CHAPTER 37

# Creating Still Graphics for the Web

In This Chapter

Understanding graphics file formats

Understanding color depth

Enhancing downloading speed

Creating graphics

Capturing graphics

Progressive JPEGs and interlaced GIFs

Using transparent GIFs

You have been working with images for about 400 pages now. In this chapter, you learn how to *create* images. You learn about your choices for file formats. You also learn about color depth (bit depth) and what you can do — between file format selection and bit-depth reduction — to shrink the size of your file so it downloads quickly. This chapter also shows you how to create graphics using two popular tools, how to capture graphics you like from elsewhere, how to create image previews, and how to create transparent GIFs.

## Understanding Graphics File Formats

Web browsers support — to some degree — three graphics file formats: GIF, JPEG, and PNG. All three of these graphics file formats use some form of compression to store your image.

### Why compression?

Uncompressed images can be large. Consider Table 37-1, which compares image dimensions, number of colors, and file size for some sample uncompressed images.

As you can see, with file sizes like this, you would have to limit yourself to mighty tiny images, or two-color, such as black and white, images. Or, you could compress the files.

**Table 37-1**
**Uncompressed Image File Size Comparison by Image Dimensions and Number of Colors**

| *Dimensions (in Inches)* | *Colors* | *File size* |
|---|---|---|
| 1×1 | 2 | 9K |
| 1×1 | 256 | 9K |
| 1×1 | 16.7 million | 18K |
| 2×2 | 2 | 16K |
| 2×2 | 256 | 24K |
| 2×2 | 16.7 million | 63K |
| 3×3 | 2 | 16K |
| 3×3 | 256 | 49K |
| 3×3 | 16.7 million | 139K |

Figures 37-1 to 37-9 show these images with compression. Even though these are only black and white images, to look good, they still require a lot of shades of gray.

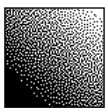

**Figure 37-1:** This 1×1-inch image uses only two colors: black and white

**Figure 37-2:** The same 1×1-inch image using 256 colors: all shades of gray

**Figure 37-3:** The same 1×1-inch image using 16.7 million colors

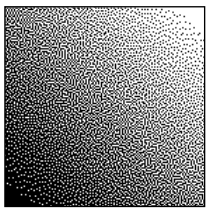

**Figure 37-4:** This 2×2-inch image uses only two colors: black and white

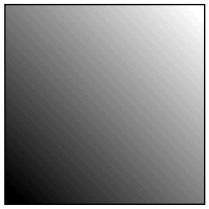

**Figure 37-5:** The same 2×2-inch image using 256 colors—obviously a big improvement

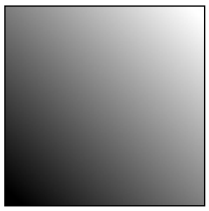

**Figure 37-6:** The same 2×2-inch image using 16.7 million colors; notice there is no color striping as in the previous image

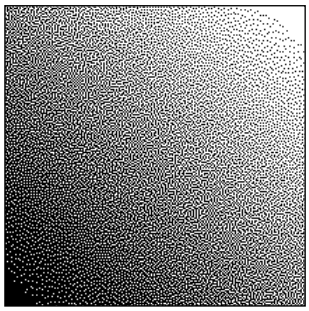

**Figure 37-7:** This 3×3-inch image uses two colors

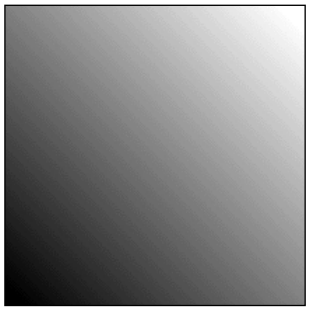

**Figure 37-8:** The same 3×3-inch image using 256 colors

## Compression options

When you implement file compression, you either have to throw away some information about the image or find a way to store the existing information about the image in a more intelligent manner. GIF files throw away some color information. JPEG files throw away some information about the image itself. PNG files store the information using a more intelligent algorithm.

### GIF

*GIF* was the earliest format in use in inline images on the Web. Version 1 browsers could open GIF images inline, but required that JPEG images be opened out-of-line. GIF uses a compression scheme — called *LZW compression* — that predates Compu Serve, even though you might see it called CompuServe GIF. CompuServe implemented LZW compression, thinking it was in the public sphere and then found out it was proprietary. A lot of lawyers sorted it out.

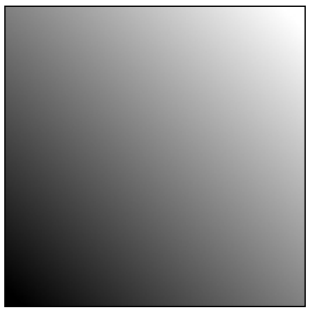

**Figure 37-9:** The same 3×3-inch image using 16.7 million colors, which looks nicest, but makes too large of a file size

How does GIF work? Simply, GIF indexes images to an 8-bit palette. The system palette is 256 colors. Before you can save your file in GIF format, the utility you are using simply makes its best guess at mapping all your colors to one of the 256 colors in an 8-bit palette.

Is a reduction in color depth a problem? That depends. GIF uses dithering to achieve colors between two colors on the palette. Even with dithering, however, GIF images of a sunset have stripes of color, where a smooth gradation would be more natural. GIF images also tend to have more cartoonish colors because flesh tones aren't part of the palette. A GIF image of a drawing, say, of a checkerboard, however, will look just fine.


See Chapter 38 for a lesson in creating animated GIFs. Transparent GIFs are discussed at the end of this chapter.


System Palette. The system palette is the 256 colors your monitor is able to display if you set your video board only to show 256 colors. These colors differ from a PC to a Mac.

### JPEG

JPEG takes a different approach. JPEG, in case you are curious, stands for the *Joint Photographic Experts Group,* the name of the group that created the standard. With JPEG, you get to keep all your colors, but you don't get to keep all the data about the image. What kinds of images lend themselves to being compressed with JPEG? A tree. If you take a photo of a pine tree, the acorns are in specific places, but when the image is compressed and decompressed (opened on your Web page), the computer has to approximate where those acorns went, because it had to throw away some of the data. Is this a problem? Not with most photos of most pine trees. Faces also take well to JPEG because the colors are all there; faces in GIF can look unnatural because of the color loss.

Every generation 3 and higher browser can handle inline JPEGs. JPEGs are also ideal for showing gradient filled graphics (when the color changes gradually from one color to another). The same graphic would suffer enormously under the GIF compression because all those in-between colors wouldn't be there.

What suffers under JPEG compression? Text, schematic drawings, and any line art. Of course, with JPEG, you can select the level of compression (usually either as a percentage or as Maximum, High, Medium, or Low). You generally want to use the maximum compression level your image can handle without losing image quality. You won't know how much compression your image can handle without loss until you try it at different levels of compression.

### PNG

The *Portable Network Graphics,* or PNG format, was developed exclusively for the Web and is in the public domain. The PNG format takes advantage of a clever way of storing the information about the image so you don't lose color and you don't lose image quality; it is a lossless format. The only drawback is, because the standard is so new, only fourth-generation and later browsers support PNG graphics. Eventually, PNG will replace GIFs for many color-rich still image files. Only GIFs can support animation and transparency.

**Definition**

Lossy versus lossless. File formats that implement compression schemes that discard information about the image are called *lossy* file formats. Both GIF, which discards color information, and JPEG, which discards image information, are lossy file formats. File formats that don't discard any information about an image are called *lossless.* PNG is a lossless compression scheme.

# Understanding Color Depth

In the computer world, everything is black or white, on or off. Computers operate in the base two system, so when creating colors, your choices of colors are base two numbers. A *bit* is a representation of on or off (1 or 0). One-bit color uses a two-color palette ($2^1$). Two-bit color uses a four-color palette ($2^2$). Eight-bit color uses a 256-color palette ($2^8$). Thirty-two-bit color uses a 16.7-million-color palette ($2^{32}$).

**Definition**

Browser-safe color palette. Between the two system palettes, there are 216 colors in common. This is called the *216-browser-safe palette*. By limiting your graphics to colors from this palette, you can be sure the browser won't have to guess or dither to achieve the color you want.

You might be thinking: *Two colors: that's not so bad. An artist can do a lot with two colors; think of the ways you can blend them*. Unfortunately, this isn't how computers work. When you select a color palette, you get only the colors in that palette, not any blends of colors in that palette.

When you create an image, you want to balance the quality of the image against the file size of the image. When you send an image file over the Internet to a Web page, you send either information about the palette or you send the actual palette. With GIF files, you send a color look-up table (CLUT) with the image. With JPEG files, you send a palette. As you can imagine, this makes the files considerably larger.

# Enhancing Downloading Speed

The bandwidth conservation society was created to help with these problems. You can find their useful Web site at `www.infohiway.com/faster/index.html`. What can you do to ensure your pages download quickly? There are a few things:

- Limit image file sizes.
- Limit the number of images.
- Reuse images as much as possible so images can be loaded from cache.
- Use frames so only part of the browser windows need to reload.
- Use text rather than images, where possible; see Figure 37-10 for an example of changing the colors of cells in a table to approximate a graphic image.

## Image file sizes

You can limit image file sizes

- by using the maximum compression your image will take
- by using the smallest bit-depth your image can stand
- by minimizing the dimensions of your image on the page

Test your pages at 640×480, 800×600, and 1024×768 to see how they will look to different visitors. Often an image that renders well at 1024×768 and doesn't dominate the page may look huge and overbearing at 640×480.


**Figure 37-10:** Use a table with text instead of a graphic to create visually appealing navigational tools.

## Number of images

How many images is the right number? You may be surprised to learn that sometimes very small images with white space between them load faster than one large image.

Take advantage of white space to contribute to your images. You can use two intelligent techniques to get more image for the byte. By changing the background color to match the background color of your images, you can keep your images smaller. By anti-aliasing the text against that background to blend the edges into the background color, you can achieve the look of one large graphic with multiple small — and fast to load — images.

## Reuse images

Reusing images is as simple as having a single graphic for “home” on all your pages. Have a single bullet graphic (if you can’t stand to use the standard bullet) for every bullet on every page. Why does this help your pages load faster? Your browser checks to see whether an image it needs is already in cache and loads the image from cache, if it can. This reduces the number of bytes that actually needs to be downloaded.

## Use frames

How can using frames speed download time? After the initial frameset loads, the browser will usually be loading one new frame at a time. Also, because the images are probably part of the banner and/or the navigational tools, the frame that does reload is less likely to be image-intensive.


By putting all or most of the images into one of your frames and the mostly text-based content into your main frame, you can save visitors from having to load the images more than once. After the initial load, subsequent loads will be faster.

## Use text rather than images

You've read this elsewhere in the book. You can use tricks to make text look somewhat like an image. Consider Figure 37-10, for example. Instead of using a graphic with boxes and buttons in the left frame (this is a frameset page) for navigation, it uses a table with each cell assigned a different background color. You can assign each cell a different text color. You can even assign each cell a different font, if that would contribute to the message of the navigational tools.

# Creating Graphics

If you want to create top-notch graphics, the tool of choice among professionals is Adobe Photoshop, available for the Mac, the PC, and the SGI computer (see Figure 37-11). Freeware and shareware software programs also are available that perform subsets of the functions performed by Photoshop. Photoshop LE, the lite version, ships with many scanners.

## Essential functions

What should your graphics package be able to do? For existing images, such as photographs, you want to sharpen, blur, and perform some special effects on the image (for example, posterize, swirl, and mosaic). For images you create on the screen, you want to create your own custom palette (so you can send as few colors as you need). You also need some basic artist tools, such as a paintbrush, a pencil, a spray can, and a magnifying glass for magnifying part of the image to see it better.

Regardless of whether the image is made by hand or based on a photograph or clipart, you need the following capabilities:

- ✦ to reduce the bit-depth of any image you want to save as GIF
- ✦ to index the color of the image so you can save the image to GIF

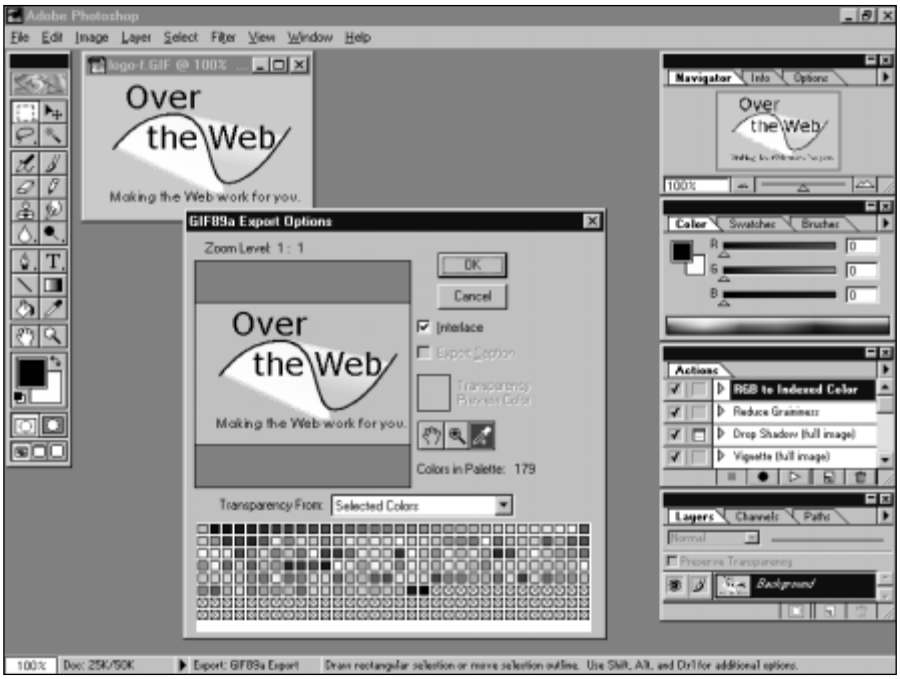


**Figure 37-11:** Adobe Photoshop

- ✦ to save the image as an interlaced GIF
- ✦ to save the image as a transparent GIF
- ✦ to save the image as a PNG file
- ✦ to save the image as a progressive JPEG, which is discussed at the end of this chapter

**Definition** Progressive JPEG. Progressive JPEGs are a nice addition to a Web page. They work the same as interlaced GIFs. Before the entire image has been downloaded, you can begin to see the image. Then the images slowly come into focus.

## Free alternatives

If you aren't ready to commit to a $500 software package to get all these great functions, you can work with a number of small, free software packages and services that do many of the things previously listed for you. On the Web, you can find sites that turn your TIF file into a GIF, or make your GIF an interlaced GIF. The trade-off is the time. Finding, learning, and using a variety of small packages to solve all your imaging needs obviously takes longer than learning one package and using it on your desktop.

# Capturing Graphics

What about taking graphics you like from another site? This is generally not an okay thing to do. Unless you have explicit permission from the creator of the images — say, you are taking graphics from a site that makes free images available or you have written permission from the owner of the site — you are essentially stealing the images from the legitimate owner. Images are intellectual property and are protected by copyright laws. Most people won't take you to court, but you are still a thief.

Just because an image is on a Web page doesn't mean it is in the public domain. Yes, it gets downloaded onto your own computer (into cache), and, yes, your browser gives you the ability to save the image as a local file (using the right mouse button or prolonged clicking on a Mac), but it still doesn't mean you own the image or the right to use the image. If you see something you like on another page, write to the page owner and ask if he or she owns the image and if you can use it. Chances are, the owner will be flattered by your request. Be sure that person owns the image or permission won't mean anything (if the image was stolen from somewhere else).

# Progressive JPEGs and Interlaced GIFs

Once upon a time on the Web, you had to wait for an image to finish loading before you knew what it was. Today, you can save your files using the progressive JPEG format or the interlaced GIF format and watch the image come into focus as it loads.

The advantage to this approach is a visitor to your site knows roughly what an image is before the entire image has downloaded. If download times are long, say, due to a poor Internet connection, the visitor to the site can actually take a link off the page before the image has finished loading without having missed anything.

Finally, these two image formats are good because the visitor participates in the download time. Instead of waiting for the page to download — sitting idly by — the visitor waits for the page to download while watching the images become clearer. This is more of a reward for waiting — and less of a sense of waiting — for the visitor.

The sense of "coming into focus" that these types of images provide is the result of the way the images are stored. Progressive JPEGs and interlaced GIFs download only every eighth line at first, then every fourth line, then every second line, and then, finally, the odd-numbered lines. The result is the image goes from blurry to focused.

You create a progressive JPEG or an interlaced GIF by saving it into this format. In Photoshop, when you save a file as a GIF file, it asks you whether you want the file to be normal or interlaced (see Figure 37-12). Freeware packages are also available that convert your regular JPEGs and GIFs into progressive JPEGs and interlaced GIFs.

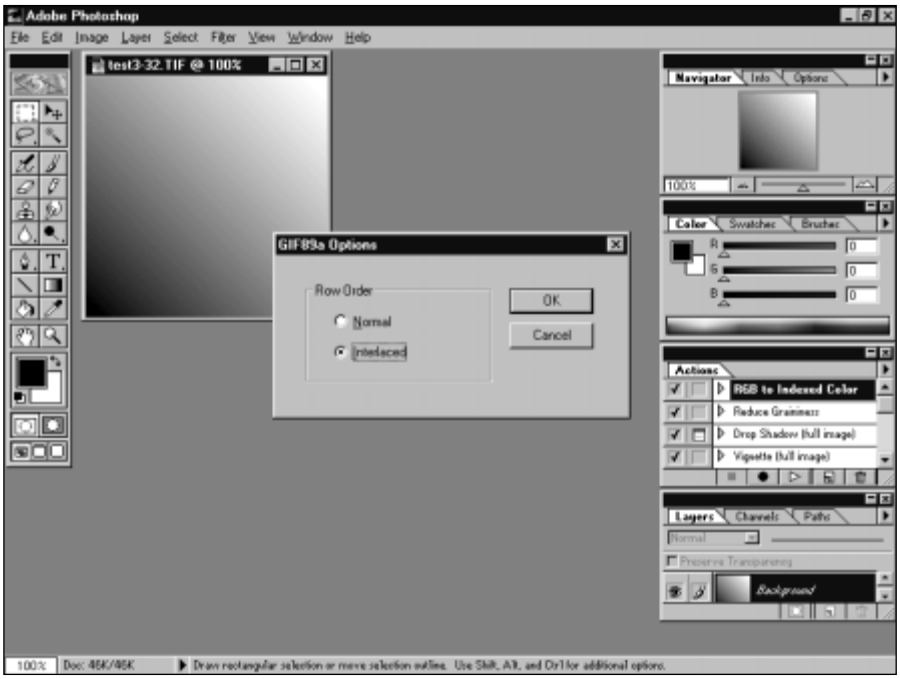


**Figure 37-12:** Adobe Photoshop asks you whether you want your GIF file to have rows interlaced or normal.

# Using Transparent GIFs

Transparent GIFs are a wonderful invention that enable your image to blend into your background or to float over your page. The effect of a transparent GIF on a page can be magical. By setting the page background color to the same color as the outline of the image or to one of the colors of the image, transparent GIFs can contribute a light, airy look to a page.

Transparent GIFs enable you to choose one or more colors that will not appear. Whatever color you set as the transparent color, depending on how you do it, will be transparent when rendered in the browser. This can result in the cut-out parts of letters also being clear — say, the hole in the middle of an *O*. The danger to this effect is if you have a part of your image that should be white — say, the whites of a cartoon character's eyes, and you set the transparent color to white and put the image on a yellow background — then the cartoon character will look like he has jaundice or hepatitis (yellow whites to his eyes).

# From Here


Jump to Chapter 41 and learn how to add video to your Web pages.

You can learn to create animated graphics by jumping to Chapter38

# Summary

In this chapter, you learned most of what you should know to use images in your pages. You learned about the compression choices you have for images. You learned about color palettes and bit depth. This chapter also discussed clever tricks for increasing the download speed of your page, such as using frames and reusing images.

You learned a few things about creating graphics and the tools you can use to do this. You also were warned about copyright issues related to using graphics from other people's sites. You learned about progressive JPEGs and interlaced GIFs, about transparent GIFs, and about tools for creating these interesting types of images.

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