



# Chapter 5

## Introduction to Cascading Style Sheets (CSS): Part 2

Internet & World Wide Web  
How to Program, 5/e



## OBJECTIVES

In this chapter you'll:

- Add text shadows and text-stroke effects.
- Create rounded corners.
- Add shadows to elements.
- Create linear and radial gradients, and reflections.
- Create animations, transitions and transformations.
- Use multiple background images and image borders.
- Create a multicolumn layout.
- Use flexible box model layout and `:nth-child` selectors.
- Use the `@font-face` rule to specify fonts for a web page.
- Use RGBA and HSLA colors.
- Use vendor prefixes.
- Use media queries to customize content to fit various screen sizes.



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# 5.1 Text Shadows

- ▶ The CSS3 **text-shadow property** makes it easy to add a **text shadow** effect to *any* text (Fig. 5.1).
- ▶ The text-shadow property has four values which represent:
  - Horizontal offset of the shadow—the number of pixels that the text-shadow will appear to the *left* or the *right* of the text. A *negative* value moves the text-shadow to the *left*, a *positive* value moves it to the *right*.
  - Vertical offset of the shadow—the number of pixels that the text-shadow will be shifted *up* or *down* from the text. A *negative* value moves the shadow *up*, whereas a *positive* value moves it *down*.
  - **blur radius**—the blur (in pixels) of the shadow. A blur-radius of 0px would result in a shadow with a sharp edge (no blur). The greater the value, the greater the blurring of the edges.
  - **color**—determines the color of the text-shadow.



```
1  <!DOCTYPE html>
2
3  <!-- Fig. 5.1: textshadow.html -->
4  <!-- Text shadow in CSS3. -->
5  <html>
6      <head>
7          <meta charset = "utf-8">
8          <title>Text Shadow</title>
9          <style type = "text/css">
10              h1
11              {
12                  text-shadow: -4px 4px 6px dimgrey; /* add shadow */
13                  font-size: 400%; /* increasing the font size */
14              }
15          </style>
16      </head>
17      <body>
18          <h1>Text Shadow</h1>
19      </body>
20  </html>
```

**Fig. 5.1** | Text shadow in CSS3. (Part I of 2.)



**Fig. 5.1** | Text shadow in CSS3. (Part 2 of 2.)



## 5.2 Rounded Corners

- ▶ The **border-radius property** allows you to add **rounded corners** to an element (Fig. 5.2).
- ▶ For the first rectangle, we set the border-radius to 15px. This adds slightly rounded corners to the rectangle.
- ▶ For the second rectangle, we increase the border-radius to 50px, making the left and right sides completely round.
- ▶ Any border-radius value greater than half of the shortest side length produces a completely round end.
- ▶ You can also specify the radius for each corner with border-top-left-radius, border-top-right-radius, border-bottom-left-radius and border-bottom-right-radius.
- ▶



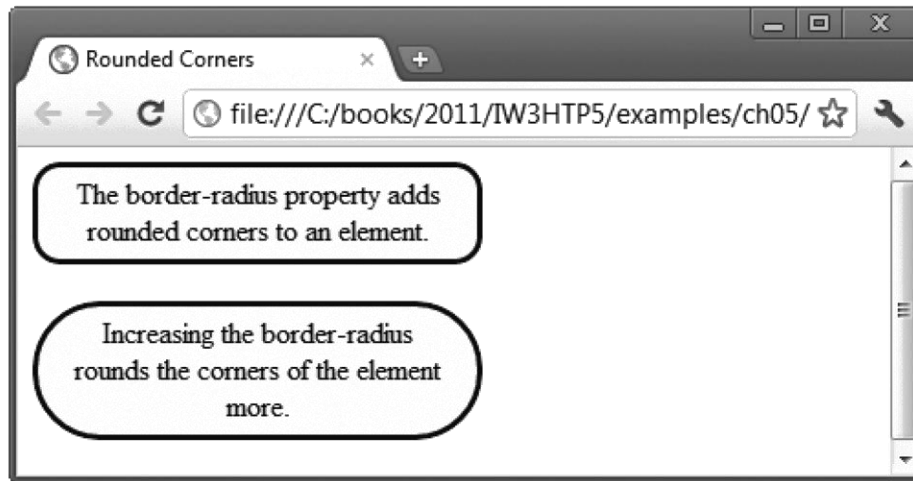
```
1  <!DOCTYPE html>
2
3  <!-- Fig. 5.2: roundedcorners.html -->
4  <!-- Using border-radius to add rounded corners to two elements. -->
5  <html>
6      <head>
7          <meta charset = "utf-8">
8          <title>Rounded Corners</title>
9          <style type = "text/css">
10              div
11              {
12                  border: 3px solid navy;
13                  padding: 5px 20px;
14                  background: lightcyan;
15                  width: 200px;
16                  text-align: center;
17                  border-radius: 15px; /* adding rounded corners */
18                  margin-bottom: 20px;
19              }
```

**Fig. 5.2** | Using border-radius to add rounded corners to two elements. (Part I of 3.)



```
20     #round2
21     {
22         border: 3px solid navy;
23         padding: 5px 20px;
24         background: lightcyan;
25         width: 200px;
26         text-align: center;
27         border-radius: 50px; /* increasing border-radius */
28     }
29 </style>
30 </head>
31 <body>
32     <div>The border-radius property adds rounded corners
33         to an element.</div>
34     <div id = "round2">Increasing the border-radius rounds the corners
35         of the element more.</div>
36 </body>
37 </html>
```

**Fig. 5.2** | Using border-radius to add rounded corners to two elements. (Part 2 of 3.)



**Fig. 5.2** | Using border-radius to add rounded corners to two elements. (Part 3 of 3.)



## 5.3 Color

- ▶ CSS3 allows you to express color in several ways in addition to standard color names (such as Aqua) or hexadecimal RGB values (such as #00FFFF for Aqua).
- ▶ **RGB** (Red, Green, Blue) or **RGBA** (Red, Green, Blue, Alpha) gives you greater control over the exact colors in your web pages.
- ▶ The value for each color—red, green and blue—can range from 0 to 255.
- ▶ The *alpha* value—which represents *opacity*—can be any value in the range 0.0 (fully transparent) through 1.0 (fully opaque).
- ▶ If you were to set the background color as follows:
  - `background: rgba(255, 0, 0, 0.5);`the resulting color would be a half-opaque red.
- ▶ There are over 140 HTML color names, whereas there are 16,777,216 different RGB colors (256 x 256 x 256) and varying opacities of each.





## 5.3 Color (cont.)

- ▶ CSS3 also allows you to express color using **HSL** (hue, saturation, lightness) or **HSLA** (hue, saturation, lightness, alpha) values.
- ▶ The *hue* is a color or shade expressed as a value from 0 to 359 representing the degrees on a color wheel (a wheel is 360 degrees).
- ▶ The colors on the wheel progress in the order of the colors of the rainbow—red, orange, yellow, green, blue, indigo and violet.
- ▶ The value for red, which is at the beginning of the wheel, is 0.
- ▶ Green hues have values around 120 and blue hues have values around 240.
- ▶ A hue value of 359, which is just left of 0 on the wheel, would result in a red hue.
- ▶ The *saturation*—the intensity of the hue—is expressed as a percentage, where 100% is fully saturated (the full color) and 0% is gray.



## 5.3 Color (cont.)

- ▶ *Lightness*—the intensity of light or luminance of the hue—is also expressed as a percentage.
- ▶ A lightness of 50% is the actual hue.
- ▶ If you *decrease* the amount of light to 0%, the color appears completely dark (black).
- ▶ If you *increase* the amount of light to 100%, the color appears completely light (white).
- ▶ For example, if you wanted to use an `hsla` value to get the same color red as in our example of an `rgba` value, you would set the background property as follows:
  - `background: hsla(0, 100%, 50%, 0.5);`

## 5.4 Box Shadows

- ▶ You can shadow *any* block-level element in CSS3.
- ▶ Figure 5.3 shows you how to create a **box shadow**.
  - Horizontal offset of the shadow—the number of pixels that the box-shadow will appear to the left or the right of the box. A *positive* value moves the box-shadow to the *right*
  - Vertical offset of the shadow—the number of pixels the box-shadow will be shifted up or down from the box. A *positive* value moves the box-shadow *down*.
  - Blur radius—A blur-radius of 0px would result in a shadow with a sharp edge (no blur). The greater the value, the more the edges of the shadow are blurred.
  - Color—the box-shadow's color.



```
1  <!DOCTYPE html>
2
3  <!-- Fig. 5.3: boxshadow.html -->
4  <!-- Creating box-shadow effects. -->
5  <html>
6      <head>
7          <meta charset = "utf-8">
8          <title>Box Shadow</title>
9          <style type = "text/css">
10              div
11              {
12                  width: 200px;
13                  height: 200px;
14                  background-color: plum;
15                  box-shadow: 25px 25px 50px dimgrey;
16                  float: left;
17                  margin-right: 120px;
18                  margin-top: 40px;
19              }
20
```

**Fig. 5.3** | Creating box-shadow effects. (Part I of 3.)



```
21     #box2
22     {
23         width: 200px;
24         height: 200px;
25         background-color: plum;
26         box-shadow: -25px -25px 50px dimgrey;
27     }
28     h2
29     {
30         text-align: center;
31     }
32 </style>
33 </head>
34 <body>
35     <div><h2>Box Shadow Bottom and Right</h2></div>
36     <div id = "box2"><h2>Box Shadow Top and Left</h2></div>
37 </body>
38 </html>
```

**Fig. 5.3** | Creating box-shadow effects. (Part 2 of 3.)



**Fig. 5.3** | Creating box-shadow effects. (Part 3 of 3.)



## 5.5 Linear Gradients; Introducing Vendor Prefixes

- ▶ **Linear gradients** are a type of image that gradually transitions from one color to the next horizontally, vertically or diagonally.
- ▶ You can transition between as many colors as you like and specify the points at which to change colors, called **color-stops**, represented in pixels or percentages along the *gradient line*—the angle at which the gradient extends.
- ▶ *You can use gradients in any property that accepts an image.*

## 5.5 Linear Gradients; Introducing Vendor Prefixes (cont.)



### *Creating Linear Gradients*

- ▶ In Fig. 5.4, we create three linear gradients—*vertical*, *horizontal* and *diagonal*—in separate rectangles.
- ▶ The background property for each of the three linear gradient styles (vertical, horizontal and diagonal) is defined multiple times in each style—once for WebKit-based browsers, once for Mozilla Firefox and once using the standard CSS3 syntax for linear gradients.
- ▶ This occurs frequently when working with CSS3, because many of its features are not yet finalized.
- ▶ Many of the browsers have gone ahead and begun implementing these features so you can use them now.





```
1  <!DOCTYPE html>
2
3  <!-- Fig. 5.4: lineargradient.html -->
4  <!-- Linear gradients in CSS3. -->
5  <html>
6      <head>
7          <meta charset = "utf-8">
8          <title>Linear Gradient</title>
9          <style type = "text/css">
10             div
11             {
12                 width: 200px;
13                 height: 200px;
14                 border: 3px solid navy;
15                 padding: 5px 20px;
16                 text-align: center;
17                 background: -webkit-gradient(
18                     linear, center top, center bottom,
19                     color-stop(15%, white), color-stop(50%, lightsteelblue),
20                     color-stop(75%, navy) );
21                 background: -moz-linear-gradient(
22                     top center, white 15%, lightsteelblue 50%, navy 75% );
```

**Fig. 5.4** | Linear gradients in CSS3. (Part I of 4.)



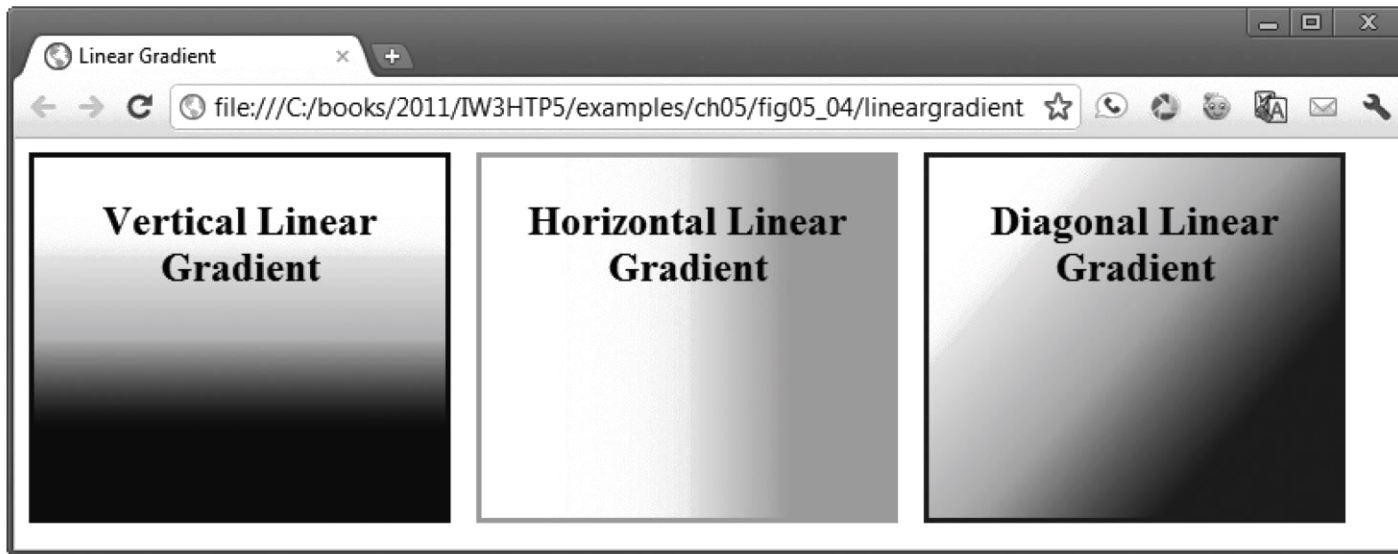
```
23     background: linear-gradient(  
24         to bottom, white 15%, lightsteelblue 50%, navy 75% );  
25     float: left;  
26     margin-right: 15px;  
27 }  
28 #horizontal  
29 {  
30     width: 200px;  
31     height: 200px;  
32     border: 3px solid orange;  
33     padding: 5px 20px;  
34     text-align: center;  
35     background: -webkit-gradient(  
36         linear, left top, right top,  
37         color-stop(15%, white), color-stop(50%, yellow),  
38         color-stop(75%, orange) );  
39     background: -moz-linear-gradient(  
40         left, white 15%, yellow 50%, orange 75% );  
41     background: linear-gradient(  
42         90deg, white 15%, yellow 50%, orange 75% );  
43     margin-right: 15px;  
44 }
```

**Fig. 5.4** | Linear gradients in CSS3. (Part 2 of 4.)



```
45     #angle
46     {
47         width: 200px;
48         height: 200px;
49         border: 3px solid Purple;
50         padding: 5px 20px;
51         text-align: center;
52         background: -webkit-gradient(
53             linear, left top, right bottom,
54             color-stop(15%, white), color-stop(50%, plum),
55             color-stop(75%, purple) );
56         background: -moz-linear-gradient(
57             top left, white 15%, plum 50%, purple 75% );
58         background: linear-gradient(
59             45deg, white 15%, plum 50%, purple 75% );
60     }
61     </style>
62 </head>
63 <body>
64     <div><h2>Vertical Linear Gradient</h2></div>
65     <div id = "horizontal"><h2>Horizontal Linear Gradient</h2></div>
66     <div id = "angle"><h2>Diagonal Linear Gradient</h2></div>
67 </body>
68 </html>
```

**Fig. 5.4** | Linear gradients in CSS3. (Part 3 of 4.)



**Fig. 5.4** | Linear gradients in CSS3. (Part 4 of 4.)

## 5.5 Linear Gradients; Introducing Vendor Prefixes (cont.)



### *WebKit Vertical Linear Gradient*

- ▶ Begin with the background property.
- ▶ The linear gradient syntax for WebKit differs slightly from that for Firefox.
- ▶ For WebKit browsers, we use `-webkit-gradient`.
- ▶ We then specify the type of gradient (`linear`) and the *direction* of the linear gradient, from center top to center bottom.
- ▶ Next, we specify the **color-stops** for the linear gradient.
- ▶ Within each color-stop are two values—the first is the *location* of the stop and the second is the *color*.
- ▶ You can use as many color-stops as you like.

## 5.5 Linear Gradients; Introducing Vendor Prefixes (cont.)



### *Mozilla Vertical Linear Gradient*

- ▶ For Mozilla browsers, we use `-moz-linear-gradient`.
- ▶ We specify the `gradient-line` (top center), which is the direction of the gradient.
- ▶ After the `gradient-line` we specify each color and `color-stop`.

## 5.5 Linear Gradients; Introducing Vendor Prefixes (cont.)



### *Standard Vertical Linear Gradient*

- ▶ The standard CSS3 syntax for linear gradients is also slightly different.
- ▶ First, we specify the `linear-gradient`.
- ▶ We include the values for the gradient—the direction of the gradient (`top`), followed by each color and color-stop.

## 5.5 Linear Gradients; Introducing Vendor Prefixes (cont.)



### *Horizontal Linear Gradient*

- ▶ Next we create a rectangle with a *horizontal* (left-to-right) gradient.
- ▶ For WebKit, the direction of the gradient is `left top to right top`, followed by the colors and color-stops.
- ▶ For Mozilla, we specify the gradient-line (`left`), followed by the colors and color-stops.
- ▶ The standard CSS3 syntax begins with the direction (`left`), indicating that the gradient changes from left to right, followed by the colors and color-stops.
- ▶ The direction can also be specified in degrees, with 0 degrees straight up and positive degrees progressing clockwise.



## 5.5 Linear Gradients; Introducing Vendor Prefixes (cont.)



### *Diagonal Linear Gradient*

- ▶ In the third rectangle we create a *diagonal* linear gradient.
- ▶ For WebKit, the direction of the gradient is `left top to right bottom`, followed by the colors and color-stops.
- ▶ For Mozilla, we specify the gradient-line (top left), followed by the colors and color-stops.
- ▶ The standard CSS3 syntax begins with the direction (`135deg`), indicating that the gradient changes at a 45-degree angle, followed by the colors and color-stops.

## 5.5 Linear Gradients; Introducing Vendor Prefixes (cont.)



### *Vendor Prefixes*

- ▶ **Vendor prefixes** (Fig. 5.5) and are used for properties that are still being finalized in the CSS specification but have already been implemented in various browsers.



Vendor prefix	Browsers
-ms-	Internet Explorer
-moz-	Mozilla-based browsers, including Firefox
-o-	Opera and Opera Mobile
-webkit-	WebKit-based browsers, including Google Chrome, Safari (and Safari on the iPhone) and Android

**Fig. 5.5** | Vendor prefixes.



## 5.5 Linear Gradients; Introducing Vendor Prefixes (cont.)

- ▶ Prefixes are *not* available for every browser or for every property.
- ▶ If we remove the prefixed versions of the linear gradient styles in this example, the gradients will *not* appear when the page is rendered in a WebKit-based browser or Firefox.
- ▶ If you run this program in browsers that don't support gradients yet, the gradients will *not* appear.
- ▶ It's good practice to include the multiple prefixes when they're available so that your pages render properly in the various browsers.
- ▶ As the CSS3 features are finalized and incorporated fully into the browsers, the prefixes will become unnecessary.
- ▶ Many of the new CSS3 features have not yet been implemented in Internet Explorer.
- ▶ When using vendor prefixes in styles, always place them *before* the nonprefixed version.
- ▶ The last version of the style that a given browser supports takes precedence and the browser will use it. By listing the standard non-prefixed version last, the browser will use the standard version over the prefixed version when the standard version is supported.



## 5.6 Radial Gradients

- ▶ **Radial gradients** are similar to linear gradients, but the color changes gradually from an inner point (the *start*) to an outer circle (the *end*) (Fig. 5.6).
- ▶ In this example, the **radial-gradient property** has three values.
- ▶ The first is the position of the start of the radial gradient—in this case, the center of the rectangle. Other possible values for the position include top, bottom, left and right.
- ▶ The second value is the *start color* (yellow), and the third is the *end color* (red).
- ▶ The resulting effect is a box with a yellow center that gradually changes to red in a circle around the starting position.
- ▶ In this case, notice that other than the vendor prefixes, the syntax of the gradient is identical for WebKit browsers, Mozilla and the standard CSS3 `radial-gradient`.

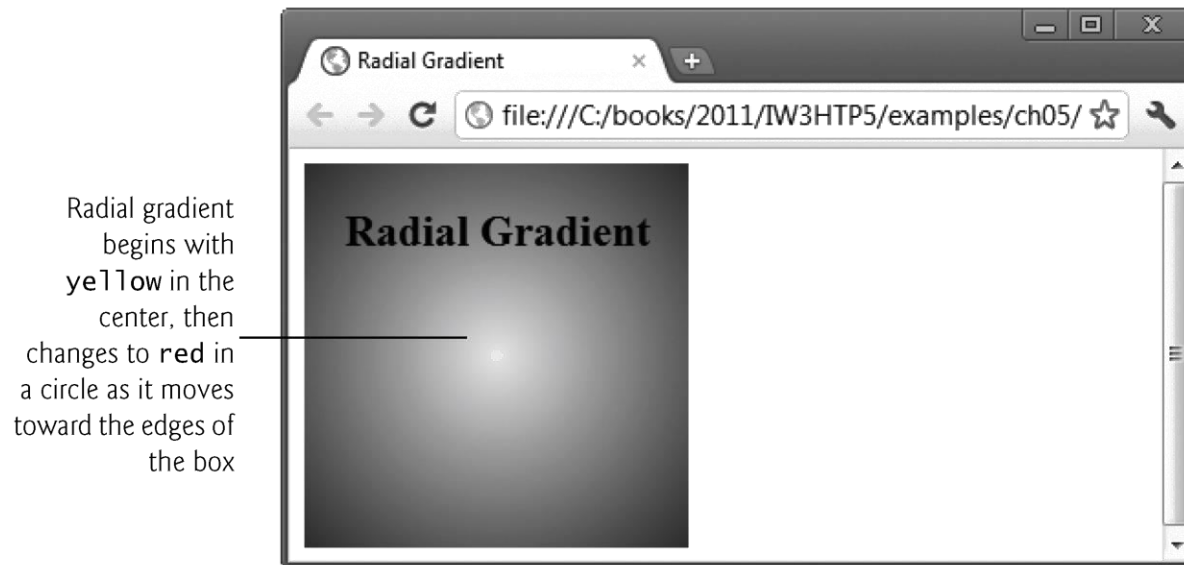


```
1  <!DOCTYPE html>
2
3  <!-- Fig. 5.6: radialgradient.html -->
4  <!-- Radial gradients in CSS3. -->
5  <html>
6    <head>
7      <meta charset = "utf-8">
8      <title>Radial Gradient</title>
9      <style type = "text/css">
10     div
11     {
12       width: 200px;
13       height: 200px;
14       padding: 5px;
15       text-align: center;
16       background: -webkit-radial-gradient(center, yellow, red);
17       background: -moz-radial-gradient(center, yellow, red);
18       background: radial-gradient(center, yellow, red);
19     }
20   </style>
21 </head>
```

**Fig. 5.6** | Radial gradients in CSS3. (Part 1 of 2.)



```
22     <body>
23         <div><h2>Radial Gradient</h2></div>
24     </body>
25 </html>
```



**Fig. 5.6** | Radial gradients in CSS3. (Part 2 of 2.)



## 5.7 (Optional: WebKit Only) Text Stroke

- ▶ The `-webkit-text-stroke` property is a nonstandard property for WebKit-based browsers that allows you to add an outline (text stroke) around text.
- ▶ Four of the seven browsers we use in this book are WebKit based—Safari and Chrome on the desktop and the mobile browsers in iOS and Android.
- ▶ In Fig. 5.7, we set the color of the h1 text to LightCyan.
- ▶ We add a `-webkit-text-stroke` with two values—the outline *thickness* (2px) and the *color* of the text stroke (black).
- ▶ We used the font-size 500% here so you could see the outline better.





```
1  <!DOCTYPE html>
2
3  <!-- Fig. 5.7: textstroke.html -->
4  <!-- Text stroke in CSS3. -->
5  <html>
6      <head>
7          <meta charset = "utf-8">
8          <title>Text Stroke</title>
9          <style type = "text/css">
10              h1
11              {
12                  color: lightcyan;
13                  -webkit-text-stroke: 2px black; /* vendor prefix */
14                  font-size: 500%; /* increasing the font size */
15              }
16          </style>
17      </head>
18      <body>
19          <h1>Text Stroke</h1>
20      </body>
21  </html>
```

**Fig. 5.7** | A text-stroke rendered in Chrome. (Part 1 of 2.)



**Fig. 5.7** | A text-stroke rendered in Chrome. (Part 2 of 2.)



## 5.8 Multiple Background Images

- ▶ CSS3 allows you to add **multiple background images** to an element (Fig. 5.8).
- ▶ The style begins by adding two background-images—`logo.png` and `ocean.png`.
- ▶ Next, we specify each image's placement using property `background-position`.
- ▶ The comma-separated list of values matches the order of the comma-separated list of images in the `background-image` property.
- ▶ The first value—`bottom right`—places the first image, `logo.png`, in the bottom-right corner of the background in the border-box.
- ▶ The last value—`100% center`—centers the entire second image, `ocean.png`, in the content-box so that it appears behind the content and stretches to fill the content-box.
- ▶ The **background-origin** determines where each image is placed using the box model we discussed in Fig. 4.13.
- ▶ The first image (`logo.png`) is in the outermost border-box, and the second image (`ocean.png`) is in the innermost content-box.



```
1  <!DOCTYPE html>
2
3  <!-- Fig. 5.8: multiplebackgrounds.html -->
4  <!-- Multiple background images in CSS3. -->
5  <html>
6      <head>
7          <meta charset = "utf-8">
8          <title>Multiple Backgrounds</title>
9          <style type = "text/css">
10              div.background
11              {
12                  background-image: url(logo.png), url(ocean.png);
13                  background-position: bottom right, 100% center;
14                  background-origin: border-box, content-box;
15                  background-repeat: no-repeat, repeat;
16              }
17              div.content
18              {
19                  padding: 10px 15px;
20                  color: white;
21                  font-size: 150%;
22              }
23          </style>
24      </head>
```

**Fig. 5.8** | Multiple background images in CSS3. (Part I of 3.)



```
25 <body>
26   <div class = "background">
27     <div class = "content">
28       <p>Deitel & Associates, Inc., is an internationally recognized
29         authoring and corporate training organization. The company
30         offers instructor-led courses delivered at client sites
31         worldwide on programming languages and other software topics
32         such as C++, Visual C++<sup>&reg;</sup>, C, Java&trade;,
33         C#<sup>&reg;</sup>, Visual Basic<sup>&reg;</sup>,
34         Objective-C<sup>&reg;</sup>, XML<sup>&reg;</sup>,
35         Python<sup>&reg;</sup>, JavaScript, object technology,
36         Internet and web programming, and Android and iPhone app
37         development.</p>
38     </div></div>
39 </body>
40 </html>
```

**Fig. 5.8** | Multiple background images in CSS3. (Part 2 of 3.)



The second image (ocean.png) is centered behind the content and stretched as needed to fill the

The first image (logo.png) is placed at the bottom right with

**Fig. 5.8** | Multiple background images in CSS3. (Part 3 of 3.)



## 5.9 (Optional: WebKit Only) Reflections

- ▶ Figure 5.9 shows how to add a simple **reflection** of an image using the **`-webkit-box-reflect` property**.
- ▶ This is a nonstandard property that's available only in WebKit-based browsers for now.
- ▶ The `-webkit-box-reflect` property's first value is the *direction* of the reflection.
- ▶ The direction value may be `above`, `below`, `left`, or `right`.
- ▶ The second value is the offset, which determines the space between the image and its reflection.
- ▶ Optionally, you can specify a gradient to apply to the reflection.
- ▶ The first gradient causes the bottom reflection to fade away from top to bottom. The second gradient causes the right reflection to fade away from left to right.



```
1  <!DOCTYPE html>
2
3  <!-- Fig. 5.9: reflection.html -->
4  <!-- Reflections in CSS3. -->
5  <html>
6      <head>
7          <meta charset = "utf-8">
8          <title>Reflection</title>
9          <style type = "text/css">
10             img { margin: 10px; }
11             img.below
12             {
13                 -webkit-box-reflect: below 5px
14                 -webkit-gradient(
15                     linear, left top, left bottom,
16                     from(transparent), to(white));
17             }
```

**Fig. 5.9** | Reflections in CSS3. (Part I of 3.)





```
18     img.right
19     {
20         -webkit-box-reflect: right 5px
21         -webkit-gradient(
22             linear, right top, left top,
23             from(transparent), to(white));
24     }
25 </style>
26 </head>
27 <body>
28     <img class = "below" src = "jhttp.png" width = "138" height = "180"
29         alt = "Java How to Program book cover">
30     <img class = "right" src = "jhttp.png" width = "138" height = "180"
31         alt = "Java How to Program book cover">
32 </body>
33 </html>
```

**Fig. 5.9** | Reflections in CSS3. (Part 2 of 3.)



**Fig. 5.9** | Reflections in CSS3. (Part 3 of 3.)



## 5.10 Image Borders

- ▶ The CSS3 **border-image property** uses images to place a border around *any* block-level element (Fig. 5.10).
- ▶ We set a div's border-width to 30px, which is the thickness of the border we're placing around the element.
- ▶ Next, we specify a width of 234px, which is the width of the entire rectangular border.



```
1  <!DOCTYPE html>
2
3  <!-- Fig. 5.10: imageborder.html -->
4  <!-- Stretching and repeating an image to create a border. -->
5  <html>
6      <head>
7          <meta charset = "utf-8">
8          <title>Image Border</title>
9          <style type = "text/css">
10              div
11              {
12                  border-width: 30px;
13                  width: 234px;
14                  padding: 20px 20px;
15              }
16              #stretch
17              {
18                  -webkit-border-image: url(border.png) 80 80 80 80 stretch;
19                  -moz-border-image: url(border.png) 80 80 80 80 stretch;
20                  -o-border-image: url(border.png) 80 80 80 80 stretch;
21                  border-image: url(border.png) 80 80 80 80 stretch;
22              }
23              #repeat
```

**Fig. 5.10** | Stretching and repeating an image to create a border. (Part 1 of 4.)

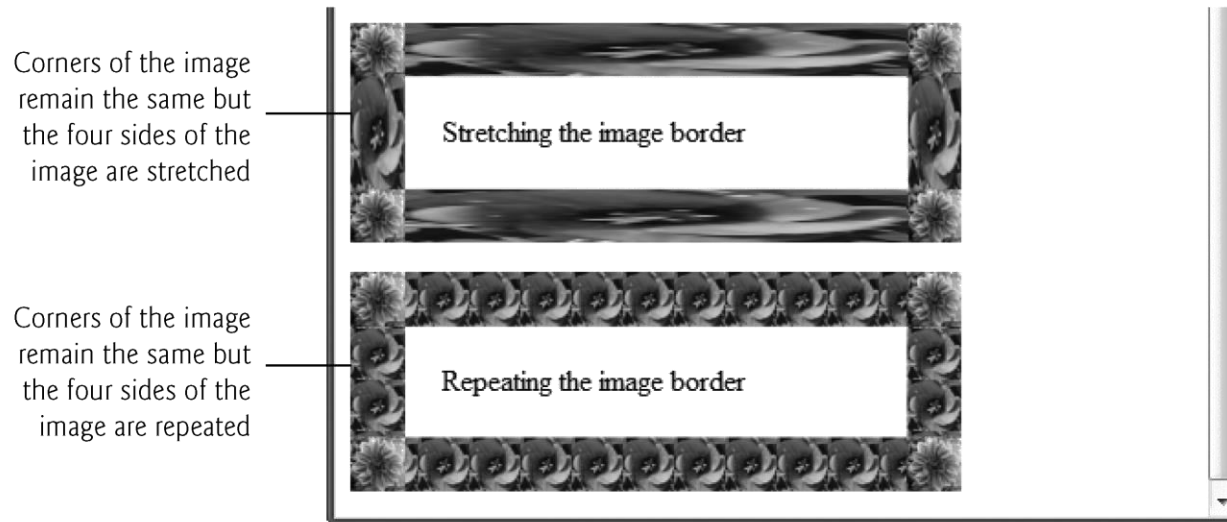


```
24      {
25          -webkit-border-image:url(border.png) 34% 34% repeat;
26          -moz-border-image:url(border.png) 34% 34% repeat;
27          -o-border-image:url(border.png) 34% 34% repeat;
28          border-image:url(border.png) 34% 34% repeat;
29      }
30  </style>
31 </head>
32 <body>
33     <h2>Image Borders</h2>
34     <img src = "border.png" alt = "image used to demonstrate borders">
35     <p><div id="stretch">Stretching the image border</div></p>
36     <p><div id="repeat">Repeating the image border</div></p>
37 </body>
38 </html>
```

**Fig. 5.10** | Stretching and repeating an image to create a border. (Part 2 of 4.)



**Fig. 5.10** | Stretching and repeating an image to create a border. (Part 3 of 4.)



**Fig. 5.10** | Stretching and repeating an image to create a border. (Part 4 of 4.)



## 5.10 Image Borders (cont.)

### *Stretching an Image Border*

- ▶ In this example, we create two image border styles.
- ▶ In the first, we stretch (and thus distort) the sides of the image to fit around the element while leaving the corners of the border image unchanged (not stretched).





## 5.10 Image Borders (cont.)

### *Stretching an Image Border*

- ▶ The border-image property has six values:
  - **border-image-source**—the URL of the image to use in the border (in this case, `url(border.png)`).
  - **border-image-slice**—expressed with four space-separated values in pixels. These values are the *inward offsets* from the top, right, bottom and left sides of the image. The border-image-slice divides the image into nine *regions*: four corners, four sides and a middle, which is transparent unless otherwise specified. *You may not use negative values.* We could express the border-image-slice in *two* values, in which case the first value would represent the top and bottom, and the second value the left and right. The border-image-slice may also be expressed in percentages.



## 5.10 Image Borders (cont.)

### *Stretching an Image Border*

- **border-image-repeat**—specifies how the regions of the border image are scaled and *tiled* (repeated).
  - Indicating stretch just *once* creates a border that will stretch the top, right, bottom and left regions to fit the area.
  - You may specify *two* values for the border-image-repeat property.
  - If we specified stretch repeat, the top and bottom regions of the image border would be *stretched*, and the right and left regions of the border would be repeated (i.e., *tiled*) to fit the area.
  - Other possible values for the border-image-repeat property include round and space.
  - If you specify round, the regions are repeated using only whole tiles, and the border image is scaled to fit the area.
  - If you specify space, the regions are repeated to fill the area using only whole tiles, and any excess space is distributed evenly around the tiles.



## 5.10 Image Borders (cont.)

### *Repeating an Image Border*

- ▶ Next, we create an image border by repeating the regions to fit the space.
- ▶ The border-image property includes four values:
  - border-image-source—the URL of the image to use in the border (once again, `url(border.png)`).
  - border-image-slice—in this case, we provided *two* values expressed in percentages for the top/bottom and left/right, respectively.
  - border-image-repeat—the value `repeat` specifies that the tiles are repeated to fit the area, using partial tiles to fill the excess space.



## 5.11 Animation; Selectors

- ▶ In Fig. 5.11, we create a simple *animation* of an image that moves in a diamond pattern as it changes opacity.



```
1  <!DOCTYPE html>
2
3  <!-- Fig. 5.11: animation.html -->
4  <!-- Animation in CSS3. -->
5  <html>
6      <head>
7          <meta charset = "utf-8">
8          <title>Animation</title>
9          <style type = "text/css">
10              img
11              {
12                  position: relative;
13                  -webkit-animation: movingImage linear 10s 1s 2 alternate;
14                  -moz-animation: movingImage linear 10s 1s 2 alternate;
15                  animation: movingImage linear 10s 2 1s alternate;
16              }
```

**Fig. 5.11** | Animation in CSS3. The dotted lines show the diamond path that the image takes, (Part 1 of 4.)



```
17 @-webkit-keyframes movingImage
18 {
19     0%    {opacity: 0; left: 50px; top: 0px;}
20     25%   {opacity: 1; left: 0px; top: 50px;}
21     50%   {opacity: 0; left: 50px; top: 100px;}
22     75%   {opacity: 1; left: 100px; top: 50px;}
23     100%  {opacity: 0; left: 50px; top: 0px;}
24 }
25 @-moz-keyframes movingImage
26 {
27     0%    {opacity: 0; left: 50px; top: 0px;}
28     25%   {opacity: 1; left: 0px; top: 50px;}
29     50%   {opacity: 0; left: 50px; top: 100px;}
30     75%   {opacity: 1; left: 100px; top: 50px;}
31     100%  {opacity: 0; left: 50px; top: 0px;}
32 }
```

**Fig. 5.11** | Animation in CSS3. The dotted lines show the diamond path that the image takes, (Part 2 of 4.)



```
33     @keyframes movingImage
34     {
35         0%    {opacity: 0; left: 50px; top: 0px;}
36         25%   {opacity: 1; left: 0px; top: 50px;}
37         50%   {opacity: 0; left: 50px; top: 100px;}
38         75%   {opacity: 1; left: 100px; top: 50px;}
39         100%  {opacity: 0; left: 50px; top: 0px;}
40     }
41 </style>
42 </head>
43 <body>
44     <img src = "jhttp.png" width = "138" height = "180"
45         alt = "Java How to Program book cover">
46     <div></div>
47 </body>
48 </html>
```

**Fig. 5.11** | Animation in CSS3. The dotted lines show the diamond path that the image takes, (Part 3 of 4.)

The animation starts and ends at the top of the diamond, moving the image in the counterclockwise direction initially. When the animation reaches the top of the diamond, the animation reverses, continuing in the clockwise direction. The animation terminates when the image reaches the top of the diamond for a second time.



**Fig. 5.11** | Animation in CSS3. The dotted lines show the diamond path that the image takes, (Part 4 of 4.)





## 5.12 Animation; Selectors

### *animation Property*

- ▶ The **animation property** allows you to represent several animation properties in a *shorthand* notation, rather than specifying each separately, as in:
  - `animation-name: movingImage;`  
`animation-timing-function: linear;`  
`animation-duration: 10s;`  
`animation-delay: 1s;`  
`animation-iteration-count: 2;`  
`animation-direction: alternate;`



## 5.12 Animation; Selectors (cont.)

- ▶ In the shorthand notation, the values are listed in the following order:
  - **animation-name**—represents the name of the animation (`movingImage`).
  - **animation-timing-function**—determines how the animation progresses in one cycle of its duration. Possible values include `linear`, `ease`, `ease-in`, `ease-out`, `ease-in-out`, `cubic-bezier`.
    - `linear` specifies that the animation will move at the same speed from start to finish.
    - The default value, `ease`, starts slowly, increases speed, then ends slowly.
    - `ease-in` starts slowly, then speeds up, whereas the `ease-out` value starts faster, then slows down.
    - `ease-in-out` starts and ends slowly.
    - `cubic-bezier` allows you to customize the timing function with four values between 0 and 1, such as `cubic-bezier(1,0,0,1)`



## 5.12 Animation; Selectors (cont.)

- **animation-duration**—specifies the time in seconds (s) or milliseconds (ms) that the animation takes to complete one iteration (10s in this case).
- **animation-delay**—specifies the number of seconds (1s in this case) or milliseconds after the page loads before the animation begins.
- **animation-iteration-count**—specifies the number of times the animation will run. You may use the value `infinite` to repeat the animation continuously.
- **animation-direction**—specifies the direction in which the animation will run. The value `alternate` used here specifies that the animation will run in alternating directions—in this case, counterclockwise (as we define with our keyframes), then clockwise. The default value, `normal`, would run the animation in the same direction for each cycle.



## 5.12 Animation; Selectors (cont.)

- ▶ The shorthand animation property cannot be used with the **animation-play-state property**—it must be specified separately.
- ▶ If you do not include the animation-play-state, which specifies whether the animation is paused or running, it defaults to running.



## 5.12 Animation; Selectors (cont.)

### *@keyframes Rule and Selectors*

- ▶ The **@keyframes rule** defines the element's properties that will change during the animation, the values to which those properties will change, and when they'll change.
- ▶ The **@keyframes rule** is followed by the name of the animation (movingImage) to which the keyframes are applied.
- ▶ CSS **rules** consist of one or more **selectors** followed by a **declaration block** in curly braces ({}).
- ▶ Selectors enable you to apply styles to elements of a particular type or attribute.
- ▶ A declaration block consists of one or more declarations, each of which includes the property name followed by a colon (:), a value and a semicolon (;).
- ▶ In this example, the @keyframes rule includes five selectors to represent the points-in-time for our animation.
- ▶ You can break down the animation into as many points as you like.



## 5.13 Transitions and Transformations

- ▶ With CSS3 **transitions**, you can change an element's style over a specified duration.
- ▶ CSS3 **transformations** allow you to *move*, *rotate*, *scale* and *skew* elements.
- ▶ Transitions are similar in concept to the animations, but transitions allow you to specify only the starting and ending values of the CSS properties being changed.
- ▶ An animation's keyframes enable you to control intermediate states throughout the animation's duration.



## 5.13.1 transition and transform Properties

- ▶ Figure 5.12 uses the **transition** and **transform properties** to scale and rotate an image 360 degrees when the cursor *hovers* over it.
- ▶ We begin by defining the transition. For each property that will change, the transition property specifies the duration of that change.
- ▶ We could specify a comma-separated list of property names that will change and the individual durations over which each property will change. For example:
  - `transition: transform 4s, opacity 2s;`
- ▶ indicates that a transform takes four seconds to apply and the opacity changes over two seconds—thus, the transform will continue for another two seconds after the opacity change completes.
- ▶ In this example, we define the transform only when the user *hovers* the mouse over the image.



```
1  <!DOCTYPE html>
2
3  <!-- Fig. 5.12: transitions.html -->
4  <!-- Transitions in CSS3. -->
5  <html>
6    <head>
7      <meta charset = "utf-8">
8      <title>Transitions</title>
9      <style type = "text/css">
10        img
11        {
12          margin: 80px;
13          -webkit-transition: -webkit-transform 4s;
14          -moz-transition: -moz-transform 4s;
15          -o-transition: -o-transform 4s;
16          transition: transform 4s;
17        }
```

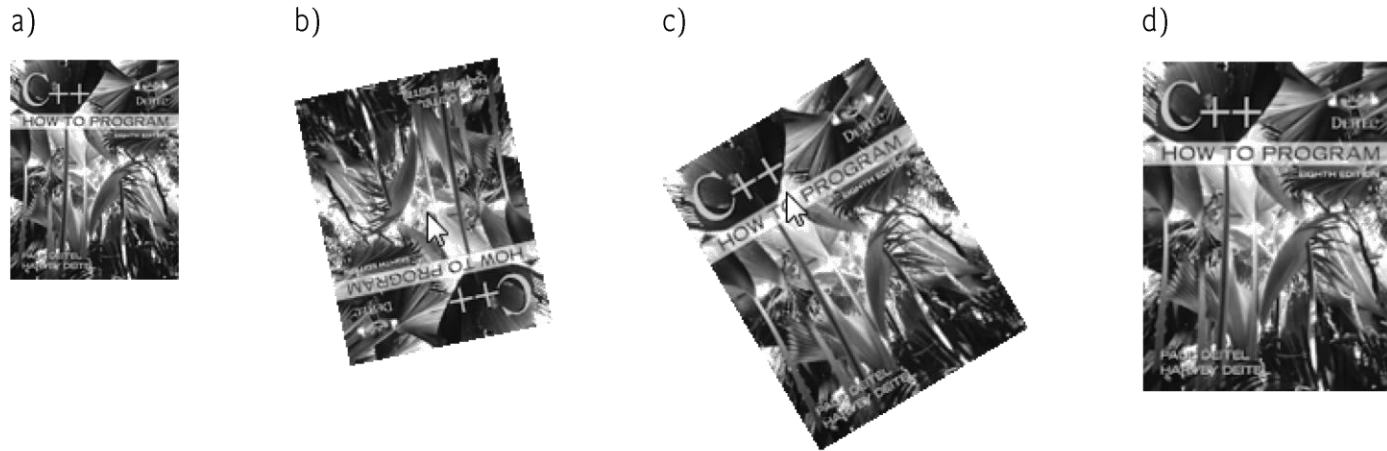
**Fig. 5.12** | Transitioning an image over a four-second duration and applying rotate and scale transforms. (Part I of 3.)





```
18     img: hover
19     {
20         -webkit-transform: rotate(360deg) scale(2, 2);
21         -moz-transform: rotate(360deg) scale(2, 2);
22         -o-transform: rotate(360deg) scale(2, 2);
23         transform: rotate(360deg) scale(2, 2);
24     }
25 </style>
26 </head>
27 <body>
28     <img src = "cpphttp.png" width = "76" height = "100"
29         alt = "C++ How to Program book cover">
30 </body>
31 </html>
```

**Fig. 5.12** | Transitioning an image over a four-second duration and applying rotate and scale transforms. (Part 2 of 3.)



**Fig. 5.12** | Transitioning an image over a four-second duration and applying rotate and scale transforms. (Part 3 of 3.)



## 5.13.1 transition and transform Properties (cont.)

- ▶ The :hover pseudo-class formerly worked only for anchor elements but now works with *any* element.
- ▶ We use :hover to begin the rotation and scaling of the image.
- ▶ The transform property specifies that the image will rotate 360deg and will scale to twice its original width and height when the mouse hovers over the image.
- ▶ The transform property uses **transformation functions**, such as **rotate** and **scale**, to perform the transformations.
- ▶ The rotate transformation function receives the number of degrees. Negative values cause the element to rotate left.
- ▶ The scale transformation function specifies how to scale the width and height. The value 1 represents the original width or original height, so values greater than 1 increase the size and values less than 1 decrease the size.



## 5.13.2 Skew

- ▶ CSS3 transformations also allow you to **skew** block-level elements, slanting them at an angle either horizontally (skewX) or vertically (skewY).
- ▶ We use the animation and transform properties to skew a rectangle and text horizontally by 45 degrees (Fig. 5.13).
- ▶ First we create a rectangle with a LightGreen background, a solid DarkGreen border and rounded corners.
- ▶ The animation property specifies that the element will skew in a three-second (3s) interval for an infinite duration.
- ▶ The fourth value, linear, is the animation-timing-function.
- ▶ Next, we use the @keyframes rule and selectors to specify the angle of the skew transformation at different intervals.



```
1  <!DOCTYPE html>
2
3  <!-- Fig. 5.13: skew.html -->
4  <!-- Skewing and transforming elements in CSS3. -->
5  <html>
6      <head>
7          <meta charset = "utf-8">
8          <title>Skew</title>
9          <style type = "text/css">
10             .skew .textbox
11             {
12                 margin-left: 75px;
13                 background: lightgreen;
14                 height: 100px;
15                 width: 200px;
16                 padding: 25px 0;
17                 text-align: center;
18                 font-size: 250%;
19                 border: 3px solid DarkGreen;
20                 border-radius: 15px;
21                 -webkit-animation: skew 3s infinite linear;
22                 -moz-animation: skew 3s infinite linear;
23                 animation: skew 3s infinite linear;
24             }
```

**Fig. 5.13** | Skewing and transforming elements in CSS3. (Part 1 of 3.)



```
25 @-webkit-keyframes skew
26 {
27     from { -webkit-transform: skewX(0deg); }
28     25% { -webkit-transform: skewX(45deg); }
29     50% { -webkit-transform: skewX(0); }
30     75% { -webkit-transform: skewX(-45deg); }
31     to { -webkit-transform: skewX(0); }
32 }
33 @-moz-keyframes skew
34 {
35     from { -webkit-transform: skewX(0deg); }
36     25% { -webkit-transform: skewX(45deg); }
37     50% { -webkit-transform: skewX(0); }
38     75% { -webkit-transform: skewX(-45deg); }
39     to { -webkit-transform: skewX(0); }
40 }
41 @-keyframes skew
42 {
43     from { -webkit-transform: skewX(0deg); }
44     25% { -webkit-transform: skewX(45deg); }
45     50% { -webkit-transform: skewX(0); }
46     75% { -webkit-transform: skewX(-45deg); }
47     to { -webkit-transform: skewX(0); }
48 }
49 </style>
```

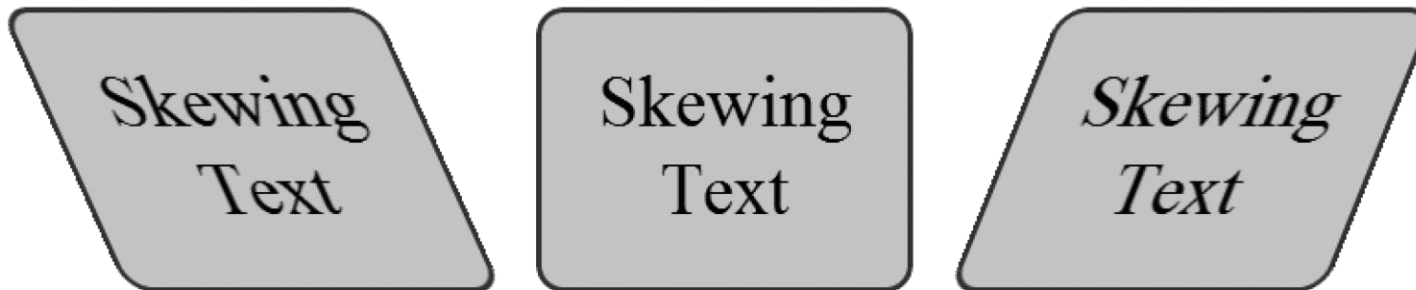
**Fig. 5.13** | Skewing and transforming elements in CSS3. (Part 2 of 3.)

```
50 </head>
51 <body>
52   <div class = "box skew">
53     <div class = "textbox">Skewing Text</div>
54   </div>
55 </body>
56 </html>
```

a) Bordered div at skewed left position

b) Bordered div at centered position

c) Bordered div at skewed right position



**Fig. 5.13** | Skewing and transforming elements in CSS3. (Part 3 of 3.)



## 5.13.3 Transitioning Between Images

- ▶ We can use the `transition` property to create the visually beautiful effect of *melting* one image into another (Fig. 5.14).
- ▶ The `transition` property includes three values. First, we specify that the transition will occur on the `opacity` of the image.
- ▶ The second value, `4s`, is the `transition-duration`.
- ▶ The third value, `ease-in-out`, is the `transition-timing-function`.
- ▶ Next, we define `:hover` with an `opacity` of `0`, so when the cursor hovers over the top image, its opacity becomes fully transparent, revealing the bottom image directly behind it. We then add the bottom and top images, placing one directly behind the other.





```
1  <!DOCTYPE html>
2
3  <!-- Fig. 5.14: meltingimages.html -->
4  <!-- Melting one image into another using CSS3. -->
5  <html>
6      <head>
7          <meta charset = "utf-8">
8          <title>Melting Images</title>
9          <style type = "text/css">
10              #cover
11              {
12                  position: relative;
13                  margin: 0 auto;
14              }
15              #cover img
16              {
17                  position: absolute;
18                  left: 0;
19                  -webkit-transition: opacity 4s ease-in-out;
20                  transition: opacity 4s ease-in-out;
21              }
22              #cover img.top:hover
23              { opacity:0; }
24          </style>
```

**Fig. 5.14** | Melting one image into another using CSS3. (Part I of 2.)



```
25     </head>
26     <body>
27         <div id = "cover">
28             <img class = "bottom" src = "jhttp.png" alt = "Java 9e cover">
29             <img class = "top" src = "jhttp8.png" alt = "Java 8e cover">
30         </div>
31     </body>
32 </html>
```



**Fig. 5.14** | Melting one image into another using CSS3. (Part 2 of 2.)



## 5.14 Downloading Web Fonts and the @font-face Rule

- ▶ Using the **@font-face rule**, you can specify fonts for a web page, even if they're not installed on the user's system.
- ▶ You can use *downloadable fonts* to help ensure a uniform look across client sites.
- ▶ In Fig. 5.15, we use the Google web font named "Calligraffiti."
- ▶ You can find numerous free, open-source web fonts at <http://www.google.com/webfonts>.
- ▶ *Make sure the fonts you get from other sources have no legal encumbrances.*



```
1  <!DOCTYPE html>
2
3  <!-- Fig. 5.15: embeddedfonts.html -->
4  <!-- Embedding fonts for use in your web page. -->
5  <html>
6      <head>
7          <meta charset = "utf-8">
8          <title>Embedded Fonts</title>
9          <link href = 'http://fonts.googleapis.com/css?family=Calligraffiti'
10             rel = 'stylesheet' type = 'text/css'>
11          <style type = "text/css">
12              body
13              {
14                  font-family: "Calligraffiti";
15                  font-size: 48px;
16                  text-shadow: 3px 3px 3px DimGrey;
17              }
18          </style>
19      </head>
```

**Fig. 5.15** | Embedding fonts for use in your web page. (Part 1 of 2.)

```
20 <body>
21   <div>
22     <b>Embedding the Google web font "Calligraffiti"</b>
23   </div>
24 </body>
25 </html>
```



**Fig. 5.15** | Embedding fonts for use in your web page. (Part 2 of 2.)



## 5.14 Downloading Web Fonts and the @font-face Rule (cont.)

- ▶ To get Google's Calligraffiti font, go to <http://www.google.com/webfonts> and use the search box on the site to find the font "Calligraffiti."
- ▶ Next, click Quick-use to get the link to the style sheet that contains the @font-face rule.
- ▶ Paste that link element into the head section of your document. The referenced CSS style sheet contains the following CSS rules:

```
• @media screen {  
  @font-face {  
    font-family: 'Calligraffiti';  
    font-style: normal;  
    font-weight: normal;  
    src: local('Calligraffiti'),  
         url('http://themes.googleusercontent.com/static/fonts/  
             calligraffiti/v1/vLVN2Y-z65rVu1R7lwdvyKIZAuDCNtpCWuPSaIR0Ie8  
             .woff') format('woff');  
  }  
}
```



## 5.14 Downloading Web Fonts and the @font-face Rule (cont.)

- ▶ The @media screen rule specifies that the font will be used when the document is rendered on a computer screen.
- ▶ The @font-face rule includes the font-family (Calligraffiti), font-style (normal) and font-weight (normal).
- ▶ The @font-face rule also includes the *location* of the font.



## 5.15 Flexible Box Layout Module and :nth-child Selectors

- ▶ **Flexible Box Layout Module (FBLM)** makes it easy to align the contents of boxes, change their size, change their order dynamically, and lay out the contents in any direction.
- ▶ In Fig. 5.16, we create flexible divs for four programming tips. When the mouse hovers over one of the divs, the div expands, the text changes from black to white, the background color changes and the layout of the text changes.





```
1  <!DOCTYPE html>
2
3  <!-- Fig. 5.16: fb1m.html -->
4  <!-- Flexible Box Layout Module. -->
5  <html>
6      <head>
7          <meta charset = "utf-8">
8          <title>Flexible Box Layout Model</title>
9          <link href = 'http://fonts.googleapis.com/css?family=Rosario'
10             rel = 'stylesheet' type = 'text/css'>
11          <style type = "text/css">
12              .flexbox
13              {
14                  width: 600px;
15                  height: 420px;
16                  display: -webkit-box;
17                  display: box;
18                  -webkit-box-orient: horizontal;
19                  box-orient: horizontal;
20              }
```

**Fig. 5.16** | Flexible Box Layout Module. (Part 1 of 5.)



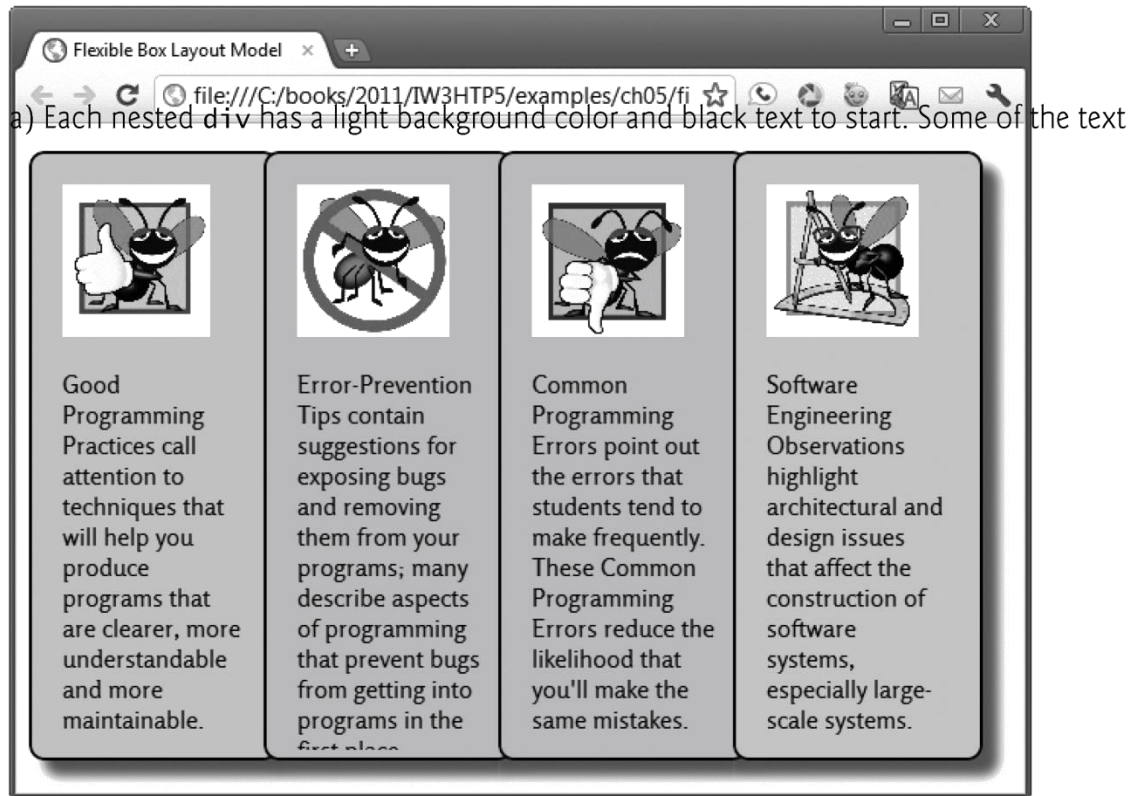
```
21 .flexbox > div
22 {
23     -webkit-transition: 1s ease-out;
24     transition: 1s ease-out;
25     -webkit-border-radius: 10px;
26     border-radius: 10px;
27     border: 2px solid black;
28     width: 120px;
29     margin: 10px -10px 10px 0px;
30     padding: 20px 20px 20px 20px;
31     box-shadow: 10px 10px 10px dimgrey;
32 }
33 .flexbox > div:nth-child(1){ background-color: lightgrey; }
34 .flexbox > div:nth-child(2){ background-color: lightgrey; }
35 .flexbox > div:nth-child(3){ background-color: lightgrey; }
36 .flexbox > div:nth-child(4){ background-color: lightgrey; }
37
38 .flexbox > div:hover {
39     width: 200px; color: white; font-weight: bold; }
40 .flexbox > div:nth-child(1):hover { background-color: royalblue; }
41 .flexbox > div:nth-child(2):hover { background-color: crimson; }
42 .flexbox > div:nth-child(3):hover { background-color: crimson; }
43 .flexbox > div:nth-child(4):hover { background-color: darkgreen; }
44 p { height: 250px; overflow: hidden; font-family: "Rosario" }
45 </style>
```

**Fig. 5.16** | Flexible Box Layout Module. (Part 2 of 5.)



```
46  </head>
47  <body>
48      <div class = "flexbox">
49          <div><img src = "GPP.png" alt = "Good programming practice icon">
50              <p>Good Programming Practices call attention to techniques that
51                  will help you produce programs that are clearer, more
52                  understandable and more maintainable.</p></div>
53          <div><img src = "EPT.png" alt = "Error prevention tip icon">
54              <p>Error-Prevention Tips contain suggestions for exposing bugs
55                  and removing them from your programs; many describe aspects of
56                  programming that prevent bugs from getting into programs in
57                  the first place.</p></div>
58          <div><img src = "CPE.png" alt = "Common programming error icon">
59              <p>Common Programming Errors point out the errors that students
60                  tend to make frequently. These Common Programming Errors reduce
61                  the likelihood that you'll make the same mistakes.</p></div>
62          <div><img src = "SEO.png"><p>Software Engineering Observations
63                  highlight architectural and design issues that affect the
64                  construction of software systems, especially large-scale
65                  systems.</p></div>
66      </div>
67  </body>
68  </html>
```

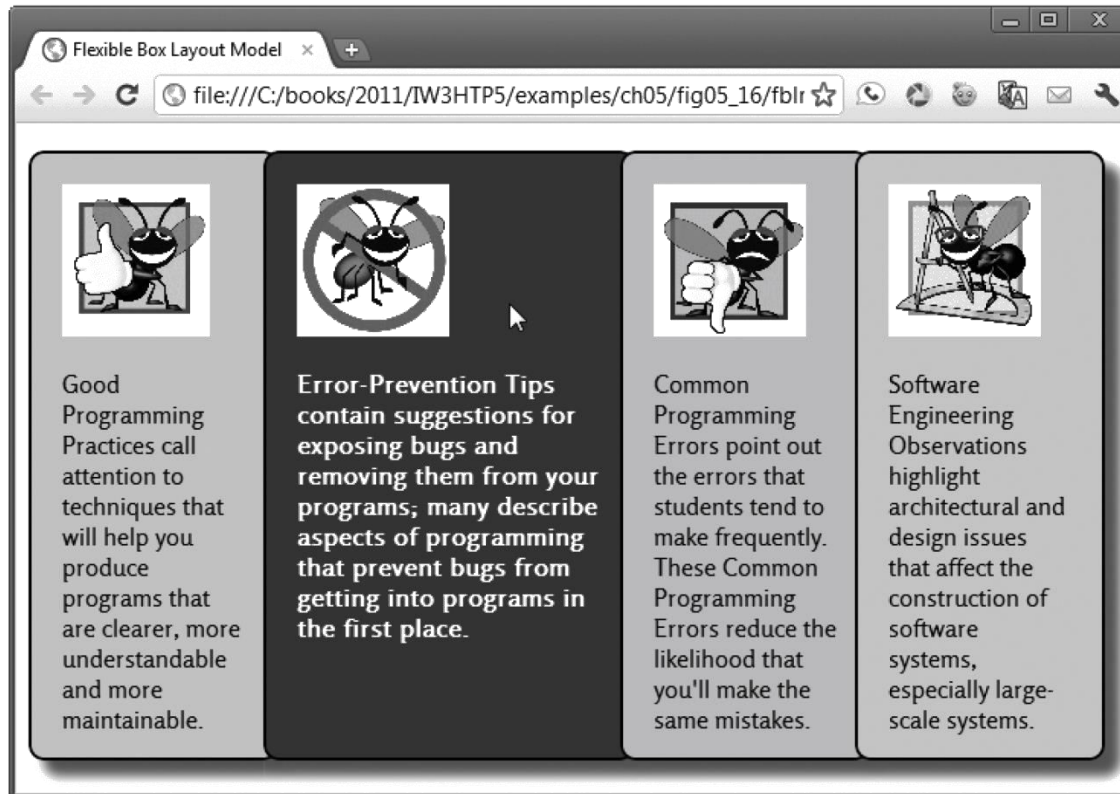
**Fig. 5.16** | Flexible Box Layout Module. (Part 3 of 5.)



**Fig. 5.16** | Flexible Box Layout Module. (Part 4 of 5.)



b) When the mouse hovers over `:nth-child(2)`, the flexbox expands, the background-color changes to Crimson, the overflow text is revealed and the text changes to a bold



**Fig. 5.16** | Flexible Box Layout Module. (Part 5 of 5.)



## 5.15 Flexible Box Layout Module and :nth-child Selectors (cont.)

- ▶ We define a `div` to which we apply the `flexbox` CSS class. That `div` contains four other `div`s.
- ▶ The `flexbox` class's `display` property is set to the new CSS3 value `box`.
- ▶ The `box-orient` property specifies the orientation of the box layout. The default value is `horizontal` (which we specified anyway). You can also use `vertical`.
- ▶ For the nested `div`s, we specify a one-second ease-out transition. This will take effect when these the `:hover` pseudo-class style is applied to one of these `div`s to expand it.





## 5.15 Flexible Box Layout Module and :nth-child Selectors (cont.)

### *:nth-child Selectors*

- ▶ In CSS3, you can use selectors to easily select elements to style based on their *attributes*.
- ▶ We use **:nth-child selectors** to select each of the four div elements in the flexbox div to style.
- ▶ `div:nth-child(1)` selects the div element that's the *first* child of its parent and applies the `background-color LightBlue`.
- ▶ Similarly, `div:nth-child(2)` selects the div element that's the *second* child of its parent, `div:nth-child(3)` selects the *third* child of its parent, and `div:nth-child(4)` selects the *fourth* child of its parent—each applies a specified `background-color`.



## 5.15 Flexible Box Layout Module and :nth-child Selectors (cont.)

- ▶ Next, we define styles that are applied to the nested `div` elements when the mouse hovers over them—the width (200px), color (white) and font-weight (bold).
- ▶ We use `:nth-child` selectors to specify a new background color for each nested `div`.
- ▶ Finally, we style the `p` element—the text within each `div`.
- ▶ In the output, notice that the text in the *second* child element (the Error-Prevention Tips), the overflow text is hidden. When the mouse hovers over the element, all of the text is revealed.





## 5.16 Multicolumn Layout

- ▶ CSS3 allows you to easily create **multicolumn layouts**.
- ▶ In Figure 5.17, we create a three-column layout by setting the **column-count property** to 3 and the **column-gap property** (the spacing between columns) to 30px.
- ▶ We then add a thin black line between each column using the **column-rule property**.
- ▶ When you run this example, try resizing your browser window. The width of the columns changes to fit the three-column layout in the browser.



```
1  <!DOCTYPE html>
2
3  <!-- Fig. 5.17: multicolumns.html -->
4  <!-- Multicolumn text in CSS3. -->
5  <html>
6      <head>
7          <meta charset = "utf-8">
8          <title>Multicolumns</title>
9          <style type = "text/css">
10              p
11              { margin:0.9em 0em; }
12              .multicolumns
13              {
14                  /* setting the number of columns to 3 */
15                  -webkit-column-count: 3;
16                  -moz-column-count: 3;
17                  -o-column-count: 3;
18                  column-count: 3;
19                  /* setting the space between columns to 30px */
20                  -webkit-column-gap: 30px;
21                  -moz-column-gap: 30px;
22                  -o-column-gap: 30px;
23                  column-gap: 30px;
```

**Fig. 5.17** | Multicolumn text in CSS3. (Part I of 5.)



```
24      /* adding a 1px black line between each column */
25      -webkit-column-rule: 1px outset black;
26      -moz-column-rule: 1px outset black;
27      -o-column-rule: 1px outset black;
28      column-rule: 1px outset black;
29  }
30  </style>
31  </head>
32  <body>
33    <header>
34      <h1>Computers, Hardware and Software</h1>
35    </header>
36    <div class = "multicolumns">
37      <p>A computer is a device that can perform computations and make
38        logical decisions phenomenally faster than human beings can.
39        Many of today's personal computers can perform billions of
40        calculations in one second—more than a human can perform
41        in a lifetime. Supercomputers are already performing thousands
42        of trillions (quadrillions) of instructions per second! To put
43        that in perspective, a quadrillion-instruction-per-second
44        computer can perform in one second more than 100,000
45        calculations for every person on the planet! And—these
46        "upper limits" are growing quickly!</p>
47      <p>Computers process data under the control of sets of
48        instructions called computer programs. These programs guide
```

**Fig. 5.17** | Multicolumn text in CSS3. (Part 2 of 5.)



the computer through orderly sets of actions specified by people called computer programmers. The programs that run on a computer are referred to as software. In this book, you'll learn today's key programming methodology that's enhancing programmer productivity, thereby reducing software-development costs&mdash;object-oriented programming.</p><p>A computer consists of various devices referred to as hardware (e.g., the keyboard, screen, mouse, hard disks, memory, DVDs and processing units). Computing costs are dropping dramatically, owing to rapid developments in hardware and software technologies. Computers that might have filled large rooms and cost millions of dollars decades ago are now inscribed on silicon chips smaller than a fingernail, costing perhaps a few dollars each. Ironically, silicon is one of the most abundant materials&mdash;it's an ingredient in common sand. Silicon-chip technology has made computing so economical that more than a billion general-purpose computers are in use worldwide, and this is expected to double in the next few years.</p><p>Computer chips (microprocessors) control countless devices. These embedded systems include anti-lock brakes in cars, navigation systems, smart home appliances, home security systems, cell phones and smartphones, robots, intelligent traffic intersections, collision avoidance systems, video game controllers and more. The vast majority of the microprocessors

**Fig. 5.17** | Multicolumn text in CSS3. (Part 3 of 5.)



```
74         produced each year are embedded in devices other than general-
75         purpose computers.</p>
76     <footer>
77         <em>&copy; 2012 by Pearson Education, Inc.
78         All Rights Reserved.</em>
79     </footer>
80 </div>
81 </body>
82 </html>
```

**Fig. 5.17** | Multicolumn text in CSS3. (Part 4 of 5.)



Fig. 5.17 | Multicolumn text in CSS3. (Part 5 of 5.)

## 5.17 Media Queries

- ▶ With CSS3 *media queries* you can determine the finer attributes of the media on which the user is viewing the page, such as the *length* and *width* of the viewing area on the screen, to better customize your presentation.
- ▶ In Fig. 5.18, we modify the multicolumn example to alter the numbers of columns and the rules between columns based on the screen size of the device on which the page is viewed.





```
1  <!DOCTYPE html>
2
3  <!-- Fig. 5.18: mediaqueries.html -->
4  <!-- Using media queries to reformat a page based on the device width. -->
5  <html>
6      <head>
7          <meta charset = "utf-8">
8          <title>Media Queries</title>
9          <style type = "text/css">
10              p
11              { margin: 0.9em 0em; }
12              /* styles for smartphones with screen widths 480px or smaller */
13              @media handheld and (max-width: 480px),
14                  screen and (max-device-width: 480px),
15                  screen and (max-width: 480px)
16              {
17                  div {
18                      -webkit-column-count: 1;
19                      column-count: 1; }
20              }
```

**Fig. 5.18** | Using media queries to reformat a page based on the device width. (Part I of 8.)





```
21  /* styles for devices with screen widths of 481px to 1024px */
22  @media only screen and (min-width: 481px) and
23  (max-width: 1024px)
24  {
25      div {
26          -webkit-column-count: 2;
27          column-count: 2;
28          -webkit-column-gap: 30px;
29          column-gap: 30px;
30          -webkit-column-rule: 1px outset black;
31          column-rule: 1px outset black; }
32  }
33  /* styles for devices with screen widths of 1025px or greater */
34  @media only screen and (min-width: 1025px)
35  {
36      div {
37          -webkit-column-count: 3;
38          column-count: 3;
39          -webkit-column-gap: 30px;
40          column-gap: 30px;
41          -webkit-column-rule: 1px outset black;
42          column-rule: 1px outset black; }
43  }
```

**Fig. 5.18** | Using media queries to reformat a page based on the device width. (Part 2 of 8.)



```
44     </style>
45 </head>
46 <body>
47     <header>
48         <h1>Computers, Hardware and Software</h1>
49     </header>
50     <div>
51         <p>A computer is a device that can perform computations and make
52             logical decisions phenomenally faster than human beings can.
53             Many of today's personal computers can perform billions of
54             calculations in one second&mdash;more than a human can perform
55             in a lifetime. Supercomputers are already performing thousands
56             of trillions (quadrillions) of instructions per second! To put
57             that in perspective, a quadrillion-instruction-per-second
58             computer can perform in one second more than 100,000
59             calculations for every person on the planet! And&mdash;these
60             "upper limits" are growing quickly!</p>
61         <p>Computers process data under the control of sets of
62             instructions called computer programs. These programs guide
63             the computer through orderly sets of actions specified by
64             people called computer programmers. The programs that run on a
65             computer are referred to as software. In this book, you'll
66             learn today's key programming methodology that's enhancing
```

**Fig. 5.18** | Using media queries to reformat a page based on the device width. (Part 3 of 8.)



```
67      programmer productivity, thereby reducing software-development
68      costs&mdash;object-oriented programming.</p>
69      <p>A computer consists of various devices referred to as hardware
70      (e.g., the keyboard, screen, mouse, hard disks, memory, DVDs
71      and processing units). Computing costs are dropping
72      dramatically, owing to rapid developments in hardware and
73      software technologies. Computers that might have filled large
74      rooms and cost millions of dollars decades ago are now
75      inscribed on silicon chips smaller than a fingernail, costing
76      perhaps a few dollars each. Ironically, silicon is one of the
77      most abundant materials&mdash;it's an ingredient in common
78      sand. Silicon-chip technology has made computing so economical
79      that more than a billion general-purpose computers are in use
80      worldwide, and this is expected to double in the next few
81      years.</p>
82      <p>Computer chips (microprocessors) control countless devices.
83      These embedded systems include anti-lock brakes in cars,
84      navigation systems, smart home appliances, home security
85      systems, cell phones and smartphones, robots, intelligent
86      traffic intersections, collision avoidance systems, video game
87      controllers and more. The vast majority of the microprocessors
88      produced each year are embedded in devices other than general-
89      purpose computers.</p>
```

**Fig. 5.18** | Using media queries to reformat a page based on the device width. (Part 4 of 8.)

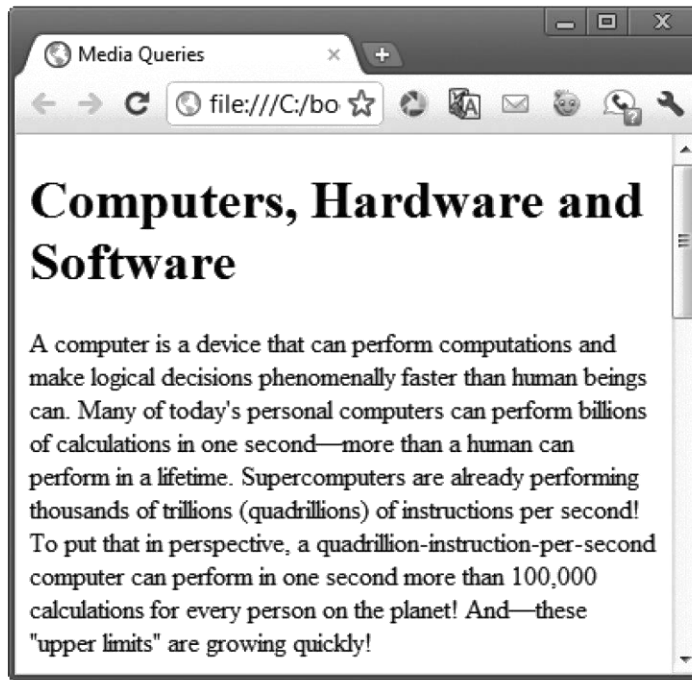


```
90         <footer>
91             <em>&copy; 2012 by Pearson Education, Inc.
92                 All Rights Reserved.</em>
93         </footer>
94     </div>
95 </body>
96 </html>
```

**Fig. 5.18** | Using media queries to reformat a page based on the device width. (Part 5 of 8.)



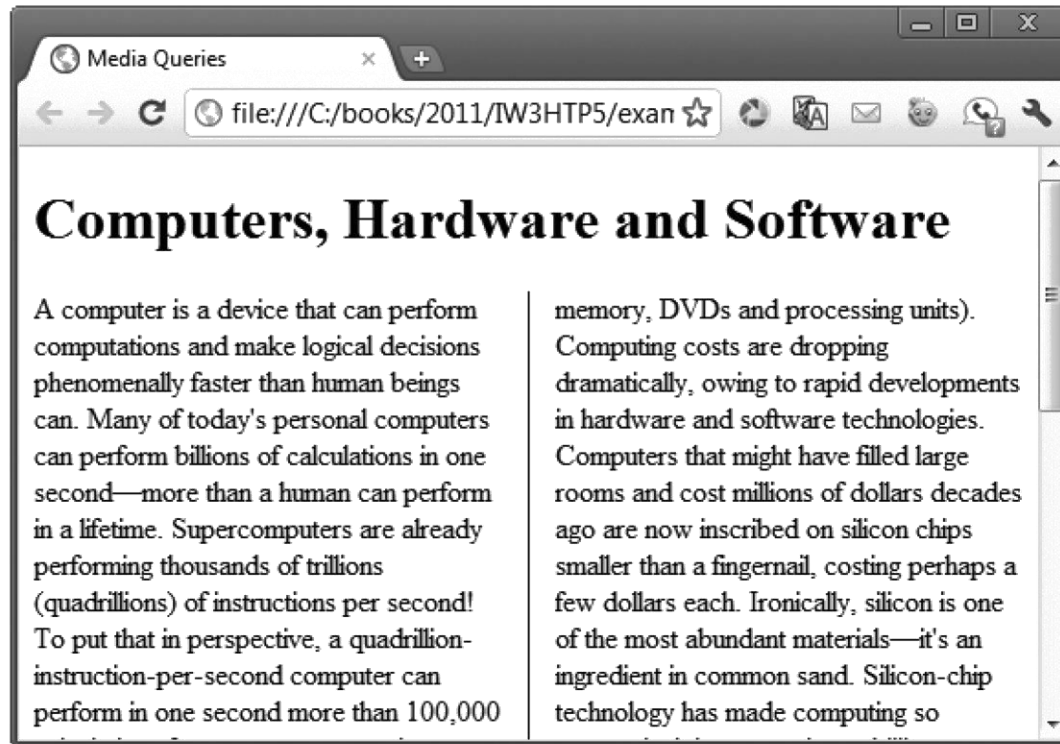
a) Styles for smartphones  
with screen widths  
480px or smaller



**Fig. 5.18** | Using media queries to reformat a page based on the device width. (Part 6 of 8.)



b) Styles for devices with screen widths of 481px to 1024px

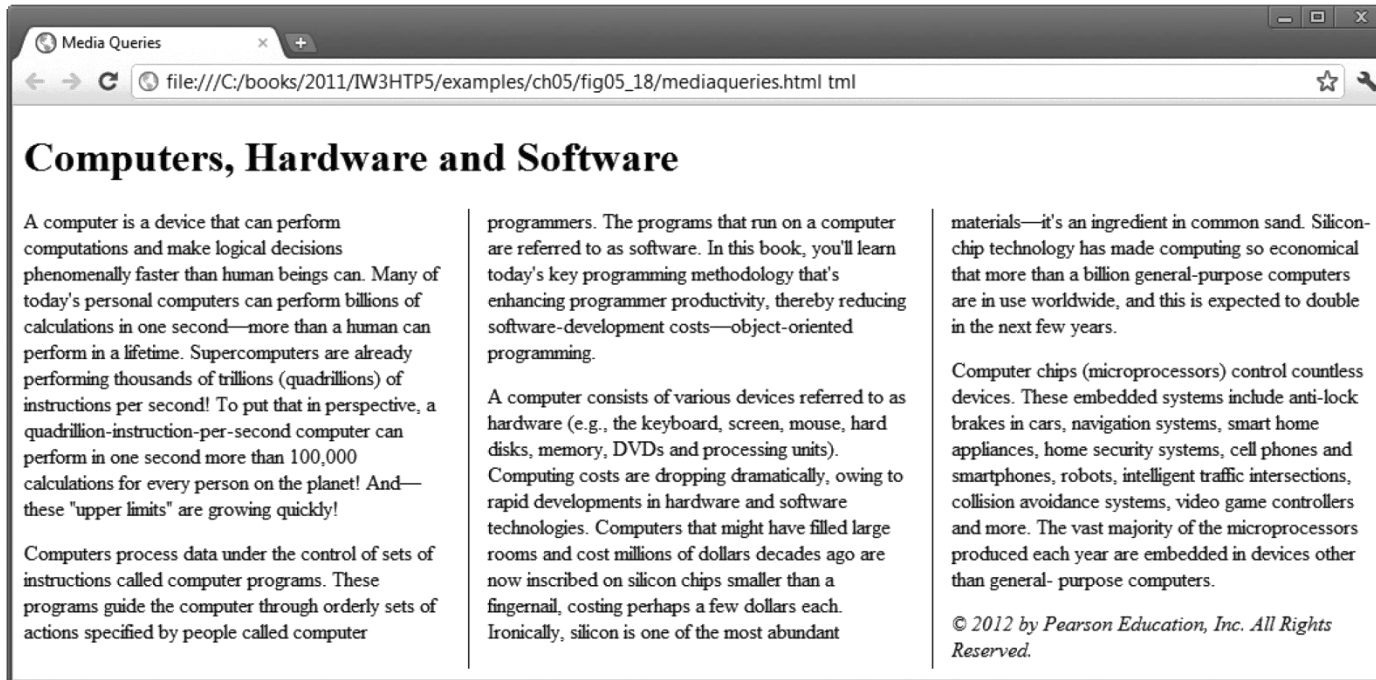


**Fig. 5.18** | Using media queries to reformat a page based on the device width. (Part 7 of 8.)





c) Styles for devices with screen widths of 1024px or greater



**Fig. 5.18** | Using media queries to reformat a page based on the device width. (Part 8 of 8.)



## 5.17 Media Queries (cont.)

### *@media-Rule*

- ▶ The **@media rule** is used to determine the type *and size* of device on which the page is rendered.
- ▶ When the browser looks at the rule, the result is either *true* or *false*. The rule's styles are applied only if the result is true.
- ▶ First, we use the @media rule to determine whether the page is being rendered on a handheld device (e.g., a smartphone) with a max-width of 480px, or a device with a screen that has a max-device-width of 480px, or on a screen having max-width of 480px.
- ▶ If this is *true*, we set the column-count to 1—the page will be rendered in a single column on handheld devices such as an iPhone or in browser windows that have been resized to 480px or less.





## 5.17 Media Queries (cont.)

- ▶ If the condition of the first `@media` rule is *false*, a second `@media` rule determines whether the page is being rendered on devices with a min-width of 481px and a max-width of 1024px.
- ▶ If this condition is *true*, we set the `column-count` to 2, the `column-gap` (the space between columns) to 30px and the `column-rule` (the vertical line between the columns) to 1px outset black.



## 5.17 Media Queries (cont.)

- ▶ If the conditions in the first two `@media` rules are *false*, we use a third `@media` rule to determine whether the page is being rendered on devices with a `min-width` of 1025px.
- ▶ If the condition of this rule is *true*, we set the `column-count` to 3, the `column-gap` to 30px (lines 39–40) and the `column-rule` to 1px `outset black`.