

# ASK THE HOMEGURRRR!



# W

HAT DO ALL FILE FORMATS FOR THE WEB HAVE IN COMMON? Compression. Compression is the key to making small graphics. Compression is not a necessary feature in other computer graphic file format specifications, which is why the file formats you'll find on the web might be new to you. Web-based image file formats have to implement impressive compression schemes in order to transform large images to small file sizes. Unfortunately, at times, with compression comes loss of quality.

Some web file formats use lossy compression techniques, meaning that there is some loss of quality to the resulting images. But don't let that scare you; there is no way these file formats could impose the required amount of compression needed for web delivery and not sacrifice some quality. Remember, print quality is not expected on the web.

The two types of image file formats most commonly accepted by graphic web browsers are JPEGs and GIFs. One difference between them is that JPEGs can be 24-bit (include up to 16.7 million colors) and GIFs must be 8-bit or less (256 colors maximum).

JPEG stands for **J**oint **P**hotographic **E**xperts **G**roup, and GIF stands for **G**raphic **I**nterchange **F**ormat. These names tell you, in each respective acronym, which format is best for which kind of image. JPEGs were designed to compress photographs, and GIFs were designed to compress graphics.

There will be times when you will want to make a photograph into a GIF, such as with transparent GIFs and animated GIFs, and times when you want to make a graphic into a JPEG, such as when a logo or graphic is combined with a photograph.

It's easy to convert to JPEGs and GIFs from other image file formats, such as PICT, BMP, TGA, TIFF, or EPS, if you have the proper software. Many other imaging programs support JPEGs and GIFs.

## HTML FOR EMBEDDING IMAGES

Regardless of whether you're using a regular GIF, animated GIF, transparent GIF, interlaced GIF, JPEG, or Progressive JPEG format, the HTML is usually the same.

# Web File Formats

BY LYNDA WEINMAN

Excerpted and edited with permission from Lynda Weinman's newest book on web design, *designing web graphics.2*, published by New Riders Publishing and distributed in Canada by Prentice-Hall.



To insert a graphic into an HTML page, use this tag:

```
<IMG SRC="myimage.gif">
```

To link an image to another image or HTML page, use this tag:

```
<A HREF="www.destination_url.com">
```

```
<IMG SRC="myimage.jpg"></A>
```

To get rid of the border of an image that's been linked, use this tag:

```
<A HREF="www.destination_url.com">
```

```
<IMG SRC="myimage.jpg" BORDER=0></A>
```

The HTML is the easy part — it's understanding how to optimize graphics, choosing which file format for which type of image, and making the images and content that will be much harder to master!

## GIF FILE FORMATS

Unlike most other computer graphic file formats, GIF, originally developed for CompuServe in the late 1980s, was designed specifically for online delivery. The file format compresses graphics beautifully, but can also be used for photographic images. Whenever you create graphics, such as logos, illustrations, or cartoons, we recommend GIF file format.

GIF uses a compression scheme called LZW, which is based on work done by Lempel-Ziv & Welch. The patent for LZW compression is owned by Unisys, which charges developers such as Netscape and *Photoshop* licensing and royalty fees for selling products that use the GIF file format. GIFs are accepted by all browsers, GIFs are small, and GIFs do things that many other file formats do not, such as animation, transparency, and interlacing.

The GIF file format, by definition, can contain only 256 colors or less. This is not the case with JPEGs, which by definition contain millions of colors (24-bit). Because GIF is an indexed color file format (256 colors or less), it's extremely beneficial to have a thorough understanding of bit-depth settings and palette management when preparing GIF images.

There are two different flavors of GIF: GIF87a and GIF89a. GIF87a supports transparency and interlacing, whereas GIF89a supports transparency, interlacing, and ani-

mation (more information on these features follow). You don't really have to refer to the names GIF89a or GIF87a unless you want to sound techie. Most of us simply call these files by the features used, be it a transparent GIF, animated GIF, or plain vanilla GIF.

GIF compression is lossless, meaning that the GIF compression algorithm will not cause any unwanted image degradation. The process of converting a 24-bit image to 256 or fewer colors will cause image degradation on its own, however, so don't get too excited!

### GIFS FOR ILLUSTRATION-STYLE IMAGERY

GIFs work much better for graphics than photographs. By graphics, we mean illustrations, cartoons, or logos. Such graphics typically use areas of solid color, and GIFs handle compression of solid color better than the varied colors found in photos. Because the GIF file format is lossless, illustrations with limited colors won't lose any quality. Because JPEG is a lossy method, it actually introduces image artifacts into solid color.

GIFs are definitely designed to handle graphics better than photographs. But that doesn't mean there won't be times where you have to turn photographs into GIFs anyway. You may want to use transparency or animation, which are two features that JPEGs do not offer.

GIFs can be saved at any bit depth from 8 bits down to 1 bit. The bit depth refers to how many colors the image contains. Generally, the lower the bit depth, the smaller the GIF.

### CONTROLLING YOUR COLOR MAPPING

Color mapping refers to the colors that are assigned to a GIF image and can be taken from either the image or a pre-determined palette of colors. *Photoshop* calls palettes that are derived from existing colors "adaptive palettes". It enables

#### Adaptive palette



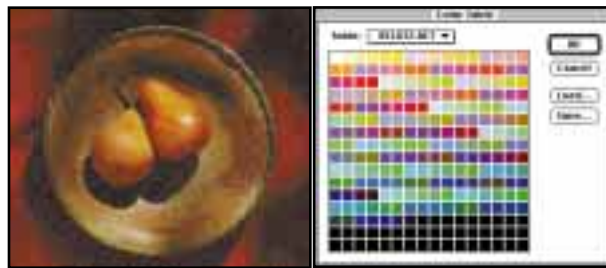
The adaptive palette looks the best because the colors are based on the content of the image. Paint Shop Pro calls this type of palette a Nearest Color palette. Photoshop calls it an adaptive palette.

#### Mac System palette



The system palette image looks much worse. Although it has the same number of colors as the adaptive palette, the colors are unrelated to the image and detract from the quality.

#### 216 browser-safe palette



The browser-safe palette looks worst of all. Not only does it use fewer colors, but just like the system palette, the colors are unrelated to the image.

you to apply external palettes (system or browser-safe are two examples) or makes a best-guess palette (adaptive) based on the content of your image. While the numbers of colors in an image (bit depth) affect the size of the graphic, the palette additionally affects the quality of your image. Some images can support fewer colors, while others cannot. If you understand how color affects size and quality, you will create better looking and faster loading web pages.

It's clear that an adaptive or nearest color palette gives the best results to the image, but what about when it's seen in a browser?

### INTERLACED GIFS

If you've toured the web much, you've encountered interlaced GIFs. They're those images that start out blocky, and appear less and less blocky until they come into full focus.

Interlacing doesn't affect the overall size or speed of a GIF. In theory, interlacing is supposed to make it possible for your end viewer to get a rough idea of your visuals and to make a decision

whether to wait or click onward before the image finishes rendering. Again — in theory — this is supposed to save time. Unfortunately for the end viewer, being forced to wait for the entire image to finish coming into focus to read essential information is often a frustrating experience. In other words, interlaced images save time if you don't have to wait for them to finish.

Our recommendation is that you do not use interlaced GIFs for important visual information that is critical to viewing your site. An imagemap or navigation icon, for example, must be seen in order to fulfill its function. Although interlaced GIFs serve their purpose on nonessential graphics, they only frustrate end users when used on essential graphics.

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## TRANSPARENT GIFS

Transparent GIFs are used to create the illusion of irregularly shaped artwork. All computer-made images end up in rectangular-shaped files; it's the nature of the medium. Certain file formats, such as GIF, can store masked regions, which create the illusion of shapes other than rectangles. This "masked region" appears to be transparent.

Transparency comes in two forms: 8-bit transparency and 1-bit transparency. 8-bit transparency is the best, but it isn't supported by GIFs or by web browsers. 8-bit transparency is what is used by the file formats PSD (*Photoshop*), TGA, and PICT. 8-bit transparency is also called alpha channel-based transparency and can support up to 256 different levels of opacity (which is why it looks so great!). GIFs support 1-bit transparency, which makes it a much more limited type of masking.

## ANIMATED GIFS

Animated GIFs are part of the GIF89a specification. They are formally called multi-block GIFs because multiple images can be stored as separate blocks within one single GIF document. When the GIF document is viewed, the multiple images display, one at a time, and produce a streaming animation.

Streaming is a wonderful and appropriate method for displaying animation over the web. Streaming means that each frame of the animation displays one after the other, so that your end user doesn't have to wait for the whole file to download before seeing anything. Other animation formats

in the past required that the entire movie download before a single frame could be viewed.

Animated GIFs function much like automated slide shows. They can include custom palette information and be set to play at different speeds. They can include interlacing and transparency, too! The beauty of animated GIFs is that they require no plug-ins, and the authoring tools to create them are often free and easy to learn. As well, major browsers (Netscape, Internet Explorer, and Mosaic) support them, so you can include them in web pages without

worrying about compatibility or accessibility.

Just like other GIF files, the number of colors and amount of noise in the frames affect the overall file size. If you have a 100-frame animation with each frame totaling 5k, your animated GIF will be 500k. It simply multiplies in size according to how many frames you create and the file size of the individual frame of artwork. On the other hand, your end viewer is really waiting for only 5k servings at a time, so it's nothing like the painful waiting that a standard 500k GIF would incur!

## JPEG

The JPEG file format offers a 24-bit alternative to the 8-bit GIF file format. This is especially great for photographic content because 24-bit photographs do not dither! One added advantage to dealing with JPEGs is that, unlike GIFs, they don't need you to define the palette for them. Whenever an image format includes millions of colors (24-bit), palette and color mapping issues disappear. This is because enough colors are allowed to rely on the original image's color information, and substitute colors are no longer necessary.

JPEG was developed specifically for photographic-style images. It looks to areas with subtle tonal and color changes and offers the best compression when it encounters that type of imagery. But it does not compress solid color well at all.

JPEG is a lossy compression algorithm, meaning that it removes information from your image and, therefore, causes a loss in quality. JPEG does a great job of doing this so the difference in information data is often not visible or objectionable. It does introduce artifacts in some instances, especially where it encounters solid colors. This is a by-product of its lossy compression methods.

Unlike the GIF file format, JPEGs require both compression and decompression. This means that JPEG files need to decompress when they're viewed. Although a GIF and a JPEG might be identical sizes, or sometimes even when the JPEG is smaller, the JPEG may take longer to download or view from a web browser because of the added time required to decompress.

Another difference between GIF and JPEG is the fact that you can save JPEGs in a variety of compression levels. This means that more or less compression can be applied to an image, depending on which looks best.

## PROGRESSIVE JPEGS VERSUS STANDARD JPEGS

Progressive JPEGs are a new entrée into our web graphics file format vocabulary. This type of JPEG boasts much higher compression rates than regular JPEG and supports interlacing (where the graphic starts chunky and comes into focus). They were initially introduced by Netscape, and are now additionally supported by MSIE. Progressive-JPEG-making tools for Mac and PCs are listed at:

■ <http://www.in-touch.com/pjpeg2.html#software>.

### ■ note

#### Naming Conventions for JPEGs and GIFs

When saving a JPEG or GIF file for a web page, always use the three letter extension of either .jpg or .gif at the end of your file name. Because many servers that store web graphics are Unix-based, it is important to pay close attention to whether your files are named with upper- or lowercase titles. The HTML document must exactly match the upper- or lowercase structure of the file name. For example, if you have something saved as "image.jpg" on your server, and your HTML reads "image.JPG", the file will not load!

Pro-JPEGs boast superior compression to regular JPEGs. They also give you a wider range of quality settings. Instead of *Photoshop's* standard max, high, medium, and low settings, pro-JPEGs can be set in quality from 0–100.

### PNG

PNG (**P**ortable **N**etwork **G**raphics, or more fondly known as PNG Not GIF) holds great promise as a new web file format. The W3C (World Wide Web Consortium at

■ <http://www.w3.org/pub/WWW/Press/PNG-PR.en.html>)

has made a formal endorsement of PNG, which strongly indicates that Netscape and MSIE will support it as an inline file format in the near future.

PNG is a lossless compression method, meaning that no quality loss is incurred when it's applied to images. Unlike GIF or JPEG, PNG can be stored at many different bit depths using different storage methods. GIF, for example, can be stored only in 8-bit or lower bit depths. JPEGs must be stored in 24-bit and no lower. PNG can be stored in either 8-bit or 24-bit or 32-bit. PNG also has a multitude of different filtering methods. This makes optimizing PNG images a daunting task.

### ■ note

Popular GIF animation authoring tools:

GIFBuilder/freeware (Mac)

■ <http://iawww.epfl.ch/Staff/Yves.Piguet/clip2gif-home/GifBuilder.html>

GIFBuilder's FAQ

■ <http://iawww.epfl.ch/Staff/Yves.Piguet/clip2gif-home/GifBuilderDoc/GifBuilder-FAQs.html>

PNG was developed by Thomas Boutell. Visit his amazing site at ■ <http://www.boutell.com> and the W3C spec pages for PNG at ■ <http://www.boutell.com/boutell/png>.

Unlike JPEG and GIF, PNG was created to be a cross-platform file format and contains information about the characteristics of the authoring platform so that viewing software can automatically compensate and display the image correctly.

What this means is that Macs and PCs, which each utilize different gamma settings, can adjust properly for images created in the PNG file format. This is *way* cool!

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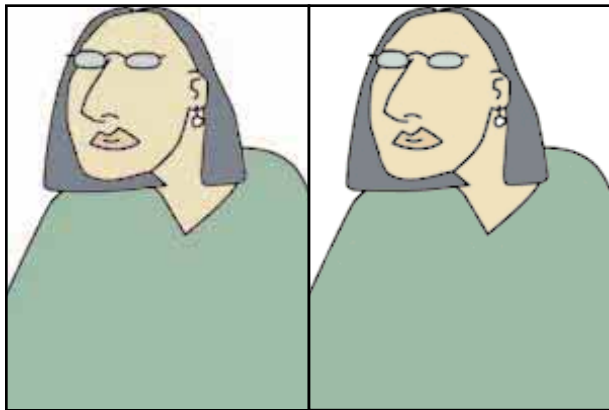
JPEG ■ 8.2k

GIF ■ 19.3k



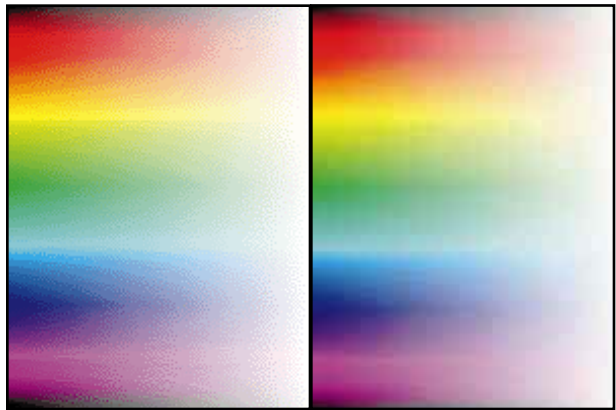
JPEG ■ 7.1k

GIF ■ 17.6k



JPEG ■ 9.5k

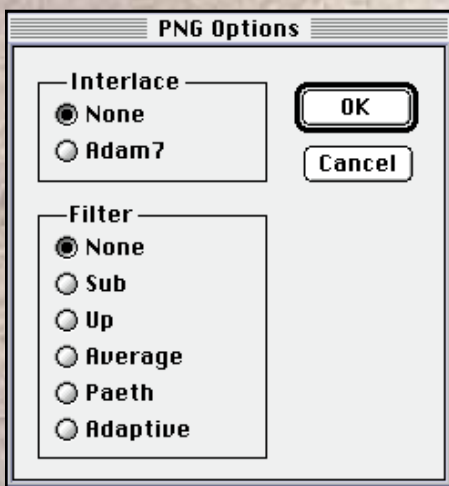
GIF ■ 5.2k



JPEG ■ 2.5k

GIF ■ 17.3k

JPEG handles images with subtle gradations beautifully. This is in part because the file format enables the image to remain in 24-bit. Compare the JPEG images to the left to the 8-bit GIF images to the right. The JPEGs compress photographic-style images better than graphic style images and look better too!



Interlacing is either off or Adam7 (who names these things?). Filtering is applied to the data before it's compressed, and the filtering process is reversed after the image is decompressed, restoring the data to its original values. This is how PNG compression can generate file savings and also be lossless at the same time.

For an excellent description of gamma, check out:

■ [http://www.cgsd.com/papers/gamma\\_intro.html](http://www.cgsd.com/papers/gamma_intro.html)

PNG also supports a far superior interlacing scheme than GIF. GIF interlacing gives a preview of the image after 1/8th of the image data has been recognized, whereas PNG gives a preview after only 1/64th of the image has loaded.

With alpha channel support, all the transparency problems of halos, matte lines, and fringing will be history. Alpha channels offer superior masking results, meaning that designers will be able to prepare images with glows, blurs, soft edges, and fades that will display beautifully on web browsers that support PNG.

Unfortunately the major browsers (Netscape, MSIE, and Mosaic) still do not support PNG. There are a couple of plug-ins that enable you to see PNG files, but neither support transparency properly. They are:

■ <http://iagu.on.net/jsam/png-plugin>

■ <http://codelab.siegelgale.com/solutions>

*Photoshop* 4.0 supports creating images in the PNG file format. The *Photoshop* documentation does not explain what any of the PNG settings do, unfortunately! When in doubt about image formats, I turn to my trusty book:

Graphic File Formats ■ Publisher: O'Reilly & Associates

■ Authors: James D. Murray and William VanRyper

■ Retail: \$79.95 ■ ISBN: 0932102085

*Photoshop* doesn't include any documentation about the PNG settings, but here's what I've pieced together from my research:

**Interlace** ■ **None:** No interlacing

■ **Adam7:** The sequel to the popular television show Adam 12, featuring pre-pubescent cops...No, wait! This function has a funny name, but all it does is interlace the image.

**Filter** ■ **None:** Like the name says, this filter offers no compression whatsoever!

■ **Sub:** Compares and averages pixel values next to each other on a horizontal axis.

■ **Up:** Compares and averages pixel values next to each other on a vertical axis.

■ **Average:** Averages all the pixel values in the document.

■ **Paeth:** Uses linear calculations to average and compare the different pixel values.

■ **Adaptive:** Best guess.

## DIGITAL WATERMARKS

The term watermark is traditionally used to describe special printed paper that guarantees proof of authenticity and ownership. Dollar bills are a good example of watermarked currency that has special information embedded in the paper stock to prevent counterfeiting.

Digital watermarks are a new technology that follows a similar principle, only the embedded copyright information is not visible until loaded into a computer that can read it. Watermarking technology can embed copyright notification, ownership, audience (adult or general interest material), and usage information (restricted, or royalty free). The watermark signature can be read by Digimarc's *PictureMarc* plug-in.

Digimarc (■ <http://digimarc.com>) offers a digital watermarking service that offers watermarking software and a database/retrieval service for professionals. Digimarc's fee structure is listed on its site.

The *PictureMarc* plug-in for *Photoshop* is digital watermarking software that lets you embed watermarks into digital documents for print or web-based submission. When *PictureMarc* is invoked, you are given the opportunity to obtain your own creator ID, which links your images to up-to-date contact information stored on the Digimarc site.

By clicking on the © on the title bar, *PictureMarc* launches your web browser, displays detailed information about the image, and lists whatever contact details you have provided.

This service supports CMYK, RGB, LAB, Grayscale, and Index Color color spaces and works with any file format type that *Photoshop* supports on NT, Win95, Win3.1, and Mac platforms (68000 and PowerPC). The minimum image size is 256x256 pixels, which makes its usefulness for the web limited to larger images, thereby unfortunately excluding navigational graphics, buttons, bullets, and rules. \*

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This is the dialog box used by the watermarking *Photoshop* plug-in *PictureMarc*, distributed by ■ <http://digimarc.com>.



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