Objectives

- To take control of the appearance of a Web site by creating style sheets.
- To use a style sheet to give all the pages of a Web site the same look and feel.
- To use the `class` attribute to apply styles.
- To specify the precise font, size, color and other properties of displayed text.
- To specify element backgrounds and colors.
- To understand the box model and how to control the margins, borders and padding.
- To use style sheets to separate presentation from content.

*Fashions fade, style is eternal.*

Yves Saint Laurent

*A style does not go out of style as long as it adapts itself to its period. When there is an incompatibility between the style and a certain state of mind, it is never the style that triumphs.*

Coco Chanel

*How liberating to work in the margins, outside a central perception.*

Don DeLillo

*I’ve gradually risen from lower-class background to lower-class foreground.*

Marvin Cohen
6.1 Introduction

In Chapters 4 and 5, we introduced the Extensible Markup Language (XHTML) for marking up information. In this chapter, we shift our focus from marking up information to formatting and presenting information using a W3C technology called Cascading Style Sheets (CSS) that allows document authors to specify the presentation of elements on a Web page (spacing, margins, etc.) separately from the structure of the document (section headers, body text, links, etc.). This separation of structure from presentation simplifies maintaining and modifying a document’s layout.

6.2 Inline Styles

A Web developer can declare document styles in many ways. In this section, we present inline styles that declare an individual element’s format using attribute style. Figure 6.1 applies inline styles to p elements to alter their font size and color.
Chapter 6 Cascading Style Sheets™ (CSS)

The first inline style declaration appears in line 20. Attribute style specifies the style for an element. Each CSS property (the font-size property in this case) is followed by a colon and a value. On line 20, we declare the p element to have 20-point text size. Line 21 uses element em to "emphasize" text, which most browsers do by making the font italic.

Line 24 specifies the two properties, font-size and color, separated by a semicolon. In this line, we set the text’s color to blue, using the hexadecimal code #0000ff. Color names may be used in place of hexadecimal codes, as we demonstrate in the next example. We provide a list of hexadecimal color codes and color names in Appendix E. [Note: Inline styles override any other styles applied using the techniques we discuss later in this chapter.]

6.3 Embedded Style Sheets

In this section, we present a second technique for using style sheets called embedded style sheets. Embedded style sheets enable a Web-page author to embed an entire CSS docu-
Cascading Style Sheets (CSS) Chapter 6

ement in an XHTML document’s head section. Figure 6.2 creates an embedded style sheet containing four styles.

```xml
<?xml version = "1.0"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">

<!-- Fig. 6.2: declared.html -->
<!-- Declaring a style sheet in the header section. -->
<html xmlns = "http://www.w3.org/1999/xhtml">
<head>
<title>Style Sheets</title>

<!-- this begins the style sheet section -->
<style type = "text/css">
em { background-color: #8000ff;
       color: white }

h1 { font-family: arial, sans-serif }

p { font-size: 14pt }

.special { color: blue }

</style>
</head>

<body>

<!-- this class attribute applies the .blue style -->
<h1 class = "special">Deitel & Associates, Inc.</h1>

<!-- Deitel & Associates, Inc. is an internationally recognized corporate training and publishing organization specializing in programming languages, Internet/World Wide Web technology and object technology education. Deitel & Associates, Inc. is a member of the World Wide Web Consortium. The company provides courses on Java, C++, Visual Basic, C, Internet and World Wide Web programming, and Object Technology. -->

<p>The company’s clients include many Fortune 1000 companies, government agencies, branches of the military and business organizations. Through its publishing partnership with Prentice Hall, Deitel & Associates, Inc. publishes leading-edge programming textbooks, professional books, interactive CD-ROM-based multimedia Cyber Classrooms, satellite courses and World Wide Web courses.</p>

</body>
</html>
```

Fig. 6.2 Declaring styles in the head of a document (part 1 of 2).
The style element (lines 13–24) defines the embedded style sheet. Styles placed in the head apply to matching elements in the entire document, not just to a single element. The type attribute specifies the Multipurpose Internet Mail Extension (MIME) type that describes a file’s content. CSS documents use the MIME type text/css. Other MIME types include image/gif (for GIF images) and text/javascript (for the JavaScript scripting language, which we discuss in Chapters 7–12).

The body of the style sheet (lines 15–22) declares the CSS rules for the style sheet. We declare rules for em (lines 15–16), h1 (line 18) and p (line 20) elements. When the browser renders this document, it applies the properties defined in these rules to each element to which the rule applies. For example, the rule on lines 15–16 will be applied to all em elements. The body of each rule is enclosed in curly braces ({}). We declare a style class named special in line 22. Class declarations are preceded with a period and are applied to elements only of that class. We discuss how to apply a style class momentarily.

CSS rules in embedded style sheets use the same syntax as inline styles; the property name is followed by a colon (:) and the value of that property. Multiple properties are separated by semicolons (;). In this example, the color property specifies the color of text in an element line and property background-color specifies the background color of the element.
The `font-family` property (line 18) specifies the name of the font to use. In this case, we use the `arial` font. The second value, `sans-serif`, is a generic font family. Not all users have the same fonts installed on their computers, so Web-page authors often specify a comma-separated list of fonts to use for a particular style. The browser attempts to use the fonts in the order they appear in the list. Many Web-page authors end a font list with a generic font family name in case the other fonts are not installed on the user’s computer. In this example, if the `arial` font is not found on the system, the browser instead will display a generic `sans-serif` font such as `helvetica` or `verdana`. Other generic font families include `serif` (e.g., `times`, `times new roman`, `Georgia`), `cursive` (e.g., `script`), `fantasy` (e.g., `critter`) and `monospace` (e.g., `courier`, `fixedsys`).

The `font-size` property (line 20) specifies a 14-point font. Other possible measurements in addition to `pt` (point) are introduced later in the chapter. Relative values—`xx-small`, `x-small`, `small`, `smaller`, `medium`, `large`, `larger`, `x-large` and `xx-large` also can be used. Generally, relative values for `font-size` are preferred over point sizes because an author does not know the specific measurements of the display for each client. For example, a user may wish to view a Web page on a handheld device with a small screen. Specifying an 18-point font size in a style sheet will prevent such a user from seeing more than one or two characters at a time. However, if a relative font size is specified, such as `large` or `larger`, the actual size will be determined by the browser that displays the font.

Line 30 uses attribute `class` in an `h1` element to apply a style class—in this case class `special` (declared as `.special` in the style sheet). When the browser renders the `h1` element, notice that the text appears on screen with both the properties of an `h1` element (`arial` or `sans-serif` font defined at line 18) and the properties of the `.special` style class applied (the color `blue` defined on line 22).

The `p` element and the `.special` class style are applied to the text in lines 42–49. All styles applied to an element (the parent, or ancestor, element) also apply to that element’s nested elements (descendant elements). The `em` element inherits the style from the `p` element (namely, the 14-point font size in line 20), but retains its italic style. However, this property overrides the `color` property of the `special` class because the `em` element has its own `color` property. We discuss the rules for resolving these conflicts in the next section.

### 6.4 Conflicting Styles

Cascading style sheets are “cascading” because styles may be defined by a user, an author or a user agent (e.g., a Web browser). Styles defined by authors take precedence over styles defined by the user and styles defined by the user take precedence over styles defined by the user agent. Styles defined for parent and ancestor elements are also inherited by child and descendant elements. In this section, we discuss the rules for resolving conflicts between styles defined for elements and styles inherited from parent and ancestor elements.

Figure 6.2 presented an example of inheritance in which a child `em` element inherited the `font-size` property from its parent `p` element. However, in Fig. 6.2, the child `em` element had a `color` property that conflicted with (i.e., had a different value than) the `color` property of its parent `p` element. Properties defined for child and descendant elements have a greater specificity than properties defined for parent and ancestor elements. According to the W3C CSS Recommendation, conflicts are resolved in favor of properties with a higher
specificity. In other words, the styles defined for the child (or descendant) are more specific than the styles for that child’s parent (or ancestor) element; therefore, the child’s styles take precedence. Figure 6.3 illustrates examples of inheritance and specificity.

```
<?xml version = "1.0"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- Fig 6.3: advanced.html -->
<!-- More advanced style sheets -->
<html xmlns = "http://www.w3.org/1999/xhtml">
<head>
<title>More Styles</title>
<style type = "text/css">
a.nodec { text-decoration: none }
a:hover { text-decoration: underline; color: red; background-color: #ccffcc }
li em { color: red; font-weight: bold }
ul { margin-left: 75px }
ul ul { text-decoration: underline; margin-left: 15px }
</style>
</head>
<body>
<h1>Shopping list for <em>Monday</em>:</h1>
<ul>
<li>Milk</li>
<li>Bread
<ul>
<li>White bread</li>
<li>Rye bread</li>
<li>Whole wheat bread</li>
</ul>
</li>
<li>Rice</li>
<li>Potatoes</li>
<li>Pizza <em>with mushrooms</em></li>
</ul>
</body>
</html>
```

Fig. 6.3 Inheritance in style sheets (part 1 of 2).
Line 14 applies property `text-decoration` to all `a` elements whose `class` attribute is set to `nodec`. The `text-decoration` property applies decorations to text within an element. By default, browsers underline the text marked up with an `a` element. Here, we set the `text-decoration` property to `none` to indicate that the browser should not underline hyperlinks. Other possible values for `text-decoration` include `blink`, `overline`. 

```html
49  <p><a class="nodec" href="http://www.food.com">Go to the Grocery store</a></p>
50
51
52  </body>
53  </html>
```

Fig. 6.3  Inheritance in style sheets (part 2 of 2).
line-through and underline. The .nodec appended to a is an extension of class styles; this style will apply only to a elements that specify nodec as their class.

Lines 16–18 specify a style for hover, which is a pseudoclass. Pseudoclasses give the author access to content not specifically declared in the document. The hover pseudoclass is activated dynamically when the user moves the mouse cursor over an element.

**Portability Tip 6.1**

To ensure that your style sheets work in various Web browsers, test your style sheets on all client Web browsers that will render documents using your styles.

Lines 20–21 declare a style for all em elements that are descendants of li elements. In the screen output of Fig. 6.3, notice that Monday (which line 33 contains in an em element) does not appear in bold red, because the em element is not in an li element. However, the em element containing with mushrooms (line 46) is in an li element; therefore, it is formatted in bold red.

The syntax for applying rules to multiple elements is similar. For example, to apply the rule in lines 20–21 to all li and em elements, you would separate the elements with commas, as follows:

```
li, em { color: red; font-weight: bold }
```

Lines 25–26 specify that all nested lists (ul elements that are descendants of ul elements) be underlined and have a left-hand margin of 15 pixels. A pixel is a relative-length measurement—it varies in size, based on screen resolution. Other relative lengths are em (the so-called “M-height” of the font, which is usually set to the height of an uppercase M), ex (the so-called “x-height” of the font, which is usually set to the height of a lowercase x) and percentages (e.g., margin-left: 10%). To set an element to display text at 150% of its default text size, the author could use the syntax

```
font-size: 1.5em
```

Other units of measurement available in CSS are absolute-length measurements—i.e., units that do not vary in size based on the system. These units are in (inches), cm (centimeters), mm (millimeters), pt (points; 1 pt = 1/72 in) and pc (picas—1 pc = 12 pt).

**Good Programming Practice 6.1**

Whenever possible, use relative-length measurements. If you use absolute-length measurements, your document may not be readable on some client browsers (e.g., wireless phones).

In Fig. 6.3, the entire list is indented because of the 75-pixel left-hand margin for top-level ul elements. However, the nested list is indented only 15 pixels more (not another 75 pixels) because the child ul element’s margin-left property overrides the parent ul element’s margin-left property.

### 6.5 Linking External Style Sheets

Style sheets are a convenient way to create a document with a uniform theme. With external style sheets (i.e., separate documents that contain only CSS rules), Web-page authors can provide a uniform look and feel to an entire Web site. Different pages on a site can all use the same style sheet. Then, when changes to the style are required, the Web-page author needs to modify only a single CSS file to make style changes across the entire Web site.
Figure 6.4 presents an external style sheet and Fig. 6.5 contains an XHTML document that references the style sheet.

```xml
<?xml version = "1.0"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<html xmlns = "http://www.w3.org/1999/xhtml">
<head>
<title>Linking External Style Sheets</title>
<link rel = "stylesheet" type = "text/css" href = "styles.css" />
</head>
<body>
<h1>Shopping list for <em>Monday</em>:</h1>
<ul>
<li>Milk</li>
<li>Bread
    <ul>
        <li>White bread</li>
        <li>Rye bread</li>
        <li>Whole wheat bread</li>
    </ul>
</li>
<li>Rice</li>
<li>Potatoes</li>
</ul>
</body>
</html>
```

Fig. 6.5 Linking an external style sheet (part 1 of 2).
Lines 11–12 (Fig. 6.5) show a **link element**, which uses the **rel** attribute to specify a **relationship** between the current document and another document. In this case, we declare the linked document to be a **stylesheet** for this document. The **type** attribute specifies
the MIME type as text/css. The href attribute provides the URL for the document containing the style sheet.

**Software Engineering Observation 6.1**

Style sheets are reusable. Creating them once and reusing them reduces programming effort.

**Software Engineering Observation 6.2**

The link element can be placed only in the head element. The user can specify next and previous, which allow the user to link a whole series of documents. This feature allows browsers to print a large collection of related documents at once. (In Internet Explorer, select Print all linked documents in the Print... submenu of the File menu.)

### 6.6 W3C CSS Validation Service

The W3C provides a validation service ([jigsaw.w3.org/css-validater](http://jigsaw.w3.org/css-validator)) that validates external CSS documents to ensure that they conform to the W3C CSS Recommendation. Like XHTML validation, CSS validation ensures that style sheets are syntactically correct. The validator provides the option of either entering the CSS document’s URL, pasting the CSS document’s contents into a text area or uploading a CSS document from disk. Figure 6.6 illustrates uploading a CSS document from a disk.

![Image of W3C CSS Validation Service](image.png)

**Fig. 6.6** Validating a CSS document. (Courtesy of World Wide Web Consortium (W3C).)
Chapter 6    Cascading Style Sheets™ (CSS)  173

Figure 6.7 shows the results of validating styles.css (Fig. 6.4), using the file upload feature available at

jigsaw.w3.org/css-validator/validator-upload.html

To validate the document, click the Browse button to locate the file on your computer. After locating the file, click Submit this CSS file for validation to upload the file for validation. [Note: Like many W3C technologies, CSS is being developed in stages (or versions). The current version under development is Version 3.]

6.7 Positioning Elements

Prior to CSS, controlling the positioning of elements in an XHTML document was difficult—the browser determined positioning. CSS introduces the position property and a capability called absolute positioning, which provides authors greater control over how document elements are displayed. Figure 6.8 demonstrates absolute positioning.
Lines 15–17 position the first img element (i.gif) on the page. Specifying an element’s position as absolute removes the element from the normal flow of elements on the page, instead positioning the element according to the distance from the top, left, right or bottom margins of its containing block (i.e., an element such as body or p). Here, we position the element to be 0 pixels away from both the top and left margins of the body element.

The z-index attribute allows you to layer overlapping elements properly. Elements that have higher z-index values are displayed in front of elements with lower z-index values. In this example, i.gif has the lowest z-index (1), so it displays in the background. The img element at lines 20–22 (circle.gif) has a z-index of 2, so it displays in front of i.gif. The p element at lines 18–19 (Positioned Text) has a z-index of 3, so it displays in front of the other two. If you do not specify a z-index or if elements have the same z-index value, the elements are placed from background to foreground in the order they are encountered in the document.

Absolute positioning is not the only way to specify page layout. Figure 6.9 demonstrates relative positioning in which elements are positioned relative to other elements.

```
<head>
<title>Absolute Positioning</title>
</head>

<body>
<p><img src = "i.gif" style = "position: absolute; top: 0px; left: 0px; z-index: 1" alt = "First positioned image" /></p>
<p style = "position: absolute; top: 50px; left: 50px; z-index: 3; font-size: 20pt;" >Positioned Text</p>
<p><img src = "circle.gif" style = "position: absolute; top: 25px; left: 100px; z-index: 2" alt = "Second positioned image" /></p>
</body>
</html>

Fig. 6.8  Positioning elements with CSS (part 2 of 2).

Setting the `position` property to `relative`, as in class `super` (lines 21–22), lays out the element on the page and offsets the element by the specified `top`, `bottom`, `left` or `right` values. Unlike absolute positioning, relative positioning keeps elements in the general flow of elements on the page, so positioning is relative to other elements in the flow.

```xml
<?xml version = "1.0"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- Fig. 6.9: positioning2.html -->
<!-- Relative positioning of elements -->
<html xmlns = "http://www.w3.org/1999/xhtml">
<head>
<title>Relative Positioning</title>
<style type = "text/css">
p {
  font-size: 1.3em;
  font-family: verdana, arial, sans-serif }
span {
  color: red;
  font-size: .6em;
  height: 1em }
.super {
  position: relative;
  top: -1ex }
.sub {
  position: relative;
  bottom: -1ex }
.shiftleft {
  position: relative;
  left: -1ex }
.shiftright {
  position: relative;
  right: -1ex }
</style>
</head>
<body>
<p>The text at the end of this sentence
<span class = "super">is in superscript</span>.</p>
<p>The text at the end of this sentence
<span class = "sub">is in subscript</span>.</p>
<p>The text at the end of this sentence
<span class = "shiftleft">is shifted left</span>.</p>
</body>
</html>
```

Fig. 6.9 Relative positioning of elements (part 1 of 2).
Cascading Style Sheets™ (CSS)  

Chapter 6

We introduce the span element in line 39. Element span is a grouping element—it does not apply any inherent formatting to its contents. Its primary purpose is to apply CSS rules or id attributes to a block of text. Element span is an inline-level element—it is displayed inline with other text and with no line breaks. Lines 17–19 define the CSS rule for span. A similar element is the div element, which also applies no inherent styles but is displayed on its own line, with margins above and below (a block-level element).

Common Programming Error 6.1

Because relative positioning keeps elements in the flow of text in your documents, be careful to avoid unintentionally overlapping text.

6.8 Backgrounds

CSS also provides control over the element backgrounds. In previous examples, we introduced the background-color property. CSS also can add background images to documents. Figure 6.10 add a corporate logo to the bottom-right corner of the document. This logo stays fixed in the corner, even when the user scrolls up or down the screen.
Chapter 6 Cascading Style Sheets™ (CSS)

```
<head>
  <title>Background Images</title>
  <style type = "text/css">
    body { background-image: url(logo.gif); background-position: bottom right; background-repeat: no-repeat; background-attachment: fixed; }
    p { font-size: 18pt; color: #aa5588; text-indent: 1em; font-family: arial, sans-serif; }
    .dark { font-weight: bold; }
  </style>
</head>
<body>
<p>This example uses the background-image, background-position and background-attachment styles to place the Deitel & Associates, Inc. logo in the bottom, right corner of the page. Notice how the logo stays in the proper position when you resize the browser window.
</p>
</body>
</html>
```

This example uses the background-image, background-position and background-attachment styles to place the Deitel & Associates, Inc. logo in the bottom, right corner of the page. Notice how the logo stays in the proper position when you resize the browser window.

Fig. 6.10 Adding a background image with CSS (part 2 of 2).
The `background-image` property (line 14) specifies the image URL for the image `logo.gif` in the format `url(fileLocation)`. The Web-page author can set the `background-color` in case the image is not found.

The `background-position` property (line 15) places the image on the page. The keywords `top`, `bottom`, `center`, `left` and `right` are used individually or in combination for vertical and horizontal positioning. Image can be positioned using lengths by specifying the horizontal length followed by the vertical length. For example, to position the image as vertically centered (positioned at 50% of the distance across the screen) and 30 pixels from the top, use

```
background-position: 50% 30px;
```

The `background-repeat` property (line 16) controls the tiling of the background image. Tiling places multiple copies of the image next to each other to fill the background. Here, we set the tiling to `no-repeat` to display only one copy of the background image. The `background-repeat` property can be set to `repeat` (the default) to tile the image vertically and horizontally, `repeat-x` to tile the image only horizontally or `repeat-y` to tile the image only vertically.

The final property setting, `background-attachment: fixed` (line 17), fixes the image in the position specified by `background-position`. Scrolling the browser window will not move the image from its position. The default value, `scroll`, moves the image as the user scrolls through the document.

Line 21 indents the first line of text in the element by the specified amount, in this case `1em`. An author might use this property to create a Web page that reads more like a novel, in which the first line of every paragraph is indented.

Line 24 uses the `font-weight` property to specify the “boldness” of text. Possible values are `bold`, `normal` (the default), `bolder` (bolder than `bold` text) and `lighter` (lighter than `normal` text). Boldness also can be specified with multiples of 100, from 100 to 900 (e.g., `100`, `200`, ..., `900`). Text specified as `normal` is equivalent to `400`, and `bold` text is equivalent to `700`. However, many systems do not have fonts can scale this finely, so using the values from `100` to `900` might not display the desired effect.

Another CSS property that formats text is the `font-style` property, which allows the developer to set text to `none`, `italic` or `oblique` (`oblique` will default to `italic` if the system does not support oblique text).

### 6.9 Element Dimensions

In addition to positioning elements, CSS rules can specify the actual dimensions of each page element. Figure 6.11 demonstrates how to set the dimensions of elements.
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<title>Box Dimensions</title>
<style type="text/css">
div { background-color: #ffccff;
    margin-bottom: .5em }
</style>
</head>
<body>
<div style="width: 20%">
Here is some text that goes in a box which is set to stretch across twenty percent of the width of the screen.
</div>
<div style="width: 80%; text-align: center">
Here is some CENTERED text that goes in a box which is set to stretch across eighty percent of the width of the screen.
</div>
<div style="width: 20%; height: 30%; overflow: scroll">
This box is only twenty percent of the width and thirty percent of the height. What do we do if it overflows? Set the overflow property to scroll!
</div>
</body>
</html>

**Fig. 6.11**  Setting box dimensions and aligning text (part 2 of 2).
The inline style in line 22 illustrates how to set the \texttt{width} of an element on screen; here, we indicate that the \texttt{div} element should occupy 20\% of the screen width. Most elements are left-aligned by default; however, this alignment can be altered to position the element elsewhere. The height of an element can be set similarly, using the \texttt{height} property. The \texttt{height} and \texttt{width} values also can be specified relative and absolute lengths. For example

\begin{verbatim}
width: 10em
\end{verbatim}

sets the element’s width to be equal to 10 times the font size. Line 27 sets text in the element to be \texttt{center} aligned; some other values for the \texttt{text-align} property are \texttt{left} and \texttt{right}.

One problem with setting both dimensions of an element is that the content inside the element can exceed the set boundaries, in which case the element is simply made large enough for all the content to fit. However, in line 32, we set the \texttt{overflow} property to \texttt{scroll}, a setting that adds scrollbars if the text overflows the boundaries.

\section*{6.10 Text Flow and the Box Model}

A browser normally places text and elements on screen in the order in which they appear in the XHTML document. However, as we have seen with absolute positioning, it is possible to remove elements from the normal flow of text. \textit{Floating} allows you to move an element to one side of the screen; other content in the document then flows around the floated element. In addition, each block-level element has a box drawn around it, known as the \textit{box model}. The properties of this box can be adjusted to control the amount of padding inside the element and the margins outside the element (Fig. 6.12).

In addition to text, whole elements can be \texttt{floated} to the left or right of content. This means that any nearby text will wrap around the floated element. For example, in lines 30–32 we float a \texttt{div} element to the \texttt{right} side of the screen. As you can see from the sample screen capture, the text from lines 34–41 flows cleanly to the left and underneath the \texttt{div} element.

The second property on line 30, \texttt{margin}, specifies the distance between the edge of the element and any other element on the page. When the browser renders elements using the box model, the content of each element is surrounded by \texttt{padding}, a \texttt{border} and a \texttt{margin} (Fig. 6.13).

\textit{Margins} for individual sides of an element can be specified by using \texttt{margin-top}, \texttt{margin-right}, \texttt{margin-left} and \texttt{margin-bottom}.

Lines 43–45 specify a \texttt{div} element that floats at the right side of the content. Property \texttt{padding} for the \texttt{div} element is set to \texttt{.5em}. \textit{Padding} is the distance between the content inside an element and the element’s border. Like the \texttt{margin}, the \texttt{padding} can be set for each side of the box, with \texttt{padding-top}, \texttt{padding-right}, \texttt{padding-left} and \texttt{padding-bottom}.

A portion of lines 54–55 show that you can interrupt the flow of text around a \texttt{floated} element by setting the \texttt{clear} property to the same direction as that in which the element is \texttt{floated—right} or \texttt{left}. Setting the \texttt{clear} property to \texttt{all} interrupts the flow on both sides of the document.
<?xml version="1.0"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- Fig. 6.12: floating.html -->
<!-- Floating elements and element boxes -->
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<title>Flowing Text Around Floating Elements</title>
<style type="text/css">
div { background-color: #ffccff;
         margin-bottom: .5em;
         font-size: 1.5em;
         width: 50% }

p { text-align: justify; }
</style>
</head>
<body>
<div style="text-align: center">
Deitel & Associates, Inc.
</div>
<div style="float: right; margin: .5em; text-align: right">
Corporate Training and Publishing
</div>
<div style="float: right; padding: .5em; text-align: right">
Leading-edge Programming Textbooks</div>
<p>The company's clients include many Fortune 1000 companies, government agencies, branches of the military and business organizations. Through its publishing partnership with Prentice Hall, Deitel & Associates, Inc. publishes leading-edge programming textbooks, professional books, interactive CD-ROM-based multimedia Cyber Classrooms, satellite courses and World Wide Web
</p>

Fig. 6.12 Floating elements, aligning text and setting box dimensions (part 1 of 2).
Another property of every block-level element on screen is the border, which lies between the padding space and the margin space and has numerous properties for adjusting its appearance as shown in Fig. 6.14.
<?xml version = "1.0"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- Fig. 6.14: borders.html -->
<!-- Setting borders of an element -->
<html xmlns = "http://www.w3.org/1999/xhtml">
<head>
<title>Borders</title>
<style type = "text/css">
body {
  background-color: #ccffcc
}
div {
  text-align: center;
  margin-bottom: 1em;
  padding: .5em
}
.thick {
  border-width: thick
}
div {
  text-align: center;
  margin-bottom: 1em;
  padding: .5em
}
.mediu
  border-width: medium
}
div {
  text-align: center;
  margin-bottom: 1em;
  padding: .5em
}
.thin {
  border-width: thin
}
div {
  text-align: center;
  margin-bottom: 1em;
  padding: .5em
}
.groove {
  border-style: groove
}
div {
  text-align: center;
  margin-bottom: 1em;
  padding: .5em
}
inset {
  border-style: inset
}
div {
  text-align: center;
  margin-bottom: 1em;
  padding: .5em
}
.outset {
  border-style: outset
}
div {
  text-align: center;
  margin-bottom: 1em;
  padding: .5em
}
.red {
  border-color: red
}
div {
  text-align: center;
  margin-bottom: 1em;
  padding: .5em
}
.blue {
  border-color: blue
}
</style>
</head>
<body>
<div class = "thick groove">This text has a border</div>
<div class = "medium groove">This text has a border</div>
<div class = "thin groove">This text has a border</div>
<p class = "thin red inset">A thin red line...</p>
<p class = "medium blue outset">And a thicker blue line</p>
</body>
</html>

Fig. 6.14  Applying borders to elements (part 1 of 2).
In this example, we set three properties—border-width, border-color and border-style. The border-width property may be set to any of the CSS lengths or to the predefined values of thin, medium or thick. The border-color property sets the color. (This property has different meanings for different borders.)

As with padding and margins, each of the border properties may be set for individual sides of the box (e.g., border-top-style or border-left-color). A developer can assign more than one class to an XHTML element by using the class attribute as shown in line 41.

The border-styles are none, hidden, dotted, dashed, solid, double, groove, ridge, inset and outset. Borders groove and ridge have opposite effects, as do inset and outset. Figure 6.15 illustrates these border styles.

```xml
<?xml version = "1.0"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" 
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- Fig. 6.14: Applying borders to elements (part 2 of 2). -->
<!-- Fig. 6.15: Various border-styles (part 1 of 2). -->
<html xmlns = "http://www.w3.org/1999/xhtml">
<head>
<title>Borders</title>
<style type = "text/css">
body { background-color: #ccffcc }
</style>
</head>
<body>

This text has a border

This text has a border

This text has a border

A thin red line...

And a thicker blue line

Fig. 6.14 Fig. 6.14 Fig. 6.14 Fig. 6.14 Various border-styles (part 1 of 2).
```
6.11 User Style Sheets

Users can define their own user style sheets to format pages based on their preferences. For example, people with visual impairments may want to increase the page’s text size. A Web-page author needs to be careful because they may inadvertently override user preferences with defined styles. This section discusses possible conflicts between author styles and user styles.
Figure 6.16 contains an author style. The font-size is set to 9pt for all \textless p\textgreater tags that have class \texttt{note} applied to them.

User style sheets are external style sheets. Figure 6.17 shows a user style sheet that sets the \texttt{body}'s font-size to 20pt, color to \texttt{yellow} and background-color to \texttt{#000080}.

User style sheets are not linked to a document; rather, they are set in the browser's options. To add a user style sheet in Internet Explorer 5.5, select Internet Options..., located in the Tools menu. In the Internet Options dialog (Fig. 6.18) that appears, click Accessibility... Check the Format documents using my style sheet check box and type the location of the user style sheet. Internet Explorer 5.5 applies the user style sheet to any document it loads.

```xml
<?xml version = "1.0"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- Fig. 6.16: user_absolute.html   -->
<!-- User styles                     -->
<html xmlns = "http://www.w3.org/1999/xhtml">
<head>
<title>User Styles</title>
<style type = "text/css">
 .note { font-size: 9pt }
</style>
</head>
<body>
<p>Thanks for visiting my Web site. I hope you enjoy it.
</p>
<p class = "note">Please Note: This site will be moving soon. Please check periodically for updates.</p>
</body>
</html>
```

\textbf{Fig. 6.16} Modifying text size with the \texttt{pt} measurement.
Chapter 6  Cascading Style Sheets™ (CSS)  187

The Web page from Fig. 6.16 is displayed in Fig. 6.19, with the user style sheet from Fig. 6.17 applied.

Fig. 6.17  User style sheet.

```
/* Fig. 6.17: userstyles.css */
/* A user stylesheet */

body { font-size: 20pt;
      color: yellow;
      background-color: #000080 }
```

Fig. 6.18  Adding a user style sheet in Internet Explorer 5.5.

The Web page from Fig. 6.16 is displayed in Fig. 6.19, with the user style sheet from Fig. 6.17 applied.

Fig. 6.19  Web page with user styles applied.
In this example if users define their own `font-size` in a user style sheet, the author style has a higher precedence and overrides the user style. The 9pt font specified in the author style sheet overrides the 20pt font specified in the user style sheet. This small font may make pages difficult to read, especially for individuals with visual impairments. A developer can avoid this problem by using relative measurements (such as `em` or `ex`) instead of absolute measurements such as `pt`. Figure 6.20 changes the `font-size` property to use a relative measurement (line 14), which does not override the user style set in Fig. 6.17. Instead, the font size displayed is relative to that specified in the user style sheet.

In this case, text enclosed in the `<p>` tag displays as 20pt and `<p>` tags that have class `note` applied to them are displayed in 15pt (0.75 times 20pt).

```xml
<?xml version = "1.0"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<!-- Fig. 6.20: user_relative.html -->
<!-- User styles -->
<html xmlns = "http://www.w3.org/1999/xhtml"
<head>
<title>User Styles</title>
<style type = "text/css">
   .note { font-size: .75em }
</style>
</head>
<body>
   <p>Thanks for visiting my Web site. I hope you enjoy it.</p>
   <p class = "note">Please Note: This site will be moving soon. Please check periodically for updates.</p>
</body>
</html>
```

**Fig. 6.20** Modifying text size with the `em` measurement.
Fig. 6.21 displays the Web page from Fig. 6.20 with the user style sheet from Fig. 6.16 applied. Notice that the second line of text displayed is larger than the same line of text in Fig. 6.19.

6.12 Internet and World Wide Web Resources

www.w3.org/TR/REC-CSS2
The W3C Cascading Style Sheets, Level 2 specification contains a list of all the CSS properties. The specification also provides helpful examples detailing the use of many of the properties.

www.webreview.com/style
This site has several charts of CSS properties, including a list containing which browsers support what attributes and to what extent.

tech.irt.org/articles/css.htm
This site contains articles dealing with CSS.

msdn.microsoft.com/workshop/author/css/site1014.asp
This site contains samples of some CSS features.

www.web-weaving.net
This site contains many CSS articles.

SUMMARY

• The inline style allows a developer to declare a style for an individual element by using the style attribute in that element’s opening XHTML tag.
• Each CSS property is followed by a colon and the value of the attribute.
• The color property sets text color. Color names and hexadecimal codes may be used as the value.
• Styles that are placed in the <style> tag apply to the entire document.
• style element attribute type specifies the MIME type (the specific encoding format) of the style sheet. Style sheets use text/css.
• Each rule body begins and ends with a curly brace ( { and }).
• Style class declarations are preceded by a period and are applied to elements of that specific class.
• The CSS rules in a style sheet use the same format as inline styles: The property is followed by a colon (:) and the value of that property. Multiple properties are separated by semicolons (;).
• The background-color attribute specifies the background color of the element.
• The **font-family** attribute names a specific font that should be displayed. Generic font families allow authors to specify a type of font instead of a specific font, in case a browser does not support a specific font. The **font-size** property specifies the size used to render the font.

• The **class** attribute applies a style class to an element.

• Pseudoclasses provide the author access to content not specifically declared in the document. The **hover** pseudoclass is activated when the user moves the mouse cursor over an element.

• The **text-decoration** property applies decorations to text within an element, such as **underline**, **overline**, **line-through** and **blink**

• To apply rules to multiple elements, separate the elements with commas in the style sheet.

• A pixel is a relative-length measurement: It varies in size based on screen resolution. Other relative lengths are **em**, **ex**, and percentages.

• The other units of measurement available in CSS are absolute-length measurements—i.e., units that do not vary in size. These units can be **in** (inches), **cm** (centimeters), **mm** (millimeters), **pt** (points; 1 pt = 1/72 in) and **pc** (picas; 1 pc = 12 pt).

• External linking can create a uniform look for a Web site; separate pages can all use the same styles. Modifying a single file makes changes to styles across an entire Web site.

• **link**’s **rel** attribute specifies a relationship between two documents.

• The CSS **position** property allows absolute positioning, which provides greater control over where on a page elements reside. Specifying an element’ s **position** as **absolute** removes it from the normal flow of elements on the page and positions it according to distance from the top, left, right or bottom margins of its parent element.

• The **z-index** property allows a developer to layer overlapping elements. Elements that have higher **z-index** values are displayed in front of elements with lower **z-index** values.

• Unlike absolute positioning, relative positioning keeps elements in the general flow on the page and offsets them by the specified **top**, **left**, **right**, or **bottom** values.

• Property **background-image** specifies the URL of the image, in the format **url(fileLocation)**. The property **background-position** places the image on the page using the values **top**, **bottom**, **center**, **left** and **right** individually or in combination for vertical and horizontal positioning. You can also position by using lengths.

• The **background-repeat** property controls the tiling of the background image. Setting the tiling to **no-repeat** displays one copy of the background image on screen. The **background-repeat** property can be set to **repeat** (the default) to tile the image vertically and horizontally, to **repeat-x** to tile the image only horizontally or to **repeat-y** to tile the image only vertically.

• The property setting **background-attachment**: **fixed** fixes the image in the position specified by **background-position**. Scrolling the browser window will not move the image from its set position. The default value, **scroll**, moves the image as the user scrolls the window.

• The **text-indent** property indents the first line of text in the element by the specified amount.

• The **font-weight** property specifies the “boldness” of text. Values besides **bold** and **normal** (the default) are **bolder** (bolder than **bold** text) and **lighter** (lighter than **normal** text). The value also may be justified using multiples of 100, from 100 to 900 (i.e., **100**, **200**, ..., **900**). Text specified as **normal** is equivalent to **400**, and **bold** text is equivalent to **700**.

• The **font-style** property allows the developer to set text to **none**, **italic** or **oblique** (**oblique** will default to **italic** if the system does not have a separate font file for oblique text, which is normally the case).

• **span** is a generic grouping element; it does not apply any inherent formatting to its contents. Its main use is to apply styles or **id** attributes to a block of text. Element **span** is displayed inline
(an inline element) with other text and with no line breaks. A similar element is the \texttt{div} element, which also applies no inherent styles, but is displayed on a separate line, with margins above and below (a block-level element).

- The dimensions of elements on a page can be set with CSS by using the \texttt{height} and \texttt{width} properties.
- Text within an element can be centered using \texttt{text-align}; other values for the \texttt{text-align} property are \texttt{left} and \texttt{right}.
- One problem with setting both dimensions of an element is that the content inside the element might sometimes exceed the set boundaries, in which case the element must be made large enough for all the content to fit. However, a developer can set the \texttt{overflow} property to \texttt{scroll}; this setting adds scroll bars if the text overflows the boundaries set for it.
- Browsers normally place text and elements on screen in the order in which they appear in the XHTML file. Elements can be removed from the normal flow of text. Floating allows you to move an element to one side of the screen; other content in the document will then flow around the floated element.
- Each block-level element has a box drawn around it, known as the box model. The properties of this box are easily adjusted.
- The \texttt{margin} property determines the distance between the element’s edge and any outside text.
- CSS uses a box model to render elements on screen. The content of each element is surrounded by padding, a border and margins.
- Margins for individual sides of an element can be specified by using \texttt{margin-top}, \texttt{margin-right}, \texttt{margin-left} and \texttt{margin-bottom}.
- The padding is the distance between the content inside an element and the edge of the element. Padding can be set for each side of the box by using \texttt{padding-top}, \texttt{padding-right}, \texttt{padding-left} and \texttt{padding-bottom}.
- A developer can interrupt the flow of text around a floated element by setting the \texttt{clear} property to the same direction in which the element is floated—\texttt{right} or \texttt{left}. Setting the \texttt{clear} property to \texttt{all} interrupts the flow on both sides of the document.
- A property of every block-level element on screen is its border. The border lies between the padding space and the margin space and has numerous properties with which to adjust its appearance.
- The \texttt{border-width} property may be set to any of the CSS lengths or to the predefined values of \texttt{thin}, \texttt{medium} or \texttt{thick}.
- The \texttt{border-style} available are \texttt{none}, \texttt{hidden}, \texttt{dotted}, \texttt{dashed}, \texttt{solid}, \texttt{double}, \texttt{groove}, \texttt{ridge}, \texttt{inset} and \texttt{outset}.
- The \texttt{border-color} property sets the color used for the border.
- The \texttt{class} attribute allows more than one class to be assigned to an XHTML element.

\textbf{TERMINOLOGY}

\begin{itemize}
  \item absolute positioning
  \item absolute-length measurement
  \item \texttt{arial} font
  \item \texttt{background}
  \item \texttt{background-attachment}
  \item \texttt{background-color}
  \item \texttt{background-image}
  \item \texttt{background-position}
  \item background-repeat
  \item blink
  \item block-level element
  \item border
  \item border-color
  \item border-style
  \item border-width
  \item box model
\end{itemize}
SELF-REVIEW EXERCISES

6.1 Assume that the size of the base font on a system is 12 points.
   a) How big is 36-point font in ems?
   b) How big is 8-point font in ems?
   c) How big is 24-point font in picas?
   d) How big is 12-point font in inches?
   e) How big is 1-inch font in picas?

6.2 Fill in the blanks in the following statements:
   a) Using the ________ element allows authors to use external style sheets in their pages.
b) To apply a CSS rule to more than one element at a time, separate the element names with a ________.
c) Pixels are a(n) ________-length measurement unit.
d) The hover ________ is activated when the user moves the mouse cursor over the specified element.
e) Setting the overflow property to ________ provides a mechanism for containing inner content without compromising specified box dimensions.
f) While ________ is a generic inline element that applies no inherent formatting, ________ is a generic block-level element that applies no inherent formatting.
g) Setting the background-repeat property to ________ tiles the specified background-image only vertically.
h) If you float an element, you can stop the flowing text by using property ________.
i) The ________ property allows you to indent the first line of text in an element.
j) Three components of the box model are the ________, ________, and ________.

ANSWERS TO SELF-REVIEW EXERCISES

6.1  a) 3 ems. b) 0.75 ems. c) 2 picas. d) 1/6 inch. e) 6 picas.
6.2  a) link. b) comma. c) relative. d) pseudoclass. e) scroll. f) span, div. g) y-repeat.
h) clear. i) text-indent. j) padding, border, margin.

EXERCISES

6.3  Write a CSS rule that makes all text 1.5 times larger than the base font of the system and colors the text red.
6.4  Write a CSS rule that removes the underline from all links inside list items (li) and shifts them left by 3 ems.
6.5  Write a CSS rule that places a background image halfway down the page, tiling it horizontally. The image should remain in place when the user scrolls up or down.
6.6  Write a CSS rule that gives all h1 and h2 elements a padding of 0.5 ems, a grooved border style and a margin of 0.5 ems.
6.7  Write a CSS rule that changes the color of all elements containing attribute class = "greenMove" to green and shifts them down 25 pixels and right 15 pixels.
6.8  Write an XHTML document that shows the results of a color survey. The document should contain a form with radio buttons that allows users to vote for their favorite color. One of the colors should be selected as a default. The document should also contain a table showing various colors and the corresponding percentage of votes for each color. (Each row should be displayed in the color to which it is referring.) Use attributes to format width, border and cell spacing for the table.
6.9  Add an embedded style sheet to the XHTML document of Fig. 4.5. This style sheet should contain a rule that displays h1 elements in blue. In addition, create a rule that displays all links in blue without underlining them. When the mouse hovers over a link, change the link’s background color to yellow.
6.10 Modify the style sheet of Fig. 6.4 by changing a:hover to a:over and margin-left to margin-left. Validate the style sheet using the CSS Validator. What happens?