with the `</video>` tag. [Table 11.5](#) lists the attributes of the video element.

# Table 11.5 Video element

# attributes

Attribute	Value	Usage
src	File name	Optional; video file name
type	MIME type	Optional; the MIME type of the video file, such as video/mp4 or video/ogg
autoplay	autoplay	Optional; indicates whether video should start playing automatically; use with caution
controls	controls	Optional; indicates whether controls should be displayed; recommended
height	number	Optional; video height in pixels
loop	loop	Optional; indicates whether video should be played over and over
poster	File name	Optional; specifies an image to display if the browser cannot play the video
preload	none, metadata, auto	Optional; values: none (no preload), metadata (only download media file metadata), and auto (download the media file)

<code>title</code>	Text	Optional; specifies a brief text description that may be displayed by browsers or assistive technologies
<code>width</code>	Number	Optional; video width in pixels

You'll need to supply multiple versions of the video file because of the browser support of different codecs. Plan to supply video files in at least two different containers, including MP4 and OGG (or OGV). It is typical to omit the `src` and `type` attributes from the `video` tag and, instead, configure multiple versions of the audio file with the `source` element.

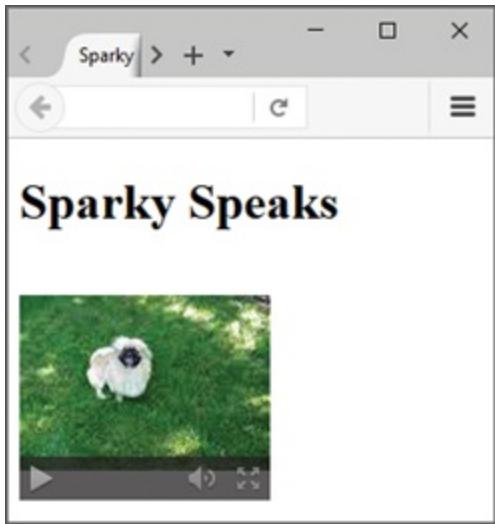
## Source Element

Recall from the previous section that the `source` element is a self-contained, or void, tag that specifies a media file and a MIME type. The `src` attribute identifies the file name of the media file. The `type` attribute indicates the MIME type of the file. Code `type="video/mp4"` for video files using the MP4 codec. Code `type="video/ogg"` for video files using the Theora codec. Configure a `source` element for each version of the video file. Place the `source` elements before the closing `video` tag.

## HTML5 Video on a Web Page

The following code configures the web page shown in [Figure 11.6](#) (chapter11/sparky2.html in the student files) with the native HTML5 browser controls to display and play a video:

## Figure 11.6



The Firefox browser. Screenshots of Mozilla Firefox. Courtesy of Mozilla Foundation.

[Figure 11.6 Full Alternative Text](#)

```
<video controls="controls" poster="sparky.png" width="160" height="160">
  <source src="sparky.mp4" type="video/mp4">
  <source src="sparky.ogv" type="video/ogg">
  <a href="sparky.mov">Sparky the Dog</a> (.mov)
</video>
```

Current versions of popular browsers support the HTML5 video element. The controls displayed by each browser are different. Review the code just given and note the anchor element placed between the second source element and the closing video tag. Any HTML elements or text placed in this area is rendered by browsers that do not support the HTML5 video element. This is referred to as fallback content. In this case, a hyperlink to a .mov version of the file is supplied for the user to download. Another fallback option is to configure an embed element to play a Flash SWF version of the video.



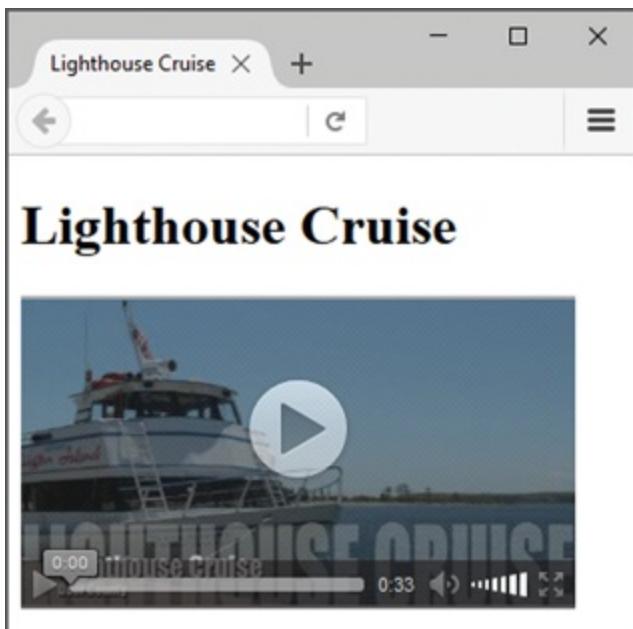
## Hands-On Practice 11.4



## VideoNote HTML5 Video

In this Hands-On Practice, you will launch a text editor and create the web page in [Figure 11.7](#), which displays a video control to play a movie.

# Figure 11.7



HTML5 video element

### [Figure 11.7 Full Alternative Text](#)

Copy the lighthouse.m4v, lighthouse.ogv, lighthouse.swf, and lighthouse.jpg files from the chapter11/starters folder in the student files and save them to a folder named video. Open chapter2/template.html in a text editor and configure a web page with the heading “Lighthouse Cruise” and a video control (use the video element and two source elements). While we could configure a hyperlink to a video file as fallback content, in this example, we’ll configure an embed element to display the Flash media file (lighthouse.swf) as fallback content. Configure the lighthouse.jpg file as a poster image, which will display if the browser supports the video element,

but it cannot play any of the video files. The code for the video element is

```
<video controls="controls" poster="lighthouse.png" width="320" he  
    <source src="lighthouse.m4v" type="video/mp4">  
    <source src="lighthouse.ogv" type="video/ogg">  
    <embed type="application/x-shockwave-flash"  
        src="lighthouse.swf" quality="high" width="320" height="240"  
        title="Door County Lighthouse Cruise">  
</video>
```

Save your web page as index.html in the video folder and display it in a browser. Test your web page in different browsers. Compare your work to [Figure 11.7](#) and chapter11/11.4/index.html in the student files.



## FAQ

1. How can I convert a video file to the new codecs?

Online-Convert offers free conversion to WebM (<http://video.online-convert.com/convert-to-webm>) and to Ogg Theora (<http://video.online-convert.com/convert-to-ogg>). The free, open-source Miro-VideoConverter (<http://www.mirovideoconverter.com>) can convert most video files to MP4, WebM, or OGG formats.

# 11.5 Multimedia Files and Copyright Law



## Focus on Ethics

It is very easy to copy and download an image, audio, or video file from a website. It may be very tempting to place someone else's file in one of your own projects, but that may not be ethical or lawful. Only publish web pages, images, and other media that you have personally created or have obtained the rights or license to use. If another individual has created an image, sound, video, or document that you think would be useful on your own website, ask permission to use the material instead of simply taking it. All work (web pages, images, sounds, videos, and so on) is **copyrighted**, even if there is no copyright symbol and date on the material.

Be aware that there are times when students and educators can use portions of another's work and not be in violation of copyright law. This is called fair use. Fair use is the use of a copyrighted work for purposes such as criticism, reporting, teaching, scholarship, or research. The criteria used to determine fair use are as follows:

- The use must be educational rather than commercial.
- The nature of the work copied should be factual rather than creative.
- The amount copied must be as small a portion of the work as possible.
- The copy does not impede the marketability of the original work.

Visit the U.S. Copyright Office (<http://copyright.gov>) and Copyright Website (<http://www.copyrightwebsite.com>) for some additional information about

copyright issues.

Some individuals may want to retain ownership of their work, but make it easy for others to use or adapt it. Creative Commons (<http://creativecommons.org>) provides a free service that allows authors and artists to register a type of copyright license called a Creative Commons license. There are several licenses to choose from, depending on the rights you wish to grant as the author. The Creative Commons license informs others exactly what they can and cannot do with the creative work.

# 11.6 CSS3 and Interactivity

## CSS Drop Down Menu

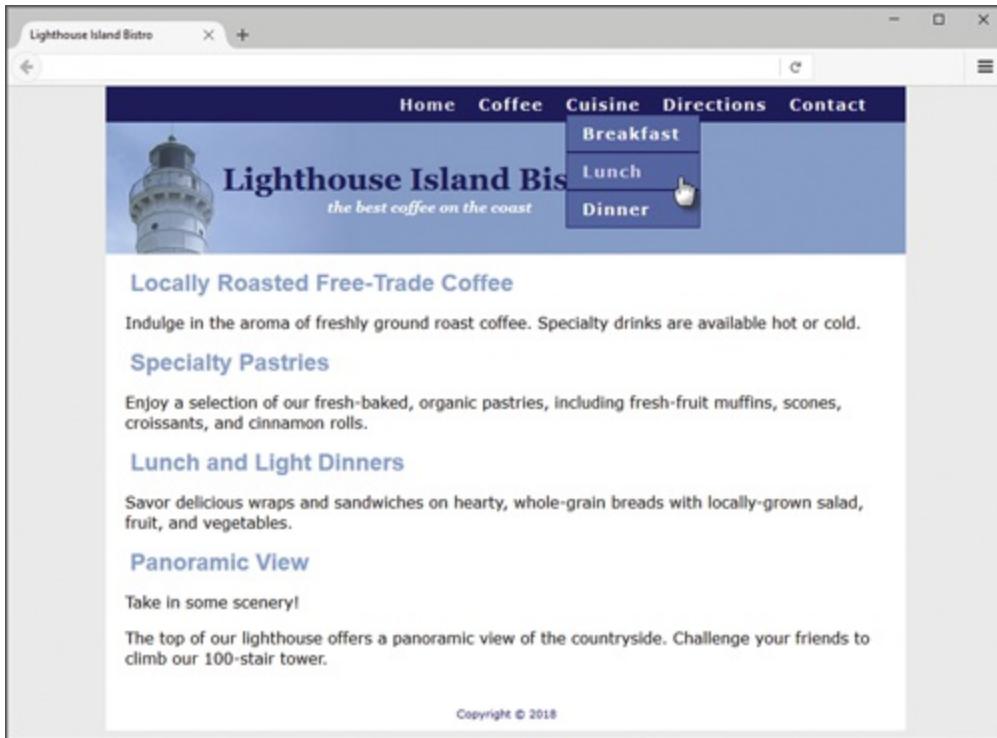
Recall from Chapter 6 that the CSS `:hover` pseudo-class provides a way to configure styles to display when the web page visitor moves the mouse over an element. You'll use this basic interactivity, along with CSS positioning and display properties, to configure an interactive navigation menu with CSS and HTML in the next Hands-On Practice.



## Hands-On Practice 11.5

In this Hands-On Practice you will configure a drop down menu that displays when a visitor hovers over the Cuisine navigation hyperlink as shown in [Figure 11.8](#). The main menu has hyperlinks for Home, Coffee, Cuisine, Directions, and Contact. As shown in the site map ([Figure 11.9](#)) the Cuisine page has three subpages: Breakfast, Lunch, and Dinner. Create a folder named mybistro. Copy the files from the chapter11/bistro folder in the student files into your mybistro folder. You will modify the CSS and edit each page to configure a Cuisine submenu that provides hyperlinks to three pages (Breakfast, Lunch, and Dinner).

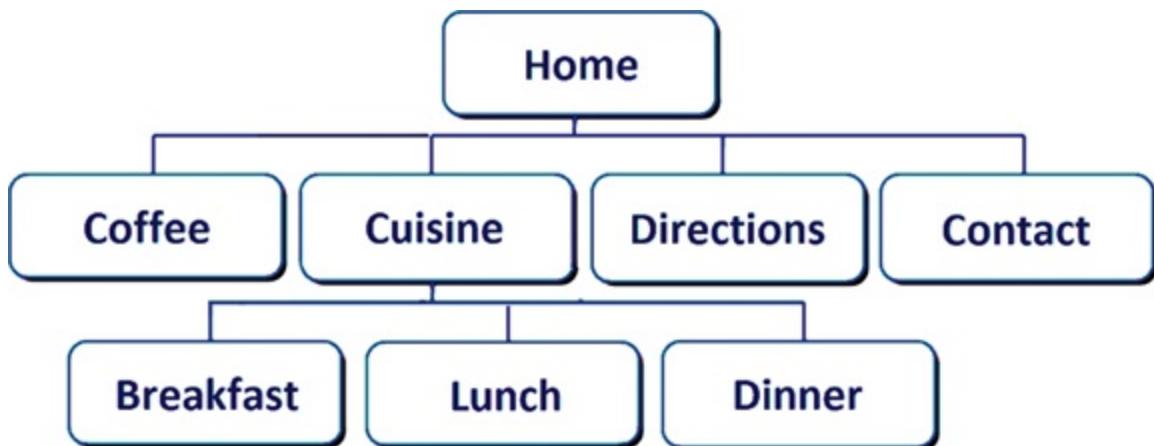
**Figure 11.8**



An interactive navigation menu with CSS

[Figure 11.8 Full Alternative Text](#)

## Figure 11.9



Site map

[Figure 11.9 Full Alternative Text](#)

- Task 1: Configure the HTML. Launch a text editor and open the index.html file. Modify the nav area to contain a new unordered list with hyperlinks to the Breakfast, Lunch, and Dinner pages. Configure a new ul element that is contained *within* the Cuisine li element. The new ul element will contain an li element for each meal. The HTML follows with the new code displayed in blue.

```

<nav>
<ul>
  <li><a href="index.html">Home</a></li>
  <li><a href="coffee.html">Coffee</a></li>
  <li><a href="cuisine.html">Cuisine</a>
    <ul>
      <li><a href="breakfast.html">Breakfast</a></li>
      <li><a href="lunch.html">Lunch</a></li>
      <li><a href="dinner.html">Dinner</a></li>
    </ul>
  </li>
  <li><a href="directions.html">Directions</a></li>
  <li><a href="contact.html">Contact</a></li>
</ul>
</nav>
```

Save the file and display it in a browser. Don't worry if the navigation area seems a bit garbled—you'll configure the submenu CSS in Step 2. Next, edit each page (coffee.html, cuisine.html, breakfast.html, lunch.html, dinner.html, directions.html and contact.html) and edit the nav area as you did in the index.html file.

- Task 2: Configure the CSS. Launch a text editor and open the bistro.css file.
  1. The submenu will be configured with absolute positioning. Recall from Chapter 7 that absolute positioning precisely specifies the location of an element outside of normal flow in relation to its first parent non-static element. The nav element's position is static by default so add the following declaration to the styles for the nav element selector:

```
position: relative;
```

2. The submenu that displays the hyperlinks for the Breakfast, Lunch, and Dinner pages is configured using a new ul element that is contained within the existing ul element in the nav area. Configure a descendant nav ul ul selector and code style declarations to use absolute positioning, #5564A0 background color, 0 padding, left text alignment and display set to none. The CSS follows:

```
nav ul ul { position: absolute;  
            background-color: #5564A0;  
            padding: 0;  
            text-align: left;  
            display: none; }
```

3. To style each li element within the submenu, use a descendant nav ul ul li selector and configure the li elements in the submenu with a border, block display, 8em width, 1em left padding, and 0 left margin. The CSS follows:

```
nav ul ul li { border: 1px solid #00005D;  
                display: block;  
                width: 8em;  
                padding-left: 1em;  
                margin-left: 0; }
```

4. Configure the submenu ul to display when the :hover is triggered for the li elements in the nav area. The CSS follows:

```
nav li:hover ul { display: block; }
```

Test your pages in a browser. The drop down menu should look similar to [Figure 11.8](#). You can compare your work to the sample in the student files (chapter11/11.5/horizontal). An example of a web page with a vertical fly-out menu is available in the student files (chapter11/11.5/vertical).

## CSS3 Transform Property

CSS transforms allow you to change the display of an element and provides functions to rotate, scale, skew, and reposition an element. Both two-

dimensional (2D) and three-dimensional (3D) transforms are possible.

[Table 11.6](#) lists commonly used 2D transform property function values and their purpose. See <http://www.w3.org/TR/css3-transforms/#transform-property> for a complete list. We'll focus on the rotate and scale transforms in this section.

## Table 11.6 Values of the transform property

Value	Purpose
<code>rotate (degree)</code>	Rotates the element by the angle
<code>scale (number, number)</code>	Scales or resizes the element along the X and Y axis (X,Y)
<code>scaleX (number)</code>	Scales or resizes the element along the X axis
<code>scaleY (number)</code>	Scales or resizes the element along the Y axis
<code>skewX (number)</code>	Distorts the display of the element along the X axis
<code>skewY (number)</code>	Distorts the display of the element along the Y axis

`translate (number, number)` Repositions the element along the X and Y axis (X,Y)

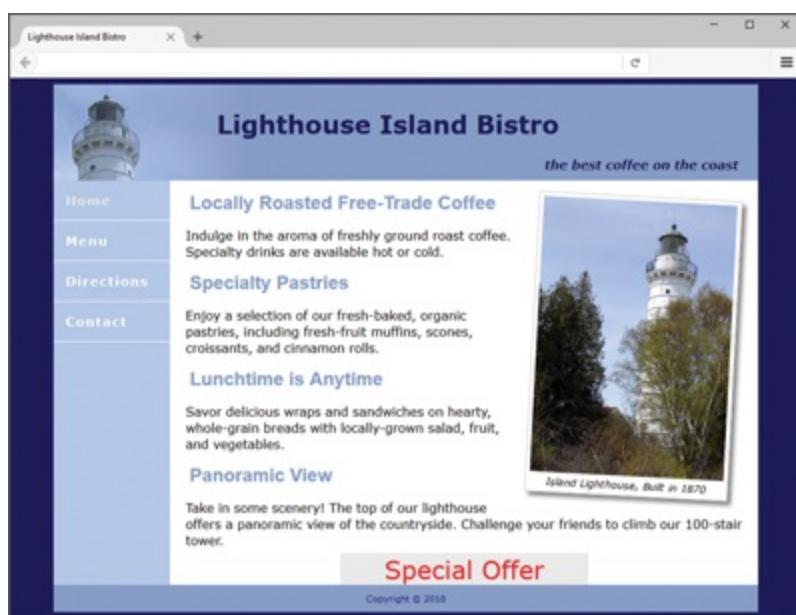
`translateX (number)` Repositions the element along the X axis

`translateY (number)` Repositions the element along the Y axis

## CSS3 Rotate Transform

The **rotate()** transform function takes a value in degrees (like an angle in geometry). Rotate to the right with a positive value. Rotate to the left with a negative value. The rotation is around the origin, which, by default, is the middle of the element. The web page in [Figure 11.10](#) demonstrates the use of the CSS3 transform property to slightly rotate the figure.

## Figure 11.10



The transform property in action

[Figure 11.10 Full Alternative Text](#)

## CSS3 Scale Transform

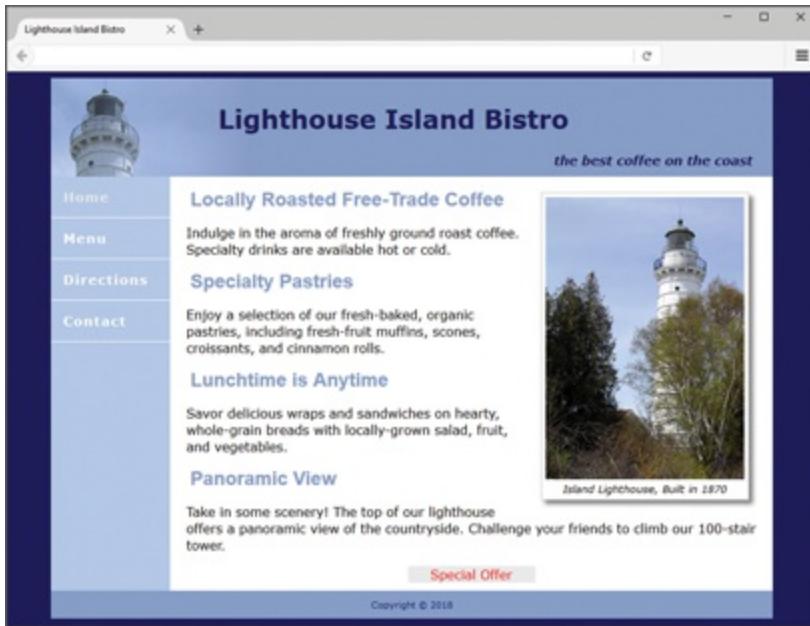
The **scale()** transform function resizes an element in three different ways: along the X-axis, along the Y-axis, and along both the X- and Y-axes. Specify the amount of resizing using a number without units. For example, scale(1) does not change the element's size, scale(2) indicates the element should render two times as large, scale(3) indicates the element should render three times as large, and scale(0) indicates the element should not display.



### Hands-On Practice 11.6

In this Hands-On Practice you will configure the rotation and scale transforms shown in [Figure 11.10](#). Create a new folder named transform. Copy the lighthouseisland.jpg, lighthousemini.jpg, and lighthouselogos.jpg images from the chapter11/starters folder in the student files to your transform folder. Launch a text editor and open the starter.html file in the chapter11 folder. Save the file as index.html in your transform folder. Launch the file in a browser and it will look similar to [Figure 11.11](#).

### Figure 11.11



Before the transform property

[Figure 11.11 Full Alternative Text](#)

Open index.html in a text editor and view the embedded CSS.

1. Locate the figure element selector. You will add new style declarations to the figure element selector that will configure a three-degree rotation transform. The new CSS is shown in blue.

```
figure { float: right; margin: 10px; background-color: #FFF;  
padding: 5px; border: 1px solid #CCC;  
box-shadow: 5px 5px 5px #828282;  
transform: rotate(3deg); }
```

2. Locate the #offer selector. This configures the “Special Offer” div displayed above the page footer. You will add a style declaration to the #offer selector that configures the browser to display the element two times larger. The new CSS is shown in blue.

```
#offer { background-color: #eaeaea;  
width: 10em;  
margin: auto;  
text-align: center;  
transform: scale(2); }
```

Save the file and display it in a browser. You should see the figure displayed on a slight angle and the “Special Offer” text displayed in large text. Compare your work to [Figure 11.10](#) and the sample in the student files (chapter11/11.6/index.html).

## Explore Transforms

This section provided an overview of the rotate and scale transforms. Visit <http://www.westciv.com/tools/transforms/index.html> to generate the CSS for rotate, scale, translate, and skew transforms. Find out more about transforms at <http://www.css3files.com/transform> and [http://developer.mozilla.org/en/CSS/Using\\_CSS\\_transforms](http://developer.mozilla.org/en/CSS/Using_CSS_transforms).

## CSS Transition Property

CSS3 transitions provide for changes in property values to display in a smoother manner over a specified time. You can apply a transition to a variety of CSS properties including color, background-color, border, font-size, font-weight, margin, padding, opacity, and text-shadow. A full list of applicable properties is available at <http://www.w3.org/TR/css3-transitions>. When you configure a transition for a property, you need to configure values for the transition-property, transition-duration, -transition-timing-function, and transition-delay properties. These can be combined in a single **transition property**. [Table 11.7](#) lists the transition properties and their purpose. [Table 11.8](#) lists commonly used transition-timing-function values and their purpose.

## Table 11.7 CSS transition properties

Property	Description
----------	-------------

<code>transition-</code>	Indicates the CSS property to which the transition property applies
<code>transition-duration</code>	Indicates the length of time to apply the transition; default value 0 configures an immediate transition; a numeric value specifies time (usually in seconds)
<code>transition-timing-function</code>	Configures changes in the speed of the transition by describing how intermediate property values are calculated; common values include ease (default), linear, ease-in, ease-out, ease-in-out
<code>transition-delay</code>	Indicates the beginning of the transition; default value 0 configures no delay; a numeric value specifies time (usually in seconds)
<code>transition</code>	Shorthand property; list the value for <code>transition-property</code> , <code>transition-duration</code> , <code>transition-timing-function</code> , and <code>transition-delay</code> separated by spaces; default values can be omitted, but the first time unit applies to <code>transition-duration</code>

## Table 11.8 Commonly used transition-timing-function values

<b>Value</b>	<b>Purpose</b>
ease	Default; transition effect begins slowly, speeds up, and ends slowly
linear	Transition effect has a constant speed
ease-in	Transition effect begins slowly and speeds up to a constant speed
ease-out	Transition effect begins at a constant speed and slows down
ease-in-out	Transition effect is slightly slower; Begins slowly, speeds up, and slows down



## Hands-On Practice 11.7

Recall that the CSS :hover pseudo-class provides a way to configure styles to display when the web page visitor moves the mouse over an element. The change in display happens somewhat abruptly. Web designers can use a CSS transition to create a more gradual change to the hover state. You'll try this out in this Hands-On Practice when you configure a transition for the navigation hyperlinks on a web page.

Create a new folder named transition. Copy the lighthouseisland.jpg, lighthousemini.jpg, and lighthouselogo.jpg images from the chapter11/starters folder in the student files to your transition folder. Launch

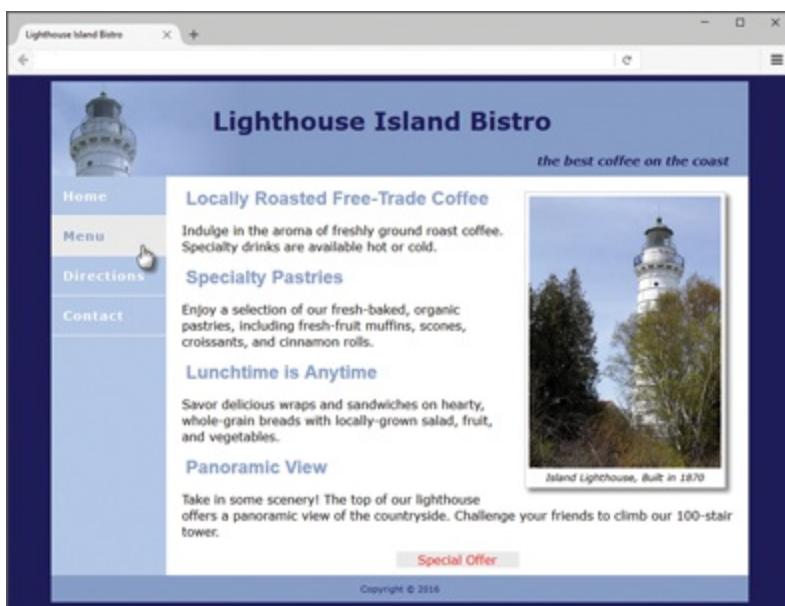
a text editor and open the starter.html file in the chapter11 folder. Save the file as index.html in your transition folder. Open index.html in a browser and it will look similar to [Figure 11.11](#). Place your mouse over one of the navigation hyperlinks and notice that the background color and text color change immediately.

Open index.html in a text editor and view the embedded CSS. Locate the nav a:hover selector and notice that the color and background-color properties are configured. You will add new style declarations to the nav a selector to cause a more gradual change in the background color when the user places the mouse over the hyperlink. The new CSS is shown in blue.

```
nav a { text-decoration: none; display: block; padding: 15px;  
transition: background-color 2s linear; }
```

Save the file and display it in a browser. Place your mouse over one of the navigation hyperlinks and notice that while the text color changes immediately, the background color changes in a more gradual manner—the transition is working! Compare your work to [Figure 11.12](#) and the student files (chapter11/11.7/index.html).

## Figure 11.12



The transition in action

[Figure 11.12 Full Alternative Text](#)

## Explore Transitions

If you'd like more control over the transition than what is provided by the values listed in [Table 11.8](#), explore using the cubic-bezier value for the transition-timing-function. A Bezier curve is a mathematically defined curve often used in graphic applications to describe motion. Explore the following resources:

- <http://www.the-art-of-web.com/css/timing-function>
- <http://roblaplaca.com/blog/2011/03/11/understanding-css-cubic-bezier>
- <http://cubic-bezier.com>

## Practice with Transitions



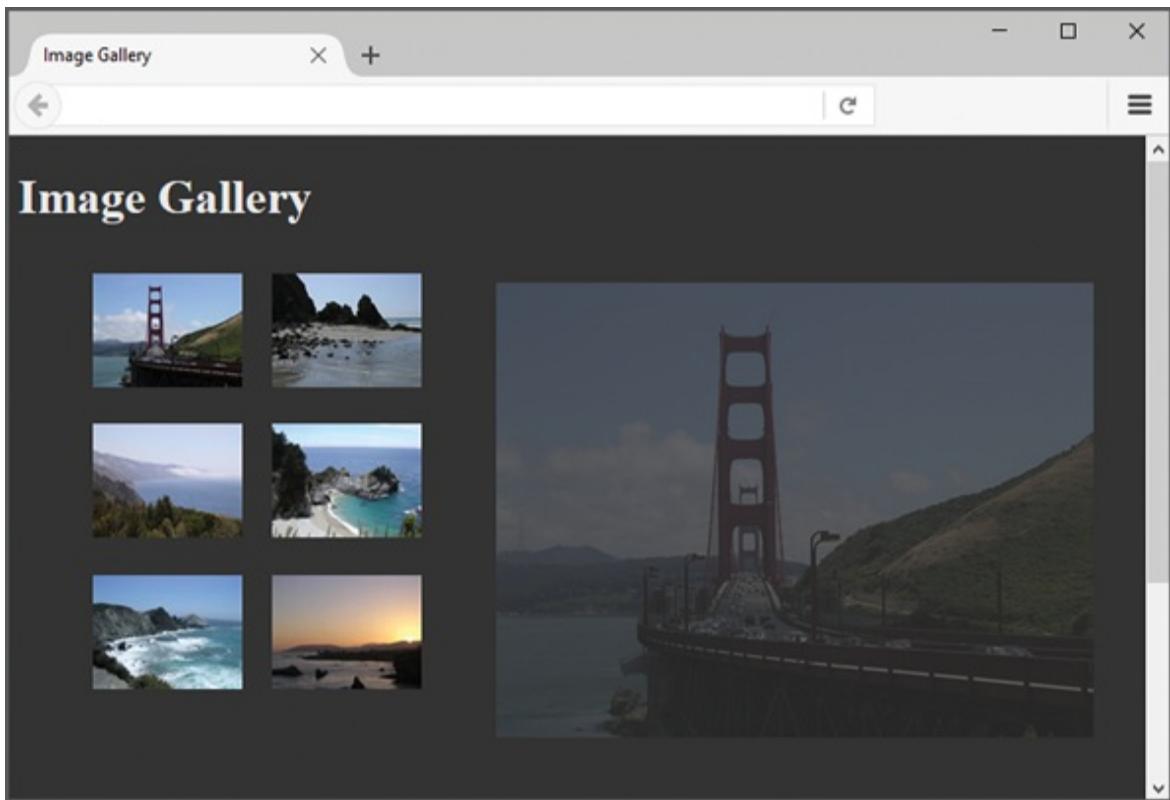
### Hands-On Practice 11.8

In this Hands-On Practice you will use CSS positioning, opacity, and -transition properties to configure an interactive image gallery with CSS and HTML. This is a slightly different version of the image gallery than the web page you created in [Hands-On Practice 6.8](#).

[Figure 11.13](#) shows the initial display of the gallery (see the student files chapter11/11.8/index.html) with a semi-opaque placeholder image. When you place the mouse over a thumbnail image, the larger version of that image is gradually displayed along with a caption (see [Figure 11.14](#)). If you click

the thumbnail, the image will display in its own browser window.

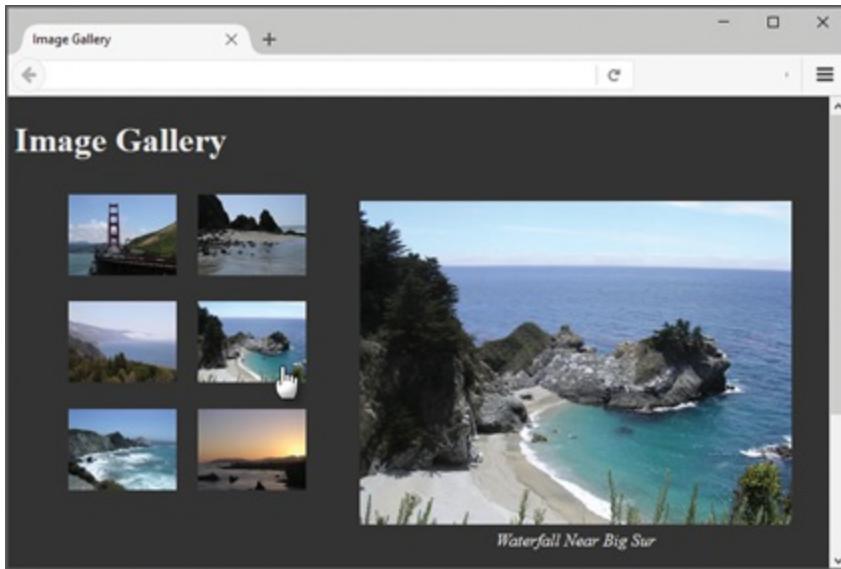
## Figure 11.13



Initial display of the gallery

[Figure 11.13 Full Alternative Text](#)

## Figure 11.14



The new photo gradually displays

[Figure 11.14 Full Alternative Text](#)

Create a new folder called gallery2. Copy all the images from the chapter11/starters/gallery folder in the student files to the new gallery2 folder.

Launch a text editor and modify the chapter2/template.html file to configure a web page as indicated:

1. Configure the text, “Image Gallery”, within an h1 element and within the title element.
2. Code a div element assigned to the id named gallery. This div will contain a placeholder figure element and an unordered list that contains the thumbnail images.
3. Configure a figure element within the div. The figure element will contain a placeholder img element that displays photo1.jpg.
4. Configure an unordered list within the div. Code six li elements, one for each thumbnail image. The thumbnail images will function as image links with a :hover pseudo-class that causes the larger image to display on the page. We’ll make this all happen by configuring an anchor

element containing both the thumbnail image and a span element that comprises the larger image along with descriptive text. An example of the first li element is

```
<li><a href="photo1.jpg">
<span><br>Golden Gate Bridge</span></a>
</li>
```

5. Configure all six li elements in a similar manner. Substitute the actual name of each image file for the href and src values in the code. Write your own descriptive text for each image. Use photo2.jpg and photo2thumb.jpg in the second li element. Use photo3.jpg and - photo3thumb.jpg in the third li element, and so on for all six images. Save the file as index.html in the gallery2 folder. Display your page in a browser. You'll see the placeholder image followed by an unordered list with the thumbnail images, the larger images, and the descriptive text.
6. Now, let's add CSS. Open your file in a text editor and code a style element in the head section. Configure embedded CSS as follows:
  1. Configure the body element selector with a dark background color (#333333) and a light gray text color (#eaeaea).
  2. Configure the gallery id selector. Set position to relative. This does not change the location of the gallery but sets the stage to use absolute positioning on the span element relative to its container (#gallery) instead of relative to the entire web page document.
  3. Configure the figure element selector. Set position to absolute, left to 280px, text-align to center, and opacity to .25. This will cause the figure to initially be semi-opaque.
  4. Configure the unordered list within the #gallery with a width of 300 pixels and no list marker.
  5. Configure the list item elements within the #gallery with inline display, left float, and 10 pixels of padding.

6. Configure the img elements within the #gallery to not display a border.
7. Configure anchor elements within the #gallery with no underline, #eaeaea text color, and italic text.
8. Configure span elements within the #gallery. Set position to absolute, left to -1000px (which causes them not to display initially in the browser viewport), and opacity to 0. Also configure a three second ease-in-out transition.

```
#gallery span { position: absolute; left: -1000px; opacity: 0; transition: opacity 3s ease-in-out; }
```

9. Configure the span elements within the #gallery to display when the web visitor hovers the mouse over the thumbnail image link. Set position to absolute, top to 16px, left to 320px, centered text, and opacity to 1.

```
#gallery a:hover span { position: absolute; top: 16px; left: 320px; text-align: center; opacity: 1; }
```

Save your file in the gallery2 folder and display it in a browser. Compare your work to [Figure 11.13](#), [Figure 11.14](#), and the student files (chapter11/11.8/index.html).

See the following resources for more examples of CSS transforms and transitions:

- CSS Transitions 101: <http://www.webdesignerdepot.com/2010/01/css-transitions-101>
- Using CSS Transitions: [https://developer.mozilla.org/en-US/docs/Web/Guide/CSS/Using\\_CSS\\_transitions](https://developer.mozilla.org/en-US/docs/Web/Guide/CSS/Using_CSS_transitions)
- CSS: Animation Using CSS Transforms: <http://www.the-art-of-web.com/css/css-animation/>

# 11.7 HTML5 Details and Summary Elements

The details element and summary element are used together to configure an interactive widget that will hide and show information.

## Details Element

The purpose of the details element is to configure the browser to render an interactive widget which contains one summary element and detailed information (which can be a combination of text and HTML tags). The details element begins with the `<details>` tag and ends with the `</details>` tag.

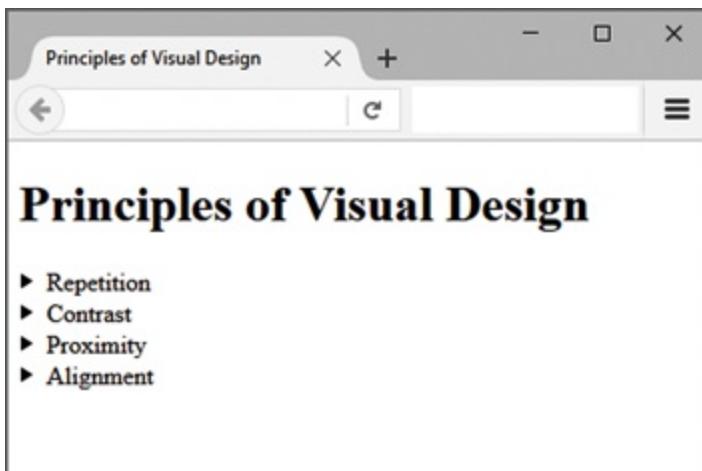
## Summary Element

The **summary element** is coded within the details element. The purpose of the summary element is to contain the text summary shown in the interactive widget. The summary element begins with the `<summary>` tag and ends with the `</summary>` tag.

## Details & Summary Widget

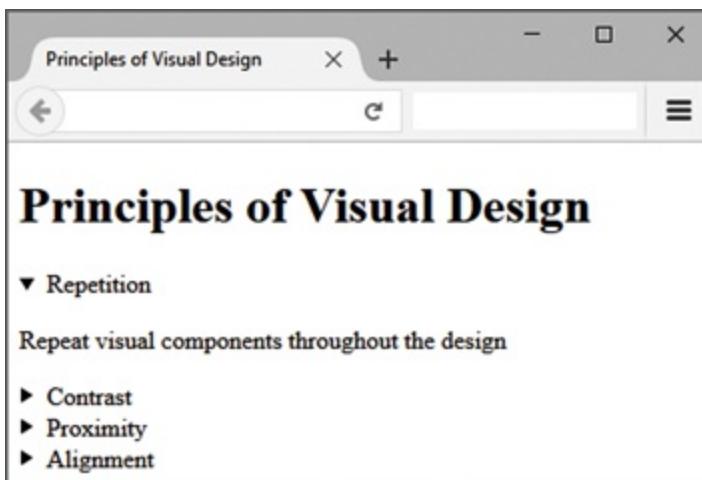
[Figures 11.15](#) and [11.16](#) show the details and summary elements in action. [Figure 11.15](#) shows the initial display of the web page with each summary item (in this case the terms Repetition, Contrast, Proximity, and - Alignment) visible and displayed next to a triangle rendered automatically by the Chrome browser.

## Figure 11.15 Initial browser display



[Figure 11.15 Full Alternative Text](#)

## Figure 11.16 Detailed information displays



[Figure 11.16 Full Alternative Text](#)

In [Figure 11.16](#), the visitor has selected the first summary item (Repetition) which caused browser to display the detailed information for that item. The visitor can select the same summary item again to hide the details or can select another summary item to also show its corresponding detailed information.

Browsers that do not support the details and summary elements display all the information immediately and do not provide interactivity.



## Hands-On Practice 11.9

In this Hands-On Practice you will configure an interactive widget with the details and summary elements as you create the page shown in [Figures 11.15](#) and [11.16](#). Create a new folder named ch11details. Launch a text editor and open the template file located at chapter1/template.html in the student files. Save the file as index.html in your ch11details folder. Modify the file to configure a web page as indicated:

1. Configure the text, Principles of Visual Design, within an h1 element and within the title element.
2. Code the following in the body of the web page:

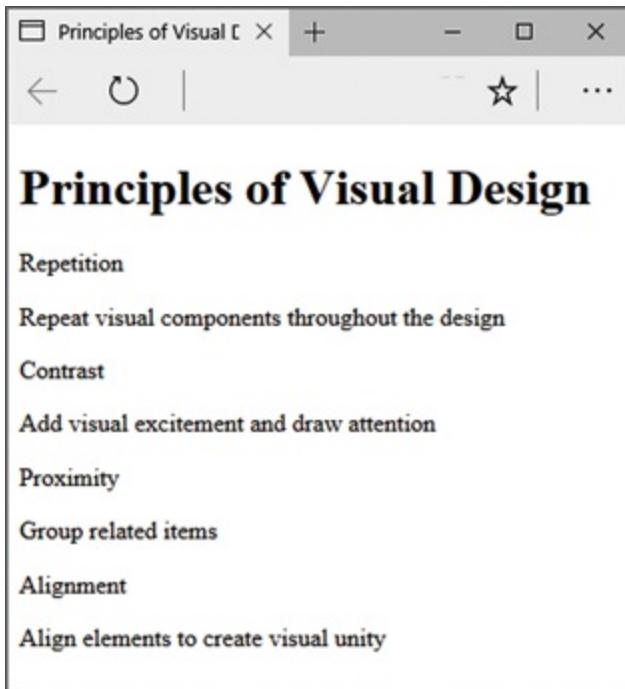
```
<details>
  <summary>Repetition</summary>
  <p>Repeat visual components throughout the design</p>
</details>
<details>
  <summary>Contrast</summary>
  <p>Add visual excitement and draw attention</p>
</details>
<details>
  <summary>Proximity</summary>
  <p>Group related items</p>
</details>
<details>
```

```
<summary>Alignment</summary>
<p>Align elements to create visual unity</p>
</details>
```

Save your file and test your page in Firefox or Chrome. The initial display should be similar to [Figure 11.15](#). Try selecting or clicking on one of the terms or arrows to display the information you coded within the details element. If you select the term “Repetition” your browser should be similar to [Figure 11.16](#).

If you are using a browser that does not support the details and summary elements, your display will be similar to [Figure 11.17](#).

## Figure 11.17 Display in a - nonsupporting browser



[Figure 11.17 Full Alternative Text](#)

A suggested solution is in the student files chapter11/11.9 folder. Visit <http://caniuse.com/#feat=details> to check the current level of browser support

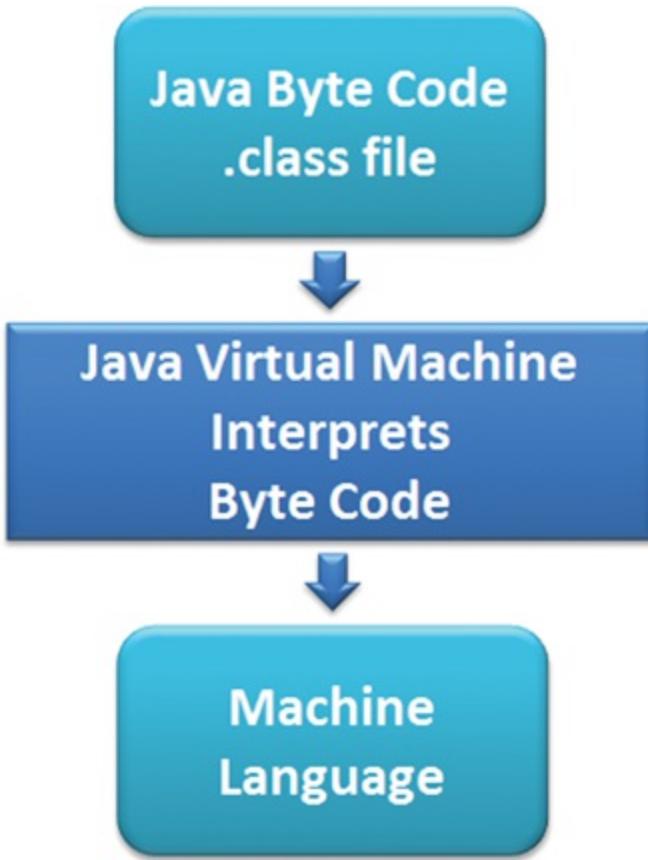
for the details and summary elements.

## 11.8 Java

Java is an object-oriented programming (OOP) language developed by Sun Microsystems, which was later acquired by Oracle. An object-oriented program consists of a group of cooperating objects that exchange messages for the purpose of achieving a common objective. Java is not the same language as JavaScript. It is more powerful and much more flexible than JavaScript. Java can be used to develop both stand-alone executable applications and applets that are invoked by web pages.

**Java applets** are platform independent, which means that they can be written and run on any platform: Mac, UNIX, Linux, and Windows. Java applets are compiled (translated from the English-like Java statements to an encoded form) and saved as .class files, which contain byte code. The byte code is interpreted by the Java Virtual Machine (JVM) in the web browser. The JVM interprets the byte code into the proper machine language for the operating system. The applet is then executed and appears on the web page. See [Figure 11.18](#) for a diagram that shows this process. When a Java applet loads, the area reserved for it on the web page displays an empty rectangular area until the applet begins to execute.

### Figure 11.18



The Java Virtual Machine interprets the byte code into machine language

[Figure 11.18 Full Alternative Text](#)

Online games are a popular use of Java applets; try some classic Java applet games at Java on the Brain (<http://www.javaontheframe.com/brain.html>). Java applets can also be used to create image and text effects, such as the example applet shown in [Figure 11.19](#). While text effects and games are fun, Java applets may be used in business applications for functions such as financial calculations and data visualization. As a web developer, your usual role will not be that of a Java software developer—that is, you should not be expected to write Java applets. However, you could be asked to work with a Java developer to place his or her applet on your website. Whether you obtain an applet from a coworker or find one on a free site, you need to code HTML to display the applet.

## Figure 11.19



A Java applet that displays a text message

[Figure 11.19 Full Alternative Text](#)

## Adding a Java Applet to a Web Page

A while back, the now-obsolete applet element was typically used along with the param element to configure a Java applet on a web page. The W3C recommends using the multipurpose object element to configure a Java applet on a web page. The object element is a multipurpose container tag for adding various types of objects to a web page. The `<object>` tag specifies the beginning of an applet area in the body of a web page. Its closing tag, `</object>`, specifies the ending of an applet area in the body of a web page. The object element has a number of attributes that are used with Java applets, as described in [Table 11.9](#).

# Table 11.9 Object element attributes used with Java applets

Attribute	Value
type	Specifies the MIME type of the Java applet: application/x-java-applet
height	Specifies the height of the applet area in pixels
width	Specifies the width of the applet area in pixels
title	Optional; brief text description that may be displayed by browsers or assistive technologies

The software developer who creates an applet determines the parameter values and names required by a specific Java applet. Therefore, expect each applet to require different parameters. Other parameter names and expected values will be provided in the applet documentation. The parameters will be different, depending on the function of the applet. One parameter might be used to set a background color; another parameter could be used to contain a person's name. Parameters are configured with the **param element**, which is a void element with two attributes: name and value. All the `<param>` tags for the object appear before the closing `</object>` tag. The code parameter indicates the name of the Java applet.

Whether you obtain an applet from a free website or from a coworker, each

applet should have some accompanying documentation that indicates what parameter it expects. Documentation for the example applet appears in [Table 11.10](#).

## Table 11.10 Documentation for example applet

Parameter Name	Parameter Value
code	example.class
message	The text to be displayed by the Java applet
textColor	The color of the text to be displayed by the Java applet; uses a hexadecimal color value
backColor	The background color of the Java applet area; uses a hexadecimal color value

The following code configures appropriate object and param elements to display a Java applet named example.class that is 610 pixels wide and 30 pixels high, has a white background (backColor parameter), has red text (textColor), and displays a text message parameter.

```
<object type="application/x-java-applet" width="610" height="30"  
title="This Java Applet displays a message">  
  <param name="code" value="example.class">  
  <param name="textColor" value="#FF0000">  
  <param name="message" value="This is a Java Applet">
```

```
<param name="backColor" value="#FFFFFF">
Java Applets can be used to display text, manipulate graphics,
Visit <a href="http://download.oracle.com/javase/tutorial/">Ora
</object>
```

# Java Applet Resources

There are many resources for free and commercial Java applets on the Web, - including Java on the Brain (<http://www.javaonthebrain.com>) and Java Applet Archive (<http://www.echoecho.com/freeapplets.htm>).



**Focus on  
Ethics**

As you visit these and other Java resource sites, keep in mind that some Java applets are copyrighted. Be sure to obtain permission from the creator of the applet before using it on your site. There may be some requirements for giving credit to the creator either by name or by linking to their website. Follow the instructions provided with the applet. Some applets are free for use on personal websites, but require licenses for commercial use.



## FAQ

1. Can you show an example of using the obsolete applet element?

Sure! Although the applet element is obsolete, you'll probably run across web pages that still use it. An example of using the applet element to display a Java applet is

```
<applet code="example.class" width="610" height="30"
        alt="Displays a message that describes uses of Java applets"
```

```
<param name="textColor" value="#FF0000">
<param name="message" value="This is a Java Applet">
<param name="backColor" value="#FFFFFF">
Java AppletHTML5 Details and Summary
Elementss can be used to display text, manipulate graphics, p
<a href="http://download.oracle.com/javase/tutorial/">Oracel
</applet>
```



## Checkpoint 11.2

1. Describe a benefit of using the HTML5 audio and video elements.
2. What is the purpose of the transform property?
3. Describe a disadvantage of using Java applets on web pages.

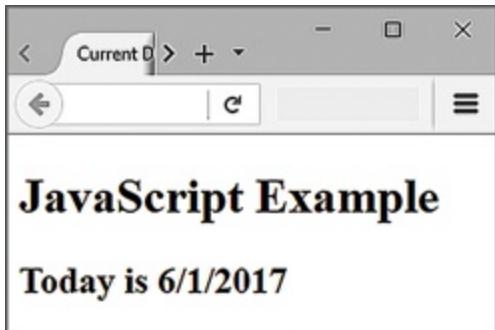
## 11.9 JavaScript

Although some interactivity on web pages can be achieved with CSS, JavaScript powers much of the interactivity on the Web. **JavaScript**, developed initially by Brendan Eich at Netscape, is an object-based, **client-side scripting** language interpreted by a web browser. JavaScript is considered to be **object-based** because it's used to manipulate the objects associated with a web page document: the browser window, the document itself, and elements such as forms, images, and hyperlinks.

JavaScript is not the same as the Java programming language. Unlike Java, JavaScript cannot be used to write stand-alone programs that can run outside of a web browser. JavaScript statements can be placed in a separate file (with a .js extension) that is accessed by a web browser or within an HTML script element. The purpose of the **script element** is to either contain scripting statements or to indicate a file that contains scripting statements. Some JavaScript also can be coded within the HTML. In all cases, the web browser interprets the JavaScript statements. Because JavaScript is interpreted by a browser, it is considered to be a client-side scripting language.

JavaScript can be used to respond to events such as moving the mouse, clicking a button, and loading a web page. This technology is also often utilized to edit and verify information on HTML form controls such as text boxes, check boxes, and radio buttons. Other uses for JavaScript include pop-up windows, image slideshows, animation, date manipulation, and calculations. [Figure 11.20](#) shows a web page (found in the student files at chapter11/date.html) that uses JavaScript to determine and display the current date. The JavaScript statements are enclosed within an HTML script element and coded directly in the .html file. The code sample is below:

### Figure 11.20



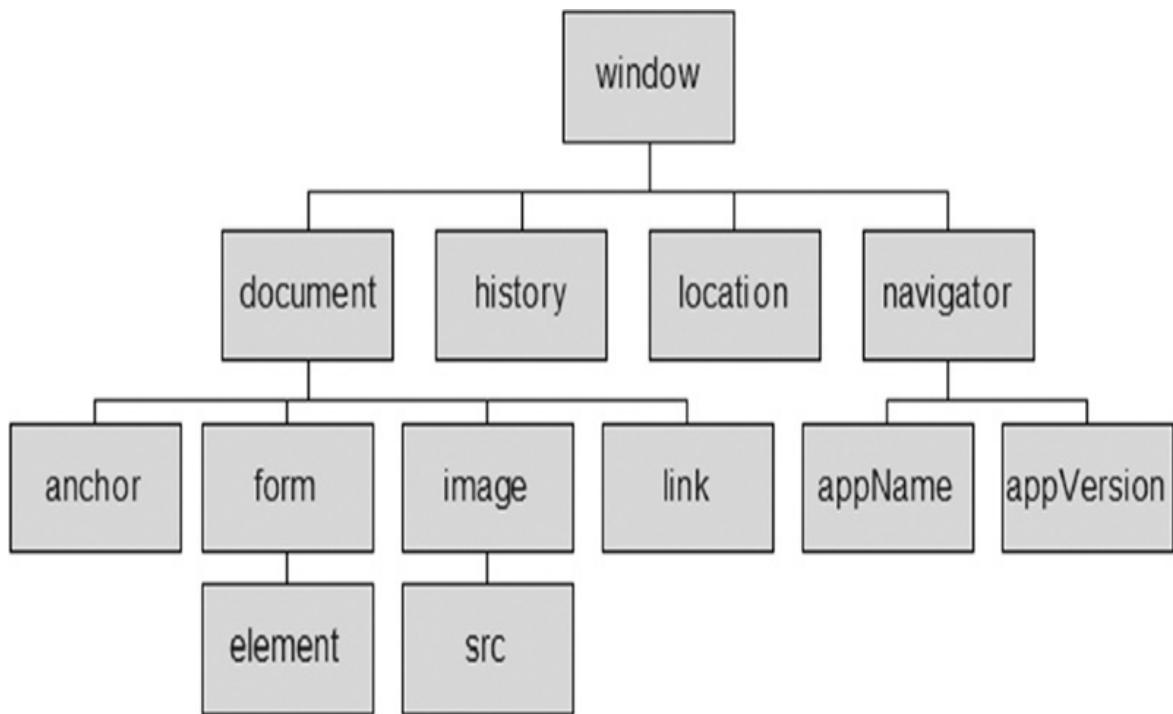
JavaScript in action

[Figure 11.20 Full Alternative Text](#)

```
<h2>Today is
<script>
var myDate = new Date()
var month = myDate.getMonth() + 1
var day = myDate.getDate()
var year = myDate.getFullYear()
document.write(month + "/" + day + "/" + year)
</script>
</h2>
```

There is an introduction to coding JavaScript in [Chapter 14](#). An important part of working with JavaScript is manipulating the Document Object Model (DOM). The DOM defines every object and element on a web page. Its hierarchical structure can be used to access page elements and apply styles to page elements. A portion of a basic DOM that is common to most browsers is shown in [Figure 11.21](#).

## Figure 11.21



The Document Object Model (DOM)

[Figure 11.21 Full Alternative Text](#)

## JavaScript Resources

There is a lot to learn about JavaScript, but there are many free resources for JavaScript code and JavaScript tutorials on the Web. Here are a few sites that offer free tutorials:

- JavaScript Tutorial: <http://echoecho.com/javascript.htm>
- Mozilla Developer Network JavaScript Guide:  
<https://developer.mozilla.org/en-US/docs/Web/JavaScript/Guide>
- JavaScript Tutorial: <http://www.w3schools.com/JS>

Once you are comfortable with HTML and CSS, the JavaScript language is a good technology to learn as you continue your studies. Try some of the resources listed and get your feet wet. See [Chapter 14](#) for a more detailed

introduction to JavaScript. The next section introduces Ajax, a technology that uses JavaScript.

## 11.10 Ajax

**Ajax** is not a single technology, but a combination of different technologies. Ajax stands for Asynchronous JavaScript and XML. These technologies are not new, but recently have been used together to provide a better experience for web visitors and create interactive web applications. Jesse James Garrett of Adaptive Path (<http://adaptivepath.org/ideas/ajax-new-approach-web-applications/>) is credited with coining the term “Ajax”. The technologies utilized in Ajax are as follows:

- Standards-based HTML and CSS
- The Document Object Model
- XML (and the related XSLT technology)
- Asynchronous data retrieval using XMLHttpRequest
- JavaScript

Some of these technologies may be unfamiliar to you. That’s okay at this point in your web development career. You’re currently creating a strong foundation in HTML and CSS and may decide to continue your studies in the future and learn additional web technologies. Right now, it’s enough to know that these technologies exist and what they can be used for.

Ajax is part of the Web 2.0 movement—the transition of the Web from isolated static websites to a platform that uses technology to provide rich interfaces and social networking opportunities for people. See “What Is Web 2.0” (<http://www.oreilly.com/pub/a/web2/archive/what-is-web-20.html>) by Tim O’Reilly, who was instrumental in the creation of the term “Web 2.0”.

Ajax is a web development technique for creating interactive web applications. Recall the client/server model discussed in [Chapters 1](#) and [9](#). The browser makes a request to the server (often triggered by clicking a link or a submit button), and the server returns an entire new web page for the

browser to display. Ajax pushes more of the processing on the client (browser) using JavaScript and XML and often uses behind-the-scenes asynchronous requests to the server to refresh a portion of the browser display instead of the entire web page. The key is that when using Ajax - technology, JavaScript code (which runs on the client computer within the confines of the browser) can communicate directly with the server, exchanging data and modifying parts of the web page display without reloading the entire web page. For example, as soon as a website visitor types a zip code into a form, the value could be looked up in a zip code database and the city/state automatically populated using Ajax—and all of this takes place while the visitor is entering the form information before they click the submit button. The result is that the visitor perceives the web page as being more responsive and has a more interactive experience. See CSS Property Review (<http://webdevfoundations.net/css>) for an example of Ajax in action. As shown in [Figure 11.22](#), hints are provided as you type the name of a CSS - property without refreshing the page.

## Figure 11.22

**CSS Property Review**

Use this page to review the purpose of commonly used CSS properties.

- Begin typing the name of a CSS property in the text box below.
- The page below uses Ajax technologies to "listen" as you type and display a list of suggested CSS property names.
- When you have finished typing the name of a CSS property, a description of the CSS property displays.

**CSS Property Name:**

ba

Hints are displayed below as you type in the textbox

Property Hints: background-color, background-image, background-position, background-repeat

Ajax technologies are used to update the page as the visitor types

### Figure 11.22 Full Alternative Text

Developers are using Ajax to support the web applications that are part of Web 2.0, including Flickr photo sharing (<http://www.flickr.com>) and Google e-mail (<http://gmail.google.com>).

## Ajax Resources

Although you'll probably want to become familiar with scripting before you tackle Ajax, there are many resources and articles available. Some helpful sites are listed here:

- Getting Started with Ajax:  
<http://www.alistapart.com/articles/gettingstartedwithajax>
- Ajax Tutorial: <http://www.tizag.com/ajaxTutorial>

## 11.11 jQuery

You're already aware that JavaScript is a client-side scripting language that adds interactivity and functionality to web pages. Web developers need to configure the same type of common interactive features (such as slideshows, form validation, and animation) on web pages. One approach is for each person to write their own JavaScript code and test it in a wide variety of browsers and operating systems. As you might guess, this can become quite time consuming. John Resig developed the free, open-source jQuery JavaScript library to simplify client-side scripting.

An application programming interface (API) is a protocol that allows software components to communicate—interacting and sharing data. The jQuery API can be used to configure many interactive features, including:

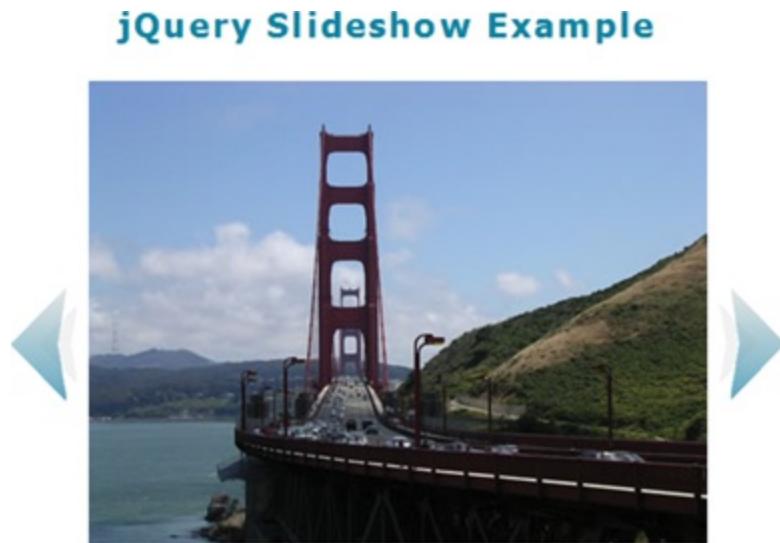
- image slideshows
- animation (moving, hiding, fading)
- event handling (mouse movements and mouse clicking)
- document manipulation
- Ajax

Many web developers and designers have found that jQuery is easier to learn and work with than writing their own JavaScript, although a basic understanding of JavaScript is needed to be efficient when using jQuery. An advantage of the jQuery library is its compatibility with all current browsers.

jQuery is often used on popular websites, such as Amazon, Google, and Twitter. Because jQuery is an open source library, anyone can extend the jQuery library by writing a new plugin that provides a new or enhanced interactive feature. For example, the jQuery Cycle plugin (<http://jquery.malsup.com/cycle>) supports a variety of transition effects. [Figure 11.23](#) (see <http://webdevfoundations.net/jQuery>) shows an example of

using jQuery and the Cycle plugin to create an image slideshow. [Chapter 14](#) includes a brief introduction to working with jQuery.

## Figure 11.23



jQuery is used to configure a slideshow

[Figure 11.23 Full Alternative Text](#)

## jQuery Resources

There are many free resources and tutorials that can help you learn about jQuery. If you'd like to find out more about jQuery, visit the following resources:

- jQuery: <http://jquery.com/>
- jQuery Documentation: <http://docs.jquery.com/>
- How jQuery Works: <http://learn.jquery.com/about-jquery/how-jquery-works/>

## 11.12 HTML5 APIs

You've already been introduced to the term, application programming interface (API), which is a protocol that allows software components to communicate—interacting and sharing data. A variety of APIs that are intended to work with HTML5, CSS, and JavaScript have been developed and approved by the W3C. We'll explore some of the new APIs in this section, including geolocation, web storage, offline web applications, and two-dimensional drawing.

### Geolocation

The geolocation API (<http://www.w3.org/TR/geolocation-API/>) allows your web page visitors to share their geographic location. The browser will first confirm that your visitor wants to share their location. Then, their location may be determined by the IP address, wireless network connection, local cell tower, or GPS hardware depending on the type of device and browser. JavaScript is used to work with the latitude and longitude coordinates provided by the browser. See <http://webdevfoundations.net/geo> and <http://html5demos.com/geo> for examples of geolocation in action.

### Web Storage

Web developers have traditionally used the JavaScript cookie object to store information in key-value pairs on the client (the website visitor's computer). The web storage API (<http://www.w3.org/TR/webstorage>) provides two new ways to store information on the client side: local storage and session storage. An advantage to using web storage is the increase in the amount of data that can be stored (5MB per domain). The **localStorage** object stores data without an expiration date. The **sessionStorage** object stores data only for the duration of the current browser session. JavaScript is used to work with the values stored in the localStorage and sessionStorage objects. Visit

<http://webdevfoundations.net/storage> and <http://html5demos.com/storage> for examples of web storage.

# Offline Web Applications

An offline web application (<http://www.w3.org/TR/html5/browsers.html#offline>) enables website visitors to view documents and access web applications even when they are not connected to the Internet. You've heard of native applications (apps) for mobile phones. A native app must be built and distributed specifically for the platform it will be used on. If your client would like a native mobile app for both an iPhone and an Android, you'll need to create two different apps! In contrast, a web application (app) can be written with HTML, CSS, and JavaScript and can run in any browser—as long as you are online. An offline web application takes this one step further and stores the HTML, CSS, and JavaScript files on the visitor's device for use offline, even when the device is not connected to the Internet.

The key to an offline web application is the manifest file, which is a plain text file having the file extension .appcache. The manifest provides information about the web app in three sections:

- Cache—lists every resource (web pages, CSS, JavaScript, images, etc.) that is associated with the web app
- Fallback—lists fallback files to display when a visitor tries to access a file that is not cached
- Network—lists files that are only available when the visitor has an Internet connection

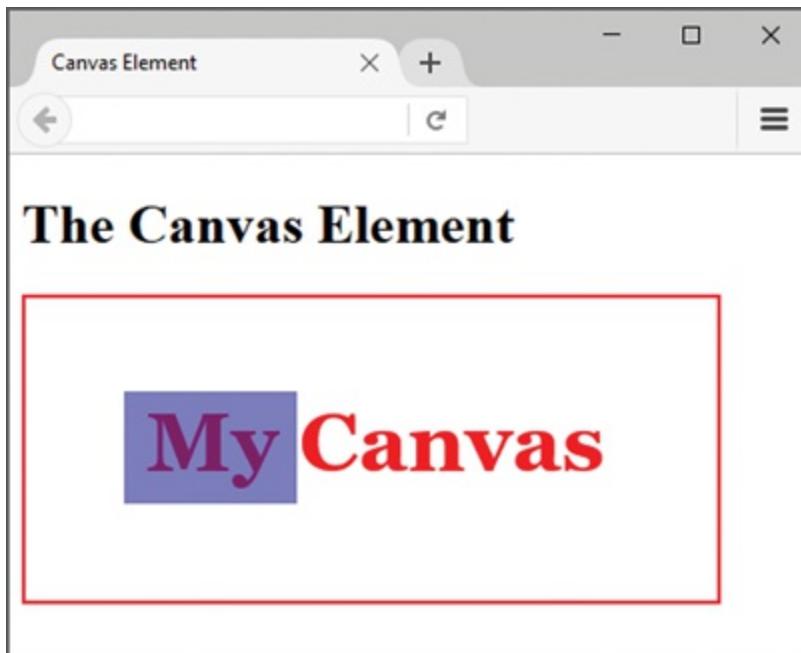
The web browser reads the list of URLs from the manifest file, downloads the resources, stores them locally, and automatically updates the local files when the resources change. If the visitor tries to access the app without an Internet connection, the web browser will render the local files and follow the fallback and network procedures. Try out a demonstration of an offline web

application at <http://html5demos.com/offlineapp>.

## Drawing with the Canvas Element

The HTML5 canvas element is a container for dynamic graphics. The canvas element begins with the <canvas> tag and ends with the </canvas> tag. The canvas element is configured with the Canvas 2D Context API (<http://www.w3.org/TR/2dcontext2>), which provides a way to dynamically draw and transform lines, shapes, images, and text on web pages. If that wasn't enough, the canvas API also provides for interaction with actions taken by the user, like moving the mouse. The canvas offers methods for two-dimensional (2D) bitmap drawing, including lines, strokes, arcs, fills, gradients, images, and text. However, instead of drawing visually using a graphics application, you draw programmatically by writing JavaScript statements. A very basic example of using JavaScript to draw within the canvas element is shown in [Figure 11.24](#) (see chapter11/canvas.html in the student files). The code is

**Figure 11.24**



## The canvas element

[Figure 11.24 Full Alternative Text](#)

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>Canvas Element</title>
<meta charset="utf-8">
<style>
canvas { border: 2px solid red; }
</style>
<script type="text/javascript">
function drawMe() {
    var canvas = document.getElementById("myCanvas");
    if (canvas.getContext) {
        var ctx = canvas.getContext("2d");
        ctx.fillStyle = "rgb(255, 0, 0)";
        ctx.font = "bold 3em Georgia";
        ctx.fillText("My Canvas", 70, 100);
        ctx.fillStyle = "rgba(0, 0, 200, 0.50)";
        ctx.fillRect(57, 54, 100, 65);
    }
}
</script>
</head>
<body onload="drawMe()">
<h1>The Canvas Element</h1>
<canvas id="myCanvas" width="400" height="175">
My Canvas</canvas>
</body>
</html>
```

If some of the code looks like a foreign language to you, don't worry: JavaScript IS a different language than CSS and HTML; it has its own syntax and rules. Here's a quick overview of the code:

- The red outline was created by applying CSS to the canvas selector.
- The JavaScript function drawMe() is invoked when the browser loads the page. JavaScript looks for a canvas element assigned to the “myCanvas” id. JavaScript tests for browser support of canvas and, if true, performs the following actions:

- Sets the canvas context to 2D.
- Draws the “My Canvas” text.
- Uses the fillStyle attribute to set the drawing color to red.
- Uses the font attribute to configure font weight, font size, and font family.
- Uses the fillText method to specify the text to display, followed by the x-value (pixels in from the left) and y-value (pixels down from the top).
- Draws the rectangle.
- Uses the fillStyle attribute to set the drawing color to blue with 50% opacity.
- Uses the fillRect method to set the x-value (pixels in from the left), y-value (pixels down from the top), width, and height of the rectangle.

The promise of the canvas element is that it can be used to provide interactions as sophisticated as those developed with Adobe Flash. Experience virtuoso examples of the canvas element in action at <http://www.canvasdemos.com>.



## FAQ

### 1. What is SVG?

Scalable Vector Graphics (SVG) is a language that describes vector-based two-dimensional graphics in XML. Vector graphic shapes, images, and text objects can be included in an SVG, which can scale to

increase or decrease in size without losing clarity.

SVG content is stored in the .svg file extension and can be interactive and animated. SVG can also be coded inline on a web page within an svg element. You can write the XML code for an SVG yourself, but it's common to use a vector graphics editor, such as Adobe Illustrator, and Adobe Animate CC, open-source Inkscape (<https://inkscape.org>), or the online app <http://editor.method.ac>, to generate an SVG file.

To learn more about SVG visit <https://www.w3.org/TR/SVG/intro.html> and <https://css-tricks.com/using-svg/>.

## HTML5 API Resources

This section provided a brief overview of several of HTML5 APIs. Visit the following resources for more information, tutorials, and demos.

- <http://html5demos.com>
- <http://www.creativebloq.com/html5/developer-s-guide-html5-apis-1122923>
- <http://www.ibm.com/developerworks/library/wa-html5fundamentals3>
- <http://platform.html5.org>



## Checkpoint 11.3

1. What are two uses of JavaScript?
2. Describe two technologies used in Ajax.
3. What is the purpose of the HTML5 canvas element?

# 11.13 Accessibility and Multimedia/Interactivity



**Focus on  
Accessibility**

Multimedia and interactivity can help to create a compelling, engaging experience for your website visitors. Please keep in mind that not every web visitor will be able to experience these features, so incorporate the following into your website:

- Provide links to free downloads for the plug-ins used by your multimedia.
- Text descriptions and equivalent content (such as captions) of audio and video will provide access for those with hearing challenges and will also assist visitors using mobile devices or slow Internet connections.
- When you work with multimedia developers and programmers to create animations for your site, request features that provide accessibility, such as keyboard access, text descriptions, and so on.
- WCAG 2.0 Guideline 2.3.1 recommends that a web page not contain any item that flashes more than three times per second. This is to prevent optically induced seizures. You may need to work with your multimedia developer to ensure that dynamic effects perform within a safe range.
- If you use JavaScript, be aware that some visitors may have JavaScript disabled or are unable to manipulate the mouse. In order to be in compliance with Section 508 of the Rehabilitation Act, your site must be functional at a basic level, even if your visitor's browser does not

support JavaScript. A site using Ajax to redisplay a portion of the browser window may have issues when accessed using an assistive technology or text browser. The importance of testing cannot be overemphasized. W3C has developed ARIA (Accessible Rich Internet Applications), which is a protocol that supports accessibility for scripted and dynamic content, such as the web applications created using Ajax. See WAI-ARIA Overview (<http://www.w3.org/WAI/intro/aria.php>) for more information about ARIA.

When you design with multimedia/interactivity accessibility in mind, you help those visitors who have physical challenges, as well as those who are using low bandwidth or who may be missing plug-ins on their browser. As a last resort, consider creating a separate text-only version of the page if the multimedia and/or interactivity used on a page cannot comply with accessibility guidelines.

# Chapter Summary

This chapter introduced technologies to add media and interactivity to web pages. HTML techniques used to configure sound and video were discussed. Adobe Flash, Java applets, JavaScript, Ajax, and the HTML5 canvas element were introduced. You configured an interactive CSS menu, an interactive CSS image gallery, a widget with the details and summary elements, and explored the CSS3 transition and transform properties. Accessibility and copyright issues related to these technologies were addressed. Visit the textbook website at <http://www.webdevfoundations.net> for examples, the links listed in this chapter, and updated information.

## Key Terms

- [.aiff](#)
- [.au](#)
- [.avi](#)
- [.class](#)
- [.flv](#)
- [.m4a](#)
- [.m4v](#)
- [.mid](#)
- [.mov](#)
- [.mp3](#)
- [.mp4](#)

- [.mpg](#)
- [.ogg](#)
- [.ogv](#)
- [.swf](#)
- [.wav](#)
- [.wmv](#)
- [<audio>](#)
- [<canvas>](#)
- [<details>](#)
- [<object>](#)
- [<param>](#)
- [<script>](#)
- [<source>](#)
- [<summary>](#)
- [<video>](#)
- [Ajax](#)
- [application programming interface \(API\)](#)
- [audio element](#)
- [canvas element](#)
- [client-side scripting](#)

- [codec](#)
- [container](#)
- [copyright](#)
- [Creative Commons license](#)
- [details element](#)
- [Document Object Model \(DOM\)](#)
- [embed element](#)
- [fair use](#)
- [Flash](#)
- [geolocation](#)
- [helper application](#)
- [interactivity](#)
- [Java](#)
- [Java applets](#)
- [Java Virtual Machine \(JVM\)](#)
- [JavaScript](#)
- [jQuery](#)
- [localStorage](#)
- [manifest](#)
- [media](#)

- [object-based](#)
- [object element](#)
- [offline web application](#)
- [param element](#)
- [plug-ins](#)
- [podcast](#)
- [rotate\(\) transform](#)
- [RSS feed](#)
- [sampling rate](#)
- [scale\(\) transform](#)
- [script element](#)
- [sessionStorage](#)
- [source element](#)
- [summary element](#)
- [transform property](#)
- [transition property](#)
- [video element](#)
- [Web 2.0](#)
- [web storage](#)

# Review Questions

## Multiple Choice

1. Which property provides a way for you to rotate, scale, skew, or move an element?
  1. display
  2. transition
  3. transform
  4. relative
2. Which code provides a hyperlink to an audio file called hello.mp3?
  1. <object data="hello.mp3"> </object>
  2. <a href="hello.mp3">Hello (Audio File)</a>
  3. <object data="hello.mp3"></object>
  4. <link src="hello.mp3">
3. What type of files are .wav, .aiff, .mid, and .au?
  1. audio files
  2. video files
  3. both audio and video files
  4. image files
4. Which of the following should you do to provide for usability and accessibility?

1. Use video and sound whenever possible.
  2. Supply text descriptions of audio and video files that appear on your web pages.
  3. Never use audio and video files.
  4. none of the above
5. What happens when a browser does not support the video or audio element?
1. The computer crashes.
  2. The web page does not display.
  3. The fallback content, if it exists, will display.
  4. The browser closes.
6. Which of the following statement is true about JavaScript?
1. JavaScript is an object-based scripting language.
  2. JavaScript is an easy form of Java.
  3. JavaScript was created by Microsoft.
  4. JavaScript is an obsolete technology.
7. Which of the following is true of Java applets?
1. Java applets are contained in files with the .class extension.
  2. Java applets are not copyrighted.
  3. Java applets must be saved in a different folder than web pages.
  4. Java is an advanced form of JavaScript.

8. Which of the following is an open-source video codec?
1. Theora
  2. Vorbis
  3. MP3
  4. Flash
9. A file that contains a Flash animation uses the \_\_\_\_\_ file extension.
1. .class
  2. .swf
  3. .mp3
  4. .flash
10. Which of the following can describe Ajax?
1. It is an object-based scripting language.
  2. It is the same as Web 2.0.
  3. It is a web development technique for creating interactive web applications.
  4. It is an obsolete technology.

## Fill in the Blank

11. A(n) \_\_\_\_\_ is a protocol that allows software components to communicate—interacting and sharing data.
12. Use of a copyrighted work for purposes such as criticism, reporting, teaching, scholarship, or research is called \_\_\_\_\_.

13. The file extensions .webm, .ogv, and .m4v indicate types of files.
14. When displaying a Java applet, the browser invokes the \_\_\_\_\_ to interpret the bytecode into the appropriate machine language.
15. The \_\_\_\_\_ defines every object and element on a web page.

## Short Answer

16. List at least two reasons not to use audio or video on a web page.
17. Describe a type of copyright license that empowers the author/artist to grant some, but not all, rights for using his or her work.

## Apply Your Knowledge

1. Predict the Result. Draw and write a brief description of the web page that will be created with the following HTML code:

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>CircleSoft Designs</title>
<meta charset="utf-8">
<style>
body { background-color: #FFFFCC; color: #330000;
       font-family: Arial,Helvetica,sans-serif; }
#wrapper { width: 750px; }
</style>
</head>
<body>
<div id="wrapper">
<h1>CircleSoft Design</h1>
<div><strong>CircleSoft Designs will </strong>
<ul>
    <li>work with you to create a Web presence that fits your c
    <li>listen to you and answer your questions</li>
    <li>utilize the most appropriate technology for your websit
```

```
</ul>
<p><a href="podcast.mp3" title="CircleSoft Client Testimonial">Listen to what our clients say</a>
</p>
</div>
</div>
</body>
</html>
```

- Fill in the Missing Code. This web page should display a details and summary widget. Some HTML element names, indicated by `<_>` and `</_>`, are missing. Fill in the missing code.

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>Fill in the Missing Code</title>
<meta charset="utf-8">
</head>
<body>x
<_>
<_>Transition Property</_>
<p>A CSS3 transition provides for changes in property values
<embed type="application/x-shockwave-flash"
</_>
</body>
</html>
```

- Find the Error. The purpose of the following web page is to display a video. The video does not display on the Safari browser. Why?

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>Find the Error</title>
<meta charset="utf-8">
</head>
<body>
<video controls="controls" width="160" height="150">
    <source src="sparky.webm" type="video/webm">
        <p>You are missing a great video.</p>
</video>
</body>
</html>
```

# Hands-On Exercises

1. Write the HTML for a hyperlink to a video called sparky.mov on a web page.
2. Write the HTML to allow a web visitor to control the playback of an audio file named lesson1.mp3.
3. Write the HTML to play a video on a web page. The video source files are prime.m4v, prime.ogv, and prime.webm. The dimensions of the video are 213 pixels wide by 163 pixels high.
4. Write the HTML to add a Flash file called banner.swf to a web page. The effect needs an area that is 468 pixels wide and 60 pixels high.
5. Create a web page about your favorite movie or music CD that plays an audio file (use Windows Sound Recorder or a similar program to record your voice) and includes your review and recommendation. Remember to consider accessibility and provide a transcript of your audio file. Choose to either include the transcript text directly on the page or provide access to it with a hyperlink. Place an e-mail link to yourself on the web page. Save the page as audio11.html.
6. Create a web page about your favorite movie or music CD that plays a video file (use a digital camera, smartphone, or one of the applications listed in this chapter to record yourself) and includes your review and recommendation. Remember to consider accessibility and either provide a transcript of your video file or caption the video file. Place an e-mail link to yourself on the web page. Save the page as video11.html.
7. Visit the textbook website at <http://webdevfoundations.net/flashcs5> and follow the instructions to create a Flash logo banner. Use your last name as the company name in your logo banner. Configure a web page to display the logo banner. Place an e-mail link to yourself on the web page. Save the page as flash11.html.

# Web Research

1. This chapter mentioned some software applications that can be used to create and edit media files. With those as a starting point, search for more applications on the Web. Create a web page that lists at least five media authoring applications. Organize your web page with a list that provides the name of the software application, the URL, a brief description, and the price. Place your name in an e-mail link on the web page. Your web page should include a hyperlink to a music audio file. Include an audio file (soundloop.mp3) from this chapter, record your own, or find an appropriate sound file on the Web. Place your name in an e-mail link on the web page.
2. Issues related to copyright law were discussed in this chapter. With the resources provided as a starting point, search for additional information related to copyright law and the Web. Create a web page that provides five helpful facts about copyright law and the Web. Provide the URLs of the websites you used as resources. Place a media console on the page to allow visitors to play an audio file while they read your web page. Include an audio file (soundloop.mp3) from this chapter, record your own, or find an appropriate sound file on the Web. Place your name in an e-mail link on the web page.
3. Choose one of the following to research: JavaScript, Ajax, or jQuery. Use the resources listed in the chapter as a starting point, but also search the Web for additional resources on the topic you have chosen. Create a web page that lists at least five useful resources along with a brief description of each. Organize your web page with a list that provides the name of the site, the URL, a brief description of what is offered, and a recommended page (such as a tutorial or free script) for each resource. Place your name in an e-mail link on the web page.
4. Choose one of the following to research: JavaScript, Canvas Element API, or jQuery. Use the resources listed in the chapter as a starting point, but also search the Web for additional resources on the topic you have chosen. Find either a tutorial or a free download that uses the

method of web interactivity you are researching. Create a web page that uses the code or download that you found. Describe the effect and list the URL of the resource on the web page. Place your name in an e-mail link on the web page.

## Focus on Web Design

- There are web design usability and accessibility issues associated with HTML5 video. Visit the following sites to become aware of these issues:
  - <https://mediaaccess.org.au/practical-web-accessibility/w3c-column/html5-media-player-accessibility-the-potential-and-the-reality>
  - [https://developer.mozilla.org/en-US/docs/Learn/Tools\\_and\\_testing/Cross\\_browser\\_testing/Accessibility](https://developer.mozilla.org/en-US/docs/Learn/Tools_and_testing/Cross_browser_testing/Accessibility)
  - <http://www.afb.org/blog/afb-blog/an-accessible-html5-video-player-from-the-american-foundation-for-the-blind/12>

Write a one-page report that describes HTML5 Video usability issues that web designers should be mindful of. Cite the URLs of the resources you used.



## WEBSITE CASE STUDY Adding Multimedia

Each of the following case studies continues throughout most of the text. This chapter adds media and interactivity to the websites.

# JavaJam Coffee House

See [Chapter 2](#) for an introduction to the JavaJam Coffee House case study. [Figure 2.31](#) shows a site map for the JavaJam website. Use the [Chapter 9](#) JavaJam website as a starting point for this case study. You have three tasks in this case study:

1. Create a new folder for this JavaJam case study.
2. Modify the style sheet (javajam.css) to configure style rules for an audio element.
3. Configure the Music page (music.html) to play audio files. [Figure 11.25](#) shows the Music page with the audio players.

**Figure 11.25**



The audio element on the Music page

[Figure 11.25 Full Alternative Text](#)

## Hands-On Practice Case Study

- Task 1: The Website Folder. Create a folder called javajam11. Copy all the files from your [Chapter 9](#) javajam9 folder into the javajam11 folder. Copy melanie.mp3, melanie.ogg, greg.mp3, and greg.ogg from the chapter11/casestudystarters folder in the student files and save them to

your javajam11 folder.

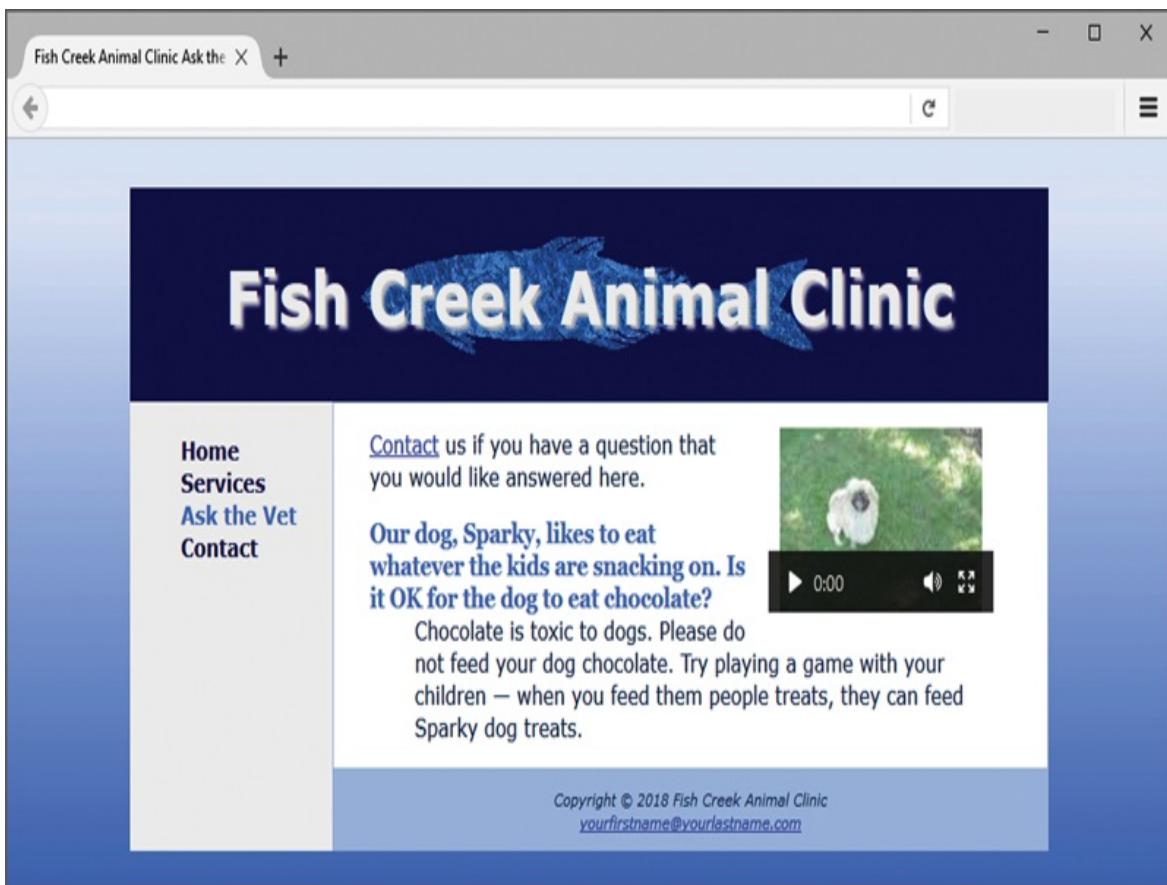
- Task 2: Configure the CSS. Modify the external style sheet (javajam.css). Open javajam.css in a text editor. Create an audio element selector with block display and 1em of top margin. Save the javajam.css file.
- Task 3: **Update the Music Page.** Open music.html in a text editor. Modify music.html so that two HTML5 audio controls display (see [Figure 11.25](#)). Refer to [Hands-On Practice 11.3](#) when you create the audio control. Configure an audio control within the div about Melanie to play the melanie.mp3 or melanie.ogg file and provide a hyperlink to the melanie.mp3 file as a fallback if the audio element is not supported. Configure an audio control within the div about Greg to play the greg.mp3 or greg.ogg file and provide a hyperlink to the greg.mp3 file as a fallback if the audio element is not supported. Save the web page. Check your HTML syntax using the W3C validator (<http://validator.w3.org>). Correct and retest if necessary. Display the page in different browsers and play the audio files.

## Fish Creek Animal Clinic

See [Chapter 2](#) for an introduction to the Fish Creek Animal Clinic case study. [Figure 2.35](#) shows a site map for the Fish Creek website. Use the [Chapter 9](#) Fish Creek website as a starting point for this case study. You have three tasks in this case study:

1. Create a new folder for this Fish Creek case study.
2. Modify fishcreek.css to configure the placement of a video.
3. Add a video to the Ask the Vet page (askvet.html). See [Figure 11.26](#) for a sample screenshot.

## Figure 11.26



Fish Creek Ask the Vet page with HTML5 video element

[Figure 11.26 Full Alternative Text](#)

## Hands-On Practice Case Study

- Task 1: The Website Folder. Create a folder called fishcreek11. Copy all the files from your [Chapter 9](#) fishcreek9 folder into the fishcreek11 folder. Copy sparky.webm, sparky.mov, sparky.m4v, sparky.ogv, and sparky.jpg from the chapter11/casestudystarters folder in the student files and save them to your fishcreek11 folder.
- Task 2: Configure the CSS. Modify the external style sheet (fishcreek.css). Open fishcreek.css in a text editor. Edit the CSS and code a new video element selector that floats to the right and has a 1em margin. Save the fishcreek.css file.

- Task 3: Configure a Video on the Ask the Vet Page. Launch a text editor and edit the Ask the Vet page (askvet.html). Configure the Sparky video (sparky.mov, sparky.m4v, sparky.ogv, sparky.webm, and sparky.jpg files) to display to the right of the paragraph and description list. Use the HTML5 video and source elements. Configure a 120 pixel height, 200 pixel width, and a hyperlink to the sparky.mov file as fallback content in browsers that do not support the video element. Save your web page and test it using several browsers.

## Pacific Trails Resort

See [Chapter 2](#) for an introduction to the Pacific Trails Resort case study. [Figure 2.39](#) shows a site map for the Pacific Trails website. Use the [Chapter 9](#) Pacific Trails website as a starting point for this case study. You have three tasks in this case study:

1. Create a new folder for this Pacific Trails case study.
2. Modify pacific.css to configure the placement of a video.
3. Add a video to the home page (index.html). See [Figure 11.27](#) for a sample screenshot.

## Figure 11.27

Pacific Trails Resort

Home  
Yurts  
Activities  
Reservations



## Pacific Trails Resort

### Enjoy Nature in Luxury

**Pacific Trails Resort** offers a special lodging experience on the California North Coast with panoramic views of the Pacific Ocean. Your stay at Pacific Trails Resort includes a sumptuously appointed private yurt and a cooked-to-order breakfast each morning.



- Unwind in the heated outdoor pool and whirlpool
- Explore the coast on your own or join our guided tours
- Relax in our lodge while enjoying complimentary appetizers and beverages
- Savor nightly fine dining with an ocean view

Pacific Trails Resort

Pacific Trails Resort home page

[Figure 11.27 Full Alternative Text](#)

## Hands-On Practice Case Study

- Task 1: The Website Folder. Create a folder called pacific11. Copy all of the files from your [Chapter 9](#) pacific9 folder into the pacific11 folder. Copy the following files from the chapter11/casestudystarters folder in the student files and save them in your pacific11 folder: pacific.mp4, pacific.ogv, pacific.jpg, and pacific.swf.
- Task 2: Configure the CSS. Modify the external style sheet (pacific.css). Open pacific.css in a text editor. Edit the CSS and configure a new video element selector and a new embed element selector with style declarations to float to the right with margin set to 2em. Save the pacific.css file.
- Task 3: Configure the Video. Launch a text editor and open the home page (index.html). Code the HTML5 video control below the h2 element and above the paragraph. Configure the video, source, and embed elements to work with the following files: pacific.mp4, pacific.ogv, pacific.swf, and pacific.jpg. The dimensions of the video are 320 pixels wide by 240 pixels high. Save the file. Check your HTML syntax using the W3C validator (<http://validator.w3.org>). Launch a browser and test your new Home page (index.html). It should look similar to [Figure 11.27](#).

## Path of Light Yoga Studio

See [Chapter 2](#) for an introduction to the Path of Light Yoga Studio case study. [Figure 2.43](#) shows a site map for the Path of Light Yoga Studio website. Use the [Chapter 9](#) Path of Light Yoga Studio website as a starting point for this case study. You have three tasks:

1. Create a new folder for this Path of Light Yoga Studio case study.

2. Modify yoga.css to configure the placement of an audio element.
3. Configure the Classes page (classes.html) to display an audio control.

## Hands-On Practice Case Study

- Task 1: The Website Folder. Create a folder called yoga11. Copy all of the files from your [Chapter 9](#) yoga9 folder into the yoga11 folder. Copy the savasana.mp3 and savasana.ogg files from the chapter11/casestudystarters folder in the student files and save them in your yoga11 folder.
- Task 2: Configure the CSS. Modify the external style sheet (yoga.css). Open yoga.css in a text editor. Edit the CSS and code a new audio element selector with block display and 1em margins. Save the yoga.css file.
- Task 3: Configure the Audio. Open the Classes page (classes.html) in a text editor. Modify classes.html so that a heading, a paragraph, and an HTML5 audio control displays below the description list area on the page (see [Figure 11.28](#)). Use an h2 element to display the text “Relax Anytime with Savasana”. Add a paragraph that contains the following text:

## Figure 11.28

Path of Light Yoga Studio :: Classes

The screenshot shows a web browser window with the title "Path of Light Yoga Studio :: Classes". The main content area features a large blue lotus flower image in the top right corner. On the left, there's a vertical sidebar with four buttons: "Home" (which is currently selected), "Classes", "Schedule", and "Contact". The main content area has a heading "Yoga Classes" followed by three sections: "Gentle Hatha Yoga", "Vinyasa Yoga", and "Restorative Yoga". Each section contains a brief description. Below these is a heading "Relax Anytime with Savasana" with a paragraph of text and an HTML5 audio control. At the bottom, there's a copyright notice.

**Path of Light Yoga Studio**

Home  
Classes  
Schedule  
Contact



## Yoga Classes

### Gentle Hatha Yoga

Intended for beginners and anyone wishing a grounded foundation in the practice of yoga, this 60 minute class of poses and slow movement focuses on asana (proper alignment and posture), pranayama (breath work), and guided meditation to foster your mind and body connection.

### Vinyasa Yoga

Although designed for intermediate to advanced students, beginners are welcome to sample this 60 minute class that focuses on breath-synchronized movement — you will inhale and exhale as you flow energetically through yoga poses.

### Restorative Yoga

This 90 minute class features very slow movement and long poses that are supported by a chair or wall. This calming, restorative experience is suitable for students of any level of experience. This practice can be a perfect way to rehabilitate an injury.

## Relax Anytime with Savasana

Prepare yourself for savasana. Lie down on your yoga mat with your arms at your side with palms up. Close your eyes and breathe slowly but deeply. Sink into the mat and let your worries slip away. When you are ready, roll on your side and use your arms to push yourself to a sitting position with crossed legs. Place your hands in a prayer position. Be grateful for all that you have in life. Namaste.

0:00 / 1:25

Copyright © 2018 Path of Light Yoga Studio  
[yourfirstname@yourlastname.com](mailto:yourfirstname@yourlastname.com)

The classes page displays an HTML5 audio control

“Prepare yourself for savasana. Lie down on your yoga mat with your arms at your side with palms up. Close your eyes and breathe slowly but

deeply. Sink into the mat and let your worries slip away. When you are ready, roll on your side and use your arms to push yourself to a sitting position with crossed legs. Place your hands in a prayer position. Be grateful for all that you have in life. Namaste.”

Refer to [Hands-On Practice 11.3](#) when you create the audio control. Configure the audio and source elements to work with the following files: savasana.mp3 and savasana.ogg. Configure a hyperlink to the savasana.mp3 file as a fallback if the audio element is not supported. Save the file. Check your HTML syntax using the W3C validator (<http://validator.w3.org>). Correct and retest if necessary. Launch a browser and test your new Classes page (classes.html). It should look similar to [Figure 11.28](#).

## Web Project

See [Chapter 5](#) for an introduction to the Web Project case study. Review the goals of your website and determine whether the use of media or interactivity would add value to your site. If so, you will add either media and/or interactivity to your project site. Check with your instructor regarding the required use of any specific media or technology that supports interactivity in your web project.

Select one or more from the following:

1. Media: Choose one of the examples from the chapter, record your own audio or media file, or search the Web for royalty-free media.
2. CSS image gallery: Create or locate images that relate to your web project. Using [Hands-On Practice 11.8](#) as an example, configure a CSS image gallery.
3. Details & Summary Widget: Choose a web page in your project that contains definitions or descriptions of items that could be enhanced with a details and summary widget. Using [Hands-On Practice 11.9](#) as an example, configure a details and summary widget.

4. Decide where to apply the media and/or interactive technology to your site. Modify, save the page(s), and test in various browsers.

# **12 E-Commerce Overview**

# Chapter Objectives

In this chapter, you will learn how to . . .

- Define e-commerce
- Identify the benefits and risks of e-commerce
- Describe e-commerce business models
- Describe e-commerce security and encryption
- Define Electronic Data Interchange (EDI)
- Identify trends and projections for e-commerce
- Describe issues related to e-commerce
- Describe options for order and payment processing

**E-commerce is the buying and selling of goods** and services on the Internet. Whether business-to-business, business-to-consumer, or consumer-to--consumer, websites that support e-commerce are everywhere. This chapter provides an overview of this topic.

# 12.1 What Is E-Commerce?

A formal definition of e-commerce is the integration of communications, data management, and security technologies, which allows individuals and organizations to exchange information related to the sale of goods and services. The major functions of e-commerce include the buying of goods, the selling of goods, and the performance of financial transactions on the Internet.



**VideoNote** *E-Commerce Benefits and Risks*

## Advantages of E-Commerce

There are a number of advantages for both businesses and consumers when engaging in e-commerce. For businesses, the many advantages include the following:

- Reduced Costs. Online businesses can stay open 24 hours a day without the overhead of a brick-and-mortar facility. Many businesses establish a website before attempting e-commerce. When they add e-commerce functions to their website, the site becomes a source of revenue and, in many cases, pays for itself in short order.
- Increased Customer Satisfaction. Businesses can use their websites to improve communication with customers and increase customer satisfaction. E-commerce sites often contain a page for frequently asked questions (FAQs). The availability of customer service representatives by e-mail, discussion forums, or even online chats (see LivePerson at <http://www.liveperson.com>) can improve customer relations.
- More Effective Data Management. Depending on the level of automation, e-commerce sites can perform credit card verification and

authorization, update inventory levels, and interface with order fulfillment systems, thereby managing the organization's data more efficiently.

- Potentially Higher Sales. An e-commerce store that is open 24 hours a day, 7 days a week and is available to everyone on the planet has the potential for higher sales than a traditional brick-and-mortar storefront.

Businesses aren't the only beneficiaries of e-commerce; consumers see some advantages as well, including the following:

- Convenience. Consumers can shop at any time of the day. There is no travel time to get to the store. Some consumers prefer website shopping over traditional catalog shopping because they can view additional images and join discussion forums about the products.
- Easier Comparison Shopping. There is no driving from store to store to check the price of an item. Customers can easily surf the Web to compare prices and value.
- Wider Selection of Goods. Because it is convenient to shop and compare, consumers have a wider selection of goods available for purchase.

As you can see, e-commerce provides a number of advantages for both businesses and consumers.

## Risks of E-Commerce

There are risks involved in any business transaction and e-commerce is no exception. The possible risks for businesses include the following:

- Loss of Sales if Technology Fails. If your website isn't available or your e-commerce form processing doesn't work, customers may not return to your site. It is always important to have a user-friendly, reliable website, but when you engage in e-commerce, reliability and ease of use are critical factors in the success of your business.

- Fraudulent Transactions. Fraudulent credit card purchases or crank orders placed by vandals (or 13-year-olds with time on their hands) are risks that businesses need to deal with.
- Customer Reluctance. Although more and more consumers are willing to purchase on the Web, the target market of your business may not be. However, by offering incentives such as free shipping or a “no questions asked” returns policy, your business may be able to attract these consumers.
- Increased Competition. Because the overhead for an e-commerce site can be much lower than that of a traditional brick-and-mortar store, a company operating out of a basement can be just as impressive as a long-standing business if its website looks professional. Because it is much easier to enter the marketplace with an e-commerce store, your business will have increased competition.

Businesses are not alone in needing to deal with the risks associated with e-commerce. Consumers may perceive the following risks:

- Security Issues. Later in this chapter, you will learn how to determine whether a website uses a Secure Sockets Layer (SSL) protocol for the encryption and security of information. The general public may not know how to determine whether a website is using this encryption method and be wary of placing a credit card order. Another, possibly more important, issue is what the site does with information after it is transmitted over the Internet. Is the database secure? Are the database backups secure? These questions are difficult to answer. It’s a good idea to purchase only from sites that you consider to be reputable.
- Privacy Issues. Many sites post privacy policy statements. These describe what the site will do (or will not do) with the information they receive. Some sites use the data for internal marketing purposes only. Other sites sell the data to outside companies. Websites can and do change their privacy policies over time. Consumers may be leery of purchasing online because of the potential lack of privacy.
- Purchasing Based on Photos and Descriptions. There is nothing like

holding and touching an item before you purchase it. Consumers run the risk of purchasing a product that they will not be happy with because they are making purchasing decisions based on photographs and written descriptions. If an e-commerce site has a generous returns policy, consumers will feel more confident about making a purchase.

- Returns. It is often more difficult to return an item to an e-commerce store than to a brick-and-mortar store. Consumers may not want to risk this inconvenience.

## 12.2 E-Commerce Business Models

Both businesses and consumers are riding the e-commerce wave. There are four common e-commerce business models: business-to-consumer, business-to-business, consumer-to-consumer, and business-to-government.

- **Business-to-Consumer (B2C).** Most of the business-to-consumer selling takes place at online stores. Some, like Amazon.com (<http://www.amazon.com>), are online only. Others are click-and-mortar—electronic storefronts for well-known brick-and-mortar stores such as Sears (<http://www.sears.com>).
- **Business-to-Business (B2B).** E-commerce between two businesses often takes the form of exchanging business supply chain information among vendors, partners, and business customers. Electronic Data Interchange (EDI) is also included in this category.
- **Consumer-to-Consumer (C2C).** Individuals are selling to each other on the Internet. The most common format is that of the auction. The most well-known auction site is eBay (<http://www.ebay.com>), which was founded in 1995.
- **Business-to-Government (B2G).** Businesses are selling to the government on the Internet. There are very strict usability standards for businesses that target governmental agencies. Section 508 of the Rehabilitation Act requires that electronic and information technology (including web pages) used by federal agencies is accessible to people with disabilities. See <http://www.section508.gov> for more information.

Businesses began exchanging information electronically using EDI many years before the Web came into existence.

## 12.3 Electronic Data Interchange (EDI)

Electronic Data Interchange (EDI) is the transfer of structured data between companies over a network. This facilitates the exchange of standard business documents, including purchase orders and invoices. EDI is not new; it has been in existence since the 1960s. Organizations that exchange EDI transmissions are called trading partners.

The Accredited Standards Committee X12 (ASC X12) is chartered by the American National Standards Institute (ANSI) to develop and maintain EDI standards. These standards include transaction sets for common business forms, such as requisitions and invoices. This allows businesses to reduce paperwork and communicate electronically.

EDI messages are placed in transaction sets, which consist of a header; one or more data segments, which are strings of data elements separated by delimiters; and a trailer. Newer technologies such as XML and web services are allowing trading partners virtually unlimited opportunities to customize their information exchange over the Internet.

Now that you are aware of the possibilities of e-commerce and the types of business models, you may be wondering where the most money is being made. The next section discusses some statistics related to e-commerce.

## 12.4 E-Commerce Statistics

Although e-commerce growth stalled during the recent economic downturn, it is again demonstrating growth. Statista reports that worldwide e-commerce sales are expected to grow from \$1.55 trillion in 2015 to \$3.4 trillion in 2019 (<https://www.statista.com/statistics/379046/worldwide-retail-e-commerce-sales/>).

You may be wondering what people are buying online. A report compiled by the U.S. Census Bureau (<http://www2.census.gov/retail/releases/current/arts/ecommerce4541.xls>) indicated that the top eight categories for online retail sales in 2015 (the most recent year reported) were the following:

1. Clothing, accessories, and footwear (\$58.2 billion)
2. Furniture and home furnishings (\$32.4 billion)
3. Electronics and appliances (\$30 billion)
4. Sporting goods (\$13.1 billion)
5. Books and magazines (\$12.6 billion)
6. Toys, hobby goods, and games (\$12.1 billion)
7. Office equipment and supplies (\$10.6 billion)
8. Food, beer, and wine (\$9.8 billion)

Now that you know what is selling the best online, who are your potential online consumers? A survey by the PEW Internet and American Life Project (<http://www.pewinternet.org/data-trend/internet-use/latest-stats/>) indicated that while about the same percentage of men and women are online, Internet usage varies by age, income, and education. [Table 12.1](#) shows an excerpt from this research.

# **Table 12.1 Online population.**

## **Data from Pew Research**

### **Center Internet Project Survey.**

<b>Category</b>	<b>Percentage Who Use the Internet</b>
Men	89%
Women	86%
Age: 18–29	99%
Age: 30–49	96%
Age: 50–64	87%
Age: 65 and older	57%
Household Income: Less than \$30,000	79%
Household Income: \$30,000 to \$49,999	90%

Household Income: \$50,000 to  
\$74,999 95%

Household Income: \$75,000 or  
higher 98%

Education: High school graduate 81%

Education: Some college 94%

Education: College graduate 98%

## 12.5 E-Commerce Issues

Doing business on the Internet is not without its problems. The following are some common issues:

- Intellectual Property. There has been some recent controversy regarding intellectual property rights and domain names. Cybersquatting is the practice of registering a domain name that is a trademark of another entity in the hopes of profiting by selling the domain name to the entity. The Internet Corporation for Assigned Names and Numbers (ICANN) sponsors the Uniform Domain Name Dispute Policy at <http://www.icann.org/udrp/udrp.htm>, which can be used to combat cybersquatters.
- Security. Security is a constant issue on the Internet. Distributed denial of service (DDoS) attacks, which are malicious attempts to make a website unavailable by flooding it with requests from multiple computers, have shut down popular e-commerce sites.
- Fraud. Fraudulent websites that ask for credit card numbers without any intent of delivering products or with fraudulent intent are an understandable source of concern for consumers.
- Taxation. State governments and local municipalities need sales tax to fund education, public safety, health, and many other essential services. When an item is purchased at a retail store, the sales tax is collected from the purchaser by the seller at the time of the sale and periodically remitted by the seller to the state in which the sale occurred.

When an item is purchased on the Internet, the seller often does not collect and remit the sales tax. In this situation, many states require that consumers file a use tax and pay the amount that would have been collected. In reality, few consumers do this and few states attempt to enforce it. Our local governments are losing revenue for funding worthwhile programs. Nolo.com provides information on Internet sales

tax laws for each state at <http://www.nolo.com/legal-encyclopedia/50-state-guide-internet-sales-tax-laws.html>.

The Marketplace Fairness Act (MFA) has been proposed and was under discussion in the U.S. Congress at the time this was written. If approved, the MFA will require online and catalog retailers to collect sales tax for states that have simplified sales tax laws (see <http://www.marketplacefairness.org> for more information).

- International Commerce. Websites that target a global audience have additional concerns. If a site will be offered in multiple languages, there are options of automatic translation programs such as SYSTRANLinks (<http://www.systranlinks.com>) and companies that provide customized website translation services such as WorldLingo (<http://www.worldlingo.com>). Be aware that the graphical user interface (GUI) that works with English may not work with other languages. For example, comparable words and phrases often take quite a few more letters in German than in English. If your GUI has minimal white space in the English version of the site, how will it look in the German version?

How will your international customers pay you? If you accept credit cards, the credit card company will perform the currency conversion. What about the culture of your target international audience? Have you studied the target countries and made certain that your site is appealing and not offensive? Another issue related to international commerce is the cost of shipping and the availability of delivery to remote destinations.

Now that you are familiar with the concept of e-commerce, let's take a closer look at encryption methods and security. The next section introduces encryption methods, SSL, and digital certificates.

## 12.6 E-Commerce Security

### Encryption

Encryption is used to ensure privacy within an organization and on the Internet. Encryption is the conversion of data into an unreadable form, called a ciphertext. Ciphertext cannot be easily understood by unauthorized individuals. Decryption is the process of converting the ciphertext into its original form, called plain text or clear text, so that it can be understood. The process of encryption and decryption requires an algorithm and a key. An algorithm involves a mathematical calculation. A key is a numeric code that should be long enough so that its value cannot easily be guessed.

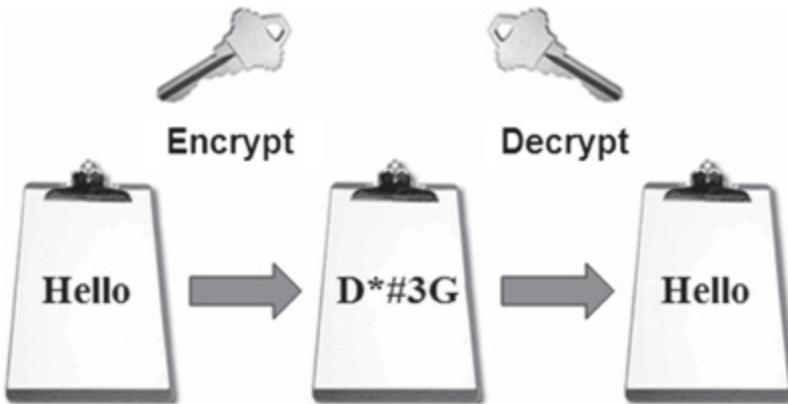
Encryption is important on the Internet because information in a packet can be intercepted as it travels the communications media. If a hacker or business competitor intercepts an encrypted packet, he or she will not be able to use the information (such as a credit card number or business strategy) because it cannot be read.

A number of types of encryption are commonly used on the Internet, including symmetric-key encryption and asymmetric-key encryption.

### Symmetric-Key Encryption

**Symmetric-key encryption**, shown in [Figure 12.1](#), is also called single-key encryption because both the encryption and decryption use the same key. Because the key must be kept secret from others, both the sender and the receiver must know the key before communicating using encryption. An advantage of symmetric-key encryption is speed.

### Figure 12.1



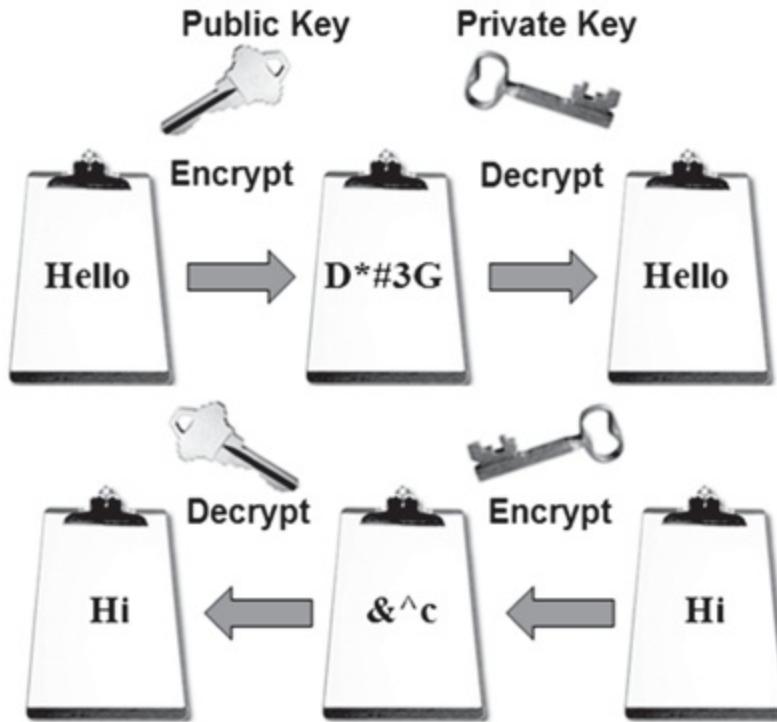
Symmetric-key encryption uses a single key

[Figure 12.1 Full Alternative Text](#)

## Asymmetric-Key Encryption

**Asymmetric-key encryption** is also called public-key encryption because there is no shared secret. Instead, two keys are created at the same time. This key pair contains a public key and a private key. The public key and the private key are mathematically related in such a way that it is unlikely that anyone would guess one of the pair even with knowledge of the other. Only the public key can decrypt a message encrypted with the private key and only the private key can decrypt a message encrypted with the public key (see [Figure 12.2](#)). The public key is available via a digital certificate (more on that later). The private key should be kept secure and secret. It is stored on the web server (or other computer) of the key owner. Asymmetric-key encryption is much slower than symmetric-key encryption.

## Figure 12.2



Asymmetric-key encryption uses a key pair

[Figure 12.2 Full Alternative Text](#)

## Integrity

The encryption methods described above help to keep the contents of a message secret. However, e-commerce security is also concerned with making sure that messages have not been altered or damaged during transmission. A message is said to have integrity if it can be proven that it has not been altered. Hash functions provide a way to ensure the integrity of messages. A hash function, or hash algorithm, transforms a string of characters into a usually shorter, fixed-length value or key, called a digest, which represents the original string.

These security methods—especially the techniques of symmetric-key and asymmetric-key encryption—are used as part of SSL, the technology that helps to make commerce on the Internet secure. The next section introduces this technology.

# Secure Sockets Layer (SSL)

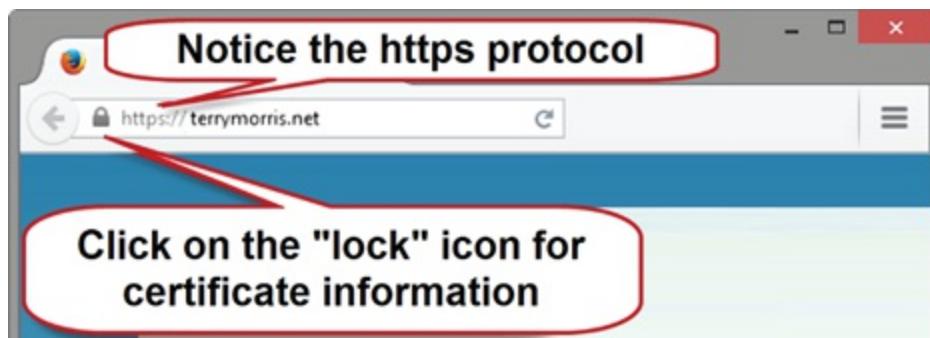
Secure Sockets Layer (SSL) is a protocol that allows data to be privately exchanged over public networks. It was developed by Netscape and is used to encrypt data sent between a client (usually a web browser) and a web server. SSL utilizes both symmetric and asymmetric keys.

SSL provides secure communication between a client and a server by using the following:

- Server and (optionally) client digital certificates for authentication
- Symmetric-key cryptography with a “session key” for bulk encryption
- Public-key cryptography for transfer of the session key
- Message digests (hash functions) to verify the integrity of the transmission

You can tell that a website is using SSL by the protocol in the web browser address text box—it shows https instead of http. Also, browsers typically display a lock icon or other indicator of SSL, as shown in [Figure 12.3](#).

## Figure 12.3



The browser indicates that SSL is being used. Screenshots of Mozilla Firefox. Courtesy of Mozilla Foundation.

### Figure 12.3 Full Alternative Text



## FAQ

1. When some websites are displayed in a browser, there is a color bar in the address area. What's up?

If a website displays a color bar in the address area of the browser in addition to the lock icon in the status bar, you know that it is using Extended Validation SSL (EV SSL). EV SSL signifies that the business has undergone more rigorous background checks to obtain its digital certificate, including verification of the following:

- The applicant owns the domain.
- The applicant works for the organization.
- The applicant has the authority to update the website.
- The organization is a valid, recognized place of business.

## Digital Certificate

SSL enables two computers to communicate securely by posting a digital certificate for authentication. A digital certificate is a form of an asymmetric key that also contains information about the certificate, the holder of the certificate, and the issuer of the certificate. The contents of a digital certificate include the following:

- The public key
- The effective date of the certificate

- The expiration date of the certificate
- Details about the certificate authority (the issuer of the certificate)
- Details about the certificate holder
- A digest of the certificate content

VeriSign (<http://www.verisign.com>) and Entrust (<http://www.entrust.net>) are well-known certificate authorities.

To obtain a certificate, you will need to generate a certificate signing request (CSR) and a private/public key pair (see <https://www.digitalocean.com/community/tutorials/how-to-install-an-ssl-certificate-from-a-commercial-certificate-authority>) for an overview of this process. Next, you request a certificate from a certificate authority, pay the application fee, and provide your CSR and public key. The certificate authority verifies your identity. After verification, the certificate authority signs and issues your certificate. You store the certificate in your software, such as a web server, web browser, or e-mail application.



## FAQ

### 1. Do I have to apply for a certificate?

If you are accepting any personal information on your website such as credit card numbers, you should be using SSL. One option is to contact a certificate authority (such as VeriSign or Thawte at <http://www.thawte.com>) and apply for your own certificate. There may be a waiting period and you will need to pay an annual fee.

As an alternative, your web host provider may let you piggyback on its certificate. Normally, there is a setup and/or monthly fee for this service. Usually, the web host assigns you a folder on its secure server. You

place the web pages (and associated files such as images) that need to be securely processed in the folder. When linking to the web pages, you use “https” instead of “http” on your absolute links. Contact your web host provider for details.

## SSL and Digital Certificates

A number of steps are involved in the SSL authentication process. The web browser and web server go through initial handshaking steps, exchanging information about the server certificate and keys. Once trust is established, the web browser generates and encrypts the session key (symmetric key) that will be used for the rest of the communication. From this point on, all data is encrypted through the session key. [Table 12.2](#) shows this process.

### Table 12.2 SSL encryption process overview

Browser → “hello” → Server

Browser ← “hello” + server certificate (with public key) ← Server

*The browser now verifies the identity of the web server. It obtains the certificate of certificate authority (CA) that signed the server’s certificate. Then the browser decrypts the certificate digest using the CA’s public key (held in a root CA certificate). Next, the browser authenticates the server’s certificate and checks the expiration date of the certificate. If all is valid, the next step occurs.*

Browser → The browser randomly generates a session key encrypted with server's public key. → Server

*Server decrypts the session key with private key.*

Browser ← The server sends a message that is encrypted with the session key. ← Server

*All future transmissions between the browser and the server are encrypted with the session key.*

At this point, you have a general idea of how SSL works to protect the integrity of information on the Internet, including the information exchanged in e-commerce transactions. The next section takes a closer look at order and payment processing in e-commerce.



## Checkpoint 12.1

1. What are three advantages of e-commerce for an entrepreneur who is just starting a business?
2. What are three risks that businesses face when engaging in e-commerce?
3. Define SSL. How can an online shopper tell that an e-commerce site is using SSL.

# **12.7 Order and Payment Processing**

In B2C e-commerce, the products for sale are displayed in an online catalog. On large sites, these catalog pages are dynamically created using server-side scripts to access databases. Each item usually has a button or image that invites visitors to “Buy Me” or “Add to Cart”. Items selected are placed in a virtual shopping cart. When visitors are finished shopping, they click a button or image link which indicates that they want to “Check Out” or “Place Order”. At this point, the items in their shopping cart are usually displayed on a web page with an order form.

Secure ordering is facilitated through the use of SSL. Once an order is placed, there are a number of commonly used payment methods by which to pay for the merchandise or service, including credit card, stored-value card, digital wallet, and digital cash.

## **Credit Card**

Credit card payment processing is a very important component of an e-commerce website. Funds from the customer need to be transferred to the merchant’s bank. In order to accept credit cards, the site owner must apply for a merchant account and be approved. A merchant account is a type of business bank account that allows a business to accept credit card payments. You may also need real-time credit card verification using a payment gateway or third party such as Authorize.Net (<http://www.authorizenet.com>). While merchant accounts can be expensive, PayPal (<http://www.paypal.com>) offers a low-cost solution. Originally intended for consumer-to-consumer credit card sales, PayPal now offers credit card and shopping cart services for business website owners. You can add an online shopping experience to your website in a day with a PayPal shopping cart (<https://www.paypal.com/us/webapps/mpp/shopping-cart>).

# **Stored-value Card**

A stored-value card, such as a gift card for a major department store, holds information, including cash. Magnetic stripe stored-value cards can hold a limited amount of information. A stored-value smart card has an integrated circuit embedded within and offers more capacity to store information. Smart cards are widely used in Europe, Australia, and Japan. Visit Smart Card Alliance (<http://www.smartcardbasics.com/smart-card-overview.html>) for more information about smart cards.

# **Digital Wallet**

A digital wallet is a virtual wallet that can be used for mobile or online payments. A digital wallet may store information about one or more credit cards along with personal identification and contact information. A software-based digital wallet stores the information on either a remote server or the purchaser's computer. Yahoo! Wallet (<https://info.yahoo.com/privacy/uk/yahoo/wallet>) is a software-based digital wallet. A hardware-based digital wallet is a physical device that stores the information, such as a smartphone, and may be accessed through an installed app. Examples of this emerging technology include Visa Checkout (<https://www.v.me/>), Google Wallet (<http://www.google.com/wallet>), Apple Pay (<https://www.apple.com/apple-pay>), and Android Pay ([https://www.android.com/intl/en\\_us/pay](https://www.android.com/intl/en_us/pay)). Near field communication (NFC) is described by Techspot (<http://www.techspot.com/guides/385-everything-about-nfc/>) as a short-range wireless communication that uses a radio frequency to share information between NFC devices in close proximity, such as an NFC-equipped smartphone and an NFC-ready credit card readers or NFC-ready ticket gate. Purchasers using the Apple Pay and Android Pay digital wallets only have to tap their phone on a compatible NFC device to share information and complete a purchase.

# **Digital Cash**

Digital cash serves as a substitute for government-issued currency. A currently popular digital cash provider is Bitcoin (<http://bitcoin.org>), which is not a company, but can be described as a peer-to-peer payment network for digital money with no central authority. No single person owns or controls Bitcoin. Government-issued currency is not deposited or exchanged. Instead, the currency is bitcoins. Bitcoin is easy to use – a Bitcoin user can send or receive bitcoins using a mobile app or digital wallet. A public ledger, called the blockchain, is kept of all Bitcoin transactions. Bitcoins are accepted at a growing number of businesses, including Overstock.com and Dell. Visit <https://bitcoin.org/en/faq> for more information about Bitcoin.

# **12.8 E-Commerce Storefront Solutions**

You have probably shopped at online stores and found some easy to work with and others difficult. A large problem for e-commerce sites is abandoned shopping carts—visitors who begin to shop but never place an order. This section explores types of storefront solutions and shopping carts. A number of different e-commerce storefront options are available to business owners and web developers. They range from a simple, instant online storefront supplied by another website to building your own shopping cart system. This section examines some of the options.

## **Instant Online Storefront**

You supply the products, the instant online storefront does the rest. There is no need to install software. All you do is use your web browser to point and click your way to a virtual store. You use a template provided by the online storefront and choose features, configure settings, and add your products, uploading images, descriptions, prices, and captions.

There are some disadvantages to this approach. You are limited to the templates offered by the online storefront provider. The number of products that you can sell may also be limited. Your store may have a look and feel that is similar to the other instant stores hosted by the provider. However, this method provides a low-overhead, low-risk approach for a small business owner who has limited technical expertise. The storefront provider will often offer merchant accounts and payment automation.

Some instant storefront solutions are free, with limited service or a limited number of products. Others are fee-based and may charge hosting fees, processing fees, and monthly fees. Two popular instant storefront solutions are Shopify (<http://www.shopify.com>) and BigCommerce

(<http://www.bigcommerce.com>). Artists and crafters have found a home on Etsy (<http://www.etsy.com>) to create instant e-storefronts to display and sell their wares.

## **Off-the-Shelf Shopping Cart Software**

With this approach, software that provides a standardized set of e-commerce features is purchased, installed on your web server, and customized. Many web host providers offer this storefront software, which usually includes a shopping cart, order processing, and optional credit card payment processing. Shopping cart software provides an online catalog where your visitors can browse, add items to their virtual shopping cart, and check out through an order form when they are ready to make a purchase. Popular shopping carts offered by web host providers are AgoraCart (<http://agoracart.com>), osCommerce (<http://oscommerce.com>), and ZenCart (<http://www.zen-cart.com>).

## **Custom-Built Solutions**

Custom building a large-scale e-commerce website entirely from scratch usually requires expertise, time, and a sizable budget! The advantage is that you get exactly what you need. Software development tools for a custom-built site include Adobe Dreamweaver, Microsoft Visual Studio, IBM's WebSphere Commerce, a database management system (DBMS), and server-side scripting. Custom-built solutions may also require a commerce server, which is a web server that is enhanced with support for certain commerce activities. IBM's WebSphere Commerce Suite and Microsoft's Commerce Server are two choices.

## **Semi-Custom-Built Solutions on a**

# Budget

If the scope of your e-commerce endeavor is small and you want to avoid the cookie-cutter look of an instant storefront, some other options may be worth considering. These include getting pre-written shopping cart and order processing scripts, hiring a company such as PayPal, and buying e-commerce add-ons to popular web-authoring tools.

There are a number of free shopping cart scripts available on the Web. Check out JustAddCommerce (<http://www.richmediatech.com>), HotScripts (<http://www.hotscripts.com>), or Mal's e-commerce (<http://www.mals-e.com>) for some alternate solutions. The level of difficulty and the exact processing of these solutions vary. Each website has instructions and documentation for its product. Some may require you to register before they provide you with specific HTML. Others may require you to download and install the scripts on your own web server.

PayPal (<http://www.paypal.com>) offers a shopping cart and payment verification for businesses at a very low cost. PayPal writes the code that you need to place on your web pages in order to interface with them. You only need to copy and paste it in.

Budget-wise solutions such as PayPal, Mal's e-commerce, or JustAddCommerce work best for businesses that fit the standard business model and do not require special processing needs.



## Checkpoint 12.2

1. Name three payment methods that are commonly used on the Web.
2. Have you made purchases online? If so, think about the last item that you purchased. Why did you purchase it online instead of at a store? Did you check to see if the transaction was secure? Why or why not? How

will your shopping habits be different in the future?

3. Describe three types of available e-commerce solutions. Which one provides the easiest entry to e-commerce? Why?

# Chapter Summary

This chapter introduced basic e-commerce concepts and implementation. Consider taking an e-commerce course to continue your study of this dynamic and growing area of web development. Visit the textbook website at <http://www.webdevfoundations.net> for examples, the links listed in this chapter, and updated information.

## Key Terms

1. [algorithm](#)
2. [asymmetric-key encryption](#)
3. [Bitcoin](#)
4. [Business-to-Business \(B2B\)](#)
5. [Business-to-Consumer \(B2C\)](#)
6. [Business-to-Government \(B2G\)](#)
7. [ciphertext](#)
8. [clear text](#)
9. [commerce server](#)
10. [Consumer-to-Consumer \(C2C\)](#)
11. [cybersquatting](#)
12. [decryption](#)
13. [digest](#)

14. [digital cash](#)
15. [digital certificate](#)
16. [digital wallet](#)
17. [e-commerce](#)
18. [Electronic Data Interchange \(EDI\)](#)
19. [encryption](#)
20. [Extended Validation SSL \(EV SSL\)](#)
21. [fraud](#)
22. [hash functions](#)
23. [instant online storefront](#)
24. [integrity](#)
25. [intellectual property](#)
26. [international commerce](#)
27. [key](#)
28. [merchant account](#)
29. [near field communication \(NFC\)](#)
30. [Secure Sockets Layer \(SSL\)](#)
31. [security](#)
32. [shopping cart software](#)
33. [smart card](#)

34. [stored-value card](#)
35. [symmetric-key encryption](#)
36. [taxation](#)

## Review Questions

### Multiple Choice

1. Which of the following acronyms refer to the business-to-consumer e-commerce business model?
  1. B2B
  2. BTC
  3. B2C
  4. C2B
2. What is a short-range wireless communication that uses a radio frequency to share information between electronic devices?
  1. NFC
  2. SSL
  3. EDI
  4. FTP
3. For businesses, which is a potential risk of using e-commerce?
  1. increased customer satisfaction

2. the possibility of fraudulent transactions
  3. lower overhead costs
  4. none of the above
4. For businesses, which is an advantage of using e-commerce?
1. the potential for fraudulent transactions
  2. reduced costs
  3. using shopping carts
  4. increased costs
5. Which of the following options best describes how a website owner can obtain a digital certificate?
1. Digital certificates are automatically created when you register for a domain name.
  2. Contact a certificate authority and apply for a digital certificate.
  3. Digital certificates are automatically created when you are listed in a search engine.
  4. none of the above
6. Which of the following issues are uniquely related to international e-commerce?
1. language and currency conversion
  2. browser version and screen resolution
  3. bandwidth and Internet service provider
  4. none of the above

7. Which of the following is a major function of e-commerce?
  1. using SSL to encrypt orders
  2. adding items to a shopping cart
  3. buying and selling goods
  4. none of the above
8. Which of the following is a disadvantage of an instant online storefront?
  1. The store is based on a template and may look very similar to other online stores.
  2. The store can be ready in minutes.
  3. The store cannot accept credit cards.
  4. none of the above
9. Which of the following include(s) an online catalog, a shopping cart, and a secure order form?
  1. web host providers
  2. shopping cart software
  3. web server software
  4. e-commerce hosting packages
10. Which of the following is true?
  1. A merchant account allows you to use SSL on your website.
  2. A digital wallet is a virtual wallet that can be used for mobile or online payments.

3. Instant storefronts are what most large-scale e-commerce sites use.
4. none of the above

## Fill in the Blank

11. \_\_\_\_\_ is a protocol that allows data to be privately exchanged over public networks.
12. \_\_\_\_\_ can be described as the transfer of structured data between different companies using networks.
13. A digital certificate is a form of a(n) \_\_\_\_\_ that also contains additional information about the entity holding the certificate.
14. An encryption method that uses a single, shared private key is \_\_\_\_\_.

## Short Answer

12. List one option for a website that needs to reach audiences that speak different languages.

## Hands-On Exercises

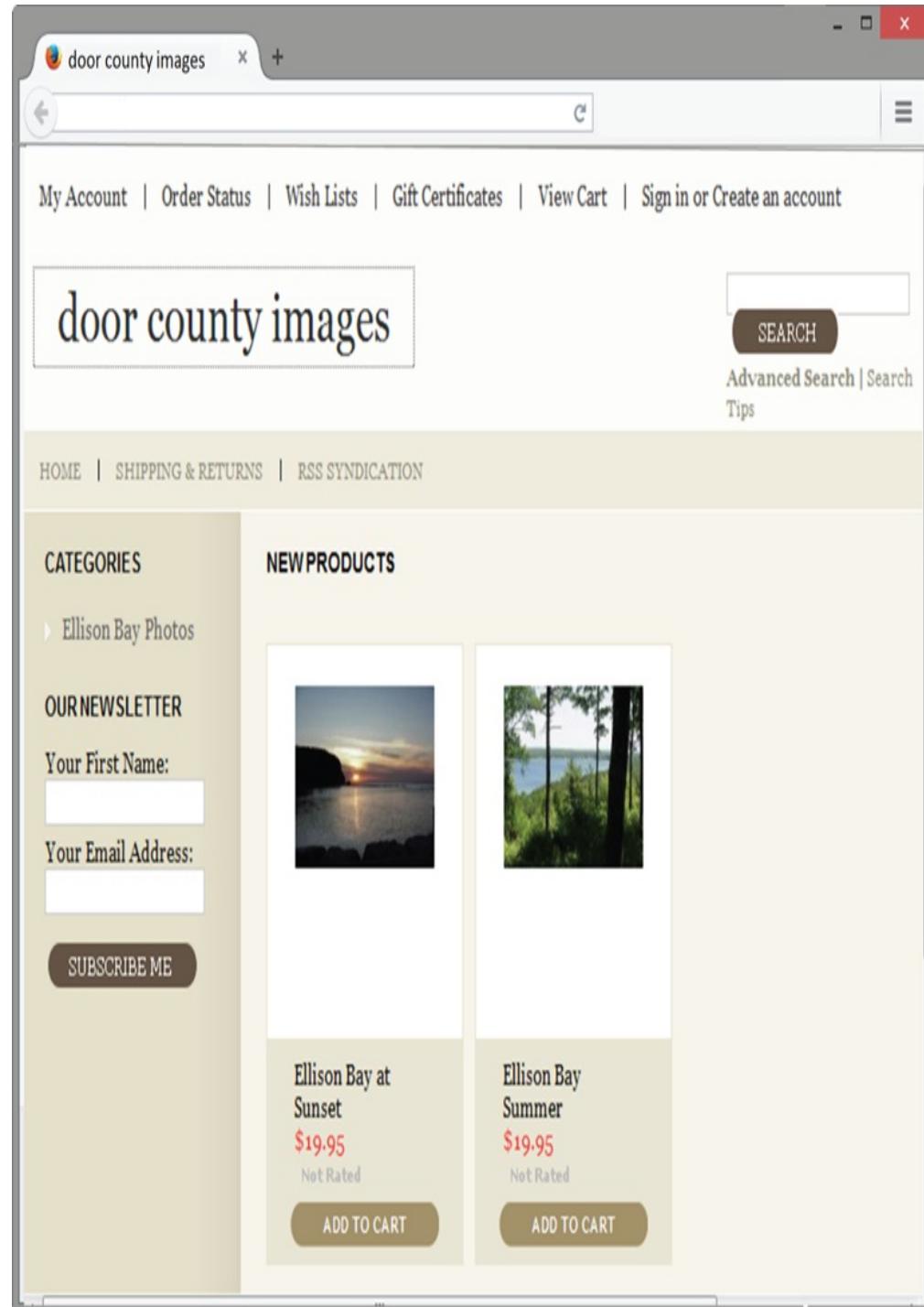
1. In this Hands-On Exercise, you will create an instant storefront. Choose one of the following websites that offer free trial online stores: InstanteStore (<http://www.instantestore.com>), Shopify (<http://www.shopify.com>), and BigCommerce (<http://www.bigcommerce.com>). Websites are constantly changing their policies, so these sites may no longer offer free trials when you do this assignment. If this is the case, check the textbook's website for updated information, ask your instructor for assistance, or search the Web for free online storefronts or trial stores. If you are certain that you have

found a website that offers a free trial store, continue with this exercise and create a store that meets the following criteria:

- Name: Door County Images
- Purpose: To sell fine quality prints of Door County scenery
- Target Audience: Adults age 40+ who have visited Door County; are middle to upper class; and who enjoy nature, boating, hiking, cycling, and fishing
- Item 1: Print of Ellison Bay at Sunset, Size: 11 inches by 14 inches, Price: \$19.95
- Item 2: Print of Ellison Bay in Summer, Size: 11 inches by 14 inches, Price: \$19.95

Create a folder called doorcounty. Copy the following images from the [chapter 12](#) folder in the student files to your doorcounty folder: summer.jpg, summer\_small.jpg, sunset.jpg, and sunset\_small.jpg. Once you are organized, visit the website you have chosen to host your free store. You will have to log in, choose options, and upload your images. Follow the instructions provided. Most free online store sites have an FAQ section or technical support to help you. [Figure 12.4](#) shows a page from an instant storefront. After you have completed your store, print out the browser view of the home page and catalog page.

## Figure 12.4



An instant store. Screenshots of Mozilla Firefox.  
Courtesy of Mozilla Foundation.

[Figure 12.4 Full Alternative Text](#)

# Web Research

1. Just how popular is e-commerce? How many of your friends, family members, coworkers, and classmates purchase on the Web? Survey at least 20 people. Determine the following:
  1. How many have purchased an item online?
  2. How many have shopped but not purchased online?
  3. How many purchase online once a year? Once a month? Once a week?
  4. What is their age range (18–25, 26–39, 40–50, or over 50)?
  5. What is their gender?
  6. What is their level of education (high school, some college, college graduate, or graduate school)?
  7. What is their favorite online shopping site?

Create a web page that illustrates your findings. Also comment on the results and draw some conclusions. Search the Web for statistics that support your conclusions. Use the Pew Internet and American Life Project (<http://pewinternet.org>), eMarketer (<http://www.emarketer.com/Articles>), ClickZ (<http://www.clickz.com>), and E-Commerce Times (<http://www.ecommercetimes.com>) as starting points for your research. Place your name in an e-mail link on the web page.

2. This chapter provided a number of resources for e-commerce shopping cart and ordering systems. Use them as a starting point. Search the Web for additional resources. Find at least three shopping cart systems that you feel would be easy to use. Create a web page that reports your findings. Organize your page and list the information along with the URLs of the websites you used as resources. Include information such

as the product name, a brief description, the cost, and the web server requirements (if any). Place your name in an e-mail link on the web page.

## Focus on Web Design

1. Visit the following sites as a starting point as you explore the web design topic of shopping cart usability:
  - E-commerce Shopping Cart Usability Research Findings:  
<http://www.uxteam.com/blog/e-commerce-shopping-cart-usability-research-findings/>
  - How to Design an e-Commerce Checkout Flow That Converts:  
<https://conversionxl.com/how-to-design-an-ecommerce-checkout-flow-that-converts/>
  - New E-Commerce Checkout Research:  
<https://baymard.com/blog/ecommerce-checkout-usability-report-and-benchmark>
  - Shopping Cart Usability: <http://uxmag.com/articles/shopping-cart-usability>
  - Optimizing Shopping Cart Page Design and Usability:  
<http://www.ecommerceillustrated.com/optimizing-shopping-cart-pages-reducing-cart-abandonment/>

Write a one-page report that describes shopping cart usability issues that web designers should be aware of. Cite the URLs of the resources you used.



# WEBSITE CASE STUDY

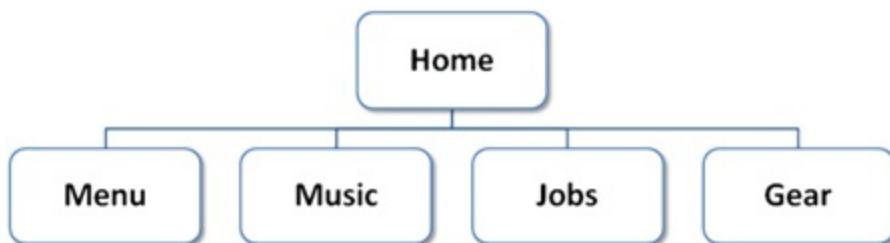
## Adding a Catalog Page for an Online Store

Each of the following case studies has continued throughout most of the text. This chapter adds a catalog page for an online store to the websites. This catalog page will connect to sample shopping cart and order pages on the textbook website at <http://www.webdevfoundations.net>.

## JavaJam Coffee House

See [Chapter 2](#) for an introduction to the JavaJam Coffee House case study. Use the [Chapter 9](#) JavaJam website as a starting point for this case study. As frequently happens with websites, the client, Julio Perez, is pleased with the response to the site and has an idea about a new use for it—selling JavaJam gear, such as T-shirts and coffee mugs. This new page, gear.html, will be part of the main navigation of the site. All pages should link to it. A revised site map is shown in [Figure 12.5](#).

## Figure 12.5



## Revised JavaJam site map

### [Figure 12.5 Full Alternative Text](#)

The Gear page should contain a description, image, and price for each product. It should link to a shopping cart system when the visitor wants to purchase an item. You may access a placeholder page provided by the textbook's website. If you have access to a different shopping cart system, check with your instructor and ask if you can use it instead.

You have four tasks in this case study:

1. Create a new folder for this JavaJam case study.
2. Modify the main navigation on each page to include a link to the new Gear page.
3. Modify the javajam.css external CSS file.
4. Create the new Gear page (gear.html) shown in [Figure 12.6](#).

## Figure 12.6



New JavaJam Gear page

[Figure 12.6 Full Alternative Text](#)

## Hands-On Practice Case Study

- Task 1: The Website Folder. Create a folder called javajam12. Copy all of the files from your [Chapter 9](#) javajam9 folder into the javajam12 folder. Copy the javamug.jpg, javashirt.jpg, and herocouch.jpg images from the [chapter 12](#) folder in the student files and save them to your javajam12 folder.
- Task 2: Update the Navigation on Each Page. Launch a text editor and open the home page (index.html). Add a new list item and hyperlink in the main navigation area that displays the text “Gear” and links to the file gear.html. See [Figure 12.6](#) for an example of the navigation area. Save the file. Edit the Menu (menu.html), Music (music.html), and Jobs (jobs.html) pages in a similar manner and save each file.
- Task 3: Configure the CSS. Launch a text editor and open javajam.css.
  1. Add a new style rule to configure a class named `item` that has a #FAF9F7 background color, 2em top margin, 2em bottom margin, 3em right margin, 3em left margin, 80% width, 1em padding, and set the overflow property to auto.
  2. Configure a new id named `#herocouch` with 250px height that displays the herocouch.jpg image in 100% of the background. Use the `#heroguitar` id as a guide as you code the styles.
- Task 4: Create the New Gear Page. One way to be productive is to create pages based on your earlier work. Launch a text editor and open the Music page (music.html). Save the file as gear.html. This will give you a head start and ensure that the pages on the website are similar. Perform the following modifications:
  1. Change the page title to an appropriate phrase.
  2. Assign the div to an id named `herocouch`.
  3. Change the text within the `h2` element to “JavaJam Gear”.
  4. Delete the contents and HTML elements within the `main` element that are below the `h2` element.

5. Place each sentence below in a separate paragraph:

JavaJam gear not only looks good, it's good to your wallet, too.

Get a 10% discount when you wear a JavaJam shirt or bring in your JavaJam mug!

6. Configure a div element assigned to the class named item. Code the following heading, img, and paragraph tags in the div.

Configure the text "JavaJam Shirt" within an h3 element.

Configure an image element to display the javashirt.jpg graphic.

Configure the following text in a paragraph: "JavaJam shirts are comfortable to wear to school and around town. 100% cotton. XL only. \$14.95"

7. Configure a div element assigned to the class named item. Code the following heading, img, paragraph, and line break tags in the div.

Configure the text "JavaJam Mug" within an h3 element.

Configure an image element to display the javamug.jpg graphic.

Configure the following text in a paragraph: "JavaJam mugs carry a full load of caffeine (12 oz.) to jump-start your morning. \$9.95".

8. Each item for sale has an "Add to Cart" button, which is contained within a form with an action attribute set to <http://webdevbasics.net/cart.html>, a placeholder shopping cart page.

To place the shopping cart button for the T-shirt, add the following code below the paragraph that describes the T-shirt and above the closing div tag.

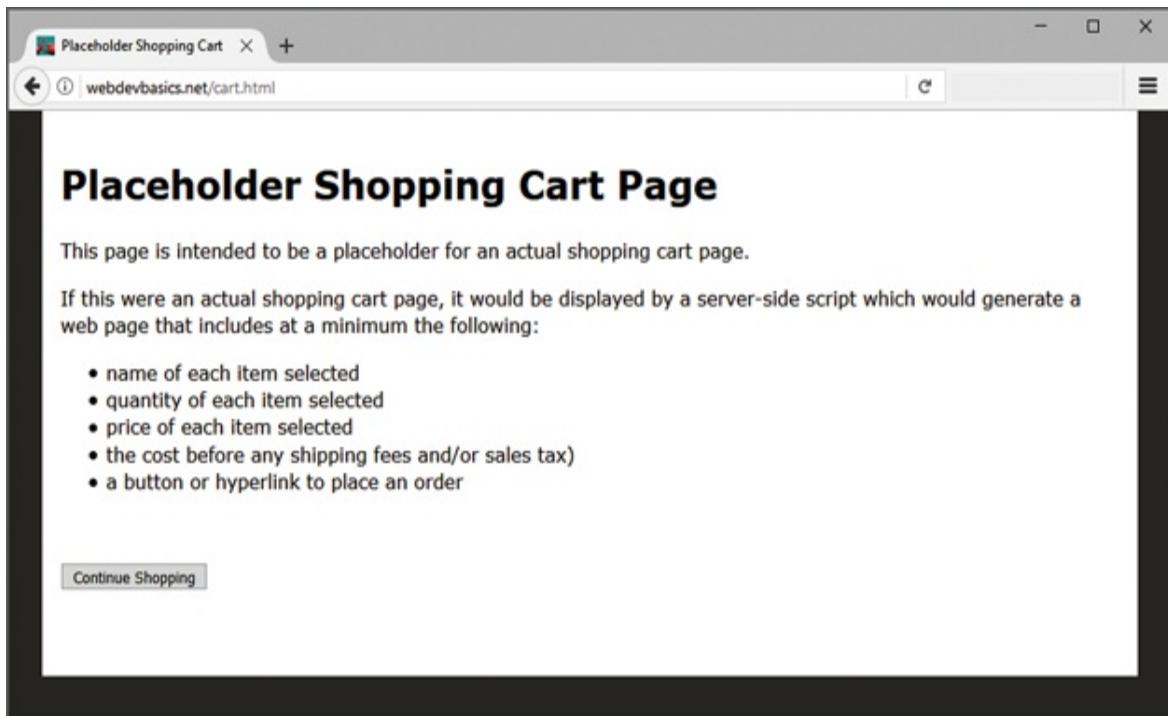
```
<form method="post"
      action="http://webdevbasics.net/cart.html">
      <input type="submit" value="Add to Cart">
</form>
```

The process for adding the shopping cart button for the mug is the same. Add the following code below the paragraph that contains the description of the mug.

```
<form method="post"
      action="http://webdevbasics.net/cart.html">
    <input type="submit" value="Add to Cart">
</form>
```

Save your page and test it in a browser. It should look similar to the one shown in [Figure 12.6](#). Click the Add to Cart buttons for one of the items. The placeholder shopping cart will display and your screen should look similar to the one shown in [Figure 12.7](#).

## Figure 12.7



A placeholder shopping cart page

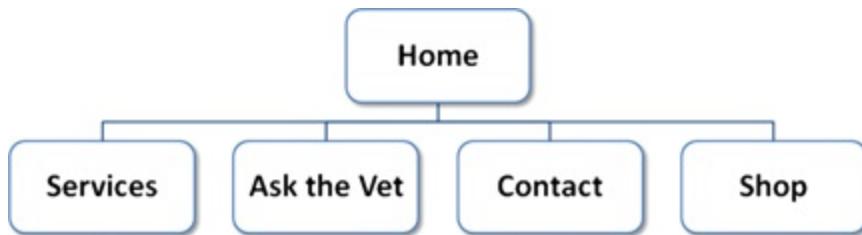
[Figure 12.7 Full Alternative Text](#)

# Fish Creek Animal Clinic

See [Chapter 2](#) for an introduction to the Fish Creek Animal Clinic case study. You will use the [Chapter 9](#) fishcreek9 folder as the starting point for this case study.

After a site is initially created, it's typical for a client to think of new ideas for the website. The owner of Fish Creek, Magda Patel, is pleased with the response to the site and has a new use for it—selling sweatshirts and tote bags with the Fish Creek logo. She already has these materials for sale at her front desk in the animal hospital and her customers seem to like them. This new Shop page (shop.html) will be part of the main navigation of the site. All pages should link to it. A revised site map is shown in [Figure 12.8](#).

## Figure 12.8



Revised Fish Creek site map

[Figure 12.8 Full Alternative Text](#)

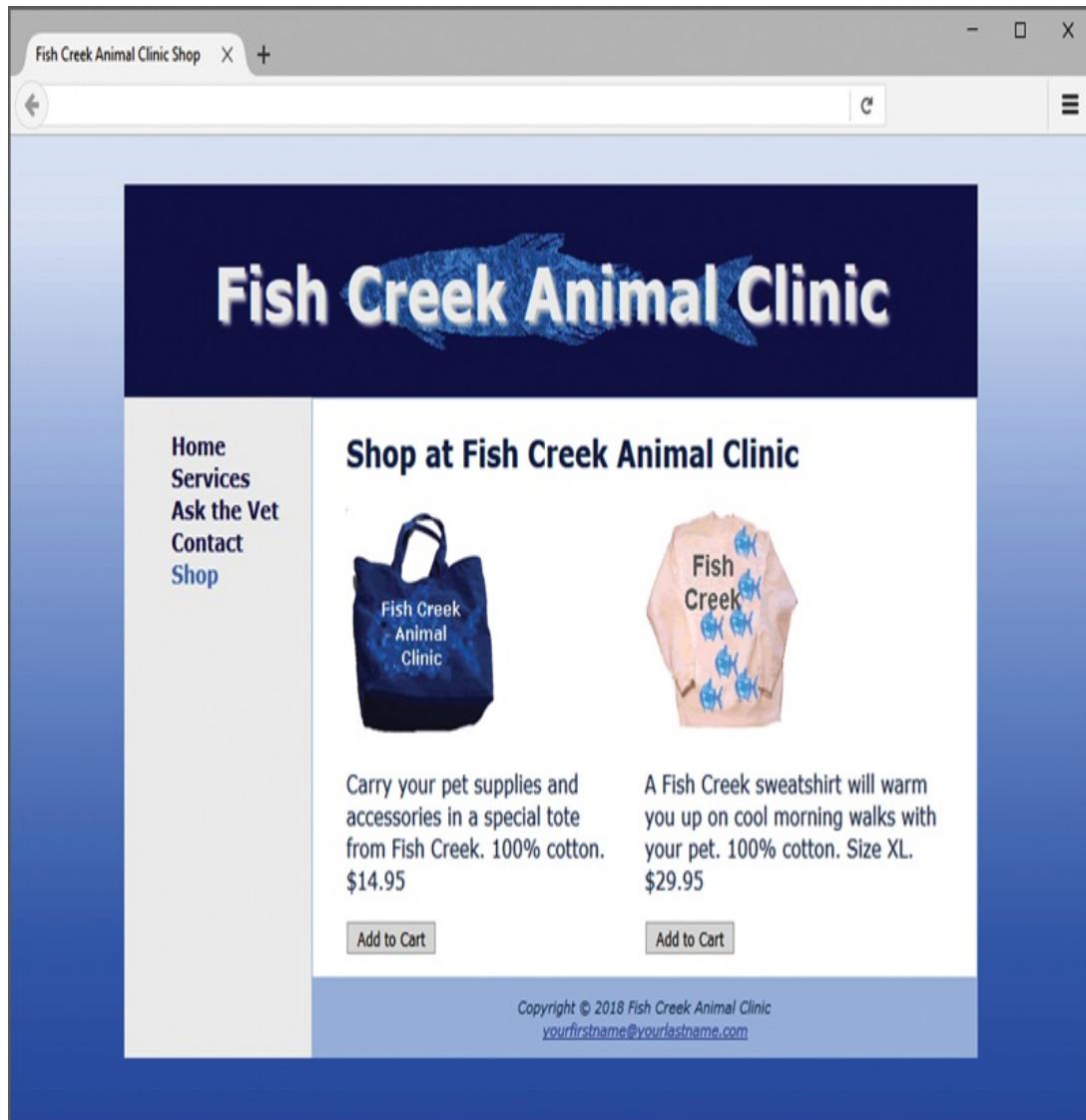
The Shop page should contain the description, image, and price of each product. It should link to a shopping cart system when the visitor wants to purchase an item. You may access a placeholder page provided by the textbook's website. If you have access to a different shopping cart system, check with your instructor and ask if you can use it instead.

You have four tasks in this case study:

1. Create a new folder for this Fish Creek case study.

2. Modify the main navigation on each page to include a link to the new Shop page.
3. Modify the fishcreek.css external CSS file.
4. Create the new Shop page (shop.html) shown in [Figure 12.9](#).

## Figure 12.9



New Fish Creek Shop page

[Figure 12.9 Full Alternative Text](#)

# Hands-On Practice Case

- Task 1: The Website Folder. Create a folder called fishcreek12. Copy all of the files from your [Chapter 9](#) fishcreek9 folder into the fishcreek12 folder. Copy the fishtote.gif and fishsweat.gif images from the [chapter12](#) folder in the student files and save them to your fishcreek12 folder.
- Task 2: Update the Navigation on Each Page. Launch a text editor and open the home page (index.html). Add a new list item and hyperlink in the main navigation area that displays the text “Shop” and links to the file shop.html. See [Figure 12.9](#) for an example of the navigation area. Save the file. Edit the Services (services.html), Ask the Vet (askvet.html), and Contact (contact.html) pages in a similar manner. Save each file.
- Task 3: Configure the CSS. Launch a text editor and open the fishcreek.css file.
  1. Configure a class named shop which will contain the first item for sale on the Shop page. Configure the shop class with 50% width, left float, #FFFFFF background color, and 2em of right padding.
  2. Add a style declaration to footer element selector that clears left floats.
- **Task 4: Create the New Shop Page.** One way to be productive is to create pages based on your earlier work. Launch a text editor and open the home page (index.html). Save the file as shop.html. This will give you a head start and ensure that the pages on the website are similar. Perform the following modifications:
  1. Change the page title to an appropriate phrase.
  2. Delete the content and HTML elements within the main element.

3. Configure the following text in an h2 element: “Shop at Fish Creek Animal Clinic”.
4. Create a div that is assigned to the shop class. The div will contain an image, a description and a form that will process the Add to Cart button. Configure the fishtote.gif image below the opening div tag. You will configure the description below the image. Type the following descriptive text in a paragraph: “Carry your pet supplies and accessories in a special tote from Fish Creek. 100% cotton. \$14.95”.
5. Create another div element but do not assign it to the shop class. The div will contain an image, a description and a form that will process the Add to Cart button. Configure the fishsweat.gif image below the opening div tag. You will configure the description below the image. Type the following descriptive text in a paragraph: “A Fish Creek sweatshirt will warm you up on cool morning walks with your pet. 100% cotton. Size XL. \$29.95”.
6. Next, we will add a shopping cart button to each item for sale. This shopping cart button is placed in a form after the paragraph in each shop div. The action for the form is <http://webdevbasics.net/cart.html>, a placeholder shopping cart page.

To place the shopping cart button for the tote, add the following code below the paragraph with the tote’s description and above the closing div tag:

```
<form method="post"  
action="http://webdevbasics.net/cart.html">  
    <input type="submit" value="Add to Cart">  
</form>
```

The process for adding the shopping cart button for the sweatshirt is the same. The HTML is

```
<form method="post"  
action="http://webdevbasics.net/cart.html">  
    <input type="submit" value="Add to Cart">  
</form>
```

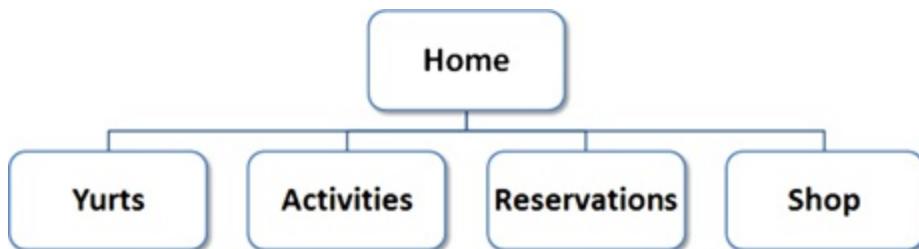
Save your page and test it in a browser. It should look similar to the one shown in [Figure 12.9](#). Click the Add to Cart button for the tote. The placeholder shopping cart will display and your screen should look similar to the one shown in [Figure 12.7](#).

# Pacific Trails Resort

See [Chapter 2](#) for an introduction to the Pacific Trails case study. You will use the [Chapter 9](#) pacific9 folder as the starting point for this case study.

As often happens with websites, the client, Melanie Bowie, is pleased with the response to the site and has an idea about a new use for it—selling books that she’s written about yoga and hiking at Pacific Trails Resort. She already has these for sale at the resort front desk and her customers seem to like them. This new Shop page (shop.html) will be part of the main navigation of the site. All pages should link to it. A revised site map is shown in [Figure 12.10](#).

## Figure 12.10



Revised Pacific Trails site map

### [Figure 12.10 Full Alternative Text](#)

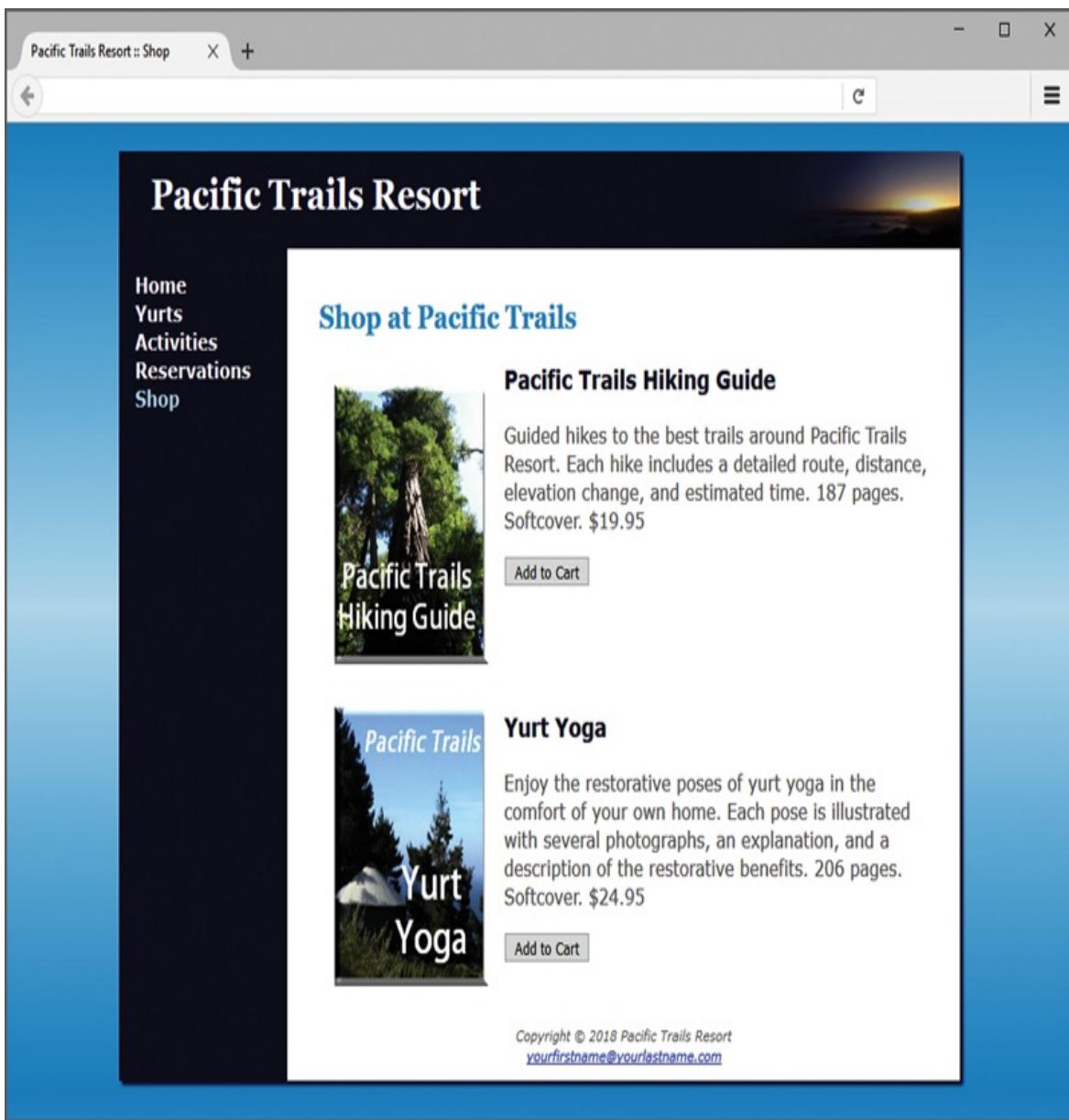
The Shop page should contain the description, image, and price of each book. It should link to a shopping cart system when the visitor wants to purchase an item. You may access a placeholder page provided by the textbook's website. If you have access to a different shopping cart system, check with your

instructor and ask if you can use it instead.

You have four tasks in this case study:

1. Create a new folder for this Pacific Trails case study.
2. Modify the main navigation on each page to include a link to the new Shop page.
3. Modify the pacific.css external CSS file.
4. Create the new Shop page (shop.html) shown in [Figure 12.11](#).

## **Figure 12.11**



New Pacific Trails Resort Shop page

[Figure 12.11 Full Alternative Text](#)

## Hands-On Practice Case Study

- Task 1: The Website Folder. Create a folder called `pacific12`. Copy all of the files from your [Chapter 9](#) `pacific9` folder into the `pacific12` folder.

Copy the trailguide.jpg and yurtyoga.jpg images from the [Chapter12](#) folder in the student files and save them to your pacific12 folder.

- Task 2: Update the Navigation on Each Page. Launch a text editor and open the home page (index.html). Add a new list item and hyperlink in the main navigation area that displays the text “Shop” and links to the file shop.html. See [Figure 12.11](#) for an example of the navigation area. Save the file. Edit the Yurts (yurts.html), Activities (activities.html), and Reservations (reservations.html) pages in a similar manner. Save each file.
- Task 3: Configure the CSS. Launch a text editor and open the pacific.css file. Configure a class named leftfloat that floats to the left with margin set to 1em. Configure a class named clear that clears all floats.
- Task 4: Create the new Shop page. One way to be productive is to create pages based on your earlier work. Launch a text editor and open the Reservations page (reservations.html). Save the file as shop.html. This will give you a head start and ensure that the pages on the website are similar. Perform the following modifications:
  1. Change the page title to an appropriate phrase.
  2. Change the text within the h2 element to “Shop at Pacific Trails”.
  3. Delete the other content and HTML elements within the main element.
  4. Write the HTML to display the trailguide.jpg image. Assign the image to the leftfloat class.
  5. Configure an h3 element to display “Pacific Trails Hiking Guide”.
  6. Code a paragraph that will display the text description: “Guided hikes to the best trails around Pacific Trails Resort. Each hike includes a detailed route, distance, elevation change, and estimated time. 187 pages. Softcover. \$19.95”

7. Each item for sale has an “Add to Cart” button, which is contained within a form with an action attribute set to <http://webdevbasics.net/cart.html>, a placeholder shopping cart page. To add the shopping cart button for the Hiking Guide book below the description paragraph, write the following code:

```
<form method="post"
      action="http://webdevbasics.net/cart.html">
    <input type="submit" value="Add to Cart">
</form>
```

8. Code a line break element assigned to the clear class.
9. Write the HTML to display the *yurtyoga.jpg* image. Assign the image to the leftfloat class.
10. Configure an h3 element to display “Yurt Yoga”.
11. Code a paragraph that will display the text description: “Enjoy the restorative poses of yurt yoga in the comfort of your own home. Each pose is illustrated with several photographs, an explanation, and a description of the restorative benefits. 206 pages. Softcover. \$24.95”
12. Configure the Add to Cart button by writing the following HTML for the form with the shopping cart button:

```
<form method="post"
      action="http://webdevbasics.net/cart.html">
    <input type="submit" value="Add to Cart">
</form>
```

13. Code a line break element assigned to the clear class.

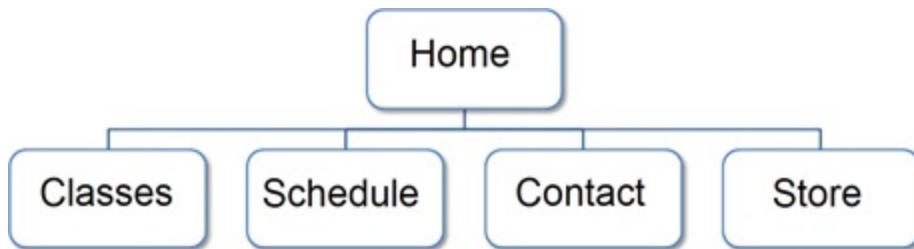
Save your page and test it in a browser. It should look similar to the one shown in [Figure 12.11](#). Click the Add to Cart button for one of the books. The placeholder shopping cart will display and your screen should look similar to the one shown in [Figure 12.7](#).

# Path of Light Yoga Studio

See [Chapter 2](#) for an introduction to the Path of Light Yoga Studio case study. You will use the [Chapter 9](#) yoga9 folder as the starting point for this case study.

The owner, Ariana Starrweaver is thrilled with the new website and would like to add an online store to sell her preferred yoga mats, blankets, and blocks. The new Store page (store.html) will be part of the main navigation of the site. All pages should link to it. A revised site map is shown in [Figure 12.12](#).

## Figure 12.12

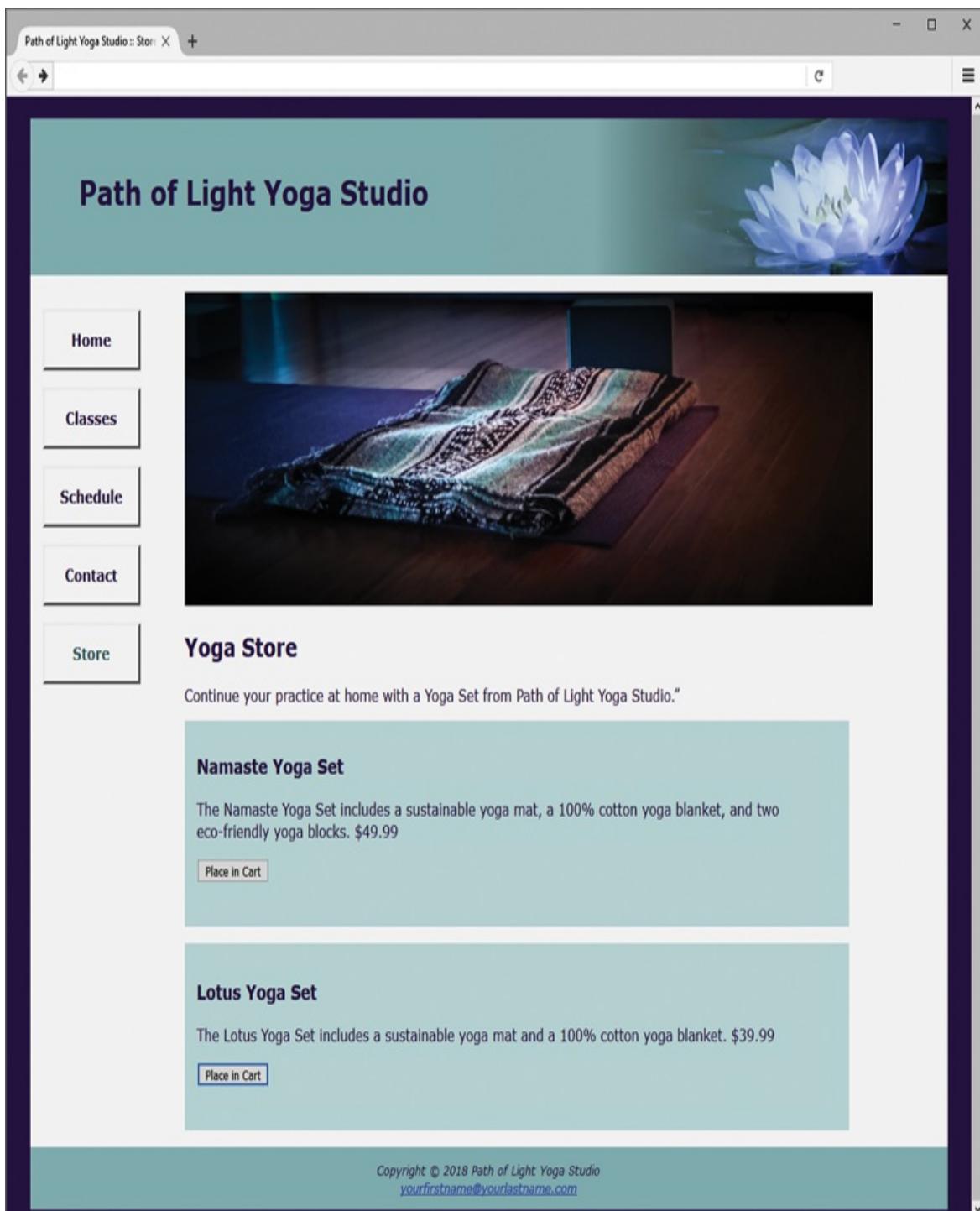


Revised Path of Light Yoga Studio site map

### [Figure 12.12 Full Alternative Text](#)

The Store page, shown in [Figure 12.13](#), should display a photo and provide information about the two yoga sets available for purchase (with the description and price of each set). You may access a placeholder page provided by the textbook's website. If you have access to a different shopping cart system, check with your instructor and ask if you can use it instead.

## Figure 12.13



New Path of Light Yoga Studio Store page

### Figure 12.13 Full Alternative Text

You have four tasks in this case study:

1. Create a new folder for this Path of Light Yoga Studio case study.
2. Modify the main navigation on each page to include a link to the new Store page.
3. Modify the yoga.css external CSS file.
4. Create the new Store page (store.html) shown in [Figure 12.13](#).

## Hands-On Practice Case Study

- Task 1: The Website Folder. Create a folder called yoga12. Copy all of the files from your [Chapter 9](#) yoga9 folder into the yoga12 folder. Copy the store.jpg image from the [Chapter12](#) folder in the student files and save it to your yoga12 folder.
- Task 2: Update the Navigation on Each Page. Launch a text editor and open the home page (index.html). Add a new list item and hyperlink in the main navigation area that displays the text “Store” and links to the file store.html. See [Figure 12.13](#) for an example of the navigation area. Save the file. Edit the Classes (classes.html), Schedule (schedule.html), and Contact (contact.html) pages in a similar manner. Save each file.
- Task 3: Configure the CSS. Launch a text editor and open the yoga.css file. Configure a section element selector with 90% width, 1em padding, 0 left margin, 0 right margin, 1em top margin, 1em bottom margin, and #C8DDDE background color. Configure a descendant selector to set 0 padding for forms within the section element. Hint: section form.
- Task 4: Create the New Store Page. One way to be productive is to create pages based on your earlier work. Launch a text editor and open the Schedule page (schedule.html). Save the file as store.html. This will give you a head start and ensure that the pages on the website are similar. Perform the following modifications:
  1. Change the page title to an appropriate phrase.

2. Display the store.jpg image in the div assigned to the hero id. Configure appropriate alt text.
3. Change the Yoga Schedule heading to Yoga Store.
4. Delete the other text and HTML within the main element related to the schedule content.
5. Place your cursor on the line after the Store heading. Create a paragraph with the following text:

“Continue your practice at home with a Yoga Set from Path of Light Yoga Studio.”

6. Information about each item will be contained within a section element. Code an opening section tag. Configure an h3 element to display the text “Namaste Yoga Set”.
7. Configure a paragraph with the following text: “The Namaste Yoga Set includes a sustainable yoga mat, a 100% cotton yoga blanket, and two eco-friendly yoga blocks. \$49.99”
8. Next, we will add a shopping cart button. The action on the form is <http://webdevbasics.net/cart.html>, replace `placeholdershoppingcartpage`.

To place the shopping cart button for the Namaste Yoga Set, add the following code below the paragraph:

```
<form method="post"  
action="http://webdevbasics.net/cart.html">  
    <input type="submit" value="Place in Cart">  
</form>
```

9. Code a closing section tag.
10. Code an opening section tag and configure an h3 element to display the text “Lotus Yoga Set”.
11. Configure a paragraph with the following text: “The Lotus Yoga Set includes a sustainable yoga mat and a 100% cotton yoga

blanket. \$39.99”

12. Configure the shopping cart button for the Lotus Yoga Set. The HTML is

```
<form method="post"  
action="http://webdevbasics.net/cart.html">  
    <input type="submit" value="Place in Cart">  
</form>
```

13. Code a closing section tag. Save your page and test it in a browser. It should look similar to the one shown in [Figure 12.13](#). Click the Place in Cart button for the Lotus Yoga Set. The placeholder shopping cart will display and your screen should be similar to the one pictured in [Figure 12.7](#).

## Web Project

See [Chapter 5](#) for an introduction to the Web Project. Review the goals of your website and determine whether they include an e-commerce component. If so, you will add this component to your web project.

## Hands-On Practice Case Study

Revise the site map as needed to include the e-commerce component. Perhaps you will add a Products page to your website. Perhaps the Products page already exists and you are just adding functionality to the page. In either case, make sure that the site map and content sheets reflect the new processing.

There are a number of free or low-cost shopping cart providers on the Web. Some are provided in the following list. Your instructor may have additional resources or suggestions. Choose one of the providers from the list in order to add a shopping cart to your website. When you subscribe or sign up for these services, be sure to note any potential costs.

- Mal's e-commerce (free and low-cost service): <http://www.mals-e.com>
- PayPal (there is a cost per transaction for this service):  
<http://www.paypal.com>
- JustAddCommerce (free trial): <http://www.richmediatech.com>

Save and test your page. Experiment with the shopping cart. Welcome to the world of e-commerce!

# **13 Web Promotion**

# Chapter Objectives

In this chapter, you will learn how to . . .

- Identify commonly used search engines and search indexes
- Describe the components of a search engine
- Design web pages that are friendly to search engines
- Submit a website for inclusion in a search engine
- Monitor a search engine listing
- Describe other website promotion activities
- Use the iframe element to create an inline frame

You've built it—now what can you do to attract visitors to your website? Once you have visitors, how do you encourage them to return? Getting listed on search engines, site affiliations, and banner ads are some of the topics that are discussed in this chapter.

## **13.1 Search Engine Overview**

What do you do when you need to find a website? Using a search engine is a popular way to navigate the Web and find websites.

A search engine listing helps customers find your site and increases the chances that they will make a purchase. Search engine listings can be an excellent marketing tool for your business. To harness the power of search engines, it helps to know how they work.

## 13.2 Popular Search Engines

According to NetMarketShare (<http://www.netmarketshare.com/search-engine-market-share.aspx?qprid=4&qpcustomd=0>), Google (<http://www.google.com>) was the most popular search engine during a recent month. Google was reported to have an overwhelming desktop market share of 77.98%, while the closest competitors were Bing (7.81%), Baidu (7.71%), and Yahoo! (5.05%). Google's popularity has continued to grow since it was founded in the late 1990s. The simple and whimsical interface, combined with quick-loading and useful results, has made it a favorite of web users.

## **13.3 Components of a Search Engine**

Search engines have the following components:

- Robot
- Database
- Search form

### **Robot**

A robot (sometimes called a spider or bot) is a program that automatically traverses the hypertext structure of the Web by retrieving a web page document and following the hyperlinks on the page. It moves like a robot spider on the Web, accessing and documenting web pages. The robot categorizes the pages and stores information about the website and the web pages in a database. Various robots may work differently, but, in general, they access and may store the following sections of web pages: title, meta tag descriptions, and some of the text on the page (usually either the first few sentences or the text contained in heading tags). Visit Web Robots Pages (<http://www.robotstxt.org>) if you'd like more details about web robots.

### **Database**

A database is a collection of information which is organized so that its contents can easily be accessed, managed, and updated. A database management system (DBMS), such as Oracle, SQL Server, MySQL, or IBM DB2, is used to configure and manage the database. The web page that displays the results of your search has information from the database

accessed by the search engine site. According to Bruce Clay (<http://www.bruceclay.com/searchenginerelationshipchart.htm>), some search engines receive portions of their content from other search engines. For example, Yahoo! receives its primary search results from Google.

## Search Form

The search form is the component of a search engine that you are most familiar with. You have probably used a search engine many times but haven't thought about what goes on "under the hood." The search form is the graphical user interface that allows a user to type in a word or phrase to search for. It is usually simply a text box and a submit button. The visitor to the search engine types in words (called keywords) related to his or her search into the text box. When the form is submitted, the data typed into the text box is sent to a server-side script that searches the database using the keywords entered. The search results (also called a result set) are a list of information, such as the URLs for web pages, that meets your criteria. This result set is formatted with a link to each page, along with additional information which might include the page title, a brief description, the first few lines of text, or the size of the page. The type of additional information varies by search engine. Next, the web server at the search engine site sends the search engine results page (SERP) to your browser for display.

The order in which the pages are displayed may depend on paid advertisements, alphabetical order, and link popularity (more on this later). Each search engine has its own policy for ordering the search results. Be aware that these policies can change over time.

The components of a search engine (robot, database, and search form) work together to obtain information about web pages, store information about web pages, and provide a graphical user interface to facilitate searching for and displaying a list of web pages that are relevant to the given keywords. Now that you are aware of the components of search engines, let's get to the most important part: how to design your pages to promote your website.

# 13.4 Search Engine Optimization

If you have followed recommended web design practices, you've already designed your website so that the pages are appealing and compelling to your target audience. How can you also make your site work with search engines? This section provides some suggestions and hints on designing your pages for search engines—a process called search engine optimization (SEO).

## Keywords

Spend some time brainstorming about terms and phrases that people may use when searching for your site. Make a list of them. These terms or phrases that describe your website or business are your keywords.

## Page Titles

A descriptive page title (the text between the `<title>` tags), which includes your company and/or website name, will help your site market itself. It's common for search engines to display the text in the page title in the SERP. The page title is also saved by default when a visitor bookmarks your site and is often included when a visitor prints a page of your site. Avoid using the exact same title for every page; include keywords in the page title that are appropriate for the page. For example, instead of just "Trillium Media Design," configure the page title to include both the company name and the purpose of the page: "Trillium Media Design: Custom E-Commerce Solutions."

## Heading Tags

Use structural tags, such as `<h1>`, `<h2>`, and so on, to organize your page

content. If it is appropriate for the web page content, also include some keywords in the text contained within the heading tags. Some search engines will give a higher list position if keywords are included in a page title or heading. Also include keywords, as appropriate, within the page text content. However, avoid spamming keywords—that is, do not list them over and over again. The programs behind search engines are becoming more sophisticated all the time and you can actually be prevented from being listed if it is perceived that you are not being honest or are trying to cheat the system.

## Description

What is special about your website that would make someone want to visit? With this in mind, write a few sentences about your website or business. This description should be inviting and interesting so that a person searching the Web will choose your site from the list provided by a search engine. Some search engines will display your description in their search engine results. You might be wondering how these are applied to the actual web pages. The description is placed on a web page by adding an HTML meta tag to the head section.

## Description Meta Tag

A meta tag is a self-contained tag that is placed in the head section of a web page. You've been using a meta tag to indicate character encoding. There are a number of other uses for meta tags. We'll focus here on providing a description of a website for use by search engines. The description meta tag content is displayed on the SERP by some search engines, such as Google. The name attribute indicates the use of the meta tag. The content attribute indicates the values needed for that specific use. The `description` value for the name attribute indicates that the use of the meta tag is to provide a description. For example, a description meta tag for a website about a web development consulting firm called Acme Design could be configured as follows:

```
<meta name="description" content="Acme Design, a premier web cons
```



## FAQ

1. What if I do not want a search engine to index a page?

Sometimes there will be pages that you do not want indexed, perhaps test pages or pages only meant for a small group of individuals (such as family or coworkers). Meta tags can be used for this purpose also. To indicate to a search engine robot that a page should not be indexed and the links should not be followed, do not code a description meta tag in the page. Instead, add a robots meta tag to the page as follows:

```
<meta name="robots" content="noindex,nofollow">
```

## Linking

Verify that all hyperlinks are working. Each page on your website should be reachable by a text hyperlink. The text should be descriptive (avoid phrases like “More info” and “Click here”) and should include keywords as appropriate. Inbound links (sometimes called incoming links) are also a factor in SEO; see the link popularity section later in this chapter.

## Images and Multimedia

Be mindful that search engine robots do not “see” the text embedded within your images and multimedia. Configure meaningful alternate text for images. Include relevant keywords in the alternate text.

## Valid Code

Search engines do not require that your HTML and CSS code pass validation

tests. However, code that is valid and well structured is likely to be more easily processed by search engine robots. This may help with your placement in the search engine results.

## **Content of Value**

Probably the most basic, but often overlooked, component of SEO is providing content of value contained within a website that follows web design best practices (see [Chapter 5](#)). Your website should contain high-quality, well-organized content that is of value to your visitors.

## 13.5 Listing in a Search Engine

Although search engines bring visitors to your website, it is not always easy to get listed in a search engine. Before you even *think* about submitting your website to a search engine, be sure that it is complete and that you have followed basic SEO techniques (as described in the previous section). Once you're confident that your website is ready, follow the steps listed below to submit your site for consideration by a search engine:

- Step 1. Visit the search engine website (such as <http://www.google.com> or <http://www.bing.com>) and look for the “Add site” or “List URL” link. This is typically on the home page or the About Us page. Be patient because these links are sometimes not obvious. If you don’t see a link to submit your site, then use the search engine to search for a phrase similar to “Submit to Google” or “Submit to Bing.” To submit your website to Bing, visit <https://www.bing.com/toolbox/submit-site-url>. To submit your website to Google, visit <http://www.google.com/submityourcontent/website-owner/> and select the “Add your URL” link.
- Step 2. Sign in with your Google account, follow the directions listed on the page, and submit the form to request that your site be added to the search engine. At other search engines, there may be a fee for an automatic listing, called paid inclusion. Currently, there is no fee to submit a site to Google or Bing.
- Step 3. The spider from the search engine will index your site. This may take several weeks.
- Step 4. Several weeks after you submit your website, check the search engine to see if your site is listed. If it is not listed, review your pages and check whether they are optimized for search engines (see the next section) and display in common browsers.

If the website is for a business, you may want to consider paying for listing

consideration in a search engine (often referred to as an express submit or express inclusion), paying for preferential placement in search engine displays (called sponsoring or advertising), and paying each time a visitor clicks the search engine's link to your site. Many businesses regard payment for these types of services as another marketing expense, such as paying for a newspaper ad or a listing in the Yellow Pages.



## FAQ

### 1. Is advertising on a search engine worth the cost?

It depends. How much is it worth to your client to appear on the first page of the search engine results? You select the keywords that will trigger the display of your ad. You also set your monthly budget and the maximum amount to pay for each click. While costs and charges vary by search engine, at this time, Google charges are based on cost per click—you'll be charged each time a visitor to Google clicks on your advertisement. Visit <http://google.com/adwords> for more information about their program.

If you explore the paid advertising programs that search engines offer, you'll encounter a number of acronyms related to marketing. The most common are listed below:

- CPC: Cost per click

CPC (also referred to as **PPC, pay per click**) is the price you are charged if you have signed up for a paid sponsor or ad program and a visitor clicks on a link to your website.

- CPM: Cost per thousand impressions

CPM is your cost for every 1,000 times that your ad is displayed on a web page (whether or not the visitor clicks on your ad).

- CTR: Click-through rate
- CTR is the ratio of the number of times an ad is clicked on to the number of times an ad is viewed. For example, if your ad was shown 100 times and 20 people clicked on it, your CTR would be 20/100, or 20%.

## Map Your Site

Google's Webmaster Guidelines describe two types of site maps that are useful for SEO:

- An HTML site map is a web page with a map of the site that contains a hierarchical list of hyperlinks to the major pages in your website. For an example, view the site map web page at <http://webdevbasics.net/sitemap.html>. The information on the site map page is not only helpful for your website visitors, but also may assist search engine robots as they follow hyperlinks on your site.
- An XML Sitemap is an XML file that is used by search engines, but it is not accessed by your web page visitors. A Sitemap provides information to a search engine, such as Google, about your website and is essentially a list of pages, along with the following information: date that each page was last modified, an indicator of how frequently each page changes, and a priority level for each page. An excerpt from a Sitemap file (sitemap.xml) is shown below:

```

<url>
  <loc>http://webdevfoundations.net/</loc>
  <lastmod>2018-07-03T08:10:09+00:00</lastmod>
  <changefreq>monthly</changefreq>
  <priority>1.00</priority>
</url>
<url>
  <loc>http://webdevfoundations.net/index.html</loc>
  <lastmod>2018-07-03T08:10:09+00:00</lastmod>
  <changefreq>monthly</changefreq>
  <priority>1.00</priority>
</url>

```

```
<url>
  <loc>http://webdevfoundations.net/8e/chapter1.html</loc>
  <lastmod>2018-08-22T15:09:07+00:00</lastmod>
  <changefreq>monthly</changefreq>
  <priority>0.800</priority>
</url>
```

Online Sitemap generators, such as <http://www.xml-sitemaps.com> will automatically create a Sitemap file, named sitemap.xml, for you. You will need to upload the Sitemap to your website and notify Google of its URL. See <http://www.google.com/support/webmasters> for more information about Sitemaps.

## Alliances

There are a number of alliances between certain search engines. The Open Directory Project (<http://www.dmoz.org>) provides directory services for a number of search engines, including Google. Note that the alliances can change over time. Explore Bruce Clay's Search Engine Relationship Chart at <https://www.bruceclay.com/searchenginerelationshipchart.htm> to see the current state of search engine alliances. Awareness of search engine alliances will help you to maximize the chances of your website turning up when a search is performed.



## Checkpoint 13.1

1. Describe the three components of a search engine.
2. What is the purpose of the description meta tag?
3. Is it beneficial for a business to pay for preferential listing? Why or why not?

## 13.6 Monitoring Search Listings

Although you may want your website to appear instantaneously in search engines, some time may be required before your site appears in the SERPs. Also, be mindful that there is no guarantee when you submit your site that it will be listed; however, it is rare that a quality website with content of value is not indexed and included in search engine listings.

As your sites get listed, it becomes important to determine which keywords are working. Usually, you need to fine-tune and modify your keywords over time. Here are a few methods for determining which keywords are working:

- Manual Checking. Visit search engines and type in the keywords. Assess the results. You might consider keeping a record of the search engine, keyword(s), and page ranking.
- Web Analytics. Every visitor to your website, including those who were referred by search engines, is recorded in your website log files. A website log consists of one or more text files that record each visit to your site, capturing information about your visitors and about referring websites. You can discover whether your keywords are successful and which search engines are being used by analyzing your log. You can also determine the days and times that your site is visited, the operating systems and browsers being used, the paths that visitors take through the site, and much more. The log is a rather cryptic text file. See [Figure 13.1](#) for a partial log.

### Figure 13.1

```
#Software: Microsoft Internet Information Services 7.0
#Version: 1.0
#Date: 2018-07-13 09:50:57
#Fields: date time s-sitename s-computername s-ip cs-method cs-uri-stem
cs-uri-query s-port cs-username c-ip cs-version cs(User-Agent) cs
(Referer) cs-host sc-status sc-substatus sc-win32-status sc-bytes cs-
bytes time-taken
2018-07-13 09:50:57 W3SVC724 ORF-PREMIUM11B 65.182.100.116 GET
/chapter5/index.htm - 80 - 74.6.73.82 HTTP/1.0 Mozilla/5.0+(compatible;
+Yahoo!+Slurp;+http://help.yahoo.com/help/us/ysearch/slurp) -
webdevfoundations.net 304 0 0 232 256 78
#Software: Microsoft Internet Information Services 7.0
#Version: 1.0
#Date: 2018-07-13 10:16:55
#Fields: date time s-sitename s-computername s-ip cs-method cs-uri-stem
cs-uri-query s-port cs-username c-ip cs-version cs(User-Agent) cs
(Referer) cs-host sc-status sc-substatus sc-win32-status sc-bytes cs-
bytes time-taken
2018-07-13 10:16:55 W3SVC724 ORF-PREMIUM11B 65.182.100.116 GET
/fireworks8/page3.10.gif - 80 - 65.55.212.239 HTTP/1.0 msnbot-media/1.0
(+http://search.msn.com/msnbot.htm) - webdevfoundations.net 200 0 0
28665 283 406
```

A website log file contains useful information, but can be difficult to read.

### [Figure 13.1 Full Alternative Text](#)

Web analytics software can analyze your log file and create easy-to-use charts and reports to provide you with information to help you improve and optimize your website for your target visitor. If you have your own website and domain name, many web host providers allow free access to the log and may even run web analysis reports as part of the monthly hosting fee. By checking information in the log, you can determine not only what - keywords are working, but also which search engines your visitors are using. See [Figure 13.2](#) for information from a log analysis report listing the top 10 keywords used by actual web visitors when searching Google to find a particular website.

## Figure 13.2

Keyword	Visits	Pages Per Visit	Average Time on Site
web design best practices	27,097	1.75	00:01:17
web design best practice	21,773	6.08	00:07:32
web development and design foundations	15,751	5.71	00:04:56
basics of web design: HTML5 & CSS3	14,346	5.96	00:05:43
html5 basics	6,859	5.32	00:04:05
basic html5 template	4,943	5.98	00:06:24
basic html5 page	4,023	8.20	00:05:23
html5 basic code	3,198	4.17	00:05:02
basic html5 tags	3,141	5.06	00:04:46
html5 basics pdf	3,120	4.94	00:04:27

### Partial log file analysis report

[Figure 13.2 Full Alternative Text](#)

Website log analysis is a powerful marketing tool because you can determine exactly how visitors are finding your site. This lets you know which keywords are working and which are not. Perhaps the developers of this website might consider adding additional content related to the popular keywords.

Google offers a free web analytics service at <http://www.google.com/analytics>. The type of information provided includes:

- Audience (including a geographical map and browser information)
- Traffic Sources (such as referring sites, keywords, and AdWords)
- Content (including landing pages, paths through the site, and exit pages)
- Conversions (tracks business objectives)

Alexa (<http://alexa.com>) and SEMRush (<http://semrush.com>) are two of many services that offer analytics reports for websites.

## 13.7 Link Popularity

Link popularity is a rating determined by a search engine based on the number of sites that link to a particular website and the quality of those sites. For example, a link from a well-known site such as Oprah Winfrey's website (<http://www.oprah.com>) would be considered a higher quality link than one from your friend's home page on a free web server. The link popularity of your website can determine its order in the search engine results page. One way to check which sites link to yours is to analyze your log file. Another method is to visit a website that offers a link popularity checking service such as LinkPopularity.com at <http://linkpopularity.com> to run a report that checks link popularity on a number of search engines. A third method is to visit particular search engines and check for - yourself. At Google, type "link:yourdomainname.com" into the search box and the sites that link to yourdomainname.com will be listed. Search engines are not the only tools you can use to bring visitors to your website. The next section looks at some other options.

# 13.8 Social Media Optimization

Reach out to your current and potential website visitors with social media optimization (SMO) by creating content of value that is easily sharable. The benefits of SMO include increased awareness of your brand and/or site, along with an increase in the number of inbound links (which can help with SEO). Social bookmarking sites such as Digg (<http://digg.com>), Reddit (<http://reddit.com>), and Pinterest (<http://pinterest.com>) provide a way for people to store, share, and categorize website content. Make it easy for your visitors to add your site to social bookmarking sites and social networking sites like Twitter and Facebook. You can code hyperlinks to these yourself or use a content-sharing service such as AddThis (<http://www.addthis.com>).

Visit the following resources for more information about SMO:

- The Beginners Guide to Social Media:<https://moz.com/beginners-guide-to-social-media>
- The 5 NEW Rules of Social Media Optimization (SMO):  
<http://www.rohitbhargava.com/2010/08/the-5-new-rules-of-social-media-optimization-smo.html>
- Free Tools for Social Media Optimization:<http://www.socialmediaexaminer.com/social-media-seo/>

# Blogs and RSS Feeds

[Chapter 1](#) introduced blogs, which are easily updatable and readily available journals on the Web. The power of the blog to share information and elicit comments is being used by businesses of various types (ranging from Nike to Adobe) to build and expand customer relationships. Most blog hosting sites, such as Google's Blogger (<http://blogger.com>) and WordPress (<http://wordpress.com>), offer free RSS (Really Simple Syndication or Rich Site Summary) feeds of blog content. The RSS feed for a blog is an XML file

(with an .rss file extension) that contains a summary of postings with links to a blog or another website. Your customers or business partners can subscribe to the RSS feed and automatically be updated when you've posted new content. RSS feeds are usually identified by an orange button with "XML" or "RSS" in the text. There are numerous free and low-cost RSS readers available, including Headline Viewer (<http://www.headlineviewer.com>) and - FeedReader (<http://feedreader.com>). To see a blog in action, visit this textbook's blog at <http://webdevfoundations.blogspot.com>.

## Social Networking

Join groups on social networking sites such as Facebook (<http://www.facebook.com>), Google+ (<http://plus.google.com>), or LinkedIn (<http://www.linkedin.com>) to find and connect with current and potential visitors. Create portable content that promotes your website and publish it on YouTube (<http://www.youtube.com>), SlideShare (<http://www.slideshare.net>), and other similar sites. Be active on microblogging sites such as Twitter (<http://twitter.com>). Twitter is not limited to personal use. The business world has also discovered the marketing reach that Twitter can provide. Visit <https://business.twitter.com/basics> for insights on how to use Twitter to promote your business and communicate with customers. Let viral marketing go to work for you as current and potential visitors find and share your content, which should increase awareness and bring new and returning visitors to your site.

## 13.9 Other Site Promotion Activities

There are a number of other ways you can promote your website, including **Quick Response (QR) codes**, affiliate programs, banner ads, banner exchanges, reciprocal link agreements, newsletters, personal recommendations, traditional media advertising, and placement of the URL on all promotional materials.

### Quick Response (QR) Codes

A QR code is a two-dimensional barcode in a square pattern that is readable by a smartphone camera scan application or a QR barcode reader. The data encoded can be text, a telephone number, or even the URL of a website. There are many free online QR code generators, including <http://qrcode.kaywa.com> and <http://www.qrstuff.com>. Free apps, such as ScanLife and QR Code Scanner, are available for smartphones that use the camera feature to scan the QR code, typically a URL for a website, which is then displayed by the smartphone's web browser. QR codes are useful for promoting a website; include it on your business card or even a T-shirt! The QR code in [Figure 13.3](#) displays the home page of the textbook's website (<http://webdevfoundations.net>).

### Figure 13.3



QR code for <http://webdevfoundations.net>

## Affiliate Programs

The essence of affiliate programs is that one website (the affiliate) promotes another website's products or services (the merchant) in exchange for a commission. Both websites benefit from this association. Amazon.com reportedly began the first affiliate marketing program and its Amazon.com Associates program is still going strong. By joining this program, your website can feature books and other products with a link to the Amazon website. If one of your visitors makes a purchase, you get a commission. Amazon benefits because you have delivered an interested visitor who may buy items now or in the future. Your site benefits from the prestige of being affiliated with a known site such as Amazon and the potential for income from the program.

View the CJ Affiliate website (<http://www.cj.com>) to see a program that matches websites with potential affiliate programs. Their service allows publishers (website owners and developers) to choose from a wide range of advertisers and affiliate programs. The benefits to web developers include the opportunity to partner with leading advertisers, earn additional revenue from website visitors or ad space, and view real-time tracking and reporting. Visit AssociatePrograms.com (<http://www.associateprograms.com>) for a directory of affiliate, associate, and referral programs.

# Banner Ads

A banner ad is typically a graphic image that is used to announce and advertise the name or identity of a site. Banner ads are image hyperlinks that display the advertised site when clicked. You probably see them many times as you surf the Web. They've been around for quite some time; *HotWired*, the first commercial web magazine, introduced the first banner ad in 1994 to promote AT&T.

There is no official size for a banner ad. However, the Interactive Advertising Bureau (IAB) provides guidelines for standard ad dimensions. Dimensions have traditionally been pixel-based, such as a leaderboard ( $728 \times 90$  pixels) and a wide skyscraper ( $160 \times 600$  pixels). The IAB is overhauling the standards and planning to move to aspect-ratio sizes that work well on multiple devices (<https://www.iab.com/newadportfolio>). The cost to display your banner ad can vary. Some websites charge by the impression (usually in terms of cost per thousand impressions, or CPM). Others charge for click-throughs only (when the banner ad is clicked). Most search engines sell ads and will display your ad on a results page for a keyword that relates to your site.

The effectiveness of banner ads has been a topic of study. If you are like most website visitors, you do not click on banner ads. This means that banner ads do not necessarily generate more immediate visitors to a site. The Interactive Advertising Bureau researched the relationship between banner ads and brand awareness. A ClickZ (<http://www.clickz.com/stats/sectors/advertising/article.php/804761>) report about this classic study indicates that while standard banner ads helped boost brand awareness, other formats such as skyscrapers (long, skinny ads that run down one side of a page) and larger rectangular ads were three to six times more effective in increasing brand awareness and message association. Media technologies such as audio, video, and animation also have a greater impact and increase branding effectiveness. Of course, the thinking is that increased brand awareness will increase the likelihood of an actual website visit in the future. If the cost associated with banner ads seems to outweigh their benefits, consider a free option, a banner exchange.

# Banner Exchange

While the details of banner exchange programs vary, the idea is that you agree to show banners from other sites and they will show your banner. Information on banner exchanges may be found at The Banner Exchange (<http://www.thebannerexchange.com>) and eBannerTraffic (<http://www.ebannertraffic.com>). Banner exchanges can be beneficial to all parties because of the free advertising.

# Reciprocal Link Agreements

A reciprocal link agreement is usually between two sites with related or complementary content. You agree to link to each other. The result should be more visitors for each site. If you find a site that you'd like to set up a reciprocal link agreement with, contact its webmaster (usually by e-mail) and ask! Because some search engines partially determine rankings based on the number of quality links to a website, a well-placed reciprocal link can help both sites.

# Newsletters

A newsletter can bring return visitors to your site. The first step is to collect e-mail addresses. Allow website visitors to opt-in to receive your newsletter by filling out a form that typically collects the visitor's name and e-mail address.

Offer your visitors some perceived value—timely information on a topic, discounts, and so on. Send out the newsletter with fresh, compelling content regularly. This helps to remind your previous visitors about your site. They may even forward the newsletter to a colleague and bring a new visitor to your site.

# **Sticky Site Features**

Updating your website often and keeping your content fresh will encourage visitors to return to your site. How can you keep them there? Make your website sticky. Stickiness is the ability to keep visitors at your site. Display your interesting and compelling content along with features that encourage stickiness, such as news updates, polls and surveys, and chats or message boards.

# **Personal Recommendations**

While forwarding a newsletter is a form of personal recommendation, some sites make it even easier to tell a friend about them. They offer a link that is used with a phrase such as “E-mail this article”, “Send this page to a friend”, or “Tell a colleague about this site”. This personal recommendation brings a new visitor who is likely to be interested in the content of your site.

# **Website Forum Postings**

Subscribe to forums related to your website content. Do not reply to postings with an advertisement of your site. Instead, reply to postings when your response can offer assistance or advice. Include a signature line with your website URL. Be subtle! You can get banned from some forums if the moderator perceives that you are merely advertising. However, by offering friendly, helpful advice in a forum you can market your website in a subtle, positive manner at no cost other than your Internet connection.

# **Traditional Media Ads and Existing Marketing Materials**

Don't forget to mention your website in any print, TV, or radio ads that your organization runs. Include the URL of your website on all brochures, stationery, and business cards. This will help make your website easy to find by your current and potential customers. Depending upon your target audience, also consider including a QR code for your website on printed materials.



## Checkpoint 13.2

1. Are the results returned by various search engines really different? Choose a place, music group, or movie to search for. Enter the same search terms, such as "Door County" into the following three search engines: Google, Yahoo!, and Bing. List the URLs of the top three sites returned by each. Comment on your findings.
2. How can you determine whether your website has been indexed by a search engine? How can you determine which search engines are being used to find your site?
3. List four website promotion methods that do not use search engines. Which would be your first choice? Why?

## 13.10 Serving Dynamic Content with Inline Frames

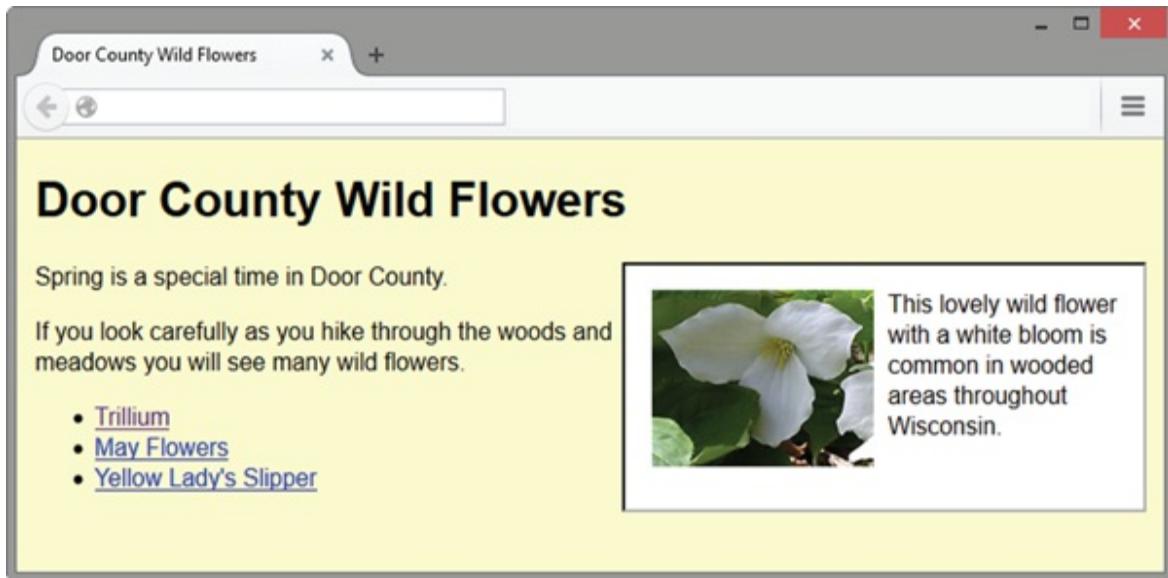
How does a website display a banner ad on its home page that is hosted and controlled by another organization? How can a web page easily display a variety of multimedia clips? How are the potential customer referrals provided by the Amazon.com Associates program initiated and tracked? How does Google facilitate Ad Sense advertisement displays and click-throughs on third-party websites? At the time this was written, the answer to all of these questions is inline frames. Inline frames are widely used on the Web for a variety of marketing and promotional purposes, including displaying banner ads, playing multimedia that may be hosted on a separate web server, and serving content for associate and partner sites to display. The advantage is separation of control. The dynamic content—such as the banner ad or multimedia clip—can be changed by a project team without allowing them access to change the rest of the website. For example, in the case of the banner ad, a third-party organization (such as DoubleClick) has control over the ad content, but is prevented from updating the other items on the page. This is accomplished by configuring the dynamic content (in the form of banner ads) within an inline frame. Let's explore how inline frames are configured.

### The Iframe Element

An inline frame, also called a floating frame, can be placed on the body of any web page, similar to the way you would place an image on a web page. The iframe element configures an inline frame that displays the contents of another web page within your web page document, which is referred to as *nested browsing*. The iframe element begins with the `<iframe>` tag and ends with the `</iframe>` tag. Fallback content that should be displayed if the browser does not support inline frames (such as a text description or hyperlink to the actual web page) should be placed between the tags. [Figure](#)

[13.4](#) shows the use of an inline frame (chapter13/dcwildflowers/index.html in the student files). The white background area is the inline frame; it displays another web page that contains the image of the flower and a text description.

## Figure 13.4

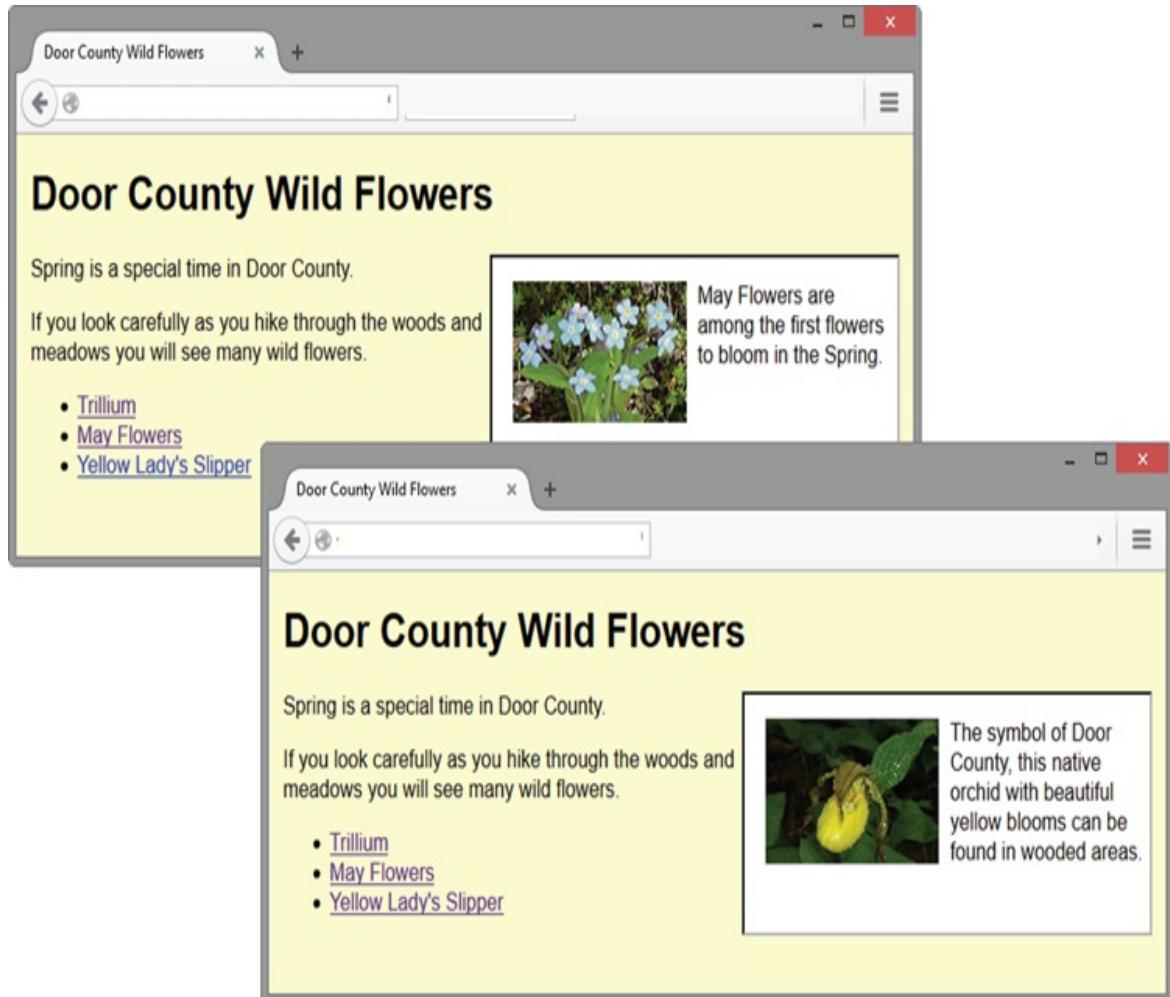


The white scrolling area on the page is an inline frame that displays a separate web page

## [Figure 13.4 Full Alternative Text](#)

The screenshots shown in [Figure 13.5](#) are of the same web page with different pages displayed in the inline frame area.

## Figure 13.5



The same page with different content in the inline frame area

[Figure 13.5 Full Alternative Text](#)

The code for the inline frame that creates this effect is

```
<iframe src="trillium.html" title="Trillium Wild Flower"
height="160" width="350" name="flower">
Description of the lovely Spring wild flower, the
<a href="trillium.html" target="_blank">Trillium</a>
</iframe>
```

[Table 13.1](#) lists iframe element attributes. Commonly used attributes are shown in bold.

# Table 13.1 The iframe element attributes

Attribute	Description
<b>src</b>	URL of the web page to be displayed in the inline frame
<b>height</b>	Inline frame height in pixels
<b>width</b>	Inline frame width in pixels
<b>id</b>	Optional; text name, alphanumeric, beginning with a letter, no spaces; the value must be unique and not used for other id values on the same web page document
<b>name</b>	Optional; text name, alphanumeric, beginning with a letter, no spaces; this attribute names the inline frame
<b>sandbox</b>	Optional; disallow/disable features such as plug-ins, scripts, forms (new in HTML5)
<b>title</b>	Optional; specifies a brief text description that may be displayed by browsers or assistive technologies

## Video in an Inline Frame

YouTube (<http://www.youtube.com>) is a popular website for sharing videos for both personal and business use. When a video is uploaded to YouTube, the creator can choose to share their video with others. It's easy to display a YouTube video on your web page; just select Share and then copy and paste the HTML into your web page source code. The code uses an iframe element to display a web page file within your web page. YouTube detects the browser and operating system of your web page visitor and serves the content in an appropriate format—with either Flash or HTML5 video.



## Hands-On Practice 13.1

In this Hands-On Practice, you will launch a text editor and create a web page that displays a YouTube video within an iframe element.



### Video Note Configure an Inline frame

This example embeds the video found at <https://youtu.be/2Cu0ug8KDWI>. You can choose to display this video or select a different video. The process is to visit the YouTube page for the video, select Share, and copy the URL provided. Take note of the video identifier, which is after the / symbol. In this example, the video identifier is 2Cu0ug8KDWI.

Use the chapter2/template.html file as a starting point and configure a web page with the heading “Inline Frame” and an iframe element that displays the video. Code the src attribute to display <http://www.youtube.com/embed/> followed by the video identifier. In this example, set the src attribute to the value <http://www.youtube.com/embed/2Cu0ug8KDWI>. Configure a hyperlink to the YouTube video page as fallback content. The code to display the video is

```
<iframe src="http://www.youtube.com/embed/2Cu0ug8KDWI" width="640"
        View the <a href="https://youtu.be/2Cu0ug8KDWI">YouTube Video<
    </iframe>
```

Save your page as iframe.html and display it in a browser. Test your page in several browsers. Compare your work to chapter13/13.1/iframe.html in the student files.

# Chapter Summary

This chapter introduced concepts related to promoting your website. The activities involved in submitting websites to search engines were discussed, along with techniques for optimizing your website for search engines. Other website promotion activities, such as social media optimization, QR codes, banner ads, and newsletters, were also introduced. At this point, you should have an idea of what is involved in the other side of website development—marketing and promotion. You can help the marketing staff by creating websites that work with search engines by following the suggestions in this chapter. For examples, chapter links, and updated information visit the textbook website at <http://webdevfoundations.net>

## Key Terms

1. [<iframe>](#)
2. [affiliate programs](#)
3. [banner ad](#)
4. [banner exchange](#)
5. [blogs](#)
6. [click-through rate \(CTR\)](#)
7. [cost per click \(CPC\)](#)
8. [cost per thousand impressions \(CPM\)](#)
9. [database](#)
10. [description meta tag](#)

11. [iframe element](#)
12. [inline frame](#)
13. [keywords](#)
14. [link popularity](#)
15. [manual checking](#)
16. [meta tag](#)
17. [newsletter](#)
18. [pay per click \(PPC\)](#)
19. [personal recommendation](#)
20. [Quick Response \(QR\) codes](#)
21. [reciprocal link agreement](#)
22. [robot](#)
23. [robots meta tag](#)
24. [RSS feed](#)
25. [search engine](#)
26. [search engine optimization \(SEO\)](#)
27. [search engine results page \(SERP\)](#)
28. [search form](#)
29. [search results](#)
30. [Sitemap](#)

31. [social media optimization \(SMO\)](#)

32. [stickiness](#)

33. [web analytics](#)

34. [website log](#)

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## Review Questions

### Multiple Choice

1. Which of the following contains information about which keywords are bringing visitors to your website?
  1. web position log
  2. website log
  3. search engine file
  4. none of the above
2. In which section of a web page should meta tags be placed?
  1. head
  2. body
  3. comment
  4. CSS
3. What is a first step for search engine optimization?

1. Join an affiliate program.
  2. Start a blog.
  3. Add a description meta tag to each page.
  4. Create a QR code.
4. In which of the following does one website promote another site's products or services in exchange for a commission?
1. newsletter
  2. affiliate program
  3. search engine optimization
  4. stickiness
5. Which of the following is a collection of information which is organized so that its contents can easily be accessed, managed, and updated?
1. SERP
  2. database
  3. robot
  4. QR Code
6. Which of the following is a rating determined by a search engine based on the number of links to a particular site and the qualities of those links?
1. line checking
  2. reciprocal linking
  3. link popularity

4. none of the above
7. Which of the following is the most popular search engine?
  1. Iframe
  2. Yahoo!
  3. Google
  4. Bing
8. Which of the following is a promotion method whose main purpose is to bring return visitors to your website?
  1. newsletter
  2. banner exchange
  3. TV ad
  4. none of the above
9. Which of the following is the main benefit of a banner ad?
  1. bringing many new visitors to your site
  2. increasing awareness of the website
  3. higher ranking in search engine results page
  4. none of the above
10. Typically, how long can it take between the time you submit your website and the time it is listed in a search engine?
  1. several hours
  2. several weeks

3. several months
4. a year

## Fill in the Blank

11. The ability to keep web page visitors at your site is called \_\_\_\_\_.
12. Use \_\_\_\_\_ to indicate that you do not want a web page to be indexed.
13. Frequently used information research resources are \_\_\_\_\_.
14. In addition to a search engine listing, a website can be promoted by \_\_\_\_\_.
15. Two-dimensional barcodes that can be scanned by smartphones to access a website are called \_\_\_\_\_ codes.

## Hands-On Exercises

1. Practice writing description meta tags. For each scenario described here, write the HTML to create an appropriate meta tag that includes keywords which may be used by visitors to search for the business.
  1. Lanwell Publishing is a small independent publisher of English as a second language (ESL) books used for secondary school and adult continuing education learners. The website offers textbooks and teacher's manuals.
  2. RevGear is a small specialty truck and auto repair shop in Schaumburg, Illinois. The company sponsors a local drag racing team.
  3. Morris Accounting is a small accounting firm that specializes in tax return preparation and accounting for small businesses. The owner,

Greg Morris, is a CPA and Certified Financial Planner.

2. Choose one of the company scenarios listed in Hands-On Exercise 1 (Lanwell Publishing, RevGear, or Morris Accounting). Create a home page for the site that includes a description meta tag, appropriate page titles, and keywords used appropriately in headings. Place an e-mail link to yourself on the web page. Save the page as scenario.html.
3. Choose one of the company scenarios listed in Hands-On Exercise 1. Create a web page that lists at least three possible activities that could be used to promote the site in addition to search engine submission. For each activity, explain why it could be helpful for the website. Place an e-mail link to yourself on the web page. Save the page as promotion.html.
4. Write the HTML and CSS to create a page named inline.html that is configured to display the heading “Web Promotion Techniques”, an inline frame that is 400 pixels wide and 200 pixels high, and an e-mail link with your name. Code a web page named marketing.html that lists your three favorite web promotion techniques. Configure the inline frame to display the marketing.html file.

## Web Research

1. This chapter discussed a number of website promotion techniques. Choose one technique described in the chapter to research. Obtain information from at least three different websites about the promotion technique you chose. Create a web page that lists at least five hints or facts about the promotion method, along with helpful links that provide additional information on the hint or fact. Provide the URLs of the websites that you used as resources. Place your name in an e-mail link on the web page.
2. Search engine submission rules are constantly changing. Research a search engine and determine the following:
  - Are free submissions accepted? If so, are they restricted to

noncommercial sites?

- What types of paid submissions are accepted? How do they work (what is the fee structure, listing guarantee, and so on)?
- What types of paid advertisements are available? How do they work (what is the fee structure, for example)?
- Is there any information about the usual time frame for the submission to be listed?
- Create a web page that describes your findings. Provide URLs of the websites you used as resources. Place your name in an e-mail link on the web page.

## Focus on Web Design

1. Explore how to design your website so that it is optimized for search engines (search engine optimization, or SEO). Visit the following sites as a starting point as you search for three SEO tips or hints:
  - Old Skool Search Engine Success, Step-by-Step:  
<http://www.sitepoint.com/article/skool-search-engine-success>
  - 10 Basic SEO Tips To Get You Started:  
<http://www.businessinsider.com/10-basic-seo-tips-everyone-should-know-2010-1>
  - 25 Tips From SEO Professionals:  
<http://www.forbes.com/sites/johnrampton/2015/04/13/25-tips-from-seo-professionals/>

Write a one-page report that describes three tips which you found interesting or potentially useful. Cite the URLs of the resources that you used.



# WEBSITE CASE STUDY

## Meta Tags to Promote Websites

Each of the following case studies continues throughout most of the text. This chapter case study focuses on description meta tags.

### JavaJam Coffee House

See [Chapter 2](#) for an introduction to the JavaJam Coffee House case study. [Figure 2.31](#) shows a site map for the JavaJam website. The pages were created in earlier chapters. Use the [Chapter 9](#) JavaJam website as a starting point for this case study. You have three tasks in this case study:

1. Create a new folder for this JavaJam case study.
2. Write a description of the JavaJam Coffee House business.
3. Code a description meta tag on each page in the website.

### Hands-On Practice Case Study

- Task 1: The Website Folder. Create a folder called javajam13. Copy all of the files from your [Chapter 9](#) javajam9 folder into the javajam13 folder.
- Task 2: Write a Description. Review the JavaJam pages that you created in earlier chapters. Write a brief paragraph that describes the JavaJam site. Edit the paragraph down to a description that is only a few sentences and less than 25 words in length.

- Task 3: Update Each Page. Open each page in a text editor and add a description meta tag to the head section. Save the files and test them in a browser. They will not look different, but they are much friendlier to search engines!

## Fish Creek Animal Clinic

See [Chapter 2](#) for an introduction to the Fish Creek Animal Clinic case study. [Figure 2.35](#) shows a site map for the Fish Creek website. The pages were created in earlier chapters. Use the [Chapter 9](#) Fish Creek website as a starting point for this case study. You have three tasks in this case study:

1. Create a new folder for this Fish Creek case study.
2. Write a description of the Fish Creek Animal Clinic business.
3. Code a description meta tag on each page in the website.

## Hands-On Practice Case Study

- Task 1: The Website Folder. Create a folder called fishcreek13. Copy all of the files from your [Chapter 9](#) fishcreek9 folder into the fishcreek13 folder.
- Task 2: Write a Description. Review the Fish Creek pages that you created in earlier chapters. Write a brief paragraph that describes the Fish Creek site. Edit the paragraph down to a description that is only a few sentences and less than 25 words in length.
- Task 3: Update Each Page. Open each page in a text editor and add a description meta tag to the head section. Save the files and test them in a browser. They will not look different, but they are much friendlier to search engines!

# Pacific Trails Resort

See [Chapter 2](#) for an introduction to the Pacific Trails Resort case study. [Figure 2.39](#) shows a site map for the Pacific Trails website. The pages were created in earlier chapters. Use the [Chapter 9](#) Pacific Trails website as a starting point for this case study. You have three tasks in this case study:

1. Create a new folder for this Pacific Trails case study.
2. Write a description of the Pacific Trails Resort business.
3. Code a description meta tag on each page in the website.

## Hands-On Practice Case Study

- Task 1: The Website Folder. Create a folder called pacific13. Copy all of the files from your [Chapter 9](#) pacific9 folder into the pacific13 folder.
- Task 2: Write a Description. Review the Pacific Trails pages that you created in earlier chapters. Write a brief paragraph that describes the Pacific Trails site. Edit the paragraph down to a description that is only a few sentences and less than 25 words in length.
- Task 3: Update Each Page. Open each page in a text editor and add a description meta tag to the head section. Save the files and test them in a browser. They will not look different, but they are much friendlier to search engines!

# Path of Light Yoga Studio

See [Chapter 2](#) for an introduction to the Path of Light Yoga Studio case study. [Figure 2.43](#) shows a site map for the Path of Light Yoga Studio website. The pages were created in earlier chapters. Use the [Chapter 9](#) Path of Light Yoga Studio website as a starting point for this case study. You have

three tasks in this case study:

1. Create a new folder for this Path of Light Yoga Studio case study.
2. Write a description of the Path of Light Yoga Studio business.
3. Code a description meta tag on each page in the website.

## Hands-On Practice Case Study

- Task 1: The Website Folder. Create a folder called yoga13. Copy all of the files from your [Chapter 9](#) yoga9 folder into the yoga13 folder.
- Task 2: Write a Description. Review the Path of Light Yoga Studio pages that you created in earlier chapters. Write a brief paragraph that describes the Path of Light Yoga Studio site. Edit the paragraph down to a description that is only a few sentences and less than 25 words in length.
- Task 3: Update Each Page. Open each page in a text editor and add a description meta tag to the head section. Save the files and test them in a browser. They will not look different, but they are much friendlier to search engines!

## Web Project

See [Chapter 5](#) for an introduction to the Web Project case study. Your task is to add an appropriate description meta tag to each page in the website.

## Hands-On Practice Case Study

1. Review the Project Topic Approval document that you created in the [Chapter 9](#) case study. Take a moment to view the pages that you created

in earlier chapters. Write a brief paragraph that describes the Web Project website.

2. Launch a text editor and edit the web pages in the project folder. Add a description meta tag to each page. Save your pages and test them in a browser. They will not look different, but they are now friendlier to search engines!

# **14 A Brief Look at JavaScript and jQuery**

# Chapter Objectives

In this chapter, you will learn how to . . .

- Describe common uses of JavaScript in web pages
- Describe the purpose of the Document Object Model (DOM) and list some common events
- Code JavaScript methods, properties, and event handlers
- Use JavaScript variables, operators, and the if control structure
- Create a basic JavaScript form data validation script
- Describe common uses of jQuery
- Describe how to obtain jQuery
- Use jQuery selectors and methods
- Configure an image gallery with jQuery
- Describe the purpose of jQuery plugins

If a popup window mysteriously appears while you are surfing the Web, you're experiencing the effects of JavaScript. JavaScript is a scripting language and JavaScript commands can be included in an HTML file. Using JavaScript, you can incorporate techniques and effects that will make your web pages come alive! You can display an alert box containing an important message for the user. You can display an image when a user moves the mouse pointer over a link and much more. jQuery is a JavaScript library that provides an easier way to code interactive effects with JavaScript. This chapter introduces JavaScript and jQuery while providing some examples that you can build on to create your own web pages.

# 14.1 Overview of JavaScript

There are a variety of methods for adding interactivity to a web page. As you learned in [Chapter 6](#), CSS can be used to achieve a hover effect as you position your mouse pointer over a hypertext link. CSS can also be used for interactive effects, including an image gallery and the new CSS3 transitions and transforms. In [Chapter 11](#), you saw examples of how JavaScript can be used to add interactivity and functionality to web pages.

So, what is JavaScript? It's an object-based, client-side scripting language interpreted by a web browser. JavaScript is considered to be object-based because it's used to work with the objects associated with a web page document: the browser window, the document itself, and elements such as forms, images, and links. Because JavaScript is interpreted by a browser, it is considered to be a client-side scripting language. A scripting language is a type of programming language, but no need to worry! You don't have to be a computer programmer to understand this.

Let's review clients and servers. In [Chapter 10](#), we discussed hosting a website on a web server. As you learned, a web host provider allows you to transfer your files to the web server and stores your website. Visitors to your site (also called users) are able to point their web browsers to your website using the URL provided by your web host provider. As you may recall, the user's web browser is called a client.

JavaScript is interpreted by the client. This means that the JavaScript code, embedded in the HTML document, will be rendered by the browser. The server's job is to provide the HTML document. The web browser's job is to interpret the code in the HTML file and display the web page accordingly. Because all the processing is performed by the client (in this case, the web browser), this is referred to as client-side processing. There are programming languages that are executed on the server, which are referred to as server-side programming languages. Server-side processing may involve sending e-mail, storing items in a database, or tracking items in a shopping cart. In [Chapter 9](#), you learned how to set the action of a form to point to a server-side script.

In summary, JavaScript is an object-based, client-side scripting language interpreted by a web browser. The JavaScript code is embedded in the HTML file and the web browser interprets it and displays the results as needed.

## **14.2 The Development of JavaScript**

There is a popular misconception that Java and JavaScript are the same. Java and JavaScript are completely separate languages with very little in common. As noted in [Chapter 11](#), Java is an object-oriented programming language. Java is robust, is very technical, and can be used to build large applications for businesses, such as inventory control systems and payroll systems. Sun Microsystems developed Java in the 1990s and designed the language to run on an operating system such as Windows or Unix. JavaScript, developed initially by Brendan Eich at Netscape, was originally called LiveScript. When Netscape collaborated with Sun Microsystems on modifications to the language, it was renamed JavaScript. However, JavaScript is not the same as the Java programming language. JavaScript is much simpler than Java. The two languages have more differences than similarities.

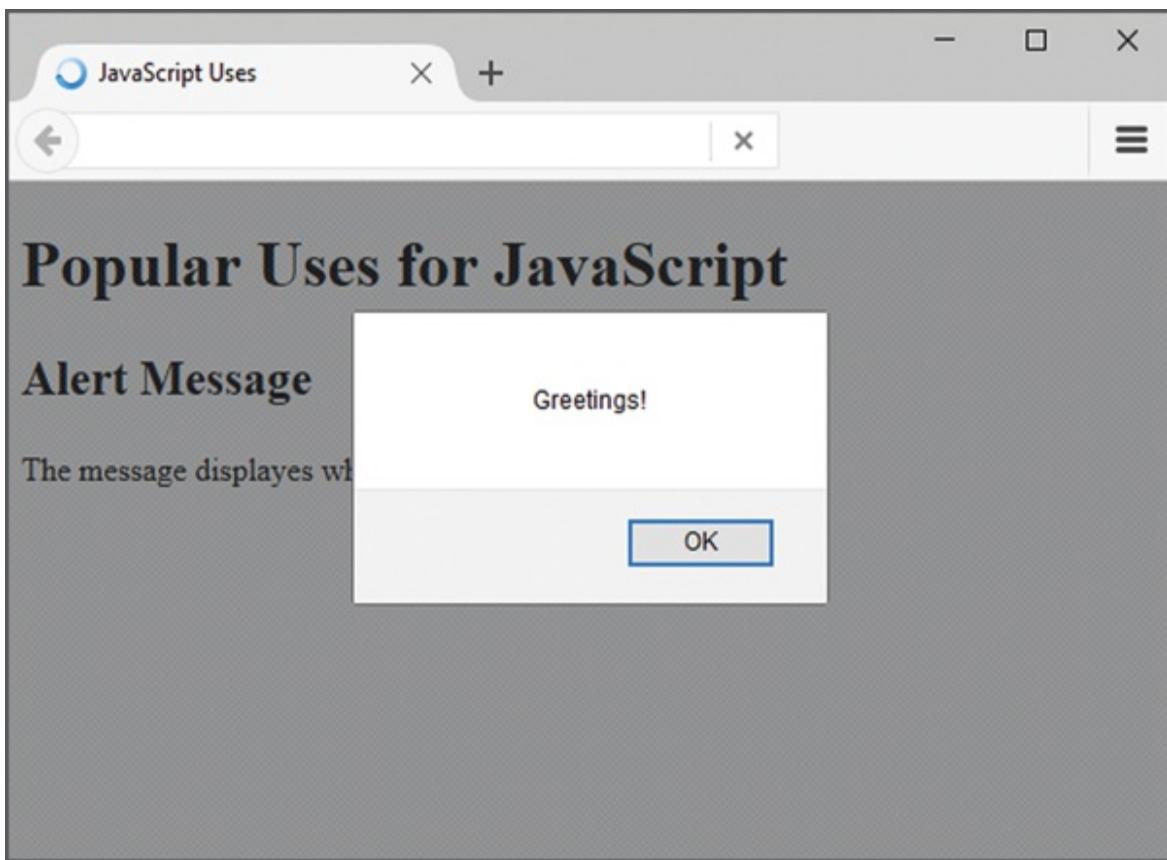
# **14.3 Popular Uses for JavaScript**

The uses of JavaScript range from providing some “bells and whistles,” such as simple animation and fancy menus, to functionality, such as popping up a new window that contains product information and detecting errors in a form. Let’s look at some examples of some of these uses.

## **Alert Message**

An alert message is a popular technique used to draw the user’s attention to something that is happening. For instance, a retail website may use an alert message to list errors in an order form or remind the user about an upcoming sale. [Figure 14.1](#) illustrates an alert message that thanks the user for visiting the page. This alert message is displayed when the user is leaving the website and going to a new site.

## **Figure 14.1**



Alert message is displayed when the user leaves the website

[Figure 14.1 Full Alternative Text](#)

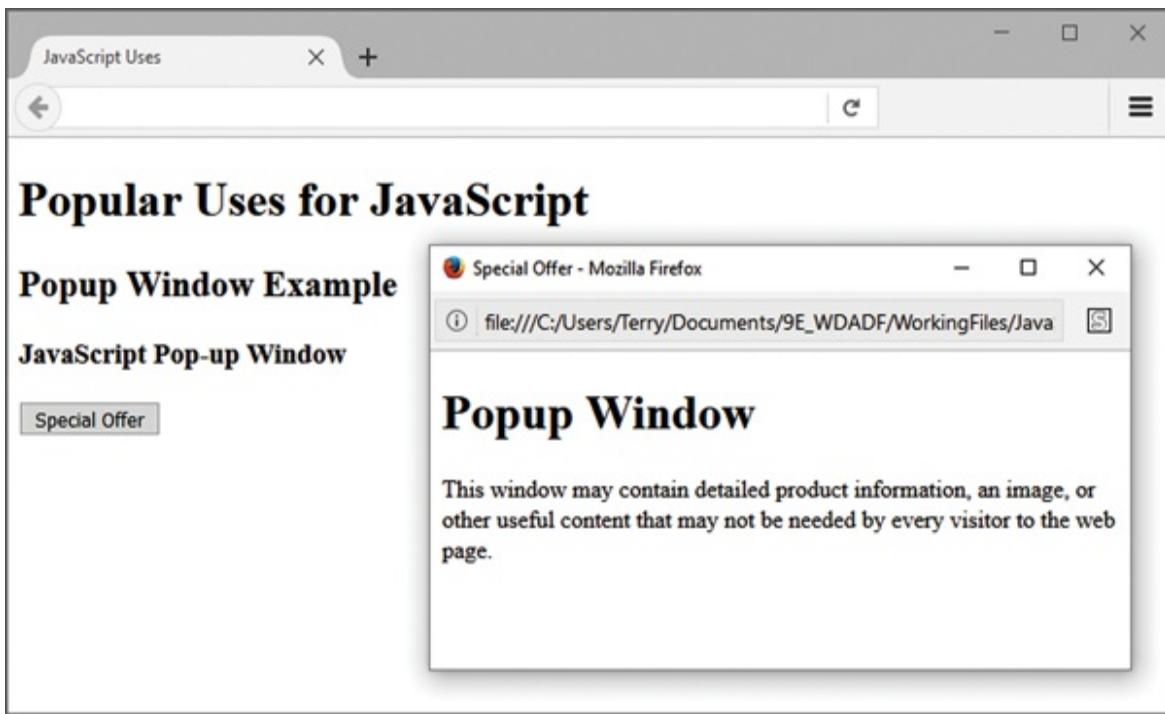
Notice that the user must click the OK button before the next page will load. This effectively grabs the user's attention, but it quickly becomes annoying if it is overused.

## Popup Windows

And speaking of annoying, a popup window is a web browser window that may appear when you interact with a web page by clicking on an image or hovering over a page area, or it may seem to appear somewhat mysteriously. This technique has some legitimate uses, such as popping up an information window that contains a larger picture and description of a product when the user clicks on the product in the main window. Unfortunately, the use of

popup windows has been so abused that most browsers allow users to disable popup windows. This also means that the useful popup windows are not displayed. [Figure 14.2](#) shows a popup window that appears when the user clicks the link on the main page.

## Figure 14.2



The smaller popup window appears when the user clicks on the link in the larger window. Screenshots of Mozilla Firefox. Courtesy of Mozilla Foundation.

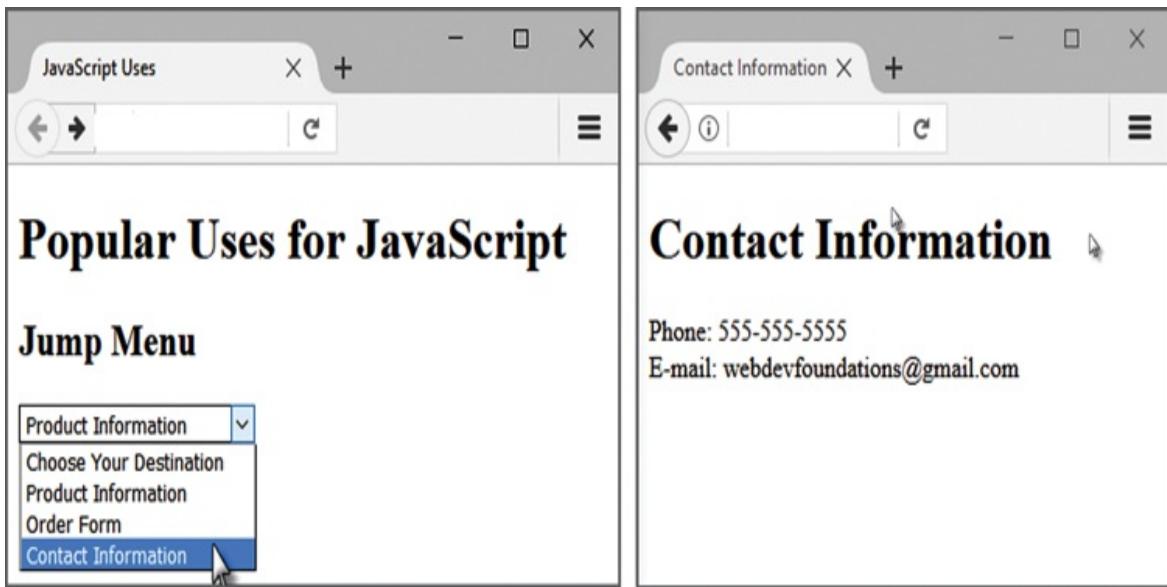
[Figure 14.2 Full Alternative Text](#)

## Jump Menus

JavaScript can also be used to create jump menus based on a select list as introduced in [Chapter 9](#). The user can select a web page from a select list and click a button to load the selected Web page. [Figure 14.3](#) shows this

technique.

## Figure 14.3



Jump menu that shows the selection of the Contact Information menu option

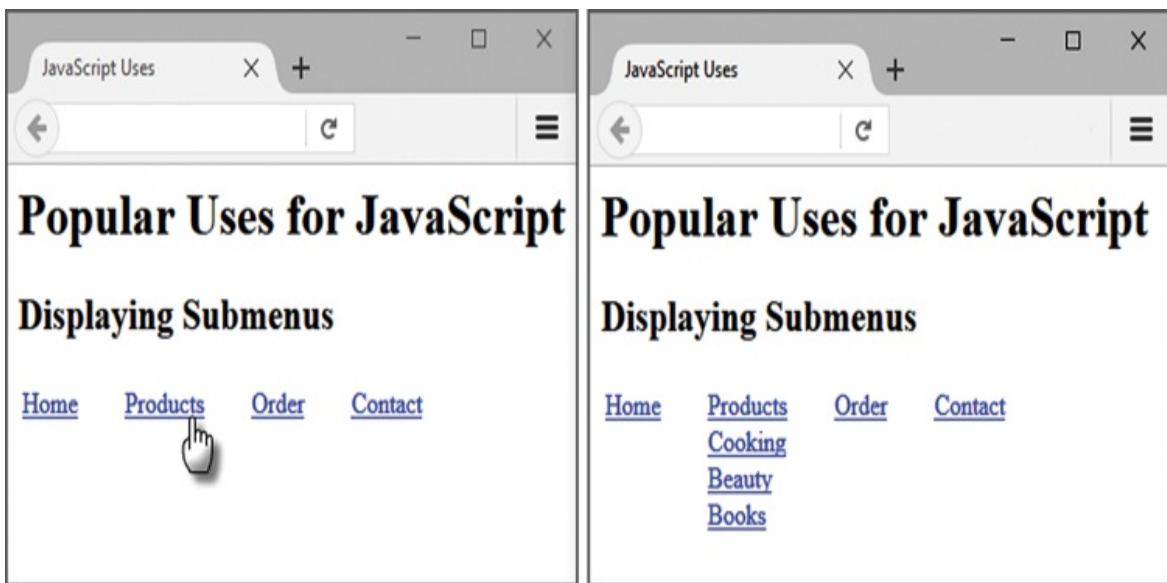
[Figure 14.3 Full Alternative Text](#)

In this example, the user selected the Contact Information option from the select list. The Contact Information page will load in the browser window.

## Mouse Movement Techniques

JavaScript can be used to perform a task based on mouse movement in the browser window. One popular technique is to display a submenu when the user hovers the mouse pointer over a menu item. [Figure 14.4](#) shows this technique.

## Figure 14.4

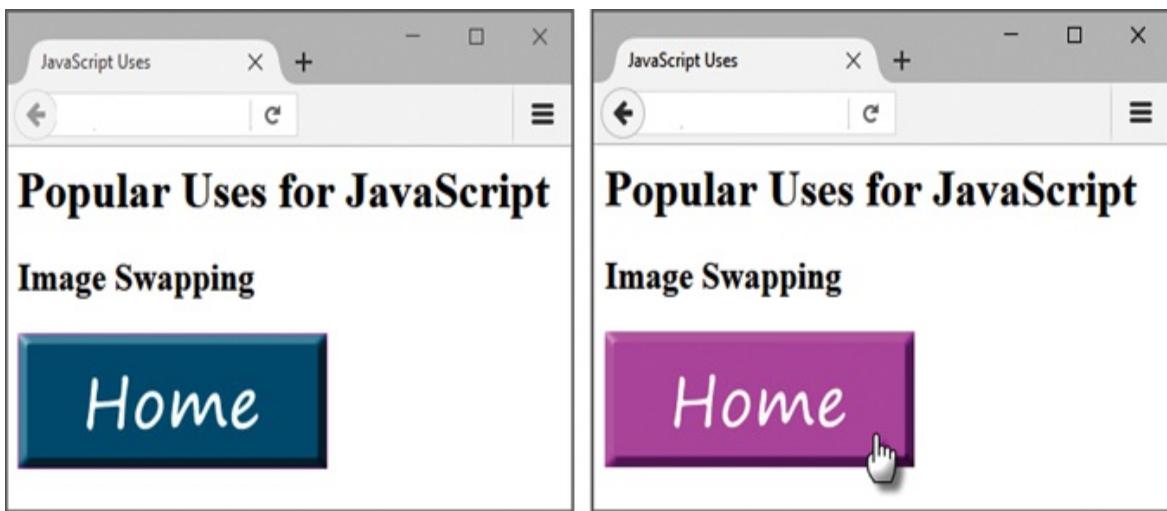


The submenu is displayed when the user hovers over the Products menu item

[Figure 14.4 Full Alternative Text](#)

The window on the left shows the main menu and the window on the right shows the submenu displayed when the user hovers the mouse pointer over the Products menu item. When the user moves the mouse away from the Products menu item, the submenu disappears. Mouse movements also trigger image swapping, often referred to as rollover images. An image is displayed on the web page when the page initially loads. When the user positions the mouse pointer on top of the image, the original image is swapped for a new image. When the user moves the mouse away from the image, the original image reappears. [Figure 14.5](#) shows the image-swapping technique. For many years, this technique was commonly used for navigation button bars. However, modern web developers typically use CSS to configure similar effects with the `:hover` pseudo-class, such as changing the background color or background image of an element.

## Figure 14.5



The original image is on the left and the swapped image is on the right with the mouse pointer hovering on the image

[Figure 14.5 Full Alternative Text](#)

In this chapter, we will touch on some of the highlights and concepts involved in using JavaScript. We will create some scripts to demonstrate the use of the alert message, mouseovers, and some of the techniques involved in checking a form for input errors. This chapter offers just a taste of JavaScript, but it will give you an overview of how some of the techniques are developed.

## 14.4 Adding JavaScript to a Web Page

JavaScript code is embedded in an HTML web page and is interpreted by the web browser. This means that the web browser is capable of understanding the code and running it. The examples in this chapter use the Mozilla Firefox web browser. The code we will create functions in most web browsers. However, we will use Firefox because it will provide us with helpful error messages that will be invaluable when we create and test our pages. If you have not already installed Mozilla Firefox on your computer, visit <http://www.mozilla.com/firefox> for a free download.

### Script Element

When JavaScript code is embedded in an HTML document, it needs to be contained, or encapsulated, in a script element. The JavaScript is typed between the opening `<script>` tag and the closing `</script>` tag. Web pages are rendered by the browser from top to bottom. The impact on our scripts is that they will execute wherever they are located in the document.

### Legacy JavaScript Statement Block Template

Back in the early days of JavaScript, developers needed to “hide” JavaScript from non-supporting browsers by coding HTML **comments** within the script element. HTML comments are contained between `<!--` and `-->` markup symbols. The `<!--` denotes the beginning of the HTML comment. The `-->` denotes the end of the HTML comment. JavaScript comment lines begin with `//`. The text in comments is ignored by the browser. Encapsulating the JavaScript block in HTML comment tags hides the block from older

browsers and the code is ignored by browsers that do not support it. When using this technique each JavaScript block has the following structure:

```
<script>
<!--
... JavaScript statements goes here ...
//-->
</script>
```

Although you will see this HTML encapsulation technique still used on the Web, modern browsers support the script tag and the encapsulation technique is no longer needed. We'll write our JavaScript statements between the script tags. Let's see how this works with a Hands-On Practice that will display an alert message.

## Alert Message Box

The alert message box is displayed using the `alert()` method. The structure is

```
alert("message to be displayed");
```

Each JavaScript command line generally ends with a semicolon (;). Also, JavaScript is case-sensitive, which means that there's a difference between uppercase and lowercase characters and it will be important to be precise when typing JavaScript code.



**VideoNote** JavaScript Message Box



## Hands-On Practice 14.1

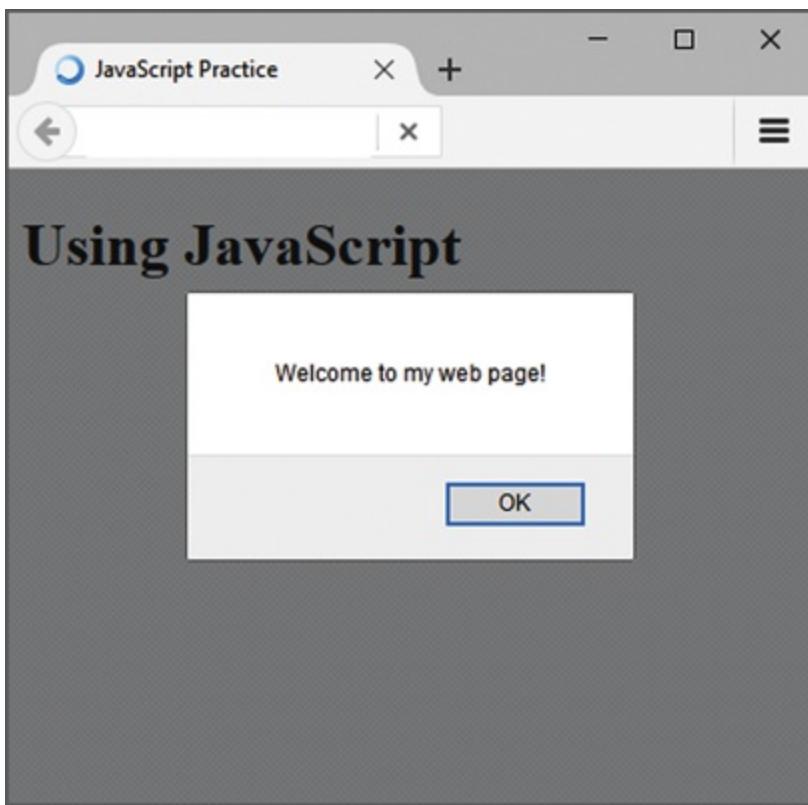
In this Hands-On Practice, you will create a simple script with an alert

message box. Launch a text editor and type the following HTML and JavaScript code. Note that `alert()` does not contain a space between `alert` and the opening parenthesis.

```
<!DOCTYPE html>
<html lang="en">
<head>
  <title>JavaScript Practice</title>
  <meta charset="utf-8">
</head>
<body>
<h1>Using JavaScript</h1>
<script>
alert("Welcome to my web page!");
</script>
<h2>When does this display?</h2>
</body>
</html>
```

Save this file as `alert.html`. Launch Firefox and open your page in the browser. Notice that the first heading appears and then the alert message pops up (see [Figure 14.6](#)). After you click the OK button, the second heading appears. This illustrates the top-down processing of the web page and the embedded JavaScript. The JavaScript block is between the headings and that's where the alert message appears as well.

## Figure 14.6



JavaScript displays the alert message box (alert.html)

[Figure 14.6 Full Alternative Text](#)

## Practice with Debugging

Sometimes your JavaScript code does not work the first time you test it. When this happens, you'll need to debug the code—find the errors and correct them.

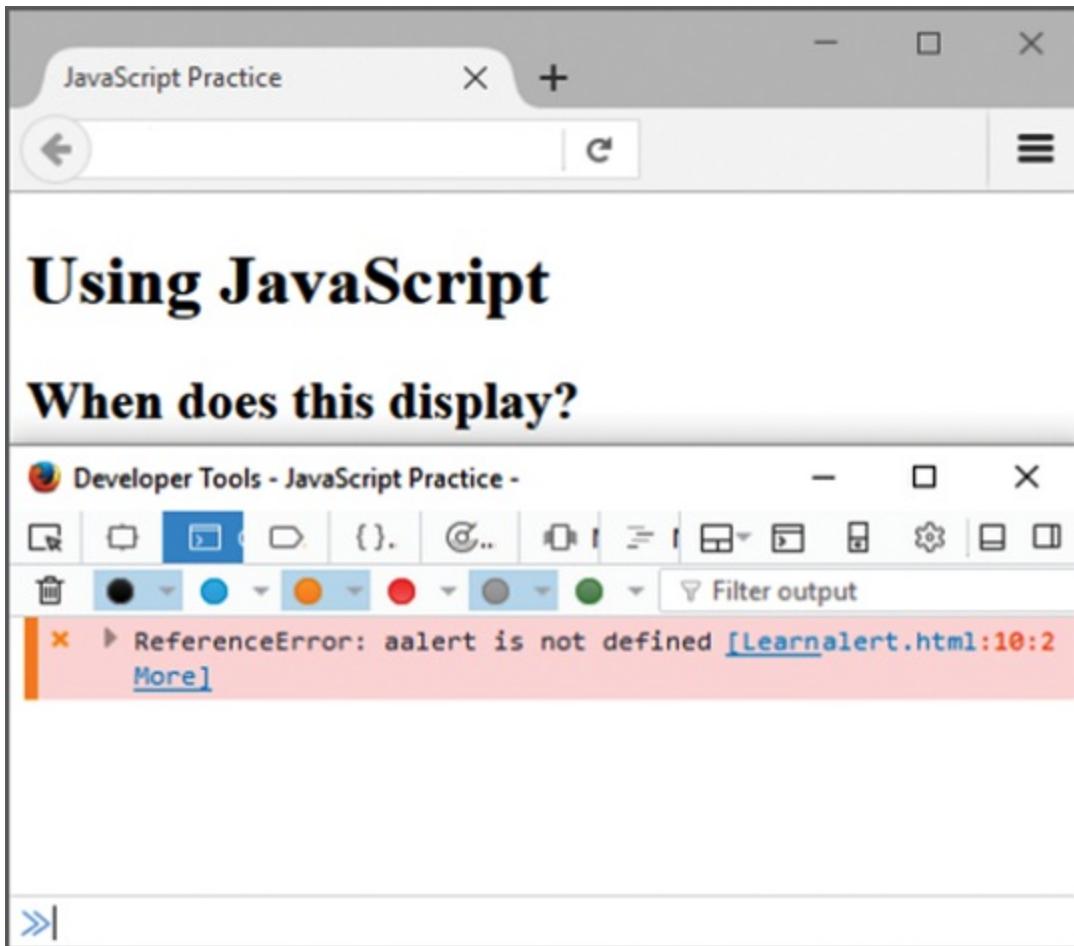
Let's look at a debugging technique. Edit the JavaScript alert to introduce a typing error:

```
aalert("Welcome to my web page!");
```

Save the file and view it in the browser. Notice that the alert box does not display this time. Firefox will point out some errors in JavaScript code, but we need to open the Web Console in order to see them.

In Firefox, select the top right menu icon > Developer > Web Console. The Web Console panel will display and the error message will appear (see [Figure 14.7](#)).

## Figure 14.7



The Web Console displays an error

[Figure 14.7 Full Alternative Text](#)

Notice that the error is displayed, along with the file name and line number where the error was detected. It's useful to create your documents in a text editor that displays the line numbers, but it's not necessary. If you are using Notepad, make use of the Go To feature in the Edit menu. This will allow

you to specify a line number and the insertion point will be positioned at the beginning of that line.

Edit the alert.html file to correct the error and test it in the browser. This time the alert box should display after the first heading. Compare your work to chapter14/14.1/alert.html in the student files.



## FAQ

1. Will the Firefox Web Console display all of the errors in my JavaScript code?

The Web Console will display the syntax errors, which include things like missing quotes and items that it does not recognize. Sometimes the error is above the line indicated, particularly if there is a missing parenthesis or quote. The errors displayed indicate that there is something wrong and they serve as a guide as to where the error might be located. Start by looking at the line indicated; if that line looks correct, look at the lines above it.



## Checkpoint 14.1

1. Describe at least three popular uses for JavaScript.
2. How many JavaScript code blocks can be embedded in an HTML document?
3. Describe a method that can be used to find an error in a JavaScript code block.

# 14.5 Document Object Model Overview

JavaScript can manipulate the elements of an HTML document, such as container tags like paragraphs, spans, and div elements. Elements also include images, forms, and individual form elements such as text boxes and select lists. In order to access these elements, we need to understand a little bit about the Document Object Model (DOM).

In general, an object is an entity or a “thing”. When using the DOM, the browser window, web page document, and any HTML element are considered to be objects. The browser window is an object. When a web page loads in the browser, the web page is considered to be a document. The document itself is an object. The document can contain objects such as images, headings, paragraphs, and individual form elements such as text boxes. The objects may have properties that can be detected or manipulated. For example, a property of the document is its title. Another property of the document is its background color.

There are actions that can be performed on some objects. For example, the window object can display the alert message box or a prompt box. This type of action is called a method. The command to display an alert message is referred to as a method of the window object. The DOM is the collection of objects, properties, and methods. JavaScript uses the DOM to detect and manipulate the elements in the HTML document.

Let’s look at this system of objects, properties, and methods differently. Let’s say that your car is an object. It has properties such as color, manufacturer, and year. Your car has elements such as the hood and trunk. The hood and trunk can be opened and closed. If we were to use a programming language to open and close the hood and trunk, the commands might look something like the following:

```
car.hood.open()  
car.hood.close()
```

```
car.trunk.open()  
car.trunk.close()
```

If we wanted to know the color, year, and manufacturer of the car, the commands might look something like the following:

```
car.color  
car.year  
car.model  
car.manufacturer
```

When we use the values, `car.color` might be equal to “silver”, `car.manufacturer` might be equal to “Nissan”, and `car.model` might be equal to “370Z”. We might be able to change the values or only read them without changing them. In this example, `car` is an object and its properties are hood, trunk, color, year, model, and manufacturer. Hood and trunk could be considered properties as well. Open and close are methods of hood and are also methods of trunk.

With respect to the DOM, we can write to the document using the `write()` method of the `document` object. The structure is

```
document.write("text to be written to the document");
```

We can use this in JavaScript to write text and HTML tags to a document and the browser will render it. The `alert()` method used in the previous Hands-On Practice is a method of the `window` object. It can be written as

```
window.alert("message");
```

The `window` object is assumed to exist and can be omitted. If the `window` doesn't exist, the script doesn't exist either.

One property of the `document` is `lastModified`. This property contains the date on which the file was most recently saved or modified and we can access it using -  
`document.lastModified`.

`lastModified`. This is a read-only property that we can display in the browser window or use for some other purpose.



## Hands-On Practice 14.2

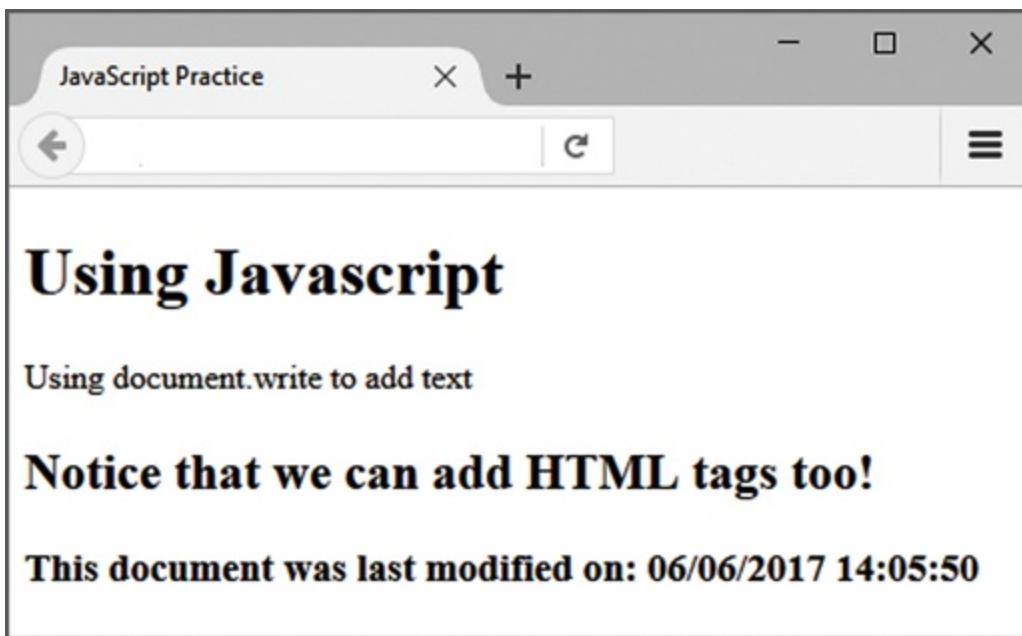
In this Hands-On Practice, you will practice using the `write()` method of the document and the `lastModified` property of the document. You will use `document.write()` to add text and some HTML tags to an HTML document. You will also use `document.write()` to write the date the file was last saved to the document.

Open the `alert.html` file (found at `chapter14/14.1/alert.html` in the student files) and edit the code as indicated:

```
<!DOCTYPE html>
<html lang="en">
<head>
    <title>JavaScript Practice</title>
    <meta charset="utf-8">
</head>
<body>
<h1>Using JavaScript</h1>
<script>
document.write("<p>Using document.write to add text</p>");
document.write("<h2>Notice that we can add HTML tags too!</h2>");
</script>
<h3>This document was last modified on:
<script>
document.write(document.lastModified);
</script>
</h3>
</body>
</html>
```

Save this file as `write.html` and view it in the browser. The text should display (see [Figure 14.8](#)). If the text does not display, open the Web Console and correct any errors that appear.

**Figure 14.8**



The Firefox browser displays write.html

[Figure 14.8 Full Alternative Text](#)

JavaScript can be seen in the source code. To confirm this, select the top right menu icon > Developer > Page Source to see the source code. Close the source code window when you have finished viewing the code. A suggested solution is located at chapter14/14.2/write.html in the student files.



## FAQ

1. Why would I use `document.write` when I can just type the HTML code by itself?

In practice, you typically wouldn't use `document.write` to generate your web page if you could just type the HTML code by itself. You would use `document.write` in conjunction with other techniques. For instance, you might use JavaScript to detect the time of day and, if it is before noon, use `document.write` to write "Good morning" to the document. If

it is afternoon, write “Good afternoon” to the document, and if it is after 6:00 p.m., write “Good evening” to the document.

## 14.6 Events and Event Handlers

As the user is viewing a web page, the browser detects mouse movement and events. An event is an action taken by the web page visitor, such as clicking the mouse, loading pages, or submitting forms. For instance, when you move your mouse pointer over a hypertext link, the browser detects a mouseover event. [Table 14.1](#) lists a few of the events and their descriptions.

**Table 14.1 Events and their descriptions**

Event	Description
click	The user clicks on an item. This could be an image, hypertext link, or button.
load	The browser displays a web page.
mouseover	The mouse pointer hovers over an item. The mouse pointer does not have to rest on the object. This could be a hypertext link, image, paragraph, or another object.
mouseout	The mouse pointer is moved away from an item that it had previously hovered over.

`submit` The user clicks the submit button on a form.

`unload` The web page unloads in the browser. This event occurs just before a new web page loads.

When an event occurs, this can trigger some JavaScript code to execute. One widely used technique is to detect the mouseover and mouseout events and swap images or display a menu.

We need to indicate which events will be acted upon and what will be done when an event occurs. We can use an event handler to indicate which event to target. An event handler is embedded in an HTML tag as an attribute and indicates some JavaScript code to execute when the event occurs. Event handlers use the event name with the prefix “on”. [Table 14.2](#) shows the event handlers that correspond to the events described in [Table 14.1](#). For example, the onload event is triggered when browser renders (loads) a web page. When you move your mouse pointer over a text hyperlink, a mouseover event occurs and is detected by the browser. If that hyperlink contains an **onmouseover** event handler, the JavaScript code indicated by the event handler will execute. This code might pop up an alert message, display an image, or display a menu. Other event handlers such as onclick and onmouseout can cause JavaScript code to execute when their corresponding event occurs.

## Table 14.2 Events and event handlers

### Event    Event Handler

`click`    `onclick`

load      onload

mouseover onmouseover

mouseout onmouseout

submit    onsubmit

unload    onunload



## Hands-On Practice 14.3

Let's practice using the onmouseover and onmouseout event handlers and alert messages to indicate when the event handler has been triggered. We will use simple hypertext links and embed the event handlers in the anchor tags. We will not need the `<script>` block because event handlers are placed as attributes within the HTML tags. We'll place the hypertext links in an unordered list so that there's a lot of room in the browser window to move the mouse pointer and test our script.

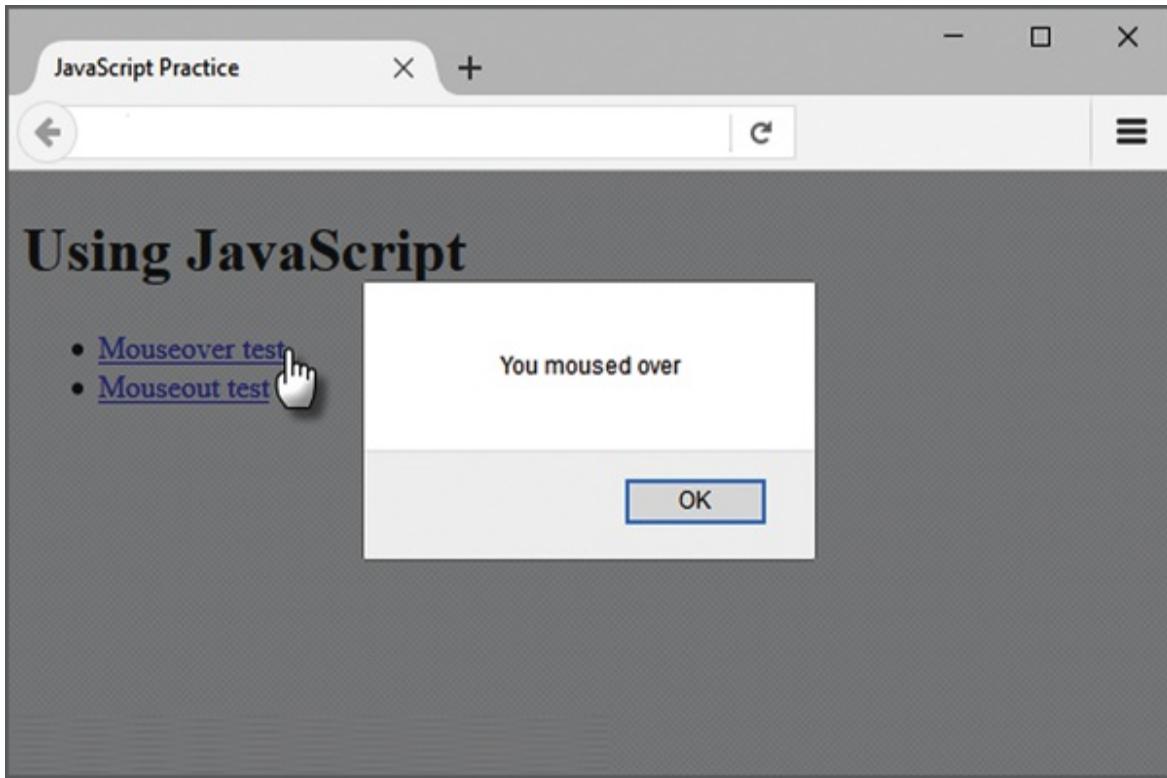
Open a text editor and enter the code shown below. Note the use of the double and single quotes in the onmouseover and onmouseout event handlers. We need quotes around the message in the `alert()` method and we need quotes that encapsulate the JavaScript for the event handler. HTML and JavaScript will allow us to use either double quotes or single quotes. The rule is that they must match in pairs. So when you have a situation where you need two sets of quotes, you can use both double and single quotes. Use double quotes for the outer set and single quotes for the inner set. In the anchor tag, the `#` symbol is used for the href value because we don't need the

functionality of loading another web page. We need the hypertext link to sense mouseover and mouseout events.

```
<!DOCTYPE html>
<html lang="en">
<head>
  <title>JavaScript Practice</title>
  <meta charset="utf-8">
</head>
<body>
<h1>Using JavaScript</h1>
<ul>
  <li><a href="#" onmouseover="alert('You moused over');">Mouseov
    test</a></li>
  <li><a href="#" onmouseout="alert('You moused out');">Mouseout
    test</a></li>
</ul>
</body>
</html>
```

Save this file as mouse.html and load it in the browser. Move your mouse on top of the Mouseover test link. As soon as your mouse touches the link, the mouseover event occurs and the onmouseover event handler is triggered. This displays the alert box (see [Figure 14.9](#)).

## Figure 14.9



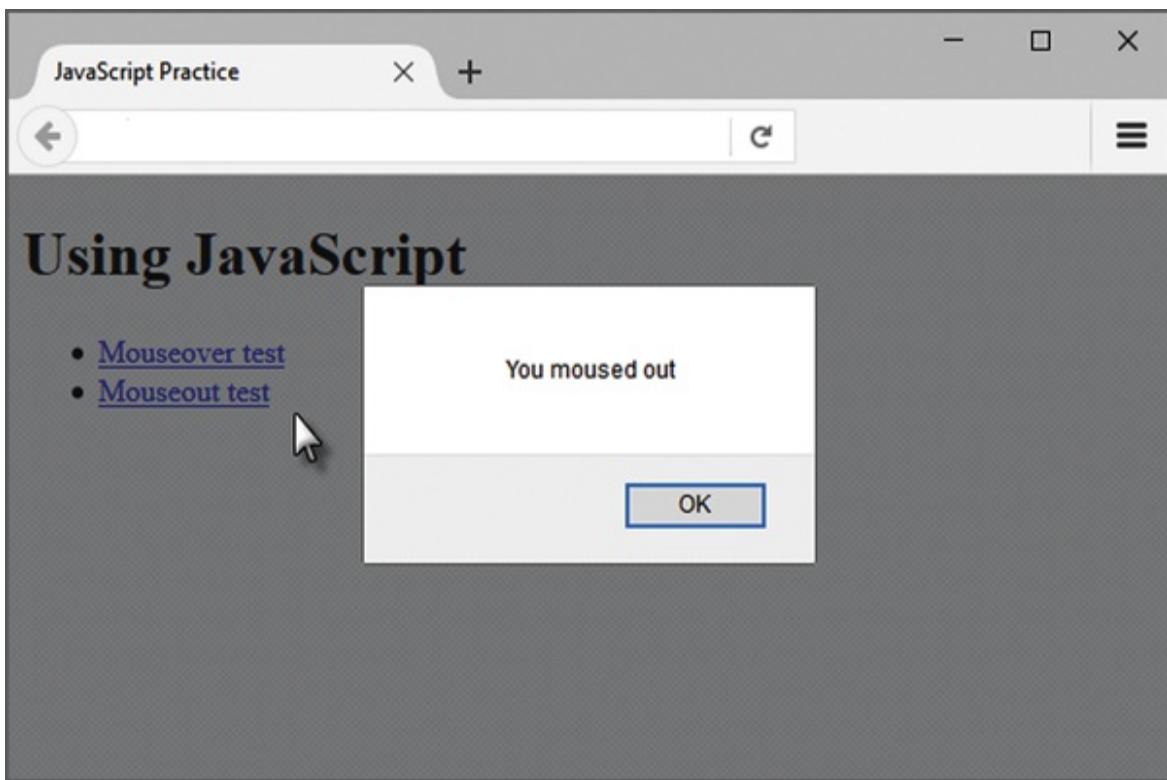
Demonstration of onmouseover

#### [Figure 14.9 Full Alternative Text](#)

Click the OK button and position your mouse pointer over the Mouseout test link. Notice that nothing happens. This is because the mouseout event has not occurred yet.

Move the mouse pointer away from the link. As soon as the mouse pointer is no longer on the link, the mouseout event occurs and the onmouseout event handler is triggered. This displays the alert box (see [Figure 14.10](#)). A suggested solution can be found in the student files - (chapter14/14.3/mouse.html).

## Figure 14.10



Demonstration of onmouseout

[Figure 14.10 Full Alternative Text](#)



## Checkpoint 14.2

1. With respect to objects, describe the difference between a property and a method. Feel free to use words like thing, action, description, attribute, and so on.
2. What is the difference between an event and an event handler?
3. Where are event handlers placed in the HTML document?

## 14.7 Variables

Sometimes we need to be able to collect information from the user. A simple example is prompting the user for a name and writing the name to the document. We would store the name in a variable. You probably took a math course at some point and used  $x$  and  $y$  as variables in equations as placeholders for values. The same principle applies when using variables in JavaScript. (We won't do any tricky math here, so relax!) JavaScript variables are also placeholders for data and the value of the variable can change. Robust programming languages like C++ and Java have all kinds of rules for variables and their data types. JavaScript is very loose that way. We won't have to worry about what type of data is contained in a variable.



### FAQ

#### 1. Are there any tips for creating variable names?

Creating the name of a variable is really something of an art form. First of all, you want to create a variable name that describes the data it contains. The underscore, or an uppercase character, can be used for readability to indicate more than one word. Do not use other special characters, though. Stick to letters and numbers. Be careful not to use a JavaScript reserved word or keyword, such as `var`, `return`, `function`, and so on. Visit <http://webdevfoundations.net/8e/chapter14.html> for a list of JavaScript keywords. The following are some variable names that could be used for a product code:

- `productCode`
- `prodCode`

- product\_code

# Writing a Variable to a Web Page

Before we use a variable, we can declare it with the JavaScript var keyword. This step isn't necessary, but it is good programming practice. We can assign data to a variable using the assignment operator, the equal sign (=). A variable can contain a number or a string. A string is encapsulated in quotes and can contain alphabetic characters, spaces, numbers, and special characters. For instance, a string can be a last name, e-mail address, street address, product code, or paragraph of information. Let's do a practice exercise that assigns data to a variable and writes it to the document.



## Hands-On Practice 14.4

In this Hands-On Practice, you will declare a variable, assign string data to it, and write it to the document.

Open a text editor and type the following:

```
<!DOCTYPEhtml>
<html lang="en">
<head>
  <title>JavaScriptPractice</title>
  <met charset="utf-8">
</head>
<body>
  <h1>UsingJavaScript</h1>
  <h2>Hello
  <script>
varuserName;
userName="Karen";
document.write(userName);
</script>
</h2>
</body>
```

```
</html>
```

Notice that the `<h2>` tag is placed before the script block and the `</h2>` tag is placed after the script block. This renders the value of `userName` in the `<h2>` heading format. There is also a single space after the “o” in “Hello”. If you miss this space, you’ll see the `userName` value displayed right after the “o”.

```
</h2>
```

Notice that the variable is mixed case. This is a convention used in many programming languages to make the variable readable. Some developers might use an underscore, like `user_name`. Selecting a variable name is somewhat of an art form, but try to select names that indicate the contents of the variable.

Also notice that the `document.write()` method does not contain quotes. The contents of the variable will be written to the document. If we had used quotes around the variable name, the variable name itself would be written to the document and not the contents of the variable.

Save this document as `var.html` and load it in the browser. [Figure 14.11](#) shows the `var.html` file in the browser. Compare your work to `chapter14/14.4/var.html` in the student files.

## Figure 14.11



Browser with var.html displayed

### Figure 14.11 Full Alternative Text

Chopping up the `<h2>` heading so that it is placed before and after the script is a bit cumbersome. We can combine strings using the plus (+) symbol. You'll see later in this chapter that the plus symbol can also be used to add numbers. The practice of combining strings using the plus symbol is called concatenation. Let's concatenate the `<h2>` information as a string with the `userName` value and the `</h2>` tag.

Edit the `var.html` document as follows:

```
<!DOCTYPE html>
<html lang="en">
<head>
  <title>JavaScript Practice</title>
  <meta charset="utf-8">
</head>
<body>
<h1>Using JavaScript</h1>
<script>
var userName;
userName = "Karen";
document.write("<h2>Hello " + userName + "</h2>");
</script>
</body>
</html>
```

Be sure to remove the `<h2>` and `</h2>` information above and below the script block. Save the file as `var2.html` and display it in the browser window. You should not see any difference in the document in the browser. Compare your work to chapter14/14.4/var2.html in the student files.

## Collecting Variable Values Using a Prompt

To demonstrate the interactive aspect of JavaScript and variables, we can use

the `prompt()` method to request data from the user and write this data to the web page. For example, we will build on [Hands-On Practice 14.4](#) and prompt the user for a name rather than hard code this data in the `userName` variable.

The `prompt()` method is a method of the `window` object. We could use `window.prompt()`, but the `window` object is assumed, so we can write this simply as `prompt()`. The `prompt()` method can provide a message to the user. This method is generally used in conjunction with a variable so that the incoming data is stored in a variable. The structure is

```
someVariable = prompt("prompt message");
```

When this command executes, a prompt box pops up that displays the message and an input box for data entry. The user types in the prompt box, clicks the OK button, and the data is assigned to the variable. Let's add this feature to the `var2.html` file.



## Hands-On Practice 14.5

In this Hands-On Practice, you will use the `prompt()` method to gather data from the user and write it to the document.

Edit your file from [Hands-On Practice 14.4](#) (also found in the student files at chapter14/14.4/var2.html) as follows:

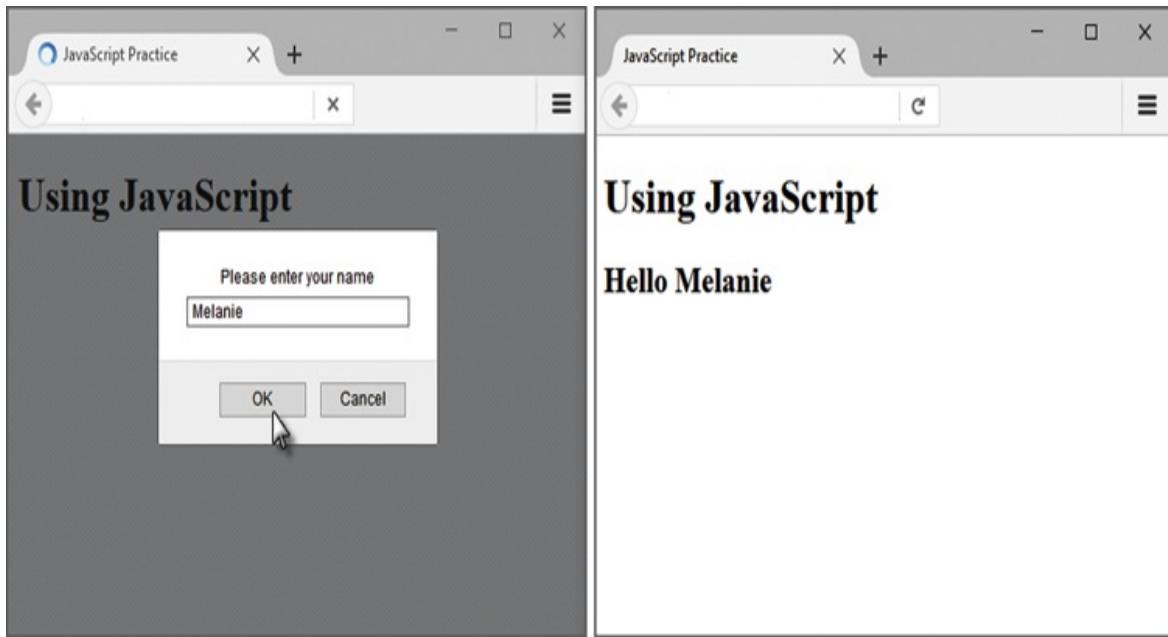
```
<script>
var userName;
userName = prompt("Please enter your name");
document.write("<h2>Hello " + userName + "</h2>");
</script>
```

Only the `userName` variable assignment command has changed. The data typed by the user will be assigned to the variable `userName`.

Save the file as `var3.html` and display it in the browser. The prompt box will

appear and you can type a name in the input box and click the OK button (see [Figure 14.12](#)). The name should appear in the browser window. Compare your work to chapter14/14.5/var3.html in the student files.

## Figure 14.12



The prompt box is displayed in the browser when the web page is loaded. The visitor types their name and clicks OK. Next, the browser accepts the input and writes a welcome message on the page.

[Figure 14.12 Full Alternative Text](#)

Let's do a variation on this and allow the user to type a color name. The user's preference will be used as the background color of the document. We will use the `bgColor` property of the document object and set it to the user's color preference. Be sure that an uppercase C is used when typing `bgColor`.

Edit the var3.html document as follows and save it as var4.html:

```
<script>
var userColor;
```

```
userColor = prompt("Please type the color name blue or red");
document.bgColor = userColor;
</script>
```

We are prompting the user to type the color name “blue” or “red”. You know from your HTML experience that there are more options for color names. Feel free to experiment!

Save the document and display it in the browser. The prompt box will appear and you can type a color name and click the OK button. You should notice the background color change immediately. Compare your work to chapter14/14.5/var4.html in the student files.

# 14.8 Introduction to Programming Concepts

Until now, we have used the DOM to access properties and methods for the window and document. We have also used some simple event handlers. There is another aspect of JavaScript that is more like programming. In this section, we'll touch on just a small part of this to get a feel for the power of using programming concepts and build on this later to test input on a form.

## Arithmetic Operators

When working with variables, it is often useful to be able to do some arithmetic. For instance, you may be creating a web page that calculates the tax on a product. Once the user has selected a product, you can use JavaScript to calculate the tax and write the result to the document. [Table 14.3](#) shows a list of arithmetic operators, descriptions, and some examples.

**Table 14.3 Commonly used arithmetic operators**

Operator	Description	Example	Value of Quantity
=	Assign	quantity = 10	10
+	Addition	quantity = 10 + 6	16

- Subtraction quantity =  $10 - 6$  4
- × Multiplication quantity =  $10 \times 2$  20
- / Division quantity =  $10 / 2$  5

Programming languages differ greatly in capabilities, but they all have a few things in common. They all allow the use of variables and have commands for decision making, command repetition, and reusable code blocks. Decision making would be used when different outcomes are required, depending on the input or action of the user. In the next Hands-On Practice, we will prompt the user to enter a number and write different text on the web page document based on the value entered. Repetition of commands comes in handy when performing a similar task many times. For instance, it is tedious to create a select list containing the numbers 1 through 31 for the days of the months. We can use JavaScript to do this with a few lines of code. Reusable code blocks are handy when you want to refer to a block of code in an event handler rather than typing many commands in the HTML tag's event handler. Because this chapter is meant to be a very brief introduction, it is beyond our scope to elaborate further. We will touch on decision making and reusable code in the Hands-On Practice.

## Decision Making

As we've seen, we can use variables in JavaScript. We may wish to test the value of a variable and perform different tasks based on the value of the variable. For instance, perhaps an order form requires that the user enter a quantity greater than 0. We could test the quantity input box to verify that the number entered is greater than 0. If the quantity is not greater than 0, we could pop up an alert message that instructs the user to enter a quantity greater than 0. The `if` control structure will be

```
if (condition) {  
... commands to execute if condition is true
```

```
} else {  
... commands to execute if condition is false  
}
```

Notice that there are two types of grouping symbols used: parentheses and brackets. The parentheses are placed around the condition and the brackets are used to encapsulate a block of commands. The `if` statement includes a block of commands to execute if the condition is true and a block of commands to execute if the condition is false. The brackets are aligned so that you can easily see the opening brackets and closing brackets. It's very easy to miss a bracket when you're typing and then you would have to hunt for the missing bracket. Aligning them makes it much easier to track them visually. As you are typing JavaScript code, remember that parentheses, brackets, and quotes always are used in pairs. If a script isn't working as intended, verify that each of these items has a "partner."

If the condition evaluates as true, the first command block will be executed and the `else` block will be skipped. If the condition is false, the first command block will be skipped and the `else` block will execute.

This overview should give you a sense of how conditions and the `if` control structure can be useful. The condition must be something that can be evaluated as either true or false. We can think of this as a mathematical condition. The condition will generally make use of an operator. [Table 14.4](#) lists commonly used comparison operators. The examples in [Table 14.4](#) could be used as conditions in an `if` control structure.

## Table 14.4 Commonly used comparison operators

Operator	Description	Example	Sample Values of a Quantity that Would Result in True
----------	-------------	---------	-------------------------------------------------------

<code>==</code>	Double equal signs (equivalent); “is exactly equal to”	<code>quantity == 10</code>
<code>&gt;</code>	Greater than	<code>quantity &gt; 10</code> 11, 12 (but not 10)
<code>&gt;=</code>	Greater than or equal to	<code>quantity &gt;= 10</code> 10, 11, 12
<code>&lt;</code>	Less than	<code>quantity &lt; 10</code> 9, 8 (but not 10)
<code>&lt;=</code>	Less than or equal to	<code>quantity &lt;= 10</code> 10, 9, 8



## FAQ

### 1. What can I do when my JavaScript code doesn't seem to be working?

You can try the following debugging techniques:

- Open the Web Console in Firefox (Tools > Web Developer > Web Console) to see if there are any errors. Common errors include missing a semicolon at the end of a line and typing errors in commands.
- Use `alert()` to print variables to verify the contents. For instance, if you have a variable named `quantity`, try `alert(quantity);` to see what is contained in the variable.

- Ask a classmate to look at your code. It's difficult to edit your own code because you tend to see what you think you wrote rather than what you actually wrote. It's easier to edit someone else's code.
- Try to explain your code to a classmate. Often, talking through the code will help you uncover errors.
- Verify that you are not using any JavaScript reserved words as variable names or function names. Visit <http://webdevfoundations.net/9e/chapter14.html> for a list of reserved words.



## Hands-On Practice 14.6

In this Hands-On Practice, you will code the quantity example described earlier. The user will be prompted for a quantity and must enter a quantity greater than 0. We will assume that the user will enter a number. If the user enters a value of 0 or a negative number, there will be an error message displayed. If the user enters a value greater than 0, a message will be displayed thanking the user for the order. We will use a prompt and will write messages to the document.

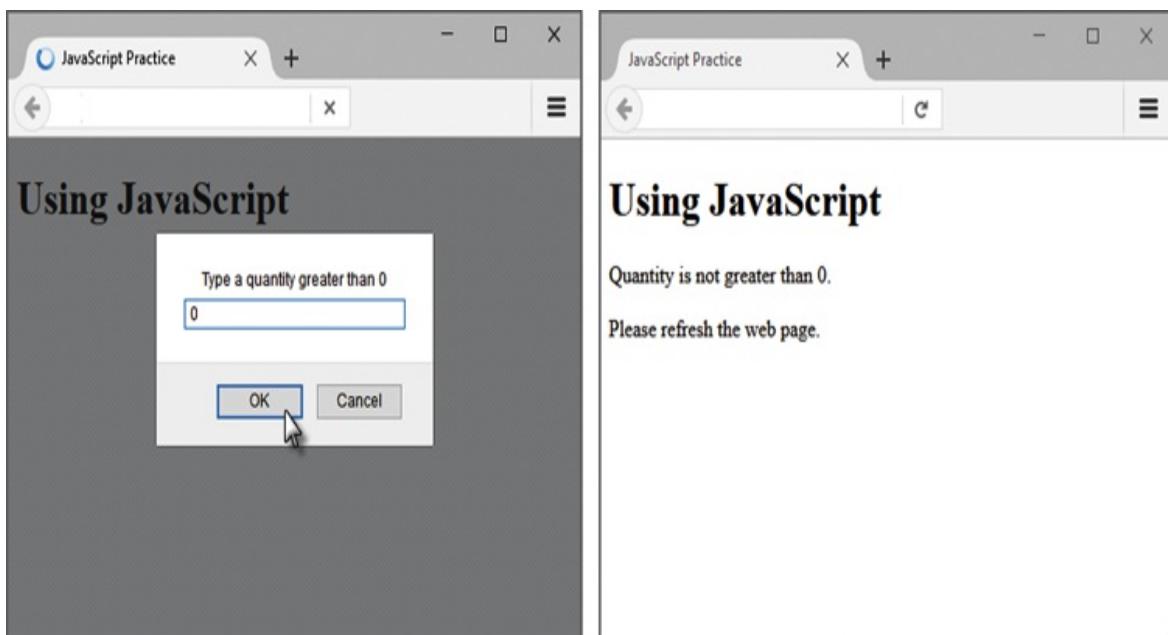
Open a text editor and enter the following:

```
<!DOCTYPE html>
<html lang="en">
<head>
  <title>JavaScript Practice</title>
  <meta charset="utf-8">
</head>
<body>
<h1>Using JavaScript</h1>
<script>
var quantity;
quantity = prompt("Type a quantity greater than 0");
if (quantity <= 0) {
  document.write("<p>Quantity is not greater than 0.</p>");
}
```

```
document.write("<p>Please refresh the web page.</p>");
} else {
    document.write("<p>Quantity is greater than 0.</p>");
}
</script>
</body>
</html>
```

Save this document as quantityif.html and display it in a browser. If the prompt box does not appear, remember to check the Web Console for errors. When the prompt box appears, type the number 0 and click the OK button. You should see the error message you have created in the browser window (see [Figure 14.13](#)).

## Figure 14.13

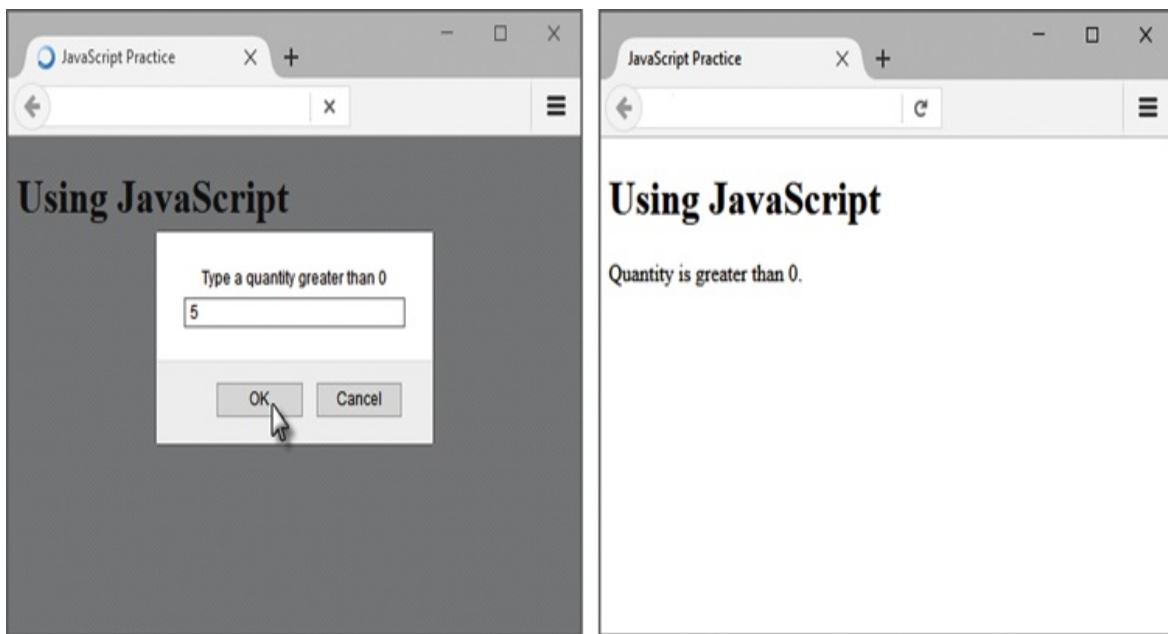


The browser on the left shows the prompt box with input of 0 and the browser on the right shows the result

[Figure 14.13 Full Alternative Text](#)

Now, refresh the page and enter a value greater than 0 (see [Figure 14.14](#)). Compare your work to chapter14/14.6/if.html in the student files.

# Figure 14.14



The browser on the left shows the prompt box with an input value that is greater than 0 and the browser on the right shows the result

[Figure 14.14 Full Alternative Text](#)

## Functions

In [Hands-On Practice 14.6](#), you coded a prompt box that pops up as soon as the page loads. What if we prefer to allow the user to decide when a particular script should be interpreted or run by the browser? Perhaps we could use an onmouseover event handler and run the script when the user moves the mouse pointer over a link or image. Another method, perhaps more intuitive for the user, is to make use of a button and direct the user to click the button to run the script. The web page visitor doesn't need to be aware that a script will run, but can click a button to initiate some sort of functionality.

Three types of buttons were introduced in [Chapter 9](#):

- A submit button, `<input type="submit">`, is used to submit a form.
- A reset button, `<input type="reset">`, is used to clear values entered on a form.
- The third type of button, `<input type="button">`, does not have any default action related to forms.

In this section, we will make use of the button, `<input type="button">`, and the `onclick` event handler to run a script. The `onclick` event handler can run a single command or multiple commands. The sample HTML is

```
<input type="button" value="Click to see a message"
      onclick="alert('Welcome!');">
```

In this sample, the button will display the text “Click to see a message”. When the user clicks the button, the click event occurs and the `onclick` event handler executes the `alert('Welcome!');` statement. The message box appears. This method is very effective when there is only one JavaScript statement to execute. It quickly becomes unmanageable when there are more statements to execute. When that happens, it makes sense to place all JavaScript statements in a block and somehow point to the block to execute. If the statement block has a name, we can execute the block by pointing to the name. In addition to providing a shortcut name, this code is also easily reused. We can provide a name for a statement block by creating a function.

A **function** is a block of JavaScript statements with a specific purpose that can be run when needed. A function can contain a single statement or a group of statements and is defined as

```
function function_name() {
  ... JavaScript statements
}
```

The function definition starts with the keyword `function` followed by the name of the function. The parentheses are required and more advanced functions make use of them. You can choose a name for the function just like you choose a name for a variable. The function name should indicate the purpose of the function. The statements are contained within the brackets.

The block of statements will execute when you invoke, or call, the function.

Here's an example of a function definition:

```
function showAlerts() {  
    alert("Please click OK to continue.");  
    alert("Please click OK again.");  
    alert("Click OK for the last time to continue.");  
}
```

The function can be invoked using

```
showAlerts();
```

Now, we could include the `showAlerts()` function call in a button as

```
<input type="button" value="Click to see alerts." onclick="showAl
```

When the user clicks the button, the `showAlerts()` function will be called and the three alert messages will appear one after the other. Try out the example in the student files (chapter14/function.html) to see this in action.

Function definitions are typically placed in the head section of the HTML document. This loads the function definition code, but it does not execute or run until it is invoked. This ensures that the function definition is loaded and ready to use before the function is called. Another feature of a function is that variables declared within the function are only available within that function; they have limited scope and are not available outside of the function. In contrast, variables that are declared outside of functions have global scope and can be available to all JavaScript associated with the page. Limiting scope prevents conflicts with variable names when using JavaScript libraries such as jQuery.



## Hands-On Practice 14.7

In this Hands-On Practice, you will edit your file from [Hands-On Practice](#)

[14.6](#) (found in the student files at chapter14/14.6/if.html) to move the prompting script into a function and call it with an onclick event handler. There are a few things to note. The script has been moved into the head section and is included in a function definition. The document.write() methods have been changed to alert() methods and the messages have been altered slightly. The document.write() methods will not work well after the page has already been written, as is the case in this exercise. Also, there have been some comments added to the end brackets for the if statement and the function definition. These comments can help you keep track of the code blocks within the script. The indentation of the code blocks also helps to identify which brackets begin and end various statements. Launch a text editor and edit the if.html file as follows:

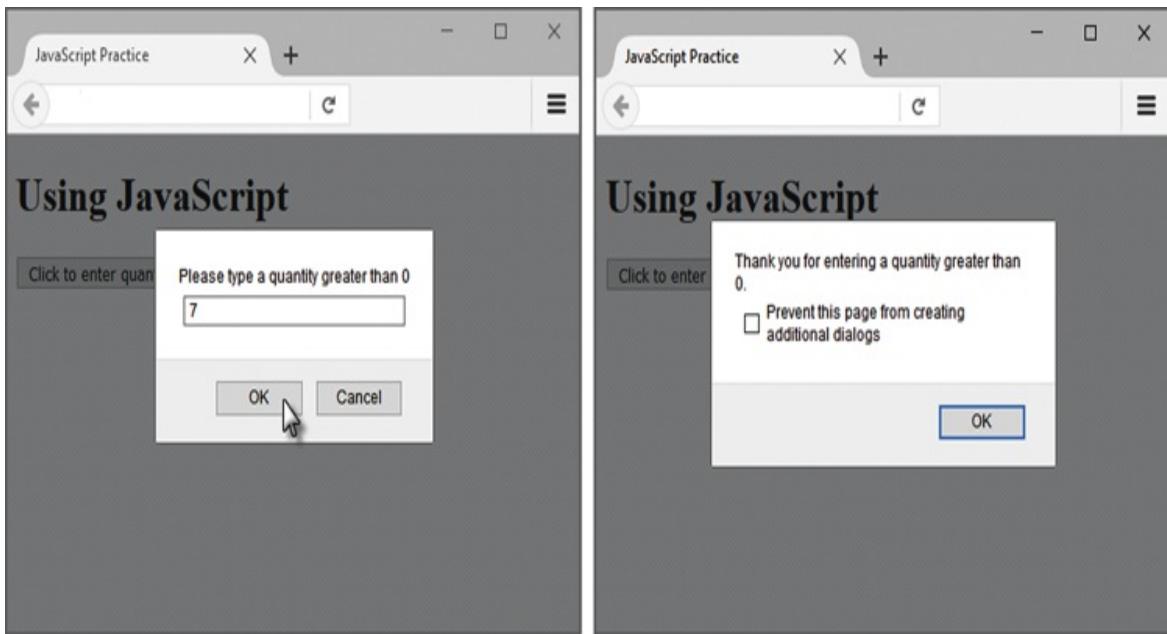
```
<!DOCTYPE html>
<html lang="en">
<head>
    <title>JavaScript Practice</title>
    <meta charset="utf-8">,
<script>
function promptQuantity() {
    var quantity;
    quantity = prompt("Please type a quantity greater than 0");
    if (quantity <= 0) {
        alert("Quantity is not greater than 0.");
    } else {
        alert("Thank you for entering a quantity greater than 0.");
    } // end if
} // end function promptQuantity
</script>
</head>
<body>
<h1>Using JavaScript</h1>
<input type="button" value="Click to enter quantity" onclick="pro
</body>
</html>
```

Save the document as if2.html and display it in a browser. Open the Web Console to check whether there are typing errors when you run the script.

Click the button to test the script. If the prompt box does not appear, check the Web Console and correct any errors. [Figure 14.15](#) shows the browser and the prompt box after the button has been clicked, as well as the resulting alert

box. Be sure to test for a value larger than 0 and a value of 0 or less. Compare your work to chapter14/14.7/if2.html in the student files.

## Figure 14.15



The browser on the left shows the prompt box and input; the browser on the right shows the alert box displayed after the input

[Figure 14.15 Full Alternative Text](#)



## Checkpoint 14.3

1. Describe a method that can be used to gather a piece of data such as the user's age.
2. Write the JavaScript code to display an alert message for users who are under 18 years old and a different alert message for users who are 18 years or older.

3. What is a function definition?

# 14.9 Form Handling

As you discovered in [Chapter 9](#), the data from a web form can be submitted to a CGI or a server-side script. This data can be added to a database or used for some other purpose; therefore, it is important that the data submitted by a user is as accurate as possible. When the user enters information in a form, there is always a chance that the information will be incorrect or inaccurate. This is particularly true when text input boxes are used because the user can easily mistype data. Often, the form data is checked for invalid data before it is submitted. Form data validation can be done by the server-side script, but it can also be done client-side, using JavaScript. Again, this topic is simplified here, but we can get a sense of how this might be done.

When the user clicks the form's submit button, the submit event occurs. We can make use of the onsubmit event handler to call a function that tests form data for validation. This technique is referred to as form handling. The web developer can validate all form input, some input, or just one form input. The following list is a selection of some types of things that might be validated:

- Required fields such as name and e-mail address
- A required check box to acknowledge a license agreement
- A radio button that indicates a method of payment or a delivery option
- A value entered that is numeric and must be within a particular range

When the user clicks the submit button, the onsubmit event handler invokes a function that tests all of the appropriate form elements for valid data. Then the validation function confirms that the data is valid (true) or not valid (false). The form is submitted to the URL indicated in the form action attribute if the data is valid (true). The form would not be submitted if the data is not valid (false) and some indication to the user regarding errors would be displayed. The overall structure of the web page code related to declaring the function and handling the onsubmit event is

```

... HTML begins the web page
function validateForm() {
    ... JavaScript commands to test form data go here
    if form data is valid
        return true
    else
        return false
}
... HTML continues
<form method="post" action="URL" onsubmit="return validateForm();
    ... form elements go here
<input type="submit" value="submit form">
</form>
... HTML continues

```

A new concept with regard to functions is indicated here. A function can encapsulate a group of statements, but it can also send a value back to where it was invoked, or called. This is referred to as “returning a value” and the JavaScript keyword `return` is used in the JavaScript code to indicate the value that will be sent back. Our example will return a value of `true` if the data is valid and a value of `false` if the data does not pass our validation tests. Notice that the `onsubmit` event handler also contains the keyword `return`. It works like this: If the `validateForm()` function returns a value of `true`, the `onsubmit` event handler becomes `return true` and the form is submitted. If the `validateForm()` function returns a value of `false`, the `onsubmit` event handler becomes `return false` and the form is not submitted. Once a function returns a value, it is finished executing, even if there are more statements in the function.



## Hands-On Practice 14.8

In this Hands-On Practice, you will create a form with inputs for name and age, and use JavaScript to validate: verify data in the name field and a value for age of 18 or greater. If there is nothing in the name field, an alert message will be displayed that indicates an error. If the age value entered is less than 18, an alert message will be displayed that indicates an error. If all data is

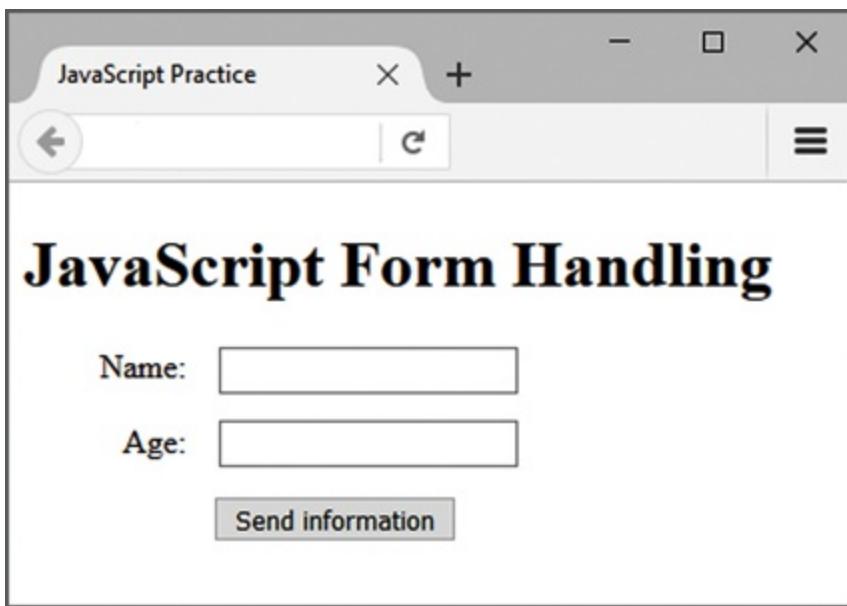
valid, an alert message will be displayed indicating that the data is valid and the form will be submitted.

Let's start by creating the form. Open a text editor and type the HTML below. Notice that the `onsubmit` form handler is embedded in the `<form>` tag and we will add the JavaScript code later. CSS is used to align and add space around the form elements.

```
<!DOCTYPE html>
<html lang="en">
<head>
    <title>JavaScript Practice</title>
    <meta charset="utf-8">
<style>
input { display: block;
        margin-bottom: 1em;
}
label { float: left;
        width: 5em;
        padding-right: 1em;
        text-align: right;
}
#submit { margin-left: 7em; }
</style>
</head>
<body>
<h1>JavaScript Form Handling</h1>
<form method="post"
        action="http://webdevbasics.net/scripts/demo.php"
        onsubmit="return validateForm();">
<label for="userName">Name: </label>
<input type="text" name="userName" id="userName">
<label for="userAge">Age: </label>
<input type="text" name="userAge" id="userAge">
<input type="submit" value="Send information" id="submit">
</form>
</body>
</html>
```

Save the file as `form.html` and view it in the browser. [Figure 14.16](#) shows the form in the browser.

## Figure 14.16



The form.html file displayed in the browser

Figure 14.16 Full Alternative Text

Feel free to click the submit button. You will notice that the inputs will be submitted. For the moment, we have not coded the `validateForm()` function, so the form simply submits.

Accessing form inputs is a little tricky. The form is a property of the document object. Each form element is a property of the form object. A property of a form element can be a value. So, the HTML for accessing the contents of an input box could look something like this:

```
document.forms[0].inputbox_name.value
```

The form is identified by `forms[0]` to indicate which form will be used. An HTML document can contain multiple forms. Note that there is an `s` in `forms[0]`. The first form is `forms[0]`. To access the value in the `userAge` input box, we will need to use `document.forms[0].userAge.value`. This is a mouthful, for sure.

Also, notice that the values `true` and `false` are not enclosed in quotes. This is important because `true` and `false` are not strings, they are JavaScript reserved words, or keywords, and represent special values. If you add quotes

to them, they become strings and this function will not work properly.

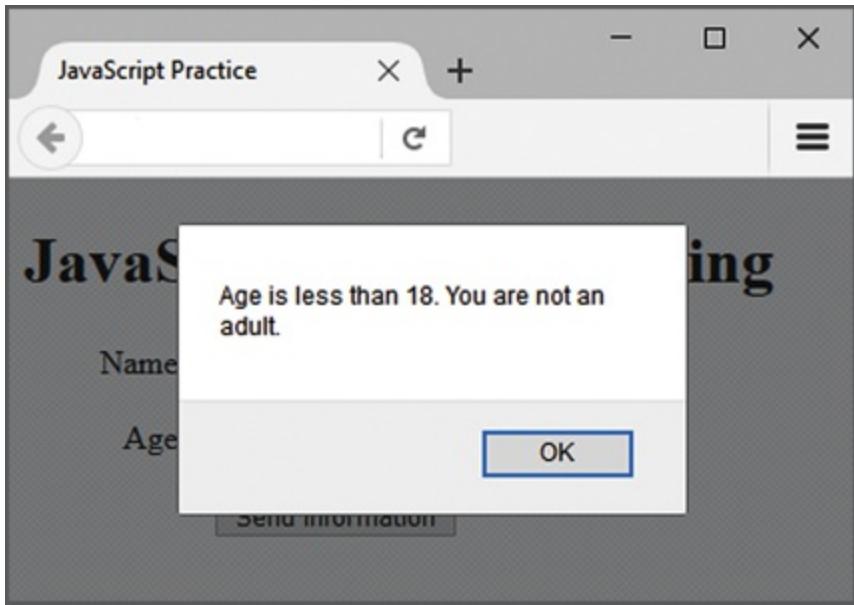
Let's start by adding the code to validate the age. Edit the form.html file to add the following script block in the head section above the </head> tag:

```
<script>
function validateForm() {
if (document.forms[0].userAge.value < 18) {
    alert ("Age is less than 18. You are not an adult.");
    return false;
} // end if
alert ("Age is valid.");
return true;
} // end function validateForm
</script>
```

The validateForm() function will check the age in the userAge input box. If it is less than 18, the alert message will be displayed and a value of false will be returned and the function will finish executing. The onsubmit event handler will become return false and the form will not be submitted. If the value for age is 18 or greater, the statements in the if structure will be skipped and the alert("Age is valid."); will execute. After the user clicks the OK button in the alert message, the statement return true; will execute and the onsubmit event handler will become return true; thus, the form will be submitted. Let's test this out!

Type a value less than 18 in the userAge input box and click the submit button. If the form submits right away, there is likely an error in the JavaScript code. If this happens, open the Error Console and correct the errors indicated. [Figure 14.17](#) shows the alert message displayed after clicking the submit button.

## Figure 14.17



The form.html file displayed in a browser with input for age that is less than 18 (notice the alert message)

[Figure 14.17 Full Alternative Text](#)

Click the OK button and type a value for age that is 18 or greater in the userAge input box. Click the submit button. [Figure 14.18](#) shows the alert message and the resulting web page after the form has been submitted.

## Figure 14.18

The image contains two side-by-side screenshots of a browser window titled "Form Confirmation". The left screenshot shows the same form as in Figure 14.17, but the alert message now says "Age is valid." The right screenshot shows the confirmation message "Your information has been received." and the submitted data "userAge : 18".

The form.html file displayed in a browser with input for age greater than or equal to 18 (notice the alert message); the browser on the right shows the resulting web page after the form is submitted

Figure 14.18 Full Alternative Text

Now, let's add another if statement to validate the name. To ensure that something has been entered in the `userName` input box, we will test to see if the value of the input box is empty. The null string (no characters) is represented by two double quotes ("") or two single quotes ('') without a space or any other character in between. We can compare the value of the `userName` text box to the null string. If the value of the `userName` box is equal to the null string, then we know that the user did not enter any information in this box. In our example, we will be sending only one error message at a time. If the user does not have a name in the `userName` box and also does not have an appropriate age in the `userAge` box, the user will only see the `userName` error message displayed. After the user corrects the name and resubmits the information, the user will see the `userAge` error message displayed. This is very basic form processing, but it gives you an idea of how form handling might be accomplished. More sophisticated form processing would verify each form field and indicate all errors each time the form is submitted.

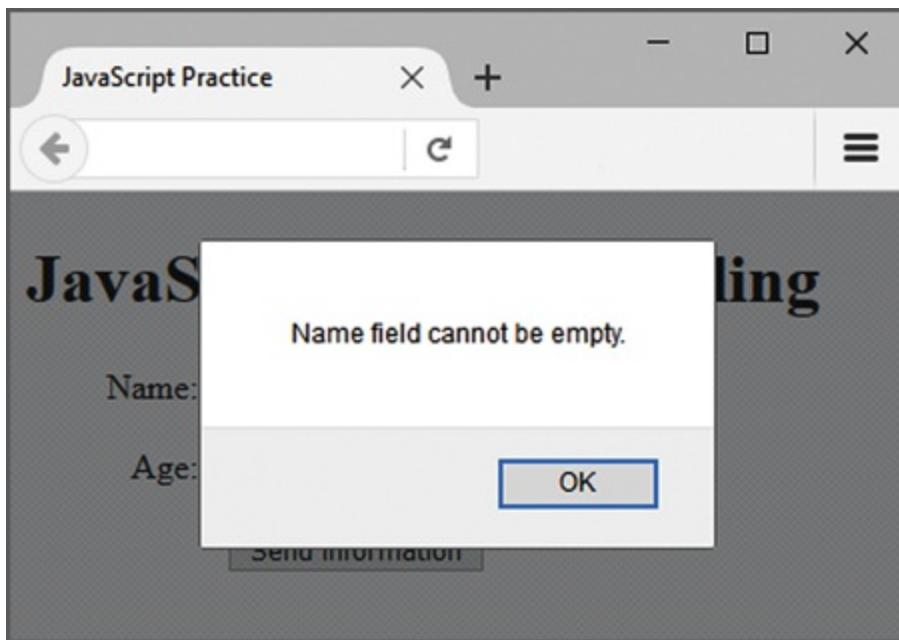
Let's add the code to validate the `userName` data. Edit the `formvalidation.html` file and modify the following script block. Note that two equal signs represent equivalency in the `if` statement. Some students find it helpful to read the two equal signs (==) as "is exactly equal to".

```
<script>
function validateForm() {
    if (document.forms[0].userName.value == "") {
        alert("Name field cannot be empty.");
        return false;
    } // end if
    if (document.forms[0].userAge.value < 18) {
        alert("Age is less than 18. You are not an adult.");
        return false;
    } // end if
    alert("Name and age are valid.");
}
```

```
return true;  
} // end function validateForm  
</script>
```

Save the document and refresh it in the browser window. Click the submit button without entering data in the Name or Age input boxes. [Figure 14.19](#) shows the alert message displayed when no data has been input and the submit button has been clicked.

## Figure 14.19

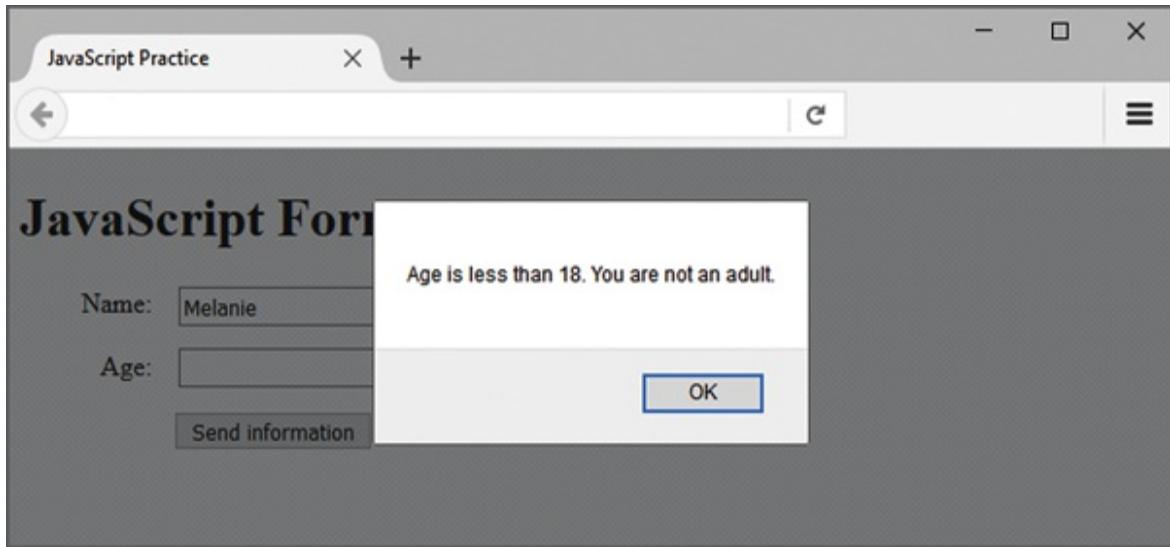


The form.html file displayed in the browser without input in the Name and Age boxes; the alert message appears after the form is submitted

### [Figure 14.19 Full Alternative Text](#)

Click the OK button, enter some text in the Name input box, and submit the form again. [Figure 14.20](#) shows data in the Name input box and the alert message that appears as a result of validating the age when no value for age is entered.

# Figure 14.20

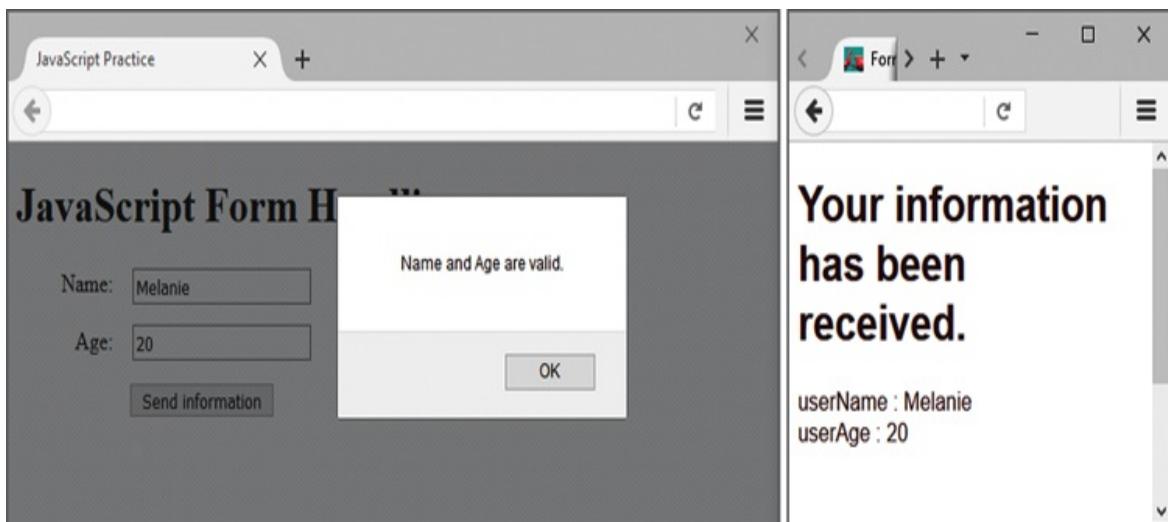


The form.html file displayed in the browser with input in the Name box and without input in the Age box; the alert message appears after the submit button is clicked

## [Figure 14.20 Full Alternative Text](#)

Click the OK button and enter a value for age that is 18 or greater. Click the submit button. [Figure 14.21](#) shows data in the Name and Age input boxes and the alert message that displays after the submit button has been clicked. It also shows the resulting web page after successful submission when all data is valid. Compare your work to chapter14/14.8/form.html in the student files.

# Figure 14.21



The form.html file displayed in the browser with valid input in the Name and Age boxes and alert message; the browser on the right shows the web page displayed after valid input has been submitted

[Figure 14.21 Full Alternative Text](#)



## Checkpoint 14.4

1. What is meant by the term “form data validation”?
2. Give three examples of form data that may require validation.
3. An HTML document contains the <form> tag as follows:

```
<form method="post"
action="http://webdevbasics.net/scripts/demo.php"
onsubmit="return validateForm();">
```

What happens when the user clicks the submit button?

## 14.10 Accessibility and JavaScript

The interactivity and functionality that JavaScript can add to a web page is exciting. However, be aware that some visitors may have JavaScript disabled, may not be able to see your visual effect, or may be unable to manipulate the mouse. WCAG 2.0 and Section 508 require that your site is functional at a basic level, even if your visitor's browser does not support JavaScript. If you use JavaScript to handle mouse events in your site navigation, you should also provide plain-text navigation that does not require a mouse and can be easily accessed by a screen reader. If you use JavaScript for form validation, provide an e-mail address to allow physically challenged visitors to contact your organization and obtain assistance.



## 14.11 JavaScript Resources

This chapter has barely scratched the surface regarding the uses of JavaScript in web development. You may wish to do further research using some of the following online resources:

- JavaScript Tutorial: <http://www.w3schools.com/JS>
- JavaScript Tutorial: <http://echoecho.com/javascript.htm>
- Mozilla Developer Network JavaScript Reference:  
<https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference>
- Mozilla Developer Network JavaScript Guide:  
<https://developer.mozilla.org/en-US/docs/Web/JavaScript/Guide>

## 14.12 Overview of jQuery

Many websites, including Amazon and Google, use jQuery to provide interaction and dynamic effects on web pages. The free, open-source jQuery JavaScript library was developed by John Resig in 2006 to simplify client-side scripting. The jQuery Foundation is a volunteer organization that contributes to the continued development of jQuery and provides jQuery documentation at <http://api.jquery.com>.

So, what can you do with jQuery? The jQuery API (application programming interface) works along with JavaScript and provides easy ways to dynamically manipulate the CSS properties of elements, detect and react to events (such as mouse movements), and animate elements on a web page, such as image slideshows. And there's more—the jQuery JavaScript library has been thoroughly tested and is compatible with all current browsers (Internet Explorer, Google Chrome, Firefox, Safari, Opera, and so on). Many web developers and designers have found that jQuery is easier to learn to work with than trying to write and test their own complex JavaScript interactions. However, a basic understanding of JavaScript is useful when working with jQuery.

# **14.13 Adding jQuery to a Web Page**

The jQuery library is stored in a .js JavaScript file. There are two ways to access the jQuery library. You can either download the jQuery JavaScript library file and save it to your hard drive or you can access a version of the jQuery JavaScript library file online through a Content Delivery Network (CDN).

## **Download jQuery**

Visit <http://jquery.com/download> to download one of the jQuery library .js files. There are several versions of jQuery to choose from. When you visit the download page, right click on “Download the compressed, production jQuery 3.2.1” and save the file with the name of jquery-3.2.1.min.js in your website folder. You can make jQuery available to your web page by adding the following script tag to the head section of your web page document:

```
<script src="jquery-3.2.1.min.js"></script>
```

## **Access jQuery via a Content Delivery Network**

Google, Microsoft, Amazon, and Media Temple have created free Content Delivery Network (CDN) repositories of frequently used code and scripts, such as jQuery. There is no cost for you or your web page visitor to use a CDN. An advantage of using a CDN is that your pages may load faster because your visitor’s browser most likely has accessed the CDN in the past and already saved the file in its cache. A disadvantage of using a CDN is that you will always need to have a live Internet connection when you are coding

and testing your pages. We'll use Google's CDN in this chapter. To access the jQuery library that is stored in Google's Content Delivery Network (CDN), add the following script tag in the head section of your web page document:

```
<script  
src="https://ajax.googleapis.com/ajax/libs/jquery/3.2.1/jquery.mi  
</script>
```

## The Ready Event

You need to inform the jQuery library when your web page's Document Object Model (DOM) has been completely loaded by the browser. A jQuery statement referred to as the ready event is used for this purpose. A jQuery statement consists of a jQuery alias, a selector, and a method in the following format:

```
$(selector).method()
```

The jQuery alias is your choice of either the text "jQuery" or the \$ character. Most people use the \$ character because it is shorter. The selector indicates the DOM element(s) that jQuery will work with. The method is an action that jQuery can take. The ready() method indicates the code the browser should execute when the DOM is fully loaded.

In this case, the selector is the document itself, so the syntax for the ready event is as follows:

```
$(document).ready(function() {  
    Your JavaScript statements and other jQuery statements go here  
});
```

Place your JavaScript statements and additional jQuery statements after the opening line in the ready event. For example, to display an alert box when the DOM is ready for jQuery, code the following:

```
$(document).ready(function() {  
    alert("Ready for jQuery");  
});
```



## FAQ

1. What's the `function()` part of the ready event?

The `function()` creates an unnamed, anonymous function that defines a block of code, and, for example, limits the scope of variables declared within the code block. This prevents conflicts, such as those caused by duplicate variable names, that can occur when you are using multiple libraries of code.



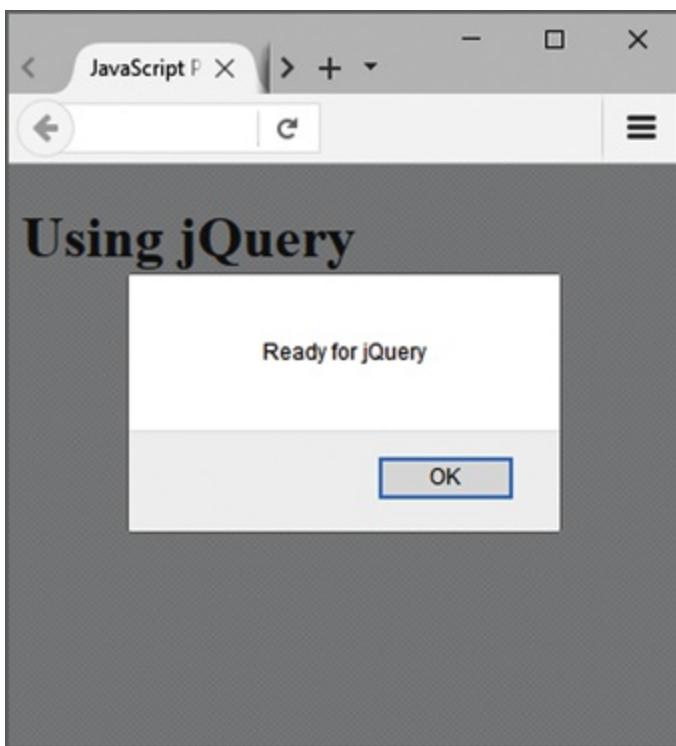
## Hands-On Practice 14.9

Let's practice using the jQuery ready event. Open a text editor and enter the code shown below.

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>JavaScript Practice</title>
<meta charset="utf-8">
<script
src="https://ajax.googleapis.com/ajax/libs/jquery/3.2.1/jquery.mi
</script>
<script>
$(document).ready(function() {
  alert("Ready for jQuery");
});
</script>
</head>
<body>
<h1>Using jQuery</h1>
</body>
</html>
```

Save this file as ready.html and open it in the browser. If you are connected to the Internet, the jQuery library at the CDN will be accessed and the alert message will display (see [Figure 14.22](#)) when the web page's DOM is fully loaded by the browser. Compare your work with the solution in the student files chapter14/14.9/ready.html.

## Figure 14.22



Ready for jQuery

## 14.14 jQuery Selectors

Configure a jQuery selector to indicate which DOM elements jQuery will affect. There are a wide variety of selectors—similar to the types of selectors you can configure in CSS. A wildcard selector will cause jQuery to act upon all elements. You could also specify a class, id, or html element selector. In addition, filters, such as :first and :odd can be applied to selectors. A complete list of jQuery selectors is available at <http://api.jquery.com/category/selectors>. [Table 14.5](#) shows examples of some commonly used jQuery selectors and their purpose.

**Table 14.5 Commonly used  
jQuery selectors**

Selector	Purpose
<code>\$('*')</code>	wildcard—selects all elements
<code>\$('li')</code>	HTML element selector—selects all li elements
<code>\$('.myclass')</code>	Class selector—selects all elements assigned to the class named myclass
<code>\$('#myid')</code>	Id selector—selects the element assigned to the id named myid

`$('nav a')` HTML element selector—selects all anchor elements contained within the nav element

`$('#resources a')` Id selector and HTML element selector—selects all anchor elements contained within the id named resources

`($('li:first'))` Positional selector that selects the first element of that type on the page

`($('li:odd'))` Positional selector—selects every other li element on the page

## 14.15 jQuery Methods

Configure a jQuery method to act upon the DOM element(s) you have selected. There are several categories of methods including methods that work with CSS, Effects, Events, Forms, Traversing, Data, Ajax, and Manipulation. The jQuery documentation at <http://api.jquery.com> provides a somewhat overwhelming list—it takes a while to explore the methods available in the jQuery library. [Table 14.6](#) lists some commonly used jQuery methods.

**Table 14.6 Commonly used  
jQuery methods**

Method	Purpose
<code>attr()</code>	Gets or sets attributes for the selected element(s)
<code>click()</code>	Binds a jQuery event handler to the JavaScript click event
<code>css()</code>	Sets the specified CSS property for the selected element(s)
<code>fadeToggle()</code>	Displays or hides the selected element(s) by animating their opacity

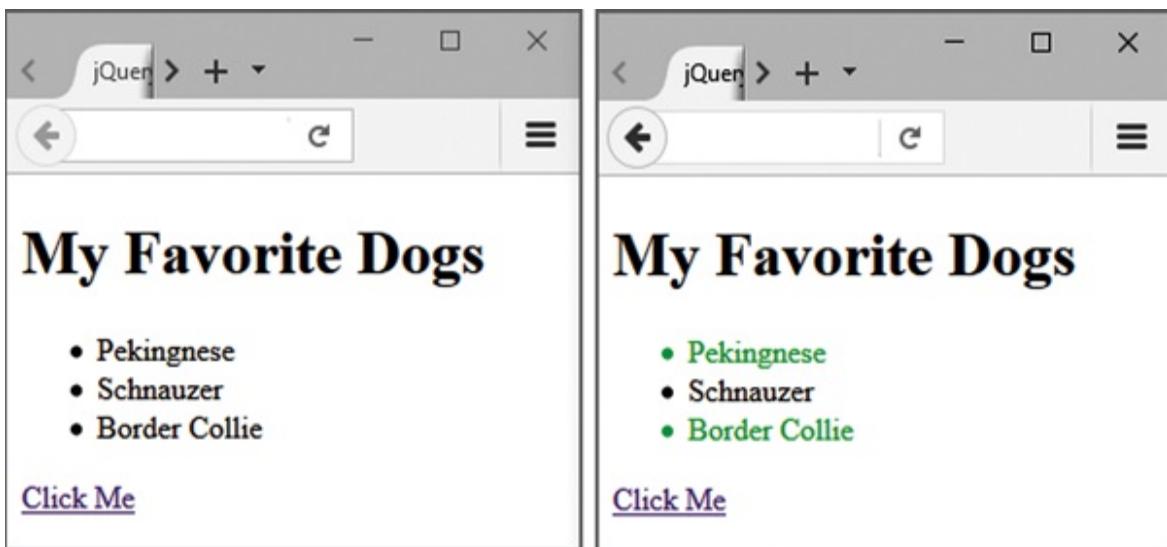
<code>hover()</code>	Binds a jQuery event handler to the JavaScript <code>onmouseover</code> event
<code>html()</code>	Gets or sets HTML contents for the selected element(s)
<code>slideToggle()</code>	Displays or hides the selected element(s) with a sliding motion
<code>toggle()</code>	Displays or hides the selected element(s)

Let's start by delving into the `css()` and `click()` methods. Use the `css()` method to set a CSS property for the selector. The `css()` method accepts a pair of string expressions that indicate the CSS property and value. For example, the following script, found in the student files (chapter14/color.html), will select all li elements on a page and configure them with a text color of red, use the `($('li')` selector along with the `css()` method to set the `color` property to `#FF0000`.

```
$(document).ready(function(){
    $('li').css('color', '#FF0000');
});
```

Use the `click()` method to bind, or associate, a JavaScript click event for the selected element(s) with an event handler action in jQuery. jQuery will execute the event handler when the event occurs. The web page shown in [Figure 14.23](#) (see the student files chapter14/changeme.html) demonstrates the click event. The click event has been bound to the anchor element and causes the text color of every other li element to change when the click event fires. The script is as follows:

## Figure 14.23



The `changeme.html` file displayed in a browser; the browser on the right shows the resulting web page after the “Click Me” hyperlink is clicked.

Figure 14.23 Full Alternative Text

```
$(document).ready(function() {  
    $('a').click(function(){  
        $('li:even').css('color', '#006600');  
    });  
});
```



## Hands-On Practice 14.10

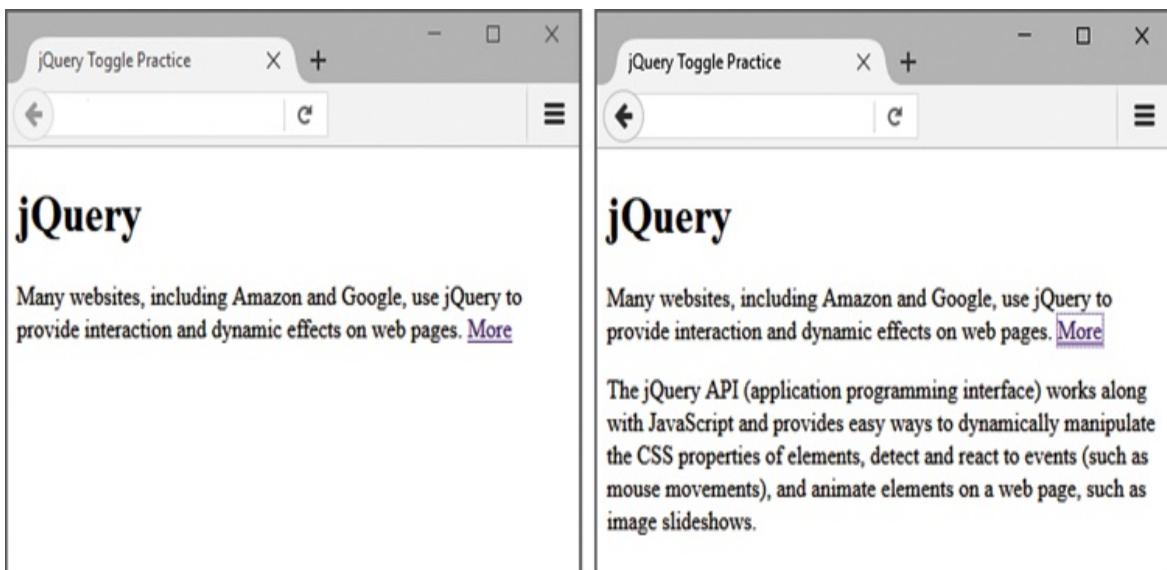
The best way to learn to use jQuery is to practice coding. You’ll work with the `click()` and `toggle()` methods in this Hands-On Practice. You’ll configure CSS to initially hide a block of text by setting the `display` property to `none`. Then, you’ll use jQuery to bind a click event to an event handler that will toggle back and forth between displaying and hiding a block of text. Open a text editor and enter the code shown below.

```
<!DOCTYPE html>  
<html lang="en">
```

```
<head>
<title>jQuery Toggle Practice</title>
<meta charset="utf-8">
<style>
#details { display: none; }
</style>
<script>
src="https://ajax.googleapis.com/ajax/libs/jquery/3.2.1/jquery.mi
</script>
<script>
$(document).ready(function() {
    $('#more').click(function(){
        $('#details').toggle();
    });
});
</script>
</head>
<body>
<h1>jQuery</h1>
<p>Many websites, including Amazon and Google, use jQuery, to pro
id="more">More</a></p>
<div id="details"><p>The jQuery API (application programming inte
</div>
</body>
</html>
```

Save this file as toggle.html and open it in the browser. As shown in [Figure 14.24](#), the second paragraph does not initially display. Click on the “More” hyperlink to display the second paragraph. Next, click on the “More” hyperlink again to hide the second paragraph. The “More” hyperlink works as a toggle to hide and show the div assigned to the id details. Compare your work with the solution in the student files chapter14/14.10/toggle.html.

## Figure 14.24



The toggle.html file displayed in a browser; the browser on the right shows the resulting web page after the “More” hyperlink is clicked.

[\*\*Figure 14.24 Full Alternative Text\*\*](#)

Experiment with the `fadeToggle()` and `slideToggle()` methods. You can control the speed of the effect of these methods by passing a duration parameter—valid values are `'slow'`, `'fast'`, and a number indicating the milliseconds. Configure the duration of the `fadeToggle()` to be 1000 milliseconds. Open your file in a text editor and replace the `$('#details').toggle();` statement with the following:

```
$('#details').fadeToggle(1000);
```

Test in a browser. Did you notice the text fade in? Feel free to experiment with other values for the duration parameter.

Next, open your file in a text editor and replace the `fadeToggle()` method with the `slideToggle()` method with slow duration as follows:

```
$('#details').slideToggle('slow');
```

Test in a browser. Did you notice the text slide in? Feel free to experiment with other values for the duration parameter.

You can find out more about these methods at  
<http://api.jquery.com/fadeToggle> and <http://api.jquery.com/slidetoggle>.

## 14.16 jQuery Image Gallery

You created an interactive image gallery with CSS in [Chapter 11](#). In the next Hands-On Practice you'll explore using jQuery and JavaScript along with CSS to create three versions of the image gallery (shown in [Figure 14.25](#)) with different interactions.

### Figure 14.25

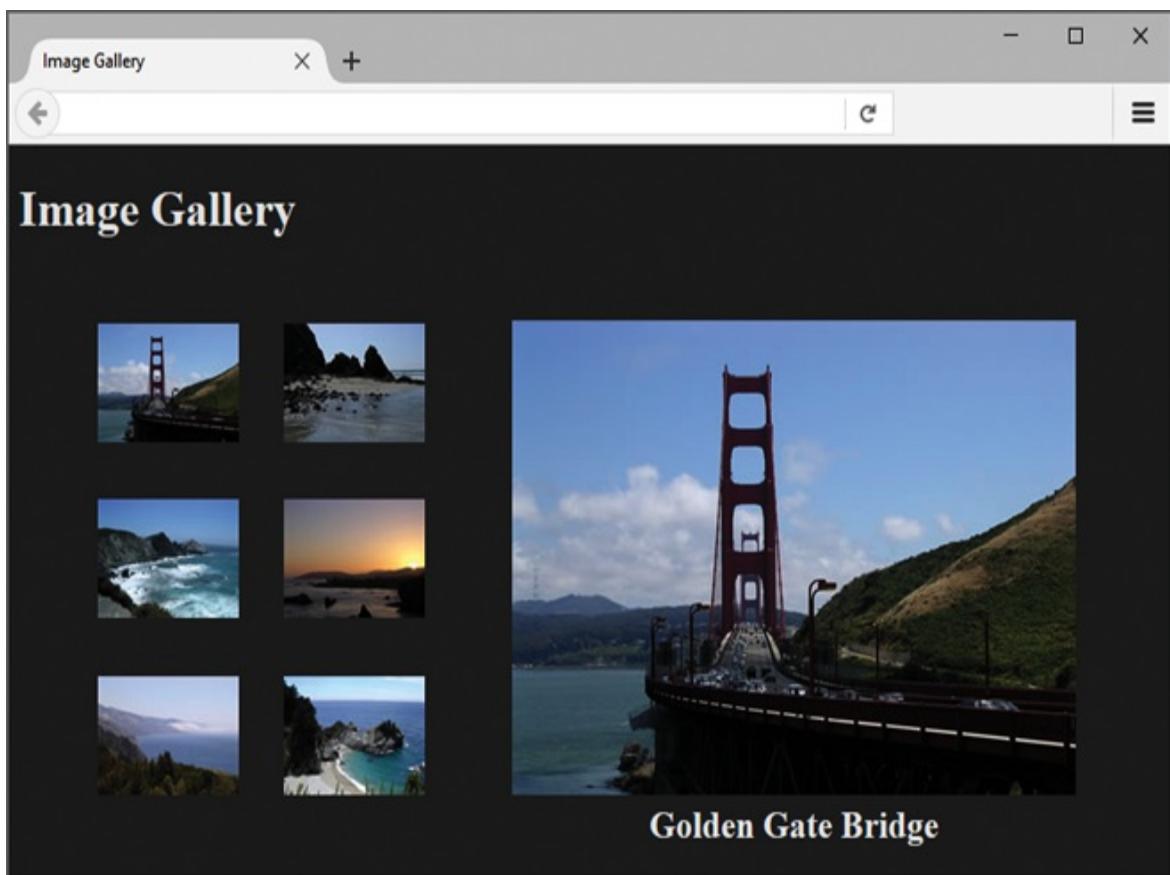


Image gallery with jQuery interactions

[Figure 14.25 Full Alternative Text](#)

You'll work with some jQuery methods you have already used, the `click()`,

`css()`, and `fadeToggle()` methods. You'll also explore the `hover()`, `html()`, and `attr()` methods. Use the `hover()` method to bind, or associate, the jQuery `mouseenter` and `mouseleave` events for the selected element(s) with an event handler action in jQuery. jQuery will execute the event handler when the event occurs.

The `html()` method allows you to dynamically configure the content of an HTML element. You'll use the `html()` to change the text that is displayed within a `figcaption` element. The `attr()` method allows you to configure the value of HTML attributes. You'll use the `attr()` method to change the `src` and `alt` attributes of the large gallery image.



## Hands-On Practice 14.11

Create a new folder called `gallery14`. Copy all the images from the `chapter11/starters/gallery` folder in the student files to the new `gallery14` folder. Launch a text editor and modify the `chapter2/template.html` file to configure a web page as indicated:

1. Configure the text, “Image Gallery”, within an `h1` element and within the `title` element.
2. Code a `div` element assigned to the `id` named `gallery`. This `div` will consist of an unordered list and a `figure` element. The unordered list will contain the thumbnail image links. The `figure` element will contain the large gallery image and a `figcaption` element.
3. Configure an unordered list within the `div`. Code six `li` elements, one for each thumbnail image. The thumbnail images will function as image links. Each anchor tag will include a `title` attribute with a descriptive text title. An example of the first `li` element is

```
<li>
<a href="photo1.jpg" title="Golden Gate Bridge"></a>  
</li>
```

4. Configure all six li elements in a similar manner. Substitute the actual name of each image file for the href and src values in the code. Write your own descriptive text for each image. Use photo2.jpg and photo2thumb.jpg in the second li element. Use photo3.jpg and -photo3thumb.jpg in the third li element, and so on for all six images. Save the file as index.html in the gallery14 folder.
5. Configure a figure element below the unordered list within the div. The figure element will contain an img tag that displays photo1.jpg and a figcaption element that contains the text “Golden Gate Bridge”.
6. Code a style element in the head section of your document. Configure embedded CSS as follows:
  1. Configure the body element selector with a dark background color (#333333) and a light gray text color (#eaeaea).
  2. Configure the gallery id selector. Set the width to 800px.
  3. Configure the unordered list within the #gallery with a width of 300 pixels, no list marker, and left float.
  4. Configure the list item elements within the #gallery with inline display, left float, and 16 pixels of padding.
  5. Configure the img elements within the #gallery to not display a border.
  6. Configure the figure element selector with 30 pixels of top padding and center text alignment.
  7. Configure the figcaption element selector with bold font and 1.5em font size.
7. Code a script element in the head section of your document that accesses the Google jQuery CDN.

```
<script  
src="https://ajax.googleapis.com/ajax/libs/jquery/3.2.1/jquer  
</script>
```

8. Code jQuery and JavaScript statements in the head section of your document that determine when a mouse is placed over a thumbnail image link and change the gallery image and description.

1. Code a pair of script tags that contain the jQuery ready event.

```
<script>  
$(document).ready(function(){  
  
});  
</script>
```

2. Add the following code within the ready event to listen for the hover event on anchor elements in the #gallery div.

```
$('#gallery a').hover(function(){  
  
});
```

3. Code JavaScript statements within the hover method's function to store href value and title value from the anchor tag in JavaScript variables. The Javascript keyword this indicates that the attributes refer to the current selector.

```
var galleryHref = $(this).attr('href');  
var galleryAlt = $(this).attr('title');
```

4. Use the jQuery attr() method to set the src and alt attributes on the large gallery image. Add the following statement below the variable assignment.

```
($('figure img').attr({ src: galleryHref, alt: galleryAlt
```

5. Use the jQuery html() method to change the text displayed within the figcaption element: Add the following statement below the attr() method statement.

```
($('figcaption').html(galleryAlt);
```

6. The entire jQuery code block is

```
<script>
$(document).ready(function(){
    $('#gallery a').hover(function(){
        var galleryHref = $(this).attr('href');
        var galleryAlt = $(this).attr('title');
        $('figure img').attr({ src: galleryHref, alt: galleryAlt });
        $('figcaption').html(galleryAlt);
    });
});
</script>
```

9. Save your file in the gallery14 folder as hover.html and display it in a browser. The large gallery image will change when you hover on an image link. Compare your work with the student files (chapter14/14.11/hover.html).
10. Next, create a new version of the image gallery that will change the large gallery image and description when a web page visitor clicks on a thumbnail image instead of placing the mouse over a thumbnail image. Launch a text editor and open hover.html. Save the file with a new name: click.html. Edit the jQuery code block. Replace hover with click. By default, the hyperlink will open the larger image in a new window. To prevent this from happening, code return false; after the html() method statement. The entire jQuery code block is:

```
<script>
$(document).ready(function(){
    $('#gallery a').click(function(){
        var galleryHref = $(this).attr('href');
        var galleryAlt = $(this).attr('title');
        $('figure img').attr({ src: galleryHref, alt: galleryAlt });
        $('figcaption').html(galleryAlt);
        return false;
    });
});
</script>
```

11. Save your file in the gallery14 folder and display it in a browser. The large gallery image will change when you click on an image link. Compare your work with the student files (chapter14/14.11/click.html).

12. Now, let's experiment with a slightly different jQuery interaction for the image gallery, using the `fadeToggle()` method, which either displays or hides selected elements. In order to force the `fadeToggle()` method to always fade in and display the large gallery image when a thumbnail image is clicked, you need to hide the figure element before invoking - `fadeToggle()`. Launch a text editor, open the `click.html`, save the file with a new name: `toggle.html`, and add two new statements to the jQuery code block as shown below:

```
<script>
$(document).ready(function(){
    $('#gallery a').click(function(){
        var galleryHref = $(this).attr('href');
        var galleryAlt = $(this).attr('title');
        $('figure').css('display', 'none');
        $('figure img').attr({ src: galleryHref, alt: galleryAlt });
        $('figure').fadeToggle(1000);
        return false;
    });
});
</script>
```

13. Save your file in the `gallery14` folder and display it in a browser. When you click on a thumbnail image link, the large gallery image area will briefly fade to black and then fade in with the new gallery image. Experiment with different duration values for the `fadeToggle`. Compare your work the student files (`chapter14/14.11/toggle.html`).

## 14.17 jQuery Plugins

jQuery is open-source and designed for continued enhancement and extension. An experienced web developer can create a new jQuery method and build a plugin that extends the functionality of jQuery. There are many jQuery plugins available, providing interactions and functionality such as slideshows, tooltips, and form validation. Visit the jQuery Plugin Registry at <http://plugins.jquery.com/> for a list. You can also find jQuery plugins by - searching the Web.

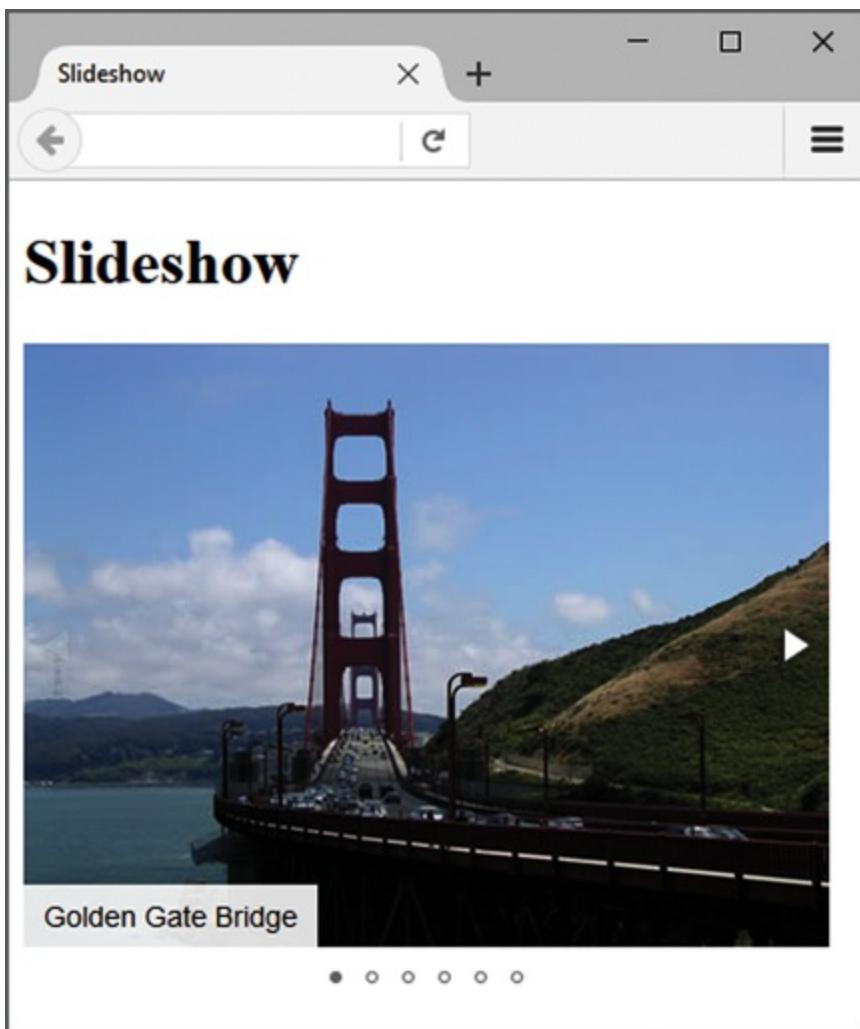
When you find a plugin that you think you may want to use, check the plugin documentation which will explain the purpose of the plugin, describe how to work with the plugin, and often provide examples of using the plugin. Check the documentation to verify that it is compatible with the version of jQuery you are using. Verify the terms of the license for use of the plugin—many plugins use an MIT license (<http://opensource.org/licenses/MIT>), which freely allows use and distribution of both noncommercial and commercial work. Also, search the Web and see what types of comments and/or questions others have written about the plugin. If there are a lot of people struggling with using a plugin, you may want to choose a different one! You'll work with two popular jQuery plugins in the following Hands-On Practice exercises.



### Hands-On Practice 14.12

In this Hands-On Practice you'll create the web page shown in [Figure 14.26](#) as you work with the very easy to use fotorama plugin for jQuery (<http://fotorama.io>), which configures a slideshow.

### Figure 14.26



jQuery plugin slideshow

[Figure 14.26 Full Alternative Text](#)

Create a new folder called slideshow. Copy the following images from the - chapter11/starters/gallery folder in the student files to the new slideshow folder: photo1.jpg, photo2.jpg, photo3. jpg, photo4.jpg, photo5.jpg, and photo6.jpg. Launch a text editor and modify the chapter2/template.html file to configure a web page as indicated:

1. Configure the text, “Slideshow,” within an h1 element and within the title element.
2. Code a div element assigned to the class named fotorama below the h1

element. The slideshow will not automatically play by default. The plugin's documentation specifies that adding the `data-autoplay="true"` attribute to the fotorama div element will configure automatic play. Code the opening div tag as follows:

```
<div class="fotorama" data-autoplay="true">
```

3. Code an img tag for each photograph within the div. Configure both the alt and the data-caption attribute with a description of the image. The plugin requires the data-caption attribute to display a caption for the image in the slideshow. An example of the first img element is

```

```

Configure the other images in a similar manner.

4. Code the following link tag in the head section of your document to access the CSS needed by the fotorama plugin:

```
<link href="http://cdnjs.cloudflare.com/ajax/libs/fotorama/4.  
rel="stylesheet">
```

5. Code the following script element in the head section of your document to access the jQuery library:

```
<script src=  
"https://ajax.googleapis.com/ajax/libs/jquery/3.2.1/jquery.mi  
</script>
```

6. Code the following script element in the head section of your document to access the fotorama library:

```
<script src=  
"http://cdnjs.cloudflare.com/ajax/libs/fotorama/4.6.4/fotoram
```

7. That's all there is to it! Save your file with the name index.html in the slideshow folder and display it in a browser. The slideshow will automatically start to play. Place your mouse over the image to trigger the caption and side arrows to appear. Select the side arrow or bottom image indicator to move directly to a specific image. Compare your

work with the student files (chapter14/14.12/index.html).



## Hands-On Practice 14.13

In this Hands-On Practice you'll work with the jQuery validation plugin (<https://jqueryvalidation.org>), which performs basic form validation. This plugin has many features listed in its documentation. For example when you configure a form control, such as an input element, with one of class names specified in the documentation, the plugin will automatically perform the corresponding edit. In addition the plugin is configured to assign the class named error to the error messages it generates. A partial list of class names supported by the plugin for data validation is shown in [Table 14.7](#).

**Table 14.7 Selected jQuery validate plugin class names and actions**

Class Name	Action
required	Verifies whether data is entered
email	Verifies whether data is in e-mail format
digits	Verifies whether data is a positive integer

url      Verifies whether data is in url format

To get started, create a new folder called jform. You'll work with the web page shown in [Figure 14.27](#). Launch a text editor and open the chapter14/formstarter.html file. Edit the code as indicated:

## Figure 14.27

The screenshot shows a web browser window titled "Newsletter Sign Up". The page content is a "Newsletter Sign Up" form. It contains two input fields: "Name:" and "E-mail:", each with a corresponding text input box. Below the input fields is a "Sign Up" button. The browser interface includes standard controls like back, forward, and search buttons, as well as window control buttons (minimize, maximize, close).

Newsletter signup form

### [Figure 14.27 Full Alternative Text](#)

1. Style error messages. Edit the embedded CSS and configure styles for a class named error with a 1em left margin and red, italic, .90em size, Arial or sans-serif font typeface:

```
.error { font-family: Arial, sans-serif;  
        font-style: italic; font-size: .90em;  
        color: #FF0000; margin-left: 1em; }
```

2. Code the following script element in the head section of your document to access the jQuery library:

```
<script src=
"https://ajax.googleapis.com/ajax/libs/jquery/3.2.1/jquery.mi
</script>
```

3. Code the following script element in the head section of your document to access the Validate plugin:

```
<script src=
"https://cdnjs.cloudflare.com/ajax/libs/jquery-validate/1.16.0/ jquery
</script>
```

4. Code script tags, the jQuery ready event, and a jQuery statement that will invoke form validation in the head section of the document:

```
<script>
$(document).ready(function(){
  $('form').validate();
});
</script>
```

5. Edit the HTML to configure the form validation. The Name is required. The e-mail address is required and should be in e-mail format.

1. Add class="required" to the input tag for the Name textbox.
2. Add class="required email" to the input tag for the e-mail textbox.
6. Save your file with the name index.html in the jform folder and display it in a browser. Try clicking the Sign Up button without entering any data. The jQuery Validation plugin will check for the errors you specified and it will display two error messages as shown in [Figure 14.28](#).

## Figure 14.28

The screenshot shows a web browser window titled "Newsletter Sign Up". The main content area has a heading "Newsletter Sign Up". Below it, there are two input fields: "Name:" followed by an empty text input box, and "E-mail:" followed by another empty text input box. To the right of each empty input box is a red error message: "This field is required.". Below these fields is a "Sign Up" button. At the bottom of the page are navigation arrows (< and >).

jQuery validate plugin error messages

[Figure 14.28 Full Alternative Text](#)

7. Next, enter information in both textboxes but do not enter a correct e-mail address. The jQuery Validation plugin will display an error message as shown in [Figure 14.29](#).

## Figure 14.29

The screenshot shows a web browser window titled "Newsletter Sign Up". The main content area has a large heading "Newsletter Sign Up". Below it, there are two input fields: "Name:" followed by a text input containing "Sparky", and "E-mail:" followed by a text input containing "Feik". To the right of the "E-mail:" input field, the error message "Please enter a valid email address." is displayed in red. Below the inputs is a "Sign Up" button. At the bottom of the page, there are navigation arrows (< and >).

jQuery validate plugin e-mail error message

[Figure 14.29 Full Alternative Text](#)

8. Finally, submit the form with both a name and a valid e-mail address entered. With all specified edits passed, the browser will send the form information to the server-side script configured in the form's action attribute and you'll see a confirmation page display. Compare your work with the student files (chapter14/14.13/index.html).

## 14.18 jQuery Resources

This chapter has just touched on some of the power and functionality of jQuery. There is so much more to learn! You may wish to do further research using some of the following online resources:

- jQuery

<http://jquery.com>

- jQuery Documentation

<http://docs.jquery.com>

- How jQuery Works

<http://learn.jquery.com/about-jquery/how-jquery-works>

- jQuery Fundamentals

<http://jqfundamentals.com/chapter/jquery-basics>

- jQuery Tutorials for Web Designers

<http://webdesignerwall.com/tutorials/jquery-tutorials-for-designers>



### Checkpoint 14.5

1. Describe the two ways the web developers can obtain the jQuery JavaScript Library.
2. Explain the purpose of the `css()` method.

3. Describe the purpose of the ready event.

# Chapter Summary

This chapter introduced the use of JavaScript as a client-side scripting language in web pages. You learned how to embed script blocks in web pages, display an alert message, use an event handler, and validate a form. Visit the textbook web site at <http://www.webdevfoundations.net> for examples, the links listed in this chapter, and updated information.

## Key Terms

- [alert\(\)](#)
- [attr\(\)](#)
- [click\(\)](#)
- [css\(\)](#)
- [hover\(\)](#)
- [html\(\)](#)
- [fadeToggle\(\)](#)
- [prompt\(\)](#)
- [slideToggle\(\)](#)
- [toggle\(\)](#)
- [<script>](#)
- [write\(\)](#)
- [arithmetic operators](#)

- [case-sensitive](#)
- [client-side processing](#)
- [comments](#)
- [comparison operators](#)
- [concatenation](#)
- [Content Delivery Network \(CDN\)](#)
- [debug](#)
- [document](#)
- [event](#)
- [event handler](#)
- [form handling](#)
- [function](#)
- [if](#)
- [image swapping](#)
- [invoke](#)
- [jQuery](#)
- [jQuery Alias](#)
- [jump menus](#)
- [keyword](#)
- [method](#)

- [mouse enter](#)
- [mouse leave](#)
- [mouseover](#)
- [null](#)
- [object](#)
- [object-based](#)
- [onclick](#)
- [onload](#)
- [onmouseout](#)
- [onmouseover](#)
- [onsubmit](#)
- [plugin](#)
- [popup window](#)
- [ready event](#)
- [reserved word](#)
- [scripting language](#)
- [scope](#)
- [selector](#)
- [server-side processing](#)
- [string](#)

- [this](#)
- [var](#)
- [variable](#)
- [window object](#)

## Review Questions

### Multiple Choice

1. Which of the following is a technique for creating reusable JavaScript code?
  1. define a function
  2. create a script block
  3. define an if statement
  4. use an onclick event handler
2. When the user positions the mouse pointer on a link, the browser detects which one of these events?
  1. mouseon
  2. mousehover
  3. mouseover
  4. mousedown
3. When the user moves the mouse pointer away from a link it had been hovering over, the browser detects which one of these events?

1. mouseoff
  2. mouseout
  3. mouseaway
  4. mouseup
4. Which method of the window can be used to display a message to the user?
1. alert()
  2. message()
  3. status()
  4. display()
5. Which of the following will assign the value 5 to the variable productCost?
1. productCost => 5;
  2. productCost <= 5;
  3. productCost == 5;
  4. productCost = 5;
6. A condition (`productCost > 5`) is used in an if statement. Which of the following values of `productCost` will result in this condition being evaluated as true?
1. 4
  2. 5
  3. 5.1

4. none of the above
7. Which of the following can describe JavaScript as used in a web page?
  1. a scripting language
  2. a markup language
  3. an easy form of Java
  4. a language created by Microsoft
8. Which of the following is the code for accessing the contents of an input box named `userData` on a form?
  1. `document.forms[0].userData`
  2. `document.forms[0].userData.value`
  3. `document.forms[0].userData.contents`
  4. `document.forms[0].userData.data`
9. Which of the following is the code to invoke a function called `isValid()` when the user clicks the submit button?
  1. `<input type="button" onmouseout="isValid();">`
  2. `<input type="submit" onsubmit="isValid();">`
  3. `<form method="post" action="URL" onsubmit="return isValid();">`
  4. `<form method="post" action="URL" onclick="return isValid();">`
10. A web page document is considered to be which of the following in the Document Object Model?
  1. object

2. property
  3. method
  4. attribute
11. What does the jQuery code snippet `$('.div')` select?
1. the element assigned to an id named div
  2. all div elements
  3. the first div element
  4. the last div element

## Fill in the Blank

12. The comparison operator that checks for the exactly equal to condition is  
.
13. Use the       jQuery method to configure the value of HTML attributes.
14. The       object is assumed to exist and it is not necessary to include it as an object when referring to its methods and properties.
15. The jQuery       is triggered when the DOM of a web page is completely loaded by a browser.
16. A form control button can be used with a(n)       event handler to run a script when the user clicks a button.
17. jQuery is a(n)       library.
18. Use the       jQuery method to configure CSS styles.

# Short Answer

19. Describe at least three popular uses for JavaScript.
20. Describe how you could debug JavaScript code when it is not working properly.

# Apply Your Knowledge

1. Predict the Result. Given the following code, what will happen when the user clicks the button?

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>JavaScript Practice</title>
<meta charset="utf-8">
<script>
function mystery() {
    alert('hello');
}
</script>
</head>
<body>
<h1>Using JavaScript</h1>
<input type="button" value="click me" onclick="mystery();">
</body>
</html>
```

2. Fill in the Missing Code. This web page should prompt the user for the name of a song and print the song name in the document. The missing code is indicated by "\_". Fill in the missing code.

```
<!DOCTYPE html>
<html lang="en">
<head>
<title>JavaScript Practice</title>
<meta charset="utf-8">
</head>
<body>
```

```

<h1>Using JavaScript</h1>
<script>
var userSong;
userSong = _("Please enter your favorite song title.");
document._(_);
</script>
</body>
</html>

```

3. Find the Error. When this page is loaded in the web browser, it is supposed to display an error message if the user has not typed any data in the Name input box. It is not working properly, so the form is submitted regardless of the missing input. Fix the errors so that the form does not submit if there is no information in the Name input box. Correct the errors and describe the process you followed.

```

<!DOCTYPE html>
<html lang="en">
<head>
<title>JavaScript Practice</title>
<meta charset="utf-8">
<script>
function validateForm() {
if (document.forms[0].userName.value == "") {
    aert("Name field cannot be empty.");
    return false;
} // end if
aert("Name and age are valid.");
return true;
} // end function validateForm
</script>
</head>
<body>
<h1>JavaScript Form Handling</h1>
<form method="post"
action="http://webdevbasics.net/scripts/demo.php"
onsubmit="return validateUser();">
    <label>Name: <input type="text" name="userName"></label>
    <br>
    <input type="submit" value="Send information">
</form>
</body>
</html>

```

# Hands-On Exercises

1. Practice writing event handlers.
  1. Write the HTML tag and event handler to pop up an alert message that says “Welcome” when the user clicks a button.
  2. Write the HTML tag and event handler to pop up an alert message that says “Welcome” when the user moves the mouse pointer over a hypertext link that says “Hover for a welcome message”.
  3. Write the HTML tag and event handler to pop up an alert message that says “Welcome” when the user moves the mouse pointer away from a hypertext link that says “Move your mouse pointer here for a welcome message”.
2. Practice writing jQuery selectors:
  1. Write the jQuery selector that will select all anchor tags in the main element.
  2. Write the jQuery selector that will select the first div on a web page.
  3. Create a web page that will pop up an alert message that welcomes the user to the web page. Use a script block in the head section for this task.
  4. Create a web page that will prompt the user for a name and age, and write a message using the name and age in the message. Use the `prompt()` method and variables to accomplish this.
  5. Create a web page that will prompt the user for a color name. Use this color name to write the text “This is your favorite color!”. The `fgColor` property of the document changes the text color of all text in a document. Use the `fgColor` property to accomplish this task.
  6. Continue with [Hands-On Practice 14.8](#). Add a text box for the user’s

city. Ensure that this text box is not empty when the form is submitted. If the city text box is empty, pop up an appropriate alert message and do not submit the form. If the city text box is not empty and the other data is valid, submit the form.

7. Using [Hands-On Practice 14.11](#) as a guide, create an image gallery web page with your own favorite photos. Remember to optimize each photo for web display.
8. Using [Hands-On Practice 14.12](#) as a guide, create a slideshow web page with your own favorite photos. Remember to optimize each photo for web display. If the jQuery plugin is not available for some reason, search for and use an alternate jQuery slideshow plugin.

## Web Research

1. Use the resources listed in this chapter as a starting point, but also search the Web for additional resources on JavaScript. Create a web page that lists at least five useful resources, along with a brief description of each. Organize your web page with a list that provides the name of the site, the URL, a brief description of what is offered, and a recommended page (such as a tutorial, free script, and so on) for each resource. Place your name in an e-mail link on the web page.
2. Use the resources listed in the chapter as a starting point, but also search the Web for additional resources on JavaScript. Find either a tutorial or a free download that uses JavaScript. Create a web page that uses the code or download that you found. Describe the effect and list the URL of the resource on the web page. Place your name in an e-mail link on the web page.
3. Use the resources listed in the chapter as a starting point, but also search the Web for additional resources on jQuery. Locate a jQuery plugin that is appealing and/or useful to you. Create a web page that uses the jQuery plugin. Describe the purpose of the plugin and list the URL of the plugin documentation on the web page. Place your name in an e-mail link on

the web page.



## WEBSITE CASE STUDY

# Adding JavaScript

Each of the following case studies has continued throughout most of the text. This chapter adds JavaScript to selected web pages from each of the case studies.

## JavaJam Coffee House

See [Chapter 2](#) for an introduction to the JavaJam Coffee House case study. Figure 2.31 shows a site map for the JavaJam website. The pages were created in earlier chapters. Use the web pages indicated in this exercise from the [Chapter 9](#) javajam9 folder. You have three tasks in this case study:

1. Create a new folder for this JavaJam case study.
2. Add the date that the document was last modified to the bottom of the Home page (index.html).
3. Add an alert message to the Menu page (menu.html).

## Hands-On Practice Case Study

- Task 1: The Website Folder. Create a folder called javajam14. Copy all the files from your [Chapter 9](#) javajam9 folder into the javajam14 folder.

- Task 2: Add a Date to the Home Page. Launch a text editor and open the index.html file. You will add the date that the document was last modified to the bottom of the index.html page.

You have the option to complete this task with JavaScript or to complete this task with jQuery.

- Option 1: Using JavaScript. Modify the page as follows:
  - In the footer area after the e-mail link, add a script block contained within a div element that will write the following message to the document:

“This page was last modified on: date”
  - Use the `document.lastModified` property to print the date.

Save the index.html page and test it in the browser. You should see the new information in the footer area below the e-mail address.

- Option 2: Using JavaScript and jQuery. Modify the page as follows:
  - In the footer area after the e-mail link, code a div element.
  - Add a script tag in the head section to access a jQuery CDN.
  - Code a jQuery script block that includes the ready event and uses the `html()` method to display the message “This page was last modified on:” and the `document.lastModified` value within the new div.

Save the index.html page and test it in the browser. You should see the new information in the footer area below the e-mail address.

- Task 3: Display an Alert Message on the Menu Page. Launch a text editor and open the music.html file. You will add JavaScript to the menu.html page so that an alert message will pop up when the user places the mouse over the phrase “Mug Club”. The alert message will indicate “JavaJam Mug Club Members get a 10% discount on each cup

of coffee!"

You have the option to complete this task with JavaScript or to complete this task with jQuery.

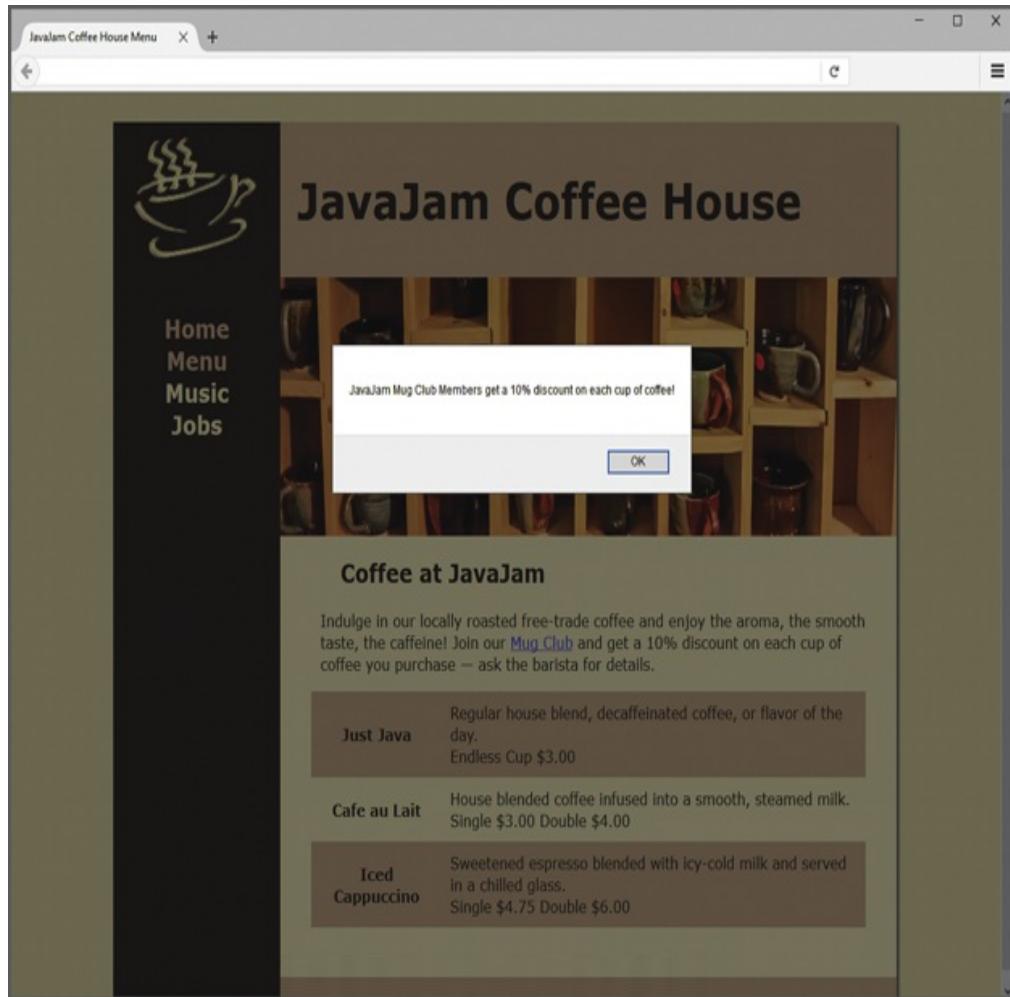
- Option 1: Using Javascript. Modify the page as follows:

- Add a hypertext link to the first paragraph with an onmouseover event handler as follows:

```
<a href="#" onmouseover=
"alert('JavaJam Mug Club Members get a 10% discount on ea
```

Save the menu.html page and test it in the browser. [Figure 14.30](#) shows the alert message when users place their mouse pointer over the hyperlinked phrase.

## Figure 14.30



JavaJam Menu page with the mouseover alert

[Figure 14.30 Full Alternative Text](#)

- Option 2: Using JavaScript and jQuery. Modify the page as follows:
  - Configure a hyperlink in the paragraph for the text “Mug Club”.
  - Code # as the value of the href attribute in the anchor tag.
  - Add a script tag in the head section to access a jQuery CDN
  - Code a jQuery script block that includes the ready event.
  - Code a jQuery statement to listen for the hover event on anchor

tags in the main element. Code JavaScript to display an alert box with the message “JavaJam Mug Club Members get a 10% discount on each cup of coffee!” when the hover occurs.

Save the menu.html page and test it in the browser. Figure 14.30 shows the alert message when users place their mouse pointer over the hyperlinked phrase.

## Fish Creek Animal Clinic

See [Chapter 2](#) for an introduction to the Fish Creek Animal Clinic case study. Figure 2.35 shows a site map for the Fish Creek website. The pages were created in earlier chapters. Use the web pages indicated in this exercise from the [Chapter 9](#) fishcreek9 folder. You have three tasks in this case study:

1. Create a new folder for this Fish Creek case study.
2. Add the date last modified to the Home page (index.html).
3. Add form validation to the Contact page (contact.html).

## Hands-On Practice Case Study

- Task 1: The Website Folder. Create a folder called fishcreek14. Copy all the files from your [Chapter 9](#) fishcreek9 folder into the fishcreek14 folder.
- Task 2: Add a Date to the Home Page. Launch a text editor and open the index.html file. You will add the date that the document was last modified to the bottom of the index.html page.

You have the option to complete this task with JavaScript or to complete this task with jQuery.

- Option 1: Using JavaScript. Modify the page as follows:

- In the page footer section after the e-mail link, add div element that contains a script block that will write the following message to the document:

“This page was last modified on: date”

- Use the `document.lastModified` property to print the date.

Save the index.html page and test it in the browser. You should see the new information in the footer area below the e-mail address.

- Option 2: Using JavaScript and jQuery. Modify the page as follows:

- In the footer area after the e-mail link, code a div element.
- Add a script tag in the head section to access a jQuery CDN.
- Code a jQuery script block that includes the ready event and uses the `html()` method to display the message “This page was last modified on:” and the `document.lastModified` value within the new div.

Save the index.html page and test it in the browser. You should see the new information in the footer area below the e-mail address.

- Task 3: Add Form Data Validation to the Contact Page. Launch a text editor and open the contact.html file. You will configure form data validation to the Contact page that requires an e-mail address to be entered.

You have the option to complete this task with JavaScript or to complete this task with jQuery.

- Option 1: Using JavaScript.

- Add a script block to the head section as follows:

```
<script>
function validateForm() {
```

```
if (document.forms[0].myEmail.value == "") {  
    alert("Please enter an e-mail address.");  
    return false;  
} // end if  
return true;  
} // end function validateForm  
</script>
```

- Edit the <form> tag as follows:

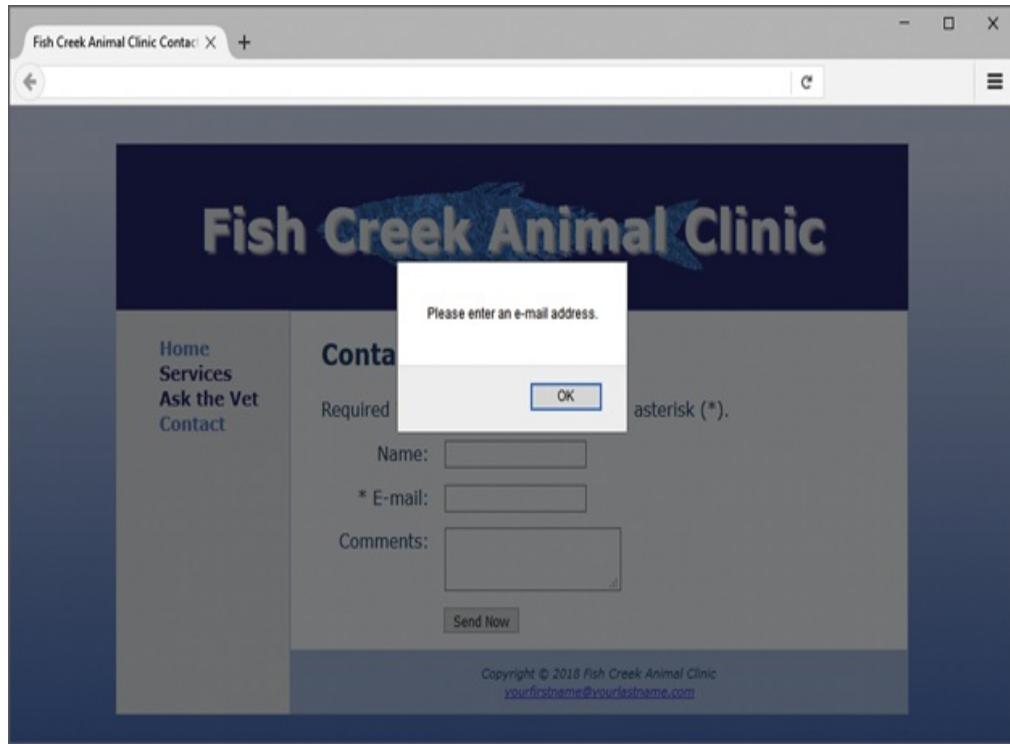
```
<form method="post" action=  
"http://webdevbasics.net/scripts/fishcreek.php"  
onsubmit="return validateForm();">
```

- Remove the HTML5 required attributes. Remove the \* from the name and comments labels. Verify that the input textbox that accepts the visitor's e-mail address has a name attribute with the value of myEmail. Sample code is

```
<input type="email" name="myEmail" id="myEmail">
```

- Save the file and load it in a browser. Test it by clicking the submit button without typing in the e-mail input box. The alert box should pop up and the form should not be submitted (see [Figure 14.31](#)). Test it again by entering information in the e-mail input box and submit again. The form should be submitted successfully and a confirmation page should appear.

## Figure 14.31



Fish Creek Animal Hospital Contact page

[Figure 14.31 Full Alternative Text](#)

- Option 2: Using JavaScript and jQuery. Modify the page as follows:
  - Add a script tag in the head section to access a jQuery CDN.
  - Add a script tag in the head section to access the jQuery Validate plugin (refer to [Hands-On Practice 14.13](#)).
  - Code a jQuery script block that includes the ready event and invokes the Validate plugin (refer to [Hands-On Practice 14.13](#)).
  - Edit the CSS to configure styles for error messages generated by the plugin. Configure a style rule for all label elements with the class name `error`. Configure a `label.error` selector. Set `float` to `none`, `position` to `relative`, `left` to `14em`, `top` to `-2.5em`, `width` to `15em`, `color` to red, and `font` typeface to Arial.
  - Edit the HTML. Remove the HTML5 required attributes. Remove

the \* from the name and comments labels. Add class="required email" to the input tag for the email textbox.

- Save the file and load it in a browser. Test it by clicking the submit button without typing anything in the form. Your page should be similar to [Figure 14.32](#). Notice how the jQuery Validate plugin displayed an error message for the e-mail form control. Test the form again by entering information in all the form controls but enter an invalid e-mail address. Note the error message. Next, correct the e-mail address and click the submit button. The form should be submitted successfully and a confirmation page should appear.

## Figure 14.32

The screenshot shows a web browser window titled "Fish Creek Animal Clinic Contact". The main content area features a dark blue header with the text "Fish Creek Animal Clinic" in white. Below the header, on the left, is a sidebar with links: "Home", "Services", "Ask the Vet", and "Contact". The main content area is titled "Contact Fish Creek" and contains the following text: "Required information is marked with an asterisk (\*).". It includes three input fields: "Name:" followed by an empty input box, "\* E-mail:" followed by an empty input box with the red error message "This field is required.", and "Comments:" followed by an empty input box. At the bottom right is a "Send Now" button. The footer of the page contains the copyright notice "Copyright © 2018 Fish Creek Animal Clinic" and the email address "yourfirstname@yourlastname.com".

Form validation processed by a jQuery plugin

[Figure 14.32 Full Alternative Text](#)

# Pacific Trails Resort

See [Chapter 2](#) for an introduction to the Pacific Trails case study. Figure 2.39 shows a site map for the Pacific Trails Resort website. The pages were created in earlier chapters. Use the web pages indicated in this exercise from the [Chapter 9](#) pacific9 folder. You have three tasks:

1. Create a new folder for this Pacific Trails case study.
2. Add an alert message that displays a message when the browser renders the Yurts page (yurts.html).
3. Add form data validation to the Reservations page (reservations.html) that requires an e-mail address to be entered.

## Hands-On Practice Case Study

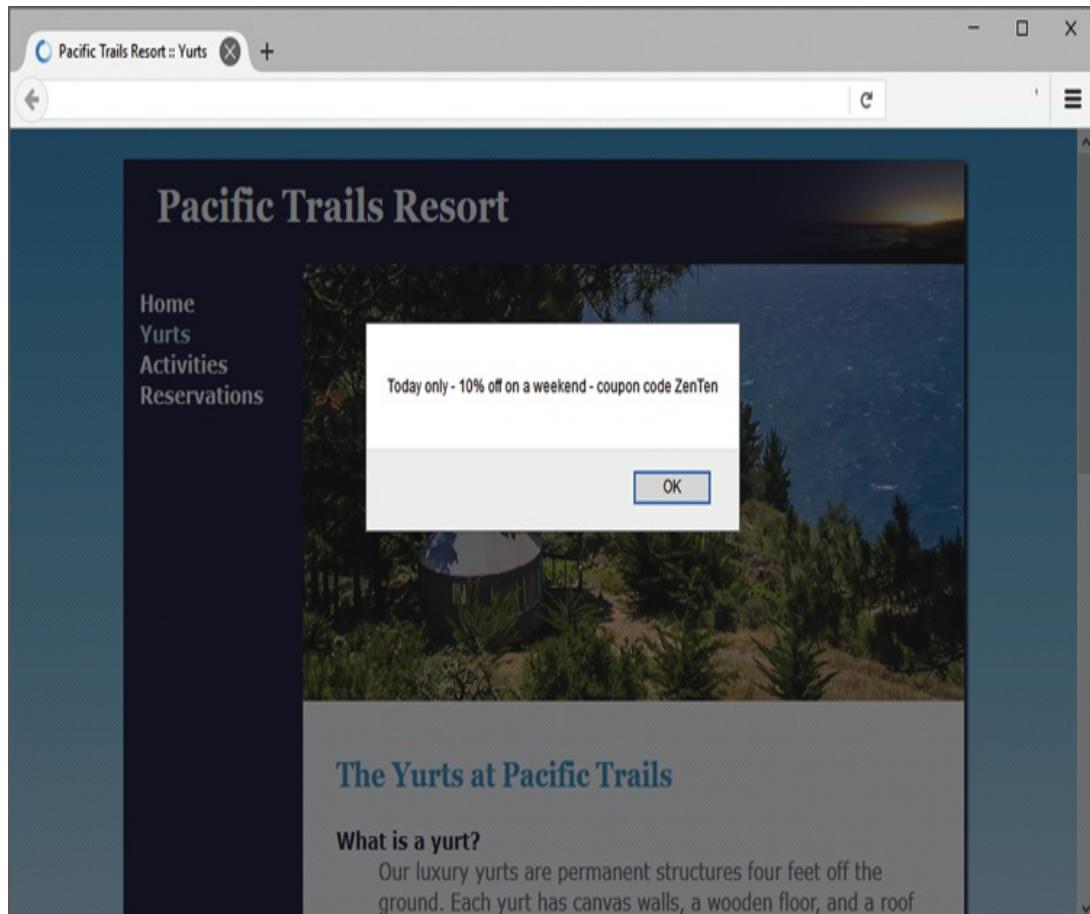
- Task 1: The Website Folder. Create a folder called pacific14. Copy all of the files from your [Chapter 9](#) pacific9 folder into the pacific14 folder.
- Task 2: Display an Alert Message on the Yurts Page. Launch a text editor and open the yurts.html file. You will configure the yurts.html page so that an alert message will pop up when the page is displayed in the browser.
- You have the option to complete this task with JavaScript or to complete this task with jQuery.
- Option 1: Using JavaScript.
  - Edit the body tag as follows:

```
<body onload="alert('Today only - 10% off on a weekend -')
```
  - The load event occurs when the web page begins to load in the browser. The onload event handler in this case pops up an alert

message.

- Save the file and test it in the browser. Your display should be similar to [Figure 14.33](#).

## Figure 14.33



A message displays when the Yurts page is loaded by the browser

### [Figure 14.33 Full Alternative Text](#)

- Option 2: Using JavaScript and jQuery. Modify the page as follows:
  - Add a script tag in the head section to access a jQuery CDN.

- Code a jQuery script block that includes the ready event. Code JavaScript within the ready event to display an alert box with the message, “Today only—10% off on a weekend—coupon code ZenTen”.
- Save the file and test it in the browser. Your display should be similar to [Figure 14.33](#).
- Task 3: Add Form Data Validation to the Reservations Page. Launch a text editor and open the reservations.html file. You will configure form data validation for the Reservations page that requires an e-mail address to be entered.

You have the option to complete this task with JavaScript or to complete this task with jQuery.

- Option 1: Using JavaScript.
  - Add a script block to the head section as follows:

```
<script>
function validateForm() {
  if (document.forms[0].myEmail.value == "") {
    alert("Please enter an e-mail address.");
    return false;
  } // end if
  return true;
} // end function validateForm
</script>
```

  - Edit the <form> tag as follows:

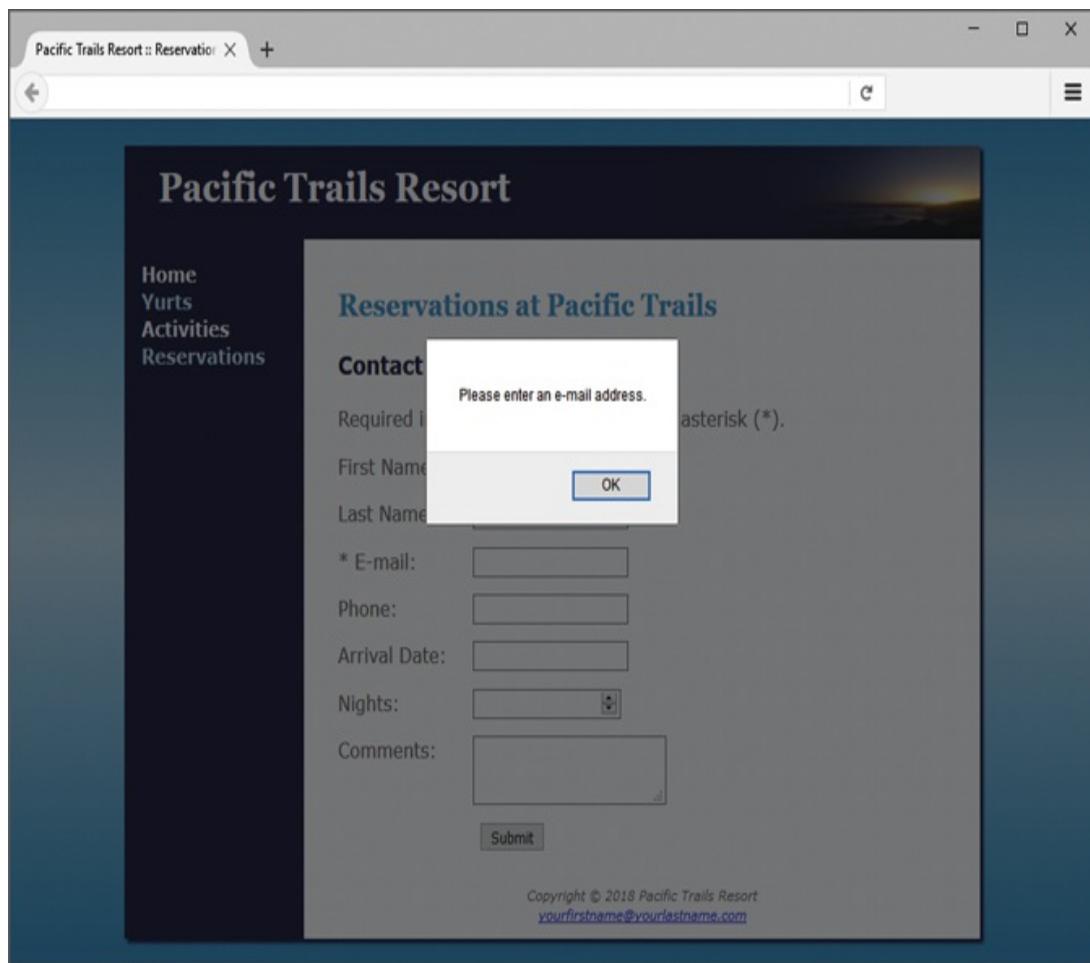
```
<form method="post" onsubmit="return validateForm();" act
```

  - Remove the HTML5 required attributes. Remove the \* from the labels for the first name, last name, and comments form controls. Verify that the input textbox that accepts the visitor’s e-mail address has a name attribute with the value of myEmail. Sample code is

```
<input type="email" name="myEmail" id="myEmail">
```

- Save the file and load it in a browser. Test it by clicking the submit button without typing in the e-mail input box. The alert box should pop up and the form should not be submitted (see [Figure 14.34](#)). Test it again by entering information in the e-mail input box and submit again. The form should be submitted successfully and a confirmation page should appear.

## Figure 14.34



The Reservations page indicates that an e-mail address was not entered

[Figure 14.34 Full Alternative Text](#)

- Option 2: Using JavaScript and jQuery. Modify the page as follows:
  - Add a script tag in the head section to access a jQuery CDN.
  - Add a script tag in the head section to access the jQuery Validate plugin (refer to [Hands-On Practice 14.13](#)).
  - Code a jQuery script block that includes the ready event and invokes the Validate plugin (refer to [Hands-On Practice 14.13](#)).
  - Edit the CSS to configure styles for error messages generated by the plugin. Configure a style rule for all label elements with the class name error. Use label.error as the selector. Set float to none, position to relative, left to 10em, top to -2.5em, width to 25em, color to red, and font typeface to Arial.
  - Edit the HTML. Remove the HTML5 required attributes. Remove the \* from the first name, last name, and comments labels. Add class="required\_email" to the input tag for the email textbox.
  - Save the file and load it in a browser. Test it by clicking the submit button without typing anything in the form. Your page should be similar to [Figure 14.35](#). Notice how the jQuery Validate plugin displayed an error message for the e-mail form control. Test the form again by entering information in form controls but enter an invalid e-mail address. Note the error message. Next, correct the e-mail address and click the submit button. The form should be submitted successfully and a confirmation page should appear.

## Figure 14.35

The screenshot shows a web browser window with the title 'Pacific Trails Resort :: Reservation'. The main content area has a blue header bar with the text 'Pacific Trails Resort' and a sunset image. Below this is a white form area with the heading 'Reservations at Pacific Trails'. On the left, there's a sidebar with links: 'Home', 'Yurts', 'Activities', and 'Reservations'. The main form includes fields for 'First Name' (empty), 'Last Name' (empty), 'E-mail' (empty), 'Phone' (empty), 'Arrival Date' (empty), 'Nights' (dropdown menu), 'Comments' (text area), and a 'Submit' button. A red error message 'This field is required.' is displayed next to the empty E-mail field. At the bottom of the form, there's a copyright notice: 'Copyright © 2018 Pacific Trails Resort' and 'yourfirstname@yourlastname.com'.

Form validation processed by a jQuery plugin

[Figure 14.35 Full Alternative Text](#)

## Path of Light Yoga Studio

See [Chapter 2](#) for an introduction to the Path of Light Yoga Studio case study. Figure 2.43 shows a site map for the Path of Light Yoga Studio website. The pages were created in earlier chapters. Use the web pages indicated in this exercise from the [Chapter 9](#) yoga9 folder. You have three tasks in this case study.

1. Create a new folder for this Path of Light Yoga Studio case study.

2. Add the date last modified to the footer section of the Schedule page - (schedule.html).
3. Add form data validation to the Contact page (contact.html) that requires an e-mail address to be entered.

## Hands-On Practice Case Study

- Task 1: The Website Folder. Create a folder called yoga14. Copy all the files from your [Chapter 9](#) yoga9 folder into the yoga14 folder.
- Task 2: Add a Date to the Schedule Page. Launch a text editor and open the schedule.html file. You will add the date that the document was last modified to the bottom of the schedule.html page. You have the option to complete this task with JavaScript or to complete this task with jQuery.
  - Option 1: Using JavaScript. Modify the page as follows:
    - In the page footer section after the e-mail link, add a div element containing a script block that will write the following message to the document:
    - “This page was last modified on: date”
    - Use the document.lastModified property to print the date.

Save the file and test it in a browser. You should see the new information in the footer area below the e-mail address.

- **Option 2: Using JavaScript and jQuery.** Modify the page as follows:
  - In the footer area after the e-mail link, code a div element.
  - Add a script tag in the head section to access a jQuery CDN.
  - Code a jQuery script block that includes the ready event and uses

the `innerHTML` method to display the message “This page was last modified on:” and the `document.lastModified` value within the new div.

Save the schedule.html page and test it in the browser. You should see the new information in the footer area below the e-mail address.

- Task 3: Add Form Data Validation to the Contact Page. Launch a text editor and open the contact.html file. You will configure form data validation to the Contact page that requires an e-mail address to be entered.

You have the option to complete this task with JavaScript or to complete this task with jQuery.

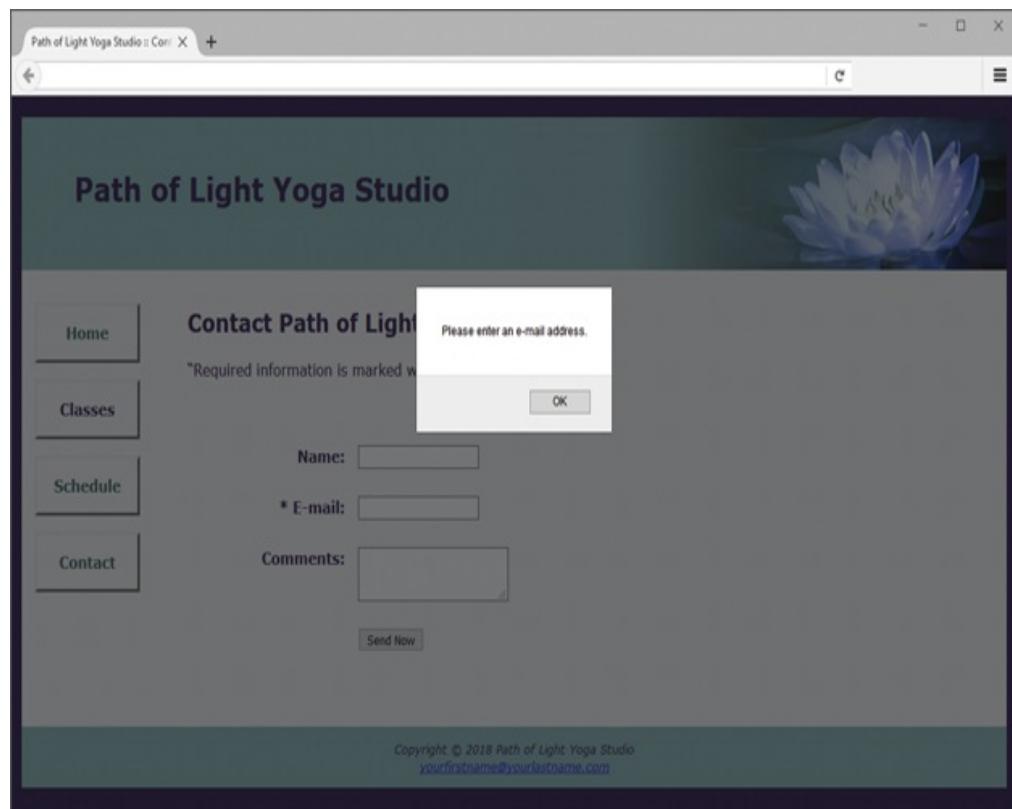
- Option 1: Using JavaScript.
  - Add a script block to the head section as follows:

```
<script>
function validateForm() {
    if (document.forms[0].myEmail.value == "") {
        alert("Please enter an e-mail address.");
        return false;
    } // end if
    return true;
} // end function validateForm
</script>
```
  - Edit the `<form>` tag as follows:

```
<form method="post" action=
"http://webdevbasics.net/scripts/yoga.php"
onsubmit="return validateForm();">
```
  - Remove the HTML5 required attributes. Remove the `*` from the name and comments labels. Verify that the input textbox that accepts the visitor’s e-mail address has a name attribute with the value of `myEmail`. Sample code is
    - `<input type="email" name="myEmail" id="myEmail">`

- Save the file and load it in a browser. Test it by clicking the submit button without typing in the e-mail input box. The alert box should pop up and the form should not be submitted (see [Figure 14.36](#)). Test it again by entering information in the e-mail input box and submit again. The form should be submitted successfully and a confirmation page should appear.

## Figure 14.36



Path of Light Yoga Studio Contact page

### [Figure 14.36 Full Alternative Text](#)

- Option 2: Using JavaScript and jQuery. Modify the page as follows:
  - Add a script tag in the head section to access a jQuery CDN.
  - Add a script tag in the head section to access the jQuery Validate

plugin (refer to [Hands-On Practice 14.13](#)).

- Code a jQuery script block that includes the ready event and invokes the Validate plugin (refer to [Hands-On Practice 14.13](#)).
- Edit the CSS to configure styles for error messages generated by the plugin. Configure a style rule for all label elements with the class name error. Configure a label.error selector. Set float to none, position to relative, left to 25em, top to -2.5em, width to 25em, text alignment to left, font style to italic, font size to .90em, color to red, and font typeface to Arial.
- Edit the HTML. Remove the HTML5 required attributes. Remove the \* from the name and comments labels. Add class="required email" to the input tag for the email textbox.
- Save the file and load it in a browser. Test it by clicking the submit button without typing anything in the form. Your page should be similar to [Figure 14.37](#). Notice how the jQuery Validate plugin displayed an error message for the e-mail form control. Test the form again by entering information in all the form controls but enter an invalid e-mail address. Note the error message. Next, correct the e-mail address and click the submit button. The form should be submitted successfully and a confirmation page should appear.

## Figure 14.37

The screenshot shows a web page titled "Path of Light Yoga Studio". On the left, there is a vertical navigation menu with four items: "Home" (selected), "Classes", "Schedule", and "Contact". The main content area is titled "Contact Path of Light Yoga Studio" and contains a form. The form has three input fields: "Name" (text input), "\* E-mail" (text input, marked with a red asterisk and a red error message "This field is required."), and "Comments" (text input). Below the form is a "Send Now" button. At the bottom of the page, there is a copyright notice: "Copyright © 2018 Path of Light Yoga Studio" and an email address "yourfirstname@yourlastname.com".

Form validation processed by a jQuery plugin

[Figure 14.37 Full Alternative Text](#)

# Web Project

See [Chapter 5](#) for an introduction to the Web Project case study. Review the goals of your website and determine whether the use of JavaScript in order to add interactivity would add value to your site. If so, add it appropriately. Check with your instructor regarding the required use of interactivity (with or without jQuery) in your Web project.

Select one or more from the following:

- Choose one of the examples from the chapter to add an alert message to grab the user's attention with regard to important information.
- Choose one of the examples from the chapter to add data validation to a

form on your website. Consider using one or more of the following validation rules:

- Required information such as name, address, e-mail, phone number
- Numeric information within bounds such as a quantity greater than 0 or age greater than 18

Decide where to apply the interactive technology to your site. Modify the page(s), save the page(s), and test it in a browser.

# Web Developer's Handbook

In the following Appendices you will find a variety of resources that can help you be a more productive web developer.

## APPENDICES

1. [Appendix A.](#) HTML5 Quick Reference contains a list of commonly used HTML5 elements and attributes
2. [Appendix B.](#) Special Entity Characters contains a list of codes needed to display symbols and other special characters on web pages
3. [Appendix C.](#) Comparison of XHTML and HTML5
4. [Appendix D.](#) CSS Property Reference contains a list of commonly used properties and values
5. [Appendix E.](#) WCAG 2.0 Quick Reference lists the WCAG 2.0 accessibility principles and the textbook chapters that discuss related coding or design techniques
6. [Appendix F.](#) Landmark Roles with ARIA
7. [Appendix G.](#) FTP Tutorial provides a brief introduction to using File Transfer Protocol
8. [Appendix H.](#) The Web-Safe Color Palette provides examples of each color along with hexadecimal and decimal RGB values

# A HTML5 Quick Reference

## Commonly Used HTML5 Elements

Element	Purpose	Commonly Used Attributes
<!-- -->	Comment	<i>Not applicable</i>
<a>	Anchor tag: configures hyperlinks	accesskey, class, href, id, name, rel, style, tabindex, target, title
<abbr>	Configures an abbreviation	class, id, style
<address>	Configures contact information	class, id, style
<area>	Configures an area in an image map	accesskey, alt, class, href, hreflang, id, media, shape, style, tabindex, target
<article>	Configures an independent section of a document as an article	class, id, style
<aside>	Configures tangential content	class, id, style

<audio>	Configures an audio control native to the browser	autoplay, class, controls, id, loop, preload, src, style, title
<b>	Configures bold text with no implied importance	class, id, style
<blockquote>	Configures a long quotation	class, id, style
<body>	Configures the body section	class, id, style
 	Configures a line break	class, id, style
<button>	Configures a button	accesskey, autofocus, class, disabled, form, formaction, formenctype, formmethod, formtarget, formnovalidate, id, name, type, style, value
<canvas>	Configures dynamic graphics	class, height, id, style, title, width
<caption>	Configures a caption for a table	
<cite>	Configures the title of a cited work	class, height, id, style, title, width

<code>	Configures a fragment of computer code	class, id, style
<col>	Configures a table column	class, id, span, style
<colgroup>	Configures a group of one or more columns in a table	class, id, span, style
<command>	Configures an area to represent commands	class, id, style, type
<data>	Provides a machine-readable format for text content	class, id, style, value
<datalist>	Configures a control that contains one or more option elements	class, id, style
<dd>	Configures a description area in a description list	class, id, style
<del>	Configures deleted text (with strikethrough)	cite, class, datetime, id, style
<details>	Configures a widget to provide additional information to the user on demand	class, id, open, style

<dfn>	Configures the definition of a term	class, id, style
<div>	Configures a generic section or division in a document	
<dl>	Configures a description list (formerly called a definition list)	class, id, style
<dt>	Configures a term in a description list	class, id, style
<em>	Configures emphasized text (usually displays in italics)	class, id, style
<fieldset>	Configures a grouping of form elements with a border	class, id, style
<figcaption>	Configures a caption for a figure	class, id, style
<figure>	Configures a figure	class, id, style
<footer>	Configures a footer area	class, id, style
<form>	Configures a form	accept-charset, action, autocomplete, class, enctype, id, method, name, novalidate, style, target

<code>&lt;h1&gt; ...</code>	Configures headings	<code>align (obsolete), class, id, style</code>
<code>&lt;head&gt;</code>	Configures the head section	<i>Not applicable</i>
<code>&lt;header&gt;</code>	Configures a header area	<code>class, id, style</code>
<code>&lt;hr&gt;</code>	Configures a horizontal line; indicates a thematic break in HTML5	<code>class, id, style</code>
<code>&lt;html&gt;</code>	Configures the root element of a web page document	<code>lang, manifest</code>
<code>&lt;i&gt;</code>	Configures italic text with no particular emphasis or importance	<code>class, id, style</code>
<code>&lt;iframe&gt;</code>	Configures an inline frame	<code>class, height, id, name, sandbox, src, style, width</code>
<code>&lt;img&gt;</code>	Configures an image	<code>alt, class, height, id, ismap, longdesc, name, sizes, src, srcset, style, usemap, width</code>
	Configures an input control: text box, email text box, URL text box, search text box, telephone	<code>accesskey, autocomplete, class, checked, disabled,</code>

<input>	number text box, scrolling text box, submit button, reset button, password box, calendar control, slider control, spinner control, color-well control, or hidden field form control	form, id, list, max, maxlength, min, name, pattern, placeholder, readonly, required, size, step, style, tabindex, type, value
<ins>	Configures text that has been inserted into a document	cite, class, datetime, id, style
<kbd>	Configures a representation of user input	class, id, style
<keygen>	Configures a control that generates a public-private key pair or submits the public key	autofocus, challenge, class, disabled, form, id, keytype, style
<label>	Configures a label for a form control	class, for, form, id, style
<legend>	Configures a caption for a fieldset element	class, id, style
<li>	Configures a list item in an unordered or ordered list	class, id, style, value
<link>	Associates a web page document with an external resource	class, href, hreflang, id, rel, media, sizes, style, type

<main>	Configures the main content area of a web page	class, id, style
<map>	Configures an image map	class, id, name, style
<mark>	Configures text as marked (or highlighted) for easy reference	class, id, style
<menu>	Configures a list of commands	class, id, label, style, type
<meta>	Configures metadata	charset, content, http-equiv, name
<meter>	Configures a visual gauge of a value	class, id, high, low, max, min, optimum, style, value
<nav>	Configures an area with navigation hyperlinks	class, id, style
<noscript>	Configures content for browsers that do not support client-side scripting	
<object>	Configures an embedded object	classid, codebase, data, form, height, name, id, style, title, tabindex, type, width
		class, id, reversed,

<ol>	Configures an ordered list	start, style, type
<optgroup>	Configures a group of related options in a select list	class, disabled, id, label, style
<option>	Configures an option in a select list	class, disabled, id, selected, style, value
<output>	Configures the results of a calculation	class, for, form, id, name, style
<p>	Configures a paragraph	class, id, style
<param>	Configures a parameter for plugins	name, value
<picture>	Configures display of different images depending on specific	class, id, style
<pre>	Configures preformatted text	class, id, style
<progress>	Configures a visual progress indicator	class, id, max, style, value
<q>	Configures quoted text	class, id, style
<rp>	Configures a ruby parenthesis	class, id, style

<rt>	Configures ruby text component of a ruby annotation	class, id, style
<ruby>	Configures a ruby annotation	class, id, style
<s>	Configures text that is no longer accurate or relevant	class, id, style
<samp>	Configures sample output from a computer program or system	class, id, style
<script>	Configures a client-side script (typically, JavaScript)	async, charset, defer, src, type
<section>	Configures a section of a document	class, id, style
<select>	Configures a select list form control	class, disabled, form, id, multiple, name, size, style, tabindex
<small>	Configures a disclaimer in small text size	class, id, style
<source>	Configures a media file and MIME type	class, id, media, sizes, src, srcset, style, type
<span>	Configures a generic section of a	class, id, style

	document with inline display	
<strong>	Configures text with strong importance (typically displayed as <code>class</code> , <code>id</code> , <code>style</code> <code>bold</code> )	
<style>	Configures embedded styles in a document	<code>media</code> , <code>scoped</code> , <code>type</code>
<sub>	Configures subscript text	<code>class</code> , <code>id</code> , <code>style</code>
<summary>	Configures text as a summary, caption, or legend for a details control	<code>class</code> , <code>id</code> , <code>style</code>
<sup>	Configures superscript text	<code>class</code> , <code>id</code> , <code>style</code>
<table>	Configures a table	<code>class</code> , <code>id</code> , <code>style</code> , <code>summary</code>
<tbody>	Configures the body section of a table	<code>class</code> , <code>id</code> , <code>style</code>
<td>	Configures a table data cell in a table	<code>class</code> , <code>colspan</code> , <code>id</code> , <code>headers</code> , <code>rowspan</code>
<textarea>	Configures a scrolling text box form control	<code>accesskey</code> , <code>autofocus</code> , <code>class</code> , <code>cols</code> , <code>disabled</code> , <code>id</code> , <code>maxlength</code> , <code>name</code> , <code>placeholder</code> , <code>readonly</code> ,

		required, rows, style, tabindex, wrap
<tfoot>	Configures the footer section of a table	class, id, style
<th>	Configures a table header cell in a table	class, colspan, id, headers, rowspan, scope, style
<thead>	Configures the head section of a table	class, id, style
<time>	Configures a date and/or time	class, datetime, id, style
<title>	Configures the title of a web page document	
<tr>	Configures a row in a table	class, id, style
<track>	Configures a subtitle or caption track for media	class, default, id, kind, label, src, srclang, style
<u>	Configures text conventionally styled with an underline	class, id, style
<ul>	Configures an unordered list	class, id, style

<var>	Configures text as a variable or placeholder	class, id, style
<video>	Configures a video control native to the browser	autoplay, class, controls, height, id, loop, poster, preload, src, style, width
<wbr>	Configures a line-break opportunity	class, id, style

# B Special Entity Characters

The table that follows lists a selection of special entity characters in order of numeric code. The most commonly used special characters are shown in bold. The W3Cs list of special characters is found at [http://www.w3.org/MarkUp/html-spec/html-spec\\_13.html](http://www.w3.org/MarkUp/html-spec/html-spec_13.html).

Entity Name	Numeric Code	Descriptive Code	Character
<b>Quotation mark</b>	&#34;	&quot;	"
<b>Ampersand</b>	&#38;	&amp;	&
<b>Apostrophe</b>	&#39;		,
<b>Less than sign</b>	&#60;	&lt;	<
<b>Greater than sign</b>	&#62;	&gt;	>
Vertical bar	&#124;		
<b>Left single quotation mark</b>	&#145;	&lsquo;	'
<b>Right single quotation mark</b>	&#146;	&rsquo;	,

<b>Nonbreaking space</b>	&#160;	&nbsp;	a blank space
Inverted exclamation	&#161;	&iexcl;	¡
Cent sign	&#162;	&cent;	¢
Pound sterling sign	&#163;	&pound;	£
General currency sign	&#164;	&curren;	‡
Yen sign	&#165;	&yen;	¥
Broken vertical bar	&#166;	&brvbar;	¦
Section sign	&#167;	&sect;	§
Umlaut	&#168;	&uml;	“
<b>Copyright symbol</b>	&#169;	&copy;	©
Feminine ordinal	&#170;	&ordf;	ª
Left angle quote	&#171;	&laquo;	<<
Not sign	&#172;	&not;	¬

Soft hyphen	&#173;	&shy;	-
<b>Registered trademark symbol</b>	&#174;	&reg;	®
Macron	&#175;	&macr;	—
Degree sign	&#176;	&deg;	°
Plus or minus	&#177;	&plusmn;	±
Superscript two	&#178;	&sup2;	²
Superscript three	&#179;	&sup3;	³
Acute accent	&#180;	&acute;	'
Micro (Mu)	&#181;	&micro;	µ
Paragraph sign	&#182;	&para;	¶
Middle dot	&#183;	&middot;	·
Cedilla	&#184;	&cedil;	,

Superscript one	&#185;	&sup1;	1
Masculine ordinal	&#186;	&ordm;	º
Right angle quote	&#187;	&raquo;	»
Fraction one-fourth	&#188;	&frac14;	¼
Fraction one-half	&#189;	&frac12;	½
Fraction three-fourths	&#190;	&frac34;	¾
Inverted question mark	&#191;	&iquest;	¿
Small e, grave accent	&#232;	&egrave;	è
Small e, acute accent	&#233;	&eacute;	é
En dash	&#8211;	&ndash;	—
<b>Em dash</b>	<b>&amp;#8212;</b>	<b>&amp;mdash;</b>	<b>—</b>

# **C Comparison of XHTML and HTML5**

As you traverse the Web and view the source code of pages created by others, you may notice that the style and syntax of the coding sometimes uses XHTML syntax.

XHTML, eXtensible HyperText Markup Language, utilizes the tags and attributes of HTML along with the syntax of XML (eXtensible Markup Language). For the most part, you will use the same tags and attributes in HTML and XHTML; the major change is the syntax and additional restrictions in XHTML. The W3C has created a Recommendation for HTML5, which is intended to be the successor to HTML4 and to replace XHTML. HTML5 incorporates features of both HTML and XHTML, adds new elements and attributes, provides new features, such as form edits and native video, and is intended to be backward compatible.

In this section we'll concentrate on the differences between XHTML and HTML5—introducing you to some specific examples of syntax differences.

# **XML Declaration**

Since XHTML follows XML syntax, each document should begin with an XML declaration. HTML5 has no such requirement.

## **XHTML**

```
<?xml version="1.0" encoding="UTF-8"?>
```

## **HTML5**

*Not required*

# Document Type Definition

XHTML 1.0, the first version of XHTML (and the version that has been most widely used on the Web), has three distinct document type definitions: strict, transitional, and frameset. HTML5 has one document type definition. The Document Type Definitions (DTDs) follow:

## XHTML 1.0 Strict DTD

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"  
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
```

## XHTML 1.0 Transitional DTD

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"  
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
```

## XHTML 1.0 Frameset DTD

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Frameset//EN"  
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-frameset.dtd">
```

## HTML5

```
<!doctype html>
```

# The <html> Tag

XHTML requires that the root element (immediately after the DTD) is an <html> tag which refers to the XML namespace. HTML5 has no such namespace requirement. To assist in interpreting the page content by search engines and screen readers, use the lang attribute to indicate the spoken language of the web page content.

## XHTML

```
<html xmlns="http://www.w3.org/1999/xhtml" lang="en" xml:lang="en"
```

## HTML5

```
<html lang="en">
```

# **Uppercase versus Lowercase**

The XHTML standard follows XML syntax, which requires lowercase.  
HTML5 allows both upper and lowercase letters; lowercase is preferred.

## **XHTML**

<table>

## **HTML5**

Either <TABLE> or <table>

Note: lowercase is preferred.

# Quotation Marks with Attributes

The XHTML standard requires that the values for all attributes be enclosed in quotation marks. This is recommended (but not required) when coding HTML5.

## XHTML

```
<p id="article">
```

## HTML5

Either `<p id=article>` or `<p id="article">`

# Start and End Tags

The XHTML standard requires both opening (start) and closing (end) tags for all elements except self-closing (void) elements (such as br, hr, img, input, link, and meta). HTML5 requires both start and end tags for all non-void elements except body, dd, dt, head, html, li, option, p, tbody, td, tfoot, th, thead, and tr. However, it is good coding practice to always code both start and end tags for non-void elements.

## XHTML

```
<p>This is the first paragraph.</p>
<p>This is the second paragraph.</p>
```

## HTML5

```
<p>This is the first paragraph.</p>
<p>This is the second paragraph.</p>
```

# **Self-Closing Elements**

The XHTML standard requires that all self-closing elements are properly closed using " />". HTML5 does not require this and refers to self-closing elements as void elements.

## **XHTML**

```
This is the first line.<br />
This is the second line.
```

## **HTML5**

```
This is the first line.<br>
This is the second line.
```

# Attribute Values

The XHTML standard requires that all attributes be assigned values. HTML5 allows some attributes, such as checked, to be minimized. Since these attributes only have a single value, HTML5 does not require that the value be provided.

## XHTML 1.0

```
<input type="radio" checked="checked" name="gender" id="gender" v
```

## HTML5

Either

```
<input type="radio" checked id="gender" name="gender" value="male
```

or

```
<input type="radio" checked="checked" id="gender" name="gender" v
```

# **Elements New to HTML5**

The following elements are new in HTML5: article, aside, audio, bdi, canvas, command, datalist, details, embed, figcaption, figure, footer, header, keygen, main, mark, meter, nav, output, picture, progress, ruby, rt, rp, section, source, time, track, video, and wbr. See Appendix A and <http://www.w3.org/TR/html5-diff/#new-elements> for information about these new elements.

# Attributes New to HTML5

HTML5 includes a variety of new attributes and new attribute values. The autocomplete, autofocus, min, max, multiple, pattern, placeholder, required, and step attributes are new for the input element. The textarea element now supports the following new attributes: autofocus, maxlength, placeholder, required, and wrap. The autofocus and required attributes are new for the select element. The input element supports the following new values for the type attribute: color, date, datetime, datetime-local, email, month, number, range, search, tel, time, url, and week. The srcset, sizes, and longdesc attributes are new for the img element. See  
<http://www.w3.org/TR/html5-diff/#new-elements> and  
<http://www.w3.org/TR/htmlmarkup/elements.html#elements> for more information about these new attributes and attribute values.

# **Elements Considered Obsolete in HTML5**

The following elements are obsolete in HTML5: acronym, applet, basefont, big, center, dir, font, frame, frameset, isindex, noframes, strike, and tt. An obsolete element may be displayed by a browser. However, the code will not pass syntax validation and browsers may drop support of obsolete elements/attributes at any time. See

<http://www.whatwg.org/specs/webapps/current-work/multipage/obsolete.html#non-conforming-features> for suggestions on replacing these elements.

# **Attributes Considered Obsolete in HTML5**

A number of attributes present in XHTML and HTML4 are obsolete in HTML5, including align, alink, background, bgcolor, border, cellpadding, cellspacing, clear, frameborder, hspace, link, marginheight, marginwidth, noshade, nowrap, summary, text, valign, and vspace. See <http://www.w3.org/TR/html5-diff/#obsolete-attributes> for a complete list.

# **Elements Changed in HTML5**

The purpose of the address, b, cite, dl, hr, I, label, menu, noscript, s, script, small, strong, and u elements was changed in HTML5. Visit <http://www.w3.org/TR/html5-diff/#changed-elements> for detailed information.

# **Attributes Changed in HTML5**

The use of over 20 attributes was changed in HTML5. Of note is that the `id` value can now begin with any nonspace character. Visit <http://www.w3.org/TR/html5-diff/#changedattributes> for detailed information.

# Video and Audio Support

XHTML required the use of the object element to provide a video or audio player on a web page and was dependent on the visitor's browser having the corresponding plug-in or helper application installed. HTML5 supports video and audio native to the browser using the video, audio, and source elements. Because all browsers do not support the same media encoding formats, multiple versions of the media file should be provided when using HTML5 video and audio elements. The following code samples configure an audio file player on a web page.

## XHTML

```
<object data="soundloop.mp3" height="50" width="100" type="audio/  
title="Music Sound Loop">  
  <param name="src" value="soundloop.mp3" />  
  <param name="controller" value="true" />  
  <param name="autoplay" value="false" />  
</object>
```

## HTML5

```
<audio controls="controls">  
  <source src="soundloop.mp3" type="audio/mpeg">  
  <source src="soundloop.ogg" type="audio/ogg">  
  <a href="soundloop.mp3">Download the Soundloop</a> (MP3)  
</audio>
```

# Adobe Flash Support

XHTML required the use of the object element to play a Flash .swf file on a web page, although the embed element had been used and supported by browsers for many years. HTML5 still supports the use of the object element. However, the embed element is now officially supported in HTML5.

## XHTML

```
<object type="application/x-shockwave-flash" data="lighthouse.swf"
width="320" height="240" title="Door County Lighthouse Cruise">
  <param name="movie" value="lighthouse.swf">
  <param name="bgcolor" value="#ffffffff">
  <param name="quality" value="high">
</object>
```

## HTML5

```
<embed type="application/x-shockwave-flash" src="lighthouse.swf"
```

# **Document Outline**

The document outline is the structure of a document indicated by the heading-level elements, such as h1, h2, and so on. XHTML coding practice is to use only one h1 element on a web page and to configure the heading-level elements in outline format. Outlining is different in HTML5. Instead of a solely heading-level outline, the HTML5 outline is also configured using sectioning elements (such as section, article, nav, and aside), each of which may contain headings. Try out an HTML5 outliner at <http://gsnedders.html5.org/outliner>.

# JavaScript and the <script> Tag

XHTML considers JavaScript statements to be arbitrary character data (CDATA). The XML parser should not process them. The CDATA statement tells the XML parser to ignore the JavaScript. This is not part of HTML and not supported by many current browsers.

## XHTML

```
<script type="text/javascript">
<![CDATA[
    . . . JavaScript statements go here ]]>
</script>
```

## HTML5

```
<script>
    . . . JavaScript statements go here
</script>
```

An alternative method for using JavaScript on a web page that is supported by XHTML standards is to place JavaScript statements in a separate (.js) file. This file can be configured by the <script> tag. HTML5 also supports this syntax.

## XHTML

```
<script src="myscript.js" type="text/javascript"></script>
```

## HTML5

```
<script src="myscript.js"></script>
```

## Wrap-Up

Visit the W3C's website for the most up-to-date information about XHTML (<http://www.w3.org/TR/xhtml1>), HTML5 (<http://www.w3.org/TR/html5>), HTML5.1 (<http://www.w3.org/TR/html51>), and HTML 5.2 (<https://www.w3.org/TR/html52/>).

# D CSS Property Reference

## Commonly Used CSS Properties

Property	Description
background	Shorthand to configure all the background properties of an element Value: <code>background-color background-image background-repeat background-position</code>
background-attachment	Configures a background image as fixed in place or scrolling Value: <code>scroll</code> (default) or <code>fixed</code>
background-clip	CSS3; configures the area to display the background Value: <code>border-box</code> , <code>padding-box</code> , or <code>content-box</code>
background-color	Configures the background color of an element Value: Valid color value
background-image	Configures a background image for an element Value: <code>url(file name or path to the image)</code> , <code>none</code> (default) Optional new CSS3 functions: <code>linear-gradient()</code> and

`radial-gradient()`

`background-origin` CSS3; configures the background positioning area  
Value: padding-box, border-box, or content-box

`background-position` Configures the position of a background image  
Value: Two percentages, pixel values, or position values (left, top, center, bottom, right)

`background-repeat` Configures how the background image will be repeated  
Value: repeat (default), repeat-y, repeat-x, or no-repeat

`background-size` CSS3; configures the size of the background images  
Value: Numeric value (px or em), percentage, contain, cover

`border` Shorthand to configure the border of an element  
Value: border-width border-style border-color

`border-bottom` Configures the bottom border of an element  
Value: border-width border-style border-color

`border-collapse` Configures the display of borders in a table  
Value: separate (default) or collapse

**border-color** Configures the border color of an element

Value: Valid color value

CSS3; configures an image in the border of an element

**border-image** See <http://www.w3.org/TR/css3-background/#the-border-image>

**border-left** Configures the left border of an element

Value: border-width border-style border-color

CSS3; configures rounded corners

**border-radius** Value: One to four numeric values (px or em) or percentages that configure the radius of the corners. If a single value is provided, it configures all four corners. The corners are configured in order of top left, top right, bottom right, and bottom left.

Related properties: border-top-left-radius, border-top-right-radius, border-bottom-left-radius, and border-bottom-right-radius

**border-right** Configures the right border of an element

Value: border-width border-style border-color

**border-spacing** Configures the space between table cells in a table

Value: Numeric value (px or em)

border-style	Configures the style of the borders around an element Value: none (default), inset, outset, double, groove, ridge, solid, dashed, or dotted
border-top	Configures the top border of an element Value: border-width border-style border-color
border-width	Configures the width of an element's border Value: numeric pixel value (such as 1px), thin, medium, or thick
bottom	Configures the offset position from the bottom of a containing element Value: Numeric value (px or em), percentage, or auto (default)
box-shadow	CSS3; configures a drop shadow on an element Values: Three or four numerical values (px or em) to indicate horizontal offset, vertical offset, blur radius, spread distance (optional), and a valid color value. Use the inset keyword to configure an inner shadow.
box-sizing	CSS3; alters the default CSS box model that calculates widths and heights of elements Values: content-box (default), padding-box, border-box
caption-	Configures the placement of a table caption

side	Value: top (default) or bottom
clear	Configures the display of an element in relation to floating elements Value: none (default), left, right, or both
color	Configures the color of text within an element Value: Valid color value
display	Configures how and whether an element will display Value: inline, none, block, flex, grid, inline-flex, list-item, table, table-row, or table-cell
flex	CSS3; configures proportional size and flexibility of a flex item Values: numeric value sets the proportional flexible size of the item. See <a href="http://www.w3.org/TR/css3-flexbox/#flex-common">http://www.w3.org/TR/css3-flexbox/#flex-common</a>
flex-direction	CSS3; configures direction of flex items within a flex container Values: row (default), column, row-reverse, column-reverse
flex-wrap	CSS3; configures whether flex items are displayed on multiple lines within a flex container Values: nowrap (default), wrap, wrap-reverse

	Configures the horizontal placement (left or right) of an element
<code>float</code>	Value: none (default), <code>left</code> , or <code>right</code>
	Configures the font typeface of text
<code>font-family</code>	Value: List of valid font names or generic font family names
	Configures the font size of text
<code>font-size</code>	Value: Numeric value (px, pt, em) percentage value, xx-small, x-small, small, medium (default), large, x-large, xx-large, smaller, or larger
	CSS3; configures a normal, condensed, or expanded face from a font family
<code>font-stretch</code>	Value: normal (default), wider, narrower, condensed, semi-condensed, expanded, or ultra-expanded
	Configures the font style of text
<code>font-style</code>	Value: normal (default), italic, or oblique
	Configures whether text is displayed in small-caps font
<code>font-variant</code>	Value: normal (default) or small-caps
	Configures the weight (boldness) of text
<code>font-weight</code>	Value: normal (default), bold, bolder, lighter, 100, 200, 300, 400, 500, 600, 700, 800, or 900

	Configures one or more in the grid for an item or area
<code>grid-column</code>	Value: See <a href="https://www.w3.org/TR/css-grid-1/#typedef-grid-row-start-grid-line">https://www.w3.org/TR/css-grid-1/#typedef-grid-row-start-grid-line</a>
	Configures one or more rows in a grid for an item or area
<code>grid-row</code>	Value: See <a href="https://www.w3.org/TR/css-grid-1/#typedef-grid-row-start-grid-line">https://www.w3.org/TR/css-grid-1/#typedef-grid-row-start-grid-line</a>
	Specifies how much space to reserve for each column in the grid
<code>grid-template-columns</code>	Value: Numeric pixels, percentage, auto, and flex factor units; see <a href="https://www.w3.org/TR/css-grid-1/#propdef-grid-template-columns">https://www.w3.org/TR/css-grid-1/#propdef-grid-template-columns</a>
	Specifies how much space to reserve for each row in the grid
<code>grid-template-rows</code>	Value: Numeric pixels, percentage, auto, and flex factor units; see <a href="https://www.w3.org/TR/css-grid-1/#propdef-grid-template-rows">https://www.w3.org/TR/css-grid-1/#propdef-grid-template-rows</a>
	Configures the height of an element
<code>height</code>	Value: Numeric value (px or em), percentage, or auto (default)
	CSS3; configures how the browser should display any extra space that may exist in the flex container
<code>justify-content</code>	Values: <code>flex-start</code> (default), <code>flex-end</code> , <code>center</code> , <code>space-between</code> , <code>space-around</code>

<code>left</code>	Configures the offset position from the left of a containing element Value: Numeric value (px or em), percentage, or auto (default)
<code>letter-spacing</code>	Configures the space between text characters Value: Numeric value (px or em) or normal (default)
<code>line-height</code>	Configures the line height of the text Value: Numeric value (px or em), percentage, multiplier numeric value, or normal (default)
<code>list-style</code>	Shorthand to configure the properties of a list Value: <code>list-style-type</code> <code>list-style-position</code> <code>list-style-image</code>
<code>list-style-image</code>	Configures an image as a list marker Value: <code>url(file name or path to the image)</code> or none (default)
<code>list-style-position</code>	Configures the position of the list markers Value: <code>inside</code> or <code>outside</code> (default)
<code>list-style-type</code>	Configures the type of list marker displayed Value: none, circle, disc (default), square, decimal,

decimal-leading-zero, georgian, lower-alpha, lower-roman, upper-alpha, or upper-roman

Shorthand to configure the margin of an element

`margin` Value: One to four numeric values (px or em) or percentages, auto, or 0

Configures the bottom margin of an element

`margin-bottom` Value: Numeric value (px or em), percentage, auto, or 0

Configures the left margin of an element

`margin-left` Value: Numeric value (px or em), percentage, auto, or 0

Configures the right margin of an element

`margin-right` Value: Numeric value (px or em), percentage, auto, or 0

Configures the top margin of an element

`margin-top` Value: Numeric value (px or em), percentage, auto, or 0

Configures the maximum height of an element

`max-height` Value: Numeric value (px or em), percentage, or none (default)

Configures the maximum width of an element

`max-width` Value: Numeric value (px or em), percentage, or none (default)

<code>min-height</code>	Configures the minimum height of an element Value: Numeric value (px or em), percentage, or none (default)
<code>min-width</code>	Configures the minimum width of an element Value: Numeric value (px or em), percentage, or none (default)
<code>opacity</code>	CSS3; configures the transparency of an element and its child elements Value: Numeric value between 1 (fully opaque) and 0 (completely transparent)
<code>order</code>	CSS3; display the flex items in a different order than they are coded Value: Numeric value
<code>outline</code>	Shorthand to configure an outline of an element Value: <code>outline-width</code> , <code>outline-style</code> , <code>outline-color</code>
<code>outline-color</code>	Configures the outline color of an element Value: Valid color value
<code>outline-style</code>	Configures the style of the outline around an element Value: <code>none</code> (default), <code>inset</code> , <code>outset</code> , <code>double</code> , <code>groove</code> , <code>ridge</code> , <code>solid</code> , <code>dashed</code> , or <code>dotted</code>

outline-width	Configures the width of an element's outline Value: Numeric pixel value (such as 1px), thin, medium, or thick
overflow	Configures how content should display if it is too large for the area allocated Value: visible (default), hidden, auto, or scroll
padding	Shorthand to configure the padding of an element Value: One to four numeric values (px or em) or percentages, or 0
padding-bottom	Configures the bottom padding of an element Value: Numeric value (px or em), percentage, or 0
padding-left	Configures the left padding of an element Value: Numeric value (px or em), percentage, or 0
padding-right	Configures the right padding of an element Value: Numeric value (px or em), percentage, or 0
padding-top	Configures the top padding of an element Value: Numeric value (px or em), percentage, or 0

**page-break-after** Configures the page break after an element

Value: auto (default), always, avoid, left, or right

**page-break-before** Configures the page break before an element

Value: auto (default), always, avoid, left, or right

**page-break-inside** Configures the page break inside an element

Value: auto (default) or avoid

**position** Configures the type of positioning used to display an element

Value: static (default), absolute, fixed, or relative

**right** Configures the offset position from the right of a containing element

Value: Numeric value (px or em), percentage, or auto (default)

**text-align** Configures the horizontal alignment of text within an element

Value: left (default), right, center, or justify

**text-decoration** Configures the decoration added to text

Value: none (default), underline, overline, line-through, or blink

**text-indent** Configures the indentation of the first line of text

	<p>Value: Numeric value (px or em) or percentage</p>
text-outline	<p>CSS3; configures an outline around text displayed within an element</p> <p>Value: One or two numerical values (px or em) to indicate thickness and (optionally) blur radius, and a valid color value</p>
	<p>CSS3; configures a drop shadow on the text displayed within an element</p>
text-shadow	<p>Values: Three or four numerical values (px or em) to indicate horizontal offset, vertical offset, blur radius, or spread distance (optional), and a valid color value</p>
	<p>Configures the capitalization of text</p>
text-transform	<p>Value: none (default), capitalize, uppercase, or lowercase</p>
top	<p>Configures the offset position from the top of a containing element</p> <p>Value: Numeric value (px or em), percentage, or auto (default)</p>
	<p>CSS3; configures change or transformation in the display of an element</p>
transform	<p>Value: A transform function such as scale(), translate(), matrix(), rotate(), skew(), or perspective()</p>

CSS3; shorthand property to configure the presentational transition of a CSS property

`transition`

Value: List the value for the `transition-property`, `transition-duration`, `transition-timing-function`, and `transition-delay`, separated by spaces; default values can be omitted, but the first time unit applies to `transition-duration`

CSS3; Indicates the beginning of the transition

`transition-`

`delay`

Value: 0 (default) configures no delay; otherwise use a numeric value to specify time (usually in seconds)

CSS3; Indicates the length of time to apply the transition

`transition-`

`duration` Value: 0 (default) configures an immediate transition; otherwise use a numeric value to specify time (usually in seconds)

CSS3; Indicates the CSS property that the transition applies to

`transition-`

`property`

Value: A list of applicable properties is available at <http://www.w3.org/TR/css3-transitions>

CSS3; Configures changes in the speed of the transition by describing how intermediate property values are calculated

`transition-`

`timing-`

`function` Value: `ease` (default), `linear`, `ease-in`, `ease-out`, or `ease-in-out`

Configures the vertical alignment of an element

Value: Numeric value (px or em), percentage, baseline

`vertical-align` (default),  
sub, super, top, text-top, middle, bottom, or text-bottom

`visibility` Configures the visibility of an element

Value: visible (default), hidden, or collapse

`white-space` Configures white space inside an element  
Value: normal (default), nowrap, pre, pre-line, or pre-wrap

`width` Configures the width of an element  
Value: Numeric value (px or em), percentage, or auto (default)

`word-spacing` Configures the space between words within text  
Value: Numeric value (px or em) or auto (default)

`z-index` Configures the stacking order of an element  
Value: Numeric value or auto (default)

# E WCAG 2.0 Quick Reference

## Perceivable

- 1.1 Text Alternatives: Provide text alternatives for any nontext content so that it can be changed into other forms people need, such as large print, Braille, speech, symbols, or simpler language. *You configure images ([Chapter 4](#)) and multimedia ([Chapter 11](#)) on web pages and provide for alternative text content.*
- 1.2 Time-Based Media: Provide alternatives for time-based media. *You don't create time-based media in this textbook, but keep this option in mind for the future if you create animation.* You create a jQuery slideshow in [Chapter 14](#), which includes an option for the user to manually advance or reverse the slide display.
- 1.3 Adaptable: Create content that can be presented in different ways (for example, simpler layout) without losing information or structure. In [Chapter 2](#), you use *block elements (such as headings, paragraphs, and lists) to create single-column web pages.* You create multicolumn web pages in [Chapter 6](#) and [Chapter 7](#). You use HTML tables in [Chapter 8](#) to configure information.
- 1.4 Distinguishable: Make it easier for users to see and hear content, including separating foreground from background. *You are aware of the importance of good contrast between text and background.*

# Operable

- 2.1 Keyboard Accessible: Make all functionality available from a keyboard. In [Chapter 2](#), you configure hyperlinks to named fragment identifiers on a web page. The label element is introduced in [Chapter 9](#).
- 2.2 Enough Time: Provide users enough time to read and use content. *Keep this requirement in mind for the future if you create animation or use client-side scripting for interactive text-based features.*
- 2.3 Seizures: Do not design content in a way that is known to cause seizures. *Be careful when you use animation created by others; web pages should not contain elements that flash more than three times in a one-second period.*
- 2.4 Navigable: Provide ways to help users navigate, find content, and determine where they are. *In Chapter 2, you use block elements (such as headings and lists) to organize web page content. In Chapter 6, you learn to structure navigation links within an unordered list. In Chapter 7, you configure hyperlinks to named fragment identifiers on a web page.*

# Understandable

- 3.1 Readable: Make text content readable and understandable. You explore techniques used in writing for the Web in [Chapter 5](#).
- 3.2 Predictable: Make web pages appear and operate in predictable ways. *The web pages you create are predictable, with clearly labeled and functioning hyperlinks.*
- 3.3 Input Assistance: Help users avoid and correct mistakes. You learn to use *HTML form controls in [Chapter 9](#) that cause a supporting browser to validate basic form information and display error messages.* In [Chapter 14](#), you configure client-side scripting to edit web page forms and provide additional feedback to users.

# Robust

- 4.1 Compatible: Maximize compatibility with current and future user agents, including assistive technologies. *You provide for future compatibility by writing code that follows W3C Recommendations (standards).*

*The WCAG 2.0 Quick Reference List*

*(<https://www.w3.org/WAI/WCAG20/quickref/>) entries are copyright © 2016 World Wide Web Consortium (MIT, ERCIM, Keio, Beihang).*

*<http://www.w3.org/Consortium/Legal/2015/doc-license>.*

# Resources

You'll find the most up-to-date information about WCAG 2.0 at the following resources:

- Overview of WCAG 2.0 <http://www.w3.org/TR/WCAG20/Overview>
- Understanding WCAG 2.0 <http://www.w3.org/TR/UNDERSTANDING-WCAG20>
- How to Meet WCAG 2.0 <http://www.w3.org/WAI/WCAG20/quickref>
- Techniques for WCAG 2.0 <http://www.w3.org/TR/WCAG-TECHS>

# F Landmark Roles with ARIA

The W3C's Web Accessibility Initiative (WAI) has developed a standard to provide for additional accessibility, called **Accessible Rich Internet Applications (ARIA)**. ARIA provides methods intended to increase the accessibility of web pages and web applications by identifying the role or purpose of an element on a web page (<http://www.w3.org/WAI/intro/aria>).

We'll focus on ARIA landmark roles in this appendix. A **landmark** on a web page is a major section such as a banner, navigation, main content, and so on. **ARIA landmark roles** allow web developers to configure semantic descriptions of HTML elements using the **role attribute** to indicate landmarks on the web page. For example, to indicate the landmark role of `main` on an element containing the main content of a web page document, code `role="main"` on the opening tag.

People visiting a web page with a screen reader or other assistive technology can access the landmark roles to quickly skip to specific areas on a web page (watch the video at [http://www.youtube.com/watch?v=IhWMou12\\_Vk](http://www.youtube.com/watch?v=IhWMou12_Vk) for a demonstration). Visit [http://www.w3.org/TR/wai-aria/roles#landmark\\_roles](http://www.w3.org/TR/wai-aria/roles#landmark_roles) for a complete list of ARIA landmark roles.

Commonly used ARIA landmark roles include:

- `banner` (a header/logo area)
- `navigation` (a collection of navigation elements)
- `main` (the main content of a document)
- `complementary` (a supporting part of the web page document, designed to be complementary to the main content)
- `contentinfo` (an area that contains information about the content such as authorship)

as copyright)

- **form** (an area that contains a form)
- **search** (an area of a web page that provides search functionality)

The code for the body section of sample web page with the banner, navigation, main, and contentinfo roles configured is shown below. Notice that while the role attribute will not change the way the web page displays, it offers additional information about the document that can be used by assistive technologies.

```
<body>
  <header role="banner">
    <h1>Heading Logo Banner</h1>
  </header>
  <nav role="navigation">
    <a href="index.html">Home</a> <a href="contact.html">Contact
  </nav>
  <main role="main">
    This is the main content area.
  </main>
  <footer role="contentinfo">
    Copyright © 2018 Your Name Here
  </footer>
</body>
```

# G FTP Tutorial

## Publish with File Transfer Protocol (FTP)

Once you obtain your web hosting space, you'll need to upload your files. Although your web host may offer a web-based file manager application for client use, a common method of transferring files is to use File Transfer Protocol (FTP). A protocol is a convention or standard that enables computers to speak to one another. FTP is used to copy and manage files and folders over the Internet. FTP uses two ports to communicate over a network — one for the data (typically port 20) and one for control commands (typically port 21). See <http://www.iana.org/assignments/port-numbers> for a list port numbers used on the Internet.

## FTP Applications

There are many FTP applications available for download or purchase on the Web, including the following:

- Filezilla
  - Windows, Mac, Linux Platform
  - <http://filezilla-project.org>
  - Free download
- SmartFTP
  - Windows

- <http://www.smartftp.com>
- Free download
- CuteFTP
  - Windows, Mac
  - <http://www.cuteftp.com>
  - Free trial download, academic pricing available

## Connecting with FTP

Your web host will provide you with the following information along with any other specifications, such as whether the FTP server requires the use of active mode or passive mode:

- FTP Host: Your FTP Host
- Username: Your Account Username
- Password: Your Account Password

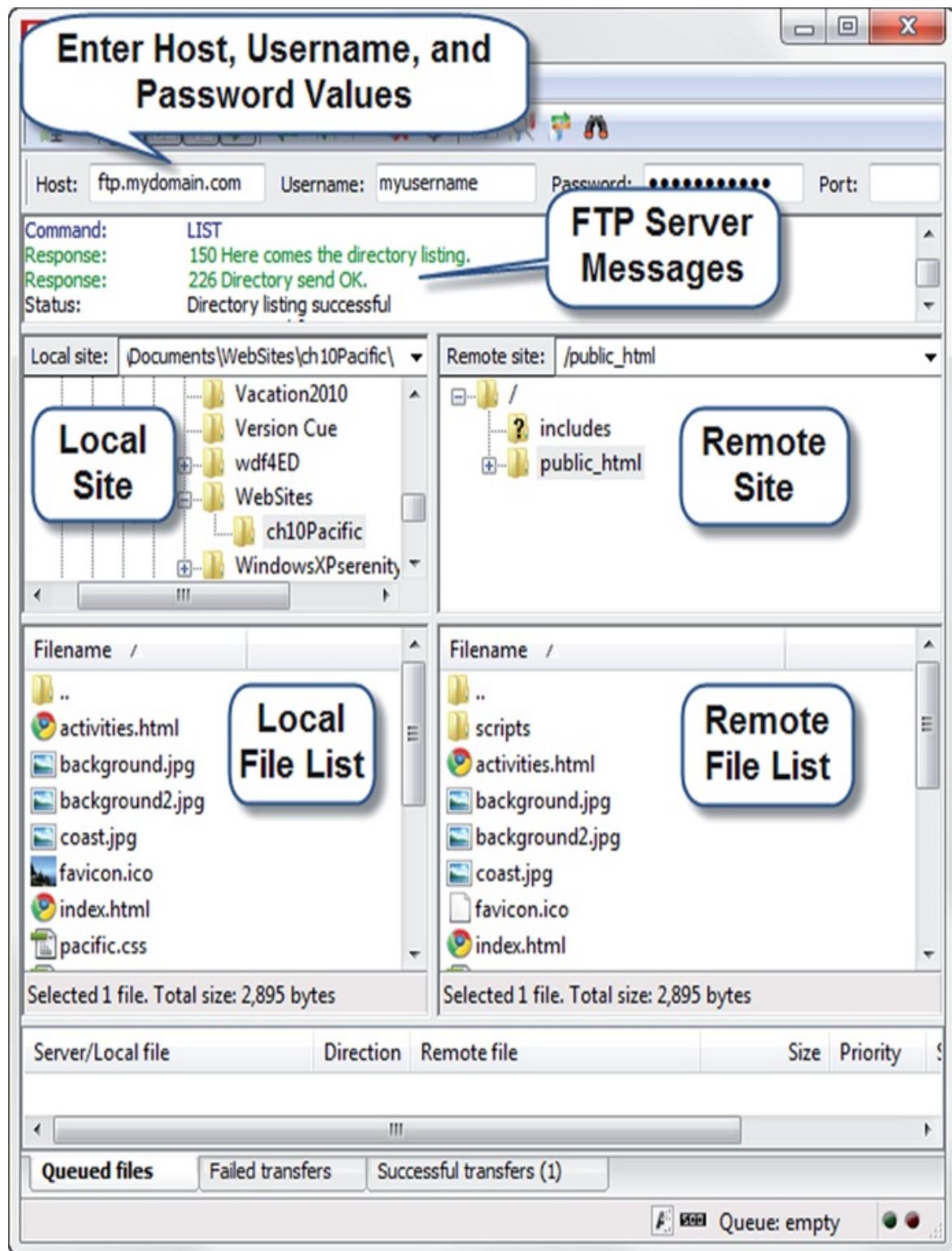
## Overview of Using an FTP Application

This section focuses on FileZilla, a free FTP application with versions for the Windows, Mac, and Linux platforms. A free download of FileZilla is available at <http://filezilla-project.org/download.php>. After you download an FTP application of your choice, install the program on your computer, using the instructions provided.

# **Launch and Login**

Launch Filezilla or another FTP application. Enter the information required by your web host (such as FTP host, username, and password) and initiate the connection. An example screenshot of FileZilla after a connection is shown in [Figure G.1](#)

## **Figure G.1**



The FileZilla FTP application. Terry Felke-Morris

[Figure G.1 Full Alternative Text](#)

As you examine [Figure G.1](#), notice the text boxes near the top of the application for the Host, Username, and Password information. Under this area is a display of messages from the FTP server. Review the area to confirm a successful connection and the results of file transfers. Next, notice that the application is divided into a left panel and a right panel. The left panel is the local site—it displays information about your local computer and allows you to navigate to your drives, folders, and files. The right panel is the remote site—it displays information about your website and provides a way to navigate to its folders and files.

## Uploading a File

It's really easy to transfer a file from your local computer to your remote website: Just select the file with your mouse in the left panel (local site list) and drag it to the right panel (remote site list).

## Downloading a File

If you need to download a file from your website to your local computer, just drag the file with your mouse from the right panel (remote site list) to the left panel (local site list).

## Deleting a File

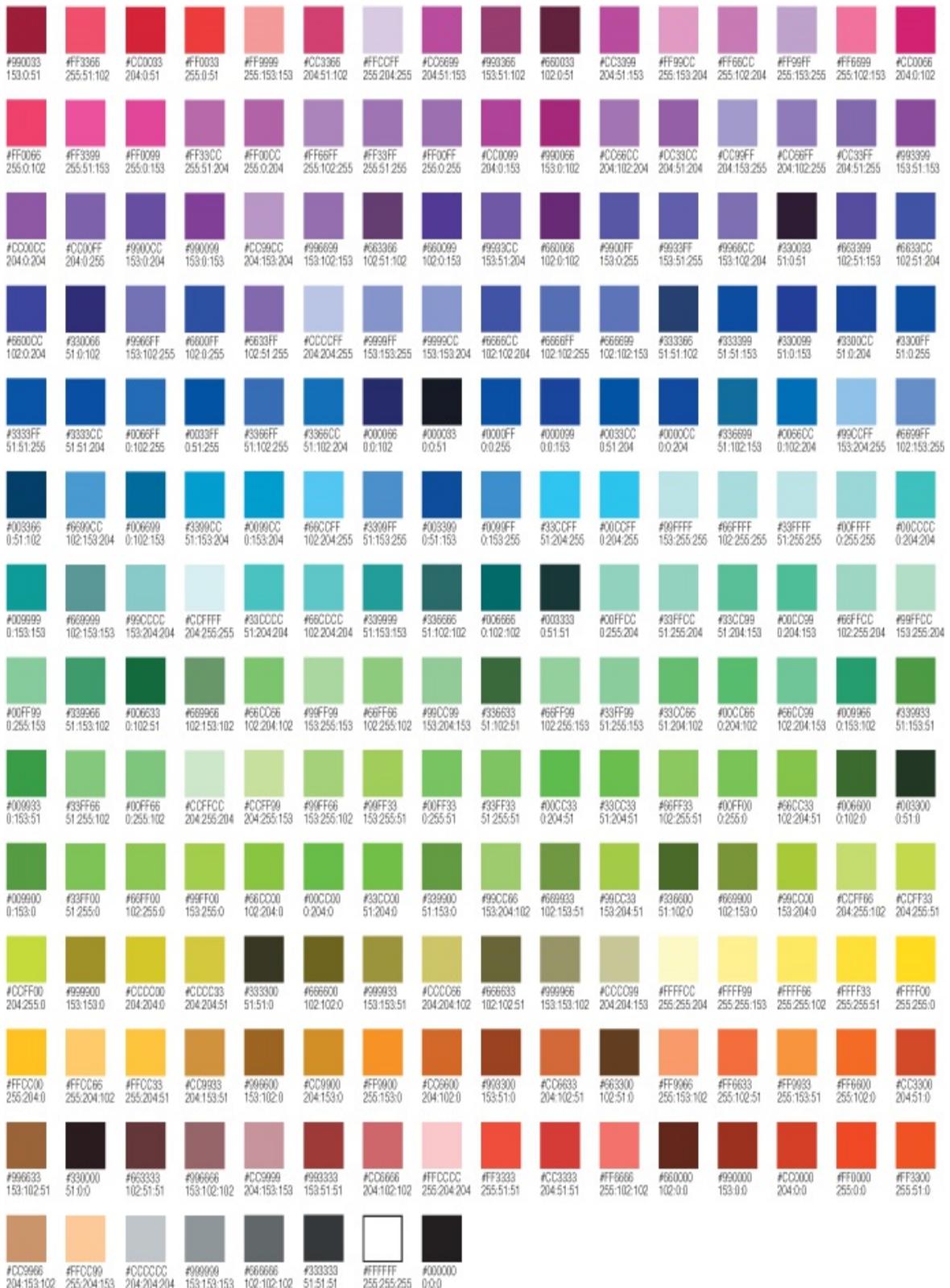
To delete a file on your website, right-click on the file name (in the right panel) and select Delete from the context-sensitive menu.

## And There's More!

Feel free to explore the other functions offered by FileZilla (and most FTP applications). Right-click on a file in the remote site list to display a context-

sensitive menu with several options, including renaming a file, creating a new directory (also known as a folder), and viewing a file.

# H Web-Safe Color Palette



Web-safe colors look the most similar on various computer platforms and computer monitors. Back in the day of eight-bit color it was crucial to use

web-safe colors. Since most modern video drivers support millions of colors the use of web-safe colors is now optional. The hexadecimal and decimal RGB values are shown for each web-safe color in the palette above.

# **Answers**

# **Chapter 1**

# **Checkpoint 1.1**

1. The Internet is a public, globally connected network of computer networks. The Web is a graphical user interface to information stored on computers running web servers connected to the Internet. The Web is a subset of the Internet.
2. The commercialization and exponential growth of the Internet that began in the early 1990s was due largely to a convergence of technologies, including the development of personal computers with graphical operating systems, widespread availability of Internet - connection services, the removal of the restriction of commercial use on NSFnet, the development of the World Wide Web by Tim Berners-Lee at CERN, and the development of a graphical browser (called Mosaic) at the NCSA. These events combined to provide the commercial incentive and an easy way to share and access information in a manner that had never been experienced.
3. Universal design is a very important concept for web developers because the websites that they create should be usable by all people. Not only is this the right thing to do, but in developing websites for the government or for educational institutions, access to technology (including websites) is mandated by law.

# Checkpoint 1.2

1. An example of a web client is a computer running a browser software application such as Internet Explorer. Typically, the computer is connected to the Internet only when needed. The web browser software uses HTTP to request web pages and related resources from a web server. A web server is a computer that is continually connected to the Internet and that runs some type of web server software application. It uses the HTTP protocol to receive requests for web pages and related resources. It responds to these requests and sends the resources.
2. In this chapter, several protocols are discussed that use the Internet but not the Web. E-mail messages are transmitted via the Internet. SMTP (Simple Mail Transfer Protocol) is used to send e-mail messages. POP (Post Office Protocol) and IMAP (Internet Message Access Protocol) can be used to receive e-mail messages. FTP (File Transfer Protocol) can be used to exchange (send and receive) files with a computer connected to the Internet.
3. A URL (Uniform Resource Locator) represents the address of a resource that is available on the Internet. A URL consists of a protocol, a domain name, and the hierarchical location of the file or resource. An example of a URL is <http://www.webdevfoundations.net/9e/chapter1.html>. A domain name locates an organization or other entity on the Internet and is associated with a unique numeric IP address. A domain name is part of a URL. An example of a domain name is [webdevfoundations.net](http://www.webdevfoundations.net).

# Review Questions

1. [b](#)
2. [b](#)
3. [c](#)

4. a
5. a
6. True
7. True
8. False
9. False
10. True
11. HTML
12. subdomain
13. SGML
14. microblogging
15. TCP

# **Chapter 2**

# **Checkpoint 2.1**

1. HTML (Hypertext Markup Language) was developed by Tim Berners-Lee at CERN, using SGML. HTML is the set of markup symbols or codes placed in a file intended for display on a web browser. HTML configures a platform-independent display of information. Each markup code is referred to as an element (or tag).
2. No expensive software is required to create and code web pages. You can use a Windows or Mac text editor application that is part of the operating system. Free text editors and web browsers are also available for download.
3. The head section is located between the `<head>` and `</head>` tags on a web page. This area is used to contain information that describes the web page, such as the title of the page that will display in the menu bar of the browser window. The body section is located between the `<body>` and `</body>` tags. This area is used to code text and tags that show directly in the browser's display of the web page. The purpose of the body section is to describe the contents of the web page.

# Checkpoint 2.2

1. The heading element is used to display headings and subheadings of documents. The size of the heading is configured with the particular heading level used—ranging from 1 to 6. `<h1>` is the largest heading. `<h6>` is the smallest heading. Text contained between heading tags will be displayed in a bold font and will have a line break above and below.
2. Ordered lists and unordered lists can be used to organize information on a web page. Unordered lists display a small symbol or bullet in front of each item. Use the `<ul>` tag to configure an unordered list. By default, ordered lists display a sequence of numbers in front of each item. Use the `<ol>` tag to configure an ordered list. Configure individual items in both ordered and unordered lists using the `<li>` tag.
3. The purpose of the blockquote element is to format a long quotation by indenting a section of text on a web page. Empty space is placed above and below the text contained in the blockquote element. The text is indented from both the left and right margins.

# Checkpoint 2.3

1. Special characters are used to display items such as quotation marks, greater than (>), less than (<), and the copyright symbol © on a web page. These special characters, sometimes called entity characters, are interpreted by the browser when the page is rendered.
2. Use an absolute link to display a web page document from a website other than your own. The http protocol is used in the href value.  
Example: <a href = "http://www.google.com">Google</a>
3. Use a relative link to display a web page document from your website. The http protocol is not used in the href value.

## Review Questions

1. b
2. c
3. c
4. a
5. b
6. c
7. d
8. b
9. b
10. b

11. **strong**
12. **special characters**
13. **describe a characteristic of a web page, such as the character encoding.**
14. **&ampnbsp**
15. **em**
16. **It is good practice to place the e-mail address both on the web page and within the anchor tag. Not everyone has an e-mail program configured with his or her browser. By placing the e-mail address in both places, you increase usability for all your visitors.**

# **Chapter 3**

# **Checkpoint 3.1**

1. Reasons to use CSS on a web page include the following: greater control of typography and page layout, separation of style from structure, potentially smaller web page documents, and easier site maintenance.
2. Because visitors may set their browsers to certain colors, it is a good idea when changing a text or background color to configure both the text color and the background color properties to provide good contrast between text and background.
3. Embedded styles are coded once in the header section of the web page and apply to the entire page. This practice is more efficient than using inline styles to code individual styles on HTML elements.

# Checkpoint 3.2

1. Embedded styles can be used to configure the text and color formatting for an entire web page. Embedded styles are placed in the head section of a web page. The `<style>` tag is used to contain the CSS selectors and properties that configure the embedded styles.
2. External styles can be used to configure the text and color formatting for some or all of the pages on a website in one file. This single file can be changed, and all the web pages associated with it will display the new styles the next time they are rendered in a browser. External styles are placed in a separate text file that uses a .css file extension. Web pages use the `<link>` tag to indicate that they are using an external style sheet.
3. `<link rel="stylesheet" href="mystyles.css">`

# Review Questions

1. b
2. b
3. ab
4. c
5. c
6. c
7. d
8. d
9. a

10. b

11. c

12. span

13. text-align

14. text-indent

15. 1996

# **Chapter 4**

# Checkpoint 4.1

1. It is reasonable to code pages that look similar on various browsers; it is not reasonable to try to code pages that look exactly the same on various browsers and operating systems. Modern web developers code pages to look satisfactory in commonly used browsers and may add enhancements that are applied by the most recent browser versions. This approach is called “progressive enhancement.” Look for more web design tips in [Chapter 5](#).
2. The first style rule is missing an ending semicolon (;).
3. True. CSS can be utilized to configure color, text, and even visual elements such as rectangular shapes (with the background-color property) and lines (with the border property).

# Checkpoint 4.2

1. The CSS background-image property configures the file that is displayed. The CSS background-repeat property configures the way the image is displayed on the page.

Suggested solution:

```
h1 { background-image: url(circle.jpg);  
     background-repeat: no-repeat;  
}
```

2. The CSS background-image property configures the file that is displayed. The CSS background-repeat property configures the way the image is displayed on the page.

Suggested solution:

```
body { background-image: url(bg.gif);  
      background-repeat: repeat-y;  
}
```

3. The browser will display the background color immediately. Then, the browser will render the background image and repeat the image as specified in the CSS. The background color will appear in areas not covered by the background image.

# Checkpoint 4.3

1. Answers will vary with the site that you choose to review. There should be good contrast between the navigation text and image background. Alt attributes should be descriptive and contain the text displayed in the image. A row of plain text navigation links in the footer section of the web page could help provide for accessibility.
2. The image, map, and area elements work together to create a functioning image map. The `<img>` tag configures the image that will be used for the map and contains a `usemap` attribute whose value corresponds to the `id` value on the `<map>` tag associated with the image. The `<map>` tag is a container tag and surrounds one or more `<area>` tags. There is one self-contained `<area>` tag for each clickable hotspot on the image map.
3. False. There is a trade-off between the quality of the image and the file size. The goal should be to save images that use the smallest file size which provides acceptable display quality.

# Review Questions

1. [a](#)
2. [b](#)
3. [b](#)
4. [b](#)
5. [a](#)
6. [c](#)
7. [b](#)

8. b
9. c
10. d
11. tiled
12. text links
13. thumbnail
14. box-shadow
15. meter

# **Chapter 5**

# **Checkpoint 5.1**

1. The four basic principles of design are repetition, contrast, proximity, and alignment. Descriptions of school home pages and how these principles are applied will vary.
2. Answers will vary. Best practices for writing for the Web include the following: short paragraphs, bullet points, common fonts, white space, multiple columns if possible, bold or emphasized important text, and correct spelling and grammar. The chosen best practice, URL of each example website, and description of how the website exemplifies the best practice will vary.
3. <http://www.walmart.com> is an e-commerce site. It is designed to appeal to the general public—note the white background and high contrast and the use of tabbed navigation, product hierarchy, and site search. This design meets the needs of its target audience: teen and adult shoppers. <http://www.sesamestreet.org/muppets> is geared toward young children and their parents. It is bright and colorful with much interactivity and animation, all of which is appealing to the target audience. <http://www.willyporter.com> is a musician's site designed to appeal to everyone. The home page features a compelling photo of the musician along with a grouping of small sections that point you to the new album, gigs, and related social media sites. This site appeals to its audience.

# **Checkpoint 5.2**

1. Answers will vary.
2. Answers will vary.
3. Best practices for using graphics on web pages include the following: careful choice of colors, use of necessary images only, use of images optimized for display on web pages, a usable site even if images are not displayed, and use of the alt attribute to configure text descriptions for images. Recommendations for school home pages will vary.

# **Review Questions**

1. d
2. b
3. b
4. b
5. c
6. d
7. c
8. a
9. c
10. b
11. hierarchical

12. do not
13. Web Accessibility Initiative (WAI)
14. Student answers will vary. Issues to be aware of in designing for the mobile web include small screen size, low bandwidth, awkward controls, limited processor and memory, and reduced support of font typefaces and color.
15. Student answers will vary. The four principles that are essential to - complying with WCAG 2.0 are as follows: Perceivable, Operable, Understandable, and Robust.
  1. Content must be **Perceivable**
  2. Interface components in the content must be **Operable**
  3. Content and controls must be **Understandable**
  4. Content should be **Robust** enough to work with current and future user agents, including assistive technologies

# **Chapter 6**

# **Checkpoint 6.1**

1. The components of the box model, from innermost to outermost, are the content, padding, border, and margin.
2. The purpose of the float property is to shift the display of an element to the right or left side of the container element.
3. The clear property and the overflow property can be used to “clear” a float.

# Checkpoint 6.2

1. The div element is a multipurpose generic element that configures a section or division of a web page. HTML5 introduces new elements for configuring web page areas intended to be more specific in their semantic purpose. Depending on the target audience for a website, it may be appropriate to use new HTML5 elements instead of div elements to configure page areas for navigation (nav element), logo header (header element), main content (main element), footer (footer element), sidebar (aside element), articles (article element), images/charts (figure and figcaption elements), and page sections (section element). As time goes on and browser support increases, use of these new HTML5 elements is expected to be the norm.
2. Answers will vary. Some of the suggestions listed in the debugging section may be used.
3. Configure an HTML element selector if the style is expected to be applied every time that tag is used. Configure an id if the style is for a specific element that is expected to occur only once on a page. Configure a class if the style is expected to be applied to a variety of different HTML elements.

# Review Questions

1. [a](#)
2. [a](#)
3. [b](#)
4. [b](#)
5. [d](#)

6. c

7. b

8. c

9. d

10. b

11. id

12. left

13. margin

14. :hover

15. article

# **Chapter 7**

# Checkpoint 7.1

1. Organizing a website into folders can help increase productivity by arranging the files into file type (such as images or media), file function (web page or script), and/or website section (products, services, and so on). Using folders and subfolders can be helpful when a project team (see [Chapter 10](#)) is developing a large website.
2. The target attribute configures a hyperlink to open the file in a new browser window or tab.
3. Advantages of using CSS sprites on a website include reduced bandwidth (a condensed sprite image typically will have lower file size than multiple individual images will have), reduced number of http requests by the browser (only one request must be made for the sprite image, instead of multiple requests for individual image files), and quick display of individual images in the sprite, which are configured to display in response to mouse movement.

# Checkpoint 7.2

1. Web page areas can be configured specifically for hard copy. For example, navigation areas can be hidden, page breaks can be configured, and font typeface can be configured in serif fonts. In addition, content useful for a person with a hard copy—such as a contact phone number or even a map—can be configured to display and print on the hard copy.
2. A single-column page layout with a small header, key navigation links, content, and page footer works well for mobile device display. Heading elements and lists are well suited for mobile web pages. Eliminate content that is not essential for mobile use. Avoid the use of tables and absolute positioning when configuring pages for mobile display.
3. Use the following well-supported techniques to configure flexible images with CSS:
  1. Remove the height and width attributes from the HTML
  2. Set the CSS max-width property to 100%
  3. Set the CSS height property to auto

Other techniques available to configure responsive images include using the new HTML5.1 picture element (and companion source element) and configuring the img element with the new HTML5.1 sizes and srcset attributes.

# Review Questions

1. [a](#)
2. [a](#)

3. c
  4. b
  5. c
  6. a
  7. b
  8. c
  9. c
  10. b
11. CSS Grid Layout
  12. media queries
  13. One Web
  14. minimal
  15. only

# **Chapter 8**

# **Checkpoint 8.1**

1. Tables are often used to organize tabular information on a web page.
2. The default browser rendering of the text contained within a `th` element is bold and centered.
3. Coding a caption element with a relevant description and configuring headers for columns or rows are among the various coding techniques that improve the accessibility of a table.

# Checkpoint 8.2

1. Using CSS properties instead of HTML attributes to configure table characteristics provides for flexibility and easier maintenance.
2. The thead, tbody, and tfoot elements are used to group table rows.

## Review Questions

1. b
2. c
3. c
4. c
5. c
6. b
7. d
8. b
9. b
10. a
11. border
12. vertical-align
13. rowspan

14. [headers](#)

15. [caption](#)

# **Chapter 9**

# Checkpoint 9.1

1. Although either solution would be appropriate, the solution that uses three input boxes (first name, last name, and e-mail address) is the more flexible solution. These separate values could be stored in a database by server-side processing, where they could easily be selected and placed into personalized e-mail messages. This approach provides the most useful functionality of the collected information in future manipulations.
2. There are a number of possible solutions for this design question. If the responses are short and of about equal length, perhaps a group of radio buttons would be appropriate. If the responses are lengthy or of widely varying lengths, a select list would be a good choice. Radio button groups can accept only one response per group. By default, select lists accept only one response. Check boxes would not be appropriate because they allow more than one response to be selected.
3. False. In a radio button group, the name attribute is used by the browser to process separate elements as a group.

# Checkpoint 9.2

1. The fieldset element creates a visual border around the elements contained within the fieldset. The border can help to organize form elements and increase the usability of the form. The legend element is used to provide a text description of the area bounded by the fieldset element, further increasing the usability of the form for visitors using browsers that support these tags.
2. The accesskey attribute allows a visitor to select an element immediately by using the keyboard instead of a mouse. This approach improves the accessibility of the page and can be very helpful to mobility-impaired visitors. The W3C recommends providing a visual cue of an underlined letter, bold letter, or message that indicates the hot keys to press to activate an element.
3. The web designer and client decide which is used: standard submit button, image button, or button tag. However, it makes sense to use the simplest possible technology that provides the needed functionality. In most cases, this is the standard submit button. Visually challenged visitors using a screen reader will hear that a submit button has been encountered. Submit buttons automatically invoke the server-side processing configured in the form tag.

An image button will also automatically invoke the server-side processing configured for the form and can be more accessible if configured with the alt and accesskey attributes. Unless there is a very good reason or a very insistent client, avoid the button element for standard web forms. Avoid choosing a complex solution when a basic submit button can be used.

# Checkpoint 9.3

1. A web browser requests web pages and their related files from a web server. The web server locates the files and sends them to your web browser. Then the web browser renders the returned files and displays the requested web pages. Server-side processing is required to save and handle information entered by web page visitors. The action attribute on a form element specifies the script or program that the web server should invoke and pass the form data to. The script or program returns a result (often a web page) that is sent from the web server to the browser for display.
2. The server-side script developer and the web page designer must work together to get both parts of the form processing—the front-end web page and the back-end server-side script—working together. They need to communicate regarding the method (get or post) to be used by the form and the location of the server-side script. Because the names of the form elements are often used by the server-side script as variable names, the form element names are usually specified at this time.

## Review Questions

1. b
2. a
3. a
4. b
5. b
6. d

7. c
8. c
9. a
10. d
11. d
12. maxlength
13. fieldset
14. name
15. The following form controls could provide a way for a web page visitor to select a color: an input text box for free-form entry of a color value, an HTML5 datalist with one option element for each color choice, a radio button group with one radio button for each color choice, a select list with one option element for each color choice, and an HTML5 color-well form control (although this is not yet well supported by browsers and will usually result in the display of an input text box).

# **Chapter 10**

# **Checkpoint 10.1**

1. The project manager directs the website development process—creating the project plan and schedule. He or she must keep the big picture in mind while communicating with the staff and coordinating team activities. The project manager is accountable for meeting project milestones and producing results.
2. A large-scale web project is much more than brochure-ware—it is often a complex information application that the company depends on. Such an application needs the special talents of a wide variety of individuals—including experts in graphics, organization, writing, marketing, coding, database administration, and so on—one or two people simply cannot fulfill all these roles and create a quality website.
3. Answers will vary. Different testing techniques include the unit testing done by individual web developers, automated testing performed by link checker programs, code testing and validation performed by code validation programs, and usability testing achieved by watching typical web visitors use a website to perform tasks.

# **Checkpoint 10.2**

1. A virtual web host that offers reliability and scalability would meet the needs of a small company for its initial web presence. The web host chosen should offer higher-end packages with scripting, database, and e-commerce capabilities to allow for future growth.
2. A dedicated web server is owned and supported by the web host company. The client company may choose to administer it or may pay the web host company to perform this task. A co-located server is owned by the client company and housed at the web host provider. This configuration offers both the advantage of a reliable Internet connection at the web host and full control of the administration and support of the web server.
3. If your website is down and your web host is not responding to technical support requests, it doesn't matter that you are saving \$5.00 per month. When comparing web host plans, check prices to know the currently prevailing fees. If the charges of a particular Web host seem abnormally low, the company is probably cutting corners. Do not base your choice on price alone.

# **Review Questions**

1. a
2. a
3. c
4. b
5. d

6. d
7. d
8. a
9. a
10. c
11. usability testing
12. graphic designer
13. UNIX and Linux
14. A careful review of your competitor's web presence helps you design a site that will stand out from the rest and be more appealing to your shared customer base. Note both the good and bad components of your competitors' sites.
15. Contacting technical support can give you a general idea of the responsiveness of the web host provider to issues and problems. If the technical support staff is slow getting back to you at this point, don't be surprised if you get the same type of service when you have a problem and need immediate help. While not fail-safe, a quick response to a simple question at least gives the appearance of a well-organized, professional, and responsive technical support staff.

# **Chapter 11**

# **Checkpoint 11.1**

1. Answers will vary and will include Windows Media Player, Apple QuickTime, Adobe Reader, Adobe Flash Player, and Adobe Shockwave Player. Review Section 11.1 for more information.
2. Issues include bandwidth, unreliability of the delivery of the media because of platform, browser, and plug-in issues, and accessibility. It is a good idea to have alternate content available that does not rely on media alone.
3. Although Flash has good support on desktop browsers, not all your web page visitors are able to use Flash: The technology is not supported by mobile devices. While the accessibility of Flash content has improved, “plain” HTML web pages are still more easily accessible. The Flash .swf files take up bandwidth and slow the delivery of pages. If most of your target audience uses a dial-up connection or mobile devices, slower delivery may be a concern.

## **Checkpoint 11.2**

1. HTML5 video and audio elements provide for native display of media by browsers—no need for plug-ins. These elements can be configured with fallback content, such as hyperlinks to the media, for browsers that do not support the new HTML5 elements.
2. The transform property allows you to rotate, scale, skew, or move an element with CSS.
3. After download, a Java applet must be interpreted by the Java Virtual Machine in the web browser before the applet runs. The time taken for interpretation can cause a delay before the applet is displayed on the page. Also, visitors with mobile devices may not be using a browser that supports Java.

# **Checkpoint 11.3**

1. JavaScript can be used to add a wide range of interactive effects to a web page, including form validation, popup windows, jump menus, message boxes, image rollovers, status message changes, calculations, and so on.
2. The foundation for Ajax is standards-based HTML and CSS. Other technologies used in Ajax include the DOM, JavaScript, and XML.
3. The HTML5 canvas element provides an API to web developers that allows them to configure dynamic graphics with JavaScript.

# **Review Questions**

1. c
2. b
3. a
4. b
5. c
6. a
7. a
8. a
9. b
10. c

11. [application programming interface \(API\)](#)
12. [fair use](#)
13. [video](#)
14. [Java Virtual Machine \(JVM\)](#)
15. [Document Object Model \(DOM\)](#)
16. [Answers will vary but may include the following: large file size to download, uneven support of browser plug-ins, and the time, talent, and software required to create audio or video content.](#)
17. [Creative Commons at <http://creativecommons.org> provides a free service that allows authors and artists to register a type of a copyright license. The Creative Commons license informs others exactly what they can and cannot do with the creative work.](#)

# **Chapter 12**

# **Checkpoint 12.1**

1. There are many advantages to engaging in e-commerce, especially for a small business owner who must watch costs carefully. Advantages include very low overhead, 24/7 business hours, and global sales potential.
2. There are risks in any business venture, including e-commerce. Risks associated with e-commerce include increased competition, fraudulent transactions, and security issues.
3. SSL (Secure Sockets Layer) is a protocol that allows data to be privately exchanged over public networks such as the Internet. An online shopper can check the following to determine whether SSL is being used:
  - The https protocol, rather than http, will display in the browser address bar.
  - The browser may display a lock icon. If this icon is clicked, information about the digital certificate and encryption level being used will display.

## **Checkpoint 12.2**

1. Commonly used payment methods include credit card, stored-value card, digital wallet, and digital cash.
2. Answers will vary. People make online purchases for many reasons, including the following: convenience, lower cost, and ease of shipping. If you did not check for SSL the last time you purchased an item on the Web, most likely you'll look for it in the future.
3. E-commerce solutions include instant storefronts, off-the-shelf shopping cart software that you or your web host installs, and custom solutions. The easiest entry to e-commerce is an instant storefront. Although this solution does not provide the most flexibility, you can get a store up and running in an afternoon. An easy semi-custom solution would be to create your own website but use PayPal to process the shopping cart and credit card transactions.

## **Review Questions**

1. c
2. a
3. b
4. b
5. b
6. a
7. c

8. a
9. d
10. b
11. Secure Sockets Layer (SSL)
12. EDI
13. asymmetric key
14. symmetric encryption
15. The website developers may use an automatic translation program or other customized web translation service.

# **Chapter 13**

# **Checkpoint 13.1**

1. Three components of a search engine are the robot, database, and search form. The robot is a special program that “walks” the Web and follows links to sites. The robot updates the search engine’s database with the information it finds. The search form is the graphical user interface that is used to request a search by a visitor to the search engine site.
2. Use the description meta tag to provide a brief description of the website. The information in the description meta tag may be used by search engines when they index your website. Some search engines, such as Google, display the description meta tag information on the search engine results page (SERP).
3. Yes, it may be beneficial for a business to pay for preferential listing. If your business is listed in the first page of search results, visitors are more likely to find your site than if you are in the hundredth page of search results. Paid programs for preferential listing such as Google’s AdWords should be carefully considered and may be a good match for the marketing goals of an organization.

# Checkpoint 13.2

1. Answers will vary. In most cases, the top three sites returned for a particular search phrase will not be the same. Consider optimizing your site so that currently the most popular search engine displays the site as high as possible in its results list.
2. A brute force method is to experiment by visiting a search engine, typing in keywords, and checking for your site in the search results. If your web site host provides you with web log reports, you can easily tell by examining the reports. You'll see the names of the robot/spider programs—Googlebot is the name of Google's spider (see <http://www.robotstxt.org> for more information on search engine robots). The web log reports will also itemize both the search engines used by visitors and the keywords used to locate your site.
3. Answers will vary. Website promotion methods that do not use search engines include the following: affiliate programs, banner ads, banner exchanges, reciprocal link agreements, newsletters, sticky site features such as polls, forums, surveys, QR codes, personal recommendations, newsgroup/listserv postings, social media marketing techniques, blog postings, RSS feeds, traditional media ads, and existing paper marketing materials. Any of these are valid as a first choice—depending on the needs of the organization. The newsletter technique is an interesting promotion method. Place a form on a web page to allow visitors to opt into your newsletter. Send them a periodic e-mail with information of value related to your site (possibly even special offers). This approach encourages visitors to return to your site. They may even forward your e-mail to a friend.

*Note:* Be sure to provide a way for visitors to opt out of the newsletter. For example, newsletters sent by TechLearning News include the following message:

“UNSUBSCRIBE

To unsubscribe from this type of e-mail, please reply to this message.  
unsubtechlearning@news.techlearning.com”

# Review Questions

1. b
2. a
3. c
4. b
5. b
6. c
7. c
8. a
9. b
10. b
11. stickiness
12. <meta name="robots" description="noindex, nofollow">
13. search engines
14. a variety of methods, including affiliate programs, banner ads, banner exchanges, reciprocal link agreements, blog posting, RSS feeds, newsletters, personal recommendations, social bookmarking, and traditional media advertising, or including a URL or QR code on all promotional materials

15. [QR codes](#)

# **Chapter 14**

# **Checkpoint 14.1**

1. JavaScript can be used for rollover images, form data validation, popup windows, interactivity such as alert messages and prompts, and mathematical calculations for tasks such as determining tax.
2. There is no limit to the number of script blocks that can be embedded in an HTML document.
3. You can use the JavaScript Console in Firefox to find an error. You could also look through your code, paying particular attention to names of objects, properties, methods and statements, and missing semicolons.

## **Checkpoint 14.2**

1. An object is a thing, a property is an attribute, and a method is an action.
2. An event is an occurrence such as clicking a mouse, loading a page, or placing the mouse over an area on the page. An event handler is an attribute embedded in an HTML tag such as onclick, onload, and onmouseover, that points to JavaScript code to execute when the corresponding event occurs.
3. Event handlers are embedded in HTML tags and are not placed in separate script blocks.

# Checkpoint 14.3

1. The `prompt()` method could be used to gather a piece of data such as the user's age. The `prompt()` method should be used in conjunction with a variable so that the data will be stored in the variable.
2. The code might look something like the following:

```
if (userAge < 18) {  
    alert("You are under 18");  
} else {  
    alert("You are 18 or older");  
}
```

3. A function definition begins with the keyword `function`, followed by the name of the function and some JavaScript statements. It defines a function, and calling that function results in the execution of the statements within it.

# Checkpoint 14.4

1. Form data validation refers to checking form input against validation rules and not allowing the form to be submitted if the data does not conform to the rules.
2. Answers may vary, but may include required fields such as name, e-mail address, and phone number. Numeric fields may require validation to ensure that they are within particular bounds—for example, order quantity greater than 0 and age between 1 and 120.
3. When the user clicks the submit button, the submit event occurs and the onsubmit event handler executes the `return validateForm()` statement. The `validateForm` function runs and tests the form data for validation. If the data is valid, `validateForm()` returns the value of true, and the form is submitted. If the data is not valid, `validateForm()` returns the value of false and the form is not submitted.

# Checkpoint 14.5

1. You can either download the .js file for the jQuery library from <http://jquery.com/download> or you can access the jQuery library stored at a CDN using a script tag with the src value set to the URL of the jQuery CDN.
2. The `css()` method allows you to set css properties dynamically within jQuery.
3. The ready event is a jQuery statement that determines when the Document object model (DOM) has been completely loaded by the browser.

# Review Questions

1. a
2. c
3. b
4. a
5. d
6. c
7. a
8. b
9. c
10. a

11. [b](#)
12. [==](#)
13. [attr\(\)](#)
14. [window](#)
15. [ready event](#)
16. [onclick](#)
17. [JavaScript](#)
18. [css\(\)](#)
19. [Common uses for JavaScript include rollover images, form data validation, popup windows, interactivity such as alert messages and prompts, and mathematical calculations.](#)
20. [The following techniques can be used in debugging JavaScript: Check the JavaScript code carefully for syntax errors. Verify that quotation marks, braces, and parentheses are used in pairs. Check for missing semicolons. Verify that your code uses the correct case \(uppercase and lowercase characters\) in variable, object, property, and method names. Use the Console to help with debugging—it will provide some information about the error. Use an alert\(\) to display the values of variables or to display messages as your script is running.](#)

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The convergence of technologies includes the following.

- Commercial use of internet allowed
- W W W invented at C E R N
- Affordable personal computers
- Graphical operating systems
- First graphical browser
- Easy online access

Widespread use of the web.

The web address reads, h t t p, colon, forward slash, forward slash, w w w, dot, web dev foundations dot net, forward slash, chapter 1, forward slash, index, dot, h t m l. Each portion of the U R L is broken down as follows.

- H T T P Protocol is, h t t p, colon, forward slash, forward slash.
- Subdomain or web server name is, w w w.
- Domain name is, web dev foundations dot net.
- Folder name is, chapter 1.
- Web page file name is, index, dot h t m l.

The steps to accessing the web page are as follows.

- The web browser requests the web page.
- The domain name system, D N S, sends the web browser the I P address.
- The web browser uses T C P I P to send the h t t p request to the web server.
- The web server uses T C P I P to send h t t p responses with files, back to the web browser.
- The web browser displays the web page.

The body of the window displays the following code. Line 1. less than sign exclamation point doc type h t m l greater than sign. Line 2. less than sign h t m l l a n g = quotation mark e n quotation mark greater than sign. Line 3. less than sign head greater than sign. Line 4 less than sign title greater than sign my first h t m l 5 web page less than sign forward slash title greater than sign. Line 5. less than sign meta c h a r set = quotation mark u t f hyphen 8 quotation mark greater than sign. Line 6. less than sign forward slash head greater than sign. Line 7. less than sign body greater than sign. Line 8. hello world. Line 9. less than sign forward slash body greater than sign. Line 10. less than sign forward slash h t m l greater than sign.

The browser's title bar reads, using headings. An h 1 tag element at the top of the body reads, my website logo header. Beneath, an h 2 tag element reads, major topic heading, followed by a paragraph of sample text. Beneath the paragraph, an h 3 tag element reads, subtopic heading, followed by another sample paragraph. Each successive heading tag element is smaller in size than the previous.

The browser's title bar reads, paragraph example. The body displays four headings, with a paragraph written between the first and second. The paragraph has an empty space above and below it. It reads as follows. This is a sample paragraph. Heading tags can help to make your pages more accessible and usable. It is good coding practice to use heading tags to outline the structure of your web page content.

The browser's title bar reads,blockquote example. In the body, a level 1 heading reads, the power of the web. Beneath is the following partial paragraph. According to Tim Berners Lee, the inventor of the world wide web, at `http://www.w3.org/`

The remainder of the paragraph is a quote written beneath the previous text. It is separated by a space above and each line is indented. It reads as follows.

The power of the web is in its universality. Access by everyone regardless of disability is an essential aspect.

The browser's title bar reads, description list. In the body, a heading reads, sample description list. Beneath it, separated by a space, is a list. Each term begins on its own line at the margin. An indented description for each begins on the next line. The list reads as follows.

T C P. Transmission control protocol is a method, protocol, used along with the Internet protocol, I P, to send data in the form of message units, called packets, between computers over the Internet.

I P. Internet protocol is the method or protocol by which data is sent from one computer to another on the Internet. Each computer on the Internet is uniquely identified by an I P address.

F T P. File transfer protocol is a protocol used to exchange files between computers on the Internet.

H T T P. Hypertext transfer protocol is the protocol used for exchanging text, graphic images, sound, video, and other multimedia files on the Web.

The browser's title bar reads, web design steps. In the body, a heading also reads, web design steps. Beneath is an unordered list. The first line of each bulleted item is the title of a step, written in a bold font. The step is written on the next line beneath each title, in a normal font. The list reads as follows.

- begin bold, Determine the intended audience, end bold. The colors, images, fonts, and layout should be tailored to the, begin italics, preferences of your audience, end italics. The type of site content, reading level, amount of animation, etcetera, should be appropriate for your chose audience.
- begin bold, Determine the goals of the site, end bold. Some common goals of web sites are to be informative, to create a personal home page, to establish a corporate web presence, and to do business in e commerce.
- begin bold, Determine the general content and create a site map, end bold. The site map is sometimes called a storyboard. Common organizational structures for Web sites are hierarchical, linear, and random.
- begin bold, Sketch a tentative page layout, end bold. begin italics, Be consistent, end italics, in your overall layout, color typefaces, logo location, navigation bar, etcetera. Plan your home page layout to avoid scrolling. Plan you content page layout to be consistent, with easy navigation.

Beneath the list is copyright information, which reads as follows. Copyright, copyright symbol, 2018 your name. All rights reserved.

The browser's title bar reads, Trillium Media Design. The body of the page contains header, nav, main, and footer elements. The header reads, Trillium Media Design. Beneath, the nav element reads, home, services, contact. The main element contains two h 2 headings and paragraphs which read as follows.

- New media and web design.
- Trillium media design offers a comprehensive range of services to take your company's web presence to the next level.
- Meeting your business needs.
- Our expert designers will listen to you as they create a website that helps to promote and grow your business.
- At the bottom of the page, the footer element reads, copyright, copyright symbol, 2018 your name here.

The browser's title bar reads, Casita Sedona. The body of the page contains header, nav, main, and footer elements. The header reads, Casita Sedona Bed ampersand Breakfast. Beneath, the nav element reads, home, rooms, events, contact. The main element contains two h 2 headings and paragraphs which read as follows.

Stay in the heart of Sedona.

At Casita Sedona Bed ampersand Breakfast you'll be close to art galleries, shops, restaurants, hiking trails, and tours. Ride the free trolley to shops and galleries.

Luxurious rooms.

Stay in a well-appointed room at Casita Sedona with you own fireplace, king-size bed, and balcony overlooking the red rocks.

At the bottom of the main element is a div element, with a space above and below, which contains the following contact information. Casita Sedona Bed ampersand Breakfast. 6 1 2 Tortuga Lane. Sedona, A Z 8 6 3 3 6. 9 2 8 5 5 5 5 5 5. The name, address, and phone number are each on a separate line.

At the bottom of the page, the footer element reads, copyright, copyright symbol, 2018 your name here.

The browser's title bar reads, Trillium Media Design, services. The header, nav, and footer elements are identical to the index dot h t m l page from figure 2.24. The main element has an h 2 header which reads, our services meet your business needs. Beneath is a description list which reads as follows.

Website design. Whether your needs are large or small, Trillium can get you on the Web.

E commerce solutions. Trillium offers quick entry into the e commerce marketplace.

Search Engine optimization. Most people find new sites using search engines. Trillium can get your website noticed.

The browser's title bar reads, Trillium Media Design, contact. The header, nav, and footer elements are identical to the index dot h t m l page from figure 2.24. vme. phone, 5 5 5 5 5 5 5 5 5.

The body of the page displays errors in an ordered list. Each item lists a description of the error, the location, and shows the corresponding section of code with the error highlighted. Multiple errors are displayed. The first reads as follows.

1. Error. End tag l i seen, but there were open elements. From line 12, column 160, to line 12, column 164. Code, audience period, start highlight, less than sign forward slash l i greater than sign, end highlight.

The browser's title bar reads, Java Jam Coffee House. The body of the page contains header, nav, main, and footer elements as follows.

- The header contains an h 1 heading.
- The nav element contains four hyperlinks.
- The main element contains an h 2 heading, beneath which is an unordered list. Beneath the list is contact information, with each element on a separate line.
- The footer contains copyright information and a contact email address, each on a separate line.

The browser's title bar reads, Java Jam Coffee House Menu. The header, nav, and footer elements are identical to the index dot h t m l page from figure 2.33. The main element has an h 2 header, beneath which is a list of menu items. Each item has both an indented description and indented price information on separate lines.

The browser's title bar reads, Fish Creek Animal Clinic. The body of the page contains header, nav, main, and footer elements as follows.

- The header contains an h 1 heading.
- The nav element contains four hyperlinks.
- The main element contains description list. Beneath the list is contact information, with each element on a separate line.
- The footer contains copyright information and an email address, each on a separate line.

The browser's title bar reads, Fish Creek Animal Clinic Services. The header, nav, and footer elements are identical to the index dot h t m l page from figure 2.37. The main element displays an unordered list. The first line of each bulleted item is the title of a service, written in a bold font. A description is written on the next line beneath each, in a normal font.

The browser's title bar reads, Pacific Trails Resort. The body of the page contains header, nav, main, and footer elements as follows.

- The header reads contains an h 1 heading.
- The nav element contains four hyperlinks.
- The main element contains a paragraph followed by an unordered list. Beneath the list is contact information. Each item is on a separate line, with an additional space between the address and phone number.
- The footer contains copyright information and an email address, each on a separate line.

The browser's title bar reads, Pacific Trails Resort, yurts. The header, nav, and footer elements are identical to the index dot h t m l page from figure 2.41. The main element has an h 2 header. Beneath is a description list of questions with answers.

The browser's title bar reads, Path of Light Yoga Studio. The body of the page contains header, nav, main, and footer elements as follows.

- The header contains an h 1 heading.
- The nav element contains four hyperlinks.
- The main element contains an h 2 heading followed by a paragraph and an unordered list. Beneath the list is contact information. Each item is on a separate line, with an additional space between the address and phone number.
- The footer contains copyright information and an email address, each on a separate line.

This service can't be reached.  
Please try again later!

[More information](#)

A single cascading style sheet file can control the color, typography, and layout of multiple web pages. An illustration with an arrow points from a rounded rectangle with the caption Cascading Style Sheet to 4 slightly overlapping rounded rectangles, with the captions. Index dot h t m l, products dot h t m l, about dot h t m l, and contact dot h t m l.

Body left brace color colon blue right brace, with three callouts. A callout with the caption Selector points to body. A call with the caption Declaration Property points to color. A callout with the caption Declared Value points to blue.

After applying the C S S rule. body left brace color colon white semicolon  
background hyphen color colon orchid semicolon right brace, a web page is  
displayed where white text appears on an orchid background

A red swatch is displayed with the value, hash mark F F 0 0 0 0. A green swatch is displayed with the value, hash mark 0 0 F F 0 0. A blue swatch is displayed with the value, hash mark 0 0 0 0 F F. A black swatch is displayed with the value, hash mark 0 0 0 0 0 0. A white swatch is displayed with the value, hash mark F F F F F F. A grey swatch is displayed with the value, hash mark C C C C C C.

The first inline style changes the body background color to off white and the text color to teal. The second inline style changes the heading 1 body background to teal and the text color to off white.

A new inline style is applied to the previous figure that changes the color of text in a new paragraph to gray.

The embedded style changes the body background to lavender and the text color to midnight blue.

The text for the web page is in a black serif font with a white background. At the top of the web page, the H 1 heading reads, Trillium Media Design. Immediately below it are three links for Home, Services, and Contact. Below the links is the H 2 subheading that reads New Media and Web Design, followed by some text describing the company. Below the description are the five bulleted items. Website Design, Interactive Animation, E Commerce Solutions, Usability Studies, and Search Engine Optimization. Below the items is another H 2 subheading that reads Meeting your Business Needs, followed by brief text describing how the company can improve a business. At the bottom of the web page is a copyright notice along with a place to enter one's name. We will refer to this as the Trillium Media Design home web page.

The body style changes the background color to lavender and the text color to midnight blue. The H 1 style changes the heading background color to midnight blue and the text color to lavender. The H 2 style changes the subheading to a darker lavender and the text color to midnight blue.

A table shows the category, a description, and examples. The table has 5 rows and three columns. The column headings are as follows from left to right. Font Family Category, Font Family Description, and Font Typeface Examples. Row 1. Font Family Category, serif. Font Family Description, Serif fonts have small embellishments on the end of letter strokes, often used for headings. Font Typeface Examples. Times New Roman, Georgia, Palatino. Row 2. Font Family Category, sans-serif. Font Family Description, sans-serif fonts do not have serifs, often used for web page text. Font Typeface Examples. Arial, Tahoma, Helvetica, verdana. Row 3. Font Family Category, monospace. Font Family Description, fixed width font, often used for code samples. Font Typeface Examples. Courier New, lucida console. Row 4. Font Family Category, cursive. Font Family Description, hand written style, use with caution, may be difficult to read on a web page. Font Typeface Examples. Lucida handwriting, brush script, comic sans M S. Row 5. Font Family Category, fantasy. Font Family Description, exaggerated style, use with caution, may be difficult to read on a web page. Font Typeface Examples. Jokerman, Impact, papyrus.

The following changes have been made. The H 1 heading line height has been increased 200%, the Georgia typeface has been selected, the text is indented 1 e m, and a gray text shadow with a blur has been added. For the H 2 heading, the Georgia typeface has been selected and a center text alignment has been applied. For the navigation links, the nav font weight is set to bold, the font size to 1.25 e m, and the word spacing to 1 e m. For the paragraphs, the p font size is set to .90 e m and the text indent to 3 e m. For the bulleted list, the u l font weight is set to bold.

A revised body style is applied to the Trillium Media Design web page. In addition to the previously changed background color to lavender and text color to midnight blue, all text is changed to a serif typeface.

The following changes have been made. The H 1 heading line height has been increased 200%, the Georgia typeface has been selected, the text is indented 1 e m, and a gray text shadow with a blur has been added. For the H 2 heading, the Georgia typeface has been selected and a center text alignment has been applied. For the navigation links, the nav font weight is set to bold, the font size to 1.25 e m, and the word spacing to 1 e m. For the paragraphs, the p font size is set to .90 e m and the text indent to 3 e m. For the bulleted list, the u l font weight is set to bold.

A class selector named feature is created using the color medium dark red, and then that feature is applied to the last two bulleted items turning their text color to medium dark red.

The selectors are applied to the links removing the underlines from them and the copyright and your name line font size is italicized and make smaller. In addition, an email link has been below the line.

Using a span element, the company name in the company description is bolded, the font is changed to Times New Roman, and the font size is increased to 1.25 em.

The code in the external style sheet is. Body left brace background hyphen color colon hash mark 0 0 0 0 F F semicolon color colon hash mark F F F F F F semicolon right brace.

The background color is blue, which is 0 0 0 F F, and the text color is white, which is F F F F F F.

The code in the external style sheet is. Body. left brace background hyphen color colon hash mark E 6 6 6 F A semicolon, color colon hash mark 1 9 1 9 7 0 semicolon, Font hyphen family colon arial comma verdana comma sans hyphen serif semicolon, right brace. H 1. left brace background hyphen color colon hash mark 1 9 1 9 7 0 semicolon, color colon hash mark E 6 E 6 F A semicolon, line hyphen height colon 200% semicolon, Font hyphen family colon Georgia comma times new roman comma serif semicolon, text hyphen indent colon 1 e m semicolon, text hyphen shadow colon 3 p x 3 px 5 px hash mark C C C C C semicolon, right brace. H 2. left brace background hyphen color colon hash mark A E A E D 4 semicolon, color colon hash mark 1 9 19 7 0 semicolon, font hyphen family colon Georgia comma times new roman comma serif semicolon, text hyphen align colon center semicolon, right brace. Nav. left brace font hyphen weight colon bold semicolon, word hyphen spacing colon 1 e m semicolon, font hyphen size colon 1.25 e m semicolon, right brace. nav a. left brace text hyphen decoration colon none semicolon, right brace. p. left brace font hyphen size colon .90 e m semicolon, text hyphen indent colon 3 e m semicolon, right brace. u l. left brace font hyphen weight colon bold semicolon, right brace. Footer. left brace color colon hash mark 3 3 3 3 3 3 semicolon, font hyphen size colon .75 e m semicolon, font hyphen style colon italic semicolon, right brace. Dot feature. left brace color colon hash mark C 7 0 0 0 0 semicolon, right brace. Dot company. left brace font hyphen weight colon bold semicolon, font hyphen family colon Georgia comma times new roman comma serif semicolon, font hyphen size colon 1.25 e m semicolon, right brace

Similar to the Trillium Media Design home page, the text for the service web page is in a black serif font with a white background. At the top of the web page, the H 1 heading reads, Trillium Media Design. Immediately below it are three links for Home, Services, and Contact. Below the links is the H 2 subheading that reads Our Services meet your business needs, followed by a list of services. Website Design, Interactive Animation, E Commerce Solutions, Usability Studies, and Search Engine Optimization where each is followed by an indented brief description. At the bottom of the web page is a copyright notice along with a place to enter one's name. We will refer to this as the Trillium Media Design service web page.

The body, headings, links, and paragraphs have been changed based on the previously discussed external style sheet.

4 rounded rectangles are arranged diagonally from upper left to lower right, where arrows indicate flow from one rounded rectangle down to next.  
Beginning with the upper right rectangle, they are named as follows, browser defaults, external styles, embedded styles, and inline styles.

In the first paragraph, the black text configured in an external stylesheet has been replaced by blue text configured in an embedded style. In the second paragraph, the blue text configured in an embedded style has been replaced by red text configured in an inline style.

The website has examined the color dot c s s file and found two errors in the body style. These errors are, Property background hyphen color does not exist colon hash mark 0 0 0 F F and value error colon color F F F F F F is not a color value colon F F F F F F.

After making the suggested correction, the website has reexamined the color dot c s s file and still finds value error colon color F F F F F F is not a color value colon F F F F F F.

After making the suggested correction, the website has reexamined the color dot c s s file and now reports, congratulations exclamation point No error found.

The JavaJam home page body is changed by setting the page background color to a pale yellow, hash mark F C E B B 6, the text color to a near black, hash mark 2 2 1 8 1 1, and the font typeface to any sans-serif font. The h 1 heading and footer background colors is changed to tan, hash mark D 2 B 4 8 C, and the text is centered. The H 1 heading height is configured to 200%. The footer font size is reduced and italicized. Additionally, the nav element is centered and bolded.

The same changes done to the home page are applied to the menu page components.

The Fish Creek Animal Clinic home page body is changed by setting the page background color to white, hash mark F F F F F F, the text color to dark midnight blue, hash mark 0 0 3 3 6 6, and the font typeface to any sans-serif font. The h 1 heading background color is changed to dark midnight blue, the text color is changed to a light grayish cobalt blue, hash mark A E C 3 E C, a serif typeface, the line height is configured to 200%, and indented 1 e m. The nav displays text in bold. The d t sets the text color to a medium blue, hash mark 5 2 8 0 C 5, and a serif typeface. A class named category is created with a bold font, text color of a medium blue, and a serif typeface. The footer has a smaller font size and is italicized.

The same changes done to the home page are applied to the services page components.

The Pacific Trail Resort home page body is changed by setting the page background color to white, hash mark F F F F F F, the text color to dark gray, hash mark 6 6 6 6 6 6, and the font typeface to any sans-serif font.

The h 1 heading background color is changed to Stratos blue, hash mark 0 0 0 0 3 3, the text color is changed to white, a serif typeface, and the line height is configured to 200%. The nav displays text in bold and has a sky-blue background color, hash mark 9 0 C 7 E 3. The h 2 heading text color is changed to a medium-blue text color, hash mark 3 3 9 9 C C, and any serif typeface. The d t sets the text color to Stratos blue and any serif typeface. A class named resort is created with a dark blue text color and is bolded. The footer has a smaller font size, is italicized, and is centered.

The same changes done to the home page are applied to the Yurts page components.

The Path of Light Yoga Studio home page body is changed by setting the page background color to white smoke, hash mark F 5 F 5 F 5, the text color to a purple, hash mark 3 F 2 8 6 0, and the font typeface to any sans-serif font. The h 1 heading background color is changed to grayish cyan, hash mark 9 B C 1 C 2, the text is centered, and the line height is configured to 200%. The nav displays text in bold and is bolded. The nav a eliminates the underlines from the links. A class named studio configures the text in italic. The footer background color is changed to grayish cyan, has a smaller font size, and is centered.

The same changes done to the home page are applied to the Classes page components.

The browser shows the effect of applying the H r tag.

With the default and none styles, the rectangle has no border. With the inset style, the upper and left borders are black and the lower and right borders are light blue. With the outset style, the upper and left borders are light blue and the lower and right borders are black. With the double style, two different colored border lines surround the rectangle.

With the groove style, the upper and left borders are surrounded by two border lines, both black, and the lower and right borders are surrounded by two different colored border lines. With the ridge style, the upper and left borders are surrounded by two different colored border lines, and the lower and right borders are surround by two border lines, both black. With the dashed style, a dashed border lines surround the rectangle. With the dotted style, a series of dots surround the rectangle.

The body of the message contains header, nav, main, and footer elements as follows. The header contains an H 1 heading. The nav element contains three hyperlinks. The main element contains an h 2 heading, beneath which is some text and an unordered list. Beneath the list is another h 2 heading with some text. Beneath the text is contact information, with each element on a separate line. By applying the specified style rules, the H 1 heading has a 1 em padding. The H 2 heading has a 2 px midnight blue dashed bottom border. The footer has a thin solid lavender top border with 10 em top padding and gray text.

Two images are created with white text. One is saved as a G I F with transparency, and the other is saved as a G I F with a teal background and no transparency. Both images are placed on a web page with a blue background. The image with transparency shows the blue background surrounding the words in white. The image without transparency shows the words in white surrounded by the teal background, which then sits on top of the blue background.

The body of the message contains header, nav, main, and footer elements as follows. The header contains an H 1 heading. The nav element contains four hyperlinks. The main element contains an h 2 heading, beneath which is some text and an image of a kayaker on a lake. Beneath the image is additional text and another h 2 heading with some text. Beneath the text is an unordered list, and finally a footer with copyright information. We will refer to this as the Kayak Door Country home web page.

The tradition underlined hyperlinks for Home, Tours, Reservations, and Contact have been moved to the footer, and in their place, is a black bar that contains four images of the words, Home, Tours, Reservations and Contact in a white font color. These images are hyperlinks to the various pages on the website.

The image displayed with the height of 480 and a width of 640.

In the body section, C S S code applies a caption to the image.

In the body section, C S S code applies a caption to the image.

A meter element shows the number of browsers that were used to visit a site. Total visits, 14,417. Chrome, 7,000. Edge, 3,800. Firefox, 2,062. Safari, 1,043. Opera 312, Other,200.

The image consists of a short blue section on the left, and the remainder of the strip is yellow. When applied as the background, the image is repeated so that the entire left side of the web page is blue, and the remainder of the page is yellow.

The image consists of a bluish design pattern. When applied as the background, the image is repeated so that the entire web page consists of the bluish pattern.

The first three examples use an image that is a strip, which consists of a short dark green section on the left, and the remainder of the strip is light green. In the first two examples the strip is oriented horizontally, and in the third example it is oriented vertically. Example 1. The repeat y property is used, and the strip is repeated along the left side of the page from the top to the bottom. Example 2. The no repeat option is used, and the strip only appears in the upper left corner of the page. Example 3. The repeat x option is used, and the strip is repeated along the top of the page from left to right. The next three examples use an a floral image that is a square, which consists of a white and blue flower on a green background. Example 4. The repeat y property is used, and the square pattern is repeated along the left side of the page from the top to the bottom. Example 5. The no repeat option is used, and the square only appears in the upper left corner of the page. Example 3. The repeat x option is used, and the square is repeated along the top of the page from left to right.

The kayaker background image is configured with the no-repeat repeat property and only appears once on the right of the page.

The Circle Soft folder contains a c s s file and two h t m l files. It also contains a subfolder named images, which contains four g I f files.

The background floral image is configured with the right position option and no-repeat repeat option and only appears once on the right of the page.

The dotted rectangle around the fishing

boat indicates the location of the hotspot. The coordinates shown (24, 188) indicate that

the top-left corner is 24 pixels from the left edge of the image and 188 pixels from the top

of the image. The pair of coordinates in the lower-right corner (339, 283) indicates that

this corner is 339 pixels from the left edge of the image and 283 pixels from the top.

A thick dashed border is shown in which some text and an image will be placed. In the first example, the content box option is applied, and the text and image do not extend to the border. In the second example, the padding box option is applied, and the text and image extend to the inner edge of the border. In the final example, the border box option is applied, and the text and image extend to the outer edge of the border.

In the first example, the content box option is applied, and the text and image are positioned relative to the content area. In the second example, the padding box option is applied, and the text and image are positioned relative to the padding area. In the final example, the border box option is applied, and the text and image are positioned relative to the border area.

In the upper instance, the background size property is not set, and the image appears on the left of the page, partially overlapping the text. In the lower instance, the size property is set to 100%, 100%. The image extends entirely across the web page, overlapping the text. Because it extends across the page, the aspect ratio is changed, and the image is distorted.

The image is 500 by 500 pixels and the display area is 200 pixels wide.

The left web page uses the background size, cover, which scales and resizes the image to completely cover the area while keeping the aspect ratio of the image intact.

The right web page uses the background size, contain, which scales and resizes the image so that both the height and width of the image will fit within the area.

The web page contains a green gradient image that repeats across the entire browser viewport, and a flower image that displays once in the right footer area.

Different colors and shadow sizes are applied the box and the H1 heading and H 2 heading text.

At the top of the page above the hyperlinks area in the H 1 header area, is an image of two kayaks that appears to the right of the text, Kayak Door Country dot net. Below the hyperlinks area, the text color in the body has been changed to white. Extending from below the hyperlinks area and down to the footer area is the background image of a kayaker on a lake. The footer area has black text on a white background.

The H 1 heading has a white background with black text, and its opacity is set to 60% opaque. Because to this setting, the background image is seen behind the heading. We will refer to this as the Fall Natures Hikes home web page.

A callout with the caption, Red Hue 0 degrees or 360 degrees, points to the red region of the wheel. A callout with the caption, Green Hue 120 degrees, points to the green region of the wheel. A callout with the caption, Blue Hue 240 degrees, points to the blue region of the wheel.

The first example is red with H S L A values of 360, 100%, 50%, and 1.0. The second example is green with H S L A values of 120, 100%, 50%, and 1.0. The third example is blue with H S L A values of 240, 100%, 50%, and 1.0. The fourth example is black with H S L A values of 0, 0%, 0%, and 1.0. The fifth example is gray with H S L A values of 0, 0%, 50%, and 1.0. The sixth example is white with H S L A values of 0, 0%, 100%, and 1.0.

From darker to lighter cyan blue, the following examples are shown. The first example is dark cyan blue with H S L A values of 210, 100%, 25%, and 1.0. The second example is a medium cyan blue with H S L A values of 210, 100%, 50%, and 1.0. The third example is a light cyan blue with H S L A values of 210, 100%, 75%, and 1.0.

In the H 1 heading area, the background color has been changed to a dark tan, and an illustration of a steaming coffee cup has been added to the left side of the heading. In the body area of the page, the background color has been changed to yellow, and an image of a winding road has been added to the upper right corner of the area.

Design changes corresponding to those on the home page are also made to this page. However, an image of coffee mugs in a cabinet is used in the body area. Some additional text has been added.

Design changes corresponding to those on the home and menu pages are also made to this page. Additional text and images of two musical performers have been to the body.

In the H 1 heading area, the background color has been changed to black, and an illustration of a fish has been added to the heading. In the nav area, the tradition underlined hyperlinks for Home, Service, Ask the Vet, and Contact have been moved to the footer, and in their place, is a dark blue bar that contains four images of the words, Home, Service, Ask the Vet, and Contact in a white font color each with the same fish illustration used the H 1 area. In the body area of the page, the background color has been changed to light blue. The footer has a medium blue background color applied to it.

This web page is created by modifying the home page H T M L file. Therefore, it will have the same heading, nav, contact information and footer as the home page. The body of the home page is replaced by the following text. The first paragraph reads, Contact us if you have a question that you would like answered here, where contact is a hyperlink. The next paragraph reads, Our dog, Sparky, like to eat whatever the kids are snaking on. Is it okay for the dog to eat chocolate question mark. This text is bold and in a blue colored font. The final paragraph reads, Chocolate is toxic to dogs. Please do not feed your dog chocolate. Try playing a game with your children. When you feed them people treats, they can fee Sparky dog treats. This paragraph is indented.

This diagram will be used to modify the Pacific Trails Resort home page from the previous chapter.

The header area contains a logo image added to the right of the area, and a scenic photograph spanning the top of the main body has also been added.

The header area also contains the same logo image added to the right of the area, and a different scenic photograph spanning the top of the main body has also been added.

The H 1 heading area has a teal colored gradient background with a lily image added to the right of the area. The nav area contains hyperlinks to Home, Classes, Schedule, and Contact. The body area has a light teal background with an image of a doorway added to the right of the area. In the body area, the H 2 heading text has black colored text, while the remaining text is orchid. The footer area background color is teal and the text is centered.

This diagram will be used to modify the Classes web page and to create the Schedule web page.

The H 1 heading and nav areas are the same as the home page. The body area also has a light teal background, however, an image of a yoga mat is added that spans the top of the area. In the body area, the H 2 heading text has black colored text, while the remaining text is orchid. The footer area background color is teal and the text is centered.

The H 1 heading and nav areas are the same as the classes page. The body area also has a light teal background, however, an image of a lounge now spans the top of the area. In the body area, the H 2 heading text has black colored text, while the remaining text is orchid. The body text consists of two unordered lists, one giving the times and types of yoga for Monday through Friday and the other for Saturday and Sunday. The footer area is the same as the other pages.

At the top level is a rectangle with the caption, Home. A line descends from the bottom of the rectangle, splitting into three addition lines to the tops of three rectangles on the second level. The three rectangles with the captions, About, Contact, and Products are displayed. A line descends from the bottom of the Products rectangle, splitting into two additional lines to the tops of two rectangles on the third level. Two rectangles with captions Category 1 and Category 2 are displayed.

From the top level rectangle with the caption Home, a line descends from the bottom of the rectangle, splitting into 12 addition lines to the tops of 12 rectangles on the second level. A line descends from the bottom of the one of the rectangles to the top of a single rectangle at the third level. A line descends from the bottom of another second level rectangle, splitting into three additional lines to the tops of three rectangles at the third level.

From the top level rectangle with the caption Home, a line descends from the bottom of the rectangle, splitting into four addition lines to the tops of four rectangles on the second level. A line descends from the bottom of the one of the rectangles to the top of a single rectangle at the third level. A line descends from the bottom of this third level rectangle, splitting into additional lines to the tops of two rectangles at the fourth level. A single line descends from one of the of the fourth level rectangles to the top of a single rectangle at the fifth level. Another of the second level rectangles has a line that descends from it splitting into 2 additional lines to the tops of two rectangles on the third level. A line descends from the bottom of one of these rectangles to the top of a single rectangle on the fourth level. From the bottom of this fourth level a line descends, splitting into two additional lines to the tops of two rectangles on the fifth level. A line descends from the bottom of one of these rectangles to the top of a single rectangle on the sixth level. From the bottom of this sixth level a line descends, splitting into four additional lines to the tops of four rectangles on the seventh level.

The leftmost rectangle has the caption, Home Page. A arrow points from the right side of this rectangle to the left side of a rectangle that has the caption, Lesson 1. A arrow points from the right side of this rectangle to the left side of a rectangle that has the caption, Lesson 2. A arrow points from the right side of this rectangle to the left side of a rectangle that has the caption, Lesson 3. Finally, an arrow points from the right side of this rectangle to the left side of a rectangle that has the caption, Summary.

Random organization offers no clear path through the site, and there is often no clear home page and no discernable structure.

This web page uses a text color that has good contrast with the dark background color. The left column features a medium dark background that has good contrast with the light off white text. The middle column features dark text on a medium light background to provide good visual contrast and easy reading. The dark text in the footer area contrasts well with the medium-light background color.

There are several callouts in this image that point to organizational features of this web page. A callout with the caption, H 1 element, points to the Casita Sedona Bed and Breakfast page heading. Two callouts with the caption, H 2 element, point to the Reservation and Newsletter subheadings in the left column. Three callouts with the captions of either H 2 element or H 3 element, point to sub headings in the middle column. Three callouts with the caption, Brief paragraph, point to the text written below the three subheadings.

The photograph shows a mountain scene, where the foreground composed of a tree with red highlights. The middle ground is composed of a forest of green trees. The background is composed of exposed stone, which is pinkish in color, along with distant tree covered mountains and a blue sky. Color Scheme A consists of a dark blue patch, a lighter blue patch, a dark brown patch, and a reddish patch. Color Scheme B consists of a dark green patch, a pinkish patch, the same dark brown patch, and a blue green patch.

Thinking of a clock. yellow is at the 12 o clock position, orange is at the 1 o clock position, yellow orange at the 2 o clock position, red orange at the 3 o clock position, red at the four o clock position, red violet at the 5 o clock position, Violet at the 6 o clock position, blue violet at the 7 o clock position, blue at the 8 o clock position, blue green at the 9 o clock position, green at the 10 o clock position, yellow green at the 11 o clock position.

Four swatches are shown. At the left is the swatch for yellow. To the right of it is a shade of yellow that is darker than the original color. To the right of it is a tint of yellow that is lighter than the original. To the right of it is a tone of yellow that has less saturation than the original color.

Three swatches are shown. At the left is the swatch for a shade of blue. To the right of it is a tint of blue. To the right of it is a tone of blue.

Three swatches are shown, orange, red orange, and yellow orange.

Two swatches are shown, yellow and violet.

Four swatches are shown, yellow, violet, red violet, and blue violet.

Three swatches are shown, teal, which is blue green, yellow orange, and red violet.

Four swatches are shown, yellow, violet, yellow green, and red violet.

A website designed for younger children. It features bright graphics, several colors like yellow blue, teal, and violet, animation, and interactivity.

This website is designed for individuals in their late teens and early twenties. It consists of dark background colors with occasional use of bright contrast, music, and dynamic navigation.

This website targets a general audience by including a compelling visual graphic and providing the text content on a white background for maximum contrast while engaging visitors with a large graphic,

This website targets the 55 and older age group, by including light backgrounds, well-defined images, and large text.

The vertical axis is Time in seconds and ranges from 0 to 160. The horizontal axis shows three groups of download speeds labeled 56 kilo bits per second, 512 kilo bits per second, and Broadband at 1.544 mega bits per second. Each of these groups is divided into four subgroups representing files sizes of 30 kilo bytes, 60 kilo bytes, 90 kilo bytes, and 1 mega byte. For the first group, the graph shows that at 56 kilo bits per second, a 30 kilo byte files takes 4.39 seconds to download, a 60 kilo byte files takes 8.78 seconds to download, a 90 kilo byte files takes 13.17 seconds to download, and a 1 mega byte files takes 149.8 seconds to download. For the second group, the graph shows that at 512 kilo bits per second, a 30 kilo byte files takes 0.48 seconds to download, a 60 kilo byte files takes 0.96 seconds to download, a 90 kilo byte files takes 1.44 seconds to download, and a 1 mega byte files takes 16.88 seconds to download. For the third group, the graph shows that at 1.544 mega bits per second, a 30 kilo byte files takes 0.16 seconds to download, a 60 kilo byte files takes 0.32 seconds to download, a 90 kilo byte files takes 0.48 seconds to download, and a 1 mega byte files takes 5.43 seconds to download.

The navigation area consists of the words, Home, Tours, Reservations, and Contact located immediately below the header area and spreads across the entire page.

The navigation area consists of the words, Home, Tours, Reservations, and Contact located immediately below the header area, spreading down the left area of the page.

Selecting Tours from the Navigation bar displays a vertical menu with the One Hour Tours, Half-Day Tours, Full Day Tours, and Custom Tours options.

The site index appears on the left of the page and contains hyperlinks to the various website pages.

The wireframe consists of the following components. A header section at the top of the page, and below it, a navigation bar with hyperlinks for Home, Services, Products, About, and Content. In the body section, a heading and a related paragraph are shown, followed by a subheading, an unordered list, and related paragraphs. At the bottom of the wireframe is a footer.

The body of the previous wireframe has been modified so that content appears in three equal width columns. The first column contains the image, which has been inserted above the previous heading and its paragraph. The second column contains the original subheading, an unordered list, and its related paragraph. The third column contains additional subheadings and related paragraphs.

The body of the previous wireframe has been modified so that content appears in three varying width columns. The first column has been narrowed and now contains a small image, which has been inserted below the heading and at the top of the paragraph and an unordered list. The second column has been widened and contains a large image above the subheading and its related paragraph. Another small image appears at the top of one of the paragraphs. The third column has been narrowed and contains an image below the subheadings and related paragraphs.

As with the previous wireframes, this wireframe displays a webpage with a header, vertical navigation area on the left, content area, with headings, subheadings, images, paragraphs, and unordered lists, and a footer area.

The web page content has a fixed width, hugs the left margin, and has empty white space at the right side of the browser window.

The entire web page, header, navigation bar, and content areas are bordered by brown margins.

The entire web page, header, navigation bar, and content areas occupy the entire browser window, so there are no margins.

The header and navigation bar occupy the entire width of the browser window, but the content area occupies the center of the browser window and has brown margins.

In this version, the brown margins are not displayed, and the complete heading is not seen.

In this version, the images are truncated and there is additional word wrap of the paragraph text.

Instead of the navigation bar displayed on one line with 7 links, it is displayed in three lines with two links on each line, and the last link is missing. Furthermore, the images and reservation information have been removed.

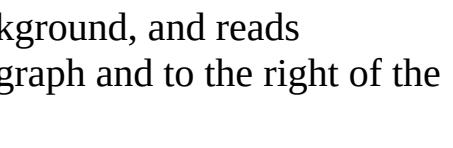
The box model consists of 4 rectangles, where each succeeding rectangle surrounds the previous one. The inner most rectangle is labeled content. The next surrounding rectangle is named padding. The next surrounding rectangle is named border. The outermost surrounding rectangle is named margin, and has its top bottom, left and right sides labeled as such. Each rectangle, except the border one, is shaded to distinguish it from the others.

At the top of the browser window, a callout with the caption, Margin, points the white space above the header. Below the margin, a callout with the caption, Content points to the header. A callout with the caption, Border points to the border surround the header. A callout with the caption, Padding points to the indentation of text from the border. Below the header is another margin, and then a bordered paragraph. Three addition callouts point to these additional components.

At the top of the web page, is a blue rectangle with a dashed border that represents the first div element. Below this rectangle is a smaller white rectangle with a solid border that represents the second div element.

At the top of the web page, is a blue rectangle with a dashed border that represents the outer div element. Within this rectangle is a smaller white rectangle with a solid border that represents the inner div element.

The heading contains black text with a green background, and reads Wildflowers. Below in the content area, is a paragraph and to the right of the paragraph is an image of a flower.



The heading has been changed so that it now contains yellow text with a darker green background, and reads Yellow Lady Slipper. Below in the content area, is the same paragraph with a light green background. A subheading and an additional paragraph appear below the original paragraph. In this example, the flower image is to the left of the original paragraph and the first line of the subheading. The second line of the subheading and the new paragraph are flush with the left edge of the window.

The light green background has been extended downward to match the height of the image. The subheading and its paragraph now appear completely below the image, flush to the left edge of the window.

The image and original paragraph remain where they were, but the light green background only encompasses the original paragraph. The subheading and its paragraph now appear completely below the image, flush to the left edge of the window

This produces the same result as applying the clear property to the break tag discussed with Figure 6 dot 7.

This automatically display scrollbars if the content exceeds the space allocated to it. The paragraph with the light green background is now displayed in a smaller space, and scroll bars now appear enabling the user to scroll up and down or left and right to see the text.

The web page contains three equally sized rectangles, and because of their size, two rectangles fit on the same line, but the third is placed below them.

This service can't be reached.  
Please try again later!

[More information](#)

There are four rectangular areas the full width of the wireframe. The topmost rectangle is labeled header, and beneath it is the nav rectangle. Below the nav rectangle is the main rectangle, and at the bottom is the footer rectangle.

There are four rectangular areas. The topmost rectangle is labeled header, and it spans the full width of the wireframe. Beneath it are the nav and main rectangles, where the nav rectangle is to the left, and the main rectangle is larger and to the right. At the bottom is the footer rectangle, which spans the entire width of the wireframe.

The web page consists of a header, a nav area with three horizontally listed hyperlinks, a subheading, a paragraph, and a copyright footer. All components span the width of the web page and are aligned to the left side of the page.

The web page consists of the same four components as in the previous figure. However, the nav area shares the display with the subheading and paragraph. In the nav area, the three hyperlinks are arranged vertically at the left side of the page. The subheading and the first line of the paragraph are moved to the right to accommodate the space taken up by the nav area. The remainder of the text in the paragraph is aligned with the left side of the page.

The web page consists of the same four components as in the previous two figures. The nav area shares the display with the subheading and paragraph. The shared display consists of two columns. In the left column, the nav area's three hyperlinks are arranged vertically at the left side of the page with empty space below them, which extends down to the footer. In the right column, are the subheading and the entire paragraph. Below the two columns is the footer, which spans the entire width of the page.

The previous two column layout is enhanced by adding a medium blue background color to the header and footer areas, and a light blue background color to the left column containing the nav area. The footer area has been centered on the page. This is the layout discussed with Figure 6 dot 14.

The wireframe consists of four components. A full width header area. The nav area shares the display with the main area and the footer. The shared display consists of two columns. In the left column, is the nav area, and in the right column, are the main area and the footer.

Based on the description of the wireframe, the web page header has a medium blue background color, and the nav column has a light blue background. The shared

The hyperlinks are shown in their default appearance of having underlines.

The hyperlinks are shown in their default appearance of having underlines.

The four hyperlinks, Home, Menu, Directions, and Contact appear on a blue bar without underlines.

The header spans the entire page. The remainder of the page is in a two column layout, where the nav area is in the left column, and the remainder of the content is in the right column. The hyperlinks are displayed in two rows, in a blue color, and contain underlines.

The hyperlinks are displayed one per row, are colored white, and the underlines have been removed.

The hyperlink appears as a button with the caption Sign Up, and shows that the mouse pointer looks like a hand with a pointing finger when placed over the link.

There are five horizontal buttons like navigation hyperlinks named Hoe Products, Services, Contact, and About. The buttons have white text on dark blue backgrounds.

There are four rectangular areas. The topmost rectangle is labeled header, and it spans the full width of the wireframe. Beneath it are the nav and main rectangles, where the nav area is to the right, and the main area is larger and to the left. At the bottom is the footer area, which spans the entire width of the wireframe.

The web page implements the wireframe just described. The heading reads Lighthouse Island Bistro, the main area begins with the subheading Locally Roasted Free Trade Coffee with a related paragraph about the coffee. The nav area consists of four bulleted vertical hyperlinks with underlines that read, Home, Menu, Directions, and Contact.

In the first image, the top of the web page is shown, with the navigation appearing at the top. In the second image, the web page has been scrolled down so that the top of the page is no longer seen, but the navigation still appears. This is accomplished by configuring the navigation with fixed positioning.

A web page with the heading Relative Positioning is shown with paragraph text below it. Instead of being flush with the left edge of the browser window, the text is shifted left.

This was accomplished by setting the position property to absolute with a left value of 200 pixels and a top value of 100 pixels.

The smaller images on the left have no captions associated with them. These images have been made into hyperlinks, so that placing the mouse pointer over one of them displays an enlargement of that image along with its caption.

A tag line that reads, the best coffee on the coast, has been added to the header element. An aside element that reads, Watch for the March Madness Wrap next month, has been added to the main element. Additionally, some elements have been positioned and had their background colors changed.

There are four rectangular areas. The topmost rectangle is labeled header, and it spans the full width of the wireframe. Beneath it are the nav and main rectangles, where the nav rectangle is to the left, and the main rectangle is larger and to the right. Within the main rectangle is a rectangle for an image. At the bottom is the footer rectangle, which spans the entire width of the wireframe.

The menu page is similar to the home page, with the following differences. The image is now that of coffee mugs in a cabinet. The subheading reads, Coffee at JavaJam, followed by a descriptive paragraph, which is followed by descriptions of some of the types of coffee that are sold.

The web page implements the wireframe just described. The entire page has a tan border at the top, bottom, left and right of the content. The heading reads JavaJam Coffee House, the main area begins with an image of a road at the top, followed by the subheading Follow the Winding Road to JavaJam with a related paragraph about the coffee. This is followed by another subheading that reads JavaJam Coffee House favorites colon, followed by a bulleted list, and then contact information. The nav area consists of four vertical hyperlinks without underlines that read, Home, Menu, Music, and Jobs. A footer is at the bottom.

This service can't be reached.  
Please try again later!

[More information](#)

There are four rectangular areas. The topmost rectangle is labeled header, and it spans the full width of the wireframe. Beneath it are the nav, main, and footer rectangles. The nav rectangle is to the left and extends to the bottom of the page. The right section is shared by the main and footer rectangles. At the top of the shared area is the main rectangle, and the footer rectangle is below it.

The web page implements the wireframe just described. The entire page has a blue horizontal linear gradient border at the top, bottom, left and right of the content. The heading reads Fish Creek Animal Clinic, the main area consists of a series of the subheadings followed by short descriptive paragraphs. The first of which is, the Full Service Facility subheading followed by the paragraph, Doctors and staff are on duty 24 hours a day, 7 days a week. A footer is at the bottom. The nav area consists of four vertical hyperlinks without underlines that read, Home, Service, Ask the Vet, and Contact.

There are five rectangular areas. The topmost rectangle is labeled header, and it spans the full width of the wireframe. Beneath it are the nav, hero image, main, and footer rectangles. The nav rectangle is to the left and extends to the bottom of the page. The right section is shared by the hero image, main and footer rectangles. At the top of the shared area is the hero image rectangle, below it is the main rectangle followed by the footer rectangle.

The web page implements the wireframe just described. There is a blue Horizontal linear gradient border at the top, bottom, left and right of the content. The heading reads Pacific Trail Resort. The hero image area contains a rocky beach scene. The main area consists of the subheading Enjoy Nature in Luxury with a related paragraph about the resort, a bulleted list, and then contact information. The nav area consists of four vertical hyperlinks without underlines that read, Home, Service, Ask the Vet, and Contact.

There are four rectangular areas. The topmost rectangle is labeled header, and it spans the full width of the wireframe. Beneath it are the nav and main rectangles, where the nav rectangle is to the left, and the main rectangle is larger and to the right. At the bottom is the footer rectangle, which spans the entire width of the wireframe.

The web page implements the wireframe just described. The header area has a teal vertical linear gradient border with the image of a lily on the right. An image of an open doorway is at the top left of the main area. To the right of the image is subheading that reads, Find you Inner Light, followed by a descriptive paragraph and a bulleted list. Below the image is contact information. The nav area consists of four vertical hyperlinks without underlines in the shape of rectangular buttons that read, Home, Classes, Schedule, and Contact. At the bottom is copyright information on a solid teal background.

The classes page is similar to the home page, with the following differences. The image is now that of a yoga mat that spans the entire main area. The subheading reads, Yoga Classes, followed by a series of subheadings that are followed by short descriptive paragraphs. The first of which is, the Gentle Hatha Yoga subheading followed by a paragraph describing this type of yoga.

In the casita folder are the index dot h t m l, contact dot h t m l, and casita dot c s s files. Within this folder are three subfolders. In the images subfolder folder are the logo dot gif and the scenery dot j p g files. In the rooms subfolder folder are the canyon dot h t m and javelina dot c s s files. In the events subfolder folder are the weekend dot h t m and festival dot c s s files.

The nav area is on the left of the screen and consists of the following links. Home, Canyon Room, Javelina Room, Weekend Events, Festivals, and Contact. None of the links are underlined.

The file has been added to the bottom of the rooms subfolder list, and an arrow points to the newly added file.

The Juniper Room link has been added between the Javelina Room and Weekend Events link, and it too has no underlining.

At the top of the JavaJam Coffee House home page, in the upper right corner of the web page, is the underlined link, Skip to Content. Clicking this link scrolls the page down to display content beginning with Follow the Winding Road to JavaJam.

The H 1 heading reads, Favorite Sites, followed by a bulleted list consisting of the following underline hyperlinks. Hobbies, H T M L 5, and C S S. Below the list are three H 2 headings followed by a description and an underlined link. The H 2 headings, text, and links are as follows. First subheading, Hobbies with text, Running and link, h t t p colon slash slash w w w dot running network dot com. Text Cooking with link h t t p colon slash slash w w w dot cooking dot com. Second subheading, H T M L 5 with text, Specification and link, h t t p colon slash slash w w w dot w 3 dot o r g slash T R slash h t m l 5 slash. Text Tutorials with link h t t p colon slash slash w w w dot w 3 schools dot com slash h t m l 5 slash. Third subheading, C S S with text, W 3 C Cascading Style Sheets and link, h t t p colon slash slash w w w dot w 3 dot o r g slash Style slash C S S. Text Tutorials with link h t t p colon slash slash w w w dot w 3 schools dot com slash c s s 3 slash.

The first image in the sprite begins at the top of the image, and the second image in the sprite begins 100 pixels down from the top. A checkerboard background indicates a transparent image.

Placing the mouse pointer over the Menu link, changes the image from the first image in the sprite to the second.

There are seven rectangular areas. The topmost rectangle is labeled header, and it spans the full width of the wireframe. Beneath it are the nav, main, and aside rectangles all of which extend to the bottom of the diagram. The nav rectangle is to the left, the main rectangle is in the center and contains the footer rectangle, which is at the bottom of the main rectangle. On the right is the aside rectangle that contains two news rectangles arranged vertically.

The header reads Door County Wildflowers is left aligned, with shadowed text, and with a background image of flowers. At the upper right corner of the header area is an underlined Skip to Content hyperlink in white. The nav area contains the Home, Spring Summer Fall, and Contact hyperlinks, all shown without underlines. Below the links is an image of a flower. The background is a light gray. The main area consists of a subheading, some related text, and image of a flower. Below the image, an additional subheading and related text appears. At the bottom of the main area is a footer containing copyright information. The background is white. The aside area contains two subheadings with lines separating them from the related text and related hyperlinks within the text. The background is a light gray. Throughout the page, the text for headings and subheadings is orchid, while the remaining text is in green.

It is displayed as a one column web page with a white background. All hyperlinks have underlines. In vertical order, the following appear. The Skip to Content hyperlink followed by the header Door Country Wildflowers. Below the heading is a bulleted list of hyperlinks that read, Home, Spring Summer Fall, and Contact. Below the links is an image, a subheading, and a related paragraph.

This is basically the same as Figure 6.10, with the following minor exceptions. The text in the header area is not enlarged and is right aligned. The hyperlinks in the nav area are in a bulleted list and underlined. The subheadings in the aside area are in a larger font and do not have a line separating them from the related text and hyperlinks. Throughout the page, the text for headings and subheadings is in green.

This is also basically the same as Figure 6.10, with the following minor exceptions. The text in the header area is not enlarged and is missing the background image. The background color of the nav and aside areas in not gray.

Same as the previous figure, but the nav area is missing.

The header reads Kayak Door County dot net. It is in black on a blue background. Below the header is a black nav bar with the Home, Tours, Reservations, and Contact hyperlinks in blue without underlines. The main area consists of a background image of two kayaks with the text Your next adventure is only a paddle away three dots all, in white text.

The header is the same as the desktop browser. The four hyperlinks are now arranged vertically instead of horizontally. A truncated version if the image appears as the background of the main area. The text is now smaller and in black. Additional text that reads 800 dash 5 5 5 dash 5 5 5 appears in white, is underlined, and is in a larger font than the original main text.

There are four rectangles arranged vertically. In order from top to bottom, they are. header, nav, main, and footer.

The header area header spans the entire width of the page and contains a lighthouse image at the left side of the page. To the right of the image is the text Lighthouse on one line and Island Bistro on the next. The text is in dark blue with a light blue background. Below the header are the main and nav areas. On the left, the main area consists of a vertical series of subheadings and related text. Subheading text is a light blue, while paragraph text is a darker blue. At the bottom right of the main area is a different image of a lighthouse. The background color is white. On the right, the nav area consists of a vertical series of hyperlinks that read, Home. Menu, Directions, Contact. The hyperlinks are in white and are not underlined. The background color of the nav area is a lighter blue. The footer area contains copyright information. The text is in black, and the background color is the same shade of blue as the header.

The portion of the page that is shown is the same as the previous figure, except the nav area is on the left.

The header area contains a lighthouse a semitransparent image of a lighthouse at the right side of the page. To the left of the image is the text Lighthouse on one line and Island Bistro on the next. The text is in dark blue with a light blue background. Below the header is the nav area, which consists of a vertical series of hyperlinks that read, Home, Menu, Directions, and Contact. The hyperlinks are in white and are not underlined. The background color of the nav area is a lighter blue. Below the nav area is the main area, which consists of a vertical series of subheadings and related text. Subheading text is a light blue, while paragraph text black. The background color is white.

The left and right margins are displayed in blue black. Left aligned in the header is the text Lighthouse Island Bistro in dark blue and in a large font size. Below and aligned to the right, is the text the best coffee on the coast, which is in a smaller font and is italicized. Below the header are the main and nav areas. On the left, the nav area consists of a vertical series of hyperlinks that read, Home Menu, Directions, and Contact. The hyperlinks are in white and are not underlined. The background color of the nav area is a lighter blue. On the right, the main area consists of a vertical series of subheadings and related text. Subheading text is a light blue, while paragraph text is a darker blue. At the upper right of the main area is an image of a lighthouse with the caption Island Lighthouse comma Built in 18 70. The background color is white. The footer area contains copyright information. The text is in dark blue, and the background color is the same shade of blue as the header.

In the portion of the page shown in the figure, the left and right margins are displayed in blue black. Left aligned in the header is the text Lighthouse Island Bistro in dark blue and in a large font size. Below and aligned to the right, is the text the best coffee on the coast, which is in a smaller font and is italicized. Below the is the nav area, which consists of a vertical series of hyperlinks that read, Home Menu, Directions, and Contact. The hyperlinks are in white and are not underlined. The background color of the nav area is a lighter blue. Below the nav area is the main area, which consists of a vertical series of subheadings and related text. Subheading text is a light blue, while paragraph text is a darker blue. At the upper right of the main area is an image of a lighthouse.

Left aligned in the header is the text Lighthouse Island Bistro and in a large font size. Below and aligned to the right, is the text the best coffee on the coast, which is in a smaller font and is italicized. Header text is in dark blue. Below the header is the nav area, which consists of a horizontal series of hyperlinks that read, Home, Menu, Directions, and Contact. The hyperlinks are in white and are not underlined. The background color of the nav area is a lighter blue. Below the nav area, main area consists of a vertical series of subheadings and related text. Subheading text is a light blue, while paragraph text is darker blue black. At the right of the main area is an image of a lighthouse with the caption Island Lighthouse comma Built in 18 70. The background color is white. The footer area contains copyright information. The text is in dark blue, and the background color is the same shade of blue as the header.

Left aligned in the header is the text Lighthouse Island Bistro and in a large font size. Below and aligned to the right, is the text the best coffee on the coast, which is in a smaller font and is italicized. Header text is in dark blue. Below the header is the nav area, which consists of a vertical series of hyperlinks that read, Home, Menu, Directions, and Contact. The hyperlinks are in white and are not underlined. The background color of the nav area is a lighter blue. Below the nav area, main area consists of a vertical series of subheadings and related text. Subheading text is a light blue, while paragraph text is darker blue black. The background color is white. The footer area contains copyright information. The text is in dark blue, and the background color is the same shade of blue as the header.

On a desktop, it displays as a three column web page. The page has a left and right dark brown border. The header fully extends between the margins. Below the header are the nav and main areas and an additional column. In the left column is the nav area, in which four links with no underlining are vertically arranged. In the middle column, is the main area, which consists of a series of subheadings and related paragraphs that are vertically arranged. At the top of the right column, is an image and below it a subheading and a related paragraph. On a tablet it displays as a two column web page. There are no borders. The header fully extends across the page. Below the header is the nav area, in which four links with no underlining are horizontally arranged. Below the nav area are is the main area and an additional column. In the left column, is the main area, which consists of a series of subheadings and related paragraphs that are vertically arranged. At the top of the right column, is an image and below it a subheading and a related paragraph. In a smartphone it displays as a one column web page. There are no borders. The header fully extends across the page. Below the header is the nav area, in which four links that appear as buttons are arranged in two rows. Below the nav area are is the main area, which consists of a series of subheadings and related paragraphs that are vertically arranged. Below the main area, the additional column heading and related paragraph appear.

The header background does not extent the full width of the header and has a callout with the caption, the width of the background image may be less than the container width in a fluid page layout that points to the right of the header. The image in the additional column extends to the right of the window, overlapping the right border.

In the large window, the entire image of a waterwheel, and building of which it is part, are displayed. In the medium window, only the waterwheel is displayed. In the small window, only a small portion of the waterwheel is displayed.

No discernable difference can be seen between this figure and the previous one.

It displays as a one column web page. There are no borders. The header fully extends across the page on one line. Below the header is the nav area, in which four links appear as buttons are arranged in two rows. Below the nav area are is the main area, which consists of a series of subheadings and related paragraphs that are vertically arranged. Below the last paragraph in the main area is the image and related paragraph that were displayed in the additional column. Below the web page are some Opera Mobile Emulator commands.

The display almost identical to the previous figure, except the heading text requires two lines and the Opera Mobile Emulator commands are not present.

The display is identical to the Opera Mobile Emulator figure, except the Opera Mobile Emulator commands are not present.

There are six rectangular areas. The topmost rectangle is labeled header, and it spans the full width of the wireframe. Beneath it are the nav, main, and aside rectangles all of which are included in a flex container indicated by a red rectangle that surrounds them. A callout with the caption, Flex container with three columns, points to the red rectangle. The nav rectangle is to the left, the main rectangle is in the center, and the aside rectangle is on the right. The footer rectangle is at the bottom of the three columns and spans the entire width of the wireframe.

The page has a left and right dark brown border. The header fully extends between the margins. Below the header are the nav and main areas and an additional column. In the left column is the nav area, in which four links with no underlining that are vertically arranged. In the middle column, is the main area, which consists of a series of subheadings and related paragraphs that are vertically arranged. At the top of the right column, is an image and below it a subheading and a related paragraph.

The header has shadowed text and a background image. Below the header is the nav area, in which four hyperlinks with no underlining are horizontally arranged. Below the nav area is the main area, which consists of a series of subheadings and related paragraphs that are vertically arranged. Below the last paragraph in the main area is the image and the related paragraph that were displayed in the additional column. At the bottom of the page is copyright information.

The header has shadowed text and a background image. Below the header is the main area, which consists of a series of subheadings and related paragraphs that are vertically arranged. Below the last paragraph in the main area is the image and related paragraph that were displayed in the additional column. Below the main area is the nav area, in which four hyperlinks with no underlining are arranged in two rows. At the bottom of the page is the copyright information.

The page has a left and right dark brown border. The header has shadowed text and a background image. Below the header is the nav area, in which four hyperlinks are vertically arranged at the left margin. The links have no underlining. Below the nav area is the main area, which consists of a series of subheadings and related paragraphs that are vertically arranged. Below the last paragraph in the main area is the image and paragraph that were displayed in the additional column. At the bottom of the page is the copyright information.

This grid area layout is similar to a wireframe layout, except horizontal and vertical dashed lines are used to delineate the rectangular regions, and the dimensions of the regions are given. There are four rectangular regions. The header spans the entire top of the layout and has a 200 pixel height. In the left column is the nav area, which has a 150 pixel width. In the right column is the main area, which has a flex factor of one width and auto height. The footer spans the entire bottom of the layout and has a 100 pixel height.

This grid area layout does not specify the dimensions of the regions. There are five rectangular regions. The header spans the entire top of the layout. In the left column is the nav area. In the middle column is the main area. In the right column is the aside area. The main area is the widest column with the nav and aside areas having the same smaller size. The footer spans the entire bottom of the entire layout.

The page has a left and right dark brown border. The header has shadowed text and a background image and fully extends between the margins. Below the header are the nav and main areas and an additional column. In the left column is the nav display, in which four links are vertically arranged. The links have no underlining. In the middle column, is the main area, which consists of a series of subheadings and related paragraphs that are vertically arranged. At the top of the right column, is an image and below it is a subheading and a related paragraph. The main area is much wider than the nav area and the additional column. At the bottom of the page is the copyright information.

There are no borders. The header has shadowed text and a background image. Below the header is the nav area, in which four links are horizontally arranged. The links have no underlining. Below the nav area are the main area and an additional column. In the left column, is the main area, which consists of a series of subheadings and related paragraphs that are vertically arranged. At the top of the right column, is an image and below it a subheading and a related paragraph. The main area is much wider than the additional column. At the bottom of the page is the copyright information.

There are no borders. The header has shadowed text and a background image. Below the header area is the main area, which consists of a series of subheadings and related paragraphs that are vertically arranged. Below the main area is the additional column with its image on top, followed by a subheading and a related paragraph. Below the additional column content is the nav area, in which four links are arranged in two rows. The links have no underlining. At the bottom of the page is the copyright information.

This grid area layout does not specify the dimensions of the regions. There are five rectangular regions. The header spans the entire top of the layout. Below the header is the nav area, which spans the entire top of the layout. Below the nav area in the left column is the main area. In the right column is the aside area. The main area is wider than the aside area. The footer spans the entire bottom of the entire layout.

The header has a semitransparent image of a steaming coffee cup on the left, with the text JavaJam Coffee House in a dark brown. Below the header is the nav area, in which four hyperlinks are vertically arranged. They have dark brown backgrounds and yellow text without underlines. Below the nav area are is the main area, which has dark brown text on a yellow background. It consists of a subheading that reads Follow the Winding Road to JavaJam and a related paragraph about coffee. This is followed by another subheading that reads JavaJam Coffee House favorites colon, followed by a bulleted list, and then contact information. At the bottom of the page is the footer, which contains copyright information displayed on a tan background.

The header has an image of a steaming coffee cup on the left. The text JavaJam Coffee House is in dark brown on a tan background. Below the header is the nav area, in which four hyperlinks are horizontally arranged. They have dark brown backgrounds and yellow text without underlines. Below the nav area is the main area, what has an image of a road at the top, followed by the subheading that reads Follow the Winding Road to JavaJam with a related paragraph about coffee. This is followed by another subheading that reads JavaJam Coffee House favorites colon, followed by a bulleted list, and then contact information. At the bottom of the page is the footer, which contains copyright information displayed on a tan background.

The page content has a light tan margins at the top, bottom, left and right of it. The nav area is in the left column and has an image of a steaming coffee cup at its top. The nav area has a dark brown background. Below the image are four hyperlinks that are vertically arranged. They have the same dark brown background and yellow text without underlines. The main area is in the right column. In the header is the text JavaJam Coffee House in dark brown on a tan background. Below the header is an image of a road at the top, followed by the subheading that reads Follow the Winding Road to JavaJam with a related paragraph about coffee. This is followed by another subheading that reads JavaJam Coffee House favorites colon, followed by a bulleted list, and then contact information. At the bottom of the page is the footer that spans the entire content area. The footer contains copyright information displayed on a tan background.

In the header is an illustration of a fish with text that reads, Fish Creek Animal Clinic. In the nav area, are four vertically aligned hyperlinks for Home, Service, Ask the Vet, and Contact. They have no underlines, are separated by lines, and the background color is light blue. In the body area of the page, the background color is white with blue text. A series of subheadings and related paragraphs appear, one below the other. At the bottom of the main area is contact information. The footer contains copyright information and an email address. The footer has a medium blue background color with dark blue text.

In the header is an illustration of a fish and text that reads, Fish Creek Animal Clinic. In the nav area, are four horizontally aligned hyperlinks for Home, Service, Ask the Vet, and Contact. They have no underlines and the background color is light blue. In the body area of the page, the background color is white with blue text. A series of subheadings and related paragraphs appear, one below the other. At the bottom of the main area is contact information. The footer contains copyright information and an email address. The footer has a medium blue background color with dark blue text.

At the right of the header is an image of a sunset and text that reads, Pacific Trails Resort. The text is in white on a black background. In the nav area, are four vertically aligned hyperlinks for Home, Yurts, Activities, and Reservations. They have no underlines and the text is white on a dark blue background. In the body area, the background color is white with blue text. At the top is a subheading and a related paragraph. Below the paragraph is a bulleted list. At the bottom of the main area is contact information, copyright information, and an email address.

At the right of the header is an image of a sunset and text that reads, Pacific Trails Resort. The text is in white on a black background. In the nav area, are four horizontally aligned hyperlinks for Home, Yurts, Activities, and Reservations. They have no underlines and the text is white on a dark blue background. In the body area, the background color is white with blue text. At the top is a subheading and a related paragraph. Below the paragraph is a bulleted list. At the bottom of the main area is contact information, copyright information, and an email address.

In the header is a semitransparent image of a lily and text that reads Path of Light Yoga Studio. The text is in black, centered in the header, and on a gradient teal background. In the nav area, are four hyperlinks for Home, Classes, Schedule, and Contact. They are arranged in two rows of buttons that have no underlines. The button text is blue on a light blue background, which is the same background color of the nav area. In the body area, the background color is same as the nav area and the text is orchid. At the top is a subheading and a related paragraph. Below the paragraph is a bulleted list. At the bottom of the main area is contact information.

At the right of the header is an image of a lily, and on the left, is text that reads Path of Light Yoga Studio. The text is in dark blue on a gradient teal background. In the nav area, are four hyperlinks for Home, Classes, Schedule, and Contact. They are horizontally arranged in buttons that have no underlines. The button text is blue on a light blue background, which is the same background color of the nav area. In the body area, the background color is same as the nav area and the text is orchid. At the top is a subheading and a related paragraph. Below the paragraph is a bulleted list. At the bottom of the main area is contact information. Below the main area is copyright information and an email address. The text is dark blue on a teal background.

The column headings are Name, Birthday, and Phone are displayed in the first row. The second row consists of, Jack, 5 slash 13, and 8 5 7 dash 5 5 5 dash 5 5 5 5. The third row consists of, Sparky, 11 slash 28, and 8 5 73 0 3 dash 5 5 5 dash 5 5 5 5.

The caption, Bird Sightings appears above the table. The column headings are Name and Date and are displayed in the first row. The second row consists of, Bobolink and 5 slash 15 slash 10. The third row consists of, Upland Sandpiper and 6 slash 0 3 slash 10.

The caption, School History appears above a table. The column headings are School Attended, Years, and Degree Awarded are displayed in the first row. The second row consists of, Schaumburg High School on, 20 12 dash 20 16, and High School Diploma. The third row consists of, Harper College, 20 16 dash 20 17, and Web Developer Certificate.

The top row spans two columns and reads, This spans two columns. The second row contains two cells, one that reads Column 1 and the other Column 2.

The first column spans two rows and reads, This spans two rows. The text is vertically centered in the cell. The second column contains two rows. One reads Row 1 Column 2 and the other Row 2 Column 2.

The first column spans three rows and reads, Cana Island Lighthouse. The text is vertically centered in the cell. The second column contains three rows. The first reads, Built colon 18 69, the second reads, Automated colon 19 44, and the last one reads, Tower Height colon 65 feet.

This figure is the same a Figure 8 point 2. The caption, Bird Sightings appears above the table. The column headings are Name and Date and are displayed in the first row. The second row consists of, Bobolink and 5 slash 15 slash 10. The third row consists of, Upland Sandpiper and 6 slash 0 3 slash 10.

The caption, Lighthouse Island Bistro Specialty Coffee Menu appears above a table. The column headings are Specialty Coffee, Description, and Price are displayed in the first row. The second row consists of, Lite Latte, Indulge in a shot of espresso with steamed, skim milk, \$3.50. The third row consists of, Mocha Latte, Choose dark or milk chocolate with steamed milk, \$4.00. The fourth row consists of M C P Latte, A luscious mocha latte with caramel and pecan syrup, \$4.50.

The caption and content of this table is the same as the previous figure, except each row is displayed with an alternating background color. Beginning with the first row, each odd number row has a white background, while each even number row has a light blue background. The entire table is surrounded with a dark blue border.

The caption and content of this table is the same as the previous two figures. In the first row, the column headings are in a white font on a dark blue background. The second and fourth rows have a light blue background. The third row has a white background. The entire table is surrounded with a dark blue border.

The Caption reads, Time Sheet and is in large font. The table and cells are borderless. The column headings, Day and Hours are displayed in the first row, and are bolded with a light blue background. The second row, reads Monday, 4, the third row reads, Tuesday, 3, the fourth row reads Wednesday, 5, the fifth row reads, Thursday, 3, and the sixth row reads, Friday, 3. Below each row is a dashed line delineating each row from the next. The final row reads, Total,18. It has bolded text with a light blue background.

The page content has a light tan margins at the top, bottom, left and right of it. The nav area is in the left column and has an image of a steaming coffee cup at its top. The nav area has a dark brown background. Below the image are four hyperlinks that are vertically arranged. They have the same dark brown background and yellow text without underlines. The main area is in the right column. In the header is the text JavaJam Coffee House in black on a yellow background. Below the header is an image of coffee cups in a cabinet at the top, followed by the subheading that reads Coffee at JavaJam with a related paragraph about coffee. This is followed by a table with three rows and two columns. The first and third rows have a tan background, while the second one has the same yellow background. The first row reads, Just Java, and in multiple lines, Regular house blend, decaffeinated coffee, or flavor of the day. Endless Cup \$3.00. The second row reads, Café au Lait, and in multiple lines, House blended coffee infused into a smooth, steamed milk. Single \$3.00, Double \$4.00. The third row reads, Iced Cappuccino, and in multiple lines, Sweetened espresso blended with icy cold milk and served in a chilled glass. Single \$4.75, Double \$6.00. At the bottom of the page is the footer that spans the entire content area. The footer contains copyright and contact information displayed on a tan background.

The entire page has a blue horizontal linear gradient border at the top, bottom, left and right of the content. The heading reads Fish Creek Animal Clinic, with a fish image in the background. The nav area is in the left column and has a light blue background. There are four hyperlinks that are vertically arranged. They have dark blue text without underlines. The main area has a white background and contains a table with five rows and two columns and no headings. The first row reads, Medical Services, and We offer state of the art equipment and technology. The second row reads, Surgical Services, and Full range of surgical procedures including orthopedics and emergency surgeries. The third row reads, Dental Care, and A dental exam can determine whether your pet need preventive dental care such as scaling and polishing. The fourth row reads, House Calls, and The elderly, physically challenged, and multiple pet households often find our in home veterinary service helpful and convenient. The fifth row reads, Emergencies, and At least one of our doctors in on call every day and night. At the bottom of the page is the footer that spans the entire content area. The footer contains copyright and contact information displayed on a blue background.

There is a blue Horizontal linear gradient border at the top, bottom, left and right of the content. The heading reads, Pacific Trail Resort, where there is a sunset image on the right. The nav area is in the left column and has a black background. There are four hyperlinks that are vertically arranged, that read, Home, Yurts, Activities, and Reservation. They have white text without underlines. On the right is the main area, which has an image of a cliff and water. The background color for this area is white. Written in blue, the heading reads, The Yurts at Pacific Trails, and is followed by three subheading and related paragraphs. The final subheading reads, Yurt Packages, followed by a related paragraph and a table with four rows and four columns. The heading row reads, Package Name, Description, Nights, and Cost per Person. The second row reads, Weekend Escape, Two breakfasts, a trail map, a picnic snack, 2, and \$450.

The third row reads, Zen Retreat, Four breakfasts, a trail map, a pass for daily yoga, 4, and \$600. The fourth row reads, Kayak Away, Two breakfasts, two hours of kayak rental daily, a trail map, 3, \$500. At the bottom of the page is the footer that contains copyright and contact information.

The header area has a teal vertical linear gradient border with the image of a lily on the right that spans the entire content area. In the right column at the top left of the main area is an image of an open doorway. Below the image is subheading that reads, Yoga Schedule, followed by a descriptive paragraph and two tables. The first table has five rows and two columns and has a caption that reads, Monday dash Friday. The heading row reads, Time and Class. The second row reads, 9:00 a m, Gentle Hatha Yoga. The third row reads, 10:30 a m, Vinyasa Yoga. The fourth row reads, 5:30 p m, Restorative Yoga. The fifth row reads, 7:00 p m, Gentle Hatha Yoga. The second table has six rows and two columns and has a caption that reads, Saturday and Sunday. The heading row reads, Time and Class. The second row reads, 10:30 a m, Gentle Hatha Yoga. The third row reads, Noon, Vinyasa Yoga. The fourth row reads, 1:30 p m, Gentle Hatha Yoga. The fifth row reads, 3:00 p m, Vinyasa Hatha Yoga. The sixth row reads, 5:30 p m, Restorative Yoga. In both tables, the rows are configured with alternating background colors of white and teal, beginning with white. In the left column, the nav area consists of four vertical hyperlinks without underlines in the shape of rectangular buttons that read, Home, Classes, Schedule, and Contact.

At the bottom is copyright information on a solid teal background that spans the entire content area.

The form is composed of the following 8 lines. Line 1, a label that reads, Shipping Address. Line 2, a label that reads, Name colon followed by a text box. Line 3, a label that reads, Address Line 1 colon followed by a text box. Line 4, a label that reads, Address Line 2 colon followed by a text box. Line 5, a label that reads, City colon followed by a text box. Line 6, a label that reads, State colon followed by a drop down box, followed by Zip colon and a drop down box. Line 7, a label that reads, Country colon followed by a drop down box. Line 8, a button that reads Continue.

The form is composed of the following lines two lines. Line 1, a label that reads, Sample Text Box. Line 2, a label that reads, E hyphen mail colon followed by a text box

The form is composed of the following three lines. Line 1, a label that reads, Join Our Newsletter. Line 2, a label that reads, E hyphen mail colon followed by a text box. Line 3, a button that reads, Sign Me Up exclamation point. Surrounding the text box is a red rectangle and below it is an error message that reads, Please fill out this field.

The form is composed of the following three lines. Line 1, a label that reads Sample Form. Line 2, a label that reads, E hyphen mail colon followed by a text box. Line 3, a button that reads, Submit Query followed by another button that reads, Reset.

The form is composed of the following three lines. Line 1, a label that reads, Join Our Newsletter. Line 2, a label that reads, E hyphen mail colon followed by a text box. Line 3, a button that reads, Sign Me Up exclamation point followed by another button that reads, Reset.

A form is composed of the following five lines. Line 1, a label that reads, Sample Check Box. Line 2, another label that reads, Choose the browsers you use colon. Line 3, a check box followed by text that reads, Google Chrome. Line 4, a check box followed by text that reads, Firefox. Line 5, a check box followed by text that reads, Microsoft Edge.

The form is composed of the following lines five lines. Line 1, a label that reads, Sample Radio Button. Line 2, another label that reads, Select your favorite browser colon. Line 3, a radio button followed by text that reads, Google Chrome. Line 4, a radio button followed by text that reads, Firefox. Line 5, a radio button followed by text that reads, Microsoft Edge.

The form is composed of the following lines two lines. Line 1, a label that reads, Sample Password Box. Line 2, a label that reads, Password colon followed by a password box containing a series of black solid circles.

The form is composed to the following three lines. Line 1, a label that reads, Sample Scrolling Text Box. Line 2, a label that reads, Comments colon. Line 3, a scrolling text box containing the text, Enter comments. Vertical scroll bars are displayed at the right of the scrolling text box.

The form is composed of the following 7 lines. Line 1, a label that reads, Contact Us. Line 2, a label that reads, First Name colon followed by a text box. Line 3, a label that reads, Last Name colon followed by a text box. Line 4, a label that reads, E hyphen mail colon followed by a text box. Line 5, a label that reads, Comments colon. Line 6, a scrolling text box. Line 7, a button that reads, Contact followed by another button that reads Reset.

The form is composed of the following two lines. Line 1, a label that reads, Select List colon One Initial Visible Item. Line 2, a drop down box with text that reads, Select your favorite browser. An arrow is displayed at the right of the drop down box.

The form is composed of the following lines two lines. Line 1, a label that reads, Select List colon Four Items Visible. Line 2, a drop down box with four items showing. These items are, Home, Products, Services, and About. Vertical scroll bars are displayed at the right of the drop down box.

The form is composed of the following three lines. Line 1, a label that reads, Name colon followed by a text box. Line 2, a label that reads, Password colon followed by a text box. Line 3, an image that looks like a button. The image has a green background with text that reads, Log In.

The form is composed of the following three lines. Line 1, a label that reads, Name colon followed by a text box. Line 2, a label that reads, E hyphen mail colon followed by a text box. Line 3, a button element that is composed of two components. The first is an image that looks like a button, where the image has a green background with text that reads, Sign Up. Below the image, is the second element, which is a label that reads, Sign up for a free newsletter.

The legend reads, Billing address followed by two lines. Line 1, a label that reads, Street colon followed by a text box. Line 2, a label that reads, City colon followed by a text box, followed by a label that reads, State colon followed by a text box, and a label that reads, Zip colon followed by a text box.

The form is composed of the following 8 lines. Line 1, a label that reads, Contact Us. Line 2, the beginning of a field set with a legend that reads, Customer Information. Line 3, a label that reads, First Name colon followed by a text box. Line 4, a label that reads, Last Name colon followed by a text box. Line 5, a label that reads, E hyphen mail colon followed by a text box, which ends the fieldset. Line 6, a label that reads, Comments colon. Line 7, a scrolling text box. Line 8, a button that reads, Contact followed by another button that reads Reset.

This form has the same elements, but the formatting of the fieldset has been modified. The font for the text box labels has been changed a non-serif typeface. The fieldset border has been changed to red, and its width has been changed to match the width of the scrolling text box.

The layout consists of four lines. Line 1, a label rectangle followed by a text box rectangle. Line 2, a label rectangle followed by a text box rectangle. Line 3, a label rectangle followed by a scrolling text box rectangle. Line 4, submit button rectangle.

The form is composed of the following 5 lines. Line 1, a label that reads, Contact Us. Line 2, a label that reads, Name colon. Line 3, a label that reads, E hyphen mail colon followed by a text box. Line 4, a label that reads, Comments colon followed by a scrolling text box. Line 5, a button that reads, Submit.

On the left of the image is a picture of a desktop computer with a caption that reads, Web Client. On the right of the image is a picture of a server with a caption that reads, Web Server. Between the two pictures are two directional arrows. One arrow goes from left to right and has the caption Browser Request. The other arrow goes from right to left and has the caption Server Response.

The web page is composed of the following 4 lines. Line 1, a label that reads, Your information has been received. Line 2, a label that reads, MyName colon followed by another label that reads Sparky. Line 3, a label that reads, MyEmail colon followed by another label that reads, Sparky at web dev basics dot net. Line 4, a label that reads, MyComments colon followed by another label that reads, This is a comment.

The web page is composed of the following three lines. Line 1, a label that reads, Join Our Newsletter. Line 2, a label that reads, E hyphen mail colon followed by a text box that contains Dr period Morris. Line 3, a button that reads, Sign Me Up exclamation point. Surrounding the text box is a red rectangle and below it is an error message that reads, Please enter an email address.

The web page is composed of the following three lines. Line 1, a label that reads, Share and Collaborate. Line 2, a label that reads, Suggest a Website colon followed by a text box that contains google dot com. Line 3, a button that reads, Send Form exclamation point. Surrounding the text box is a red rectangle and a below it is an error message that reads, Please enter a U R L.

The web page is composed of the following two lines. Line 1, a label that reads, Choose Your Favorite Color. Line 2, a label that reads, Favorite Color colon followed by a drop down list that contains the letters b l. From the list of available colors, black and blue are displayed below the drop down list. To the right of the list are the Send and Reset buttons.

The web page is composed of the following three lines. Line 1, a label that reads, Choose A Number. Line 2, a slide form control whose label reads, Choose a number between 1 and 100 colon followed below by the slide form control that contains the text, Low at the left of the control, and contains the text, High on the right of the control. The slider is at about 80. Line 3, contains the Send and Reset buttons.

The web page is composed of the following three lines. Line 1, a label that reads, Choose A Number. Line 2, a spinner control whose label reads, Choose a number between 1 and 10 colon followed below by the spinner control that contains the value 3. Line 3, contains the Send and Reset buttons.

The web page is composed of the following three lines. Line 1, a label that reads, Choose A Date. Line 2, date form control with a label that reads, Choose a date colon followed by the control text, m m slash d d slash y y y y. A calendar for July 20 16 is displayed below the control. Line 3, contains are the Send and Reset buttons.

The web page is composed of the following three lines. Line 1, a label that reads, Choose A Color. Line 2, color well form control with a label that reads, Choose a color colon followed by the form from which the color black has been selected. The standard color dialog box is displayed below the control. Line 3, contains are the Send and Reset buttons.

The form is composed of the following 7 lines. Line 1, a label that reads, Send Us Your Comments. Line 2, a label that reads, Required fields marked by an asterisk. The first two lines have a white background, while the remaining lines have a light blue background. Line 3, a label that reads, asterisk Name colon followed by a text box containing the text, your first and last name. Line 4, a label that reads, asterisk E hyphen mail colon followed by a text box containing the text, you at your domain dot com. Line 5, a slide form control whose label reads, Rating left parenthesis 1 dash 10 right parenthesis colon followed below by the slide form. Line 6, a label that reads, asterisk Comments colon followed by a scrolling text box. Line 7, contains the Submit button.

The form is the same as the previous one, however two error messages appear. The name and comments are surrounded by two red rectangles and an error message is displayed that reads, Please fill out this field.

A comprehensive form is displayed. In addition to labels and text boxes, the form contains a check box group, a radio button group, and a selection box. The first five lines of the survey are. Line 1, a label that reads, Music Survey. Line 2, a label that reads, Name colon. Line 3, a text box for the name. Line 4, a label that reads, E hyphen mail colon. Line 5, a text box for the email address. Next is a series of check boxes that use the fieldset and legend elements to group them. The legend is Select Your Favorite Types of Music colon. Below the legend are six vertically arranged check boxes with the following text, Pop, Classical, Rock, Fold, Rap, Other.

Next is a series of radio buttons that use the fieldset and legend elements to group them. The legend is Select how often you purchase Music colon. Below the legend are four vertically arranged radio buttons with the following text, Weekly, A few C Ds each year, Monthly, Never purchase.

Next is a label that reads, Select the locations you listen to Music colon. Below the label is select box displaying At home, In the car, and Anywhere. Next is a label that reads, What role does music play in your life question mark. Below the label is a scrolling text box. The width of the check box group, radio button group, and the scrolling text box are the same and encompass almost the entire width of the form. At the bottom of the form are the Submit and Reset buttons.

The page content has a light tan margins at the top, bottom, left and right of it. The nav area is in the left column and has an image of a steaming coffee cup at its top. The nav area has a dark brown background. Below the image are four hyperlinks that are vertically arranged. They have the same dark brown background and yellow text without underlines. The main area is in the right column. In the header is the text JavaJam Coffee House in black on a tan background. Below the header is an image of a table and chairs at the top, followed by the subheading that reads Jobs at JavaJam with a related paragraph about applying for a job on a yellow background. This is followed by a form that is composed of the following four lines. Line 1, a label that reads, Name colon, followed by a text box. Line 2, a label that reads, E hyphen mail colon, followed by a text box.

Line 3, a label that reads, Experience colon, followed a scrolling text box.

Line 4, an Apply Now button. The background for the form is the same yellow. At the bottom of the page is the footer that spans the entire content area. The footer contains copyright and contact information displayed on a tan background.

The layout consists of four lines. Line 1, a label rectangle followed by a text box rectangle. Line 2, a label rectangle followed by a text box rectangle. Line 3, a label rectangle followed by a scrolling text box rectangle. Line 4, submit button rectangle.

The Jobs web page from Figure 9 point 33 is displayed with the following additions. In the Name text box, Sparky Felke has been entered. In the Email text box, s p has been entered, which causes the message with the caption Please enter an email address to be displayed.

The entire page has a blue horizontal linear gradient border at the top, bottom, left and right of the content. The heading reads Fish Creek Animal Clinic, with a fish image in the background. The nav area is in the left column and has a light blue background. There are four hyperlinks that are vertically arranged. They have dark blue text without underlines. The main area has a white background and contains a five line form. Line 1, a label that reads, Contact Fish Creek. Line 2, a label that reads, Name colon, followed by a text box. Line 3, a label that reads, E hyphen mail colon, followed by a text box. Line 4, a label that reads, Comments colon, followed a scrolling text box. Line 5, a Send Now button. At the bottom of the main area is the footer that contains copyright and contact information displayed on a blue background.

The layout consists of four lines. Line 1, a label rectangle followed by a text box rectangle. Line 2, a label rectangle followed by a text box rectangle. Line 3, a label rectangle followed by a scrolling text box rectangle. Line 4, submit button rectangle.

The Contact web page from Figure 9 point 36 is displayed with the following additions. In the Name text box, Sparky Felke has been entered. In the Email text box, d has been entered, which causes the message with the caption Please enter an email address to be displayed.

There is a blue Horizontal linear gradient border at the top, bottom, left and right of the content. The heading reads, Pacific Trail Resort, where there is a sunset image on the right. The nav area is in the left column and has a black background. There are four hyperlinks that are vertically arranged, that read, Home, Yurts, Activities, and Reservation. They have white text without underlines. On the right is the main area, which has a white background. A subheading reads Reservations at Pacific Trails, followed by a nine line form. Line 1, a label that reads, Contact Us. Line 2, a label that reads, First Name colon, followed by a text box. Line 3, a label that reads, Last Name colon, followed by a text box. Line 4, a label that reads, E hyphen mail colon, followed by a text box. Line 5, a label that reads, Phone colon, followed by a text box. Line 6, a label that reads, Arrival Date colon, followed by a text box. Line 7, a label that reads, Nights colon, followed by a spinner control. Line 8, a label that reads, Comments colon, followed a scrolling text box. Line 9, a Submit button. At the bottom of the page is the footer that contains copyright and contact information.

The layout consists of six lines. Line 1, a label rectangle followed by a text box rectangle. Line 2, a label rectangle followed by a text box rectangle. Line 3, a label rectangle followed by a text box rectangle. Line 4, a label rectangle followed by a text box rectangle. Line 5, a label rectangle followed by a scrolling text box rectangle. Line 6, submit button rectangle.

The Contact web page from Figure 9 point 39 is displayed with the following additions. In the First Name text box, Sparky has been entered, and in the Last Name text box, Felke has been entered. In the Email text box, nothing has been entered, which causes the error message with the caption Please enter an email address to be displayed. The contents of the phone text box are obscured by the error message. 0 6 slash 0 3 slash 20 18 has been entered in the arrival date text box. The value of 2 has been selected in the spinner control, and Request Yurt number 16 has been entered in the scrolling text box.

The header area has a teal vertical linear gradient border with the image of a lily on the right that spans the entire content area. In the right column at the top left of the main area is a subheading that reads, Contact Path of Light Yoga Studio followed by a four line form. Line 1, a label that reads, Name colon, followed by a text box. Line 2, a label that reads, E hyphen mail colon, followed by a text box. Line 3, a label that reads, Comments colon, followed by a scrolling text box. Line 4, a Send Now button. In the left column, the nav area consists of four vertical hyperlinks without underlines in the shape of rectangular buttons that read, Home, Classes, Schedule, and Contact. At the bottom is copyright information on a solid teal background that spans the entire content area.

The layout consists of four lines. Line 1, a label rectangle followed by a text box rectangle. Line 2, a label rectangle followed by a text box rectangle. Line 3, a label rectangle followed by a scrolling text box rectangle. Line 4, submit button rectangle.

The Contact web page from Figure 9 point 42 is displayed with the following additions. In the Name text box, Sparky has been entered, In the Email text box, s p has been entered, which causes the error message with the caption Please enter an email address to be displayed. The contents of the scrolling text box are obscured by the error message.

Five rectangular shapes are arranged as follows. At the top is a rectangle with the caption, Systems Investigation, Feasibility Study, with an arrow to the next rectangle, which is below and to the right. This rectangle has the caption, Systems Analysis, Functional Requirements, with an arrow to the next rectangle, which is below and to the left. This rectangle has the caption, Systems Design, Systems Specification, with an arrow to the next rectangle, which is to the immediate left. This rectangle has the caption, Systems Implementation, Operational System, with an arrow to the next rectangle, which is above and to the left. The final rectangle has the caption, Maintenance, Improved System, with an arrow back to the first rectangle, which is above and to the right.

Eight rectangular shapes are arranged as follows. At the top is a rectangle with the caption, Conceptualization, Identify Opportunity, with an arrow to the next rectangle, which is below and to the right. This rectangle has the caption, Analysis, Gather Requirements, with an arrow to the next rectangle, which is immediately below. This rectangle has the caption, Design, Define the Solution, with an arrow to the next rectangle, which is immediately below. This rectangle has the caption, Production, Create Content, Construct site, with an arrow to the next rectangle, which is below and to the left. This rectangle has the caption, Testing, Test Site, with an arrow to the next rectangle, which is above and to the left. This rectangle has the caption, Launch, Publish Web Site, with an arrow to the next rectangle, which is directly above. This rectangle has the caption, Maintenance, Fix and Enhance Site, with an arrow to the next rectangle, which is directly above. The final rectangle has the caption, Evaluation, Review Site, with an arrow back to the first rectangle, which is above and to the right.

A content sheet describes the functionality of the document, text and graphic content requirements, source of content, and approver of content.

A sample test plan is a document that describes what will be tested on each page of a website. It consists of four sections. The Browser Compatibility section is used to help organize the testing as a document is checked in different browsers and screen resolutions. The Document Validation section covers content, links, and any forms or scripting that are required for the page. The Search Engine Optimization section identifies the meta tags that are used. The Download Time Check section tests the web page using different bandwidths.

Short description: [DO NOT DELETE THIS LINE]

An image that shows the relationship between a local computer and a web host and the relationship between the web host and website visitors.

On the left of the image is a picture of a desktop computer with a caption that reads, Your Local Computer. In the middle of the image is a picture of three servers, with the caption Web host. There are two callouts pointing to the servers. The first reads, Your website is one of the many stored on powerful web servers, and the second reads, The web server responds to requests for your website. On the right of the image are pictures of a smartphone, a tablet, and a laptop with a caption that reads, Website Visitors. Between the local computer and server pictures is a directional arrow from left to right, with the caption Upload Files. Between the servers and the visitors pictures are two directional arrows. One arrow goes from right to left and has the caption Request. The other arrow goes from left to right and has the caption Response.

The page consists of an h 1 heading that reads, Web Design Podcast, followed by two links. The first link reads, Podcast Episode 1 followed by text that reads, left parenthesis M P 3 right parenthesis. Below is the second link that reads, Podcast Transcript.

The page consists of an h 1 heading that reads, Fall Nature Hikes on a background image of trees.

The page consists of an h 1 heading that reads, Door County Lighthouse Cruise, and below it is an image of a small cruise ship at a dock.



The page consists of an h 1 heading that reads, This page has a sound loop configured with the audio tag, and below it is an audio control. The control indicates that we are at the beginning of the audio file, the duration of the file is 0.37 seconds, and the volume is displayed at the right.

Figure 11 point 1 has been revised, where the podcast link has been replaced by an audio control. The control indicates that we are at the beginning of the audio file, the duration of the file is one minute, and the volume is displayed at the right.

The page consists of an h 1 heading that reads, Sparky Speaks, and below it is a video control. The control shows an image of a dog.

The page consists of an h 1 heading that reads, Lighthouse Cruise, and below it is a video control. The control shows an image of a small cruise ship at a dock.

1

This description will only focus on the upper portion of the home page. At the top above the header, is the nav area, where the main navigation hyperlinks are displayed horizontally and are aligned to the right side of the area. They have white text on dark blue, which matches the nav background color. The hyperlinks read, Home, Coffee, Cuisine, Directions, and Contact. Cuisine has been selected and a drop down menu is now shown. It contains the Breakfast, Lunch, and Dinner hyperlinks.

From the top level rectangle with the caption Home, a line descends from the bottom of the rectangle, splitting into four addition lines to the tops of four rectangles on the second level, which have the captions Coffee, Cuisine, Directions, and Contact. A line descends from the bottom of the Cuisine rectangle, splitting into three additional lines to the tops of three rectangles at the third level, which have the captions Breakfast, Lunch, and Dinner.

This description will only focus on the two columns on the page. In the left column, is the nav area that consists of a vertical series of hyperlinks that read, Home Menu, Directions, and Contact. The hyperlinks are in white and are not underlined. The background color of the nav area is a light blue. the main area of the home page. In right column is the main area, and it consists of a vertical series of subheadings and related text. Subheading text is a light blue, while paragraph text is a darker blue. At the upper right of the main area is an image of a lighthouse with the caption Island Lighthouse comma Built in 18 70. The image and caption have been rotated clockwise a small amount.

This is the same as the previous figure, but before the image was rotated.

This is the same image as Figure 11 point 11, where the only change is made to the nav area in the left column on the page. The nav area consists of a vertical series of hyperlinks that read, Home Menu, Directions, and Contact. The hyperlinks were all in white and are not underlined. The background color of the nav area is a light blue. In this figure, Menu has been selected and the colors are reversed. That is, the hyperlink text is now in white with a light blue background.

The page consists a header and two columns of images. The header reads, Image Gallery. The left column displays 6 thumbnail images arranged in three rows of two images. The right column displays a large semi opaque image of the Golden Gate Bridge.

This is the same web page discussed in Figure 11 point 13, except the large image now displays a waterfall with the caption, Waterfall Near Big Sur. This is the image of the second thumbnail in the second row, which has the mouse over the thumbnail.

The page has an h 1 heading that reads, Principles of Visual Design, followed by four vertically arranged summary items, which read, Repetition, Contrast, Proximately, and Alignment. Each of these items is preceded by a right pointing triangle.

This is the same web page discussed in Figure 11 point 15, except Repetition has been selected. Its triangle now points downward and detailed information is now displayed that reads, Repeat visual components throughout the design.

All the summary and all detail elements are shown without any triangles.

The illustration consists of three vertically arranged rectangles with arrows pointing from the bottom of one to the top of the next. The top rectangle has the caption, Java Byte Code dot class file, the middle rectangle has the caption, Java Virtual Machine Interprets Byte Code, and the bottom rectangle has the caption, Machine Language.

The page has an h 1 heading that reads, Chapter 11 Java Applet Example. This is followed by Java Applet that displays the title, This Java Applet displays a message, and below the title is a red rectangular area with white text that reads, This is a Java Applet.

The page has an h 1 heading that reads, Java Script Example, followed by a subheading, which reads, Today is. Next to the subheading is Java Script the determine today's date. In this example, it is 6 slash 1 slash 20 17.

From the top level rectangle with the caption Window, a line descends from the bottom of the rectangle, splitting into four addition lines to the tops of four rectangles on the second level, which have the captions document, history, location, and navigator. The document and navigator second level rectangles have lines descending from them. The document second level rectangle has a line that descends from the bottom of the it, splitting into four additional lines to the tops of four rectangles at the third level, which have the captions anchor, form, image, and link. A line descends from the bottom of the form rectangle to the top of a rectangle at the fourth level. This rectangle has the caption element. At the third level, a line descends from the bottom of the image rectangle to the top of a rectangle at the fourth level. This rectangle has the caption s r c. The navigator second level rectangle has a line that descends from the bottom of the it, splitting into two additional lines to the tops of two rectangles at the third level, which have the app name and app version.

The page has an h1 heading that reads, C S S Preview Property, with a blue line drawn below it. A brief paragraph followed by a bulleted list, which reads. Begin typing the name of a C S S property in the text box below. The page below uses Ajax technologies to listen as you type and display a list of suggested C S S property names. When you have finished typing the name of a C S S property, a description of the C S S property displays. Following the list is the text, C S S Property Name colon. Below the text is a text box with the letters b a. A call out points to the text box with the caption, Hints are displayed below as you type in the text box. Below the text box, the following text appears. Property Hints colon, background color comma background image comma background position comma background repeat.

The j Query example consists of an image of the Golden Gate Bridge, flanked by two arrowheads. The arrowhead on the left, points to the left, and the arrowhead on the right, points to the right.

The page has an h 1 header that reads, The Canvas Event, and below it is a red rectangle. Inside the rectangle is the text, My Canvas in red letters. A semitransparent blue rectangle encompasses the word My.

Since this page has previously been discussed in an earlier chapter, this description will only focus on the main area. In the previous discussion, the heading read, JavaJam Coffee House, the main area began with an image of a guitar at the top, followed by the subheading Coffee at JavaJam and a brief paragraph about the music performers. A series of subheadings listing the months and performers followed the paragraph. Each month was in the format, a subheading with a tan background color containing the name of the month and a paragraph with a thumbnail image of the performer and a brief description of the performer. The revised Music page, now displays an audio element below each performer's description.

Since the Fish Creek Animal Clinic Ask the Vet page has previously been discussed in an earlier chapter, this description will only focus on the main area. In the previous discussion, there was an introductory paragraph that read, Contact us if you have a question that you would like answered here, where contact was a hyperlink. The next paragraph reads, Our dog, Sparky, likes to eat whatever the kids are snaking on. Is it okay for the dog to eat chocolate question mark. This text is bold and in a blue colored font. The final paragraph reads, Chocolate is toxic to dogs. Please do not feed your dog chocolate. Try playing a game with your children. When you feed them people treats, they can fee Sparky dog treats. This paragraph is indented. The revised Ask the Vet page now displays a video element in the upper right corner of the main area.

Since the Pacific Trail Resort Home page has previously been discussed in an earlier chapter, this description will only focus on the main area. In the previous discussion, the main area consisted of the subheading Enjoy Nature in Luxury with a related paragraph about the resort, a bulleted list, and then contact information. The revised home page now displays a video element near the upper right corner of the main area.

The diagram consists of three illustrations of clipboards arranged horizontally. The leftmost one has the caption, Hello. An arrow points from this clipboard to the right toward the next clipboard. Above the arrow is the caption, Encrypt, and above caption is an illustration of a key. The middle clipboard has the caption, D asterisk number sign 3 G. An arrow points from this clipboard to the right toward the last clipboard. Above the arrow is the caption, Decrypt, and above the caption is an illustration of a key. The final clipboard has the caption, Hello.

The diagram consists of two rows of three illustrations of clipboards arranged horizontally. In the first row, the leftmost one has the caption, Hello. An arrow points from this clipboard to the right toward the next clipboard. Above the arrow is the caption, Encrypt, above caption is an illustration of a key, and above the key is the caption, Public Key. The middle clipboard has the caption, D asterisk number sign 3 G. An arrow points from this clipboard to the right toward the last clipboard. Above the arrow is the caption, Decrypt, above the caption is an illustration of a key, and above the key is the caption Private key. The final clipboard has the caption, Hello. In the second row, the process reverses and the flow is from right to left. The rightmost one has the caption, Hi. An arrow points from this clipboard to the left toward the next clipboard. Above the arrow is the caption, Encrypt, and above caption is an illustration of a private key. The middle clipboard has the caption, ampersand carat, c. An arrow points from this clipboard to the left toward the last clipboard. Above the arrow is the caption, Decrypt, and above the caption is an illustration of a public key. The final clipboard has the caption, Hi.

The address in the address text box reads, h t t p s colon slash slash terry morris dot net. There are two callouts. One with the caption, Click on the lock icon for certificate information, that points to the lock icon that precedes the address. The other callout has the caption Notice the h t t p s protocol, and points to the beginning of the address.

The nav area is at the top of the page, and the navigation menu items read, My Account, Order Status, Wish Lists, Gift Certificates, View Car, and Sign in or Create an account. Below the nav area is the header area, which reads, door country images. To the right of the heading is a search box. Below the header is another nav area that reads, Home Shipping and Returns, and R S S Syndication. Below this are two columns. The left column has a heading that reads, Categories. Below the heading is a Summary element that reads, Ellison Bay Photos. Below the element is a subheading the reads, Our Newsletter, followed by two text boxes for one's name and email address, and finally a Subscribe Me button. The right column has a heading that reads, New Products. Below the heading are two items arranged next to each other using the following format. In vertical order, there is a thumbnail image of a picture, the name of the picture, the price of the picture, the text, Not Rated, and an Add to Cart button.

From the top level rectangle with the caption Home, a line descends from the bottom of the rectangle, splitting into four addition lines to the tops of four rectangles on the second level, which have the captions Menu, Music, Jobs, and Gear.

The overall design of the JavaJam website has already been discussed in previous chapters, so this description will briefly describe a single change to the nav area and then focus on the main area of the Gear page. In the nav area, a new hyperlink that reads, Gear has been added to the bottom of the list of hyperlinks. In the main area, a header with the text, JavaJam Coffee House appears at the top, followed below by an image of a couch, chairs, and some tables. Below the image is a subheading that reads, JavaJam Gear, followed by a descriptive paragraph relating to gear. Below the paragraph are two items arranged below each other using the following format. In vertical order, there is heading identifying the item, followed by the item's description and price. Below the text is an Add to Cart button. To the right of the text and button is an image of the item.

The page header reads, Placeholder Shopping Cart page followed by paragraph 1, which reads, This page is intended to be a placeholder for an actual shopping cart page. Paragraph 2 reads, If this were an actual shopping cart page, it would be displayed by a server side script which would generate a web page that includes at a minimum the following colon. The following are items in a bulleted list. Name of each item selected, quantity of each item selected, price of each item selected, the cost before any shipping fees and or tales tax, and a button or hyperlink to place an order. At the bottom of the page is a Continue Shopping button.

From the top level rectangle with the caption Home, a line descends from the bottom of the rectangle, splitting into four addition lines to the tops of four rectangles on the second level, which have the captions Services, Ask the Vet, Contact, and Shop.

The overall design of the Fish Creek website has already been discussed in previous chapters, so this description will briefly describe a single change to the nav area and then focus on the main area of the Shop page. In the nav area, a new hyperlink that reads, Shop has been added to the bottom of the list of hyperlinks. In the main area, a header with the text, Shop at Fish Creek Animal Clinic appears at the top, followed below by two items arranged next to each other using the following format. In vertical order, there is an image of the item, followed by the item's description and price. Below the text is an Add to Cart button.

From the top level rectangle with the caption Home, a line descends from the bottom of the rectangle, splitting into four addition lines to the tops of four rectangles on the second level, which have the captions Yurts, Activities, Reservations, and Shop.

The overall design of the Pacific Trails Resort website has already been discussed in previous chapters, so this description will briefly describe a single change to the nav area and then focus on the main area of the Shop page. In the nav area, a new hyperlink that reads, Shop has been added to the bottom of the list of hyperlinks. In the main area, a header with the text, Shop at Pacific Trails appears at the top, followed below by two items arranged below each other using the following format. In vertical order, there is heading identifying the item, followed by the item's description and price. Below the text is an Add to Cart button. To the right of the text and button is an image of the item.

From the top level rectangle with the caption Home, a line descends from the bottom of the rectangle, splitting into four addition lines to the tops of four rectangles on the second level, which have the captions Classes, Schedule, Contact, and Store.

The overall design of the Path of Light Yoga Studio website has already been discussed in previous chapters, so this description will briefly describe a single change to the nav area and then focus on the main area of the Shop page. In the nav area, a new hyperlink that reads, Store has been added to the bottom of the list of hyperlinks. In the main area, a header with the text, Path of Light Yoga Studio appears at the top, followed below by an image of a blanket. Below the image is a subheading that reads, Yoga Store, followed by a descriptive paragraph relating to the store. Below the paragraph are two items arranged below each other using the following format. In vertical order, there is heading identifying the item, followed by the item's description and price. Below the text is an Add to Cart button.

The following is a partial listing of the log file, where each number sign indicates the beginning of a new line.

number sign Software colon Microsoft Internet Information services 7.0. Number sign Version 1 point 0. Number sign Date colon 20 18 dash 7 dash 13, 9 colon 50 colon 57. Number sign fields colon date time, s hyphen site name, s hyphen computer name, s hyphen i p, c s hyphen method, c s hyphen u r i hyphen stem, c s hyphen u r i hyphen query, s hyphen port, c s hyphen user name, c hyphen i p, c s hyphen version, c s user hyphen agent, c s hyphen bytes time hyphen taken.

A table shows the top 10 keywords used by actual web visitors when searching Google to find a particular website. The table has 10 rows and 4 columns. The column headings are Keyword, Visits, Pages per Visit, and Average time on site. The row entries are as follows. Row 1. Keyword, web design best practices, visits, 27,097, Pages per visit, 1.75, and Average time on site, 1 minute and 17 seconds. Row 2. Keyword, web design best practice, visits, 21,773, Pages per visit, 6.08, and Average time on site, 7 minutes and 32 seconds. Row 3. Keyword, development and design foundations, visits, 15,751, Pages per visit, 5.71, and Average time on site, 4 minutes and 45 seconds. Row 4. Keyword, basics of web design colon H T M L 5 and C S S 3, visits, 14,346, Pages per visit, 5.96, and Average time on site, 5 minutes and 43 seconds. Row 5. Keyword, H T M L 5 basics, visits, 6,859, Pages per visit, 5.32, and Average time on site, 4 minutes and 5 seconds. Row 6. Keyword, basic H T M L 5 template, visits, 4,943, Pages per visit, 5.98, and Average time on site, 6 minutes and 24 seconds. Row 7. Keyword, basic H T M L 5 page, visits, 4,023, Pages per visit, 8.20, and Average time on site, 5 minutes and 23 seconds. Row 8. Keyword, basic H T M L 5 code, visits, 3,198, Pages per visit, 4.17, and Average time on site, 5 minutes and 2 seconds. Row 9. Keyword, basic H T M L 5 tags, visits, 3,141, Pages per visit, 5, and Average time on site, 4 minutes and 46 seconds. Row 10. Keyword, basic H T M L 5 basics p d f, visits, 3,120, Pages per visit, 4.94, and Average time on site, 4 minutes and 27 seconds.

The page heading reads, Door County Wild Flowers, followed by the text that reads, Spring is a special time in Door County. If you look carefully as you hike through the woods and meadows you will many wild flowers. Below the text is bulleted list of hyperlinks that read, Trillium, May Flowers, and Yellow Lady's Slipper. The Trillium link has been selected, and to the right of the text, framed in a white rectangular region, is an image of the flower and its description.

Trillium

May Flowers

Yellow Lady's Slipper

Two examples of the Door County Wild Flowers page are shown again. In the first example, the May Flowers link is selected with its image and description are shown. In the second example, Yellow Lady's Slipper is selected.

The header reads, Popular Uses for Java Script, followed by text that reads, Alert message, on the first line and on the second line it read. The message displays when leaving the page. An alert message box appears that reads, Greetings exclamation point and contains an OK button.

The header reads, Popular Uses for Java Script, followed by text that reads, Popup Window Example, on the first line and on the second line it reads, Java Script Popup window. Below the text is the Special Offer button. A popup window is displayed, whose heading reads, Popup Window, followed by a paragraph that reads, This window may contain detailed product information, and image, or other useful content that may not be needed by every visitor to the web page.

There are two images of web pages. The first has a header that reads, Popular uses for Java Script. This is followed by text that reads, Jump menu, which is followed by a jump menu with the following options, Choose your Destination, Product Information, Order Form, and Contact Information. Contact Information has been selected, which displays the second web page. Its header reads Contact Information, followed by contact information that reads, Phone colon 5 5 5 dash 5 5 5 dash 5 5 5 5 and email colon web dev foundations at g mail dot com.

There are two images of the same web page. The initial image has a header that reads, Popular uses for Java Script. This is followed by text that reads, Displaying Submenus, which is followed by a horizontal list of four links that read, Home Products, Order, and Contact. The mouse pointer is placed over Products, and in the second image, a submenu consisting of the three links, Cooking, Beauty, and Books appear below the Products link.

There are two images of the same web page. In the initial image, it has a header that reads, Popular uses for Java Script. This is followed by text that reads, Image Swapping, which is followed by a blue button that reads, Home. The mouse pointer is placed over Home button, and in the second image, the button color changes to violet.

The header reads, Using Java Script. When visiting the page. An alert message box appears that reads, Welcome to my web page exclamation point and contains an OK button.

Because to the mistyping, a reference error appears that reads, Reference Error colon an alert is not defined. This followed by a link to learn more about the error.

The header reads, Using Java Script, and is followed by the two lines the read, Using document dot write to add text. And Notice that we can add H T M L tags too exclamation point. The final line on the page reads, This document was last modified on colon, 0 6 slash 0 6 slash 20 17, 14 colon 05 colon 50.

The header reads, Using Java Script, and is followed by two vertically aligned links that read, Mouse over test and Mouse out test. The mouse pointer is placed over the Mouse over test link and an alert message box appears that reads, You moused over exclamation point and contains an OK button.

The same form from the previous figure is used again, except the mouse pointer is place over the Mouse out test link and an alert message box appears that reads, You moused out exclamation point and contains an OK button.

The same form from the previous figure is used again, except the mouse pointer is place over the Mouse out test link and an alert message box appears that reads, You moused out exclamation point and contains an OK button.

There are two images of the same web page. The initial image has a header that reads, Using Java Script. A prompt box is displayed with a prompt that reads, Please enter your name. Below the caption is a text box in which the name Melanie has been entered. Below the text box are the OK and Cancel buttons. After the OK button has been clicked, the second image now has text that reads, Hello Melanie, appearing below the header.

There are two images of the same web page. The initial image has a header that reads, Using Java Script. A prompt box is displayed with a prompt that reads, Type a quantity greater than 0. Below the caption is a text box in which a value of 0 has been entered. Below the text box are the OK and Cancel buttons. After the OK button has been clicked, the second image now has two lines of text that read, Quantity is not greater than 0, and Please refresh the web page, both of which appear below the header.

There are two images of the same web page. The initial image is the same as the previous figure, except the value 5 has been entered in the text box. After the OK button has been clicked, the second image now has text that reads, Quantity is greater than 0, appearing below the header.

There are two images of the same web page. The initial image has a header that reads, Using Java Script, and a Click to enter quantity button. A prompt box is displayed with a prompt that reads, Please type a quantity greater than 0. Below the caption is a text box in which a value of 7 has been entered. Below the text box are the OK and Cancel buttons. After the OK button has been clicked, the second image now displays an alert box with text that reads, Thank you for entering a quantity greater than 0. Below the text is a check box with a caption that reads, Prevent this page from creating additional dialogs. Below the caption is the OK button.

The header reads, Java Script Form Handling, and is followed by a form that has by two vertically aligned label and text box pairs. The first label reads Name colon, and the second is Age colon. Below these is a Send Information button.

The web page is the one discussed in the previous figure, but this time an alert message box with the text, Age is less than 18. You are not an adult is displayed.

There are two images of web pages. The first page is the one discussed in the previous two figures, but this time an alert box with the text, Age is valid is displayed. The second page has a header that reads, Your information has been received, followed by two lines of text that read, user Name colon, and user Age colon 18. Note, no name was entered in the first form.

A browser displays the form dot h t m l file. When no name is entered in the text box, an alert message box with the text, Name field cannot be empty is displayed.

A browser displays the form dot h t m l file. When no age is entered in the text box, an alert message box with the text, Age is less than 18. You are not an adult is displayed.

There are two images of web pages. The first page is the one discussed in several of the previous figures, but this time an alert box with the text, Name and Age are valid is displayed. The second page has a header that reads, Your information has been received, followed by two lines of text that read, user Name colon Melanie, and user Age colon 20.

There are two images of the same web page. The initial image has a header that reads, My Favorite Dogs. The header is followed by a bulleted list that reads, Pekingese, Schnauzer, and Border Collie. All list text is in black. Following the list is a Click Me link. After Click Me has been clicked, the second image now displays Pekingese and Schnauzer, as well as their bullets, in green.

There are two images of the same web page. The initial image has a header that reads, J Query. The header is followed by a paragraph that reads, Many websites, including Amazon and Google, use J Query to provide interaction and dynamic effect on web pages. The text is followed by the More hyperlink. After More has been clicked, the second image now displays an additional paragraph below the original paragraph. The new paragraph reads, The J Query A P I, application programming interface, works along with Java Script and provides easy ways to dynamically manipulate the C S S properties of elements, detect and react to events, such as mouse movements, and animate elements on a web page, such as image slideshows.

The web page has a header that reads, Image gallery. Below the header, on the left side are six thumbnail images that are arranged with two images in each row. On the right is an enlargement of one of the images including a caption below the image.

The web page has a header that reads, Slideshow. Below the header, is an image that includes a caption in the lower left corner of the image. At the right edge of the image is a left pointing triangle. Below the image is a series of 6 small hollow circles, the first of which is a solid circle.

The header reads, Newsletter Sign Up, and is followed by a form that has by two vertically aligned label and text box pairs. The first label reads Name colon, and the second reads E mail colon. Below these is a Sign Up button.

The same form from the previous figure is used again, except there is an error message that reads, This field is required. The text is in red and is italicized. The message appears the right of both the Name and email text boxes.

The same form from the previous two figures is used again, with the following changes. The name Sparky has been entered in the name text box. The letters F E L K have been entered in the email text box. A new error message is displayed that reads, Please enter a valid email address. The text is in red and is italicized. The message appears to the right of the email text box.

The overall design of the JavaJam website has already been discussed in previous chapters, so this description will describe how the Menu page has been changed. In the first paragraph, a hyperlink has been created using the words, Mug Club. The user has placed the mouse over the words Mug Club, and an alert message that reads, Java Jam Mug Club Members get a 10% discount on each cup of coffee, is displayed.

The overall design of the Fish Creek Animal Clinic website has already been discussed in previous chapters, so this description will describe how the Contact page has been changed. The user has clicked the submit button without typing in the email input box, and an alert message that reads, Please enter an email address is displayed.

The overall design of the Fish Creek website has already been discussed in previous chapters, so this description will describe the main area of the Contact page. The header reads, Contact Fish Creek followed by a label that reads, Required fields marked by an asterisk. Following this label are the following lines. Text that reads, Name colon, with a text box to its right. Text that reads, asterisk email colon, with a text box to its right. Text that reads, Comments colon, with a scrolling text box to its right. At the bottom is a Send Now button. An error message is displayed that reads, This field is required. The text is in red and appears to the right of the email text box.

The overall design of the Pacific Trail Resort website and the Yurts page have already been discussed in previous chapters, so this description will describe how the Yurts page has been changed. The appearance of the page is unchanged. However, code has been added so an alert message box appears, with text that reads, Today only, 10% off on a weekend, coupon code Zen Ten.

The overall design of the Pacific Trail Resort website and the Reservation page have already been discussed in previous chapters, so this description will describe how the Reservation page has been changed. Immediately after the Contact Us heading, new text has been added that reads, Required fields marked by an asterisk. In the line in which an email address is entered, an asterisk has been placed in front of the word email. Because an email address has not been entered, an alert message box appears, with text that reads, Please enter an email address.

By changing the code, the error message that reads, This field is required is displayed in red next to the email text box.

The overall design of the Path of Light Yoga Studio website and the Contact page have already been discussed in previous chapters, so this description will describe how the Contact page has been changed. Immediately after the Path of Light Yoga Studio heading, new text has been added that reads, Required fields marked by an asterisk. In the line in which an email address is entered, an asterisk has been placed in front of the word email. Because an email address has not been entered, an alert message box appears, with text that reads, Please enter an email address

By changing the code, the error message that reads, This field is required is displayed in red next to the email address.

The area at the top is used to enter the Host, User name, Password, and Port. There is a callout with the caption, Enter Host, User name, and Password values, that points to this area. The remainder of the application consists of 5 major regions, F T P server messages, Local Site, Remove Site, Local File List, and Remove File list, and there are callouts to each of these regions. The F T P server messages region displays any commands typed by the user and any responses from the server. This region spans the width of the application window. The Local Site region displays folders in the File Explorer format on the local computer. To the right is the Remove Site region that displays folders in the File Explorer format on the remote site. Below these two regions is the Local File List region, which displays files in the File Explorer format on the local computer. To the right is the Remove File list, which displays files in the File Explorer format on the remote computer.