CREATING WEB GRAPHICS

PART IV

IN THIS PART

Chapter 18
Web Graphics Basics

Chapter 19
Lean and Mean Web Graphics

CHAPTER 18

WEB GRAPHICS BASICS

Unless you plan on publishing text-only sites, chances are you'll need to know how to create web graphics. For many of you, that might mean getting your hands on an image-editing program for the first time and acquiring some basic graphics production skills. If you are a seasoned designer accustomed to print, you may need to adapt your style and process to make graphics that are appropriate for web delivery.

This chapter covers the fundamentals of web graphics production, beginning with some options for finding and creating images. From there, it introduces the file formats available for web graphics and helps you decide which to use. You'll also learn the basics of image resolution, resizing, and transparency.

As always, there are step-by-step exercises along the way. I want to point out, however, that I write with the assumption that you have some familiarity with an image-editing program. I use Adobe Photoshop (the industry standard) in the examples and exercises, but you can follow along with most steps using other tools listed in this chapter. If you are starting at square one, I recommend spending time with the manual or third-party books about your graphics software.

IN THIS CHAPTER

Where to get images

An overview of GIF, JPEG, and PNG formats

Image size and resolution

Resizing images in Photoshop

Binary and alpha transparency

Preventing "halos"

Image Sources

You have to *have* an image to save an image, so before we jump into the nitty-gritty of file formats, let's look at some ways to get images in the first place. There are many options: from scanning, shooting, or illustrating them yourself, to using available stock photos and clip art, or just hiring someone to create images for you.

Creating your own images

In most cases, the most cost-effective way to generate images for your site is to make your own from scratch. The added bonus is that you know you have full rights to use the images (we'll address copyright again in a moment). Designers may generate imagery with scanners, digital cameras, or using an illustration or photo editing program.

Scanning Tips

If you are scanning images for use on the Web, these tips will help you create images with better quality.

- Because it is easier to maintain image quality when resizing smaller than resizing larger, it is usually a good idea to scan the image a bit larger than you actually need. This gives you more flexibility for resizing later. Don't go overboard, however, because if you have to reduce its size too much, you'll get a blurry result. Issues of image size are discussed in more detail in the Image Size and Resolution section later in this chapter.
- Scan black and white images in grayscale (8-bit) mode, not in black-and-white (1-bit or bitmap) mode. This enables you to make adjustments in the midtone areas once you have sized the image to its final dimensions and resolution. If you really want only black and white pixels, convert the image as the last step.
- If you are scanning an image that has been printed, you will need to eliminate the dot pattern that results from the printing process. The best way to do this is to apply a slight blur to the image (in Photoshop, use the Gaussian Blur filter), resize the image slightly smaller, then apply a sharpening filter. This will eliminate those pesky dots. Make sure you have the rights to use the printed image, too, of course.

Scanning

Scanning is a great way to collect source material. You can scan almost anything, from flat art to 3-D objects. Beware, however, the temptation to scan and use found images. Keep in mind that most images you find are probably copyright-protected and may not be used without permission, even if you modify them considerably. See the Scanning Tips sidebar for some how-to information.

Digital cameras

You can capture the world around you and pipe it right into an image-editing program with a digital camera. Because the Web is a low-resolution environment, there is no need to invest in high-end equipment. Depending on the type of imagery, you may get the quality you need with a standard consumer digital camera.

Electronic illustration

If you have illustration skills, you can make your own graphics in a drawing or photo-editing application. The sidebar, Tools of the Trade, introduces some of the most popular graphics programs available today. Every designer has her own favorite tools and techniques. I sometimes create my logos, illustrations, and type effects in Adobe Illustrator, then bring the image into Photoshop to create the web-ready version. However, for most image types, Photoshop has all I need, so it is where I spend the majority of my design time.

Stock photography and illustrations

If you aren't confident in your design skills, or you just want a head-start with some fresh imagery, there are plenty of collections of ready-made photos, illustrations, buttons, animations, and textures available for sale or for free. Stock photos and illustrations generally fall into two broad categories: rights-managed and royalty-free.

Rights-managed means that the copyright holder (or a company representing them) controls who may reproduce the image. In order to use a rights-managed image, you must obtain a license to reproduce it for a particular use and for a particular period of time. One of the advantages to licensing images is that you can arrange to have exclusive rights to an image within a particular medium (such as the Web) or a particular business sector (such as the health care industry or banking). On the downside, rights-managed images get quite pricey. Depending on the breadth and length of the license, the price tag may be many thousands of dollars for a single image. If you don't want exclusive rights and you want to use the image only on the Web, the cost is more likely to be a few hundred dollars, depending on the source.

If that still sounds too steep, consider using royalty-free artwork for which you don't need to pay a licensing fee. Royalty-free artwork is available for a one-time fee that gives you unlimited use of the image, but you have no control over who else is using the image. Royalty-free images are available from the top-notch professional stock houses such as Getty Images for as little as 30 bucks an image, and from other sites for less (even free).

Following is a list of a few of my favorite resources for finding high-quality stock photography and illustrations, but it is by no means exhaustive. A web search will turn up plenty more sites with images for sale.

IStockPhoto (*www.istockphoto.com*)

If you're on a tight budget (and even if you're not), there's no better place to find images than IStockPhoto. The photo collections are generated by ordinary people who contribute to the site and all the images are royalty-free. Prices start at just a buck a pop! It's my personal favorite image resource.

Getty Images (*www.gettyimages.com*)

Getty is the largest stock image house, having acquired most of its competitors over recent years. It offers both rights-managed and royalty-free photographs and illustrations at a variety of price ranges.

Jupiter Images (*www.jupiterimages.com*) and PictureQuest (*www.picturequest.com*)

Jupiter Images and its PictureQuest division offer high quality rights-managed and royalty-free photo collections.

JuicyStock.com (*www.juicystock.com*)

This is a great resource for affordable, royalty-free photographs of people and places from around the globe.

Veer (*www.veer.com*)

I like Veer because it tends to be a little more hip and edgy than its competitors. It offers both rights-managed and royalty-free photographs, illustrations, fonts, and stock video.

Clip art

Clip art refers to collections of royalty-free illustrations, animations, buttons, and other doo-dads that you can copy and paste into a wide range of uses. Nowadays, there are huge clip-art collections available specifically for web use. A trip to your local software retail store or a browse through the pages of a software catalog will no doubt turn up royalty-free image collections, some boasting 100,000 pieces of art. Clip art collections may also come bundled with your graphics software.

There are a number of resources online, and the good news is that some of these sites give graphics away for free, although you may have to suffer through a barrage of pop-up ads. Others charge a membership fee, anywhere from $10 to $200 a year. The drawback is that a lot of them are poor quality

Tools of the Trade

What follows is a brief introduction to the most popular graphics tools among professional graphic designers. There are many other tools out there that will crank out a GIF or a JPEG; if you've found one that works for you, that's fine.

Adobe Photoshop

Without a doubt, the industry standard for creating graphics is Photoshop, in version CS3 as of this writing. It includes many features specifically for creating web graphics. If you are interested in making web sites professionally, I recommend getting up to speed with Photoshop right away. Download a trial copy of this and all Adobe software at *adobe.com*.

Adobe Macromedia Fireworks

This is one of the first graphics programs designed from the ground up to address the special requirements of web graphics. It has tools for creating both vector (line-based) and raster (pixel-based) images. It features side-by-side previews of output settings, animation, great file optimization, and more. After acquiring Fireworks from Macromedia, Adobe subsequently retired ImageReady, Photoshop's web graphic sidekick.

Adobe Illustrator

Illustrator is the standard drawing program in both the print and web design industries. It integrates nicely with Photoshop.

Corel Paint Shop Pro Photo

If you use Windows and are on a budget, Paint Shop Pro Photo offers similar functionality to Photoshop at a much lower price. You can download a trial version at *corel.com*.

or kind of hokey (but then, "hokey" is in the eye of the beholder). The following are just a few sites to get you started.

Clipart.com *(www.clipart.com)*

This service charges a membership fee, but is well-organized and tends to provide higher quality artwork than the free sites.

Original Free Clip Art *(www.free-clip-art.net)*

As the name says, they've got free clip art. This site has been around a while, unlike many others that come and go.

#1 Free Clip Art *(www.1clipart.com)*

Another no-frills free clip art site.

Hire a designer

Finding and creating images takes time and particular talents. If you have more money than either of those things, consider hiring a graphic designer to generate the imagery for your site for you. If you start with a good set of original photos or illustrations, you can still use the skills you learn in this book to produce web versions of the images as you need them.

Meet the Formats

Once you've got your hands on some images, you need to get them into a format that will work on a web page. There are dozens of graphics file formats out in the world. For example, if you use Windows, you may be familiar with BMP graphics, or if you are a print designer, you may commonly use images in TIFF and EPS format. On the Web, you have only three choices: GIF (pronounced "jif"), JPEG ("jay-peg"), and PNG ("ping"). If this sounds like alphabet soup to you, don't worry. By the end of this section, you'll know a GIF from a JPEG and when to use each one. Here is a quick rundown:

GIF images are most appropriate for images with flat colors and hard edges or when transparency or animation is required.

JPEGs work best for photographs or images with smooth color blends.

PNG files can contain any image type and are often a good substitute for the GIF format. They can also contain images with transparent or partially transparent areas.

These formats have emerged as the standards because they are platform-independent (meaning they work on Windows, Macs, and Unix operating systems) and they condense well to be easily ported over a network. The remainder of this section tackles terminology and digs deeper into the features and functions of each format. Understanding the technical details will help you make the highest-quality web graphics at the smallest sizes.

Name Files Properly

Be sure to use the proper file extensions for your image files. GIF files must be named with the ***.gif*** suffix. JPEG files must have ***.jpg*** (or the less common ***.jpeg***) as a suffix. PNG files must end in ***.png***. Browsers look at the suffix to determine how to handle various media types, so it is best to stick with the standardized suffixes for image file formats.

The ubiquitous GIF

The GIF (Graphic Interchange Format) file is the habitual favorite for web pages. Although not designed specifically for the Web, it was the first format was quickly adopted for its versatility, small file sizes, and cross-platform compatibility. GIF also offers transparency and the ability to contain simple animations.

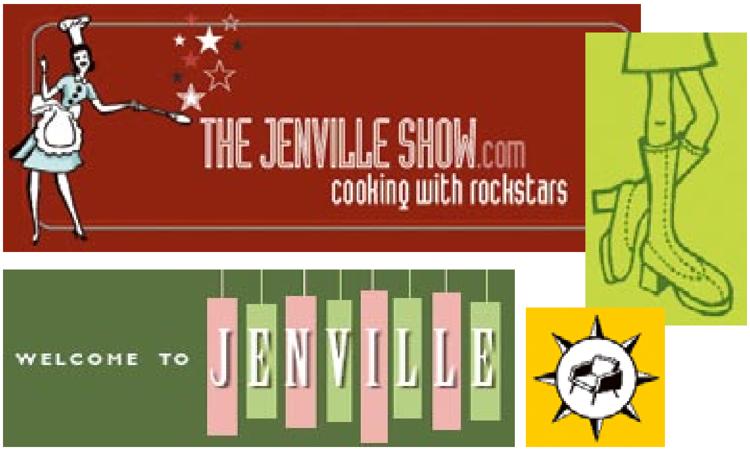


Figure 18-1. The GIF format is great for graphical images comprised mainly of flat colors and hard edges.

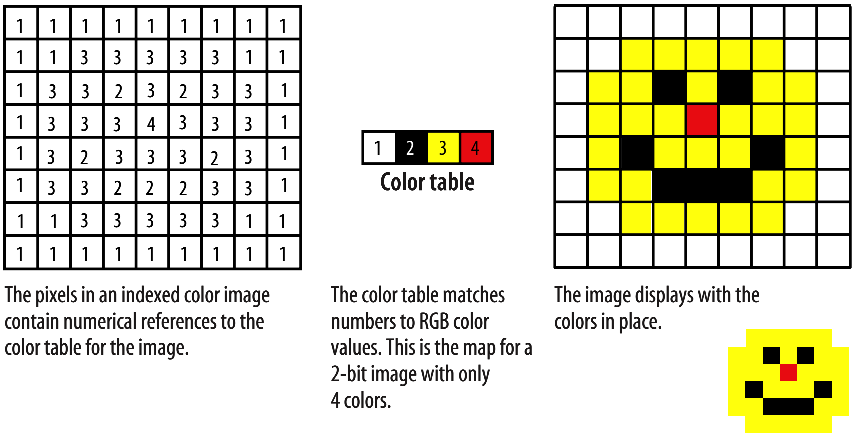
Because the GIF compression scheme excels at compressing flat colors, it is the best file format to use for logos, line art, graphics containing text, icons, etc. (Figure 18-1). You can save photographs or textured images as GIFs, too, but they won't be saved as efficiently, resulting in larger file sizes. These are best saved as JPEGs, which I'll get to next. However, GIF does work well for images with a combination of small amounts of photographic imagery and large flat areas of color.

To make really great GIFs, it's important to be familiar with how they work under the hood and what they can do.

8-bit, indexed color

In technical terms, GIF files are indexed color images that contain 8-bit color information (they can also be saved at lower bit depths). Let's decipher that statement a term at a time. 8-bit means GIFs can contain up to 256 colors—the maximum number that 8 bits of information can define (2^8=256). Lower bit depths result in fewer colors and also reduce file size.

Indexed color means that the set of colors in the image, its palette, is stored in a color table (also called a color map). Each pixel in the image contains a numeric reference (or "index") to a position in the color table. This should be made clear with a simple demonstration. Figure 18-2 shows how a 2-bit (4-color) indexed color image references its color table for display. For 8-bit images, there are 256 slots in the color table.



1	1	1	1	1	1	1	1	1
1	1	3	3	3	3	3	1	1
1	3	3	2	3	2	3	3	1
1	3	3	3	4	3	3	3	1
1	3	2	3	3	3	2	3	1
1	3	3	2	2	2	3	3	1
1	1	3	3	3	3	3	1	1
1	1	1	1	1	1	1	1	1

The pixels in an indexed color image contain numerical references to the color table for the image.

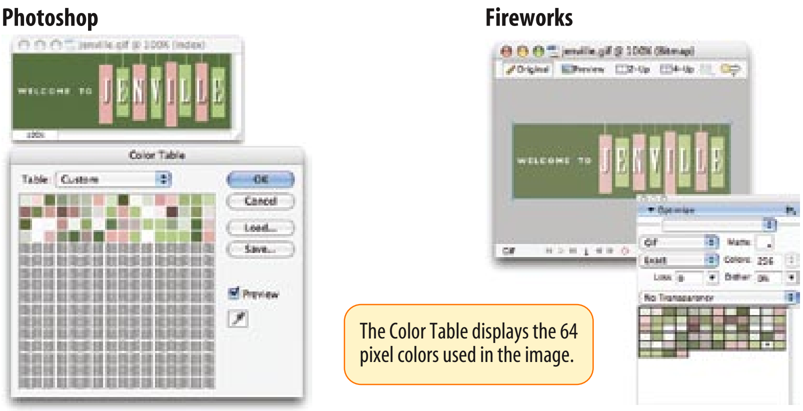
1	2	3	4

Color table

The color table matches numbers to RGB color values. This is the map for a 2-bit image with only 4 colors.

The image displays with the colors in place.

Figure 18-2. A 2-bit image and its color table.



The Color Table displays the 64 pixel colors used in the image.

Figure 18-3. A view of the Color Table in Photoshop and Fireworks.

When you open an existing GIF in Photoshop, you can view (and even edit) its color table by selecting Image → Mode → Color Table (Figure 18-3). You also get a preview of the color table for an image when you use Photoshop's Save for Web & Devices to export an image in GIF format, as we'll be doing later in this chapter. In Fireworks (and the discontinued ImageReady, not shown), the color table is displayed in the Optimize panel.

Most source images (scans, illustrations, photos, etc.) start out in RGB format, so they need to be converted to indexed color in order to be saved as a GIF. When an image goes from RGB to indexed mode, the colors in the image are reduced to a palette of 256 colors or fewer. In Photoshop, Fireworks, and (now retired) ImageReady, the conversion takes place when you save or export the GIF, although you can see a preview of the final image and its color table. Other image editing programs may require you to convert the image to indexed color manually first, then export the GIF as a second step.

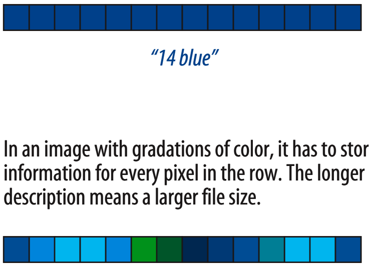
In either case, you will be asked to select a palette for the indexed color image. The sidebar, Common Color Palettes, outlines the various palette options available in the most popular image tools. It is recommended that you use Selective or Perceptual in Photoshop, Adaptive in Fireworks, and Optimized Median Cut in Paint Shop Pro for the best results for most image types.

GIF compression

GIF compression is "lossless," which means that no image information is sacrificed in order to compress the indexed image (although some image information may be lost when the RGB image is converted to a limited color palette). Second, it uses a compression scheme (called "LZW" for Lempel-Ziv-Welch) that takes advantage of repetition in data. When it encounters a string of pixels of identical color, it can compress that into one data description. This is why images with large areas of flat color condense better than images with textures.

To use an extremely simplified example, when the compression scheme encounters a row of 14 identical blue pixels, it makes up a shorthand notation that means "14 blue pixels." The next time it encounters 14 blue pixels, it uses only the code shorthand (Figure 18-4). By contrast, when it encounters a row that has a gentle gradation from blue to aqua and green, it needs to store a description for every pixel along the way, requiring more data. What actually happens in technical terms is more complicated, of course, but this example is a good mental model to keep in mind when designing GIF images for maximum compression.

GIF compression stores repetitive pixel colors as a single description.



In an image with gradations of color, it has to store information for every pixel in the row. The longer description means a larger file size.

"1 blue, 1 aqua, 2 light aqua..." (and so on)

Figure 18-4. A simplified demonstration of LZW compression used by GIF images.

Transparency

You can make parts of GIF images transparent so that the background image or color shows through. Although all bitmapped graphics are rectangular by nature, with transparency, you can create the illusion that your image has a more interesting shape (Figure 18-5). GIF transparency is discussed in detail later in this chapter.

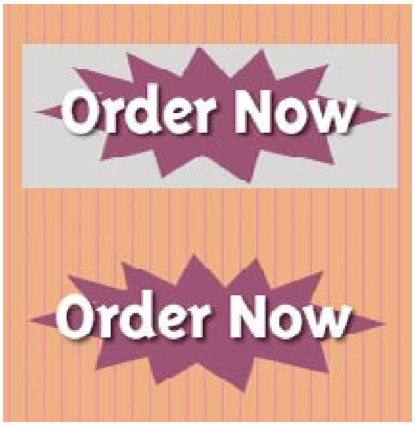


Figure 18-5. Transparency allows the striped background to show through the image on the bottom.

Common Color Palettes

All 8-bit indexed color images use palettes to define the colors in the image, and there are several standard palettes to choose from. Some are methods for producing a custom palette based on the colors in the image. Others apply a preexisting palette to the image.

Exact. Creates a custom palette out of the actual colors in the image if the image already contains fewer than 256 colors.

Adaptive. Creates a custom palette using the most frequently used pixel colors in the image. It allows for color-depth reduction while preserving the original character of the image.

Perceptual (Photoshop/ImageReady only). Creates a custom color table by giving priority to colors for which the human eye has greater sensitivity. Unlike Adaptive, it is based on algorithms, not just a pixel count. It generally results in images with better color integrity than Adaptive palette images.

Selective (Photoshop/ImageReady only). This is similar to Perceptual, but it gives preference to areas of broad color and the preservation of web-safe colors.

Web, Restrictive, or Web216. Creates a palette of colors exclusively from the web-safe palette (see Chapter 13, Colors and Backgrounds for more information on the web palette). It is no longer necessary to use colors from the web palette, so this is not recommended.

Web Adaptive (Fireworks only). This adaptive palette converts colors to the nearest web palette color. Because the web palette is obsolete and limited, this is no longer recommended.

Uniform. Creates a palette that contains an evenly stepped sampling of colors from the RGB spectrum.

Custom. This allows you to load a palette that was previously saved and apply it to the current image. Otherwise, it preserves the current colors in the palette.

System (Windows or Macintosh). Uses the colors in the specified system's default palette.

Optimized Median Cut (Paint Shop Pro only). This reduces the image to a few colors using something similar to an Adaptive palette.

Optimized Octree (Paint Shop Pro only). Use this palette if the original image has just a few colors and you want to keep those exact colors.

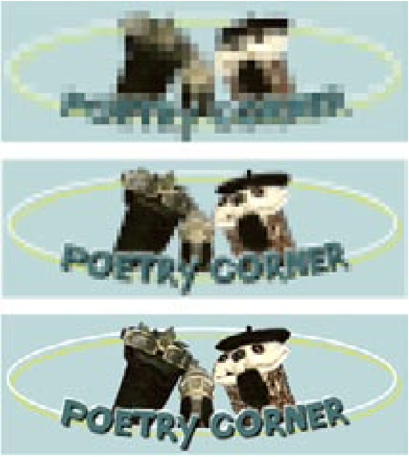


Figure 18-6. Interlaced GIFs display in a series of passes, each clearer than the pass before.

Interlacing

Interlacing is an effect you can apply to a GIF that makes the image display in a series of passes. Each pass is clearer than the pass before until the image is fully rendered in the browser window (Figure 18-6). Without interlacing, some browsers may wait until the entire image is downloaded before displaying the image. Others may display the image a few rows at a time, from top to bottom, until the entire picture is complete.

Over a fast connection, these effects (interlacing or image delays) may not even be perceptible. However, over slow modem connections, interlacing large images may be a way to provide a hint of the image to come while the entire image downloads.

Whether you interlace or not is your design decision. I never do, but if you have an especially large image and an audience with a significant percentage of dial-up connections, interlacing may be worthwhile.

Animation

Another feature built into the GIF file format is the ability to display simple animations (Figure 18-7). Many of the spinning, blinking, fading, or otherwise moving ad banners you see are animated GIFs (although Flash movies have become increasingly popular for web advertising).

FURTHER READING

Animated GIFs

With so much to say about Cascading Style Sheets, I ran out of room in this edition for a chapter on animated GIFs. The good news is that you can download a PDF of the *Animated GIFs* chapter from the second edition of *Learning Web Design* at *www.learningwebdesign.com*. The chapter includes detailed explanations of the animation settings and step-by-step instructions for how to create animations.

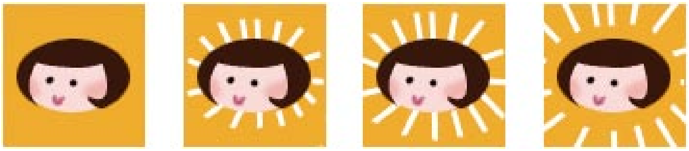


Figure 18-7. All the frames of this simple animation are contained within one GIF file.

Animated GIFs contain a number of animation frames, which are separate images that, when viewed together quickly, give the illusion of motion or change over time. All of the frame images are stored within a single GIF file, along with settings that describe how they should be played back in the browser window. Settings include whether and how many times the sequence repeats, how long each frame stays visible (frame delay), the manner in which one frame replaces another (disposal method), whether the image is transparent, and whether it is interlaced.

Adobe Photoshop CS3, Fireworks, and the discontinued ImageReady have interfaces for creating animated GIFs. Another highly recommended tool is GIFmation by BoxTop Software, available at *www.boxtopsoft.com*.

The photogenic JPEG

The second most popular graphics format on the Web is JPEG, which stands for Joint Photographic Experts Group, the standards body that created it.

Unlike GIFs, JPEGs use a compression scheme that loves gradient and blended colors, but doesn't work especially well on flat colors or hard edges. JPEG's full-color capacity and compression scheme make it the ideal choice for photographic images (Figure 18-8).

Figure 18-8. The JPEG format is ideal for photographs (color or grayscale) or any image with subtle color gradations.

24-bit Truecolor images

JPEGs don't use color palettes like GIFs. Instead, they are 24-bit images, capable of displaying colors from the millions of colors in the RGB color space (also referred to as the Truecolor space, see note). This is one aspect that makes them ideal for photographs—they have all the colors you'll ever need. With JPEGs, you don't have to worry about limiting yourself to 256 colors the way you do with GIFs. JPEGs are much more straightforward.

NOTE

RGB color is explained in Chapter 14, Colors and Backgrounds.

Lossy compression

The JPEG compression scheme is lossy, which means that some of the image information is thrown out in the compression process. Fortunately, this loss is not discernible for most images at most compression levels. When an image is compressed with high levels of JPEG compression, you begin to see color blotches and squares (usually referred to as artifacts) that result from the way the compression scheme samples the image (Figure 18-9).

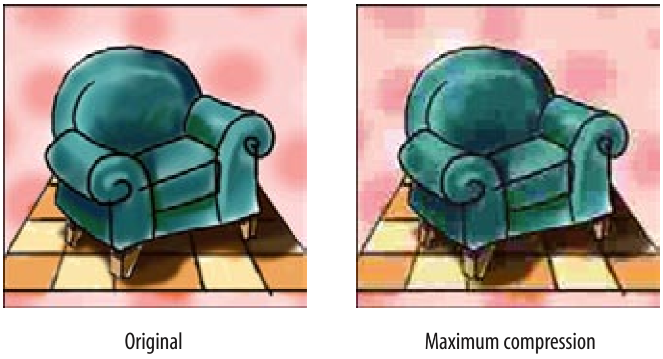


Figure 18-9. JPEG compression discards image detail to achieve smaller file sizes. At high compression rates, image quality suffers, as shown in the image on the right.

You can control how aggressively you want the image to be compressed. This involves a trade-off between file size and image quality. The more you compress the image (for a smaller file size), the more the image quality suffers. Conversely, when you maximize quality, you also end up with larger files. The best compression level is based on the particular image and your objectives for the site. Compression strategies are discussed in more detail in Chapter 19, Lean and Mean Web Graphics.

Progressive JPEGs

Progressive JPEGs display in a series of passes (like interlaced GIFs), starting with a low-resolution version that gets clearer with each pass as shown in Figure 18-10. In some graphics programs, you can specify the number of passes it takes to fill in the final image (3, 4, or 5).

WARNING

Cumulative Image Loss

Be aware that once image quality is lost in JPEG compression, you can never get it back again. For this reason, you should avoid resaving a JPEG as a JPEG. You lose image quality every time.

It is better to hang onto the original image and make JPEG copies as needed. That way, if you need to make a change to the JPEG version, you can go back to the original and do a fresh save or export. Fortunately, Photoshop's Save for Web & Devices feature does exactly that. Fireworks and ImageReady also preserve the originals and let you save or export copies.

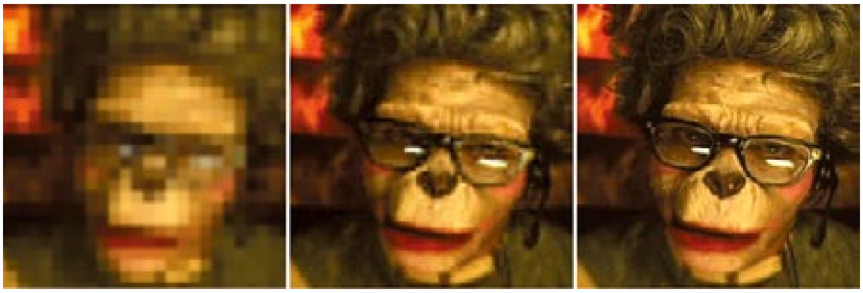


Photo courtesy of Liam Lynch

Figure 18-10. Progressive JPEGs render in a series of passes.

The advantage to using progressive JPEGs is that viewers can get an idea of the image before it downloads completely. Also, making a JPEG progressive usually reduces its file size slightly. The disadvantage is that they take more processing power and can slow down final display.

Decompression

JPEGs need to be decompressed before they can be displayed; therefore, it takes a browser longer to decode and assemble a JPEG than a GIF of the same file size. It's usually not a perceptible difference, however, so this is not a reason to avoid the JPEG format. It's just something to know.

The amazing PNG

The last graphic format to join the web graphics roster is the versatile PNG (Portable Network Graphic). Despite getting off to a slow start, PNGs are now supported by all browsers in current use. In addition, image-editing tools are now capable of generating PNGs that are as small and full-featured as they ought to be. Thanks to better support across the board, PNGs are finally enjoying the mainstream popularity they deserve.

PNGs offer an impressive lineup of features:

- The ability to contain 8-bit indexed, 24-bit RGB, 16-bit grayscale, and even 48-bit color images
- A lossless compression scheme
- Simple on/off transparency (like GIF) or multiple levels of transparency
- Progressive display (similar to GIF interlacing)
- Gamma adjustment information
- Embedded text for attaching information about the author, copyright, and so on

This section takes a closer look at each of these features and helps you decide when the PNG format is the best choice for your image.

Multiple image formats

The PNG format was designed to replace GIF for online purposes and TIFF for image storage and printing. A PNG can be used to save many image types: 8-bit indexed color, 24- and 48-bit RGB color, and 16-bit grayscale.

8-bit indexed color images

Like GIFs, PNGs can store 8-bit indexed images with a maximum of 256 colors. They may be saved at 1-, 2-, and 4-bit depths as well. Indexed color PNGs are generally referred to as PNG-8.

RGB/Truecolor (24- and 48-bit)

In PNGs, each channel (red, green, and blue) can be defined by 8- or 16-bit information, resulting in 24- or 48-bit RGB images, respectively. In graphics programs, 24-bit RGB PNGs are identified as PNG-24. It should be noted that 48-bit images are useless for the Web, and even 24-bit images should be used with care. JPEG offers smaller file sizes with acceptable image quality for RGB images.

Grayscale

PNGs can also support 16-bit grayscale images—that's as many as 65,536 shades of gray (216), enabling black-and-white photographs and illustrations to be stored with enormous subtlety of detail, although they are not appropriate for the Web.

Transparency

Like GIFs, PNGs can contain transparent areas that let the background image or color show through. The killer feature that PNG has over GIF, however, is the ability to contain multiple levels of transparency, commonly referred to as alpha-channel (or just alpha) transparency.

PNGs in Motion

One of the only features missing in PNG is the ability to store multiple images for animation. The first effort to add motion to PNGs was the MNG format (Multiple-image Network Graphic). It gained some browser support, but its popularity suffered from the fact that MNGs were not backward compatible with PNGs. If a browser didn't support MNG, it would display a broken graphic.

More recently, there has been a proposed extension to PNG called APNG (Animated Portable Network Graphic) that addresses the issue of backward compatibility. If a browser does not support an APNG, it displays the first frame as a static image PNG instead.

Both of these formats are in development and are not well supported as of this writing.

Figure 18-11 shows the same PNG against two different background images. The orange circle is entirely opaque, but the drop shadow contains multiple levels of transparency, ranging from nearly opaque to entirely transparent. The multiple transparency levels stored in the PNG allows the drop shadow to blend seamlessly with any background. The ins and outs of PNG transparency will be addressed in the upcoming Transparency section.

WARNING

Multiple levels of transparency are not supported by Internet Explorer 6 and earlier for Windows. For details, see the Internet Explorer and Alpha Transparency sidebar in the Transparency

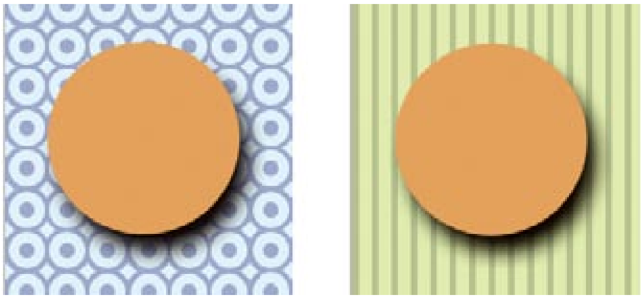


***Figure 18-11.** Alpha-channel transparency allows multiple levels of transparency, as shown in the drop shadow around the orange circle PNG.*

PNG Color Shifting

Due to incorrect gamma handling, PNGs will look darker in Internet Explorer (all versions). The upshot of it is that it is difficult to get a match between a PNG and a background color, even if the RGB values are the same. Making the edges transparent is the solution in many situations.

There is a great article written by Aaron Gustafson (*www.easy-reader.net/archives/2006/02/18/png-color-oddities-in-ie/*) that identifies the problem and serves as a great jumping-off point for further research.

Progressive display (interlacing)

PNGs can also be coded for interlaced display. When this option is selected, the image displays in a series of seven passes. Unlike interlaced GIFs, which fill in horizontal rows, PNGs fill in both horizontally and vertically. Interlacing adds to the file size and is usually not necessary, so to keep files as small as possible, turn interlacing display off.

Gamma correction

Gamma refers to the brightness setting of a monitor (see note). Because gamma settings vary by platform, the graphics you create may not look the way you intend for the end user. PNGs can be tagged with information regarding the gamma setting of the environment in which they were created. This can then be interpreted by the software displaying the PNG to make appropriate gamma compensations. When this is implemented on both the creator and end user's side, the PNG retains its intended brightness and color intensity. Unfortunately, as of this writing, this feature is poorly supported.

NOTE

Gamma is discussed in Chapter 3, The Nature of Web Design.

Embedded text

PNGs also have the ability to store strings of text. This is useful for permanently attaching text to an image, such as copyright information or a description of what is in the image. The only tools that accommodate text annotations to PNG graphics are Corel Paint Shop Pro and the GIMP (a free image editor). Ideally, the meta-information in the PNG would be accessible via right-clicking on the graphic in a browser, but this feature is not yet implemented in current browsers.

When to use PNGs

PNGs pack a lot of powerful options, but competition among web graphic formats nearly always comes down to file size.

For images that would typically be saved as GIFs, 8-bit PNG is a good option. You may find that a PNG version of an image has a smaller file size than a GIF of the same image, but that depends on how efficiently your image program handles PNG compression. If the PNG is smaller, use it with confidence.

Although PNG does support 24-bit color images, its lossless compression scheme nearly always results in a dramatically larger file than JPEG compression applied to the same image. For web purposes, JPEG is still the best choice for photographic and continuous tone images.

The exception to the "smallest file wins" rule is if you want to take advantage of multiple levels of transparency. In that case, PNG is your only option and may be worth a slightly heftier file size.

The following section takes a broader look at finding the best graphic format for the job.

Choosing the best format

Part of the trick to making quality web graphics that maintain quality and download quickly is choosing the right format. Table 18-1 provides a good starting point.

Table 18-1. Choosing the best file format

If your image...	use...	because...
Is graphical, with flat colors	GIF or 8-bit PNG	They excel at compressing flat color.
Is a photograph or contains graduated color	JPEG	JPEG compression works best on images with blended color. Because it is lossy, it generally results in smaller file sizes than 24-bit PNG.
Is a combination of flat and photographic imagery	GIF or 8-bit PNG	Indexed color formats are best at preserving and compressing flat color areas. The dithering that appears in the photographic areas as a result of reducing to a palette is usually not problematic.
Requires transparency	GIF or PNG	Both GIF and PNG allow on/off transparency in images.
Requires multiple levels of transparency	PNG	PNG is the only format that supports alpha-channel transparency.
Requires animation	GIF	GIF is the only format that can contain animation frames.

Work in RGB Mode

Regardless of the final format of your file, you should always do your image-editing work in RGB mode (grayscale is fine for non-color images). To check the color mode of the image in Photoshop, select Image → Mode and make sure there is a checkmark next to RGB Color.

JPEG and PNG-24 files compress the RGB color image directly. If you are saving the file as a GIF or PNG-8, the RGB image must be converted to indexed color mode, either manually or as part of the Save for Web or Export process.

If you need to edit an existing GIF or PNG-8, you should convert the image to RGB before doing any edits. This enables the editing tool to use colors from the full RGB spectrum when adjusting the image. If you resize the original indexed color image, you'll get lousy results because the new image is limited to the colors from the existing color table.

If you have experience creating graphics for print, you may be accustomed to working in CMYK mode (printed colors are made up of Cyan, Magenta, Yellow, and blacK ink). CMYK mode is irrelevant and inappropriate for web graphics.

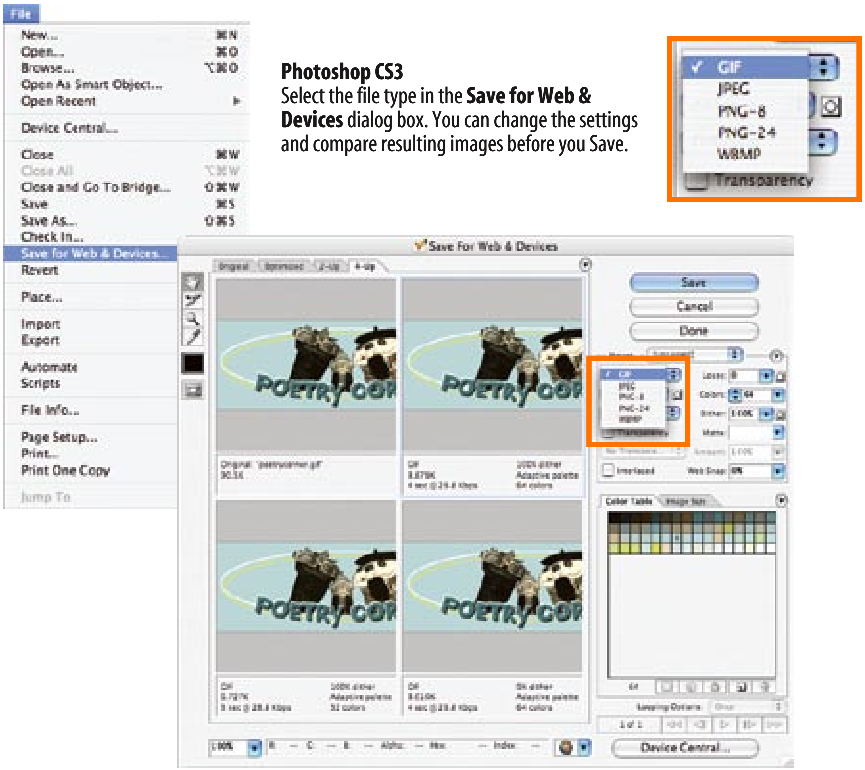
Saving an image in your chosen format

Virtually every up-to-date graphics program allows you to save images in GIF, JPEG, and PNG format, but some give you more options than others. If you use Photoshop, Fireworks or Corel Paint Shop Pro, be sure to take advantage of special web graphics features instead of doing a simple "Save As.."

Start with an RGB image that is at an appropriate size for a web page (image size is discussed in the next section). Edit the image as necessary (resizing, cropping, color correction, etc.), and when you are finished, follow these instructions for saving it as GIF, JPEG, or PNG.

Photoshop (versions 6 and higher, see note)

Open Photoshop's Save for Web & Devices dialog box (File → Save for Web & Devices) (Figure 18-12) and select the file type from the pop-up menu. When you choose a format, the panel displays settings appropriate to that format. The Save for Web window also shows you a preview of the resulting image and its file size. You can even do side-by-side comparisons of different settings; for example, a GIF and PNG-8 version of the same image. Once you have selected the file type and made your settings, click Save and give the file a name.



Photoshop CS3
Select the file type in the **Save for Web & Devices** dialog box. You can change the settings and compare resulting images before you Save.

Figure 18-12. Selecting a file type in Photoshop's handy Save for Web & Devices dialog box.

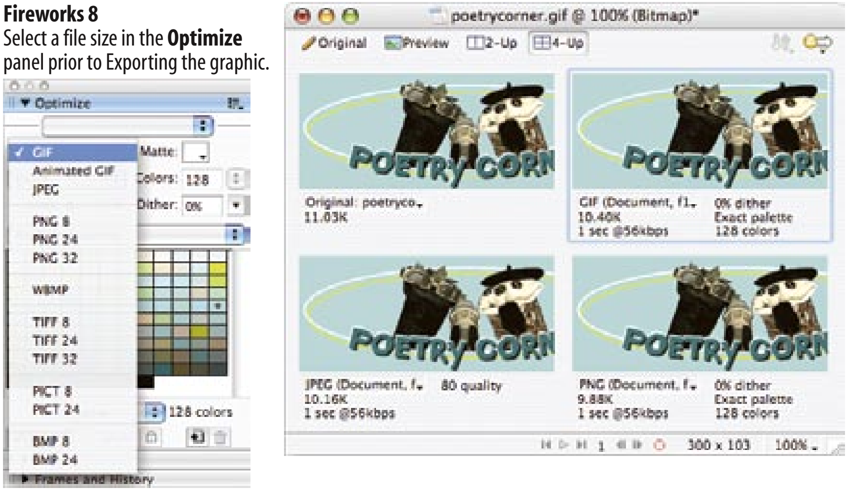
We'll see the Save for Web & Devices dialog box again later in this chapter when we resize images and work with transparency. It also pops up in Chapter 19 when we discuss the various settings related to optimization.

NOTE

This feature was called simply "Save for Web" in Photoshop versions 6 through CS2.

Fireworks (all versions)

With the image open and the Preview tab selected, the file type can be selected from the Optimize panel (Figure 18-13). When you are finished with your settings, select Export from the File menu and give the graphic file a name.

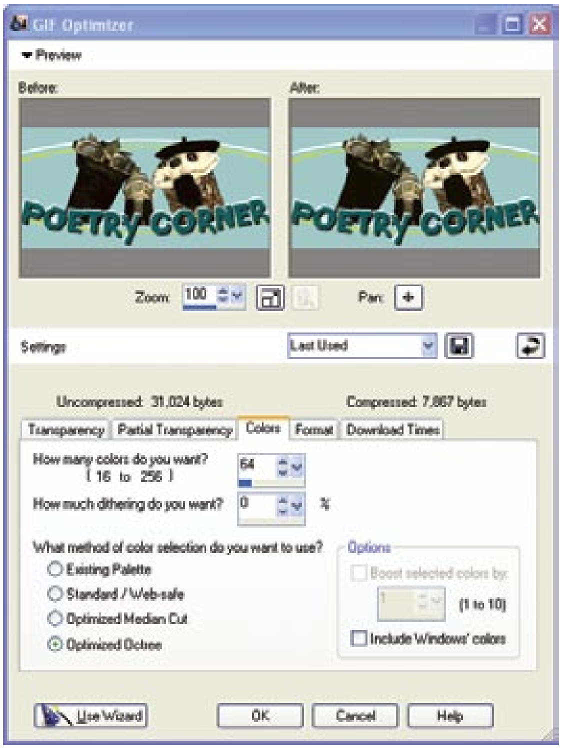


Fireworks 8
Select a file size in the **Optimize** panel prior to Exporting the graphic.

Figure 18-13. Selecting file type in the Fireworks Optimize panel.

Paint Shop Pro

The GIF Optimizer, JPEG Optimizer, and PNG Optimizer are accessed from the Export option in the File menu. Each opens a multipanel dialog box with all the settings for the respective file type and a preview of a portion of the compressed image. The Colors panel of the GIF optimizer is shown in Figure 18-14. When you have made all your settings, click OK. Note that you need to choose your file type *before* accessing the settings, and there is no way to compare image type previews as is possible in Photoshop and Fireworks.



Settings: Last Used

Uncompressed: 31,024 bytes

Compressed: 7,867 bytes

How many colors do you want? 64
(16 to 256)

How much dithering do you want? 0 %

What method of color selection do you want to use?

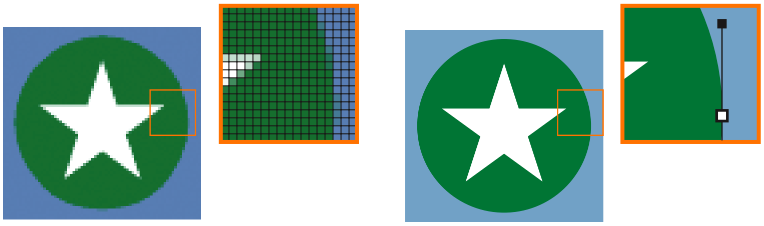
○ Existing Palette
○ Standard / Web-safe
○ Optimized Median Cut
● Optimized Octree

Options
☐ Boost selected colors by: 1 (1 to 10)
☐ Include Windows' colors

Figure 18-14. Web optimization options in Corel Paint Shop Pro.

Image Size and Resolution

One thing that GIF, JPEG, and PNG images have in common is that they are all bitmapped (also called raster) images. When you zoom in on a bitmapped image, you can see that it is like a mosaic made up of many pixels (tiny, single-colored squares). These are different from vector graphics that are made up of smooth lines and filled areas, all based on mathematical formulas. Figure 18-15 illustrates the difference between bitmapped and vector graphics.



Bitmap images are made up of a grid of variously colored pixels, like a mosaic.

Vector images use mathematical equations to define shapes.

Figure 18-15. Bitmapped and vector graphics.

Goodbye inches, hello pixels!

If you've used bitmapped images for print or the Web, you may be familiar with the term resolution, the number of pixels per inch. In the print world, image resolutions of 300 and 600 pixels per inch (ppi) are common.

On the Web, however, images need to be created at much lower resolutions. 72 ppi has become the standard, but in reality, the whole notion of "inches" and therefore "pixels per inch" becomes irrelevant in the web environment. In the end, the only meaningful measurement of a web image is its actual pixel dimensions. This statement deserves a bit more explanation.

When an image is displayed on a web page, the pixels map one-to-one with the display resolution of the monitor (see note). Because the monitor resolution varies by platform and user, the image will appear larger or smaller depending on the configuration, as the following example demonstrates.

NOTE

Some modern browsers have a feature that scales large images to fit inside the browser window. If this feature is turned on, the one-to-one pixel matching no longer applies.

I have created a graphic that is 72 pixels square (Figure 18-16). Although I may have created that image at 72 pixels per inch, it's likely that it will never measure precisely one inch when it is displayed on a monitor (particularly the higher-resolution monitors that are prevalent today). On the high-resolution monitor, the pixels are smaller and the "one-inch" square graphic ends up less than three-quarter-inch square.

Dots Per Inch

Because web graphics exist solely on the screen, it is correct to measure their resolutions in pixels per inch (ppi).

When it comes to print, however, devices and printed pages are measured in dots per inch (dpi), which describes the number of printed dots in each inch of the image. The dpi may or may not be the same as the ppi for an image.

In your travels, you may hear the terms dpi and ppi used interchangeably (albeit incorrectly so). It is important to understand the difference.

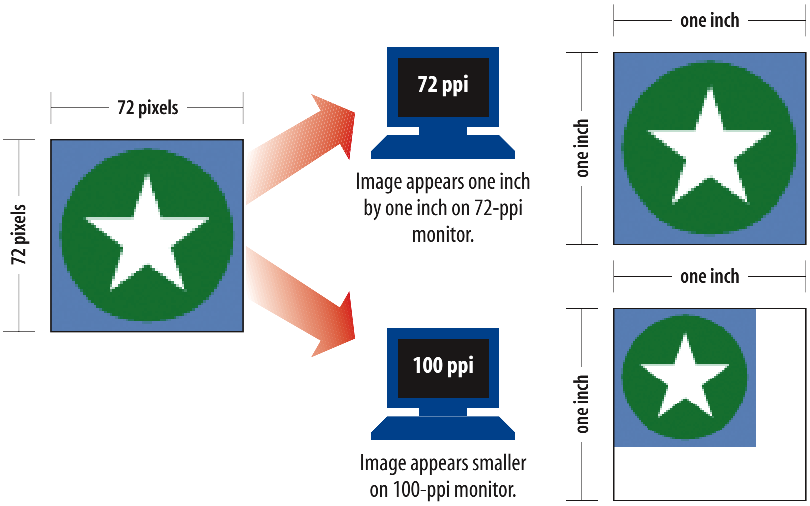

72 pixels
72 pixels
72 ppi
Image appears one inch by one inch on 72-ppi monitor.
100 ppi
Image appears smaller on 100-ppi monitor.
one inch
one inch
one inch
one inch

Figure 18-16. The size of an image is dependent on the monitor resolution.

For this reason, it is useless to think in terms of "inches" on the Web. It's all relative. And without inches, the whole notion of "pixels per inch" is thrown out the window as well. The only thing we know for sure is that the graphic is 72 pixels across, and it will be twice as wide as a graphic that is 36 pixels across.

After this example, it should be clear why images fresh from a digital camera are not appropriate for web pages. I commonly shoot images at 1600 × 1200 pixels with a resolution of 180 ppi. With browser windows commonly as small as 800 pixels wide, all those extra pixels are unnecessary and would cause half the image to hang outside a typical browser window. Users would have to scroll vertically and horizontally to see it. Even though some modern browsers scale the image down to fit the browser window, that doesn't solve the problem of forcing an unnecessarily large download on users when a much smaller file will do.

Resizing images

The images you get from a digital camera, scanner, or stock photo company are generallly too large for web use, so you need to resize them smaller. In fact, I'd say that resizing images smaller makes up a large portion of the time I spend doing graphics production, so it's a good basic skill to have.

In Exercise 18-1, I'll show you an easy way to resize an image using Photoshop's "Save For Web & Devices" feature. With this method, the exported web graphic is resized, but the original remains unaltered. Adobe Photoshop Elements has a similar feature, so you can follow along if you have either of these programs. For other programs, or if you want more control over the final image quality, see the Using Image Size sidebar following the exercise.

Working in Low Resolution

Despite the fact that resolution is irrelevant, creating web graphics at 72 ppi puts you at a good starting point for images with appropriate pixel dimensions. The drawback to working at a low resolution is that the image quality is lower because there is not as much image information in a given space. This tends to make the image look more grainy or pixilated and, unfortunately, that is just the nature of the Web. On the upside, image edits that are noticeable in high-resolution graphics (such as retouching or cloning) are virtually seamless at low resolution. In addition, low resolution means smaller file sizes, which is always a concern for media shared over a network.

NOTE

If you don't have Photoshop, you can download a free trial version at www.adobe.com/downloads.

exercise 18-1 | Resizing an image smaller in Photoshop

In this exercise, we'll take a high-resolution photo and size it to fit on a web page. The source image, ***ninja.tif***, is available with the materials for this chapter at *www.learningwebdesign.com/materials/*.

1. Open the file ***ninja.tif*** in Photoshop. A quick way to find the pixel dimensions of the image is to open the Image Size dialog box (Image → Image Size) shown in Figure 18-17 Ⓐ. This image is 1600 x 1600 pixels, which is too big for a web page. Close the Image Size box for now (we were only using it to peek at our starting point). The Info window (not shown) also shows pixel dimensions when the whole image is selected.
2. Now we'll resize the image and save it as a JPEG in one fell swoop. Select Save for Web & Devices from the File menu. Because this image is a photograph, select JPEG Ⓑ from the Formats pop-up menu. The default High/60 compression setting is fine for this example.
3. With the format chosen, it's time to get to the resizing. Click on the Image Size tab in the bottom half of the settings column Ⓒ. Enter the dimensions that you'd like the final JPEG to be when it is saved. I'm going to set the width to 400 pixels. When "constrain proportions" is checked, the width changes automatically when you enter the new height.
4. Next, select the Quality Ⓓ. I usually go for Bicubic or Bicubic Sharper for the best results then click Apply Ⓔ. You will see the resized image in the Optimized Image view (select the tab at the top if it isn't already).
5. Click Save Ⓕ, give the file a name, and select a directory in which to save it. You can close the original image without saving, or save it to preserve the Save for Web settings.

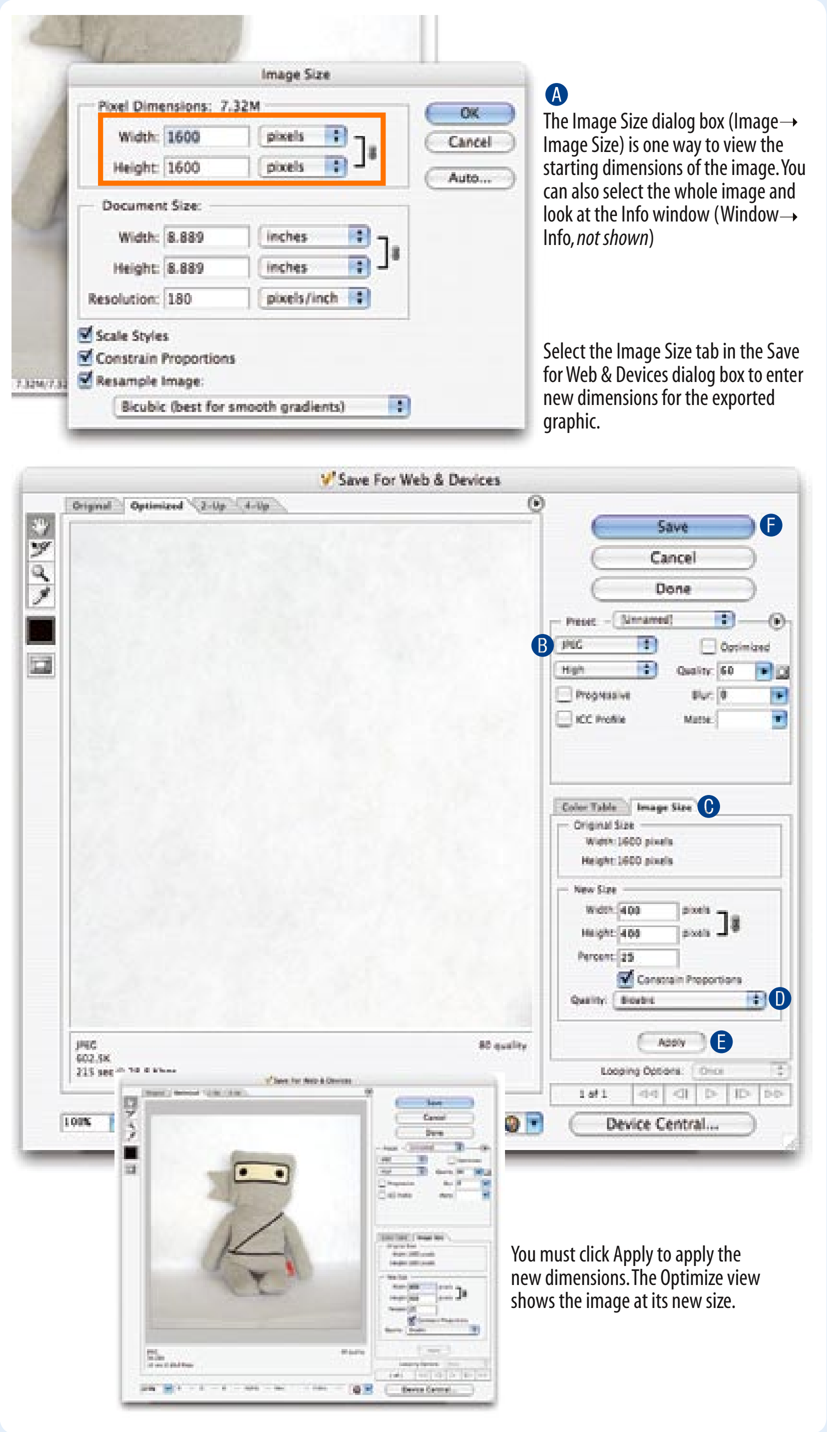


Image Size

Pixel Dimensions: 7.32M
Width: 1600 pixels
Height: 1600 pixels

Document Size:
Width: 8.889 inches
Height: 8.889 inches
Resolution: 180 pixels/inch

☑ Scale Styles
☑ Constrain Proportions
☑ Resample Image:
Bicubic (best for smooth gradients)

Save For Web & Devices

Preset: [Unnamed]
JPEG □ Optimized
High Quality: 60
□ Progressive Blur: 0
□ ICC Profile Matte:

Original Size
Width: 1600 pixels
Height: 1600 pixels

New Size
Width: 400 pixels
Height: 400 pixels
Percent: 25
☑ Constrain Proportions
Quality: Bicubic

JPEG
602.5K
215 sec
60 quality
100%
Looping Options: Once
1 of 1

Ⓐ The Image Size dialog box (Image → Image Size) is one way to view the starting dimensions of the image. You can also select the whole image and look at the Info window (Window → Info, *not shown*)

Select the Image Size tab in the Save for Web & Devices dialog box to enter new dimensions for the exported graphic.

You must click Apply to apply the new dimensions. The Optimize view shows the image at its new size.

Figure 18-17. Using the Save for Web & Devices dialog box to resize an image.

Working with Transparency

Both GIF and PNG formats allow parts of an image to be transparent, allowing the background color or image to show through. In this section, we'll take a closer look at transparent graphics, including tips on how to make them.

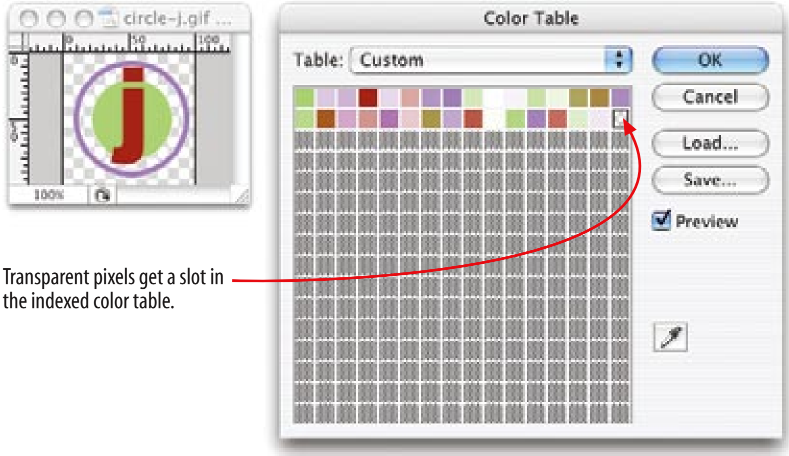
The first thing to know is that there are two types of transparency. In binary transparency, pixels are either entirely transparent or entirely opaque, like an on/off switch. Both GIF and PNG files support binary transparency.

In alpha (or alpha-channel) transparency, a pixel may be totally transparent, totally opaque, or up to 254 levels of opaqueness in between (a total of 256 opacity levels). Only PNGs support alpha transparency. The advantage of PNGs with alpha transparency is that they blend seamlessly with any background color or pattern, as shown back in Figure 18-11.

In this section, you'll become familiar with how each type of transparency works, and learn how to make transparent images using Photoshop.

How binary transparency works

Remember that the pixel colors for GIFs and PNG-8s are stored in an indexed color table. Transparency is simply treated as a separate color, occupying a position in the color table. Figure 18-18 shows the color table in Photoshop for a simple transparent GIF. The slot in the color table that is set to transparent is indicated by a checker pattern. Pixels that correspond to that position will be completely transparent when the image displays in the browser. Note that only one slot is transparent—all the other pixel colors are opaque.



Transparent pixels get a slot in the indexed color table.

Figure 18-18. Transparency is treated as a color in the indexed color table.

Using Image Size

The disadvantage to the method shown in Exercise 18-1 is that you lose control over the quality of the image. If you are an image quality control freak (like me), you may prefer resizing the image using the Image Size dialog box (Figure 18-17 Ⓐ). In Fireworks, Modify → Canvas... → Image Size... gives you a similar set of options.

Although you can set the pixel dimensions right at the top, it is better to take care of a few other settings first.

Be sure that Resample Image and Constrain Proportions are checked at the bottom, select Bicubic (or Bicubic Sharper) as the Quality setting, then set the Resolution to 72 pixels/inch. Then enter the desired final pixel dimensions at the top of the box and click OK. Double-clicking on the magnifying glass tool (not shown) displays the resized image at 100%.

Now you can apply sharpening filters and other effects and use Save For Web to output the image in a web format.

I find that resizing a very large image in a couple of steps helps preserve quality. First, I resize it to an in-between dimension and sharpen it with a sharpening filter. Then I resize it to its final dimensions and sharpen again. You can't do that with the Save For Web method.

Remember that the Image Size settings resize the *original* image. Don't save it, or you'll lose your high-quality version! Be sure to "Save As" in order to keep a copy of your original.

Internet Explorer and Alpha Transparency

Alpha transparency is really cool, but unfortunately, it comes with one major headache—it is not supported in Internet Explorer 6 and earlier for Windows. Users with those browsers (and there are a *lot* of them) will see the PNG as entirely opaque.

There is a workaround using Microsoft's proprietary AlphaImageLoader filter. The details of the process are beyond the scope of this chapter, but these resources are good places to start if you want to ensure cross-browser support for your transparent PNGs.

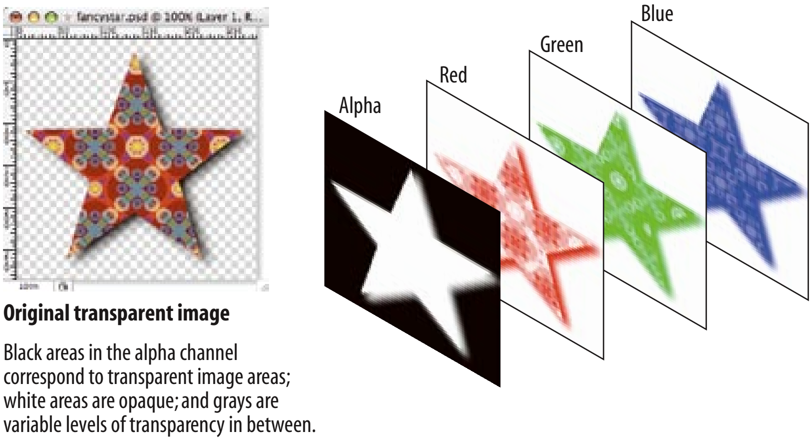
Start with the AlphaImageLoader filter documentation on the MSDN (Microsoft Developers Network) site at *msdn.microsoft.com/workshop/author/filter/reference/filters/alphaimageloader.asp*.

These articles introduce variations and alternative techniques:

- "Cross-browser Variable Opacity with PNG: A Real Solution," by Michael Lovitt at *www.alistapart.com/articles/pngopacity*.
- "PNG Behavior," *webfx.eae.net/dhtml/pngbehavior/pngbehavior.html*.

How alpha transparency works

RGB images, such as JPEGs and PNG-24s, store color in separate channels, one for red, one for green, and one for blue. PNG-24 files add another channel, called the alpha channel, to store transparency information. In that channel, each pixel may display one of 256 values, which correspond to 256 levels of transparency when the image is displayed. The black areas of the alpha channel mask are transparent, the white areas are opaque, and the grays are on a scale in between. I think of it as a blanket laid over the image that tells each pixel below it how transparent it is (Figure 18-19).



Original transparent image

Black areas in the alpha channel correspond to transparent image areas; white areas are opaque; and grays are variable levels of transparency in between.

Figure 18-19. Transparency information is stored as a separate (alpha) channel in 24-bit PNGs.

Making transparent GIFs and PNGs

The easiest way to make parts of an image transparent is to design them that way from the start and preserve the transparent areas when you create the GIF or PNG version of the image. Once again, Photoshop's Save for Web & Devices feature or Firework's Optimize panel are perfect tools for the job.

It is possible to add transparent areas to a flattened opaque image, but it may be difficult to get a seamless blend with a background. We'll look at the process for making portions of an existing image transparent later in this section.

But first, follow along with the steps in Exercise 18-2 that demonstrates how to preserve transparent areas and guarantee a good match with the background using Photoshop's Save for Web & Devices dialog box. There are some new concepts tucked in there, so even if you don't do the exercise, I recommend giving it a read, particularly steps 5, 6, and 7.

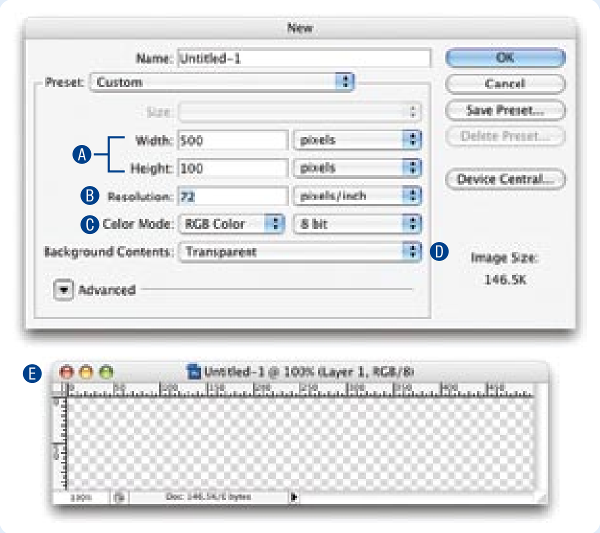
NOTE

The principles and settings outlined in Exercise 18-2 are nearly identical in Fireworks, so the same general instructions apply, although the interface is slightly different.

exercise 18-2 | Creating transparent images

In this exercise, we're going to start from scratch, so you'll get the experience of creating a layered image with transparent areas. I'm going to keep it simple, but you can apply these techniques to fancier designs, of course.

1. Launch Photoshop and create a new file (File → New...). There are a few settings in the New dialog box (Figure 18-20) that will set you off in the right direction for creating transparent web graphics.
    - First, make your new graphic 500 pixels wide and 100 pixels high to match the example in this exercise Ⓐ.
    - Set the resolution to 72 pixels/inch because web graphics are low-resolution Ⓑ.
    - Make sure the color mode is RGB Color, 8-bit Ⓒ.
    - Finally, and most importantly for this exercise, select Transparent from the Background Contents options Ⓓ. This option creates a layered Photoshop file with a transparent background. It is much easier to preserve transparent areas in an image than to add it later. The transparent areas (in this case, the whole area, since we haven't added any image content yet) is indicated by a gray checkerboard pattern Ⓔ.

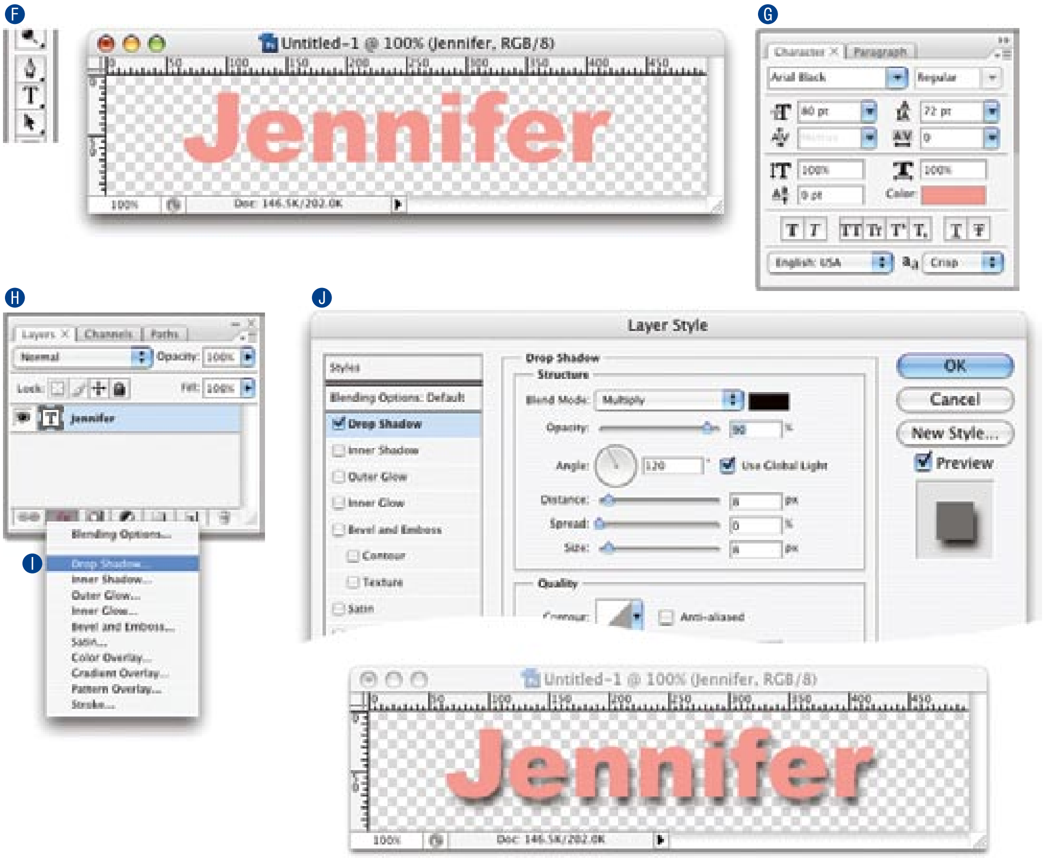


Name: Untitled-1
Preset: Custom
Size:
Width: 500 pixels
Height: 100 pixels
Resolution: 72 pixels/inch
Color Mode: RGB Color 8 bit
Background Contents: Transparent
Image Size: 146.5K

Figure 18-20. Creating a new image with a transparent background.

2. Now we'll add some text and give it a drop shadow (Figure 18-21, following page).
    - Use the type tool Ⓕ and type your name. Open the Character window Ⓖ (Window → Character) to change the look of the font. With the text selected, choose a bold typeface (something chunky) and set the size large enough to fill the space, as shown in the example. Click the swatch next to Color, and use the Color Picker to choose a color for the text that is not too light and not too dark. I'm using a medium pink.
    - Next, add a soft drop shadow to the text. Open the Layers window Ⓗ (Window → Layers) if it isn't open already. You will see the layer containing your text in the list. Add a drop shadow by clicking the Layer Style button (it looks like an FX) at the bottom of the Layers window and select "Drop Shadow..." Ⓘ. In the Layer Style dialog box Ⓙ, you can play around with the settings, but I recommend setting the Distance and Size to at least 5 to get the most out of the rest of the exercise. When you are done, click OK.
3. Save the image as a Photoshop file to preserve the layers for easier editing later, if necessary. I'm naming mine ***jennifer.psd*** (use the ***.psd*** suffix). With a nice source image saved, we are ready to start making the web versions.
4. With the new file still open, select Save for Web & Devices from the File menu. Click on the 4-Up tab at the top to compare the original image to several other versions (Figure 18-22, following page). Note, your previews may display in a grid instead of a stack.
5. Let's see how the image looks as a GIF with and without transparency. Click on the second preview to select it, then set the file type to GIF and set the number of colors to 32. Now, toggle the checkmark next to Transparency off and on (Figure 18-23 on page 381).
    - When Transparency is off (not checked, as shown on the left), the Matte color is used to fill in the transparent areas of the original image. Set the Matte color to white to match my example.
    - When Transparency is on (checked, as shown on the right), a checker pattern appears in the transparent areas of the image, indicating where the background color or pattern of the web page will show through. If you look carefully at the drop shadow area, you will see that the shades of gray are blended with the white Matte color. Try changing the Matte color and watch what happens in the drop shadow area.

➔



Arial Black

Regular

80 pt

72 pt

0

100%

100%

0 pt

Opacity: 100%

Fill: 100%

Drop Shadow

Blend Mode: Multiply

Opacity: 90 %

Angle: 120 ° ☑ Use Global Light

Distance: 8 px

Spread: 0 %

Size: 8 px

Contour: □ Anti-aliased

Figure 18-21. *Adding text with a soft drop shadow.*

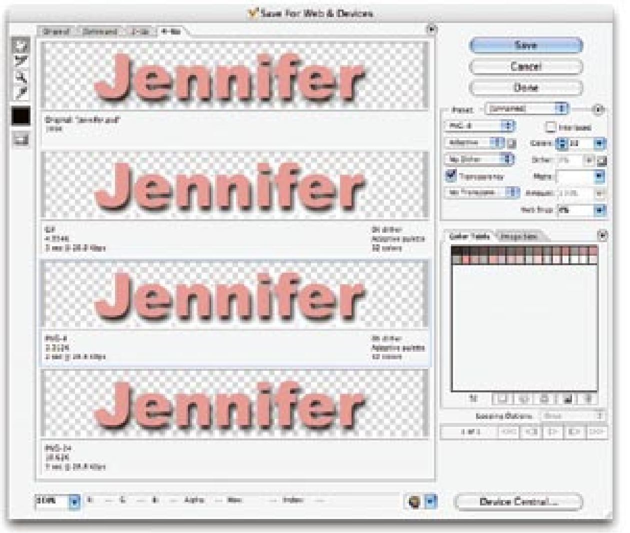


Figure 18-22. *The “4-up” tab in the Save for Web & Devices dialog box allows you to compare four different versions of the same image.*

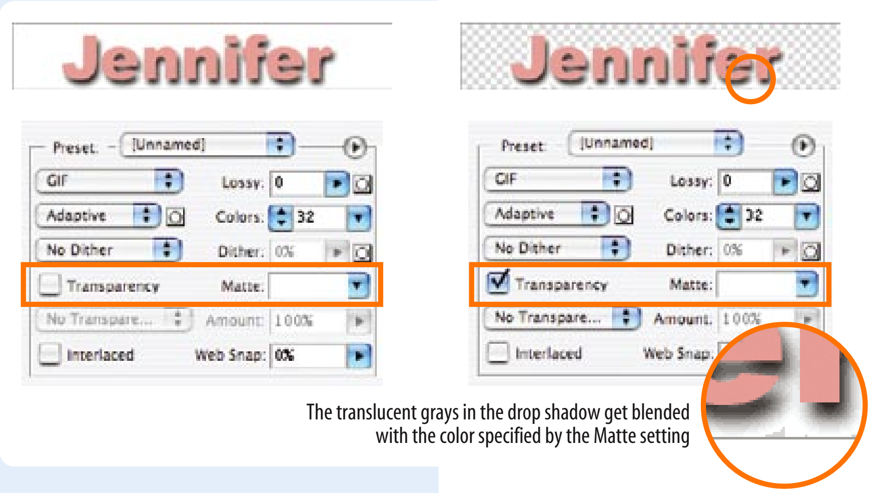
➡

6. Leave the GIF preview alone for a moment and select the next preview. Set the file type to PNG-8 and try toggling the Transparency checkbox. As expected, it behaves exactly the same as the GIF because both formats use binary transparency. The previews should look like those shown in Figure 18-23.

7. Now select the fourth preview, make it a PNG-24, and toggle the Transparency checkbox (Figure 18-24). When it is unchecked (left), the Matte color fills in the transparent areas of the original image. But when Transparency is checked (right), the checkerboard pattern shows through the drop shadow blend. So, too, will the background of a web page. When Transparency is selected, the Matte tool is no longer available, because there is no need to specify the background color of the page...the PNG with alpha transparency will blend with anything.

   Take a moment to note the file size of the transparent PNG-24. Mine is nearly 10.6 KB, while my transparent GIF version is 5 KB, and the transparent PNG-8 came in at just 3.3 KB. The significantly larger file size is the price you pay for the versatility of the alpha transparency.

8. Save the PNG-24 with Transparency turned on and name the file with the *.png* suffix (mine is *jennifer.png*). Open the Save for Web dialog box again and save a GIF version of the image with Transparency turned on (make sure that Matte is set to white). Name the file with the *.gif* suffix. We'll be using these graphics again in the next section.

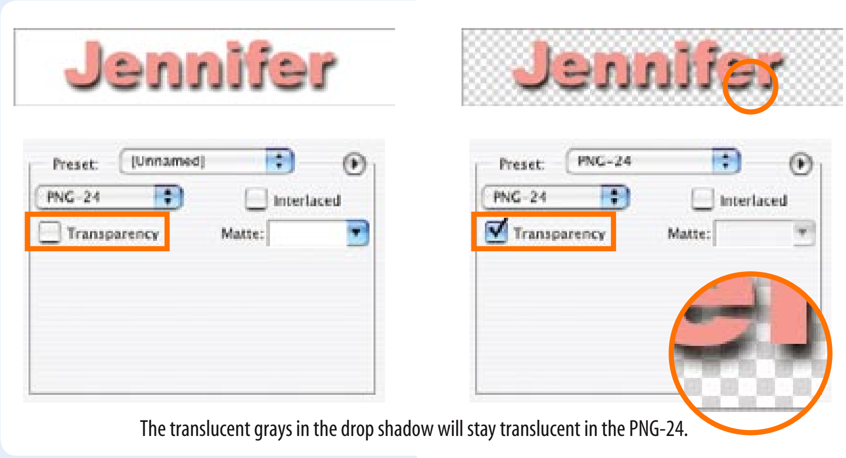


Preset: [Unnamed]
GIF
Lossy: 0
Adaptive
Colors: 32
No Dither
Dither: 0%
☐ Transparency
Matte:
No Transpare...
Amount: 100%
☐ Interlaced
Web Snap: 0%

Preset: [Unnamed]
GIF
Lossy: 0
Adaptive
Colors: 32
No Dither
Dither: 0%
☑ Transparency
Matte:
No Transpare...
Amount: 100%
☐ Interlaced
Web Snap:

The translucent grays in the drop shadow get blended with the color specified by the Matte setting

Figure 18-23. *Previews of transparency turned off (left) and on (right) in a GIF.*



Preset: [Unnamed]
PNG-24
☐ Interlaced
☐ Transparency
Matte:

Preset: PNG-24
PNG-24
☐ Interlaced
☑ Transparency
Matte:

The translucent grays in the drop shadow will stay translucent in the PNG-24.

Figure 18-24. *Previews of Transparency turned off (left) and on (right) in a PNG-24.*

DESIGN TIP

The trick to getting a transparent GIF to blend seamlessly with a background is to use the RGB values from the web page's background color (or the dominant color from a background image) for the Matte color. If your page background is a multi-colored pattern or is otherwise difficult to match, opt for a Matte color that is slightly darker than the predominant background color.

NOTE

Fireworks gives you a choice of Index or Alpha Transparency for PNG-8 graphics. See the PNG-8 "Alpha" Transparency sidebar for details.

PNG-8 "Alpha" Transparency

Technically, variable levels of transparency are *not* limited to 24-bit PNGs. PNG-8 files can do it too. Instead of using an alpha channel, they store different transparency levels in multiple slots in the index color table. The resulting file size is potentially smaller than the same image saved as a PNG-24 with an alpha channel.

As of this writing, only Fireworks allows you to create PNG-8s with multiple levels of transparency, and browser support is poor. Most browsers display them as though they have simple binary transparency. For now, this is another cool PNG feature that remains virtually untapped due to lagging software support.

Avoiding "halos"

Now that I've got some transparent graphics, I'm going to try them out on a minimal web page with a white background. If you want to work along, open a text editor and create an HTML document like the one shown here (I've omitted the DOCTYPE and character set information to save space):

```
<html>
<head>
  <title>Transparency test</title>
  <style type="text/css">
    body {
      background-color: white;
    }
  </style>
</head>
<body>
  <p><img src="jennifer.png" alt="" /></p>
  <p><img src="jennifer.gif" alt="" /></p>
</body>
</html>
```

TERMINOLOGY

Anti-aliasing

Anti-aliasing is a slight blur applied to rounded edges of bitmapped graphics to make smoother transitions between colors. Aliased edges, by contrast, have stair-stepped edges. Anti-aliasing text and graphics can give your graphics a more professional appearance.

When I open the file in a browser, the graphics look more or less the same against the white background (Figure 18-25, left). But, if I change the background color of the web page to teal (`background-color: teal;`), the difference between the alpha and binary transparency becomes very clear (right).

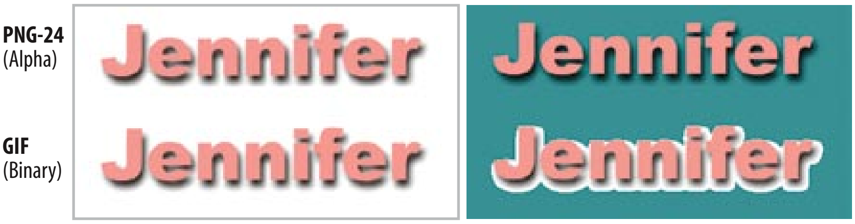


Figure 18-25. The difference between binary and alpha transparency becomes very clear when the background color of the page changes.

When the background color changes, the GIF no longer matches the background, resulting in an ugly fringe commonly called a halo. Halos are the result of anti-aliased edges that have been blended with a color other than the background color of a page. They are a potential hazard of binary transparency, whether GIF or PNG-8.

Prevention is the name of the game when it comes to dealing with binary transparency and halos. As you've just seen, the Matte color feature in Photoshop and Fireworks makes it easy to blend the edges of the graphic to a target background color. If the background color changes, you can re-export the GIF or PNG-8 with the new Matte color. See the Matte Alternative sidebar for options if your tool doesn't have a Matte setting.

Another option is to save your image as a PNG-24 with variable transparency. That way, you don't have to worry about the background color or pattern, and it will be no problem if it changes in the future. The trade-off, of course, is the larger file size to download. In addition, alpha transparency does not work in Internet Explorer 6 and earlier without the aid of some proprietary and/or JavaScript workarounds (see the Internet Explorer and Alpha Transparency sidebar earlier in this chapter). This will become less of an issue of course as those versions go away.

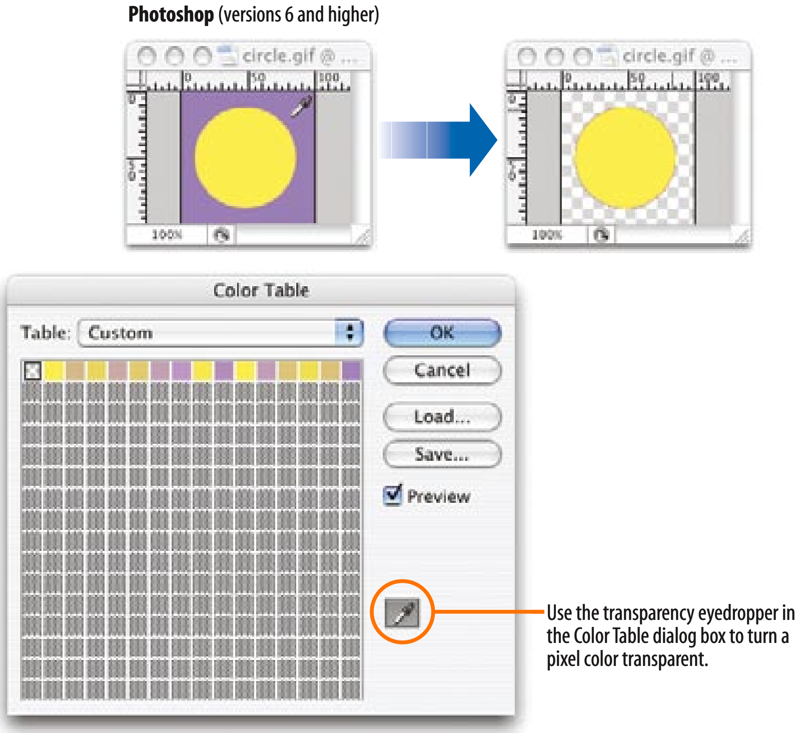
Matte Alternative

If you are using a graphics tool that doesn't have the Matte feature, create a new layer at the bottom of the layer "stack" and fill it with the background color of your page. When the image is flattened as a result of changing it to Indexed Color, the anti-aliased edges blend with the proper background color. Just select that background color to be transparent during export to GIF or PNG format and your image should be halo-free.

Adding transparency to flattened images

It is possible to add transparent areas to images that have already been flattened and saved as a GIF or PNG. The GIF containing a yellow circle on a purple background in Figures 18-25 and 18-27 blends in fine against a solid purple background, but would be an obvious square if the background were changed to a pattern. The solution is to make the purple areas transparent to let the background show through. Fortunately, most graphics tools make it easy to do so by selecting a pixel color in the image, usually an eyedropper tool, that you'd like to be transparent.

In Photoshop, the transparency eyedropper is found on the Color Table dialog box (Image → Mode → Color Table). Click on the eyedropper, then on a pixel color in the image, and it magically turns transparent (Figure 18-26). To save the new transparent graphic, use the Save For Web & Devices feature as demonstrated earlier.



Photoshop (versions 6 and higher)

Table: Custom

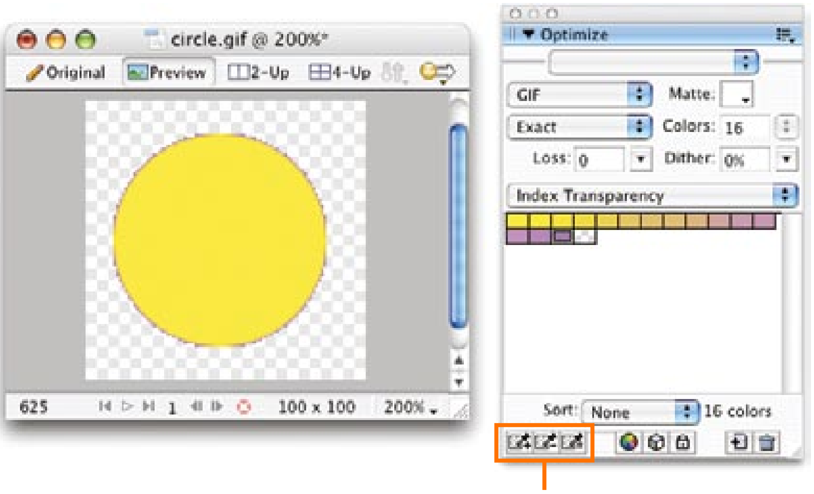
☑ Preview

Use the transparency eyedropper in the Color Table dialog box to turn a pixel color transparent.

***Figure 18-26.** Making a color transparent in Photoshop.*

In Fireworks, the transparency eyedropper is located at the bottom of the Optimize panel (Figure 18-27). The Add to Transparency tool allows you to select more than one pixel color to make transparent. The Subtract from Transparency dropper turns transparent areas opaque again. When you are finished, export the transparent graphic (File → Export).

Fireworks



GIF
Matte:
Exact
Colors: 16
Loss: 0
Dither: 0%
Index Transparency
Sort: None
16 colors

Transparency eyedropper tools

Figure 18-27. Making colors transparent in Fireworks.

If you look closely, you can see that there is a fringe of pixels still anti-aliased to purple, which means that this graphic will work well only against purple backgrounds. On other background colors, there will be a pesky halo. Unfortunately, the only way to fix a halo in an image that has already been flattened is to get in there and erase the anti-aliased edges, pixel by pixel. Even if you get rid of the fringe, you may be left with unattractive stair-stepped edges. You could also select the image area (the yellow circle in this example) with a marquee tool that has the "feathering" set to 1 or 2 pixels. Copy the image area and paste it to a new transparent layered image file, then use Save for Web & Devices to output a new graphic with the Matte set to match the background color.

If you are concerned with the professional appearance of your site, I'd say it's better to recreate the graphic from scratch, taking care to prevent halos, than to waste time trying to fix them. This is another reason to always save your layered files.

Web Graphics 101 Summary

If I've done my job, you should now have a good foundation in web graphics, including where to find an image, what file format to save it in, and how to resize it so it is appropriate for the Web. You also know the difference between binary and alpha transparency, and how to make graphics that blend well with the background of a web page.

In Chapter 19, we'll take graphics production to the next level and explore all the ways to make images as small as possible for faster downloads. But first, a little quiz.

Test Yourself

Answer the following questions to see if you got the big picture on web graphics. The answers appear in Appendix A.

1. What is the primary advantage to using rights-managed images?

2. What does ppi stand for?

3. Which graphic is more appropriate for placement on a web page: a 7-inch wide graphic at 72 ppi or a 4-inch wide graphic at 300 ppi?

4. What is "indexed color?" What file formats use it?

5. How many colors are in the color table for an 8-bit graphic? For a 5-bit graphic?

6. Name two things you can do with a GIF that you can't do with a JPEG.

7. JPEG's lossy compression is cumulative. What does that mean? Why is it important to know?

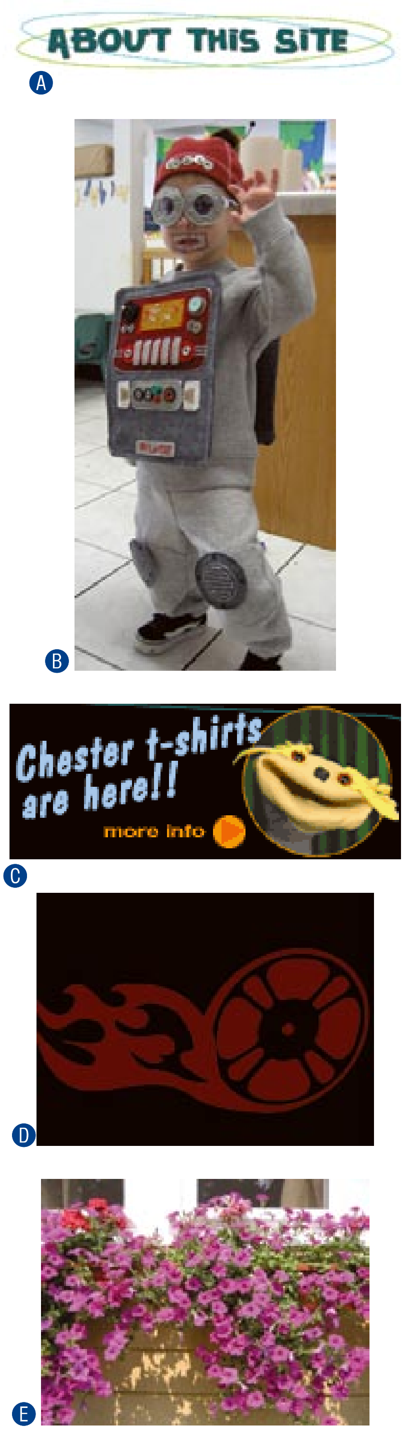


Figure 18-28. *Choose the best file format for each image.*

8. Name three types of image the PNG format can store.

9. What is the difference between binary and alpha transparency?

10. Pick the best graphic file format for each of the images in Figure 18-28. You should be able to make the decision just by looking at the images as they're printed here and explain your choice.

CHAPTER 19

LEAN AND MEAN WEB GRAPHICS

Because a web page is published over a network, it needs to zip through the lines as little packets of data in order to reach the end user. It is fairly intuitive, then, that larger amounts of data will require a longer time to arrive. And guess which part of a standard web page packs the most bytes—that's right, the graphics.

Thus is born the conflicted relationship with graphics on the Web. On the one hand, images make a web page more interesting than text alone, and the ability to display graphics is one of the factors contributing to the Web's success. On the other hand, graphics also try the patience of surfers with slow Internet connections. The user can hang in there and wait, turn graphics off in their browsers, or simply surf somewhere else.

This chapter covers the strategies and tools available for making web graphic files as small as possible (a process known as optimizing) while maintaining acceptable image quality. Maybe you're thinking, "Why bother? Everyone has broadband these days, right?!" After you read the next section, I think you'll be eager to learn the general and format-specific optimizing techniques that follow. If you're going to make web graphics, why not do it like the pros?

IN THIS CHAPTER

Why you should optimize your graphics

General optimization strategies

Optimizing GIFs

Optimizing JPEGs

Optimizing PNGs

Optimizing to a target file size

Why Optimize?

Despite the popularity of high-bandwidth connections, dial-up modem connections still make up a significant percentage of web traffic (20 to 30% as of this writing). In addition to dial-up connections, designers need to consider the performance of their web page designs on mobile devices where connection and processing speeds tend to lag behind the desktop experience.

What it boils down to is this: it is well worth your while to wring every unnecessary byte out of your graphics files to keep download times as short as possible.

In fact, many corporate clients set a kilobyte limit (or K-limit) that the sum of all the files on the page may not exceed. I know of one corporate site that set its limit to a scant 15 kilobytes (KB, or commonly just K) per page—that

NOTE

Optimization is not just for graphics. Professional (X)HTML, CSS, and JavaScript authors take measures to keep superfluous code and extra characters out of the text documents that make up web sites as well.

includes the (X)HTML document and all the graphics combined. Similarly, many sites put stingy K-limits on the ad banners they'll accept. Even if keeping graphic files small is not a priority for you, it may be for your clients. You've got to be prepared.

How Long Does It Take?

It's impossible to say exactly how long a graphic will take to download over the Web. It depends on many factors, including the speed of the user's connection, the speed of the user's computer, the amount of activity on the web server, and the general amount of traffic on the Internet itself.

The general rule of thumb is to figure that a graphic could take 1 second per kilobyte (KB) under worst-case conditions (say, over a 28.8 Kbps modem connection). That would mean a 30 KB graphic would take 30 seconds to download, which is a long time for a user to be staring at a computer screen.

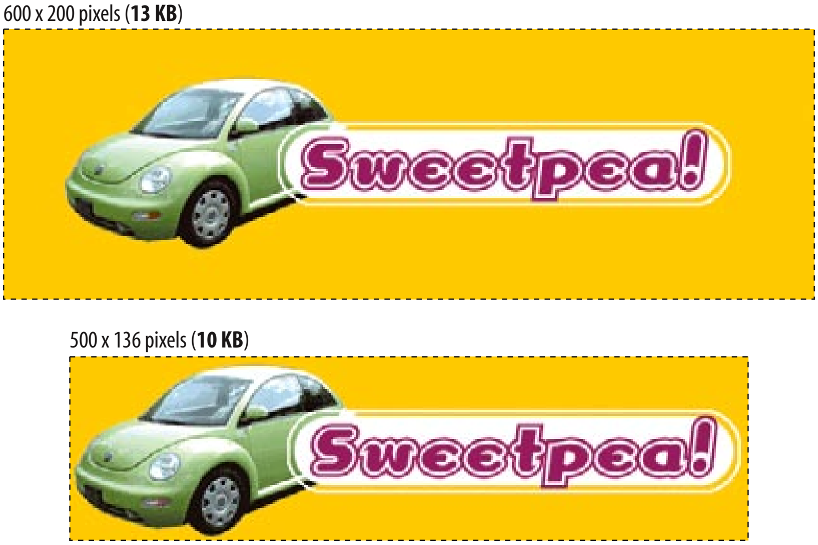
Use the 1 sec/KB guideline only to get a ballpark estimate for the lowest common denominator. Actual times are likely to be a lot better, and may be a lot worse.

General Optimization Strategies

Regardless of the image or file type, there are a few basic strategies to keep in mind for limiting file size. In the broadest of terms, they are:

Limit dimensions

Although fairly obvious, the easiest way to keep file size down is to limit the dimensions of the image itself. There aren't any magic numbers; just don't make images any larger than they need to be. By simply eliminating extra space in the graphic in Figure 19-1, I was able to reduce the file size by 3K (23%).


600 x 200 pixels (**13 KB**)

500 x 136 pixels (**10 KB**)

Figure 19-1. *You can reduce the size of your files simply by cropping out extra space.*

Reuse and recycle

If you use the same image repeatedly in a site, it is best to create only one image file and point to it repeatedly wherever it is needed. This allows the browser to take advantage of the cached image and avoid additional downloads. Caching is explained in the Taking Advantage of Caching sidebar in Chapter 7, Adding Images.

Design for compression

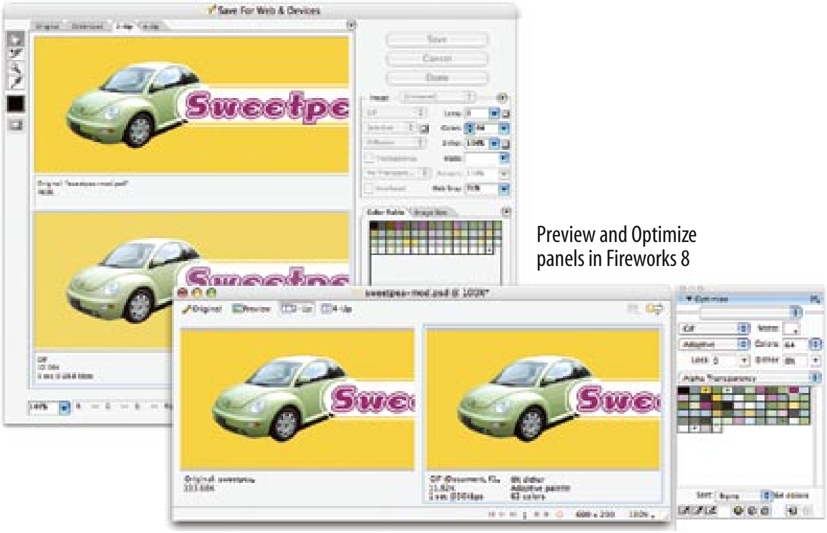
One of the best strategies for making files as small as possible is to design for efficient compression. For example, because you know that GIF compression likes flat colors, don't design GIF images with gradient color blends when a flat color will suffice. Similarly, because JPEG likes soft transitions and no hard edges, you can try strategically blurring images that will be saved in JPEG format. These strategies are discussed in more detail later in this chapter.

Use web graphics tools

If you know you will be doing a lot of web production work, it is worth investing in image editing software such as Adobe Photoshop or Adobe (Macromedia) Fireworks.

Figure 19-2 shows the Save for Web & Devices dialog box in Photoshop CS3 and the Optimize and Preview panels in Fireworks 8. We used the Save for Web function in Chapter 18, Web Graphics Basics to resize an image and to make transparency settings. In this chapter, we'll explore the settings that pertain to keeping file sizes as small as possible.

Save for Web & Devices dialog box in Photoshop CS3



Preview and Optimize panels in Fireworks 8

Figure 19-2. Web graphics optimizing tools in Photoshop CS3 and Fireworks 8

Both tools allow you to preview the final image and its respective file size as you make your optimization settings, so you can tweak settings and see the results instantly. The set of options varies by file type, so I'll explain them one format at a time, starting with that old favorite, GIF.

NOTE

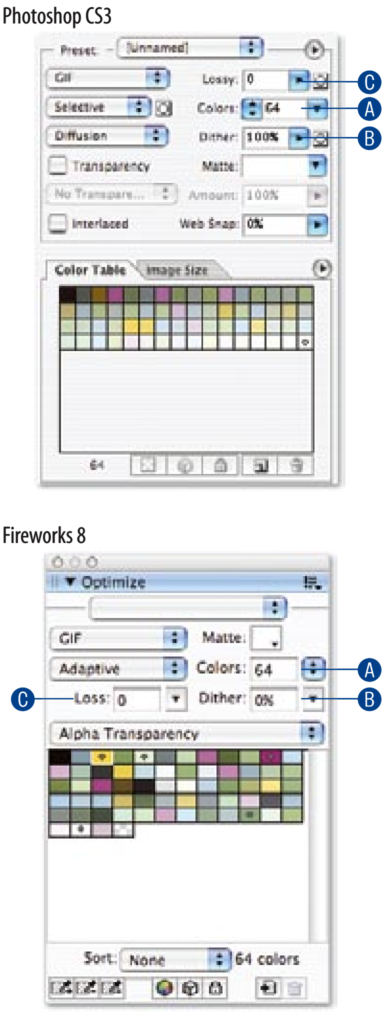
Adobe ImageReady, the web graphics tool bundled with Photoshop versions 6 through CS2, has been discontinued in favor of Fireworks, which Adobe acquired from Macromedia. For this reason, this book sticks with Photoshop and Fireworks. If you have a copy of ImageReady, you will find that the optimization options are a close match to Photoshop's Save for Web & Devices.

JPEG Optimization Tools

If you are really concerned with making the smallest JPEGs possible while maximizing image quality, I recommend checking out specialized compression utilities. These tools have been programmed specifically to work with JPEGs, so they've got fancy algorithms that can compress files much smaller than Photoshop alone.

ProJPEG by BoxTop Software
www.boxtopsoft.com

JPEG Cruncher by Spinwave
www.spinwave.com



Photoshop CS3

Preset: [Unnamed]

GIF — Lossy: 0

Selective — Colors: 64

Diffusion — Dither: 100%

□ Transparency — Matte:

No Transparency — Amount: 100%

□ Interlaced — Web Snap: 0%

Color Table | Image Size

64

Fireworks 8

Optimize

GIF — Matte:

Adaptive — Colors: 64

Loss: 0 — Dither: 0%

Alpha Transparency

Sort: None — 64 colors

Figure 19-3. GIF optimization options in Photoshop and Fireworks.

Optimizing GIFs

When optimizing GIF images, it is useful to keep in mind that GIF compression works by condensing strings of repetitive pixel colors. Many optimization strategies work by creating more areas of solid color for the compression scheme to sink its teeth into.

The general methods for keeping GIF file sizes in check are:

- Reducing the number of colors (the bit-depth) of the image
- Reducing dithering in the image
- Applying a "lossy" filter
- Designing with flat colors

This section looks at each of these options using Photoshop's Save for Web & Devices and Fireworks' Optimize panels as springboards (Figure 19-3). When a feature is specific to these tools, I will note it; otherwise, the approaches shown here should be achievable with most image editing software.

Reducing the number of colors

The most effective way to reduce the size of a GIF file, and therefore the first stop in your optimization journey, is to reduce the number of colors in the image.

Although GIFs can contain up to 256 colors, there's no rule that says they have to. In fact, by reducing the number of colors (bit-depth), you can significantly reduce the file size of an image. One reason for this is that files with lower bit depths contain less data. Another byproduct of the color reduction is that more areas of flat color are created by combining similar, abutting pixel colors. More flat color areas mean more efficient compression.

Nearly all graphics programs that allow you to save or export to GIF format will also allow you to specify the number of colors or bit depth. In Photoshop and Fireworks, the color count and the color table are revealed in the settings panel. Click on the Colors pop-up menu Ⓐ to select from a standard list of numbers of colors. Some tools give you a list of bit-depths instead. See the Bit Depth sidebar for how bit-depths match up to numbers of colors. When you select smaller numbers, the resulting file size shrinks as well.

If you reduce the number of colors too far, of course, the image begins to fall apart or may cease to communicate effectively. For example, in Figure 19-4, once I reduced the number of colors to eight, I lost the rainbow, which was the whole point of the image. This "meltdown" point is different from image to image.

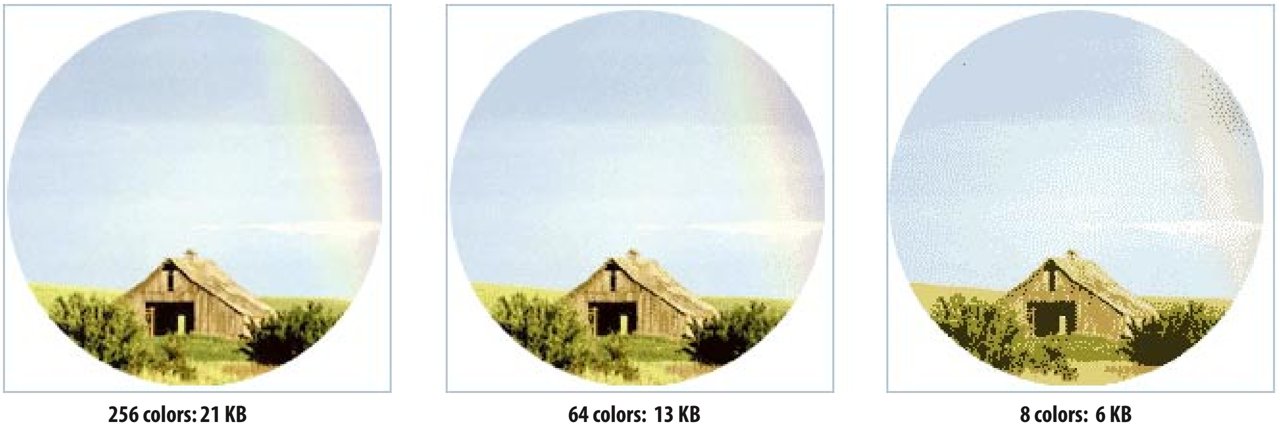


Figure 19-4. Reducing the number of colors in an image reduces the file size.

You'll be surprised to find how many images look perfectly fine with only 32 pixel colors (5-bit). That is usually my starting point for color reduction, and I go higher only if necessary. Some image types fare better than others with reduced color palettes, but as a general rule, the fewer the colors, the smaller the file.

NOTE

The real size savings kick in when there are large areas of flat color. Keep in mind that even if your image has 8-pixel colors, if it has a lot of blends, gradients, and detail, you won't see the kind of file size savings you might expect with such a severe color reduction.

Reducing dithering

When the colors in an image are reduced to a specific palette, the colors that are *not* in that palette get approximated by dithering. Dithering is a speckle pattern that results when palette colors are mixed to simulate an unavailable color.

In photographic images, dithering is not a problem and can even be beneficial; however, dithering in flat color areas is usually distracting and undesirable. In terms of optimization, dithering is undesirable because the speckles disrupt otherwise smooth areas of color. Those stray speckles stand in the way of GIF compression and result in larger files.

One way to shave extra bytes off a GIF is to limit the amount of dithering. Again, nearly all GIF creation tools allow you to turn dithering on and off. Photoshop and Fireworks go one step further by allowing you to set the specific amount of dithering on a sliding scale (Figure 19-3, Ⓑ). You can even preview the results of the dither setting, so you can decide at which point the degradation in image quality is not worth the file size savings (Figure 19-5). In images with smooth color gradients, turning dithering off results in unacceptable banding and blotches.

Bit Depth

Bit depth is a way to refer to the maximum number of colors a graphic can contain. This chart shows the number of colors each bit depth can represent:

1-bit	2 colors
2-bit	4 colors
3-bit	8 colors
4-bit	16 colors
5-bit	32 colors
6-bit	64 colors
7-bit	128 colors
8-bit	256 colors

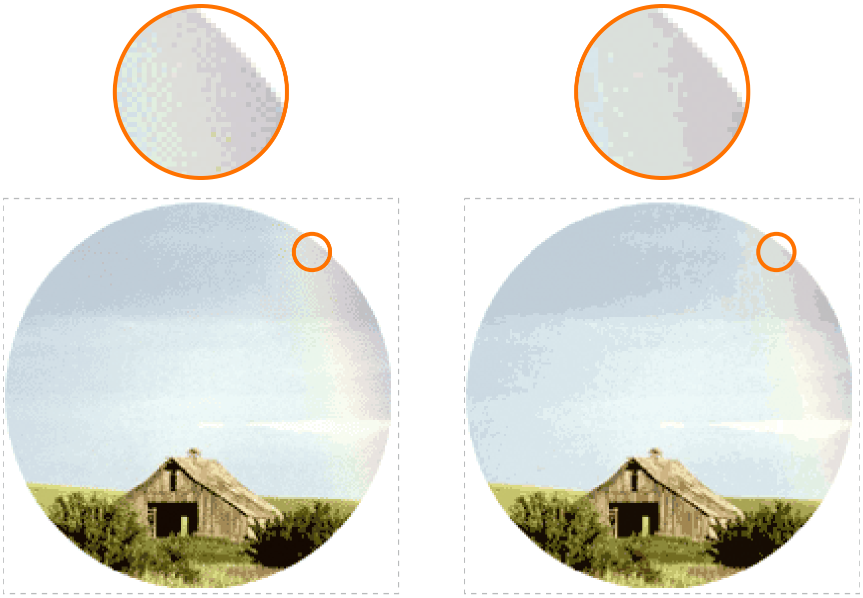
NOTE

If you've been paying attention, you may be thinking that the photo of the barn in this section should be saved as a JPEG, not a GIF. You're absolutely right. Normally, I wouldn't make this photo a GIF, but I'm using it in the examples for this section because it reveals the effects of optimization more dramatically than an image with flat colors. Thank you for bearing with me.

GRAPHICS TIP

Finding the "Sweet Spot"

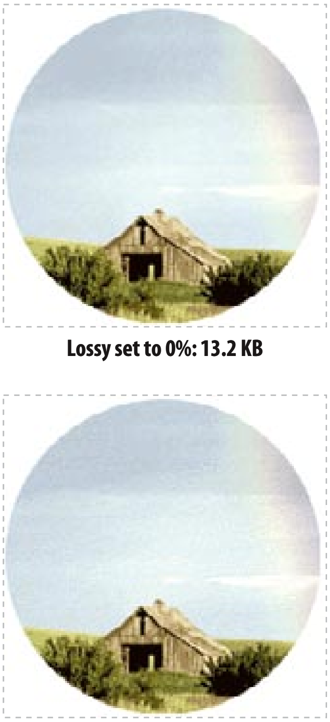
You will see that finding the best optimization for a given image requires adjusting all of these attributes (bit-depth, dithering, lossiness) in turn until the best image quality at the smallest file size is achieved. It takes time and practice, but eventually, you will find the "sweet spot" for each image.



Dithering: 9.6 KB

No dithering: 7.8 KB

Figure 19-5. Turning off or reducing the amount of dithering reduces the file size. Both images have 32 pixel colors and use an adaptive palette.



Lossy set to 0%: 13.2 KB

Lossy set to 25%: 7.5 KB

Figure 19-6. File size without and with the Lossy setting applied in Photoshop.

Using the lossy filter

As we discussed in Chapter 18, GIF compression is lossless, which means every pixel in the indexed color image is preserved during compression. You can force some pixels to be thrown out prior to compression, however, using the Lossy setting in Photoshop or Loss in Fireworks (Figure 19-3, Ⓒ).

Again, throwing out stray pixels is all in the name of maximizing repetition in strings of pixel colors, allowing GIF compression to do its stuff. Depending on the image, you can apply a loss value of 5% to 30% without seriously degrading the image. Figure 19-6 shows the results of applying Photoshop's Lossy setting to the barn image.

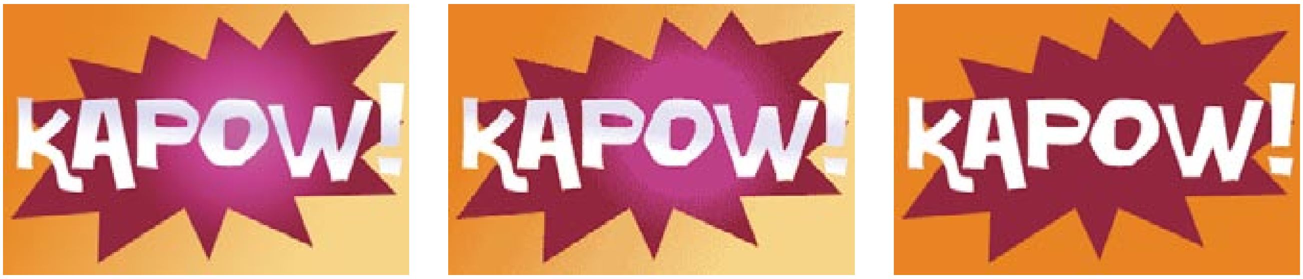
This technique works best for continuous tone art (but then, images that are all continuous tone should probably be saved as JPEGs anyway). You might try playing with lossiness on an image with a combination of flat and photographic content.

Designing for GIF compression

Now that you've seen how high bit-depths and dithering bloat GIF file sizes, you have a good context for my next tip. Before you even get to the point of making optimization settings, you can be proactive about optimizing your graphics by designing them to compress well in the first place.

Keep it flat

I've found that as a web designer, I've changed my illustration style to match the medium. In graphics where I might have used a gradient blend, I now opt for a flat color. In most cases, it works just as well, and it doesn't introduce unflattering banding and dithering or drive up the file size (Figure 19-7). You may also choose to replace areas of photos with subtle blends, such as a blue sky, with flat colors if you need to save them as GIFs (otherwise, the JPEG format may be better).



This GIF has gradient blends and 256 colors. Its file size is **19 KB.**

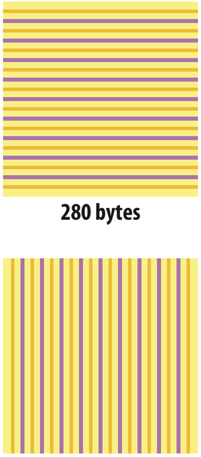
Even when I reduce the number of colors to 8, the file size is **7.6 KB**.

When I create the same image with flat colors, the size is only **3.2 KB**.

Figure 19-7. *You can keep file sizes small by designing in a way that takes advantage of the GIF compression scheme.*

Horizontal stripes

Here's an esoteric little tip. When you are designing your web graphics, keep in mind that GIF compression works best on horizontal bands of color. If you want to make something striped, it's better to make the stripes horizontal rather than vertical (Figure 19-8). Silly, but true.



280 bytes

585 bytes

Figure 19-8. *GIFs designed with horizontal bands of color will compress more efficiently than those with vertical bands.*

Summing up GIF optimization

The GIF format offers many opportunities for optimization. Designing with flat colors in the first place is a good strategy for creating small GIFs. The next tactic is to save the GIF with the fewest number of colors possible to keep the image intact. Adjusting the amount of dithering and applying a loss filter are additional ways to squeeze out even more bytes.

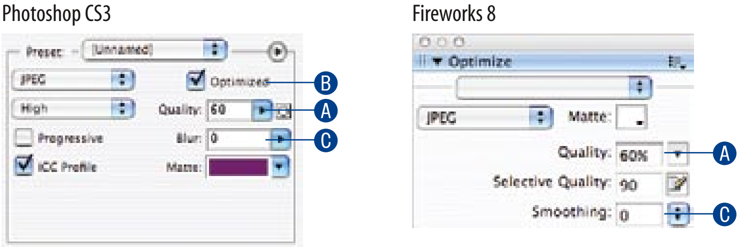
Exercise 19-1 on the following page gives you a chance to try out some of these techniques.

Optimizing JPEGs

JPEG optimization is slightly more straightforward than GIF. The general strategies for reducing the file size of JPEGs are:

- Be aggressive with compression
- Use Weighted (Selective) Optimization if available
- Choose Optimized if available
- Soften the image (Blur/Smoothing)

This section explains each approach, again using Photoshop's and Fireworks' optimization tools, shown in Figure 19-10. Notice that there is no color table for JPEGs because they do not use palettes.



Photoshop CS3

Preset: [Unnamed]

JPEG ☑ Optimized

High Quality: 60

□ Progressive Blur: 0

☑ ICC Profile Matte:

Fireworks 8

Optimize

JPEG Matte:

Quality: 60%

Selective Quality: 90

Smoothing: 0

Figure 19-10. JPEG optimization options in Photoshop's Save for Web & Devices dialog box (left) and Fireworks' Optimize panel (right).

Before we get to specific settings, let's take a look at what JPEG compression is good at. This will provide some perspective for later techniques in this section.

Getting to know JPEG compression

The JPEG compression scheme loves images with subtle gradations, few details, and no hard edges. One way you can keep JPEGs small is to start with the kind of image it likes.

Avoid detail

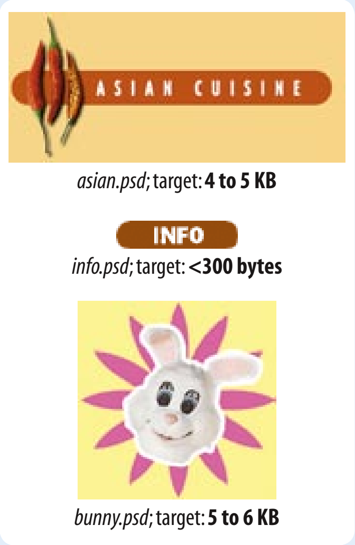
JPEGs compress areas of smooth blended colors much more efficiently than areas with high contrast and sharp detail. In fact, the blurrier your image, the smaller the resulting JPEG. Figure 19-11 shows two similar graphics with blended colors. You can see that the image with contrast and detail is more than four times larger at the same compression/quality setting.

exercise 19-1 | **Making lean and mean GIFs**

See if you can reduce the file sizes of the images in Figure 19-9 to within the target size range without seriously sacrificing image quality. The starting images are available with the materials for this chapter at *www.learningwebdesign.com*.

Take advantage of all the techniques covered in this section if you have Photoshop (version 6 or later) or Fireworks (version 4 or later). You can still play along with other tools such as Corel Paint Shop Pro, but you may not have such fine-tuned control over dithering or a Lossy setting.

There are many ways to achieve the desired file size, and there are no "right" answers. It is mostly a matter of your personal judgment, but the target file sizes give you a reasonable number to shoot for.



asian.psd; target: **4 to 5 KB**

info.psd; target: **<300 bytes**

bunny.psd; target: **5 to 6 KB**

Figure 19-9. Create GIFs that are optimized to the target file sizes.

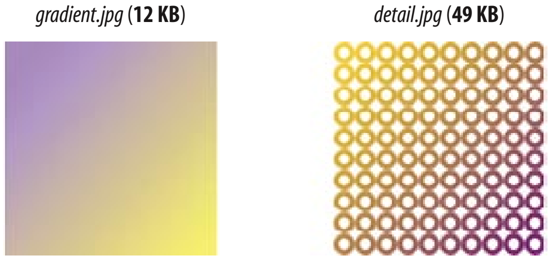
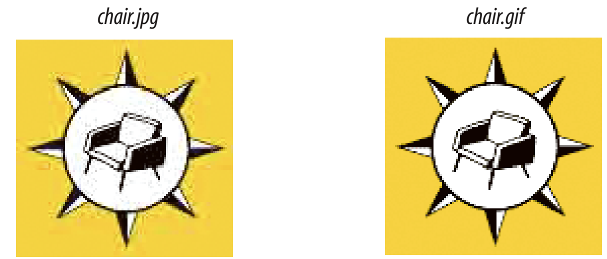


Figure 19-11. JPEG compression works better on smooth blended colors than hard edges and detail.

Avoid flat colors

It's useful to know that totally flat colors don't fare well in JPEG format because the colors tend to shift and get mottled as a result of the compression, particularly at higher rates of compression (Figure 19-12). In general, flat graphical images should be saved as GIFs because the image quality will be better and the file size smaller.



In the JPEG, the flat color changes and gets blotchy. Detail is lost as a result of JPEG compression.

In the GIF, the flat colors and crisp detail are preserved.

Figure 19-12. The same flat graphical image saved as both a JPEG and a GIF.

Unpredictable Color in JPEGs

In GIF images, you have total control over the colors that appear in the image, making it easy to match RGB colors in adjoining GIFs or in an inline GIF and a background image or color.

Unfortunately, flat colors shift around and get somewhat blotchy with JPEG compression, so there is no way to control the colors precisely. Even pure white can get distorted in a JPEG.

This means there is no guaranteed way to create a perfect, seamless match between a JPEG and another color, whether in a GIF, PNG, another JPEG, or even an RGB background color. If you need a seamless match between the foreground and background image, consider switching formats to GIF or PNG to take advantage of transparency to let the background show through.

Be aggressive with compression

The primary tool for optimizing JPEGs is the Quality setting (Figure 19-10, Ⓐ). The Quality setting allows you to set the rate of compression; lower quality means higher compression and smaller files. Figure 19-13 shows the results of different quality (compression) rates as applied in Photoshop and Fireworks.

Notice that the image holds up reasonably well, even at very low quality settings. Notice also that the same settings in each program produce different results. This is because the quality rating scale is not objective—it varies from program to program. For example, 1% in Photoshop is similar to 30% in Fireworks and other programs. Furthermore, different images can withstand different amounts of compression. It is best to go by the way the image looks rather than a specific number setting.

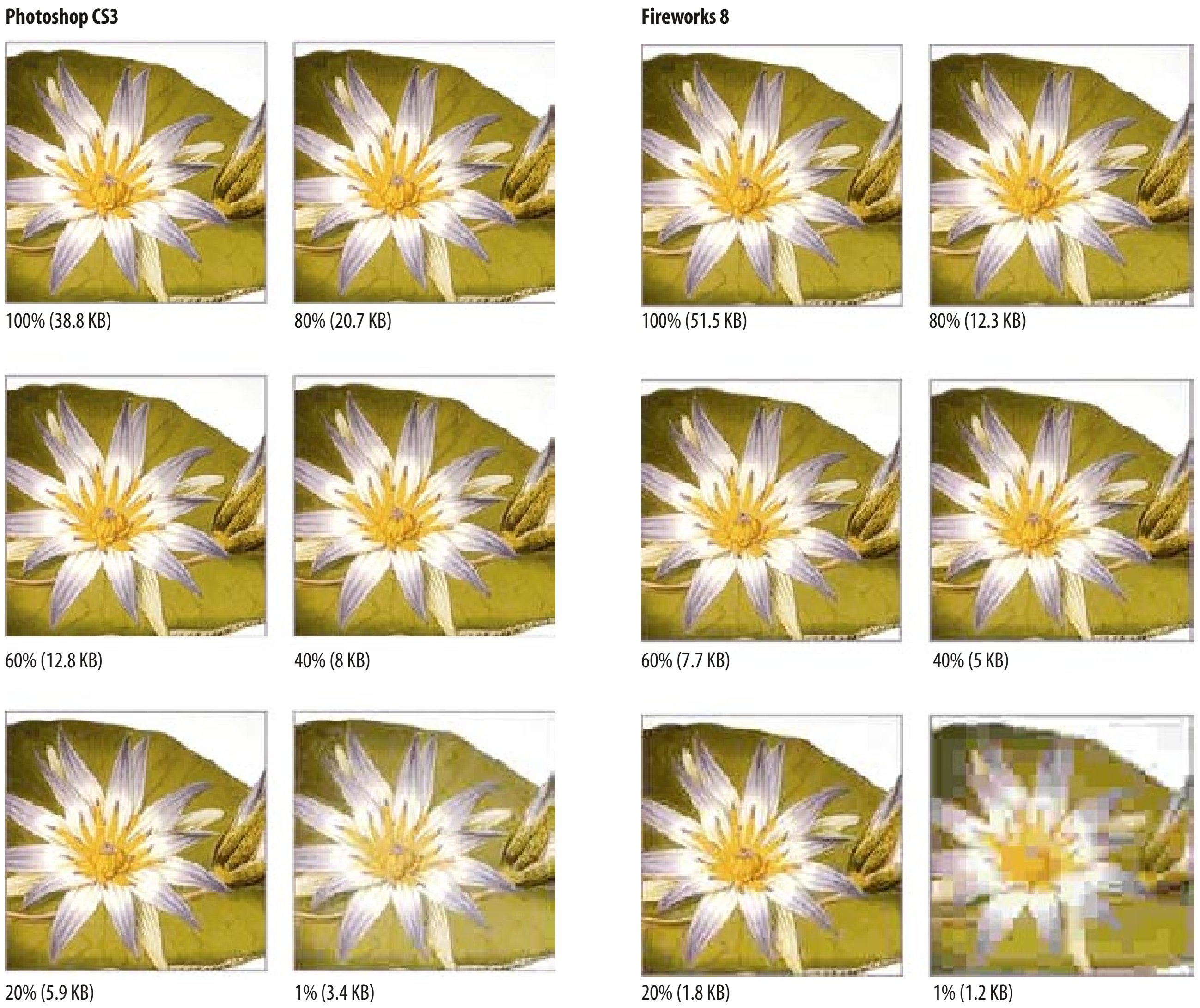


Figure 19-13. A comparison of various compression levels in Photoshop and Fireworks.

Weighted optimization (selective JPEGs)

Not all image areas are created equal. You may wish to preserve detail in one area, such as a person's face, but compress the heck out of the rest of the image. To this end, Photoshop (versions 6 and higher) gives us Weighted Optimization. In Fireworks, it's called Selective Quality. Both methods apply different amounts of JPEG compression within a single image—one setting for a selected area and another setting for the rest of the image.

In both programs, the process starts by using a selection tool to select the area of the image you'd like to preserve. From there, the programs work a little differently.

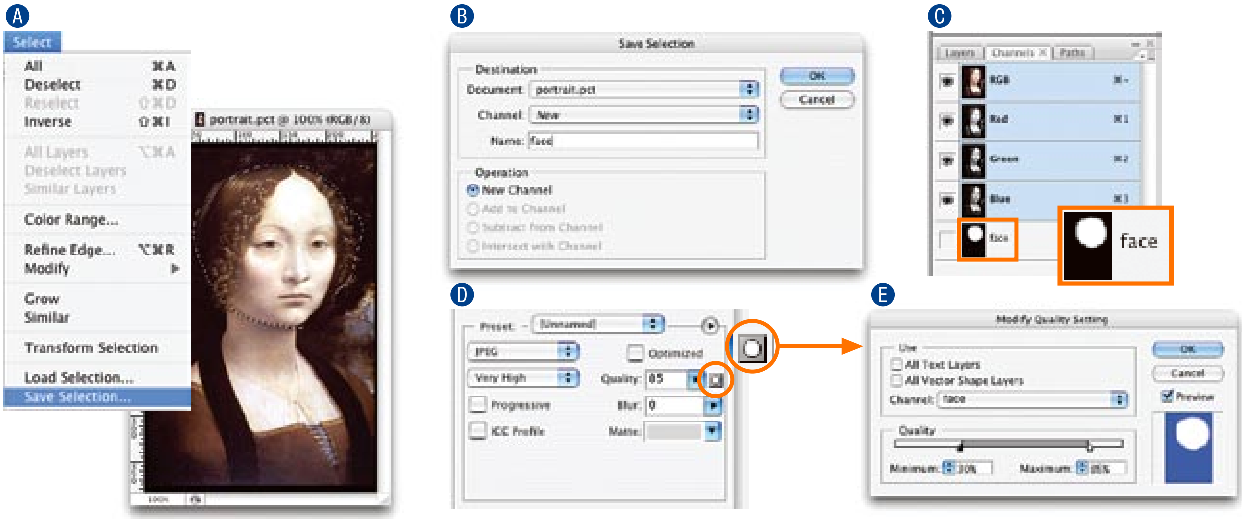
Using weighted optimization (Photoshop)

In Photoshop, once you've selected the higher-quality areas of the image, save the selection to a new channel (Select → Save Selection) (Figure 19-14, Ⓐ) and give the channel a name Ⓑ. The white areas of the mask correspond to the highest image quality, while dark areas describe the lowest (gray areas are on a linear scale in between) Ⓒ.

In the JPEG options in the Save for Web & Devices dialog box, there is a Mask button next to the Quality setting Ⓓ. Clicking the Mask button gives you the Modify Quality Setting dialog box Ⓔ where you can set the quality levels for the black (low quality) areas and white (high quality) areas of the masked image. Selecting the Preview option allows you to see the results of your settings. When you are done, click OK, then Save.

NOTE

Photoshop offers weighted optimization GIFs as well (Fireworks does not). Look for the Mask button like the one pictured in Figure 19-14 Ⓓ next to the Palette, Lossy, and Dither options to access the respective settings. Refer to the Photoshop documentation for more detailed instructions.



Document: portrait.pct
Channel: New
Name: face
● New Channel
○ Add to Channel
○ Subtract from Channel
○ Intersect with Channel

Preset: [Unnamed]
Quality: 85

□ All Text Layers
□ All Vector Shape Layers
Channel: face
☑ Preview
Minimum: 20%
Maximum: 85%

Select the image areas you want to preserve and save the selection as a channel.

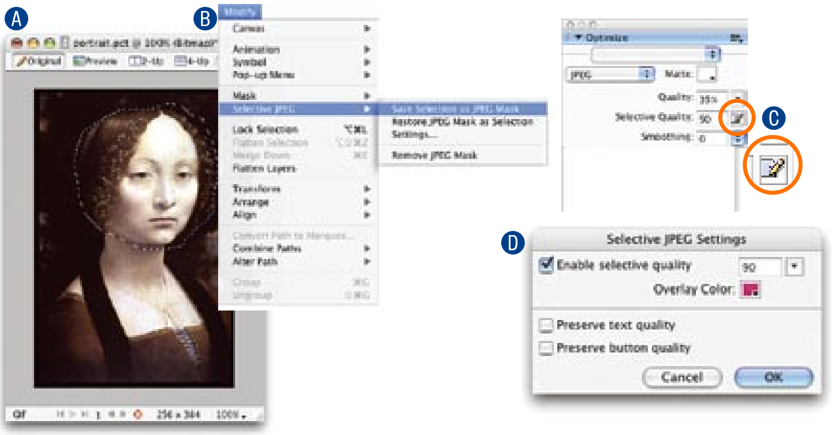
Click the Mask button next to the JPEG Quality setting to access the Modify Quality Setting dialog box.

Adjust the settings for the white (high quality) and dark (low quality) areas of the masked image.

Figure 19-14. Using Weighted Optimization in Photoshop CS3.

Using selective quality (Fireworks)

Fireworks has a set of options for creating what it calls "selective JPEGs" (Figure 19-15). Select the areas of the image you want to preserve Ⓐ, then select Modify → Selective JPEG → Save Selection as JPEG Mask Ⓑ. In the Optimize panel, you can set the Selective Quality for your selection or click the adjacent icon Ⓒ to access the Selective JPEG dialog box with a full set of options, such as preserving type and button quality and selecting a color for the masked area. The regular Quality setting will be used for all other areas of the image.



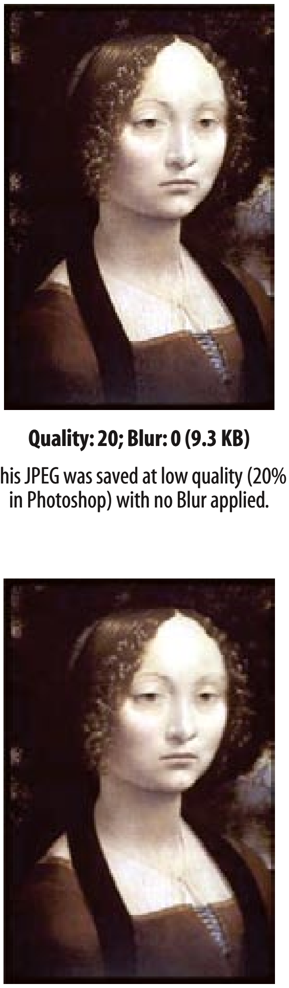
JPEG
Matte:
Quality: 35%
Selective Quality: 90
Smoothing: 0

Selective JPEG Settings
☑ Enable selective quality 90
Overlay Color: 🟥
□ Preserve text quality
□ Preserve button quality

Select the area you want to preserve and save it as a Selective JPEG Mask.

In the Optimize panel, the button next to Selective Quality access the full set of quality options for the selection.

Figure 19-15. Using Selective Quality in Fireworks 8.



Quality: 20; Blur: 0 (9.3 KB)

This JPEG was saved at low quality (20% in Photoshop) with no Blur applied.

Quality: 20; Blur: .5 (7.2 KB)

With a Blur setting of only .5, the resulting file size is 22% smaller. In Fireworks, use Smoothing for similar results.

Figure 19-16. Blurring the image slightly before exporting as a JPEG results in smaller file sizes.

Choose optimized JPEGs

Optimized JPEGs have slightly smaller file sizes and better color fidelity (although I've never been able to see the difference) than standard JPEGs. For this reason, you should select the Optimized option if your image software offers it (Figure 19-10, Ⓑ). Look for the Optimized option in Photoshop and third-party JPEG compression utilities. Fireworks does not offer the option as of this writing.

Blurring or smoothing the image

Because soft images compress smaller than sharp ones, Photoshop and Fireworks make it easy to blur the image slightly as part of the optimization process. In Photoshop, the tool is called Blur (Figure 19-10, Ⓒ); in Fireworks, it's Smoothing (Figure 19-10, Ⓒ). Blurring makes the JPEG compression work better, resulting in a smaller file (Figure 19-16). If you don't have these tools, you can soften the whole image yourself by applying a slight blur to the image with the Gaussian Blur filter (or similar) manually prior to export.

The downside of Blur and Smoothing filters is that they are applied evenly to the entire image. If you want to preserve detail in certain areas of the image, you can apply a blur filter just to the areas you don't mind being blurry. When you're done, export the JPEG as usual. The blurred areas will take full advantage of the JPEG compression, and your crisp areas will stay crisp. Try combining this selective blurring technique with Weighted Optimization or Selective JPEGs for even more file savings.

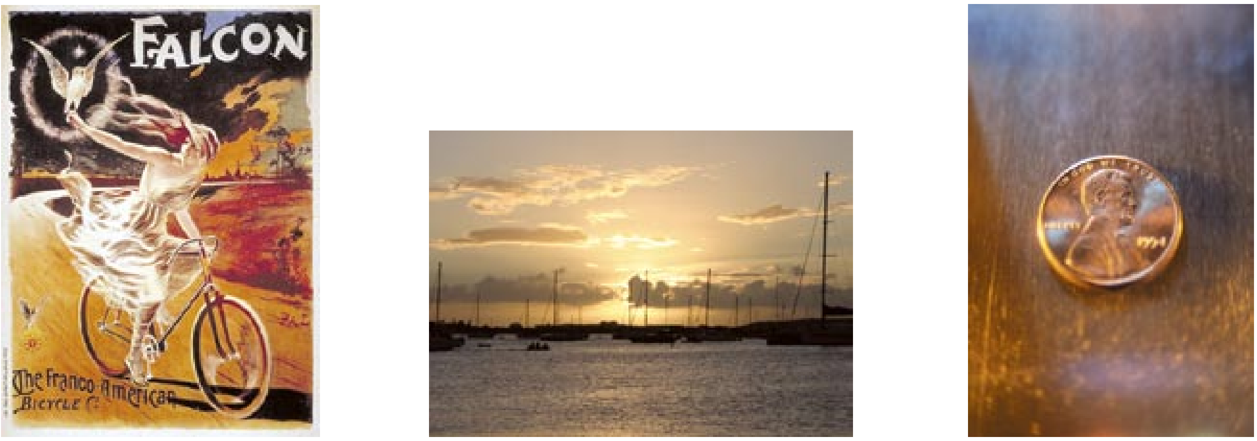
Summing up JPEG optimization

Your primary tool for optimizing JPEGs is the Quality (compression) setting. If your tools offer them, making the JPEG Optimized or applying Blur or Smoothing will make them smaller. Again, if JPEG images are central to your site and both size and quality are priorities, you may find that specialized JPEG utilities (listed in the JPEG Optimization Tools sidebar) are worth the investment. They generally produce smaller file sizes with better image quality than Photoshop and Fireworks.

Now it's your turn to play around with JPEGs in Exercise 19-2.

exercise 19-2 | Optimizing JPEGs

Once again, see if you can use the techniques in this section to save the JPEGs in Figure 19-17 in the target file size range. There are no right answers, so follow your preferences. What is important is that you get a feel for how file size and image quality react to various settings.



falcon.tif
target: 35–40 KB

Imagine that this image is going on a site that sells poster where it would be important to preserve the type and painting detail throughout the image. The result is you can't compress it as far as other images.

boats.psd
target: 24–30 KB

Watch for JPEG artifacts around the lines and masts of the boats. Try to keep those lines clean.

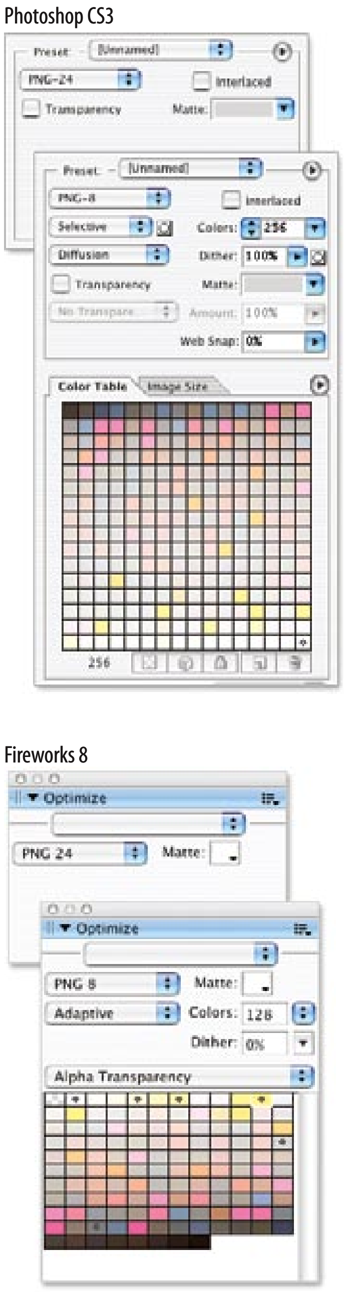
penny.tif
target: 12–18 KB

This image is a good candidate for some manual blurring of the background prior to compression.

Figure 19-17. *Match the file sizes.*

Optimizing PNGs

As discussed in the previous chapter, there are two types of PNG files: 24-bit PNGs (PNG-24) that contain colors from the millions of colors in the RGB color space, and 8-bit indexed PNGs (PNG-8) with a palette limited to 256 colors. This section looks at what you can (and can't) do to affect the file size both kinds of PNG files.



Photoshop CS3

Preset: [Unnamed]
PNG-24 □ Interlaced
□ Transparency Matte:

Preset: [Unnamed]
PNG-8 □ Interlaced
Selective Colors: 256
Diffusion Dither: 100%
□ Transparency Matte:
No Transparency Amount: 100%
Web Snap: 0%

Fireworks 8

PNG 24 Matte:

PNG 8 Matte:
Adaptive Colors: 128
Dither: 0%
Alpha Transparency

Figure 19-18. PNG-24 and PNG-8 settings in Photoshop and Fireworks.

PNG-24

PNG's lossless compression makes PNG-24 a wonderful format for preserving quality in images, but unfortunately, it makes it a poor option for web graphics. A PNG-24 will always be significantly larger than a JPEG of the same image because no pixels are sacrificed in the compression process. Therefore, your first "lean and mean" strategy is to avoid PNG-24 for photographic images and choose JPEG instead.

The big exception to this rule is if you want to use multiple levels of transparency (alpha transparency). In that case, given today's tools and browsers, PNG-24 is your only option.

There aren't any tricks for reducing the file size of a PNG-24, as evidenced by the lack of options on the PNG-24 export panels (Figure 19-18). You'll have to accept the file size that your image editing tool cranks out.

PNG-8

Indexed color PNGs work similarly to GIFs, and in fact, usually result in smaller file sizes for the same images, making them a good byte-saving option. The general strategies for optimizing GIFs also apply to PNG-8s:

- Reduce the number of colors
- Reduce dithering
- Design with flat colors

You can see that the list of export options for PNG-8s is more or less the same as for GIF (Figure 19-18). The notable exception is that there is no "lossy" filter for PNGs as there is for GIFs. Otherwise, all of the techniques listed in the Optimizing GIFs section apply to PNGs as well.

It is worth noting that making a PNG interlaced significantly increases its file size, by as much as 20 or 30 percent. It is best to avoid this option unless you deem it absolutely necessary to have the image appear in a series of passes.

NOTE

I have not included an exercise specifically for PNGs because there are no new settings or strategies to explore. However, you should feel free to try making PNG-8s and PNG-24s out of the images in the previous two exercises, and see how they compare to their GIF and JPEG counterparts.

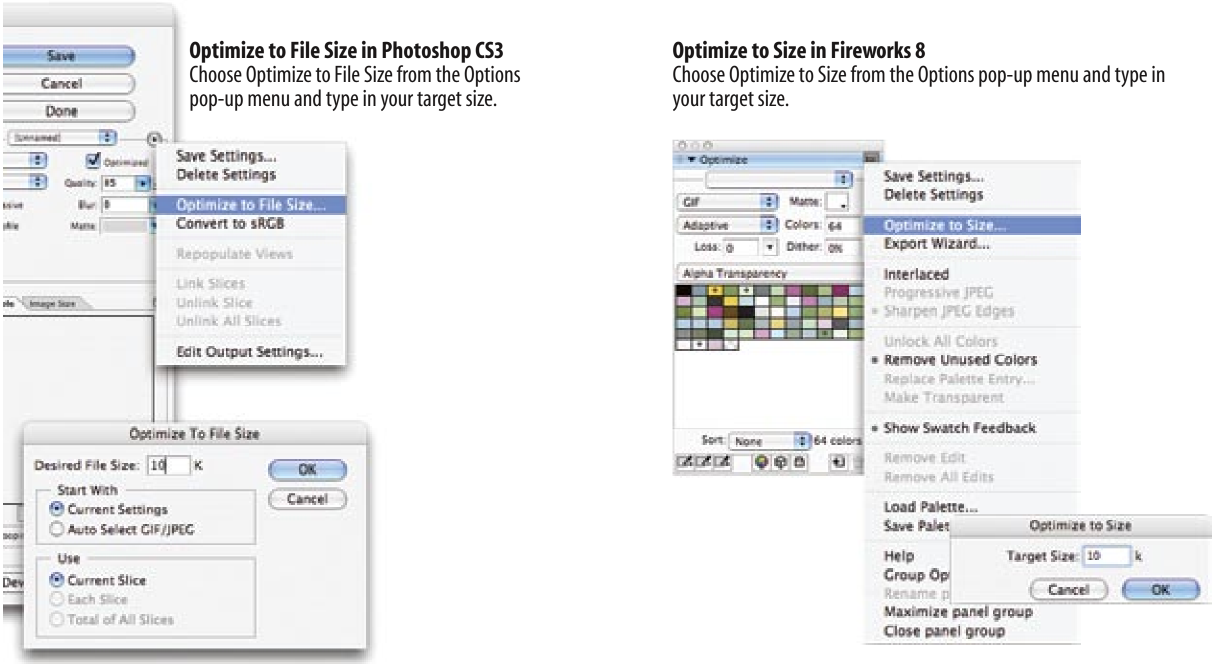
Optimize to File Size

One last optimizing technique is good to know about if you use Photoshop or Fireworks.

In some instances, you may need to optimize a graphic to hit a specific file size, for example, when designing an ad banner with a strict K-limit. Both Photoshop and Fireworks offer an Optimize to File Size function. You just set the desired file size and let the program figure out the best settings to use to get there, saving you lots of time finagling with settings.

This feature is pretty straightforward to use. In Photoshop, choose "Optimize to File Size" from the Options pop-up menu in the Save for Web & Devices dialog box . In Fireworks, choose "Optimize to Size" from the Options pop-up menu in the Optimize panel (Figure 19-19). All you need to do is type in your desired target size and click OK. The tool does the rest.

Photoshop also asks if you'd like to start with your own optimization settings or let Photoshop select GIF or JPEG automatically. Curiously, PNG is not an option for automatic selection, so start with your own settings if you want to save as PNG.



Optimize to File Size in Photoshop CS3
Choose Optimize to File Size from the Options pop-up menu and type in your target size.

Optimize to Size in Fireworks 8
Choose Optimize to Size from the Options pop-up menu and type in your target size.

Optimize To File Size

Desired File Size: 10 K

Start With
● Current Settings
○ Auto Select GIF/JPEG

Use
● Current Slice
○ Each Slice
○ Total of All Slices

Optimize to Size

Target Size: 10 k

Figure 19-19. Optimizing to a specific file size (in Photoshop and Fireworks).

Optimization in Review

If this collection of optimization techniques feels daunting, don't worry. After a while, they'll become part of your standard production process. You'll find it's easy to keep your eye on the file size and make a few setting tweaks to bring that number down. Now that you have the added advantage of understanding what the various settings are doing behind the scenes, you can make informed and efficient optimization decisions.

Combine your new graphics production skills with your knowledge of (X)HTML and style sheets, and you've got what it takes to put together a complete web site. But we're not quite through. In Part III, we'll take a birds-eye view at the web site production process as well as how to get your site on the Web.

Test Yourself

Now that you're acquainted with the world of graphics optimization, it's time to take a little test. I know you'll ace it.

1. Why do professional web designers optimize their graphics?

2. How does dithering affect the file size of a GIF?

3. How does the number of pixel colors affect the file size of a GIF?

4. What is the most effective setting for optimizing a JPEG?

5. How does the Blur or Smoothing setting affect JPEG size?

6. What is the best way to optimize a PNG-8? A PNG-24?

FROM START TO FINISH

PART V

IN THIS PART

Chapter 20
The Site Development Process

Chapter 21
Getting Your Pages on the Web

CHAPTER 20

THE SITE DEVELOPMENT PROCESS

By now you are familiar with (X)HTML and CSS, but markup and visual design are only pieces of the whole web design process. In this chapter and the following, we'll broaden the scope to consider the big picture of how sites get built and published to the Web.

Web sites come in all shapes and sizes—from a single page résumé to mega-sites conducting business for worldwide corporations and everything in between. Regardless of the scale, the process for developing a site involves the same basic steps:

1. Conceptualize and research.
2. Create and organize content.
3. Develop the "look and feel."
4. Produce a working prototype.
5. Test it.
6. Launch the site.
7. Maintain.

Of course, depending on the nature and scale of the site, these steps will vary in sequence, proportion, and number of people required, but in essence, they are the aspects of a typical journey in the creation of a site. This chapter examines each step of the web design process.

IN THIS CHAPTER

The standard steps in the web design process:

Conceptualization and research

Content organization and creation

Art direction

Prototype building

Testing

Site launch

Maintenance

1. Conceptualize and Research

Every web site begins with an idea. It's the result of some*one* wanting to get some*thing* online, be it for personal or commercial ends. This early phase is exciting. You start with the core idea ("photo album for my family," "shopping site for skateboarding gear," "online banking," etc.) then brainstorm on how it's going to manifest itself as a web site. This is a time for lists and sketches, whiteboards and notebooks. What's going to make it exciting? What's going to be on the first page?

Some Questions Before You Begin

This is just a small sampling of the questions you should ask yourself or your clients during the research phase of design.

Strategy

- Why are you creating this web site? What do you expect to accomplish?
- What are you offering your audience?
- What do you want users to do on your web site? After they've left?
- What brings your visitors back?

General Site Description

- What kind of site is it? (Purely promotional? Info-gathering? A publication? A point of sale?)
- What features will it have?
- What are your most important messages?
- Who are your competitors? What are they doing right? What could be improved upon?

Target Audience

- Who is your primary audience?
- How Internet-savvy are they? How technically savvy?
- Can you make assumptions about an average user's connection speed? Platform? Monitor size? Browser use?
- How often do you expect them to visit your site? How long will they stay during an average visit?

Content

- Who is responsible for generating original content?
- How will content be submitted (process and format)?
- How often will the information be updated (daily, weekly, monthly)?

Resources

- What resources have you dedicated to the site (budget, staff, time)?
- Does the site require a full content management system?
- Can maintenance be handled by the client's staff?
- Do you have a server for your site?
- Have you registered a domain name for your site?

Graphic Look and Feel

- Are you envisioning a certain look and feel for the site?
- Do you have existing standards, such as logos and colors, that must be incorporated?
- Is the site part of a larger site or group of sites with design standards that need to be matched?
- What are some other web sites you like? What do you like about them? What sites do you not like?

Don't bother launching an HTML editor until you have your ideas and strategy together. This involves asking your client (or yourself) a number of questions regarding resources, goals, and, most importantly, audience. The Some Questions Before You Begin sidebar provides just a sampling of the sorts of questions you might ask before you start a project.

Many web development and design firms spend more time on researching and identifying clients' needs than on any other stage of production.

Many large web development and design firms spend more time on researching and identifying clients' needs than on any other stage of production. For large sites, this step may include case studies, interviews, and extensive market research. There are even firms dedicated to developing web strategies for emerging and established companies.

You may not need to put that sort of effort (or money) into a web site's preparation, but it is still wise to be clear about your expectations and resources early on in the process, particularly when attempting to work within a budget.

2. Create and Organize Content

The most important part of a web site is its content. Despite the buzz about technologies and tools, content is still king on the Internet. There's got to be something of value, whether it's something to read, something to do, or something to buy that attracts visitors and keeps them coming back. Even if you are working as a freelancer, it is wise to be sensitive to the need for good content.

The most important part of a web site is its content.

Content creation

When creating a site for a client, you need to immediately establish who will be responsible for generating the content that goes on the site. Some clients arrive full of ideas but empty-handed, assuming that you will create the site and all of the content in it. Ideally, the client is responsible for generating its own content and will allocate the appropriate resources to do so. Solid copy writing is an important, yet often overlooked component of a successful site.

Solid copy writing is an important, yet often overlooked component of a successful site.

Information design

Once you've got content—or at least a very clear idea of what content you will have—the next step is to organize the content so it will be easily and intuitively accessible to your audience. For large sites, the information design may be handled by a specialist in information architecture. It might also be decided by a team made up of designers and the client. Even personal sites require attention to the division and organization of information.

Again, this is a time for lists and sketchbooks. Get everything that you want in the site out there on the table. Organize it by importance, timeliness, category, and so on. Decide what goes on the home page and what gets divided into sections. Think about how your users would expect to find information on your site and design with their needs and assumptions in mind.

The result of the information design phase may be a diagram (often called a site map) that reveals the overall "shape" of the site. Pages in diagrams are usually represented by rectangles; arrows indicate links between pages or sections of the site. The site map gives designers a sense of the scale of the site and how sections are related, and aids in the navigation design.

Figure 20-1 is a diagram of a small self-promotional site. It is tiny compared to the diagrams for sprawling corporate or e-commerce sites, but it demonstrates how pages and the connections between pages are represented. I once saw a site diagram for a high-profile commercial site that, despite using postage stamp–sized boxes to represent pages, filled the length and height of the hallway.

DESIGN TIP

Viva la Pen and Paper!

There's still no beating pen and paper when it comes to firing up and documenting the creative process. Before you delve into the (X)HTML and GIFs, there's no better way to hash out your ideas quickly than in your handy notepad, on a napkin or whiteboard, or whatever surface is available. It's about creativity.

Make lists. Draw diagrams. Figure out that home page. Do it fast and loose, or include every minute detail and copy it faithfully online. It all comes down to your personal style.

The effectiveness of a site's organization can make or break it. Don't underestimate the importance of this step.

ONLINE RESOURCE

You may be interested in reading my article, "Building Usable Web Sites," that discusses information and interface design in more detail. It is available for download in PDF format from *www.learningwebdesign.com*.

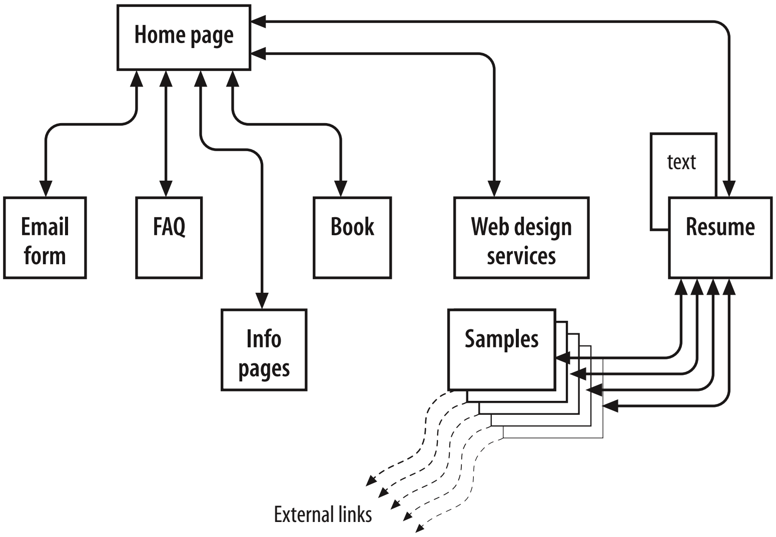


Figure 20-1. A simple site diagram.

TOOL TIP

A popular tool for creating diagrams and flow charts on Mac OS X is OmniGraffle, available at *www.omnigroup.com/applications/omnigraffle*.

For Windows users, there's Visio, part of Microsoft Office (*office.microsoft.com*).

3. Develop the "Look and Feel"

The look and feel of a site refers to its graphic design and overall visual appearance, including its color scheme, typography, and image style (for example, photographic versus illustrative). You may also hear the visual design of a site referred to as the theme or skin. As in the print world, this phase of design is often referred to as art direction.

Sketch it

This is another chance to get out pads of paper and markers. Or perhaps you prefer to work out ideas right in Photoshop. Either way, it's your chance to be creative and try things. The result is one or more sketches (sometimes called a look and feel study) that show off your proposed visual style for the site.

A sketch is usually just a flat graphic file in the approximate dimensions of the browser window. When it is necessary to show interactivity (such as a "rollover" button effect), some designers use a layer in Photoshop that can be switched on and off to simulate the effect.

In some cases, it may be necessary to create a prototype home page in HTML to show off interactive and animated features, particularly if you have a client with no imagination (but a big budget to cover development costs). Keep in mind that the art direction phase is for exploring how the site will look, so flat graphic sketches are usually adequate.

The art direction process

In most professional web development jobs, the client receives two or three sketches showing its home page in various visual styles. In some cases, a second- or third-level design might be included if it is important to show how the design plays out through several levels. Figure 20-2 shows a set of look-and-feel studies I created for a women's site several years ago.

Ideally, the graphic designer is given a list of what must appear on the page, including required images, navigational elements, and a manuscript for the text. There may also be a wireframe diagram of the functionality as worked out by an interface designer. That is the best case scenario; don't be surprised if you are asked to make stuff up on occasion.

After reviewing the sketches, the client picks one sketch, often with a list of changes, requiring another round of design until the final design is agreed upon. In my experience, clients usually see elements they like in each style and ask for some sort of hybrid. Some clients request more and more sketches. See the sidebar, Get It in Writing, for tips on keeping the process under control.

BUSINESS TIP

Get It in Writing

Design comes down to a matter of taste, and clients don't always know what they want. When writing your contract for the job, it is a good idea to specify the number of initial sketches and the number of revisions that will be included for the project price. That way, you have the opportunity to ask for extra compensation should the art direction phase get out of control.

4. Produce a Working Prototype

Once the design is approved and the content is ready to go, the site enters the production phase. For small sites, the production may be done by one person (see the sidebar, Solo Production Process). It is more common in commercial web design to have a team of people working on specialized tasks.

The art department uses its graphics tools to create all the graphics needed for the site. The production department marks up the content with (X)HTML and formats the text with style sheets. They may create final pages or simply templates that get filled out with content on the fly. Programmers write the scripts and server-side applications necessary to make the site function as intended. There may also be multimedia elements such as videos or Flash movies. In short, all of the parts of the site must be built.

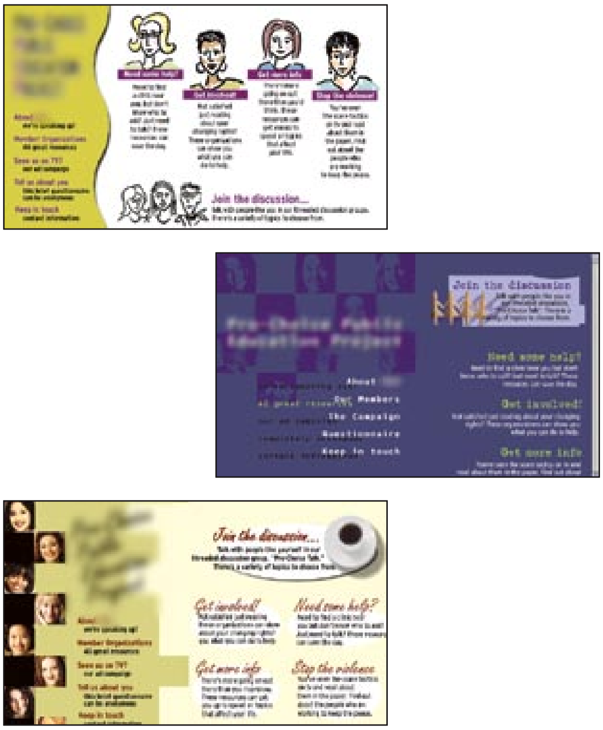


Figure 20-2. As part of the art direction phase, I created three sketches for this women's site, demonstrating how the same material might look in three different visual styles.

At some point, all the pieces are brought together into a working site. This is not necessarily a distinct step; it is more likely to be an ongoing process. As in software design, the first prototype is often called the "alpha" release. It might be made available only to people within the web team for review and revisions before it is released to the client. After changes, the second release is called the "beta." The client should certainly be involved by this phase, if not sooner. At this point, there is still plenty to do before the site is ready to go live on the Web. There are also sites out there, often web applications and services, that make their beta versions open to the public or a limited subscriber base in order to gather valuable feedback.

Solo Production Process

It is perfectly possible to create an entire web site by yourself; in fact, that is one of the cool things about the Web. If you are flying solo, as I do, your production process might go something like this:

1. Sketch out the structure of the home page and second-level pages. You might do this as a simple sketch on paper or you might develop the page structure and its look in Photoshop.
2. Create the (X)HTML documents and images. If you are using a style sheet, you should start it as well. Same goes for scripts.
3. Put the pieces together and look at the page in the browser. If you are using a WYSIWYG web authoring tool, you should still open it in a browser since the layout view is not always accurate. There are some styles and behaviors that can be tested only in the browser.
4. Make changes as necessary to the (X)HTML documents, images, styles, and scripts.
5. Save your changes and reload in the browser (or several browsers).
6. Repeat steps 4 and 5 until the pages are finished.
7. Upload it to the server and test it again.

5. Test It

All web sites need to be tested before they are ready for the public. Professional web developers build time and resources into the production schedule for rigorous testing, but even personal pages need to be taken for a spin around the block before the official launch. Whether formally or informally, sites should be tested for basic functionality, performance in different browsing environments, and how easy they are to use.

The site may be tested locally (on your own hard drive) prior to uploading to its final home on the web server. It is also useful to set up a hidden testing site on the server so that the kinks can be worked out in its natural environment before making it live.

Basic quality check

At minimum, all sites should be tested to make sure they work. In the web design biz, checking a site for basic functionality is one part of what is often called the QA (short for quality assurance) phase of production.

The following questions address some of the minimal requirements before publishing a site to the Web.

Is all the content there? Make sure that none of your content is missing, whether as the result of a markup glitch or miscommunication.

Are there typos or grammar errors? The importance of proofreading a site is often overlooked, but errors in copy can seriously damage the perceived credibility of your site. Make sure all copy is read carefully, preferably by more than one person.

Do all the links work? It's very easy to leave links un-linked during the production process. It is also possible that some files may have been moved around but the links were not updated. Before you go live, have someone click every link on every page to make sure there are no dead ends.

Are all the images showing? Confirm that all the graphic files are in the proper directory and that the correct pathname is used in the `img` elements to avoid missing image icons.

Are all the scripts and applications functioning properly? Run the pages through a few typical user scenarios (filling out forms, buying a product, or whatever interaction make sense for your site) to be sure that everything is working as it should.

Browsing environment testing

As discussed in Chapter 3, The Nature of Web Design, your site will be viewed on a wide range of browsing environments that will impact the way it looks and functions. Another part of quality assurance is to test your pages under as many conditions as possible.

Professional developers typically maintain computers running different operating systems and numerous browser versions for testing purposes. If you are a solo or hobbyist web designer, you will benefit from just looking at your site on a friend's computer that has a different operating system and browser than you used when you created your site.

A robust site will fare well when tested according to the following criteria.

How does the page look in different browsers? On another platform? Browsers are notoriously uneven in their support of Cascading Style Sheets, so if you use CSS for page layout, it is critical that you view your pages in as many graphical browsers as possible. I often use a service called Browsercam (*browsercam.com*) that allows me to view my page in many browser versions without needing to run them on my own machines.

How does the site work in different browsers? On another platform? Similarly, there are browser differences in script support, so run your functionality tests under more than browser/platform configuration. (Unfortunately, Browsercam won't test functionality.)

What happens to the pages when the browser window is resized very large? Very small? What happens if the text is zoomed very large or very small? Can your site withstand a certain amount window and text resizing? Does content fall off the screen? Does the page fall apart?

Is the site usable on a text-only browser? What will users see if they access your page with a mobile phone or PDA? If you've written your (X)HTML documents well, they should be accessible on all manner of browsing devices. Still, it's worthwhile to look at your site under minimal conditions to see if you can make any tweaks to improve the experience.

Is the site usable with the graphics turned off? Some users with slower connections may surf the Web with graphics turned off in the browser to speed up the content display. Some browsers display the alternative text for each image element, but others don't. Have you accommodated those users?

What happens if the user is not able to view the multimedia elements? It would be nice if every user was guaranteed to have the plug-ins required to view media such as Flash movies or Windows Media, but unfortunately, that is not the case. Do you provide help getting the plug-ins they need? Are there alternative versions of your content for those unable to view the media?

What is it like to look at your site on a dial-up modem connection? There is still a significant portion of users accessing the Web over slow connections. Is there anything you can do to make your pages load more quickly?

User testing

Another type of testing that is important to perform is user testing. This process involves sitting people down with your site and seeing how easily they can find information and complete tasks. Ideally, user testing is conducted as early in the development process as possible so the site design can be adjusted before the serious production begins. It is not uncommon to do additional usability testing at regular intervals throughout the production process and even after the site has launched, so that the site can be tweaked to better serve the needs of its visitors.

FURTHER READING

User testing is a rich and complex topic well beyond the scope of this chapter. For more insight, I recommend the book *Observing the User Experience* by Mike Kuniavsky (Morgan Kaufmann Publishers, 2003).

There are companies that you can hire to run controlled tests for you, but the price is usually steep, making it an option only for commercial web sites with serious budgets. However, it is possible to run informal user testing on your family members, friends, coworkers, and anyone you can get to sit in front of the computer and answer a few questions.

There are two general kinds of user testing: general observed behavior and task-oriented testing. In the first, you sit the testing subject down with the site and let them explore it on their own. They provide feedback as they go along, noting what they like, don't like, what's clear, what's confusing.

In task-oriented testing, users are given a series of tasks of varying difficulty to perform on the site, such as "Find out if there are any upcoming workshops on glassblowing," or, "Find out who is offering the best price on camcorders." An observer takes notes on how efficiently the task is completed, as well as the links the user followed in the course of completing the task.

Some questions you might want to answer through user testing are:

- Can users tell at a glance what the site is about?
- Are there any obstacles in the way of accomplishing goals? Can they quickly find critical information or make a purchase?
- Do the test subjects seem to enjoy using the site?
- Is there a particular task or site feature that seems to be tripping up multiple users?

6. Launch the Site

Once you have all the kinks worked out of the site, it's time to upload it to the final server and make it available to the world.

It's a good idea to do one final round of testing to make sure everything was transferred successfully and the pages function properly under the configuration of the final server. This may seem like extra work, but if the reputation of your business (or your client's business) is riding on the success of the web site, attention to detail is essential.

With the working site online, it's time to take yourself or your team out for a a good dinner or a round of drinks (well, that's what I would do).

7. Maintain the Site

A web site is never truly "done;" in fact, the ability to make updates and keep content current is one of the advantages of the web medium. It is important to have a strategy for what will happen with the site after its initial launch.

Although maintenance is an ongoing process that happens after the site is initially created, decisions regarding maintenance should be made early in the development process. For instance, you should be clear up front about who will be responsible for site upkeep. If you are a freelancer, this should be included in the contract you sign when you begin the job. You should also decide what parts of the site will be updated, and how frequently. The refresh rate will affect the way you organize information and design the site.

You should also consider the lifespan of the site. If it is a site promoting a specific event, what happens to the site when the event is over? Even sites that are designed to be around a while will usually require a redesign after a few years to keep up with changes in content and current publishing practices.

The Development Process in Review

Hopefully, this chapter gives you a feel for all of the work that goes into a typical site. Regardless of the role you play in the process, it is important to be familiar with the other steps along the way. As I mentioned earlier, the steps may not occur in exactly the same order listed here. You should also be prepared for any given step to entail a great deal of work, particularly for larger commercial sites.

Test Yourself

How familiar are you with these basic terms in the web design process? Answers can be found in Appendix A.

1. What is a site diagram for? At what point in the process would you make one?

2. What is a "look and feel" study?

3. Name three things that should be done or decided before the first HTML document is created.

4. What is a beta release? Who is likely to look at it?

5. Name four things for which *every* web site should be tested.

CHAPTER 21

GETTING YOUR PAGES ON THE WEB

Because your browser can display documents right from your hard drive (in other words, you can view them locally), you do not need an Internet connection to create web pages. However, eventually, you'll want to get them out there for the world to see. That is the point, right?

Putting a page on the Web is easy... just transfer your files to your web server and *ta da*—you're on the Web! But what if you don't have a web server? This chapter will tell you where to look for one (you might even have server space and not know it). You might also want your own domain name. For example, I have littlechair.com and several others.

This chapter tells you what you need to know about registering a domain name and getting a server for your web site. We'll also look at the steps involved in the typical web publishing process, including how to use FTP programs to transfer files.

IN THIS CHAPTER

Registering your own domain name

Finding a server to host your web site

The general web publishing process, step-by-step

Using FTP to upload files

www."YOU".com!

Your home page address is your identity on the Web. If you are posting a just-for-fun page and want to save money, having your own personal corner at some larger domain (such as *www.earthlink.com/members/~littlechair* or *littlechair.blogspot.com*) might be fine. More likely, you'll want your own domain name that better represents your business or content. For a small yearly fee, anyone can register a domain name.

What's in a name?

A domain name is a human-readable name associated with a numeric IP address (the "IP" stands for Internet Protocol) on the Internet. While computers know that my site is on a server at Internet point 66.226.64.6, you and I can just call it "littlechair.com." The IP address is important, though, because you'll need one (well, two, usually) to register your domain name.

Registering a domain

Registering a domain name is easy and fairly inexpensive. There are two ways to go about it: have your hosting company do it for you or get one directly from a registrar.

It has become common for companies that provide web hosting to register domain names as part of the process of setting up an account. They offer this service for your one-stop-shopping convenience. But be sure to ask specifically—some still require you to register your domain on your own.

You can also register one yourself directly from a domain name registrar. Domain name registries are regulated and overseen by ICANN (Internet Corporation for Assigned Names and Numbers). ICANN also makes sure that domain names are assigned to a single owner. There used to be just one domain name registrar, Network Solutions, but now there are hundreds of ICANN accredited registrars and countless more resellers.

You'll have to do your own research to find a registrar you like. To see the complete list of accredited registrars, go to *www.internic.net/regist.html*. Some of the most popular are Network Solutions (*www.networksolutions.com*), the original domain registrar; Register.com (*www.register.com*), which has also been around a long time; and GoDaddy (*www.godaddy.com*), known for its rock-bottom prices.

All registrars in the U.S. can register domain names ending in *.com*, *.net*, or *.org*, while some offer newer and international extensions (see the sidebar, Dot What?).

A domain registration company will ask you for the following:

- An administrative contact for the account (name and address)
- A billing contact for the account (name and address)
- A technical contact for the account (generally the name and address of your hosting service)
- Two IP addresses

If you don't have IP addresses, most domain registry services will offer to "park" the site for you for an additional fee. Parking a site means that you have reserved the domain name, but you can't actually *do* anything with it until you get a real server for the site. Basically, you're paying for the privilege of borrowing some IP addresses. Be sure to shop wisely. In addition to the $35 per year registration fee, do not spend more than $35 to $50 per year to park a site. As mentioned earlier, some domain registration companies also offer basic hosting services.

How Much Does a Domain Cost?

While it may seem overwhelming to choose from all the competing domain name sellers, the up side is that it has resulted in lower prices. The base price for registering a domain is about $35 per year; however, there are usually deep discounts for registering for more than one year. The longest any domain can be secured is 10 years.

There are domain registries that offer rock-bottom rates, but you may pay the price of being bludgeoned with advertising for their other services, such as web hosting.

There are also optional additional fees to be aware of. For instance, registrars now offer a service in which they keep your contact information private for about $10 a year (as of this writing). Without that service, the information you provide (including your address) is accessible to the public.

TIP

Because there are so many sources for domain names, it is easy to end up with domains registered with several different companies. While there is no rule against this, people who maintain multiple domains find it more convenient to have all their names registered at the same place. This makes it easier to handle billing and keep up with expirations and renewals.

Is it available?

You might have already heard that the simple domain names in the coveted *.com* top-level domain are heavily picked over. Before you get too attached to a specific name, you should do a search to see if it is still available. All of the domain name registration sites feature a domain name search right on the front page. This is the first step for setting up a new domain.

If "your-domain-name" at ".com" is not available, try one of the other top level domain suffixes, such as *.org*, *.info*, or *.us*. You may also try variations on the name itself. For example, if I found that *jenrobbins.com* wasn't available, I might be willing to settle for *jenrobbinsonline.com* or *jenniferrobbins.com*. Some registrar sites will provide a list of available alternatives for you.

If you have your heart set on a domain name and a budget to back it up, you might offer to purchase the site from its owner. To find out who owns a domain name, you can do a WhoIs search on that domain. The WhoIs database lists the name and contact information for every domain (unless the owner paid extra to keep the contact information private). You can find a WhoIs search function on most registrars' sites.

Finding Server Space

For your pages to be on the Web, they must reside on a web server. Although it is possible to run web server software on your desktop computer (in fact, every new Mac comes with web server software installed), it's more likely that you'll want to rent some space on a server that is dedicated to the task. Looking for space on a web server is also called finding a host for your site.

Fortunately, there are many hosting options, ranging in price from free to many thousands of dollars a year. The one you choose should match your publishing goals. Will your site be business or personal? Will it get a few hits a month or thousands? Do you need services such as e-commerce or streaming media? How much can you (or your client) afford to pay for hosting services?

If you are working as a freelancer, your clients will probably assume the responsibility of setting up server space for their sites. Smaller clients may ask for your assistance in finding space, so it is good to be familiar with the available options.

In this section, I'll introduce you to some of the options available for getting your web pages online. This should give you a general idea of what type of service you need. However, you should still count on doing a fair amount of research to find the one that's right for you.

NOTE

With hosting services offering to register domain names, and domain registrars offering hosting services, the line has really blurred between these two services. But be aware that getting your domain name and finding a server for your web site are indeed separate tasks. It is fine to get hosting from one company and your domain from someone else.

Dot What?

The majority of web sites that you hear about end with *.com*, but there are other suffixes available for different purposes. These suffixes, used for indicating the type of site, are called top-level domains (or TLDs). The most common top-level domains in the United States are the original six generic TLDs established in the 1980s:

.com	commercial/business
.org	nonprofit organization
.edu	educational institutions
.net	network organizations
.mil	military
.gov	government agencies

Since then, additional TLDs have been added, including .aero, .biz, .cat, .coop, .int, .jobs, .mobi, .museum, .name, .pro, .travel, plus scores of two-letter country code TLDs.

To view the current complete list of TDS, see *www.icann.org/registries/top-level-domains.htm*.

In your own backyard

You may not need to shop around for hosting at all. If one of these scenarios describes you, you may have server space there for the taking.

Student account. If you are a student, you may be given some space to publish personal pages as part of your school account. Ask the department that gives you your email account how to take advantage of web space.

Online services and ISPs. If you have an account with an online service such as America Online (*www.aol.com*) or CompuServe (*www.compuserve.com*), you probably already have some web server space just waiting to be filled. Apple Computer offers web space for Mac owners with .Mac accounts. The online services usually provide tools, templates, and other assistance for making web pages and getting them online. Likewise, ISPs (Internet Service Providers) such as Earthlink provide as much as 10 MB of web server space for their members.

Company servers. If you are working as an in-house web designer, it is likely that there will be a server connected to your company's network. If this is the case, you can just copy your files to the specified server machine. Web design firms usually have servers for testing purposes.

Professional hosting services

If you are working on a serious business site, or if you are just serious about your personal web presence, you will need to rent server space from a professional hosting service. What you're paying for is some space on one of their servers, an amount of bandwidth per month over their Internet connection, and technical support. They may also provide such additional services as mailing lists, shopping carts, and so on. The hosting service is responsible for making sure your site is online and available around the clock, 24/7.

Hosting companies usually offer a range of server packages, from just a few megabytes (MB) of space and one email address to full-powered e-commerce solutions with lots of bells and whistles. Of course, the more server space and more features, the higher your monthly bill will be, so shop wisely.

Advantages:

Scalable packages offer solutions for every size of web site. With some research, you can find a host that matches your requirements and budget.

You get your own domain name (for example, *www.littlechair.com*).

Disadvantages:

Finding the right one requires research (see the Shopping for Hosting Services sidebar).

Robust server solutions can get expensive, and you need to watch for hidden charges.

ISPs vs. Hosting Services

There are two types of Internet services, and they are easily confused.

An ISP (Internet Service Provider) is the company you go to if you want access to the Internet from your home or office. You can think of an ISP as a provider of a pipeline from your computer to the worldwide network of the Internet via dial-up, DSL, cable modem, or ISDN connections. AOL, CompuServe, and Earthlink are examples of nationwide ISPs, but there are also smaller, local ISPs in nearly every urban area.

In this chapter, we're talking about hosting services. Their business is based on renting out space on their computers. They take care of the server software, keeping the lines working, and so on. They also provide email accounts and may also include special features such mailing lists or e-commerce solutions for your site. There are thousands of hosting services out there.

The slightly confusing part is that many ISPs also give you some space on a server to host your personal pages. If you put your pages here, you will be stuck with the ISP name in your URL. In other words, they generally don't host other domain names; you need a hosting service for that.

Professional hosting services, however, do not tend to offer Internet access. They expect you to take care of that yourself. In most cases, you'll need both an ISP and a hosting company.

Shopping for Hosting Services

When you set out to find a host for your web site, you should begin by assessing your needs. The following are some of the first questions you should ask yourself or your client:

Is it a business or personal site? Some hosting services charge higher rates for business sites than for personal sites. Make sure you are signing up for the appropriate hosting package for your site, and don't try to sneak a commercial site onto a personal account.

Do you need a domain name? Check to see whether the hosting company will register a domain name for you as part of the package price. This saves you a step and the extra charge for domain registration somewhere else.

How much space do you need? Most small sites will be fine with 10 MB or 15 MB of server space. You may want to invest in more if your site has hundreds of pages, a large number of graphics, or a significant number of audio and video files that take up more space.

Do you need a dedicated server? Most hosting plans are for shared servers, which, as it sounds, means that your site will share space on a computer with many other sites. For most sites, this is fine, although it is important to be aware that excessive traffic to another site on the server may impact your site's performance. Some larger commercial sites where performance is critical opt for a dedicated server so they can take advantage of the full processing power of that machine. Dedicated server plans tend to be significantly more expensive than shared plans, but it may be money well spent for processing-intensive sites.

How much traffic will you get? Be sure to pay attention to the amount of data transfer you're allowed per month. This is a function of the size of your files and the amount of traffic you'll get (i.e., the number of downloads to browsers). Most hosting services offer 5–10 gigabytes (GB) of throughput a month, which is perfectly fine for low- or moderate-traffic sites, but after that, they start charging per megabyte. If you are serving media files such as audio or video, this can really add up. I once ran a popular site with a number of movies that turned out to have over 30 GB of data transferred a month. Fortunately, I had a service with unlimited data transfer (there are a few out there), but with another hosting company I could have racked up an extra $500 per month in fees.

How many email accounts do you need? Consider how many people will want email at that domain when you're shopping for the right server package. If you need many email accounts, you may need to go with a more robust and higher-priced package.

Do you need extra functionality? Many hosting services offer special web site features—some come as part of their standard service and others cost extra money. They range from libraries of spiffy scripts (for email forms or guestbooks) all the way up to complete, secure e-commerce solutions. When shopping for space, consider whether you need extra features, such as shopping carts, secure servers (for credit card transactions), a streaming media server (for streaming audio and video), mailing lists, and so on.

Do you feel comfortable with their level of technical support? Take a look at the hosting company's policies and record on technical support. Do they provide a phone number (preferable), live online chat with technicians, or just an email address for customer service? It is important to know that your hosting company will be there to answer your questions promptly.

Will they do regular backups? Ask whether the hosting company does regular backups of your data in case there is a problem with the server.

Do you want to be a reseller? If you run a web design business and anticipate finding server space for multiple clients, you may want to become a hosting reseller. Many hosting companies have programs in which they provide multiple server plans at discount prices. You can pass the savings along to your clients or mark up the price to compensate yourself for the administrative overhead.

Once you've identified your needs, it's time to do some hunting. First, ask your friends and colleagues if they have hosting services that they can recommend. There's nothing like firsthand experience from someone you trust. After that, the Web is the best place to do research. The following sites provide reviews and comparisons of various hosting services; they can be good starting points for your server shopping spree:

CNET Web Hosting Reviews
www.cnet.com (look for Web Hosting under Reviews)

HostIndex
www.hostindex.com

TopHosts.com
www.tophosts.com

Free hosting options

If you just want to publish a personal site and don't want to sink any money into it, there are many services out there that offer free space on the Web.

Free hosting services. Believe it or not, some companies give server space away for free! The downsides are that you can not have your own domain name, and they may put their advertising on your pages. A good place to start looking for free web hosting is *www.freewebspace.net* or do a web search for "free web hosting."

Blogging services. If you just want to publish a blog (short for web log, an online journal), you can take advantage of one of the free blogging services. They allow you to publish the type of information typically found on a blog page: entries, comments, blogroll (list of similar blogs), etc. Some of the most popular are *Blogger.com*, *LiveJournal.com*, and *Typepad.com* (which charges a small monthly fee), but if you do a web search for "free blog hosting," you'll find many more to explore.

Online community sites. Online community sites such as Yahoo! GeoCities (*geocities.yahoo.com*) or Tripod (*www.tripod.lycos.com*) organize their members' sites into categories, so people with similar interests can find each other. In exchange for free space, they put ads on the members' content.

Social network sites. Another arena for publishing your blogs, photos, music, and so on is to join one of the popular social network sites. These sites link their members together by friend (and friend-of-a-friend) connections. Some popular social network sites as of this writing are *MySpace.com*, *Friendster.com*, and *Facebook.com*; however, this is a rapidly expanding use of the Web, so they may not be the latest and greatest networks by the time you are reading this book. These services may place limitations on the type of content you can publish and offer varying levels of customization, so it's not the same as publishing your own site on their servers.

Advantages:

It's free!

Good for personal and hobbyist web pages. Also a good option for teens with limited budgets.

Depending on the service you choose, you could potentially find people with similar interests.

Disadvantages:

You may be stuck with annoying ad banners or pop-up windows.

You may be limited in the type of content you can publish.

You may have limited control over page layout and navigation.

You generally don't get your own domain name.

Not appropriate for business sites.

The Publishing Process

So, you've got your domain and your hosting all lined up... what now? This is a good time to review the typical steps involved in creating and publishing a site to the Web. Not every site follows these exact steps, but this will give you a general idea of the process.

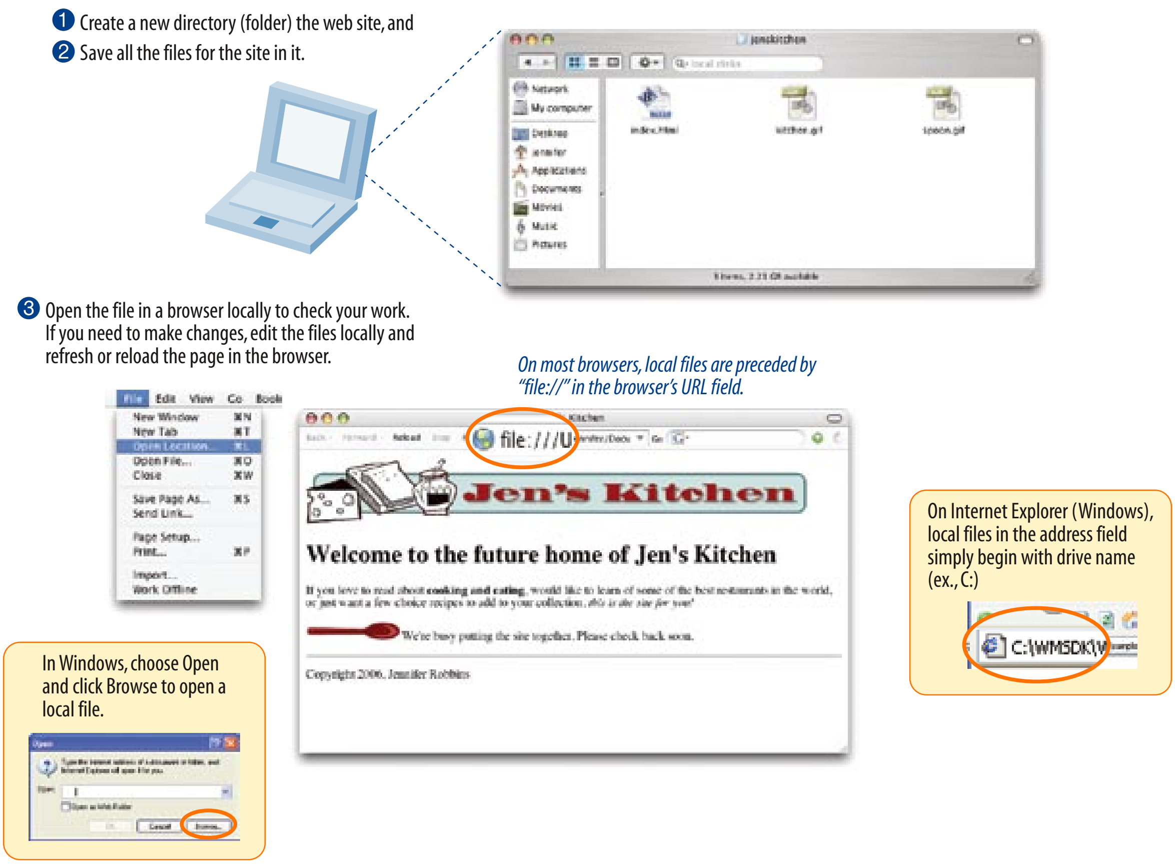
1. **Create a directory (folder) for the site on your computer.** This will be your local root directory. "Local" means it resides on your hard drive, and "root" is the technical term used to refer to a top-level directory for site. This is where you save all of the documents that make up the site and will be transferred to the actual web server. Additional files related to the site, such as layered Photoshop files, raw content documents, and other miscellaneous development documents should be kept in a separate directory. In Figure 21-1, I named my local root directory *jenskitchen*.

NOTE

On the Web, it is more appropriate to use the terms "directory" and "subdirectory" rather than "folder" and "subfolder." This is due to the fact that servers have come to be discussed using UNIX terminology, whereas folders are a convention of operating systems with graphical interfaces, such as Windows or MacOS.

❷ **Create the web page(s).** This is the step that takes all the hard work, as you know from reading the rest of this book. It's important to note that all the HTML and image files for this simple site have been saved in the local root directory, *jenskitchen*.

❸ **Check the page locally.** Before making the page live, it is a good idea to check the page in a browser while it's still on your own machine. Just launch your favorite browser and open the (X)HTML file for the page from your hard drive, as shown in Figure 21-1. If it needs some adjustments, go back and edit the (X)HTML and/or CSS files and save them. You must save the files in order to see changes in the browser (be sure to save it in the same directory so it overwrites the old version). Now click Refresh or Reload in the browser to see how it looks.



❶ Create a new directory (folder) the web site, and
❷ Save all the files for the site in it.

❸ Open the file in a browser locally to check your work. If you need to make changes, edit the files locally and refresh or reload the page in the browser.

On most browsers, local files are preceded by "file://" in the browser's URL field.

In Windows, choose Open and click Browse to open a local file.

On Internet Explorer (Windows), local files in the address field simply begin with drive name (ex., C:)

Welcome to the future home of Jen's Kitchen

If you love to read about **cooking and eating**, would like to learn of some of the best restaurants in the world, or just want a few choice recipes to add to your collection, *this is the site for you!*

We're busy putting the site together. Please check back soon.

Copyright 2006, Jennifer Robbins

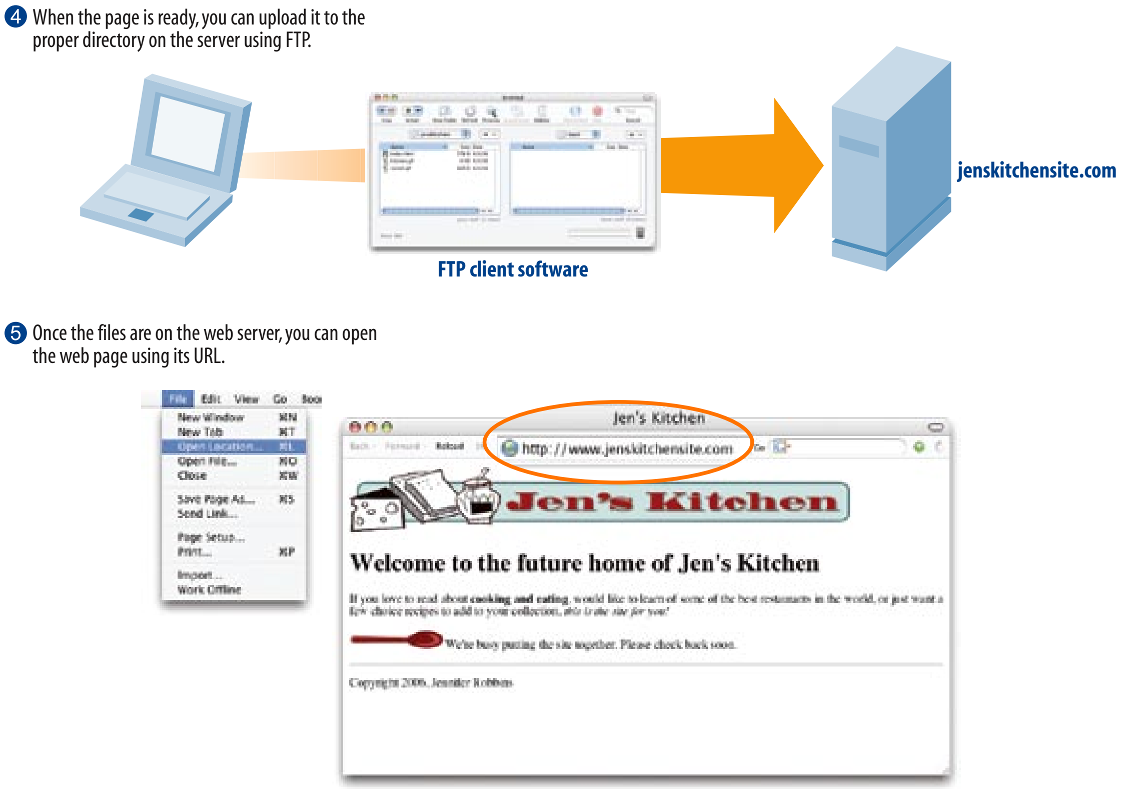
Figure 21-1. Create and test your web page on your own computer.

❹ **Upload the files.** When everything looks fine in the browser, you're ready to upload the page to the remote server that is hosting your site (Figure 21-2). Use a file transfer (FTP) program to upload your files (we'll go over the ins and outs of FTP in the next section). Just be sure to put all the files in your site's root directory on the server. The hosting company or server administrator will tell you the name of your site's root directory when you set up the account.

NOTE

If you have organized your local files into subdirectories, the same subdirectory structure will need to be set up on the remote root directory as well (see the sidebar Organizing and Uploading a Whole Site).

❺ **Check it out live on the Web.** Once all the files have been transferred to the server, you (and anyone else) can see it by typing your URL in the browser. Tell your friends!



4 When the page is ready, you can upload it to the proper directory on the server using FTP.

5 Once the files are on the web server, you can open the web page using its URL.

Welcome to the future home of Jen's Kitchen

If you love to read about **cooking and eating**, would like to learn of some of the best restaurants in the world, or just want a few choice recipes to add to your collection, *this is the site for you!*

We're busy putting the site together. Please check back soon.

Copyright 2006, Jennifer Robbins

Figure 21-2. Uploading and viewing a page from the remote server.

Testing on the Server

In the example in this chapter, the web page was tested locally and became "live" as soon as it was moved to the server. As another option, web developers may create a special test site (also called a *development* or *staging* site) on the server. The advantage is that the site can be tested on the actual server and tweaked before it is made live to the public. Staging sites are also useful when the site is being created and tested by a group of developers, because the whole team has access to it.

The staging site might be in a separate directory or in a subdomain (for example, dev.jenskitchen.com). When the site is ready to go, all the files can be moved to the root directory on the server.

Transferring Files with FTP

Most likely, your server will be in a remote location, accessible via the Internet. Files are transferred between computers on the Internet via a protocol called FTP (File Transfer Protocol). You may also hear "FTP" used casually as a verb, as in "I'll FTP those files by this afternoon."

NOTE

If you are in an office or at a school that has a web server as part of its network, you may be able to move the files directly over the network without using FTP.

You'll need some information handy to transfer files with FTP:

The name of your web server (host). For example, *www.jenware.com*.

Your login name or user ID. You'll get a login name from the server administrator when you set up your server account, often via an email. If you're a freelancer, you'll need access to your client's login.

Your password. This will also be provided by the server administrator or client.

The directory where your web pages reside. Your server administrator may also tell you which directory to use for your web pages, in other words, the name of the root directory for your site. Often, it's www or html. It is also possible that your server is set up to send you to the correct directory automatically when you log in, in which case, you won't need to enter a directory name. Again, get directions from the administrator.

The type of data transfer. In most cases, you will use FTP for uploading, but some hosting services require SFTP (see sidebar). This information will be provided to you with the login and FTP instructions for your account.

FTP software

Because FTP is an Internet protocol, you need to use special FTP software (called an FTP client) designed specifically for the job of transfering files.

The better WYSIWYG web-authoring tools such as Dreamweaver from Adobe, Microsoft Expression Web, and the open source Nvu (pronounced N-view) have FTP clients built in. This is a great feature, because you can build your pages and upload them all in one program.

If you haven't yet invested in one of these tools, there are a number of standalone FTP client utilities with simple interfaces that make file transfer as easy as moving files around on your own computer. For the Mac, Transmit, Fetch and Interarchie allow "drag and drop" transfers. On Windows, WS_FTP, CuteFTP, and Filezilla are quite popular. You can download these programs at CNET's *www.download.com*.

Two-way Street

Although this section focuses on uploading files to a server, FTP can be used to download files from the server to your local computer as well. FTP clients use the terms "download" or "get," or may provide down-arrow icons for downloading.

TERMINOLOGY

SFTP

SFTP, or SSH File Transfer Protocol, is a network protocol that offers more secure file transfer than ordinary FTP. It uses the SSH, Secure Shell, protocol that establishes a secure line between a local and remote computer. SFTP also allows basic server management such as deleting remote files and creating and naming remote directories.

ONLINE RESOURCE

FTP Clients

For a comprehensive list of FTP clients sorted by platform and protocol support, see the "Comparison of FTP Clients" page at Wikipedia (*en.wikipedia.org/wiki/List_of_SFTP_clients*).

Using FTP, step by step

FTP clients have slightly different interfaces and use different terminology, but they essentially work the same. Again, these steps should give you the general picture.

Step 1: Make sure you are online. You may have a network or cable connection that is always online, but you may need to dial in over a modem. You can launch your FTP program before or after getting online.

Step 2: Open a connection to the server and enter your information. This is usually the point at which you are asked to enter the server name, login, password, and the optional settings mentioned earlier. Some FTP programs allow you to save the settings and give the connection a name to make it easy to connect later. Your tool may call this process setting up a new "site" or "connection." The window at the top of Figure 21-3 shows the server settings in Transmit, but your tool may use a multiscreen "wizard" process for collecting and saving site settings.

Step 3: Navigate to your local and remote root servers. Many FTP clients feature two windows: one gives you a view of the files on your local hard drive, the other is a view of the files on the remote server (Figure 21-3). The windows typically also provide methods for navigating through the directories. Some clients, such as Fetch, show a view only of the remote server. Whatever tool you use, make sure that the root directory on your server (or the appropriate directory within the root) is selected.

Step 4: Select the file on your local hard drive and upload it. FTP programs vary on how the upload option is presented once your file is selected, but it's usually fairly intuitive. Some ask you to select Upload, Send, or Put from a menu or push-button; others use an up arrow or right arrow to indicate the transfer direction from your computer to the remote server. You may also be able to drag and drop the file from the local window to the server window to start the upload.

NOTE

Some FTP clients, such as Fetch, may also ask you to indicate the format or type of file being transferred. HTML documents should be sent as Text or ASCII. For images and other media, choose Binary or Raw Data. Many FTP clients choose the format for you automatically.

Step 5: Watch it upload. Once you click the Upload button or arrow, your file starts whizzing over the lines and onto the server. Your FTP client will probably provide some sort of feedback that shows the progress of the upload. When the file shows up in the file list in the remote server window, and the file size matches that shown on your local computer, you know that it has arrived.

Organizing and Uploading a Whole Site

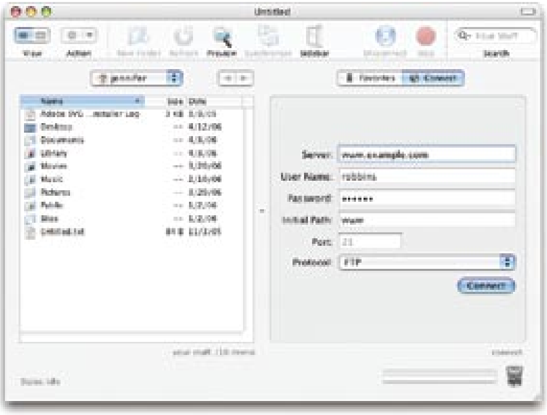
We uploaded only one document in this example, but chances are your site will consist of more than one page. If your site contains more than a dozen or so documents and graphics files, you should organize your files into directories and subdirectories. This requires some work and careful planning, but it makes site management much easier in the long run.

One common convention is to keep all of the graphic files in a directory called *images* or *graphics*. In most cases, the overall directory structure is based on the structure of the site itself. For instance, if you have a "News" category on your site, there would be a corresponding *news* directory for those files.

The good news is that you can upload an entire site in one go. When you select a directory to be FTP'd, it will upload *everything* within that directory—leaving the subdirectory structure intact. Follow the FTP instructions in this section, but select the directory name instead of a single filename for upload.

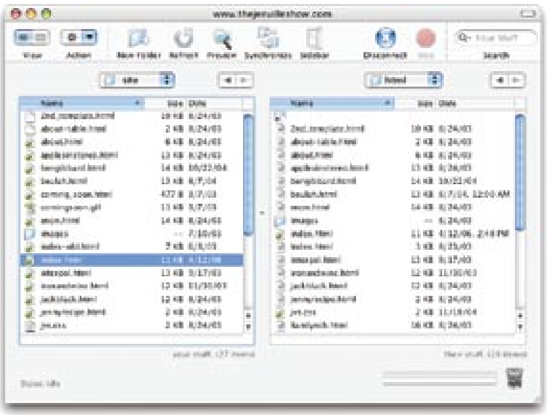
The FTP program checks the format of each file and selects text or raw data/binary as appropriate during the upload.

It is a good idea to set up your site directory structure as you want it on your local hard drive first, then upload everything to the final server once it is ready.



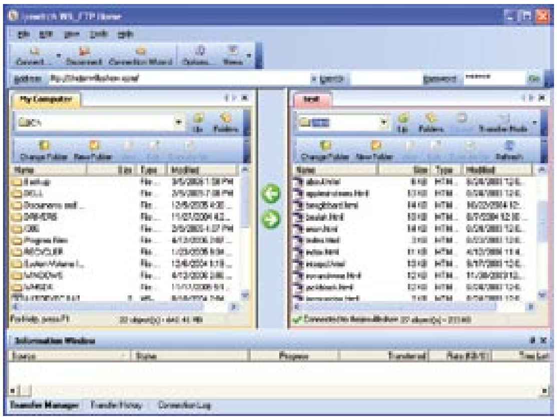
Server: www.example.com
User Name: robbins
Password: ••••••
Initial Path: www
Port: 21
Protocol: FTP

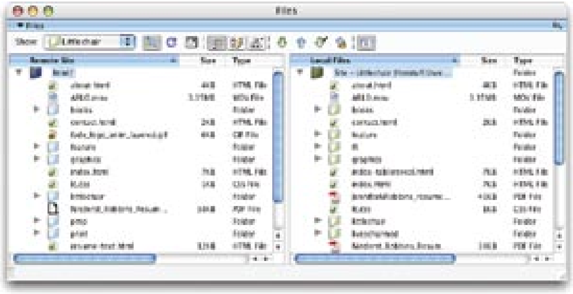
When you open a new connection, you will be asked for your server settings (shown here in the Transmit FTP client for the Mac).



When you are connected, you can see the contents of your local hard drive and the remote server. Use the navigation tools to make sure the proper directories are selected.

To upload in Transmit, select File > Upload or drag the file from the local window to the remote window. Other tools may provide arrow buttons for moving files between computers.





WS_FTP (left) and Dreamweaver site manager (right) also provide side-by-side windows.

Figure 21-3. Three popular FTP client interfaces.

Step 6: Check it in a browser. Now the document is officially on the Web. Just to be sure, check it with a browser. Open a browser and enter your URL, and there it is! If you need to make changes, do so on the local document, save it, then upload it again.

Test Yourself

Before we move on, let's see if the important parts of this chapter have been uploaded to your brain. Answers appear in Appendix A.

1. There are basic services that you need if you want to get yourself and your own site online. Match the following services with the companies that provide them. Note that some services may have more than one answer.

   A. Hosting company B. ISP C. Domain registrar

   Get connected to the Internet ___________

   Find out if yourname.com is available ___________

   Get yourname.com for 3 years ___________

   Get space on a web server ___________

2. Name two ways in which servers are identified on the Internet.

3. What does it mean to look at a page locally?

4. What three pieces of information are required to FTP files to a server? What else may you need to know?

5. What format should you select to upload a graphic file? An audio file? An HTML file?

6. How do you upload a whole directory of files at once?

7. We know the saying "no free lunches." Name at least three potential sacrifices you might need to make in exchange for free hosting.

ANSWERS

Chapter 1: Where Do I Start?

1. B, D, A, C
2. The W3C guides the development of Web-related technologies.
3. C, D, A, E, B
4. Frontend design is concerned with aspects of a site that appear in or are related to the browser. Backend development involves the programming required on the server for site functionality.
5. A web authoring tool provides a visual interface for creating entire web pages, including the necessary (X)HTML, CSS, and scripts. HTML editors provide only shortcuts to writing (X)HTML documents manually.

Chapter 2: How the Web Works

1. c, 2. i, 3. g, 4. h, 5. f, 6. b, 7. a, 8. d, 9. e

Chapter 3: The Nature of Web Design

1. You need to be aware that your page may look and work differently from browser to browser. Sticking to the standards will ensure a similar (although not identical) experience on modern standards-compliant browsers. For the rest, be sure that your content is available and accessible.
2. The platform on which your page is viewed can affect how certain page and form elements are rendered, the size of the text, availability of fonts and plug-ins, and the brightness of colors. Some technologies developed for Windows may not be as well supported on Mac or Unix platforms.
3. Users' browser settings will override the settings you make in your style sheets by default. It is easy for users to change the fonts, background colors, and size of the text. Users can also choose to turn off functionality such as Java, JavaScript, and image display.
4. Because browser windows can be resized, you never know how large your web page's screen area will be.
5. As many as 30% of Internet users are still using dial-up connections, so you should always take time to optimize your images, audio/video, even your (X)HTML documents for the quickest download possible.

6. Be sure that your content is accessible to all users, regardles of the devices they may be using to read, navigate, and input information. The best way to ensure accessibility is to stick with the standards, make sure your source document is logical, and follow the guidelines set out by the WAI.

Chapter 4: Creating a Simple Page (HTML Overview)

1. A tag is part of the markup used to delimit an element. An element consists of the content and its markup.
2. The minimal markup of an (X)HTML document is as follows:

```
<html>
<head>
  <title>Title</title>
</head>
<body>
</body>
</html>
```

3. a. *Sunflower.html*—Yes

   b. *index.doc*—No, it must end in *.html* or *.htm*

   c. *cooking home page.html*—No, there may be no character spaces

   d. *Song_Lyrics.html*—Yes

   e. *games/rubix.html*—No, there may be no slashes in the name

   f. *%whatever.html*—No, there may be no percent symbols

4. All of the following markup examples are incorrect. Describe what is wrong with each one, then write it correctly.

   a. It is missing the `src` attribute: `<img src="birthday.jpg">`

   b. The slash in the end tag is missing: `<i>Congratulations!</i>`

   c. There should be no attribute in the end-tag: `<a href="file.html">linked text</a>`

   d. The slash should be a forward-slash: `<p>This is a new paragraph</p>`

5. Make it a comment: `<!--` product list begins here `-->`

Exercises 4-1 through 4-5

```
<html>

<head>
<title>Black Goose Bistro</title>

<style type="text/css">
body { background-color: #C2A7F2;
     font-family: sans-serif;}
h1 { color: #2A1959;
     border-bottom: 2px solid #2A1959;}
h2 { color: #474B94;
     font-size: 1.2em;}
h2, p { margin-left: 120px;}
</style>

</head>
```

```
<body>
<h1><img src="blackgoose.gif" alt="black goose logo">Black Goose Bistro</h1>

<h2>The Restaurant</h2>
<p>The Black Goose Bistro offers casual lunch and dinner fare in a hip atmosphere. The menu changes regularly to
highlight the freshest ingredients.</p>

<h2>Catering</h2>
<p>You have fun... <em>we'll handle the cooking.</em> Black Goose Catering can handle events from snacks for bridge
club to elegant corporate fundraisers.</p>

<h2>Location and Hours</h2>
<p>Seekonk, Massachusetts;
Monday through Thursday 11am to 9pm, Friday and Saturday, 11am to midnight</p>
</body>

</html>
```

Chapter 5: Marking Up Text

1.
```
<p>People who know me know that I love to cook.</p>
<hr />
<p>I’ve created this site to share some of my favorite
    recipes.</p>
```

2. Deprecated means that an element or attribute is being phased out and is discouraged from use.

3. A `blockquote` is a block-level element used for long quotations or quoted material that may consist of other block elements. The `q` (quote) element is for short quotations that go in the flow of text and do not cause line breaks.

4. `pre`

5. The `ul` element is an unordered list for lists that don’t need to appear in a particular order. They display with bullets by default. The `ol` element is an ordered list in which sequence matters. The browser automatically inserts numbers for ordered lists.

6. Use a style sheet to remove bullets from an unordered list.

7. `<acronym title="World Wide Web Consortium">`W3C`</acronym>`

8. A `dl` is the element used to identify an entire definition list. The `dt` element is used to identify just one term within that list.

9. The `id` attribute is used to identify a unique element in a document, and the name in its value may appear only once in a document. `class` is used to classify multiple elements into conceptual groups.

10.

`&mdash;`	em dash —
`&amp;`	ampersand &
`&nbsp;`	non-breaking space
`&copy;`	copyright ©
`&bull;`	bullet •
`&trade;`	trademark symbol ™

Exercise 5-1

```
<html>
<head><title>Tapenade Recipe</title></head>
<body>

<h1>Tapenade (Olive Spread)</h1>

<p>This is a really simple dish to prepare and it's always a big hit at parties. My father recommends:</p>

<blockquote><p>"Make this the night before so that the flavors have time to blend. Just bring it up to room
temperature before you serve it. In the winter, try serving it warm."</p></blockquote>

<h2>Ingredients</h2>

<ul>
  <li>1 8oz. jar sundried tomatoes</li>
  <li>2 large garlic cloves</li>
  <li>2/3 c. kalamata olives</li>
  <li>1 t. capers</li>
</ul>

<h2>Instructions</h2>

<ol>
  <li>Combine tomatoes and garlic in a food processor. Blend until as smooth as possible.</li>


  <li>Add capers and olives. Pulse the motor a few times until they are incorporated, but still retain some
texture.</li>

  <li>Serve on thin toast rounds with goat cheese and fresh basil garnish (optional).</li>
</ol>

</body>
</html>
```

Exercise 5-2

The seven changes were:

1. The h1 is missing an end tag.
2. The closing p tag is missing a slash.
3. The strong element would be better than the b element.
4. Add the abbr element for Mass.
5. The book title would be better as a cite element than in italic text
6. The prize code example would be better as a kbd or samp element.
7. The text marked as italic in the last line should be emphasized (em).

```
<h1>You Won!</h1>
<p><strong>Congratulations!</strong> You have just won dinner for two at the highly acclaimed Blue Ginger
restaurant in Wellesley, <abbr title="Massachusetts">Mass.</abbr> In addition to dinner, you will receive
an autographed copy of Ming Tsai's book, <cite>Blue Ginger</cite>. To redeem your prize, go to our site and
enter your prize code (Example: <kbd>RPZ108-BG</kbd>). We're sure you're going to <em>love</em> it!</p>
```

Exercise 5-3

```
<html>
<head>
<title>Black Goose Bistro Summer Menu</title>
</head>
<body>

<div id="header">
<h1>Black Goose Bistro &bull; Summer Menu</h1>

<p>Baker’s Corner Seekonk, Massachusetts<br />Hours: M-T: 11 to 9, F-S; 11 to midnight</p>
</div>

<div id="appetizers">
<h2>Appetizers</h2>

<dl>
<dt class="newitem">Black bean purses</dt>
<dd>Spicy black bean and a blend of mexican cheeses wrapped in sheets of phyllo and baked until golden. <span
class="price">$3.95</span></dd>

<dt>Southwestern napoleons with lump crab &mdash; <strong>new item!</strong></dt>
<dd>Layers of light lump crab meat, bean and corn salsa, and our handmade flour tortillas. <span
class="price">$7.95</span></dd>
</dl>

</div>

<div id="main">

<h2>Main courses</h2>

<dl>
<dt>Shrimp sate kebabs with peanut sauce</dt>
<dd>Skewers of shrimp marinated in lemongrass, garlic, and fish sauce then grilled to perfection. Served with
spicy peanut sauce and jasmine rice. <span class="price">$12.95</span></dd>

<dt>Grilled skirt steak with mushroom fricasee</dt>
<dd>Flavorful skirt steak marinated in asian flavors grilled as you like it<sup>*</sup>. Served over a blend
of sauteed wild mushrooms with a side of blue cheese mashed potatoes. <span class="price">$16.95</span></dd>

<dt class="newitem">Jerk rotisserie chicken with fried plantains &mdash; <strong>new item!</strong></dt>
<dd>Tender chicken slow-roasted on the rotisserie, flavored with spicy and fragrant jerk sauce and served with
fried plantains and fresh mango. <span class="price">$12.95</span></dd>
</dl>

</div>

<div id="warnings">
<p class="footnote"><sup>*</sup> We are required to warn you that undercooked food is a health risk.</p>
</div>

</body>
</html>
```

Chapter 6: Adding Links

1. `<a href="tutorial.html">...</a>`
2. `<a href="examples/instructions.html">...</a>`
3. `<a href="examples/french/family.html">...</a>`
4. `<a href="/examples/german/numbers.html">...</a>`
5. `<a href="../index.html">...</a>`
6. `<a href="http://www.learningwebdesign.com">...</a>`
7. `<a href="../instructions.html">...</a>`
8. `<a href="../../index.html">...</a>`
9. `<img src="images/arrow.gif" alt="" />`
10. `<img src="../images/arrow.gif" alt="" />`
11. `<img src="../../images/bullet.gif" alt="" />`

Exercise 6-1

```
<li><a href="http://www.epicurious.com">Epicurious</a></li>
```

Exercise 6-2

```
<p><a href="index.html">Back to the home page</a></p>
```

Exercise 6-3

```
<li><a href="recipes/tapenade.html">Tapenade (Olive Spread)</a></li>
```

Exercise 6-4

```
<li><a href="recipes/pasta/linguine.html">Linguine with Clam Sauce</a></li>
```

Exercise 6-5

```
<p><a href="../index.html">[Back to the home page]</a></p>
```

Exercise 6-6

```
<p><a href="../../index.html">[Back to the home page]</a></p>
```

Exercise 6-7

1. `<p><a href="tapenade.html">Go to the Tapenade recipe</a></p>`
2. `<p><a href="../salmon.html">Go to the Salmon recipe</a></p>`
3. `<p><a href="pasta/linguine.html">Go to the Linguine recipe</a></p>`
4. `<p><a href="../../about.html">Go to the About page</a></p>`
5. `<p><a href="http://www.allrecipes.com">Go to the All Recipes web site</a></p>`

Chapter 7: Adding Images

1. The `src` and `alt` attributes are required for the document to be valid. If the `src` attribute is omitted, the browser won't know which image to use. You may leave the value of the `alt` attribute empty if alternative text would be meaningless or clumsy when read in context.

2. `<img src="furry.jpg" alt="" />`

3. 1) It improves accessibility by providing a description of the image if it is not available or not viewable, and 2) because HTML documents are not valid if the `alt` attribute is omitted.

4. It allows the browser to render the rest of the content while the image is being retrieved from the server, which can speed up the display of the page.

5. The three likely causes for a missing image are: 1) the URL is incorrect, so the browser is looking in the wrong place or for the wrong file name (names are case-sensitive); 2) the image file is not in an acceptable format; and 3) the image file is not named with the proper suffix (*.gif*, *.jpg*, or *.png*, as appropriate).

6. It indicates that the image is used as an imagemap and provides the name of the applicable map.

Exercise 7-1

In *index.html*:

```
<h2>Pozzarello</h2>
<p><a href="window.html"><img src="thumbnails/window_100.jpg" alt="view from the bedroom window" width="75"
height="100"></a></p>
<p>The house we stayed in was called Pozzarello and it was built around the year 1200 as the home of the
gardner who tended the grounds of the adjacent castle. The thick walls kept us nice and cool inside, despite
the blistering mid-day heat. This is the view from our bedroom window.</p>

<h2>On the Road</h2>
<p><a href="countryside.html"><img src="thumbnails/countryside_100.jpg" alt="photo of countryside"
width="100" height="75"></a></p>
<p>This is the scene on the way to Montalcino (all roads lead to Montalcino!). It looks a lot like the
scene on the way to Sienna, and the scene on the way to the grocery store. We were surrounded by beautiful
countryside for most of our travels.</p>

<h2>Sienna</h2>
<p><a href="sienna.html"><img src="thumbnails/sienna_100.jpg" alt="photo of Sienna" width="75"
height="100"></a><a href="duomo.html"> <img src="thumbnails/duomo_100.jpg" alt="the Duomo cathedral
in Sienna" width="75" height="100"></a></p>
<p>The closest city to our villa was Sienna, about 30 minutes away. We spent many days exploring the steep
and crooked streets, sampling the local cuisine at outdoor restaurants, and stopping in the dark and echoey
Duomo to escape the sun.</p>
```

In *countryside.html*:

```
<h1>The Tuscan Countryside</h1>
<p><img src="photos/countryside.jpg" alt="photo of the countryside on the way to Montalcino"
width="500" height="375"></p>
```

In *sienna.html*:

```
<h1>The Streets of Sienna</h1>
<p><img src="photos/sienna.jpg" alt="view of the narrow winding streets of Sienna" width="375"
height="500"></p>
```

In *duomo.html*:

```
<h1>A View of the Duomo</h1>
<p><img src="photos/duomo.jpg" alt="view of the Duomo cathedral in Sienna" width="375"
height="500"></p>
```

Chapter 8: Basic Table Markup

1. The table itself (table), rows (tr), header cells (th), data cells (td), and an optional caption (caption).
2. Professional designers no longer use tables for layout because they are not semantically correct, they can get overly complicated and be a barrier to accessibility, and style sheets are now supported well enough that they offer a superior alternative.
3. Captions are for short titles and they display in the browser. Summaries are for longer descriptions and they do not display but may be read aloud by a screen reader.
4. If you want to add additional information about the structure of a table, to specify widths to speed up display, or to add certain style properties to a column of cells.
5. 1) The caption should be the first element inside the table element; 2) There can't be text directly in the table element. It must go in a th or td; 3) The th elements must go inside the tr element; 4) There is no colspan element. This should be a td with a colspan attribute; 5) The second tr element is missing a closing tag.

Exercise 8-1

```
<table>
   <tr>
      <th>Album</th>
      <th>Year</th>
   </tr>
   <tr>
      <td>Rubber Soul</td>
      <td>1965</td>
   </tr>
   <tr>
      <td>Revolver</td>
      <td>1966</td>
   </tr>
   <tr>
      <td>Sgt. Pepper's</td>
      <td>1967</td>
   </tr>
   <tr>
      <td>The White Album</td>
      <td>1968</td>
   </tr>
   <tr>
      <td>Abbey Road</td>
      <td>1969</td>
   </tr>
</table>
```

Exercise 8-2

```
<table>
   <tr>
      <td colspan="3">The Sunday Night Movie</td>
   </tr>
   <tr>
      <td>Perry Mason</td>
      <td>Candid Camera</td>
      <td>What's My Line?</td>
   </tr>
   <tr>
      <td>Bonanza</td>
      <td colspan="2">The Wackiest Ship in the Army</td>
   </tr>
</table>
```

Exercise 8-3

```
<table>
   <tr>
     <td>apples</td>
     <td rowspan="3">oranges</td>
     <td>pears</td>
   </tr>

   <tr>
     <td>bananas</td>
     <td rowspan="2">pineapple<td>
   </tr>

     <td>lychees</td>
   </tr>
</table>
```

Exercise 8-4

```
<html>
<head>
   <title>Table Challenge</title>
   <style type="text/css">
      td, th { border: 1px solid #CCC }
      table {border: 1px solid black }
   </style>
</head>

<body>
<table border="0" cellspacing="6">
   <caption>Your Content Here</caption>
  <tr>
    <th rowspan="2">&nbsp;</th>
    <th colspan="2">A common header for two subheads</th>
    <th rowspan="2">Header 3</th>
  </tr>
  <tr>
    <th>Header 1</th>
    <th>Header 2</th>
  </tr>
  <tr>
```

```
    <th scope="row">Thing A</th>
    <td>data A1</td>
    <td>data A2</td>
    <td>data A3</td>
  </tr>
  <tr>
    <th scope="row">Thing B </th>
    <td>data B1</td>
    <td>data B2</td>
    <td>data B3</td>
  </tr>
  <tr>
    <th scope="row">Thing C</th>
    <td>data C1</td>
    <td>data C2</td>
    <td>data C3</td>
  </tr>
</table>
</body>
</html>
```

Chapter 9: Forms

1.

A form for accessing your bank account online:	POST (because of security issues)
A form for sending t-shirt artwork to the printer:	POST (because it uses the file selection input type)
A form for searching archived articles:	GET (because you may want to bookmark search results)
A form for collecting essay entries:	POST (because it is likely to have a length text entry)

2. Which form control element is best suited for the following tasks?

   Choose your astrological sign from 12 signs: Pull-down menu (<select>)

   Indicate whether you have a history of heart disease (yes or no): Radio buttons (<input type="radio">)

   Write up a book review: <textarea>

   Select your favorite ice cream flavors from a list of eight flavors. Eight checkboxes or a pull-down menu

   Select your favorite ice cream flavors from a list of 25 flavors. Scrolling menu (<select multiple="multiple">)

3. Each of these markup examples contains an error. Can you spot what it is?

```
<input name="gender" value="Male" />
```

The type attribute is missing.

```
<checkbox name="color" value="teal" />
```

Checkbox is not an element name; it is a value of the type attribute in the input element.

```
<select name="popsicle">
     <option value="orange" />
     <option value="grape: />
     <option value="cherry" />
</select>
```

The option element is not empty. It should contain the value for each option (for example, <option>Orange</option>).

```
<input type="password" />
```

The required name attribute is missing.

```
<textarea name="essay" height="6" width="100">Your story.</textarea>
```

The width and height of a text area are specified with the cols and rows attributes, respectively.

Exercises 9-1 through 9-3: Final source document

```
<!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" lang="en" xml:lang="en">
<head>
<meta http-equiv="content-type" content="text/html;charset=utf-8" />
   <title>Contest Entry Form</title>
<style type="text/css">
  ol, ul { list-style-type: none;}
</style>
</head>
<body>

<h1>"Pimp My Shoes" Contest Entry Form</h1>

<p>Want to trade in your old sneakers for a custom pair of Forcefields? Make a case for why your shoes have
got to go and you may be one of ten lucky winners.</p>

<form action="http://www.learningwebdesign.com/contest.php" method="post">

<fieldset>
<legend>Contest Entry Information</legend>
<ol>
<li><label for="name">Name:</label> <input type="text" name="name" id="name" /></li>
<li><label for="city">City:</label> <input type="text" name="city" id="city" /></li>
<li><label for="state">State:</label> <input type="text" name="state" id="state" /></li>
<li><label for="story">My shoes are SO old...</label><br />
<textarea name="story" rows="4" cols="60" maxlength="300" id="story">(Your entry must be no more than 300
characters long.)</textarea></li>
</ol>
</fieldset>

<h2>Design your custom Forcefields:</h2>

<fieldset>
<legend>Custom shoe design</legend>
<fieldset>
<legend>Color</legend>
<ul>
  <li><label><input type="radio" name="color" value="red" /> Red</label></li>
  <li><label><input type="radio" name="color" value="blue" /> Blue</label></li>
  <li><label><input type="radio" name="color" value="black" /> Black</label></li>
  <li><label><input type="radio" name="color" value="silver" /> Silver</label></li>
</ul>
</fieldset>

<fieldset>
<legend>Features <em>(Choose as many as you want)</em></legend>
```

```
<ul>
  <li><label><input type="checkbox" name="features" value="laces" /> Sparkley laces</label></li>
  <li><label><input type="checkbox" name="features" value="logo" /> Metallic logo</label></li>
  <li><label><input type="checkbox" name="features" value="heels" /> Light-up heels</label></li>
  <li><label><input type="checkbox" name="features" value="mp3" /> MP3-enabled</label></li>
</ul>
</fieldset>

<fieldset>
<legend>Size</legend>
<label for="size">(sizes reflect standard men's sizes):</label>
   <select name="size" id="size">
       <option>5</option>
       <option>6</option>
       <option>7</option>
       <option>8</option>
       <option>9</option>
       <option>10</option>
       <option>11</option>
       <option>12</option>
       <option>13</option>
   </select>
</fieldset>

</fieldset>
<p><input type="submit" value="Pimp my shoes!" />  <input type="reset" /></p>
</form>
</body>
</html>
```

Chapter 10: Understanding the Standards

1. Netscape Navigator and Microsoft Internet Explorer were the major players in the Browser Wars.
2. HTML 4.01 Transitional includes the deprecated presentational elements and attributes that have been removed from the Strict version.
3. HTML 4.01 Strict and XHTML 1.0 Strict the same in that they have the same elements and attributes listed in three DTD versions. They are different in that XHTML is an XML language that has more stringent syntax requirements.
4. The major syntax requirements in XHTML are:
   - Element and attribute names must be lowercase.
   - All elements must be closed (terminated), including empty elements.
   - Attribute values must be in quotation marks.
   - All attributes must have explicit attribute values.
   - Elements must be nested properly.
   - Always use character entities for special characters.
   - Use id instead of name as an identifier.
   - Scripts must be contained in a CDATA section.

5. Look at these valid markup examples and determine whether each is HTML or XHTML:

`<IMG SRC="panda.jpg" ALT="panda eating leaves">`	HTML
`<img src="orchid.jpg" alt="orchid" width=100 height=150 >`	HTML
`<img src="flipflop.gif" alt="closeup of foot in sandal" />`	XHTML

6. The html element must include the xmlns, lang, and xml:lang attributes in XHTML documents.
7. Include a correct DOCTYPE declaration at the beginning of a document to trigger a browser to use Standards Mode.
8. XHTML offers the benefits of XML, including the ability to be combined with other XML languages, be parsed and used by any XML parsing software, and transform information from XML applications to a web page. It is also consistent with future web technologies, requires better coding practices, and is better for accessibility and use on handheld devices.
9. ISO 8859-1 is the character encoding of the 256 characters commonly used in Western languages.

Exercise 10-1

The following changes must be made to the markup:

1. Convert all elements and attributes to lowercase.
2. Add XHTML attributes to the html element.
3. Convert the & in the title to its character entity, &amp;
4. In the img element, put the width and height values in quotation marks
5. Terminate the img element by adding a space and trailing slash before the closing bracket.
6. Close the li elements in the unordered list and the final p element.

```
<html xmlns="http://www.w3.org/1999/xhtml" lang="en" xml:lang="en">

<head>
<title>Popcorn &amp; Butter</title>
</head>

<body>
<h1>Hot Buttered Popcorn</h1>

<p><img src="popcorn.jpg" alt="bowl of popcorn" width="250" height="125" /></p>

<h2>Ingredients</h2>
<ul>
  <li>popcorn</li>
  <li>butter</li>
  <li>salt</li>
</ul>

<h2>Instructions</h2>

<p>Pop the popcorn. Meanwhile, melt the butter. Transfer the popped popcorn into a bowl, drizzle with melted
butter, and sprinkle salt to taste.</p>

</body>
</html>
```

Chapter 11: CSS Orientation

1. selector: `blockquote`, property: `line-height`, value: `1.5`, declaration: `line-height: 1.5`

2. The paragraph text will be red because when there are conflicting rules of identical weight, the last one listed in the style sheet will be used.

3. a. Use one rule with multiple declarations applied to the p element.

```
p {font-face: sans-serif;
   font-size: 1em;
   line-height: 1.2em;}
```

   b. The semicolons are missing.

```
blockquote {
   font-size: 1em;
   line-height: 150%;
   color: gray;
}
```

   c. There should not be curly braces around every declaration, only around the entire declaration block.

```
body {background-color: black;
  color: #666;
  margin-left: 12em;
  margin-right: 12em;}
```

   d. This could be handled with a single rule with a grouped element type selector.

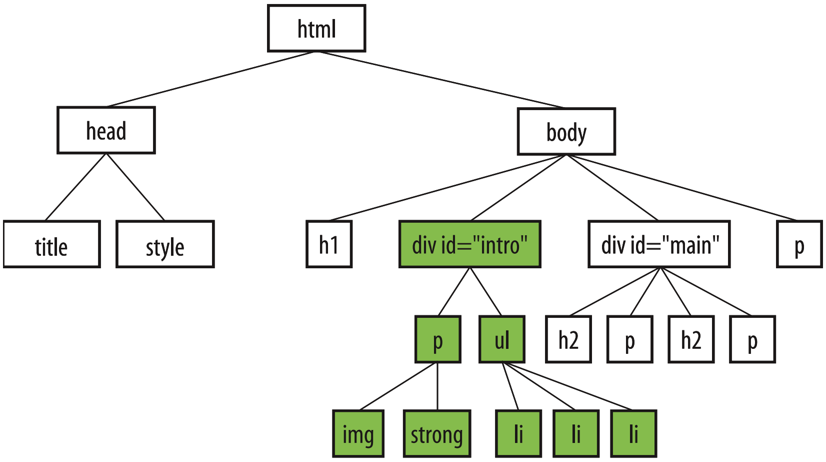
```
p, blockquote, li {color: white;}
```

   e. This inline style is missing the property name.

```
<strong style="color: red">Act now!</strong>
```

4.

```
div#intro { color: red; }
```



Chapter 12: Formatting Text

1. a. All text elements in the document: `body {color: red;}`

   b. h2 elements: `h2 {color: red;}`

   c. h1 elements and all paragraphs: `h1, p {color: red;}`

   d. Elements belonging to the class “special”: `.special {color: red;}`

   e. All elements in the “intro” section: `#intro {color: red;}`

   f. Strong elements in the “main” section: `#main strong {color: red;}`

   g. Extra credit: Just the paragraph that appears after the “main” section (hint: this selector will not work in Internet Explorer 6): `h2 + p {color: red;}`

1. a. ❹ `{font-size: 1.5em;}`

   b. ❶ `{text-transform: capitalize;}`

   c. ❼ `{text-align: right;}`

   d. ❸ `{font-family: Verdana; font-size: 1.5em;}`

   e. ❷ `{letter-spacing: 3px;}`

   f. ❾ `{font: bold italic 1.2em Verdana;}`

   g. ❽ `{text-transform: uppercase;}`

   h. ❺ `{text-indent: 2em;}`

   i. ❻ `{font-variant: small-caps;}`

Exercises 12-1 through 12-3:

```
<style type="text/css">

body { font-family: Georgia, serif;
  font-size: small;
  line-height: 175%; }

h1 { font-size: 1.5em;
   color: purple;}

dt { font-weight: bold; }

strong { font-style: italic; }

h2 { font: bold 1em Georgia, serif;
  text-transform: uppercase;
  letter-spacing: 8px;
  color: purple;}

dt strong { color: maroon; }

#header p {
  font-style: italic;
  color: gray;}
```

```
#header, h2, #appetizers p, #appetizers p { text-align: center; }

#appetizers p, #appetizers p { font-style: italic; }

.price {
  font-style: italic;
  font-family: Georgia, serif; }

.label {
  font-weight: bold;
  font-variant: small-caps;
  font-style: normal; }

p.warning, sup {
  font-size: x-small;
  color: red;}

</style>
```

Chapter 13: Colors and Backgrounds

1. g. a, b, and c
2. d. rgb(FF, FF, FF)
3. a.–5, b.–1, c.–4, d.–6, e.–2, f.–3
4. a. –1, b.–3, c.–2, d.–6, e.–5, f.–4
5. e. all of the above

Exercise 13-1

```
<style type="text/css">

   body {margin-left: 10%; margin-right: 10%; background-color: #BBE09F;}

   div#titlepage { padding: 1em; background-color: #D4F8B9;}

   div#titlepage p {text-align: center; font-variant: small-caps;}

   p {text-align: justify;}

   h1,h2,h3,h4,h5,h6 {text-transform: uppercase; text-align: center;}

   h1 { color:#C30;}
   h2 { color:#630;}

   a:link {color:#030;}
   a:visited {color:#363;}
   a:hover {color:#030; background-color:#87B862; text-decoration:none;}
   a:active {color:#C30;}

</style>
```

Chapter 14: Thinking Inside the Box

1. `border: double black medium;`
2. `overflow: scroll;`
3. `padding: 2em;`
4. `padding: 2em; border: 4px solid red;`
5. `margin: 2em; border: 4px solid red;`
6. `padding: 1em 1em 1em 6em; border: 4px dashed; margin: 1em 6em;`

   or

   `padding: 1em; padding-left: 6em; border: 4px dashed; margin: 1em 6em;`
7. `padding: 1em 50px; border: 2px solid teal; margin: 0 auto;`

Exercise 14-3

```
<style type="text/css">

body {
  margin-left: 12%;
  margin-right: 12%;
  font: 76% Verdana, sans-serif;
  background: #FCF191 url(images/top-background.gif) repeat-x; }

/* styles for the intro section */
#intro {
  margin: 3em 0;
  text-align: center; }

#intro h1 {
  font-size: 1.5em;
  color: #F26521; }

#intro img {
  vertical-align: middle; }

#intro p {
  font-size: 1.2em; }

/* styles for the testimonials box */

#testimonials {
  width: 500px;
  margin: 2em auto;
  border: 1px dashed #F26521;
  padding: 1em;
  padding-left: 60px;
  background: #FFBC53 url(images/ex-circle-corner.gif) no-repeat left top;
  line-height: 1.2em; }

#testimonials h2 {
  font-size: 1em;
  text-transform: uppercase;
  color: #F26521;
  letter-spacing: 3px; }

/* styles for the products section */
#products {
  border: double #FFBC53;
  padding: 2em;
  background-color: #FFF;
  line-height: 2em;}

#products h2 {
  margin-top: 3em;
  border-left: 3px solid;
  border-top: 1px solid;
  padding-left: 1em;
  font-size: 1.2em;
  color: #921A66;}

#products h2.first { margin-top: 0; }

/* link styles */

a:link, a:visited, a:hover, a:active {
  text-decoration: none;
  border-bottom: 1px dotted;
  padding-bottom: .25em;}

a:link, a:active {
  color: #CC0000;}

a:visited {
  color: #921A66; }

a:hover {
  background-color: #FCF191;
  color: #921A66; }

/* miscellaneous styles */

em { color: #F26521; }

p#copyright {
  color:#663333;
  font-size: 10px;
  text-align: center; }

</style>
```

Chapter 15: Floating and Positioning

1. B., floats are positioned against the content area of the containing element (not the padding edge)
2. C., floats do not use offset properties, so there is no reason to include `right`.
3. Clear the footer `div` to make it start below a floated sidebar: `div#footer { clear: both; }`
4. A. absolute, B. absolute, fixed, C. fixed, D. relative, absolute, fixed, E. static, F. relative, G. absolute, fixed, H. relative, absolute, fixed, I. relative

5. The sidebar div would be 292 pixels from outer edge to outer edge. (*Extra credit:* For IE-Win 5 and 5.5, you would set the width to 242px.)

Chapter 16: Page Layout with CSS

1. Fixed, c.; Liquid, a.; Elastic, b.
2. Fixed, b.; Liquid, c.; Elastic, a.
3. Fixed, c.; Liquid, b.; Elastic, a.
4. Fixed, c.; Liquid, a.; Elastic, b.
5. Full-width footer: floats; Not change source order: positioning; No worries about overlapping: floats.

Chapter 17: CSS Techniques

1. B, E, A, D, C
2. E, D, B, A, C
3. The display property is used to specify how the element box should be handled in the layout; for example, as a block element starting on a new line or as an inline element staying in the text flow.
4. Elements set to display: none are completely removed from the normal flow and the space they would have occupied is closed up. An element with visibility set to hidden is invisible, but the empty space it would have occupied in the normal flow is still there.
5. List items can be turned into inline elements using the display property, or floated to one edge so they stack up next to one another.
6. C, the :hover selector.

Exercise 17-1, Design A

```
<style type="text/css">
body {margin: 100px;}

table {
  font-family: verdana, sans-serif;
  font-size: 76%;
  border-collapse: separate;
  border-spacing: 4px;
  width: 550px;}

th { text-align: left;
  color: white;
  background: olive;
  vertical-align: bottom;
  padding: 3px 12px 3px 3px; }

td { padding: 6px 12px 6px 3px;
  vertical-align: top;
  border: 1px olive solid; }

.filename { font-style: italic; }
tr.odd { background-color: #F3F3A6;}
tr.even { background-color: #D4D4A2;}
</style>
```

Exercise 17-1, Design B

```
<style type="text/css">
body {margin: 100px;}

table {
  font-family: verdana, sans-serif;
  font-size: 76%;
  width: 550px;
  border-collapse: collapse; }

td { padding: 6px 12px 6px 3px;
  vertical-align: top;
  border-bottom: 1px olive solid; }

th { text-align: left;
  color: white;
  background: olive;
  vertical-align: bottom;
  padding: 3px 12px 3px 3px;}

tr.odd { background-color: #F3F3A6;}

tr.even { background-color: #D4D4A2;}
</style>
```

Exercise 17-2, Design A

```
<style type="text/css">

body {font-family: Verdana, sans-serif;
  margin: 0;}

h1#ds {
  text-indent: -5000px;
  background: url(images/designerrific_trans.gif) no-repeat;
  width: 360px;
  height: 70px;
  margin: 0;
  position: absolute;
  top: 25px;
  left: 25px;}

ul#nav {
  list-style-type: none;
  margin: 0;
  position: absolute;
  top: 65px;
  right: 25px;}

ul#nav li { display: inline;}

ul#nav li a {
  background-color: #0A6D73;
  border: 1px solid #FFF;
  color: white;
  font-size: 76%;
  text-decoration: none;
  text-align: center;
  text-transform: uppercase;
  letter-spacing: 2px;
  padding: 2px 20px;
  margin: 0px 2px;}

ul#nav li a:hover {
  background-color: #F8409C;
  border: 1px solid #600; }

#header {
  position: relative;
  background: #9cd8cd;
  border-bottom: 3px double #600;
  height: 100px;}

</style>
```

Exercise 17-2, Design B

```
<style type="text/css">

body {font-family: Verdana, sans-serif;
  margin: 0;}

h1#ds {
  text-indent: -5000px;
  background: url(images/designerrific_trans.gif) no-repeat;
  width: 360px;
  height: 70px;
  margin: 0;
  position: absolute;
  top: 25px;
  left: 25px; }

ul#nav {
  list-style-type: none;
  margin: 0;
  position: absolute;
  top: 65px;
  right: 25px; }

ul#nav li {
  display: inline; }

ul#nav li a {
  color: #1A7E7B;
  font-size: 76%;
  text-decoration: none;
  text-align: center;
  text-transform: uppercase;
  letter-spacing: 2px;
  padding: 2px 20px;
  margin: 0px 2px;
  background: url(images/star-white.gif) left center no-repeat; }

ul#nav li a:hover {
  background: url(images/star-pink.gif) left center no-repeat; }
```

```
#header {
  position: relative;
  background: #9cd8cd;
  border-bottom: 3px double #600;
  height: 100px; }

</style>
```

Chapter 18: Web Graphics Basics

1. You can license to have exclusive rights to an image, so that your competitor doesn't use the same photo on their site.
2. ppi stands for "pixels per inch" and is a measure of resolution.
3. The 7-inch, 72ppi image is only 504 pixels across and would fit fine on a web page. The 4-inch, 300 ppi image is 1200 pixels across, which is too wide for most pages.
4. Indexed color is a mode for storing color information in an image that stores each pixel color in a color table. GIF and 8-bit PNG formats are indexed color images.
5. There are 256 colors in an 8-bit graphic, and 32 colors in a 5-bit graphic.
6. GIF can contain animation and transparency. JPEG cannot.
7. Lossy compression is cumulative, which means you lose image data every time you save an image as a JPEG. If you open a JPEG and save it as a JPEG again, even more image information is thrown out than the first time you saved it. Be sure to keep your full-quality original and save JPEG copies as needed.
8. PNGs can store 8-bit indexed color, RGB color (both 24- and 48-bit) and 16-bit grayscale images.
9. In binary transparency, a pixel is either entirely transparent or entirely opaque. Alpha transparency allows up to 256 levels of transparency.
10. Ⓐ GIF or PNG-8 because it is text, flat colors, and hard edges. Ⓑ JPEG because it is a photograph. Ⓒ GIF or PNG-8 because although it has some photographic areas, most of the image is flat colors with hard edges. Ⓓ GIF or PNG-8 because it is a flat graphical image. Ⓔ JPEG because it is a photograph.

Chapter 19: Lean and Mean Web Graphics

1. Smaller graphic files means shorter download and display times. Every second counts toward creating a favorable user experience of your site.
2. Dithering introduces a speckle pattern that interrupts strings of identical pixels, therefore the GIF compression scheme can't compress areas with dithering as efficiently as flat colors.
3. The fewer pixel colors in the image, the smaller the resulting GIF, both because the image can be stored at a lower bit depth and because there are more areas of similar color for the GIF to compress.
4. The compression setting is the most effective tool for controlling the size of a JPEG.
5. JPEG compression works effectively on smooth or blurred areas, so introducing a slight blur allows the JPEG compression to work more efficiently, resulting in smaller files.

6. Just as you would do for an indexed GIF, optimize a PNG-8 by designing with flat colors, reducing the number of colors, and avoiding dithering. There are no strategies for optimizing a PNG-24 because they are designed to store images with lossless compression.

Chapter 20: The Web Development Process

1. A site diagram is useful for planning and visualizing how information is organized on the site. It should be done very early in the design process, as soon as the content and functionality of the site have been determined. The site diagram becomes a valuable reference for the whole production team.
2. A look and feel study is a sketch or series of sketches that propose graphic styles for the site. It focuses on how the site looks rather than how it works.
3. There are many things that should be determined before production begins, including answers to questions like those in the Some Questions Before You Begin sidebar, but some other general tasks include: determining the site idea and strategy, getting information about your target audience, generate content, organize site content, create a site diagram that reflects the organization, create wireframe diagrams to show page layout and functionality, and develop the graphic look and feel.
4. The beta release incorporates changes from the initial alpha prototype and is close to a working version of the site. At the very least, the client is invited to review it, but some sites choose to make beta releases available to a broader audience.
5. At minimum, sites should be checked to make sure that all the content is there and accessible, that there are no typos or errors, that all the links work, that images are visible, and that scripts and applications are functioning properly. Beyond that, it is also important to test the site's look and performance on a wide variety of browsing environments and conditions.

Chapter 21: Getting Your Pages on the Web

1. Get connected to the Internet B

   Find out if yourname.com is available C

   Get yourname.com for three years C (and sometimes A)

   Get space on a web server A (and sometimes B or C)
2. By numeric IP address and by domain name.
3. To open a file that is stored on your own hard drive. Pages that are on an external computer or server are said to be remote.
4. You must know the name of the server, your login, and password. You may also need to know the name of the root directory and the type of FTP transfer.
5. Upload graphics and audio files as "binary" or "raw data," depending on what your FTP client calls it. HTML files should be uploaded as "text" or "ASCII."
6. Select the directory name in the FTP client.
7. In order to publish content on the Web for free, you may need to accept their advertising on your pages, you may be limited as to what type of content you can publish, you may have limited control over the page layout and navigation, and you usually do not get your own domain name.

APPENDIX **B**

CSS2.1 SELECTORS

Selector	Type of Selector	Description
`*`	Universal selector	Matches any element `* {font-family: serif;}`
`A`	Element type selector	Matches the name of an element. `div {font-style: italic;}`
`A, B`	Grouped selectors	Matches elements A and B `h1, h2, h3 {color: blue;}`
`A B`	Descendant selector	Matches element B only if it is a descendant of element A. `blockquote em {color: red;}`
`A>B`	Child selector	Matches any element B that is a child of element A. `div.main>p {line-height: 1.5;}`
`A+B`	Adjacent sibling selector	Matches any element B that immediately follows any element A. `p+ul {margin-top: 0;}`

`.classname`
`A.classname`
	Class selector	Matches the value of the class attribute in all elements or in a specified element.
		`p.credits {font-size: 80%;}`

`#idname` `A#idname`	ID selector	Matches the value of the id attribute in an element. `#intro {font-weight: bold;}`
`A[att]`	Simple attribute selector	Matches any element A that has the given attribute defined, whatever its value. `table[border] {background: white;}`
`A[att="val"]`	Exact attribute value selector	Matches any element A that has the specified attribute set to the specified value. `table[border="3"] {background: yellow;}`
`A[att~="val"]`	Partial attribute value selector	Matches any element A that has the specified value as one of the values in a list given to the specified attribute. `table[class~="example"] {background: yellow;}`
`A[att|="val"]`	Hyphenated prefix attribute selector	Matches any element A that has the specified attribute with a value that is equal to or begins with the provided value. It is most often used to select languages, as shown here. `a[lang|="en"] {background-image: url(en_icon.png);}`
`a:link`	Pseudoclass selector	Specifies a style for links that have not yet been visited. `a:link {color: maroon;}`

Selector	Type of Selector	Description
`a:visited`	Pseudoclass selector	Specifies a style for links that have already been visited. `a:visited {color: gray;}`
`:active`	Pseudoclass selctor	Specifies to any element that has been activated by the user, such as a link as it is being clicked. `a:active {color: red;}`
`:focus`	Pseudoclass selector	Specifies any element that currently has the input focus, such as a selected form input. `input[type="text"]:focus {background: yellow;}`
`:hover`	Pseudoclass selector	Specifies a style for elements (typically links) that appears when the mouse is placed over them. `a:hover {text-decoration: underline;}`
`:lang(xx)`	Pseudoclass selector	Selects an element that matches the two-character language code. `a:lang(de) {color: green;}`
`:first-child`	Pseudoclass selector	Selects an element that is the first child of its parent element in the flow of the document source. `p:first-child {line-height: 2em;}`
`:first-letter`	Pseudoelement selector	Selects the first letter of the specified element. `p:first-letter {font-size: 4em;}`
`:first-line`	Pseudoelement selector	Selects the first letter of the specified element. `blockquote: first-line {letter-spacing: 4px;}`
`:before`	Pseudoelement selector	Inserts generated text at the beginning of the specified element and applies a style to it. `p.intro:before {content: "start here"; color: gray;}`
`:after`	Pseudoelement selector	Inserts generated content at the end of the specified element and applies a style to it. `p.intro:after {content: "fini"; color: gray;}`

INDEX

Symbols

#1 Free Clip Art 362
& (ampersand) 90
' (apostrophe) 90
* (CSS2.1 selector) 451
../ notation 102
< (less-than symbol) 90
> (greater-than symbol) 90
@import rule 255, 256, 258
24-bit images 367
8-bit images 363, 369

A

abbreviations 83
above the fold 43
absolute positioning
  page layouts 326–336
absolute units 208
accessibility 34
  forms 148–149
  images 120
  tables 133, 139
  versus availability 32
  zoom layouts for low-vision users 317
acronyms 83
ActionScript 8
:active (pseudoclass selector) 241, 242
address element 76
adjacent sibling selectors 219, 451
Adobe After Effects 16
Adobe Flash 8, 15
Adobe HomeSite 15
Adobe Illustrator 15, 361
Adobe Macromedia Dreamweaver 14
Adobe Macromedia Fireworks 8 361
Adobe Photoshop 15, 238, 361
  saving images 372
Adobe Photoshop Elements 15
:after (pseudoelement selector) 244
Ajax 11
align attribute (img element) 118
A List Apart 124, 162, 201, 211, 244, 258, 316, 317, 319, 334, 347, 378
alpha transparency 377, 378
alt attribute 117–119
alternate text 118
anchors 95–101, 107–113
  named 107
  syntax 95
Apache web server 20
Apple Final Cut Pro 16
Apple iMovie 16
Apple QuickTime 16
ASCII files 52
ASCII text 24
attributes 64
attribute selectors 244
  exact 244
  hyphen-separated 244
  partial 244
Audacity 16
audience, know your 47
auditory impairment 33
authoring 7
automating production 10

B

backend design 6
background-attachment property 253
background-color property 240
background-image 246–254
background-position property 249, 254
background-repeat 248, 250
background colors 36
background images 246–252
  adding 246–247
  attachment 252
  position 249
    keyword positioning 250
    length measurements 250
  shorthand background property 254
  tiling 248–249
  working with 247
backslash 57, 98
BBEdit 15
:before (pseudoelement selector) 244, 451
Behavior Layer 10
b element 85
Berners-Lee, Tim 9, 20
Big, Stark, and Chunky article 317
big element 85

big picture, keeping the 48
binary transparency 377
bit depth 391
bitmapped images 373
block-level elements 61, 80
  forms and 145
blockquote element 74
blogging services 420
BMP 116
body element 58
border-bottom property 273
border-collapse property 338, 341, 356
border-color property 218, 238, 272
border-left property 273
border-right property 273
border-spacing property 338, 341, 356
border-top property 273
border-width property 271
border attribute (img element) 118
borders 269–274
  border-width property 271–272
  border style property 269
  bottom borders instead of underlines 274
  color 272
    transparent keyword 272
  combining style, width, and color 273–274
Boutell, Tom 125
Bowman, Doug 317, 318, 347
box model 261, 264
  future of 265
  IE/Windows 264
br element 63
Briggs, Owen 211
Brill, Ryan 319
Browsercam.com 32
browsers 16, 21
  alternative environments 32–35
    disabilities, users with 32
    mobile web 33
  bugs 286
  displaying web pages 26
  familiarity with 30
  pixel dimensions of images 120
  reloaded pages look same 68
  statistics 30
  versions 29–32
    coping with 31
  what browsers ignore 56
  window size 40–44
    coping with 42
Budd, Andy 278
bullet character 90
button element 153

C

Cailliau, Robert 20
cameras, digital 360
capitalization 226
caption (system font value) 216
carriage returns 56
Cascading Style Sheets (see CSS)
CDATA 172
cell phone browser 21
center element 85
CERN 20, 165
CGI (Common Gateway Interface) 145
character encoding 180–181
  specifying 180
  Unicode (ISO/IEC 10646) 180
child selectors 219, 451
citations 83
cite element 83
Clark, Joe 317
class attribute 87, 88
  value 88
class selectors 220, 451
clear property 292
client-side versus server-side 21
client software 20
clip art 361
Clipart.com 362
closing tag 57
CNET Web Hosting Reviews 419
code element 83
cognitive impairment 33
col element 131
colgroup element 131
collapsed border model 339
color
  map 363
  table 363
color control 46
Color Names chart 236
Color Picker 235, 236
colors
  background 239–240
  extended color names 234
  foreground 238
  keywords in CSS2.1 234
  values 233–238
    RGB 234–237
  Web Palette 238
  Web Safe Colors 238
  working with 239
Colorzilla 236
comments 56, 60
.com suffix 417
connection speed 39–40
containing block 263, 292, 296–309, 323, 329–335
content attribute 181
contextual selectors 218, 220
copyright symbol 89, 90
Corel Paint Shop Pro 15
Corel Paint Shop Pro Photo 361
CSS (Cascading Style Sheets) 10, 30–32, 38, 44, 48, 187–356
  assigning importance 198
  benefits of 187–188
  box model 199
  comments in style sheets 193
  conflicting styles 197–199
    rule order 198
    specificity 197
  CSS2.1 standards 191
  CSS Level 1 Recommendation 188
  CSS Level 2 (CSS2) 188
  CSS Level 3 (CSS3) 188
  declaration 190–191
  embedded style sheets 193
  external style sheet 193

  grouped selectors 200
  how they work 188–194
  imagemaps 124
  images and 116
  inheritance 194–197
    document structure 194
    parents and children 195
  power of 188
  presentation layer 190
  properties 190
  reader style sheets 197
  rules 190
  selector 190–191
  standards 188
  structural layer 190
  stylesheet hierarchy 198
  stylesheets, attaching to document 193
  values 190
css-discuss Wiki 287, 319
CSS2
  other media 257
  units of measurement 208
CSS2.1
  color keywords 234
  letting and numbering keywords 342
  pseudoclass selectors 241
  selectors 451–452
CSS techniques 337–356
  image replacement (IR) techniques 347–349
  list bullets and numbers 340–344
  lists, using for navigation 344–347
  rollovers (see rollovers)
  table style properties 337–340
CSS Zen Garden 316
  examples 189
  site 116
CuteFTP 423
Cygwin 17

D

Davidson, Mike 349
debugging HTML 67–68
decimal-leading-zero keyword 342
decimal keyword 342
declaration 191
declaration block 191
default 204
del element 83
deprecated elements 81
descendent selector 218, 451
dfn element 83
DHTML 10
digital cameras 13, 360
disabilities, users with 32
display property 281
display roles 281–282
dithering 45
div element 86–89
DNS server 20
DOCTYPE
  declarations 175
  switching 174
Document Object Model (DOM) 10
document production 7
document structure 57–60
domain
  availability 417
  cost 416
  name 415–417
  registries 416
  suffixes 417
Domain Name System (DNS) 20
DOM scripting 10
dots per inch (dpi) 374
Download.com 12
Dreamweaver 4, 52, 238
DTD (Document Type Definition) 168, 174–182
  HTML
    frameset 175
    strict 175
    transitional 175
  which one to use 176–177
    HTML or XHTML 176
    transitional or strict 176
  XHTML
    frameset 175
    strict 175
    transitional 175

E

ECMAScript 10
.edu suffix 417
Elastic Lawn 316
elastic layouts 311, 316–318
  creating 317
element box 261–262
  content dimensions 262–266
    handling overflow 265–266
    height 262–265
    width 262–264
  overflow 265–266
    auto 266
    hidden 265
    scroll 266
    visible 265
element identifiers 86
elements
  closing 58
element type selector 191, 451
ellipses 90
em-dash 90
email accounts 419
embedded style sheets 193
em element 85
emphasis, adding to text 82
empty-cells property 339, 340, 356
empty elements 63
em tag 60
en-dash 90
end tag 57
Enkoder from Automatic Labs 111
EPS 116, 362
equipment 13
escaping special characters 89

exact attribute value selector 244, 451
exercises
- 1-1 Taking Stock 16
- 2-1 View Source 24
- 3-1 Playing with Preferences 38
- 3-2 Get a feel for the normal flow 41
- 4-1 Entering Content 55
- 4-2 Adding basic structure 59
- 4-3 Defining Text Elements 61
- 4-4 Adding an Image 65
- 4-5 Adding a style sheet 66
- 5-1 Fun with block elements 80
- 5-2 Fix it 84
- 5-3 Text Markup Practice 91
- 6-1 Make an external link 97
- 6-2 Link in the same directory 99
- 6-3 Link one directory down 100
- 6-4 Link two directories down 101
- 6-5 Link to a higher directory 102
- 6-6 Link up two directory levels 103
- 6-8 Linking to a Fragment 108
- 7-1 Adding and linking images 122
- 7-2 Making an Imagemap 126
- 8-1 Making a Simple Table 134
- 8-2 Column Spans 135
- 8-3 Row Spans 136
- 8-4 The Table Challenge 141
- 9-1 Starting the Contest Form 154
- 9-2 Adding radio buttons and checkboxes 158
- 9-3 Adding a menu 160
- 10-1 Defining Text Elements 173
- 10-2 Validating a Document 178
- 10-3 Adding the character encoding 181
- 11-1 Your first style sheet 190
- 11-2 Applying an inline style 194
- 12-1 Formatting a Menu 207
- 12-2 Using Selectors 221
- 12-3 Finishing Up the Menu 228
- 13-1 Adding Color to a Document 243
- 13-2 Working with Background Images 247
- 13-3 Making an External Style Sheet 256
- 14-1 Adding a Little Padding 268
- 14-2 Border tricks 274
- 14-3 Adding Margin Space Around Elements 280
- 15-1 Floating elements 293
- 15-2 Absolute Positioning 304
- 15-3 Fixed Positioning 308
- 16-1 Float-based Layout 324
- 16-2 Elastic layout with positioned column 333
- 16-3 Centering Layouts 335
- 17-1 Styling a Table 341
- 17-2 Putting It Together 352
- 18-1 Resizing an Image Smaller in Photoshop 376
- 18-2 Creating Transparent Images 379
- 19-1 Making Lean and Mean GIFs 394
- 19-2 Optimizing JPEGs 399

eXtensible HTML 9
external style sheet 193
extranets 21

F

Fahrner, Todd 211
fantasy font 205
Featherstone, Derek 32
Fetch 423
file:// protocol 98
files, naming conventions 55
Firebug 177
Firefox browser 21
firewalls 21
Fireworks
- saving images 373

:first-child (pseudoclass selector) 241, 452
:first-letter (pseudoelement selector) 243, 452
:first-line (pseudoelement selector) 242, 452
fixed layouts 44, 311, 314–315
- creating 315
- three-column with footer 322
- three-column with rules and padding between columns 330
- versus liquid layouts 318

floating elements 286–295
- blocks 290–291
- clearing floated elements 292–295
- defined 285
- examples 288–291
- inline text 288–289
- key behaviors 288
- multiple elements 291

float property 286, 293, 305, 345
flow, normal 285–286
fluid layouts 312
:focus (pseudoclass selector) 241, 452
font-family 204
- as alternative to font element 85

font-size property 208
- as alternative to font element 85

font-style property 214
- as alternative to i element 85

font-variant property 215
- as alternative to font element 85

font-weight property 213
- as alternative to b element 85

font element 84, 85
font face and size 36
font properties 204–217
- absolute units 208
- font-weight 213
- generic font families 205
- limitations 204
- name 204–208
- relative units 208
- size 208–211
  - em 210
  - keywords 209
  - percentages 210
  - techniques 211
- specifying 206

style
italics 214
system fonts 216
variant
small caps 215
fonts, core web from Microsoft 207
form element 145–147
action attribute 146
block elements 145
method attribute 146, 147
forms 143–164
accessibility 148–149
button element 153
checkbox buttons 156, 157
controls 150–162
hidden 161
input element 150–162
multi-line text entry field 152
password text entry field 152
single-line text entry field 151
custom input buttons 153
disabled attribute 152
encoding 144
fieldset element 149
GET method 147
hosting plans 146
how they work 143–145
IDs 149
image button 153
input element 150–162
interactivity options 146
labels 148
explicit association 149
implicit association 149
layout and design 162
legend element 149
menus 158
grouping options 160
pull-down 159
scrolling 159
multiple attribute 159
name attribute 147, 148, 151, 152, 153, 156
naming variables 148
optgroup element 160
POST method (see POST method)
programmers 146
radio buttons 156
readonly attribute 152
reset button 153
rows attribute 152
select element 159
size attribute 151
submit button 153
textarea element 152
type attribute 150, 151, 156
value attribute 151
variables and content 147–148
forward slash (/) 104
fragment identifier 106
frames
targeting 109
free hosting services 420
Frontend design 6
FrontPage 52
FTP (File Transfer Protocol) 423–425
needed information 423
software 423–425
step-by-step 424–425
uploading whole site 424
FTP programs 16
FutureSplash 8

G

gamma settings 46
Garrett, Jesse James 7
GET method 147
Getty Images 361
GIF (Graphic Interchange Format) 68, 115, 363–366, 371
Adaptive color palette 365
animated 366
common color palettes 365
compression 364
Custom color palette 365
Exact color palette 365
indexed color 363
interlacing 366
Optimized Median Cut (Paint Shop Pro only) color palette 365
Optimized Octree (Paint Shop Pro only) color palette 365
optimizing 390–393
optimizing images
designing for compression 392
horizontal stripes 393
lossy filter 392
reducing dithering 391
reducing number of colors 390
Perceptual (Photoshop/Image Ready only) color palette 365
Selective (Photoshop/ImageReady only) color palette 365
System (Windows or Macintosh) color palette 365
transparency (see transparency)
Uniform color palette 365
Web, Restrictive, or Web216 365
Web Adaptive (Fireworks only) color palette 365
GoDaddy 416
Government Accessibility Guidelines 34–35
.gov suffix 417
graphic design 5
graphic file 26
graphics software 15
grayscale images 369
Griffiths, Patrick 316
grouped selectors 451
Gustafson, Aaron 153

H

h1 56, 61, 63–65
h2 60, 66, 68
headers attribute 133
headings 73
(see also h1;h2)
hexadecimal 236
calculators 237
Hirsch, Ben 319
horizontal rule (see hr element)

HostIndex 419
hosting plans 146
hosting services
  free hosting options 420
  professional 418
  shopping for 419
  versus ISPs (Internet Service Providers) 418
:hover (pseudoclass selector) 241, 242
href attribute 96
hr element 63, 75
hspace attribute (img element) 118
HTML 9
  browser's point of view 174
  documents 24
  editors 14
  element 57, 58
  Frameset version 168
  history 165–169
  rewriting 169
  Transitional version 167
  version 5 168
HTML 4.01 Recommendation 167
HTML 4.01 Strict documents 182
HTML overview 51–70
  attributes 64
  block-level elements 61
  body 58
  capitalization 58
  closing tag 57
  comments 60
  debugging 67–68
  document structure 57–60
    html element 57
  elements, closing 58
  end tag 57
  header 58
  images 63–65
  img element 57
  opening tag 57
  quotation marks 58
  start tag 57
  style sheets 66–67
  tables 58
  text editor 52–54
    creating in Notepad 53
    creating in TextEdit 54
  text elements 60–63
    default styles 62
  title element 59
  web page, step-by-step 51–52
HTML Tidy 177
http-equiv attribute 181
http:// protocol 22, 97
HTTP servers 20
hypertext links 19
HyperText Transfer Protocol (HTTP) 19
hyphenated prefix attribute selector 451

I

ICANN 416
icon (system font value) 216
ID and NAME tokens 172
id attribute 87
  value 88
ID selectors 219, 220, 451
IE 5 (Mac) 30
IE5/Mac Bugs and Fixes 287
i element 85
image file 26
imagemaps 123–126
  components 124
  creating 124
  CSS 124
  interpreting 125
  tools 125
image replacement (IR) techniques 347–349
  future of 348
images 115–128
  accessibility 120
  adding 63–65
  adding and linking 122
  background (see background images)
  bitmapped 373
  broken graphic icon 68
  caching 119
  choosing best format 371
  clip art 361
  creating 359–360
  CSS and 116
  digital cameras 360
  dots per inch (dpi) 374
  electronic illustration 360
  formats 115–116, 362–373
  imagemaps (see imagemaps)
  inline 115
  naming properly 362
  optimizing (see optimizing images)
  organizing 118
  pixel dimensions of 120
  raster 373
  resizing 375
  resolution 374
    low 375
  rollovers (see rollovers)
  saving in chosen format 372
  scanning 360
  size and resolution 373–375
  sources 359–362
  stock photography 360–361
  tools of the trade 361
  transparency (see transparency)
  turning off 36
  web basics 359–386
  (see also img element)
img element 57, 63, 116–121
  alt attribute (see alt attribute)
  deprecated attributes 118
  height attribute 120–121
  longdesc attribute 119
  src attribute 105
  width attribute 120–121
indexed color 363
index file 23
information architects 6
information design 6
inherit (CSS keyword value) 213
inherits (properties) 204
inline elements 81–85
  abbreviations 83
  acronyms 83

citations 83
code 83
del 83
dfn element 83
emphasis 82
font 84
ins 83
kbd 83
presentational 84
samp 83
semantic 81, 82
strong 81
var 83
Inman, Shaun 349
ins element 83
Interarchie 423
interface design 6
interlacing 370
Internet
definition 19
Internet Explorer 5.5 and 5 30
Internet Explorer 6 30
flickering during rollovers 351
monitor resolutions 42
Standards Mode 335
unsupported features
:after 78
:before 78
:hover on all elements 349
generated text 78
max-width property 316
min-width property 316
PNG alpha-transparency 370, 378
zoom text sized in pixels 317
Internet Explorer 7 30
Internet tools 16
intranets 21
IP addresses 20, 416
ISPs (Internet Service Providers)
versus hosting services 418
IStockPhoto 361

J

Java 8, 12
Java and JavaScript
turning off 36
Javascript, opening window with 109
JavaScript/DOM scripting 9, 10
jello layouts 316
JPEG (Joint Photographic Experts Group) 68, 115, 367–368, 371
24-bit images 367
compression 367
optimizing images 394–399
blurring or smoothing 398
compression 394–395
compression, aggressive 395
Selective Quality 396–397
unpredictable color 395
Weighted Optimization 396–397
progressive 368
JPEG Cruncher by Spinwave 389
JuicyStock.com 361
Jupiter Images 361

K

kbd element 83
Koch, Peter-Paul 265, 287
Koechley, Nate 30
Krug, Steve 7
Kuniavsky, Mike 412

L

Landa, Robin 6
:lang() (pseudoclass selector) 241, 452
lang attribute 173
large (font size keyword) 209
larger (font size keyword) 210
Lauer, David 6
layers 10
layout
using layout tables 131
less-than symbol (<) 89
letter-spacing property 227
Levine, Matthew 319
line breaks 56, 63
adding 79–80
line lengths
dealing with 313
optimal 312
:link (pseudoclass selector) 241, 451
link element 255
linking
images 105
mail 111
pages on web 97
specific point in web page 106, 108
within your site 98–108
root relative path 104
to a higher directory 102–103
to a lower directory 100–101
within a directory 99
links 95–114
Linux emulaters 17
liquid layouts 43, 311, 312
three-column (narrow footer) 328
two-column with footer 320
two-column with narrow footer 326
versus fixed layouts 318
list-style-image property 343, 344, 356
list-style-position property 342–344, 356
list-style-type property 78, 340–345, 350–356
disc, circle, and square values 342
list-style property 344, 356
lists 76–79
bullets and numbers 340–344
changing bullets and numbering 78
definition 78
dictionary 78
item display role 342
making bullets 343–344
marker
choosing 340–342
position 342

lists (continued)
  nesting 77
  ordered 77
  unordered 76
  using for navigation 344–347
    floated list items 345
    inline list item method 344–345
    tutorials 347
longdesc attribute 119
long quotation 74
lower-alpha keyword 342
lower-greek keyword 342
lower-latin keyword 342
lower-roman keyword 342
LVHA 242

M

Mac Dec Bin Calculator 237
Macintosh, running Windows on 13
Macromedia Fireworks 15
mailto link 111
MapEdit 125
margin-bottom property 275
margin-left property 275
margin-right property 275
margin-top property 275
margins 275–281
  behavior 277–281
  browser default 276
  collapsing 277, 278
  inline elements 278
  negative 279
markup, unrecognized 56
markup language 9, 24
MathML (Mathematical Markup Language) 169
Matt's Script Archive 146
max-height property 263
max-width property 263, 314, 316
maxlength attribute 151
media types 257
medium (font size keyword) 209
menu (system font value) 216
message-box (system font value) 216
meta element 63, 181
Meyer, Eric 191, 278
Meyer, Minz 278
Microsoft Expression Web 14
Microsoft IIS web server 20
Microsoft Windows Movie Maker 16
.mil suffix 417
min-height property 263
min-width property 263
mobile web 33
mobility impairment 32
monitor color 44–47
  brightness 45
  coping with variations 46
  number of colors 45
monitor resolutions 40–44
  common 42
monitors 13
monospace font 204, 205
Morville, Peter 6
Mosaic browser 20
Mosaic Communications 166
Mozilla Firefox 1.0 30
multimedia 8
multimedia tools 15

N

name attribute 107
naming conventions (files) 55
NCSA 20
Netscape 4 30
Netscape 7 & 8 30
Netscape browser 21, 166
.net suffix 417
Network Solutions 416
Newhouse, Mark 347
Notepad 52
  creating new document 53
NUMBER data type 172
Nvu 14

O

O'Reilly Media's web site 315
online community sites 420
opening tag 57
Open source software 20
Opera 8+ 30
Opera browser 21
optgroup element 160
optimizing images 387–402
  compression 388
  file size 401
  general strategies 388–389
  GIFs 390–393
    designing for compression 392
    horizontal stripes 393
    lossy filter 392
    reducing dithering 391
    reducing number of colors 390
  JPEGs 394–399
    blurring or smoothing 398
    compression 394–395
    compression, aggressive 395
    Selective Quality 396–397
    unpredictable color 395
    Weighted Optimization 396–397
  limiting dimensions 388
  PNGs 400
    PNG-24 400
    PNG-8 400
  reusing and recycling 388
  web graphics tools 389
  why optimize 387–388
Organisation for Economic Co-operation and Development 40
.org suffix 417
Original Free Clip Art 362

P

padding 266–268
padding property 266, 269
  shorthand 267–268

page layouts 311–336
  absolute positioning 326–336

centering fixed width page 334
elastic (see elastic layouts)
fixed (see fixed layouts)
liquid (see liquid layouts)
strategies 311–314
templates 318–332
color-coding 319
dominant main column 319
headers and footers 318
multi-column layouts using floats 319–325
simplified markup 318
three-column (narrow footer) 328
three-column with footer 322
three-column with rules and padding between columns 330
top-to-bottom column backgrounds 334
two-column with footer 320
two-column with narrow footer 326
Paint Shop Pro
saving images 373
paragraphs 72
partial attribute value selector 244, 451
pathnames
things not to do 98
PCDATA 172
PDA browser 21
p element 72
Pentak, Stephen 6
Photoshop (see Adobe Photoshop)
PHP Builder 146
PHP Classes 146
The PHP Resource Index 146
PictureQuest 361
pixels 42, 373
plain text 52
platforms, different 38–39
PNG (Portable Network Graphic) 68, 115, 368–371
8-bit indexed color images 369
animation 369
gamma correction 370
grayscale images 369
optimizing images 400
PNG-24 400
PNG-8 400
progressive display (interlacing) 370
RGB/Truecolor (24- and 48-bit) 369
when to use 371
PNG-8 files 382
positioning elements 285, 295–296
absolute positioning 297–307
specifying position in percentages 303
specifying position in pixels 302
stacking order 306–307
fixed positioning 307–308
relative positioning 296–297
specifying position 296
types
absolute 295
relative 295
static 295
Position Is Everything 287
position property 295–299
POST method 146–148, 161, 162
pound 90
Powers, Shelley 11
pre element 74
preformatted text 74
Presentation Layer 10
print (media type) 257
problems, common
broken graphic icon 68
half page missing 68
reloaded pages look same 68
programmers 146
progressive display (interlacing) 370
ProJPEG by BoxTop Software 389
property listings 204
pseudoclass selectors 240–242, 451–452
:active 241, 452
:hover 241, 452
:link 241, 451
:visited 241, 452
anchors 241, 452
LVHA 242, 452
pseudoelement selectors 242–243, 452
:after 244, 452
:before 244, 452
:first-letter 243, 452
:first-line 242, 452
p tag 60
publishing sites 420–422
PuTTY 17

Q

Quirksmode Bug Reports 287
quotation
long 74
short 82
quotation marks 58
quotes 90

R

Raggett, Dave 177
RAM 13
raster images 373
Register.com 416
registered trademark 90
relative units 208
rgb() notation 236
RGB color 233–236
model 235
picking a color 235
specifying values 236
style sheets 236
RGB mode 371
Robinson, Alex 319
rollovers 349–351
shifting background images 351
swapping background images 350
root directory 104
Rosenfeld, Lou 6
RSS 12
RSS (Really Simple Syndication or RDF Site Summary) 169
Rundle, Mike 348
Rundle/Phark method 348
Rutter, Richard 211

S

Safari 1.0 and 2.0 30
Safari browser 21
samp element 83
sans-serif 205
Scalable Vector Graphics (SVG) 12
scanners 13
scanning images 360
scripting and programming 8
select element 159
selectors 190–191, 218–221
  adjacent sibling selectors 219, 451
  attribute (see attribute selectors)
  child selectors 219, 451
  class selectors 220, 451
  contextual selectors 218, 220
  descendent selector 218, 451
  element 191, 220, 451
  grouped 200, 451
  ID selectors 219, 220, 451
  pseudoclass (see pseudoclass selectors)
  specificity 220, 221
  universal 220, 451
s element 85
semantic inline elements 81, 82
semantic markup 60
separated border model 338
serif 205
server-side scripting 9, 11
server space 417–420
  how much is needed 419
server testing 422
server traffic 419
SFTP (SSH File Transfer Protocol) 423
SGML 166, 169, 171, 172
Shea, David 347, 348
shorthand property
  overrides 254
sIFR (Scalable Inman Flash Replacement) 349
simple attribute selector 451
site development process 405–414
  conceptualizing and researching 405–406
  content 406
    creating and organizing 407–408
    information design 407
  launching site 413
  look and feel 408–409
    art direction 409
    sketching it 408
  maintaining site 413
  prototype 409–410
  questions to ask before beginning 406
  resources 406
  site description 406
  strategy 406
  target audience 406
  testing it 410–412
    browsing environment 411–412
    quality check 410–411
    user testing 412
site publishing 420–422
slash versus backslash characters 57
small (font size keyword) 209
small-caption (system font value) 216
small element 85
smaller (font size keyword) 210
SMIL (Synchronized Multimedia Integration Language) 169
social network sites 420
software recommendations 13
Sony Sound Forge 16
source document 24
source file 24
space (character) 90
spaces 56
spacing 227
spam-bots 111
span element 86–89
special characters 89–90
  & (ampersand) 90
  ' (apostrophe) 90
  < (less-than symbol) 90
  > (greater-than symbol) 90
  bullet 90
  common 90
  copyright symbol 89, 90
  ellipses 90
  em-dash 90
  en-dash 90
  euro 90
  less-than symbol (<) 89
  pound 90
  quotes 90
  registered trademark 90
  space (character) 90
  trademark 90
  yen 90
special characters in file names 55
specificity 220, 221
src attribute 117, 118
SSH Secure Shell 423
standards 165–184
Staniček, Petr 351
starting web design, how to 4
start tag 57
status-bar (system font value) 216
stock photography 360–361
strike element 85
strong element 82
Structure Layer 10
style element 193
style sheets 9, 66–67
  @import rule 258
  external 254–257
    @import rule 256
    modular style sheets 256
  ignoring 36
  media types 257
  print 257–258
  RGB color 236
  (see also CSS)
sub element 85
sup element 85
SVG (Scalable Vector Graphics) 169
system fonts 216

T

table-layout property 338
tables 58, 129–142
  abbr attribute 140
  accessibility 133, 139
  advanced elements 133
  align attribute 138
  bgcolor attribute 138
  border-collapse property 138
  border-spacing property 138
  border attribute 138
  borders
    separated and collaped 338–339
  caption element 138, 141
  captions 133
  cellpadding attribute 136, 137, 142
  cells 131
    empty 339–340
    padding and spacing 136–138
    spanning 134–136
  cellspacing attribute 136–138, 141, 142
  collapsed border model 339
  colspan attribute 134
  column group elements 133
  columns 131
  column spans 134
  empty-cells property 339
  headers 131, 134
  headers attribute 140
  how they are used 129–130
  minimal structure 130–133
  presentational attributes 138
  row group elements 133
  rows 131
  rowspan attribute 135
  row spans 135
  rules attribute 138
  scope attribute 133, 140
  separated border model 338
  style 132
  style properties 337–340
    advanced 338
  summaries 133
  summary attribute 139
  td element (see td element)
  th element (see th element)
  using layout tables 131
  valign attribute 138
  width attribute 138
tabs 56
target attribute 109
targeting new browser window 108–111
  new window with markup 109
tbody element 133
td element 131
  colspan attribute 134
terminal applications 17
text-align property 85, 224
text-decoration property 85, 225
text-direction property 228
text-indent property 224
text-transform property 226
textarea element 152
text color 217–218
  background 218
  color names 217
  foreground 218
text colors 36
TextEdit 52
  creating new document 54
text editor 52–54
text elements 60–63
  default styles 62
text line adjustments 222–225
  horizontal alignment 224
  text-align property 224
  text-indent property 224
TextMate 15
TextPad 14
text properties 228
text spacing 227
tfoot element 133
thead element 133
th element 131
  colspan attribute 134
TIFF 116, 362, 369
title element 58, 59
Tofte, Svend 263
tokens 172
top-level domains (TLDs) 417
TopHosts.com 419
trademark 90
transferring files (see FTP)
Transmit 423
transparency 377–384
  adding to flattened images 383
  alpha 377, 378
  anti-aliasing 382
  binary 377
  GIF 365
  halos 382
  making GIFs and PNGs 378–384
  PNG-8 files 382
transparent background 240
transparent images 47
tr element 131
tt element 85

U

u element 85
underlines and other text decorations 225–226
Unicode (ISO/IEC 10646) 180
unicode-bidi property 228
universal selector 220, 451
untagged text 72
uploading files 422
upper-alpha keyword 342
upper-latin keyword 342
upper-roman keyword 342
URI (Uniform Resource Identifier), versus URL 21
URLs 21
  absolute 96
  default files 23
  domain name 22
  parts of 22
  relative 96
user preferences 35–38
  coping with 38

V

valid 58
validating documents 177–178
validation tools 177
  W3C Markup Validation Service 178
validator 177
values 204
var element 83
variables, naming 148
Veer 361
vertical-align property 85, 228
visibility property 228
vision impairment 32
:visited (pseudoclass selector) 241, 452
visual design 5
vspace attribute (img element) 118

W

W3C Markup Validation Service 178
Ware, Christopher 347
Web
  history 20
  versus Internet 19
web authoring 7
web design, defined 5
web page, parts of 23
web page addresses (URLs) 21
web page authoring tools 14
web page dimensions 41
Web Palette 45, 238
Web Palette Colors chart 236
web programming 8
Web Safe Colors 238
web scripting 8
web servers 20
web sites, large-scale 5
Web Standards Group 287
white-space property 228
widgets 147
Wodtke, Christina 6
word-spacing property 227
World Wide Web, definition 19
World Wide Web Consortium (W3C) 9, 20
WS_FTP 423
WYSIWYG 14

X

x-large (font size keyword) 209
x-small (font size keyword) 209
XHTML 9, 52, 169–173
  Basic version 170
  modularization 170
  syntax 170–173
  (see also HTML overview)
XHTML 1.0 166, 170, 173, 175, 177, 179, 181–183
XHTML 1.0 Strict documents 182
XHTML 1.1 170, 181
XHTML 2.0 170
XML 11
  declaration 180
  namespace 173
  on the web 169
xml:lang attribute 173
xmlns attribute 173
xx-large (font size keyword) 209
xx-small (font size keyword) 209

Y

Yahoo!'s Developer Network 30
yen 90

Z

z-index property 306
Zoom Layout Page 317
Zoom Layout presentation at @media 2005 317
zoom layouts 311
  low-vision users 317

About the Author

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About the author

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