FAQ

Portable Network Graphics

An Open, Extensible Image Format with Lossless Compression

(*Not* Related to Papua New Guinea, the Pawnee National Grassland, the Professional Numismatists Guild or the "Pack 'N' Go" format)

Welcome to the PNG Home Site, maintained by Greg Roelofs. Our hero likes to speak of himself in the third person, but don't let that put you off; this is intended to be a mostly serious set of reference pages for locating information, applications and programming code related to the eleven-year-old PNG image format.

Y! search Search

Search this site Search the web

Canonical URL: **http://www.libpng.org/pub/png/** (California, USA)

libpng

Mirror sites:

- http://libpng.rtin.bz/pub/png/ (Pennsylvania, USA)
- http://www.3-t.com/pub/png/ (Texas, USA)
- http://www.libmng.com/pub/png/ (Netherlands)
- http://png.unicast.org/pub/png/ (Denmark)
- http://www.mirrorservice.org/sites/www.libpng.org/pub/png/ (United Kingdom)
- http://libpng.oss-mirror.org/pub/png/ (Ireland)
- http://libpng.linux-mirror.org/pub/png/ (Germany)
- http://dl.ambiweb.de/mirrors/www.libpng.org/pub/png/ (Germany)
- http://png.geosdreams.info/ (Poland)
- http://libpng.nigilist.ru/pub/png/ (Russia)
- http://png.internet.bs/ (Hong Kong)

Note that the PNG home site has moved four times since 1995 (though the URL has changed only three times, and hopefully never again). The current site is hosted by the excellent folks at SourceForge. Mirror sites have been provided in Pennsylvania courtesy of Martin Eriksen, in Texas and the Netherlands courtesy of Gerard Juyn and Triple-T Software, in Denmark courtesy of Guan Yang, in the UK courtesy of Dave Beckett and the JISC National Mirror Service, in Ireland and Germany courtesy of Ralf Uhlemann, in Germany courtesy of Tobias Schwarz and AmbiWeb, in Poland courtesy of Piotr Chumicki and Geo's Dreams, in Russia courtesy of Peter Kohts, and in Hong Kong courtesy of Marco Rinaudo and Internet.bs Corp. **Thanks!**

PNG Site Layout

The PNG web site is organized into four basic categories of information (blue and white headings below), not counting the separate MNG site (covering PNG's animated and lossy cousins). A **complete site map** to the 110+ pages is available, but the basics are summarized here.

The informal history below is worth reading both for general background and for a summary of PNG's main features, but most people will probably find the basic introduction and the lists of applications to be of the greatest interest and utility. Additions, updates, corrections and suggestions are always welcome.

PNG General Information

- A Basic Introduction to PNG Features (**recommended for new visitors**)
- Current Status of PNG (**recommended for new visitors**)
- Frequently Asked Questions (**recommended for new visitors**)

- An Informal History of PNG (and a More Detailed History)
- News of the PNG Development Group
- Links to Other PNG Resources (includes **mailing lists**)

- PNG Technical Documentation
  - PNG Specification and Extensions (latest version)
  - **zlib** Technical Documentation
  - MNG / JNG Technical Documentation
- *PNG: The Definitive Guide* and Related Books

PNG-Supporting Applications

- Applications with PNG Support
  - Browsers
  - Image Viewers
  - Image Editors
  - Image Converters
  - 3D Applications (also VRML Browsers)
  - Games / Entertainment
  - Office / Business Applications
  - Scientific / Graphing Applications
  - Miscellaneous Applications
- Hardware with PNG Support

PNG Programming Resources

- PNG Programming Information:
  - PNG-supporting Libraries and Toolkits
    - **libpng** home page
    - **zlib** home page
    - **libmng** home page

- PNG Source Code

PNG Images

- PNG Images:
  - Willem van Schaik's Test Suite of PNG Icons
  - Greg's Test Suite of PNG Textures for VRML
  - Ray-traced PNG Interlacing Demo (also JPEG version)
  - Miscellaneous Transparent PNGs using IMG Tags (includes links to screenshots)
  - Miscellaneous Transparent PNGs using OBJECT Tags (also strict HTML 4.0 version)
  - Miscellaneous 32-bit RGBA PNGs
  - Photographic PNGs with Alpha Transparency:
    - Icicles
    - Redbrush flower (*Ohia Lehua*)
    - Magnolia tree
    - Horned Owl
  - Browser Gamma-Correction Test
  - Browser Color-Correction Test
- Links to Other PNG Resources (includes pointers to more PNG images)

PNG Animation

- Multiple-image Network Graphics (MNG) Home Site
(includes JNG: JPEG with alpha-transparency)

What It Be (An Informal History)

So what is PNG, and why is it worthy of its own home site? PNG (pronounced "ping") is the Portable Network Graphics format, a format for storing bitmapped (raster) images on computers. Unofficially its acronym stands for "PNG's Not GIF." PNG was designed to be the successor to the once-popular GIF format, which became decidedly less popular right around New Year's Day 1995 when Unisys and CompuServe suddenly announced that programs implementing GIF would require

royalties, because of Unisys' patent on the LZW compression method used in GIF. Since GIF had been showing its age in a number of ways even prior to that, the announcement only catalyzed the development of a new and much-improved replacement format. PNG is the result.

> (*By the way, despite the implications in some of CompuServe's old press releases and in occasional trade-press articles, PNG's development was not instigated by either CompuServe or the World Wide Web Consortium, nor was it led by them. Individuals from both organizations contributed to the effort, but the PNG development group exists as a separate, Internet-based entity.*)

That's only half the story, however; PNG would deserve a home page even if all that had not taken place, just because it's so darned nifty. Yes, it's not every day you come across an image format and say, "**Outraaageous!**" In fact, you may never say that in your entire lifetime (truly a pity), but PNG is still cool. Some of its spiffier features include:

- unambiguous pronunciation (ooo, baby!)
- multiple CRCs so that file integrity can be checked *without viewing*
- ultra-clever magic signature that can detect the most common types of file corruption
- better compression than GIF, typically 5% to 25% (but often 40% or 50% better on tiny images)
- non-patented (you betcha!), completely lossless compression
- majorly gnarly two-dimensional interlacing scheme
- 1-, 2-, 4- and 8-bit palette support (like GIF)
- 1-, 2-, 4-, 8- and 16-bit grayscale support
- 8- and 16-bit-per-sample (that is, 24- and 48-bit) truecolor support
- full alpha transparency in 8- and 16-bit modes, not just simple on-off transparency like GIF
- "palette-alpha" mode, effectively transforming normal RGB palette into RGBA
- gamma correction for cross-platform "brightness" control
- color correction for cross-platform, precision color
- both compressed and uncompressed text chunks for copyright and other info
- full Year 2000 (Y2K) support, and then some (good for *at least* 63 millenia! yowza!)
- free and complete reference implementation with full source code

Not exactly *spiffy*, but worth mentioning anyway:

- officially registered Internet media ("MIME") type: **image/png**

PNG also supports things like suggested quantization, "smart" extensibility, a standard color space and lots of other excellent stuff, but let us leave all that aside for now. Those who want a quick explanation of the main features can check out Greg's Basic Introduction to PNG Features. Those who want *all* of the gory details can either find a library with the July 1995 issue of **Dr. Dobb's Journal** and read Lee Crocker's PNG article; read a copy of Greg's O'Reilly book, **PNG: The Definitive Guide**; or else go read the full **Portable Network Graphics Specification**, a reasonably concise **W3C Recommendation**

(the very first one!) that is amazingly well written and understandable. (Greg had no part in the actual writing of it, so he can say things like that.) See the PNG documentation page for links to plain ASCII, PostScript (US letter-size) and PDF versions, and see the W3C's PNG page and official press release for links to related documentation on gamma and color correction.

Note that the PNG specification was updated to **version 1.1** on New Year's Eve 1998 (that is, 31 December 1998). It included new chunks for cross-platform color correction (sRGB and iCCP), a revised and much more sensible description of gamma correction, and a number of other minor improvements and clarifications (all fully backward compatible, of course!). A second, more minor update (**version 1.2**) was released in August 1999; its only change was the addition of the iTXt chunk (international text).

In addition, PNG began the long process of international standardization* in 1999 (*see the **10 May 1999** news item for details*), thanks largely to its inclusion in VRML97. It finally completed that process and became the joint **ISO/IEC standard 15948:2004** nearly five years later (*see the **3 March 2004** news item*), a few months after it was also rereleased by the W3C (with identical content) as their "**PNG Second Edition**" **Recommendation**.

> *PNG was already part of the UK profile for MHEG-5 on digital terrestrial television; MHEG-5 is the international standard for a next-generation teletext system that shares a number of features with HTML. PNG is also used in MHP, the Java-based Multimedia Home Platform for digital video systems, and was included in HAVi, the somewhat defunct Home Audio-Video Interoperability standard for 1394-based home networking.

And the design of the multi-image extension to PNG known as **MNG** is officially complete (version 1.0 of the MNG specification was released on 31 January 2001), with quite a number of applications available and a free reference library, too.

By now you're undoubtedly drooling over such an incredibly well-designed image format and wondering where you can find applications or programming tools that support it. Well, wonder no further! **Greg aims to please**.

General Information | **Applications** | **Programming Resources** | **Images** | **Animation**

*Last modified **7 September 2006**, you betcha.*
 png-printable.html

A Basic Introduction to PNG Features

This page is intended to provide an explanation of some of the features of the PNG format for non-technical users. As such, it doesn't emphasize PNG features like freedom from patents; those are more of concern to developers. Where programmer information is given, it is principally to explain to the *user* why various applications may not perform as well as expected. Where performance claims are made--especially compression comparisons with other image formats--we assume that the PNG implementation is at least as good as the best freeware encoders. Note that this is currently *not* necessarily a valid assumption in the case of a number of popular (and expensive) image editors, but it's not always clear where the problem lies.

> Please let Greg know if parts of this page still don't make sense or if there are other PNG features and/or foibles that aren't covered here. Greg would like this to be a friendly and usable resource for non-experts.

A Russian translation of this page (with some additional information) is available here:

- http://rus-linux.net/zen/png_feature/png_feature.html

(Thanks to Ivan Zenkov for the translation!)

Finally, there are a number of third-party pages that provide different and complementary perspectives on PNG:

- **Kerry Watson** has created a wonderfully easy-to-read, multi-page intro covering compression, transparency, interlacing, a selection of Windows software, and comparisons to other formats as part of his Web Colors site.
- **Vincent Sabio** wrote a nice PNG summary and review that is more detailed than this page but not as detailed as the full PNG specification.
- **Stephan T. Lavavej** has created an excellent PNG introduction page that includes a lovely demo of *interpolated display* of interlaced PNGs (i.e., smooth and fuzzy rather than blocky).
- **Drake Emko**, co-author of the Hackles web comic, has written an informative article entitled *PNG Tips for Cartoonists*. (See also the list of PNG comics.)
- **CraniumAbuse** has written up a nice format-comparison introduction as part of his *How To Optimize a PNG Image File Using Paint Shop Pro* tutorial.

Typical Usage

The Portable Network Graphics (PNG) format was designed to replace the older and simpler GIF format and, to some extent, the much more complex TIFF format. (See the main page or the history page for

background information.) Here we'll concentrate on two major uses: the World Wide Web (WWW) and image-editing.

For the Web, PNG really has three main advantages over GIF: alpha channels (variable transparency), gamma correction (cross-platform control of image brightness), and two-dimensional interlacing (a method of progressive display). PNG also compresses better than GIF in almost every case, but the difference is generally only around 5% to 25%, not a large enough factor to encourage folks to switch on that basis alone. One GIF feature that PNG does *not* try to reproduce is multiple-image support, especially animations; PNG was and is intended to be a single-image format only. (A very PNG-like extension format called MNG was finalized in mid-1999 and is beginning to be supported by various applications, but MNGs and PNGs will have different file extensions and different purposes.)

For image editing, either professional or otherwise, PNG provides a useful format for the storage of intermediate stages of editing. Since PNG's compression is fully lossless--and since it supports up to 48-bit truecolor or 16-bit grayscale--saving, restoring and re-saving an image will not degrade its quality, unlike standard JPEG (even at its highest quality settings). And unlike TIFF, the PNG specification leaves no room for implementors to pick and choose what features they'll support; the result is that a PNG image saved in one app is readable in any other PNG-supporting application. (Note that for transmission of finished truecolor images--especially photographic ones--JPEG is almost always a better choice. Although JPEG's lossy compression can introduce visible artifacts, these can be minimized, and the savings in file size even at high quality levels is much better than is generally possible with a lossless format like PNG. And for black-and-white images, particularly of text or drawings, TIFF's Group 4 fax compression or the JBIG format are often far better than 1-bit grayscale PNG.)

Like GIF and TIFF, PNG is a *raster* format, which is to say, it represents an image as a two-dimensional array of colored dots (pixels). PNG is explicitly not a *vector* format, i.e., one that can store shapes (lines, boxes, ellipses, etc.) and be scaled arbitrarily without any loss of quality (generally speaking). For that you probably want SVG or PostScript. (There are some private extensions to PNG that *add* vector information in addition to PNG's regular pixels--Macromedia's Fireworks does something along those lines--but no valid PNG may omit the pixel data.)

Compression

PNG's compression is among the best that can be had without losing image information and without paying patent fees, but not all implementations take full advantage of the available power. Even those that do can be thwarted by unwise choices on the part of the user.

PNG supports three main image types: truecolor, grayscale and palette-based ("8-bit"). JPEG only supports the first two; GIF only the third (although it can fake grayscale by using a gray palette). The impact on compression comes from the ability to mix up image types in PNG. Specifically, forcing an

application to save an 8-bit palette image as a 24-bit truecolor (or "RGB") image is *not* going to result in a small file. This may be unavoidable if the original has been modified to include more than 256 colors (for example, if a continuous gradient background has been added), but many images intended for the Web have 256 or fewer colors.

On the programmer's side, one common mistake is to include too many palette entries in a PNG image. This error is most noticeable when converting tiny GIF images (bullets, buttons, etc.) to PNG format; these images are typically only 1000 bytes or so in size, and storing 256 three-byte palette entries where only 50 are needed would result in over 600 bytes of wasted space.

Another common programmer mistake is to use only one type of compression filter, or to vary them incorrectly. Compression filters are described below and can make a dramatic difference in the compressibility of the image. In general this is not a feature that users should be forced to experiment with.

Finally, the low-level compression engine itself can be tweaked to compress either better or faster. Often "best compression" is the preferred setting, but an implementor may choose to use an intermediate level of compression in order to boost the interactive performance for the user. Usually the difference in file size is small, but there are cases where such a choice can make a big difference.

See the zlib home page for further details on PNG's compression engine and the CRC-32 algorithm, the 7-Zip home page for an alternative implementation of the deflate algorithm, and Vince Sabio's Compression Primer for an overview of compression in general. For tools to optimize the compression of PNG images, see the converters page (especially Glenn Randers-Pehrson's **pngcrush** and Ulead's **SmartSaver**).

Compression Filters

Compression filters are a way of transforming the image data (losslessly) so that it will compress better. Each horizontal line in the image can have one of five filter types associated with it; choosing which of the five to use for each line is almost more of a black art than a science. Nevertheless, at least one reasonably good algorithm is not only known but also described in the PNG specification and implemented in freely available software. Other algorithms are likely to perform even better, but so far this has not been an active area of research.

By way of example--admittedly an *extreme and unrealistic case*[*]--a 512 x 32,768 image containing all 16,777,216 possible 24-bit colors compressed **over 300 times better** with filtering than without. The uncompressed image was 48 MB in size; the compressed-but-unfiltered version was around 36 MB; but the filtered version is only 115,989 bytes (0.1 MB). Yow. (A 4096 x 4096 version, created by Paul

Schmidt, is a mere 59,852 bytes--more than **600 times better** than the unfiltered version, at an overall compression ratio of 841:1. Ted Samuels ran it through Ken Silverman's PNGOUT utility--see the converters page for links to it and other optimizers--and trimmed it to 57,549 bytes, for an overall 875:1 ratio. See this page for a downloadable version and further info.)

A more realistic example is the oceanography data at NASA's Ocean ESIP site. Digital maps displaying various physical measurements can be generated dynamically in either GIF or PNG format; the PNG versions are invariably one-fifth the size of the GIFs, thanks to PNG's compression filters. For example, a map showing the surface height of the northeastern Pacific Ocean on 1 August 1997 (during a major El Niño) is 70,090 bytes in GIF format but only 13,880 bytes in PNG format.

See the Filter Algorithms chapter of the PNG specification for details.

* As a measure of just how unrealistic, note that these seemingly hyper-compressed PNG images can themselves be compressed by an additional factor of anywhere from 21 to 97 or so (depending on which image) simply by applying **gzip** to them. Of course, a gzip'd PNG is not terribly useful in most contexts, and MNG is the best of all--it drops the size to **456 bytes**.

Alpha Channels

Also known as a *mask* *channel*, an alpha channel is simply a way to associate variable transparency with an image. Whereas GIF supports simple binary transparency--any given pixel can be either fully transparent or fully opaque--PNG allows up to 254 levels of partial transparency in between for "normal" images (or 65,534 levels for the special "deeply insane" formats, but here we're concentrating on image depths that are useful on the Web).

All three PNG image types--truecolor, grayscale and palette--can have alpha information, but it's most commonly used with truecolor images. Instead of storing three bytes for every pixel (red, green and blue), now four are stored: red, green, blue and alpha, or RGBA. The variable transparency allows you to create "special effects" that will look good on any background, whether light, dark or patterned. For example, a photo-vignette effect can be created for a portrait by making a central oval region fully opaque (i.e., for the face and shoulders), the outer regions fully transparent, and a transition region that varies smoothly between the two extremes. When viewed with a Web browser such as Arena, the portrait would fade smoothly to white when viewed against a white background, or smoothly to black if against a black background. Drop-shadows are another ideal application for alpha transparency; in the images below, the same toucan image is displayed against a colorful background and against another copy of itself:

Stefan Schneider's shadow-casting toucan displayed against different backgrounds

This transparency feature is far more important for the small web graphics that are typically used on web pages, such as colored (circular) bullets and fancy text. Alpha blending allows one to use *anti-aliasing*--creating the illusion of smooth curves on a grid of rectangular pixels by smoothly varying the pixels' colors--to make rounded and curved images that look good against *any* background, not just against a white background (for example). Thus the same image can be reused in many places without the "ghosting" effect that occurs with GIFs.

Of course, effective replacements for GIF buttons and icons must be comparable in size as well, and that mostly rules out truecolor RGBA images. But PNG supports alpha information with palette images as well; it's just slightly harder to implement in a smart way. A PNG alpha-palette image is just that: an image whose palette also has alpha information associated with it, not a palette image with a full alpha mask. In other words, each pixel corresponds to an entry in the palette with red, green, blue *and* alpha components. So if you want to have bright red pixels with four different levels of transparency, you must use four separate palette entries to accommodate them. (All four entries will have identical RGB components, but the alpha values will differ.) If you want *all* of your colors to have four levels of transparency, you've effectively reduced your total number of available colors from 256 to 64. In general, though, only some of the colors need more than one level of transparency, and recognizing which ones is where things get tricky for the programmer. (If you don't want to trust your local programmer, have a look at **pngquant**, which converts 32-bit RGBA PNGs into 8-bit RGBA-palette images. If you *are* a programmer, also have a look at it; full source code is included.)

For a better explanation with some nice sample images, see the Anti-aliasing and Transparency chapter of Chris Lilley's excellent WWW4 paper, *Not Just Decoration: Quality Graphics for the Web*.

Gamma Correction

Gamma correction basically refers to the ability to correct for differences in how computers (and especially computer monitors) interpret color values. Web authors in particular are probably aware that Macintosh-generated images tend to look too dark on PCs, and PC-generated images tend to look too light on Macs. An image that looks good on an SGI workstation won't look right on either a Macintosh or a PC, and even a PC-created image won't look right on *all* PCs.

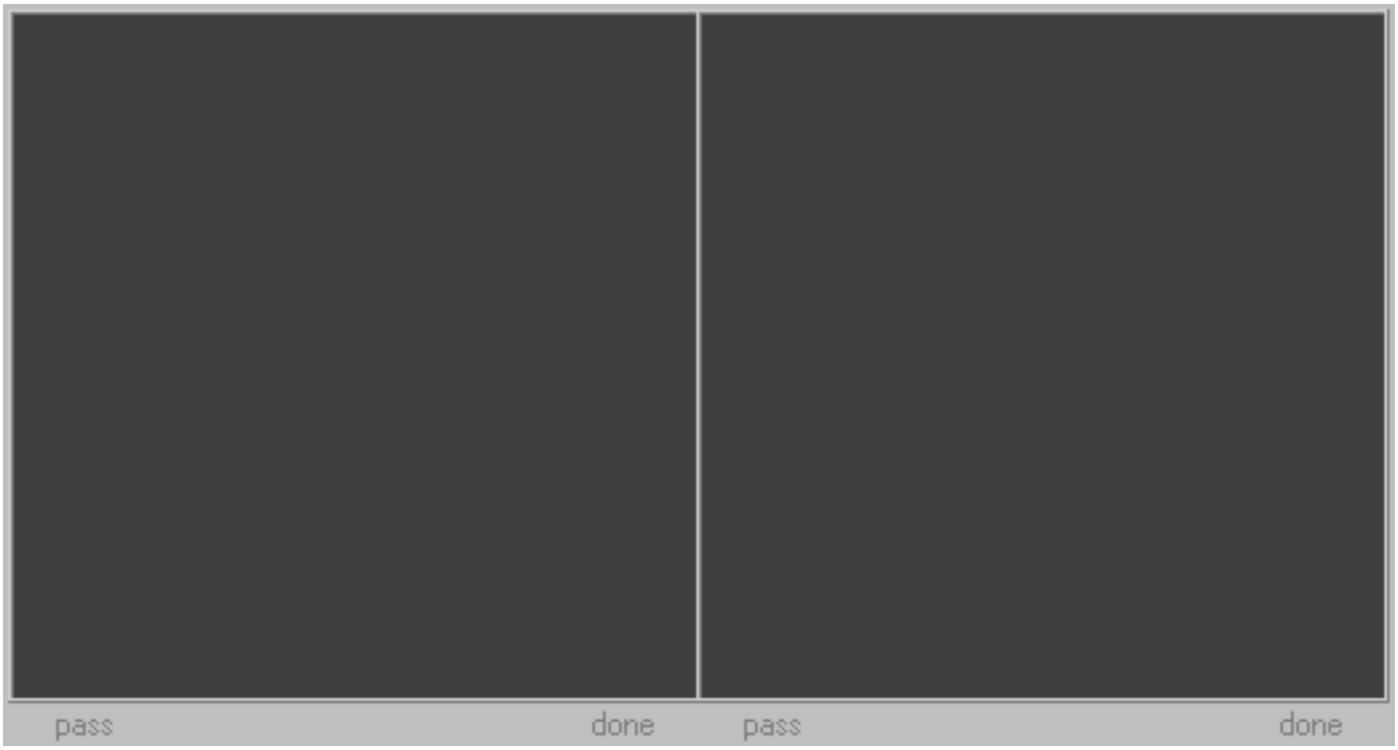
Gamma information is a partial solution. It's a means of associating a single number with a computer display system, in an attempt to characterize the tricky physics lurking within a graphics card's digital-to-analog converter (RAMDAC) and within a monitor's high-voltage electron gun. Gamma is only an approximation; a better approximation is to use so-called **chromaticity** values (also supported by PNG) as well as gamma, but even this is an approximation. The absolute best solution currently available is to use a complete **color management system** (which, again, PNG supports via the sRGB extension chunk). For most people, however, just supplying the gamma value of the image and correcting for the corresponding gamma value of the monitor system is sufficient.

For further information, see Chris Lilley's tutorials on gamma, chromaticity and color management, or the Gamma Tutorial appendix in the PNG specification. For more detailed technical information, see Charles Poynton's Gamma and Color FAQs, the International Color Consortium home page, the sRGB home page, John Denker's extensive color management page, or Chris's chapter on gamma correction (and subsequent chapters) in *Not Just Decoration: Quality Graphics for the Web*. (*Gamma logo courtesy of Claus Cyrny.*)

Interlacing

Interlacing--or, more generally, progressive display--has been around a long time. GIF has supported it since 1989, TIFF since around the same time (though not in any standardized way), and JPEG since the early 1990s (though it wasn't widely implemented until 1996). PNG's method is conceptually similar to GIF interlacing and visually similar to progressive JPEG (i.e., two-dimensional).

Here is a GIF animation by Willem van Schaik that shows some of the benefits of PNG's 2D interlacing scheme over GIF's one-dimensional version:



PNG's 2D interlacing (left) compared with GIF's 1D interlacing (right)

The first thing to notice is that only the top one-eighth or so of the GIF image is visible by the time the PNG image's first pass is complete. PNG's first pass is only 1/64th of the image data; GIF's is 1/8th. By the time GIF's first pass is done, four PNG passes have been displayed--and unlike the GIF pixels, which are stretched by a factor of 8:1 at this point, the PNG pixels are only stretched by 2:1. (Indeed, there is no stretching at all in PNG's odd-numbered passes, and its even passes are all stretched by 2:1 vertically. This means that embedded text in an image is typically readable about twice as fast in a PNG image.)

Also note that PNG's seventh pass and GIF's fourth pass are identical--both consist of every other scanline. They each therefore represent fully one half of the image data and one half of the decoding time. (The relative timing in the animation above has been adjusted to emphasize the earlier passes over the later ones.)

Check out the PNG interlacing demo for a "zoomed" look at how PNG's interlaced pixels are displayed, or see the Data Representation chapter of the PNG specification for details of PNG's interlacing scheme.

File Integrity Checks

PNG supports three main types of integrity-checking to help avoid problems with file transfers and the like. The first and simplest is the eight-byte **magic signature** at the beginning of every PNG image. It will detect the most common type of file corruption: that due to the transfer of a binary file in text (or "ASCII") mode. On most systems, line-endings in text files are flagged by either a carriage-return

character (CR), a line-feed character (LF), or both. Macintoshes use CRs; Unix systems use LFs; and all non-Unix PC systems (DOS, Windows 3.x/95/NT, OS/2) use CR/LF pairs. PNG's magic signature cleverly includes both a CR/LF pair and a single LF. Thus when transferring in text mode to a DOS box, for example, the bare LF will acquire a matching CR; when transferring to a Unix system, the CR/LF pair will turn into a plain LF; and when transferring to a Macintosh, both the CR/LF and the bare LF will probably turn into plain CRs. It's then a simple matter of looking at the first eight or nine bytes in the file to see whether text-corruption occurred (which is exactly the sort of thing the Unix **file**(1) command is designed to do). Keep in mind that messing up the signature isn't that big a deal; the real problem is that CR and LF characters in the *image data*--which don't have anything to do with line endings or text but instead refer to pixel values or more abstract compressor tokens--will also be converted, thus destroying the image.)

The second type of integrity-checking is known as a 32-bit **cyclic redundancy check** or CRC-32. PNG images are divided up into logical data chunks, and each chunk has an associated CRC stored with it. If even one bit in the chunk changes, the CRC value one would calculate from the damaged data will no longer match the stored CRC value from the original chunk data. This sort of thing can easily be tested without decoding the image; in fact, it can be tested on the fly, as the image is downloaded, if the downloading software is smart enough.

The third type of integrity check applies only to the image-data chunk(s) and is similar to the CRC values. Where an image chunk's CRC value applies to the *filtered, compressed data* in the chunk, the **Adler-32 checksum** applies to the complete stream of *uncompressed* data (regardless of how many image chunks that might span). It's really only used by the lowest-level compression library as a check against bad encoding and decoding software.

See the File Structure chapter of the PNG specification for details.

Pronunciation

No detail was too small for consideration in the authors' quest for a near-perfect image format; yea, verily, even the acronym and pronunciation were major topics of discussion. The reason, of course, is the GIF format; some pronounce it with a soft G like *giraffe*, some with a hard G like *gift*, and no one really knows what they're talking about. (For the record, the soft G is correct; it is how the author of the format pronounces it.)

"PNG" is always spelled* "PNG" (or "Portable Network Graphics") and always pronounced "ping" in English, not "pinj" or "pee en gee" or any other multi-syllabic disaster. (For non-English speakers, the three-letter pronunciation is fine, however.) See the introduction to the PNG specification (or the Scope section of the newer ISO/IEC/W3C version) for the definitive statement on the matter.

* Greg follows American English rules, but read *spelt* here if you "favour" the British "flavour." ;-)

Here are some related PNG pages at this site:

- Frequently Asked Questions about PNG
- Current Status of PNG
- PNG Technical Documentation
- *PNG: The Definitive Guide* and Related Books

- PNG Home Page
- **Complete PNG Site Map**

Last modified 28 May 2006

Applications with PNG Support

For those of you who simply wish to buy a commercial application or download a zipfile full of executables and start looking at or making pictures, the pages below have pointers to a large number of applications that are known to support PNG in one form or other, or that are going to support PNG in the near future. Some of the programs (particularly those for Unix) are provided as source code and may require **libpng** and/or **zlib** (see PNG Source Code and Libraries), but often even these have pre-built binaries for popular systems somewhere nearby.

Also take a look at the W3C's page of PNG testimonials for the official word from companies like Microsoft, Hewlett-Packard and Agfa.

The list of applications currently spans nine main sections:

- Browsers
- Image Viewers
- Image Editors
- Image Converters
- 3D Applications
- Games / Entertainment
- Office / Business Applications
- Scientific / Graphing Applications
- Miscellaneous Applications

Note that there is a fair amount of overlap between the *editors* and *converters* categories; editors that are capable of saving in multiple formats can also be used to convert between image formats. The same is true for some image viewers.

In addition, the following pages list some specialized PNG-supporting applications:

- VRML Browsers
    - ImageTexture Examples on Opaque Materials:
        - Palette-Based Textures
        - 8-bps Grayscale and RGB Textures
        - 16-bps Grayscale and RGB Textures
    - ImageTexture Examples on Partially Transparent Materials:

    - Palette-Based Textures
    - 8-bps Grayscale and RGB Textures
    - 16-bps Grayscale and RGB Textures
- Libraries and Toolkits
- PNG Source Code

And this page lists physical devices with PNG support:

- Hardware with PNG Support

Note that there are also quite a number of applications that support MNG, PNG's animated cousin; see this page for details:

- Applications with MNG Support

Of the apps listed so far, many (though not most) appear to use the free **zlib** library but independent (non-**libpng**) implementations of the PNG code. Bugs have been noted where known, but don't take any of this as gospel truth; new releases occur all the time, and many bugs in older versions are fixed in later ones. Life is full of change and uncertainty.

(**Big thanks** to everyone who has provided Greg with pointers and corrections to these pages!)

Here are some related PNG pages at this site:

- Screenshots of Browsers and PNG Transparency:
    - Internet Explorer 5.0 for Mac OS
    - iCab 1.9 beta for Mac OS
    - OmniWeb 3.1rc2 for Mac OS X Server
    - Mozilla 2000-04-14 for Linux
        - also using random-dithered binary transparency
    - CSCMail 1.7.8 for Linux
    - NetPositive 2.2 for BeOS
    - WebTV

- PNG Home Page
- **Complete PNG Site Map**

Last modified 21 February 2005.

Current Status of PNG

This page is an attempt to provide an easily digested PNG status board--basically a place to come and see how PNG currently fares for those who haven't been keeping up with the news page or mailing lists. It grew out of an article submitted to Slashdot in February 1999 (with a followup in June 2000), but it is intended to be more dynamic and has been redesigned accordingly.

Stability: excellent ★★★★★

The PNG specification has proven to be exceptionally solid. There have been two minor updates since the 1.0 release--to clarify gamma handling and to add some new chunk types for precision color and international text--but the design of PNG is such that these additions do not prevent older apps from displaying images that contain the new chunks. In addition, PNG finally emerged from the amazingly slow process of ISO/IEC standardization in March 2004, which assures its long-term stability as an image format. It is also a required part of both VRML97/X3D and the vector-based image standard, SVG.

User acceptance: very good to excellent ★★★★

Among those who are familiar with PNG, acceptance is excellent, and the most recent Unisys flap (late August 1999) further increased the level of awareness of PNG. While there are still many people who are barely aware of the difference between GIF and JPEG, much less who have heard of PNG, the number of non-PNG-Group folks who regularly post useful and accurate information about PNG (e.g., to Usenet newsgroups and mailing lists) is impressively high. In addition, application support is no longer considered extraordinary but rather is expected. Indeed, applications that do *not* support PNG are criticized both by users and by the trade press. And in 1999, technical publisher O'Reilly and Associates felt the market was ready for a book devoted entirely to the subject; ***PNG: The Definitive Guide*** was published in June 1999. (It turned out to be too narrow a topic to sell well and went out of print in late 2001, but it was relicensed under the GNU FDL, and the full text has been online since July 2003.)

Application support (quantity): excellent ★★★★★

Virtually all graphics-related applications these days are at least able to read or write basic PNG images, and many can do both. See the PNG-supporting applications pages and freshmeat.net for details; several "new" apps are announced, discovered and/or listed every week.

Application support (quality): good ★ ★ ★

The quality of PNG support in applications varies widely, but overall it is improving at a reasonable rate. Many applications now support both basic GIF-like transparency (palette-based with a single, fully transparent color index) and full alpha transparency (32-bit RGBA); a handful also support PNG's "RGBA palette" mode (8-bit with a multi-entry tRNS chunk). A number of high-end applications now support 16-bit color channels in PNG. Support for gamma correction continues to be uneven, with many applications failing to honor the gamma information when reading images, and most of them not making a distinction between *recording* gamma-related information about the user's display (lossless) and *modifying* the image data directly (lossy). Compression support is also uneven, with a surprisingly large number of applications writing overly large palettes, misusing PNG's compression filters, and often providing no way of setting the maximum possible compression level.

Among PNG-supporting image editors, Macromedia's **Fireworks 2.0 and later**, available for Windows and Macintosh, remains the best overall, with excellent support for PNG transparency, good compression, and support for text annotations. The **GIMP**, available primarily for Unix systems but now also for Windows, has reasonable alpha support, good gamma and text support, and excellent compression. Adobe's **Photoshop**, considered by many to be the preeminent image-editing application, is slowly improving but still is not at the level one might expect given its price tag. PS 7.0 fixes all known PNG bugs in previous versions, but its compression remains poor (reportedly), it cannot write 16-bit color channels (in PNG images, that is), and it has no support at all for RGBA palettes or text annotations. (It also silently "flattens" color data in areas where the image's alpha channel indicates complete transparency, which is a lossy operation and which may surprise users who expected truly lossless storage. Adobe does not consider this a bug.)

See the Image Editors page, Image Viewers page, and Image Converters page for details.

Browser support: very good to excellent ★ ★ ★ ★

Web-browser support for PNG--or the incomplete implementation thereof--was, for more than a decade, a major thorn in the side of PNG developers and web designers who wanted to use PNG. While most browsers supported PNG images natively since the late 1990s--the "Big Two" (**Netscape** and **Internet Explorer**) having finally caught up in late 1997 (early 2000 for MSIE on the Macintosh)--the *level* of support was downright pathetic until 2001 or so and didn't achieve "ubiquitous goodness" until late 2006. Users want alpha transparency, which allows one to do nifty effects like drop-shadows and anti-aliasing against *any*

background, but users of the now-dominant web browser, MSIE for Windows, were locked in the dark ages of GIF-style binary transparency until the release of MSIE 7.0 in October 2006. (Previous versions implemented PNG transparency in such a way that any palette index that wasn't *completely* opaque was treated as completely transparent--depending on your image, say goodbye to most of it! To make up for that, MSIE for Windows didn't support 32-bit RGBA transparency at all.) And even the newest version still has multiple bugs in its gamma support (screenshots).

Meanwhile, most other browsers--including Microsoft's now-defunct **MSIE 5 for Macintosh** (screenshots)--have had excellent PNG support for years. (MSIE/Mac's only real downsides from the PNG perspective were that (1) the Mac development team and code base apparently were largely independent of the Windows side, and (2) they were disbanded entirely since the release of Apple's KHTML-based **Safari** browser, with the obvious corollary that there will never be any more updates.) However, both Safari and another Mac browser, **iCab**, also have excellent transparency support (though no gamma support in the latter), as do **NetPositive** for BeOS, **OmniWeb** for Mac OS X Server, the **Sega Dreamcast** browser, and the **CSCMail** e-mail client for Linux. Netscape's **Navigator 6** and later (plus **Mozilla**, its open-source code base, and derivatives such as **Firefox**, **Galeon** and **K-Meleon**) has had very good transparency support since April 2000, with the exception of 8- and 16-bit X on Unix (mediocre quality); it also has full gamma support and even, for a brief period, native MNG support. (Navigator 4.x had no transparency support whatsoever, but virtually all users have since upgraded to one of the Mozilla-based releases.) Recent releases of **Dillo** for Linux and **Opera** for Windows and Linux and are likewise fully capable of both transparency and gamma correction (though Dillo doesn't yet handle background images). **Konqueror 3**, KDE's native browser, has full 32-bit RGBA support but, at least through version 3.2.2, only binary transparency support for palette-based images. (Like older versions of Mozilla, it supports MNG natively.) **WebTV** does both gamma and transparency reasonably well, although versions before July 2000 had serious problems with palette-based transparency; there's also a **WebTV Viewer** test browser for Windows that has excellent PNG support. The W3C's **Amaya** browser was provided with a patch against version 2.1, which was supposed to give the Windows port some level of alpha support, but there's no mention of it in the new-features list for versions released since then. And **Webster XL** for RISC OS and the **ICE Browser** for Java are both supposed to have full transparency support, although these claims have not been verified.

On the less lively side, the nearly defunct **Acorn Browse** for RISC OS had full, flawless support for all forms of PNG transparency, not to mention gamma-correction and progressive display of interlaced PNGs. The fully defunct **Arena**

also had decent alpha support, though it always used its own background pattern.

What will it take to move the Browsers rating firmly into the "Excellent" category? Leaving aside the issue of Windows users' migration to browsers with good PNG support (e.g., Firefox, MSIE 7, or Opera)--which may take another year or two--Microsoft needs to fix MSIE's broken gamma support; Mozilla/Firefox still lead in this regard. (And while Microsoft is at it, how about color correction? This falls into the "put up or shut up" category, since Microsoft was a founding member of the International Color Consortium more than a decade ago, before PNG even existed. See the screenshots page for details and links to test pages.) Beyond that, it would be nice to see some of the other actively developed browsers like **Amaya** (and **Konqueror**?) learn how to do all forms of PNG transparency correctly; that goes for most of the embedded browsers, like **ANT Fresco** and **ViewML**, as well.

As a related item, note that Microsoft's **Internet Information Server** (a.k.a. **IIS**) shipped by default without an explicit MIME type for PNG images until version 6, which effectively meant that it treated PNGs as `application/octet-stream` rather than `image/png`. Not surprisingly, this affected only *non*-Microsoft web browsers connecting to IIS servers; they rightly refused to display such mislabelled PNGs. Fortunately, Microsoft did finally correct the problem with the release of IIS 6.0 in 2003, and a fix is available for older versions (at least for version 4.0).

See the Browsers page for more info, including links to screenshots for many of the products mentioned above.

Animation support: poor to fair 

Animation and other forms of multi-image storage were intentionally excluded from the PNG specification; at the time (early 1995), animated GIFs were almost unheard of, MPEG was well established in the video realm, and the PNG Group felt (and still feels) that multi-image applications would be better served by a PNG-like meta-format. MNG, short for *Multiple-image Network Graphics*, is precisely that format. It uses exactly the same chunk architecture as PNG and actually shares many of the same chunks, but it supports looping, objects, and JPEG image data, among other things. See the MNG web site for details.

Prior to mid-1999, animation support was rather abysmal. But with the freezing of the MNG spec in May 1999 and the continued development of several MNG-supporting applications (e.g., **ImageMagick**, **MNGeye**, **eMNGma**, and **PNG/MNG Construction Set Pro**) since then, the rating has moved up a notch. In February 2001, Gerard Juyn's free libmng achieved 1.0 status, and it is (or was) being used not only in a pair of browser plug-ins, a couple of Java applets, and in

the **Qt** GUI toolkit, but also in **Mozilla**, **Navigator 6** and later, **Konqueror 3**, and **NetFront 3** and later. Unfortunately, MNG support was subsequently removed from Mozilla and its relatives (except as a separate "XPI" add-on), and MNGeye and eMNGma are no longer being developed, so the rating has moved back down a notch.

More apps and better browser support will be necessary in order to move beyond "fair" status. Currently more than four dozen are listed, a number that continues to increase slowly but steadily.

Here are some related PNG pages at this site:

- PNG Status Snapshots:
  - June 2000
  - February 1999
- History of PNG
- News (and more history) of the PNG Development Group
- Introduction to PNG features
- Frequently Asked Questions about PNG

- PNG Home Page
- **Complete PNG Site Map**

Last modified 21 October 2006.

PNG Frequently Asked Questions

1. *Why did the PNG site use only GIFs for so long?*
2. *Why is the PNG-logo graphic linked to a JPEG image?*
3. *What's the best method for displaying PNGs wherever possible, with another format as a fallback?*
4. *What about plug-ins?*
5. *Why does your web site say PNGs are smaller than GIFs? All of mine are bigger!*
6. *I thought you said PNG was patent-free--what about Stac, PKWARE, Apple, etc.?*
7. *How do I make transparent PNGs?*
8. *Why doesn't PNG support animation?*
9. *What are `PNG8' and `PNG24'?*
10. *I just recompiled Webalizer--why does it still say it's running with a different version of libpng than it was compiled with?*
11. *I'm using libpng for PNG support; why is there no libmng for MNG support?*
12. *Internet Explorer doesn't display PNG images even though your web page claims it supports PNG. What's up with that?*
13. *Why doesn't Microsoft Office print embedded PNG images correctly if its native image format is PNG?*
14. *PNG files no longer preview in Windows ME's Explorer. How can I fix that?*
15. *I just downloaded something, and now I can't delete this PNG image. What happened?*

- **Q:** ***Why did the PNG site use only GIFs for so long?***

  A: It didn't! Ever since the first HTML 4.0 drafts came out, the PNG pages were modified so that virtually all of the GIFs *most* users saw *would* have been PNGs had their browsers supported the HTML 4.0 OBJECT tag correctly. The basic idea was to wrap an OBJECT PNG around an IMG GIF or JPEG; old browsers would see the GIF or JPEG, but new ones would see the PNG--no broken images for anyone. (After all, the primary purpose of the PNG site was and is to be informative rather than political; in other words, the emphasis has always been on making it useful and functional for everyone, regardless of one's choice of browser.)

  Unfortunately, Microsoft, Netscape and most other browser vendors implemented OBJECT so poorly that the tag is still virtually useless for new image types, even as late as mid-2000. Forget about backward compatibility; even *current* compatibility is abominable! (Notable exceptions include **Amaya** and **Mozilla**.) See this page for details about the OBJECT tag and the browsers page for details about individual browser implementations. And please support the Web Standards Project.

- **Q:** ***Why is the PNG-logo graphic linked to a JPEG image?***

  A: If there's one concept you should take away from this site, it's ***Use the best tool for the job.*** In this case, that happens to be JPEG, which, at 76,563 bytes, is almost seven times smaller than the completely lossless PNG version (515,894 bytes). (Of course, the PNG image is interlaced, which tends to reduce its compression efficiency; non-interlaced, it would be 410,545 bytes, only 5.4 times as large as the JPEG. By contrast, progressive JPEG--which corresponds to PNG interlacing--tends to *shrink* normal JPEGs, in this case to 71,110 bytes.) See the Basic Introduction for more tips about what to use when, and why.

- **Q:** ***What's the best method for displaying PNGs wherever possible, with another format as a fallback?***

  A: Server-side content negotiation is the most reliable approach and the only one known to work regardless (almost) of the user's choice of browser and browser settings. Apache supports it, albeit not very conveniently; Greg doesn't know about other servers (info welcomed!). The major drawbacks are that you need to duplicate any image that you want to negiotiate (e.g., make a PNG version and a JPEG version); you need access to the server configuration; and there's no standard approach to setting up content negotiation in servers, so every product is likely to be different.

There is no known client-side approach that will work reliably in all or even in most cases. The HTML 4.0 OBJECT tag was the most promising, but it failed due to non-spec-compliant implementations (see the previous question). People have promoted various ActiveX/JavaScript-based methods, but many users (reportedly around 11%, Greg included) disable JavaScript and ActiveX controls for security and/or stability reasons. Simply using PNG images in IMG tags works in virtually all newer browsers, but mainstream ones like Internet Explorer 5.x/6.x (for Windows) and Netscape 4.x have little or no support for PNG transparency, and a few ports (such as MSIE for Macintosh) had no PNG support at all until early 2000. See the browsers page for up-to-date details on PNG support in web browsers.

- **Q:** ***What about plug-ins?***

A: Aside from the fact that plug-ins (either Netscape-style or Microsoft ActiveX "controls") are platform-specific--that is, you have to supply a separate binary for every operating system and, in some cases, for different browser versions on the same OS--the major drawback is in the implementations. Whether due to a simple oversight on the parts of both Netscape and Microsoft (and all vendors who subsequently cloned either or both plug-in architectures) or intentional design limitations, no one paid attention to the fact that HTML has supported *one* multimedia type natively since its earliest days: images. Ideally a browser would invoke a given plug-in not only for content referenced via EMBED or OBJECT tags but also for unsupported image types found in the IMG tag.

Since no one made the obvious connection, designers are therefore forced to write content either for use only with plug-ins (via OBJECT or EMBED) or for use only with PNG-supporting browsers (via IMG). Most have given up and simply support the IMG tag, which remains the most backward-compatible approach despite the lack of PNG support in pre-1998 browsers. (Indeed, most plug-in authors have also given up; very few PNG plug-ins are still available.)

Note that plug-ins have other drawbacks, too. Transparency, which is one of PNG's most desirable features, was impossible with the first generation of Netscape's plug-in architecture--which is still the current generation for Unix implementations. The second generation supports transparency via something called "windowless plug-ins," but only one PNG plug-in ever supported that (version 2.0 of Siegel & Gale's **PNG Live** for Windows), and it was never completed. Microsoft's ActiveX architecture may support transparency, but no PNG control ever has. Even worse, Microsoft apparently insists on placing a fat, opaque border around images displayed that way, at least when referenced via OBJECT tags; and with browser preferences set for relatively high security, every web page with such an image will generate a warning box, even when returning to a previously approved page via the *Back* button.

- **Q:** ***Why does your web site say PNGs are smaller than GIFs? All of mine are bigger!***

A: There are two main reasons behind this phenomenon: comparing apples and oranges (that is, not comparing the same image types), and using bad tools.

A common user mistake is to start with a truecolor image, save it in both PNG and GIF format, and then compare. Unlike GIF, which supports only colormapped (paletted) images, PNG supports both colormapped *and* truecolor images--and not just at 24 bits; the latter can be 48 bits, too. Because of this, when saving a truecolor (24-bit) image as a GIF, most tools will happily throw away color information in order to squeeze the image down to 8 bits (the largest possible palette size). But with PNGs, there's no need to be so brutal; tools almost invariably save such images in their full 24-bit glory. PNG's compression engine may be efficient, but there's no possible way it can make up for the initial factor-of-three handicap. To do a fair test, save as GIF *first*, then open that image and save it as a PNG. Now the PNG will be (or should be) the same bit depth as the GIF, and in most cases it will be noticeably smaller.

The other reason is more of a developer issue, although users should be aware of it. PNG provides a lot of flexibility in tuning the compression level of an image, from trimming the color and transparency palettes to choosing the precise combination of pre-compression filters to choosing the proper settings for the compression engine itself. (GIF, on the other hand, is practically deterministic; aside from rearranging the order of the palette--an extremely time-consuming and rare optimization--or turning off compression altogether, you get pretty much the same results regardless of the tool you use.) Not all tools do a good job of compressing PNG images, and in extreme cases the difference can be as large as a factor of two. **Photoshop** has traditionally been the poster child for poor PNG implementations, but in fairness, recent releases have also included **ImageReady**, an optimizer that does a better job. See the basic introduction and and image editors pages for details. For *serious* (yet completely

lossless) compression, check out **pngcrush**, **pngrewrite**, **PNGOUT**, and **OptiPNG** on the image converters page.

A side note: for all practical purposes, PNG is never smaller than JPEG for photographic images. On the other hand, for buttons and simple graphics with relatively few colors, PNG usually *is* smaller than JPEG. *Use the right tool for the job!* Again, see the basic introduction for details.

- **Q:** ***I thought you said PNG was patent-free--what about Stac, PKWARE, Apple, etc.?***

  A: The PNG image format was designed in 1995 specifically in response to the patent problems with the LZW algorithm used in GIF. To the best of the PNG group's knowledge, PNG was then--and still is--completely patent-free.

  However, the fact that is possible to implement PNG without infringing any known patents certainly does not imply that it is *im*possible to implement it in a manner that *does* infringe one or more patents. Patents are a minefield, and several are known to be closely related to PNG technologies:

  - Stac (Waterworth, 4,701,745; Whiting et al., 5,016,009), LZ77 with hashing: deflate algorithm
  - PKWARE (Katz, 5,051,745), LZ77 sorted hash: deflate algorithm
  - Apple (Othmer & Leak, 5,379,129), alpha mask images: alpha blending

  In each case, it is possible to work around the patent and thereby avoid infringement, which is what has been done in all known PNG implementations.

  Of course, Greg is not a lawyer, and **this is not legal advice**, merely (reasonably) informed technical opinion based on the informed technical opinions of others. The only guarantees in patent law come after court battles--and those are the tool of last resort. Nothing here has ever been tested that way, so consult a lawyer, and use your own best judgment.

- **Q:** ***How do I make transparent PNGs?***

  A: The simplest way is to use an appropriate image editor with support for PNG transparency. Greg gave specific recipes for doing this with **Photoshop**, **ImageReady**, **Paint Shop Pro**, and **The GIMP** in Chapter 4 of ***PNG: The Definitive Guide***, and for **Fireworks** in Chapter 1, but the basic approach is the same for every image editor that uses layers.

- **Q:** ***Why doesn't PNG support animation?***

  A: The answer is either "it does" or "because it's a bad idea," depending on your perspective.

  The animation-supporting version of PNG is called MNG, for *Multiple-image Network Graphics*. For most practical purposes, MNG *is* PNG, just with a different filename extension, a slightly different file signature, and the bare minimum of internal changes necessary to support animations (and other forms of multi-image files). It has exactly the same chunk structure as PNG and even shares most of the same chunks; the major difference is the addition of new chunk types to support features such as looping, clipping, and so on.

  The majority of the PNG developers felt (and still feel) that overloading a single file type with both still and animation features is a bad design, both for users (who have no simple way of determining to which class a given image file belongs) and for web servers (which should use the `image/foo` MIME type for stills and `video/foo` for animations--GIF notwithstanding). Programmers who simply *must* think of stills and animations as the same thing are free to do so internally; MNG is the proper superset, and a single PNG image wrapped in a few dozen bytes of MNG headers is a completely valid MNG stream. (Of course, an unadorned PNG image is also defined to be a valid MNG stream, but let us not quibble...)

- **Q:** ***What are `PNG8' and `PNG24'?***

  A: *PNG8* is shorthand for "8-bit PNG," but more generally it refers to palette-based (colormapped) PNG images with 1-, 2-, 4- or 8-bit pixels. That is, each pixel value in the image itself is 8 (or fewer) bits deep, and it acts as an index to a particular 24-bit

RGB color value in the palette. A 1-bit colormapped image can refer to no more than two colors; a 2-bit image can have no more than four; a 4-bit image can have no more than 16; and an 8-bit image can have up to 256 colors. (Note that, unlike GIF, PNG palettes can have any number of entries--at least, up to the maximum allowed by the bit depth--not just powers of two.)

PNG24, on the other hand, is shorthand for "24-bit PNG" and refers to truecolor or RGB (red/green/blue) images. Each pixel in such images is 24 bits (3 bytes) deep and directly specifies a color instead of acting as an index into a lookup table of colors (i.e., a palette). These images thus can contain up to 16.8 million colors, although typical ones tend to use no more than 50,000 or so.

Note that PNG supports a third basic image type, grayscale, which is usually limited to 8-bit (or smaller) depth but, like truecolor, requires no palette. Not all tools support writing true grayscale images but instead write colormapped PNGs with all-gray palettes. (This can sometimes be beneficial--if only a few, unevenly-spaced gray shades are used--but more often it simply adds 780 bytes to the image size for no good reason.)

Also note that both grayscale and RGB PNGs can have 16-bit samples--that is, 16-bit and 48-bit pixels, respectively--and both can also have an *alpha channel* for transparency information. Thus an 8-bit grayscale image or a 24-bit RGB image may contain an 8-bit alpha channel, for a total of 16 or 32 bits per pixel; while a 16-bit grayscale image or a 48-bit RGB image may contain a 16-bit alpha channel, for a total of 32 or 64 bits per pixel. However, when tools occasionally mention *PNG32*, they are invariably referring to 32-bit RGB+alpha (RGBA), not 32-bit gray+alpha. (Few tools support both reading and writing of images with 16-bit samples; such images are typically used only in science, medicine, and the film industry.)

- **Q:** ***I just recompiled Webalizer--why does it still say it's running with a different version of libpng than it was compiled with?***

  A: You need to recompile **gd**, too. Here's the typical error message:

```
        # webalizer -c /foo/webalizer.conf
        libpng warning: Application was compiled with png.h from libpng-1.0.8
        libpng warning: Application  is  running with png.c from libpng-1.2.1
        gd-png:  fatal libpng error: Incompatible libpng version in application and
library
        Segmentation fault (core dumped)
        #
```

  So the installed version of libpng (header files and shared library) in this example is 1.2.1--which presumably is also what your half of the app (e.g., Webalizer) was compiled with. But the gd library on which your app *also* depends was compiled with libpng 1.0.8. Recompile gd and all will be well--at least with this application.

  This is a general limitation (or "feature") of Unix-style shared libraries: in order to simplify the link command for application developers, library developers often build shared libraries with implicit links to other shared libraries. Thus one can link with something like **Imlib** by (say) using only the `-limlib` link option, despite the fact that it actually has dependencies on more than a dozen other GTK+, Glib, X, and image/compression libraries. Problems arise when both the application itself and one of its libraries link with the same lower-level library (such as libpng or zlib); if the latter gets updated, both the application *and* the higher-level library or libraries may need to be recompiled.

- **Q:** ***I'm using libpng for PNG support; why is there no libmng for MNG support?***

  A: There is! Gerard Juyn wrote a free libmng implementation, and as of June 2000, it is very nearly feature-complete. It has been used to create both a MNG plug-in and native MNG support in **Mozilla**, and it's used by a number of other toolkits and applications, including **Qt**. Even better, libmng includes native JNG and PNG support, too. It requires zlib and (for JNG support) libjpeg.

- **Q:** ***Internet Explorer doesn't display PNG images even though your web page claims it supports PNG. What's up with that?***

  A: This appears to be a widespread but not universal problem (Greg has never been able to reproduce it) that most often affects Windows versions but can also occur on Mac OS. It may actually have more than one cause.

For Windows, by far the simplest approach is to use **regsvr32** to re-register IE's internal PNG support, as passed along by Michael Wexler (possibly based on a posting by ARodriguez on 16 June 2001):

I couldn't see .png files in IE 5.5 even with SP1 installed on Windows ME. Then, thanks to Usenet (through Google), I found the magic step:

> Start -> Run... -> **regsvr32 c:\windows\system32\pngfilt.dll** (and click OK)

This re-registers the primary png viewer for IE. Why did I have to do this? Got me. Gotta love Windows. Anyway, 10 seconds later, I could view entire test suites. Wonderful and easy solution.

Note: this entry previously referred to **c:\windows\system**, a location that appears to have worked for at least two people. Travis Head reports that pngfilt.dll lives in **c:\windows\system32** on his systems; this matches the location mentioned in ARodriguez's posting. Check both directories if necessary!

Another fix that has worked in some cases--but not for Michael--is to install Service Pack 1 (SP1) for Windows MSIE 5.5. (*Thanks to Everett Starkweather for the tip.*)

Yet another possibility, which may apply to earlier versions of Internet Explorer (such as 5.0 and possibly even 4.0), was posted to `comp.graphics.misc` by Andrej Kluge on 1 June 2000:

For IE5 (Win95, probably the same for W98):

1. Start **regedit** (Start -> Run -> regedit <OK>)
2. Go to the key:

   ```
   HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Internet Settings
   \Accepted Documents
   ```

3. Click the "New" menu, choose "String", type as name of the new string the next free number (in my case it was 4). Double-click on the newly created value and type in "image/png" (without the quotes)
4. Close regedit, restart IE5 (no reboot needed)

Note that the regedit approach is known *not* to work in some cases, but it may be useful if a plug-in (such as QuickTime?) has modified the registry.

The QuickTime problem is known to have affected at least one Macintosh user running MSIE 5.2 on Mac OS X 10.3. For some reason his system would fail to display PNG images (despite QT's PNG support) but instead would pop up the "select a viewing application or save to disk" box that's associated with unknown media types. (The QT failure *may* be due to the browser's failure to invoke plugins for the IMG tag, which is a failing that is not unique to Microsoft.) Alain reported:

So I went back to explorer and had a look at what application was by default opening the png file (I don't know what it is in English but in Spanish it is in Preferencias -> Complementos de Archivos).

(Presumably the English version is *Preferences -> File Associations*, or something close to that.)

There I saw that Quicktime was set to open the png file. So I just deleted this preference, and now when I go back to the site it does let me see the png image. I have Quicktime 6.5.2 installed.

Quite possibly the same approach would work in many cases with Windows versions of the browser; it has the great advantage of not requiring any obscure registry hacks.

- **Q:** ***Why doesn't Microsoft Office print embedded PNG images correctly if PNG is one of its native image formats?***

A: Newer versions of Microsoft Office apparently are strongly dependent on features of the printer driver in order to print embedded PNG images (particularly those with tranparency) correctly. For example, it was reported that **Office XP** printing to a Brother HL-1250 either would fail to print embedded PNGs or else would print them with a black background instead of white, whereas printing the same document from the same machine to an HP Business Inkjet 1100 "worked perfectly."

In short, try using a different printer, and if that's not an option, check with the printer manufacturer (or maybe Microsoft) for updated Windows printer drivers.

- **Q:** ***PNG files no longer preview in Windows ME's Explorer. How can I fix that?***

A: This problem, which reportedly can be caused by Macromedia's **Fireworks 4**, is easily fixed. From the ***Start*** menu, select ***Run...*** and then type:

> **regsvr32 thumbvw**

This will restore the missing registry entries. (Thanks to David Candy for this info.)

- **Q:** ***I just downloaded something, and now I can't delete this PNG image. What happened?***

A: Similar reports began showing up in early November 2002, and as of June 2003, the problem still isn't completely characterized. At least three people have implicated **Kazaa**; two of them downloaded Spice Girls images. **It is also possible that malicious code is involved.** (See the **11 December 2002** news entry for details, but note that so far there is no direct evidence linking the two problems. See also this site for other users' experience.) Michael Brown also noted that Windows Explorer can get wedged while trying to [pre]view certain images, which renders it incapable both of deleting them and of performing various other tasks; it remains stuck until killed, although Mozilla works fine on such images.

For now, it appears that the surest way to get rid of the offending image is to note where it is (i.e., in which directory or folder), shut down to DOS (or boot from a DOS floppy), change to that directory, and use the DOS **DEL** command to remove the file. (Booting from a Linux floppy, such as Tom's Root/Boot Disk, should also work as long as the filesystem isn't NTFS, but non-Linux users will find this approach considerably more complex.)

Garvey Butler reports that using regular Windows Explorer (which, on his Windows 98se machine, doesn't display image thumbnails) to delete the images works for him. Newer versions of Windows may require the image-preview feature to be shut off altogether. In Windows 2000 it appears that this can be done from Explorer as follows:

> Tools -> Folder Options... -> General tab -> Enable Web content in folders
> (*and uncheck the checkbox to disable it*)

For Windows XP it may be necessary to modify the registry as described on this page. (Note that modifying the registry can mess up Windows in a big way if you make a mistake!) Most registry modifications require a reboot to take effect.

Richard Bytheway noted that Windows locks image files while generating the thumbnails, which can be quite slow if the images are large (he mentioned 500 MB). This is unlikely to be the problem with downloaded Spice Girls images, but users with slow machines might see some delays. Again, turning off image preview avoids the problem.

Finally, one other user reported that his problem-image was removable after he uninstalled **Photoshop 7.0**. (Your mileage may vary!)

If you have further information, feel free to let Greg know, but please don't ask him for details; everything he knows is right here already, and in general, if it doesn't involve Linux, he doesn't do it.

Here are some related PNG pages at this site:

- Introduction to PNG features
- Current Status of PNG
- History of PNG
- PNG Technical Documentation
- *PNG: The Definitive Guide* and Related Books

- PNG Home Page
- **Complete PNG Site Map**

Last modified 15 August 2006.

This article originally appeared in the electronic **Linux Gazette** in January 1997 and was subsequently (re)printed in the April 1997 issue of **Linux Journal**. A revised and extended version also appeared as Chapter 7 of ***PNG: The Definitive Guide***. **The main text of this article is current as of early January 1997**, with updates appearing at the very end as Author's Notes.

History of the Portable Network Graphics (PNG) Format

by Greg Roelofs

Prehistory

The Story of PNG actually begins way back in 1977 and 1978 when two Israeli researchers, Jacob Ziv and Abraham Lempel, first published a pair of papers on a new class of lossless data-compression algorithms, now collectively referred to as ``LZ77" and ``LZ78." Some years later, in 1983, Terry Welch of Sperry (which later merged with Burroughs to form Unisys) developed a very fast variant of LZ78 called LZW. Welch also filed for a patent on LZW, as did two IBM researchers, Victor Miller and Mark Wegman. The result was...you guessed it...the USPTO granted both patents (in December 1985 and March 1989, respectively).

Meanwhile CompuServe--specifically, Bob Berry--was busily designing a new, portable, compressed image format in 1987. Its name was GIF, for ``Graphics Interchange Format," and Berry et al. blithely settled on LZW as the compression method. Tim Oren, Vice President of Future Technology at CompuServe (now with Electric Communities), wrote: ``The LZW algorithm was incorporated from an open publication, and without knowledge that Unisys was pursuing a patent. The patent was brought to our attention, much to our displeasure, after the GIF spec had been published and passed into wide use." There are claims [1] that Unisys was made aware of this as early as 1989 and chose to ignore the use in ``pure software"; the documents to substantiate this claim have apparently been lost. In any case, Unisys for years limited itself to pursuit of hardware vendors--particularly modem manufacturers implementing V.42bis in silicon.

All of that changed at the end of 1994. Whether due to ongoing financial difficulties or as part of the industry-wide bonk on the head provided by the World Wide Web, Unisys in 1993 began aggressively pursuing commercial vendors of software-only LZW implementations. CompuServe seems to have been its primary target at first, culminating in an agreement--quietly announced on 28 December 1994, right in the middle of the Christmas holidays--to begin collecting royalties from authors of GIF-supporting software. The spit hit the fan on the Internet the following week; what was then the comp.graphics newsgroup went nuts, to use a technical term. As is the way of Usenet, much ire was directed at CompuServe for making the announcement, and then at Unisys once the details became a little clearer; but mixed in with the noise was the genesis of an informal Internet working group led by Thomas Boutell [2]. Its purpose was not only to design a replacement for the GIF format, but a successor to it: better, smaller, more extensible, and FREE.

The Early Days (All Seven of 'Em)

The very first PNG draft--then called ``PBF," for Portable Bitmap Format-- was posted by Tom to comp.graphics, comp.compression and comp.infosystems.www.providers on Wednesday, 4 January 1995. It had a three-byte signature, chunk numbers rather than chunk names, maximum pixel depth of 8 bits and no specified compression method, but even at that stage it had more in common with today's PNG than with any other existing format.

Within one week, most of the major features of PNG had been proposed, if not yet accepted: delta-filtering for improved compression (Scott Elliott and Mark Adler); deflate compression (Tom Lane, the Info-ZIP gang and many others); 24-bit support (many folks); the PNG name itself (Oliver Fromme); internal CRCs (myself); gamma chunk (Paul Haeberli) and 48- and 64-bit support (Jonathan Shekter). The first proto-PNG mailing list was also set up that week; Tom released the second draft of the specification; and I posted some test results that showed a 10% improvement in compression if GIF's LZW method was simply replaced with the deflate (LZ77) algorithm. Figure 1 is a timeline listing many of the major events in PNG's history.

```
 4 Jan 95        PBF draft 1 (Thomas Boutell)
 4 Jan 95        delta-filtering (Scott Elliott, Mark Adler)
 4 Jan 95        deflate compression (Tom Lane et al.)
 4 Jan 95        24-bit support (many)
 5 Jan 95        TeleGrafix LZHUF proposal (same or slightly larger)
 6 Jan 95        PNG name (Oliver Fromme)
 7 Jan 95        PBF draft 2 (Thomas Boutell)
 7 Jan 95        ZIF early results (Greg Roelofs)
 7 Jan 95        internal CRC(s) (Greg Roelofs)
 8 Jan 95        gamma chunk (Paul Haeberli)
 8 Jan 95        48-, 64-bit support (Jonathan Shekter)
 9 Jan 95        FGF proposal, implementation (Jeremy Wohl)
10 Jan 95        first NGF/PBF/proto-PNG mailing list (Jeremy Wohl)
15 Jan 95        PBF draft 3 (Thomas Boutell)
16 Jan 95        CompuServe announces GIF24 development (Tim Oren)
16 Jan 95        spec available on WWW (Thomas Boutell)
16 Jan 95        PBF draft 4 (Thomas Boutell)
23 Jan 95        PNG draft 5 (Thomas Boutell)
24 Jan 95        PNG draft 6 (Thomas Boutell)
26 Jan 95        final 8-byte signature (Tom Lane)
 1 Feb 95        PNG draft 7 (Thomas Boutell)
 2 Feb 95        Adam7 interlacing scheme (Adam Costello)
 7 Feb 95        CompuServe announces PNG == GIF24 (Tim Oren)
13 Feb 95        PNG draft 8 (Thomas Boutell)
 7 Mar 95        PNG draft 9 (Thomas Boutell)
11 Mar 95        first working PNG viewer (Oliver Fromme)
13 Mar 95        first valid PNG images posted (Glenn Randers-Pehrson)
 1 May 95        pnglib 0.6 released (Guy Eric Schalnat)
 1 May 95        zlib 0.9 released (Jean-loup Gailly, Mark Adler)
 5 May 95        PNG draft 10 (Thomas Boutell)
13 Jun 95        PNG home page (Greg Roelofs)
 8 Dec 95        PNG spec 0.92 released as W3C Working Draft
23 Feb 96        PNG spec 0.95 released as IETF Internet Draft
28 Mar 96        deflate and zlib approved as Informational RFCs (IESG)
22 May 96        deflate and zlib released as Informational RFCs (IETF)
 1 Jul 96        PNG spec 1.0 released as W3C Proposed Recommendation
11 Jul 96        PNG spec 1.0 approved as Informational RFC (IESG)
 4 Aug 96        VRML 2.0 spec released with PNG as requirement (VAG)
 1 Oct 96        PNG spec 1.0 approved as W3C Recommendation
14 Oct 96        image/png approved (IANA)
```

```
15 Jan 97       PNG spec 1.0 released as Informational RFC 2083 (IETF)
```

Perhaps equally interesting are some of the proposed features and design suggestions that ultimately were *not* accepted: the Amiga IFF format; uncompressed bitmaps either gzip'd or stored inside zipfiles; thumbnail images and/or generic multi-image support; little-endian byte order; Unicode UTF-8 character set for text; YUV and other lossy (non-lossless) image-encoding schemes; and so forth. Many of these topics produced an amazing amount of discussion--in fact, the main proponent of the zipfile idea is still making noise two years later.

Onward, Frigidity

One of the real strengths of the PNG group was its ability to weigh the pros and cons of various issues in a rational manner (well, most of the time, anyway), reach some sort of consensus and then move on to the next issue without prolonging discussion on ``dead'' topics indefinitely. In part this was probably due to the fact that the group was relatively small, yet possessed of a sufficiently broad range of graphics and compression expertise that no one felt unduly ``shut out'' when a decision went against him. (All of the PNG authors were male. Most of them still are. I'm sure there's a dissertation in there somewhere...) But equally important was Tom Boutell, who, as the initiating force behind the PNG project, held the role of benevolent dictator--much the way Linus Torvalds does with Linux kernel development. When consensus was impossible, Tom would make a decision, and that would settle the matter. (On one or two rare occasions he might later have been persuaded to reverse the decision, but this generally only happened if new information came to light.)

In any case, the development model worked: by the beginning of February 1995, seven drafts had been produced, and the PNG format was settling down. (The PNG name was adopted in Draft 5.) The next month was mainly spent working out the details: chunk-naming conventions, CRC size and placement, choice of filter types, palette-ordering, specific flavors of transparency and alpha-channel support, interlace method, etc. CompuServe was impressed enough by the design that on the 7th of February they announced support for PNG as the designated successor to GIF, supplanting what they had initially referred to as the GIF24 development project. [3] By the beginning of March, PNG Draft 9 was released and the specification was officially frozen--just over two months from its inception. Although further drafts followed, they merely added clarifications, some recommended behaviors for encoders and decoders, and a tutorial or two. Indeed, Glenn Randers-Pehrson has kept some so-called ``paleo PNGs'' that were created at the time of Draft 9; they are still readable by any PNG decoder today. [4]

Oy, My Head Hurts

But specifying a format is one thing; implementing it is quite another. Although the original intent was to create a "lightweight" format--and, compared to TIFF or even JPEG, PNG *is* fairly lightweight--even a completely orthogonal feature set can introduce substantial complications. For example, consider progressive display of an image in a web browser. First comes straight decoding of the compressed data; no problems there. Then any line-filtering must be inverted to get the actual image data. Oops, it's an interlaced image: now pixels are appearing here and there within each 8x8 block, so they must be rendered appropriately (and possibly buffered). The image also has transparency and is being overlaid on a background image, adding a bit more complexity. So far we're not much worse off than we would be with an interlaced, transparent GIF; the line filters and 2D interlacing scheme are pretty straightforward extensions to what programmers have already dealt with. Even adding gamma correction to the foreground image isn't too much trouble.

But wait, it's not just simple transparency; we have an alpha channel! And we don't want sparse display--we really like the replicating progressive method Netscape Navigator uses. Now things are tricky: each replicated pixel-block

has some percentage of the fat foreground pixel mixed in with complementary amounts of the background pixels in the block. And just because the current fat pixel is 65% transparent (or, even worse, completely opaque) doesn't mean later ones in the same block will be, too: thus we have to remember all of the original background pixel-values until their final foreground pixels are composited and overlaid. Toss in the ability to render all of this nicely on an 8-bit, colormapped display, and most programmers' heads will explode.

Make It So!

Of course, some of these things are application (presentation or front-end) issues, not general PNG-decoding (back-end) issues. Nevertheless, a good PNG library should allow for the possibility of such applications--which is another way of saying that it should be general enough not to place undue restrictions on any programmer who wants to implement such things.

Once Draft 9 was released, many people set about writing PNG encoders and/or decoders. The true glory is really reserved for three people, however: Info-ZIP's Jean-loup Gailly and Mark Adler (both also of gzip fame), who originally wrote Zip's deflate() and UnZip's inflate() routines and then, for PNG, rewrote them as a portable library called **zlib** [5]; and Guy Eric Schalnat of Group 42, who almost single-handedly wrote the **libpng** reference implementation (originally ``pnglib'') from scratch. [6] The first truly usable versions of the libraries were released two months after Draft 9, on the first of May, 1995. Although both libraries were missing some features required for full implementation, they were sufficiently complete to be used in various freeware applications. (Draft 10 of the specification was released at the same time, with clarifications resulting from these first implementations.)

Fast-Forward to the Present

The pace of subsequent developments slowed at that point. This was partly due to the fact that, after four months of intense development and dozens of e-mail messages every day, everyone was burned out; partly because Guy controlled libpng's development and became busy with other things at work; and partly because of the perception that PNG was basically ``done.'' The latter point was emphasized by a CompuServe press release to that effect in mid-June (and one, I might add, in which their PR guys claimed much of the credit for PNG's development, sigh).

Nevertheless, progress continued. In June of 1995 I set up the PNG home page, now grown to roughly a dozen pages [7]; Kevin Mitchell officially registered the ``PNGf'' Macintosh file ID with Apple Computer. In August Alexander Lehmann and Willem van Schaik released a fine pair of additions to the NetPBM image-manipulation suite, particularly handy under Linux: pnmtopng and pngtopnm version 2.0. And in December at the Fourth International World Wide Web Conference, the World Wide Web Consortium (W3C) released the PNG Specification version 0.92 as an official standards-track Working Draft.

1996 saw the February release of version 0.95 as an Internet Draft by the Internet Engineering Task Force (IETF), followed in July by the Internet Engineering Steering Group's (IESG) approval of version 1.0 as an official Informational RFC. (It was finally released by the IETF as RFC 2083 [8] in mid-January 1997, a full six months later...) The Virtual Reality Modeling Language (VRML) Architecture Group in early August adopted PNG as one of the two required image formats for minimal VRML 2.0 conformance. [9] Meanwhile the W3C promoted the spec to Proposed Recommendation status in July and then to full Recommendation status on the first of October. [10] Finally, in mid-October the Internet Assigned Numbers Authority (IANA) formally approved ``image/png'' as an official Internet Media Type, joining image/gif and image/jpeg as non-experimental image formats for the Web. Much of this standardization would not have happened nearly as quickly without the tireless efforts of Tom Lane and Glenn Randers-Pehrson, who took over editing duties of the spec from Thomas Boutell.

Current Status

So where are we today? The future is definitely bright for PNG, and the present isn't looking too bad, either. I now have over 125 applications listed [11] with PNG support either current or planned (mostly current); among the ones available for Linux are:

- XV (image viewer/converter)
- ImageMagick (image viewer/converter)
- GRAV (image viewer)
- Zgv (image viewer)
- xli (image viewer)
- XPaint (image editor)
- The GIMP (image editor)
- Image Alchemy (image converter)
- pnmtopng/pngtopnm (image converters)
- XEmacs (editor/web browser/operating system/etc.)
- gforge (fractal terrain generator)
- Fractint (fractal generator)
- Ghostscript (PostScript viewer/converter)
- GNUplot (plotting program)
- PV-WAVE (scientific visualization program)
- POV-Ray (ray-tracer)
- VRwave (VRML browser)
- X Mosaic (web browser)
- Arena (web browser)
- Chimera (web browser)
- Grail (web browser)
- Amaya (web browser/editor)
- Mapedit (image-map editor)
- WWWis (HTML IMG sizer)
- file(1) (Unix file-type identifier)

Discerning readers will note the conspicuous absence of Netscape Navigator. Despite the fact that Netscape was aware of the PNG project from the beginning and unofficially indicated ``probable support''; despite the nice benefits gamma correction, alpha support and 2D interlacing bring to WWW applications; despite the fact that the WWW Consortium, of which Netscape is a member, released the PNG spec as its first official Recommendation; despite the requirement to support PNG in VRML 2.0 viewers like Netscape's own Live3D plug-in; and despite considerable pestering by members of the PNG group and the Internet community at large, Netscape is still only ``considering'' future support of PNG. Until Netscape either supports PNG natively or gets swept away by Microsoft or someone else, PNG's usefulness as an image format for the Web is considerably diminished.

On the other hand, our buds at Microsoft recognized the benefits of PNG and apparently embraced it wholeheartedly. They have not only made it the native image format of the Office97 application suite but have also repeatedly promised to put it into Internet Explorer (theoretically by the time of the 4.0 betas--we'll see about that). Assuming they do, Netscape is almost certain to follow suit. (See? Microsoft *is* good for something!) At that point PNG should enjoy a real burst of WWW interest and usage.

In the meantime, PNG viewing actually is possible with Linux Netscape; it's just not very useful. Rasca Gmelch is working on a Unix plug-in with (among other things) PNG support. Although it's still an alpha version and requires ImageMagick's **convert** utility to function, that's not the problem; Netscape's brain-damaged plug-in architecture is. Plug-ins have no effect on HTML's IMG tag: if there's no native support for the image format and no helper app defined, the image is ignored regardless of whether an installed plug-in supports it. Instead you must use Netscape's EMBED extension. That means anyone who wants universally viewable web pages loses either way: PNG with IMG doesn't work under Netscape, and PNG with EMBED doesn't work under much of anything except Netscape and MSIE (and those only if the user has installed a working PNG plug-in).

But support by five or six other Linux web browsers ain't bad, and even mainstream applications like Adobe's Photoshop now do PNG natively. More are showing up every week, too. Life is good.

The Future

As VRML takes off--which it almost certainly will, especially with the advent of truly cheap, high-performance 3D accelerators--PNG will go along for the ride. (JPEG, which is the other required VRML 2.0 image format, doesn't support transparency.) Graphic artists will use PNG as an intermediate format because of its lossless 24-bit (and up) compression and as a final format because of its ability to store gamma and chromaticity information for platform-independence. Once the ``big-name'' browsers support PNG natively, users will adopt it as well--for the 2D interlacing method, the cross-platform gamma correction, and the ability to make anti-aliased balls, buttons, text and other graphic elements that look good on *any* color background (no more ``ghosting,'' thanks to the alpha-channel support).

Indeed, the only open issue is support for animations and other multi-image applications. In retrospect, the principal failure of the PNG group was its delay in extending PNG to MNG, the "Multi-image Network Graphics" format. As noted earlier, everyone was pretty burned out by May 1995; in fact, it was a full year before serious discussion of MNG resumed. As (bad) luck would have it, October 1995 is when the first Netscape 2.0 betas arrived with animation support, giving the (dying?) GIF format a huge resurgence in popularity.

At the time of this writing (mid-January 1997), the MNG specification has undergone some 31 drafts--almost entirely written by Glenn Randers-Pehrson--and seems fairly close to being frozen, although there has been a recent burst of new activity. A couple of special-purpose MNG implementations have been written, as well. But MNG is too late for the VRML 2.0 spec, and despite some very compelling features, it may never be perceived as anything more than PNG's response to GIF animations. Time will tell.

At Last...

It's always difficult for an insider to render judgment on a project like PNG; that old forest-versus-trees thing tends to get in the way of objectivity. But it seems to me that the PNG story, like that of Linux, represents the best of the Internet: international cooperation, rapid development and the production of a Good Thing that is not only useful but also freely available for everyone to enjoy.

Then again, maybe I'm just a shameless egotist (nyuk nyuk nyuk). You decide....

Acknowledgments

I'd like to thank Jean-loup Gailly for his excellent comp.compression FAQ, which was the source for much of the

patent information given above. [12] Thanks also to Mark Adler and JPL, who have been the fine and generous hosts for the PNG home pages, zlib home pages, Info-ZIP home pages and my own, personal home pages. (Through no fault of Mark's, that all came to an end as of the new year; oddly enough, JPL decided that none of it is particularly relevant to planetary research and exploration. Go figure.)

References

1. Raymond Gardner, rgardner@teal.csn.org, 8 Jan 1995 23:11:58 GMT, comp.graphics / comp.compression, Message-ID <3eprfu$jqs@news-2.csn.net>. See also Michael Battilana's article discussing the legal history of the GIF/LZW controversy: http://www.cloanto.com/users/mcb/19950127giflzw.html
2. http://www.boutell.com/boutell/
3. http://www.w3.org/Graphics/PNG/CS-950214.html
4. http://www.rpi.edu/~randeg/paleo_pngs.html
5. http://www.zlib.net/
6. ftp://ftp.simplesystems.org/pub/libpng/png/src/
7. http://www.libpng.org/pub/png/
8. ftp://ftp.isi.edu/in-notes/rfc2083.txt
9. http://www.vrml.org/Specifications/VRML97/part1/conformance.html
10. http://www.w3.org/TR/png.html
11. http://www.libpng.org/pub/png/pngapps.html
12. http://www.cis.ohio-state.edu/hypertext/faq/usenet/compression-faq/top.html

---

Author's Notes

- **16 January 1997** - New information became available after deadline; apparently Netscape is firmly committed to supporting PNG in Navigator and actually made public statements to that effect at its Internet Developers' Conference last October, although there's no indication of it anywhere on their web site. The only question is when: Navigator 4.0 has a fixed release date, and PNG support may not be ready by then.

- **5 May 1997** - As promised, the first 4.0 beta of Microsoft's Internet Explorer (released one month ago) does indeed have native PNG support, although it's not yet complete. Meanwhile Netscape's approach seems to be to let someone else do the work: Navigator 4.0 will have enhanced plug-in support, possibly even including a fix for the IMG/EMBED problem, but they have left it to Siegel & Gale to write the actual PNG plug-in.

- **4 July 1997** - Netscape's Communicator 4.0 has been released *without* any fix for the IMG/EMBED problem, but an article on Netscape's developer site has the following interesting quote:

  > *Netscape and Siegel & Gale are working together to embed PNG functionality within a future version of Communicator, so you won't have to use a plug-in to view PNG images* [...]

  The article is written by Siegel & Gale's Andrew Zolli, so one can assume the information is accurate.

- **11 November 1997** - As foreshadowed above, Netscape Communicator 4.04 was released today with native PNG support (albeit written from scratch by a Netscape employee, not as a collaboration with Siegel & Gale as reported above). Together with Microsoft's early-October release of Internet Explorer 4.0, this means that

PNG is supported by current public releases of essentially every browser on the market. Granted, it will be a while before the newest releases of the Big Two achieve serious market penetration, and both of them are still regrettably weak in their support even of features as simple as alpha channels and gamma correction. But as of today, the Portable Network Graphics format can truly claim to be a success. **YOW!**

- **8 April 1998** - The PNG-writing code in Netscape's second release of the Mozilla sources (specifically, in the Composer component--PNG reading in Navigator is still included) was removed ``for legal reasons.'' According to the included `ns/LEGAL` file, Stac claims that a pair of their patents cover the deflate algorithm (US patent numbers 4,701,745 and 5,016,009). Since no one but Netscape seems to have been contacted by Stac, and since both deflate and inflate received a clean bill of health in the Free Software Foundation's patent search, both the PNG Group and Info-ZIP are considerably puzzled by this. More news as it becomes available...

- **29 November 1998** - It's been eight months with nary a peep from Stac or anyone else, so it appears that the Netscape folks misinterpreted something when they brought up supposed PNG patent issues in Mozilla (see above). Note that while it *is* possible to write an infringing deflate encoder, the one in zlib was very carefully written to avoid all patents, and the deflate specification (RFC 1951) notes this explicitly: ``...it is strongly recommended that the implementor of a compressor follow the general algorithm presented here, which is known not to be patented *per se*.''

- **13 August 2000** - As expected, there's been no further news on the purported Stac patent claims (which is good news, of course!), but plenty of other things have been happening: alpha is fully supported in Mozilla (and its kissing cousin, Navigator 6.0PR2), Internet Explorer 5.0 for Mac OS, and roughly a dozen other browsers; MNG and JNG are very close to being fully supported in Mozilla; libmng, a freely reusable MNG/JNG library written by Gerard Juyn, is available; ISO standardization is almost complete; and PNG is a requirement for conformance in another W3C standard, SVG (Scalable Vector Graphics). Of course, VRML never took off like Greg predicted, but work on the third major version, VRML 2000 (and its close relative X3D), is progressing well.

- **Further status updates will appear on the dedicated PNG Status page. See also the 1999 and 2000 status snapshots linked below.**

Here are some related PNG pages at this site:

- Current Status of PNG
  - Status Snapshot of June 2000
  - Status Snapshot of February 1999
- News (and more history) of the PNG Development Group
- Introduction to PNG features
- Frequently Asked Questions about PNG
- ***PNG: The Definitive Guide*** and Related Books

- PNG Home Page
- **Complete PNG Site Map**

Last modified 12 June 2005.

News and History of the PNG Development Group from 2006

Herein lie news items and historical stuff primarily of interest to the Portable Network Graphics Development Group itself. Feel free to poke around even if you're not a member, though. Note that some of the links, particularly the older ones, are broken; in some cases this is explained by later entries. Other links (CompuServe, tcg.arl.mil) have fallen prey to reorganizations or upgrades; if and when they reappear, the entries below will be updated as needed.

Keep in mind that this is *history* here...

- **current** - see here

- **19 October 2006** - Microsoft releases **Internet Explorer 7.0**, the first (non-beta) version with almost acceptable PNG support! Early reports are that it still doesn't do gamma correction correctly (or color correction at all)--i.e., no change since the July 2005 beta version--but at least alpha transparency looks to be in good shape, and that's what everyone has been awaiting...for the last decade. ;-/ Party on, dudes!

- **27 June 2006** - That didn't last long... libpng 1.2.12 and 1.0.20 are released. It (correctly) fixes one potential buffer overflow that slipped through the cracks.

- **26 June 2006** - libpng 1.2.11 is released (and 1.0.19, for those still stuck on the old branch). It addresses some potential buffer overflows (no known exploits), updates the `configure` scripts, and fixes some minor typos.

- **28 May 2006** - Thanks to Tobias Schwarz of AmbiWeb, we have another new PNG mirror in Germany (http://dl.ambiweb.de/mirrors/www.libpng.org/pub/png/). It is updated twice a day.

- **23 April 2006** - libpng 1.2.10 is released. This version just fixes a handful bugs in or related to the build scripts, primarily `configure` and friends.

- **18 April 2006** - The vote on the new **sTER** stereo-image indicator chunk was unanimous; the PNG extensions document will be amended accordingly. In the meantime, here is the text of the approved 20060405 sTER chunk proposal.

- **14 April 2006** - libpng 1.2.9 is released. This version fixes some small bugs and includes a `configure` script by default. However, an error in the latter (involving the unprotected inclusion of `config.h` by `pngconf.h`) means there will be a 1.2.10 release within a week or two...

- **29 January 2006** - Thanks to Ralf Uhlemann of RealHost, we have two new PNG mirrors: one in Dublin, Ireland (http://libpng.oss-mirror.org/pub/mng/) and one in Koeln (Cologne), Germany (http://libpng.linux-mirror.org/pub/mng/). Both have 100 Mbit connections and are updated daily.

Here are some related PNG pages at this site:

- Current News of the PNG Development Group
- Historical PNG news:
  - 2006 · 2005 · 2004 · 2003 · 2002 · 2001 · 2000 · 1999 · 1998 · 1997 · 1996 · 1995
- History of PNG
- Current Status of PNG

- PNG Home Page
- **Complete PNG Site Map**

Last modified 19 October 2006.

Other PNG Links and Stuff

Greg has an entire page of PNG images, both inlined and linked, for those who want to get their hands on some right away; he also has a page of transparent PNG images for those who would like to stress their browser a bit more. In addition, here's an inlined PNG version of the small PNG icon used just above and on the other PNG pages; the GIF version is 1243 bytes, but the PNG version is only 762 bytes. It's also linked to an interlaced PNG version of the black 256x192 logo at the top of the main page:

(This will show up as a broken image for some folks...

...if it does for you, you need a PNG-supporting browser.)

The PNG logo and PNG icons are explained on Greg's PNG-interlacing demo page (which is the JPEG version of the PNG-images page mentioned above).

Here is the 1995/1996-era authors' collage:

As promised, it is **one nasty-looking group**. Yow! Brings to mind the old joke about the doctor who slapped the kid's mom. Fortunately this is only the small, fuzzy version; if you want the big, *really* nasty one, you'll have to follow the link. As befits a collage of image-format authors, the large version is available only in PNG format. In other words, you'll need a PNG-supporting image viewer or browser to look at it. Patience would be good, too. (It's 1,130,208 bytes long.)

There are three official PNG/MNG mailing lists, hosted at SourceForge.net. (Special thanks to Adam `Seven' Costello and Washington University in St. Louis for many years of support with the old lists. And ongoing thanks to Matthias B. for taking over administration of the new lists!)

NOTE

Sometime between 12 January and 18 January 2005 the old listserver hosted at **ccrc.wustl.edu** died silently. As of 30 January there are three new lists set up on **SourceForge.net**. Due to privacy concerns and the lack of any mechanism to contact former subscribers via the old lists, folks will have to manually subscribe to the new, Mailman-based lists. We apologize for the hassle, but we were not notified in advance, and there was nothing we could do about it after the fact!

To subscribe or unsubscribe to any or all of them, follow the instructions on the linked web page(s):

- **png-mng-announce** - announcements about libpng, libmng, PNG/MNG spec updates, and related items (moderated)
- **png-mng-implement** - PNG/MNG programming issues, including development and use of libpng and libmng
- **png-mng-misc** - PNG/MNG spec issues (including voting), software issues (from user perspective, not programmer), etc.

Theoretically the png-mng-announce list is received by more people than any other and should be used for all announcements of new libraries, new PNG-supporting applications, and so forth. In practice, many people subscribe only to png-mng-misc and/or png-mng-implement.

All three lists are archived at SourceForge (primary site, continuously updated: announce, implement, misc), pmt.sourceforge.net (secondary site, updated once a month, gzip'd), and ftp.simplesystems.org (tertiary site, possibly updated once a month, but with complete set of original mailing-list archives). Note that membership in the PNG Development Group (in the sense of being able to vote on new chunks or modifications to the PNG specification) is contingent upon having first *posted* to one of the PNG mailing lists at least six months prior to the end of the relevant vote. **Also note that you should be subscribed to a list, at least temporarily, to post to it; with automatic spam-filtering in place, moderator approval is not absolutely guaranteed even in the case of valid e-mail.** A temporary subscription will also ensure that you see all replies, not just those from people who remembered to cc you explicitly.

PNG documentation has moved to its own page.

Here is a list of PNG home pages by others in the PNG development group:

- Willem van Schaik's PNG pages (includes the **PNG Suite**--see below--and various PNG programs)
- Chris Lilley's official W3C PNG pages (includes various graphics tutorials)
- Glenn Randers-Pehrson's PNG and MNG Tools site
- Group 42's (abandoned) PNG home page, old home site of **libpng**'s original author, Guy Eric Schalnat
- Cosmin Truta's PNG pages (tips and pointers, especially about compression)

Official and unofficial PNG test images are also available, including:

- Willem van Schaik's PNG Suite, either Greg's local, single-page version or Willem's multi-page Netherlands version (also archived: PngSuite.tar.gz or PngSuite.zip)

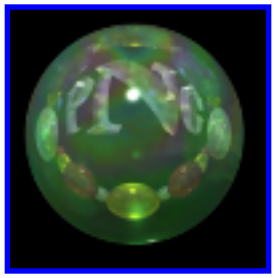
- Greg's collection of miscellaneous PNG images (old version visible in reduced size at right, as displayed by **Arena**), mostly with multiple levels of transparency (8-bit RGBA-palette or full 32-bit RGBA)
- Markus Svilans' alpha-channel test page with movable images (requires Mozilla M17 or later or Netscape 6.0PR2 or later with JavaScript enabled)
- Chris Lilley's anti-aliased alpha-channel test page (26k image)
- Chris Lilley's updated alpha-channel test page and alpha-channel-table-cells test page (same image)
- Darren Salt's Alpha/Transparency Suite (also older local copy)
- Nick Lamb's CSS and Alpha/Transparency Suite, including

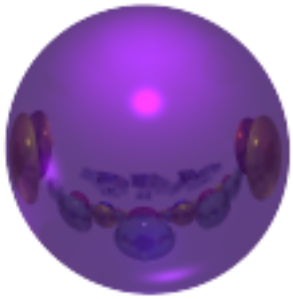
RGBA PNGs on a purple background and colormapped PNGs on a purple background

- Jason Summers' alpha/transparency test page and alpha+gamma test page
- Marcio Galli's alpha test page
- Paluba Michal's alpha test page
- Glenn Randers-Pehrson's MNG, JNG, PNG, and GIF alpha test page
- Photodude's Transparency Suite
- Lee Crocker's hell.png (675k, with alpha channel) and goldhill.png (792k) test images
- Lynn A. Davis's PNG Alpha Transparency Page (with basic textured background) and PNG Alpha Transparency Page 2 (with fixed background texture and scrollable, partially transparent foreground)
- Stuart Williams' Alpha-channel VRML textures
- Markus Svilans' draggable PNG alpha demo (requires JavaScript)
- Trevor Morris's PNG alpha IMG-vs-AlphaImageLoader demo (see also first footnote here and the *Cross-Browser Variable Opacity with PNG* item in the next section)

- Andreas Dilger's Gamma Test Page (actually has a large GIF image, plus instructions for estimating monitor gamma)
- Glenn Randers-Pehrson's Gamma Test Page
- Glenn Randers-Pehrson's ICC Profile Test Page
- Charles Cowen's ICC Profile Test Page (same image data, different ICC profiles: should look different if viewer supports embedded profiles and gamma/color correction)
- Charles Cowen's color-management spreadsheet (for Excel98; also in Macintosh format): use chromaticities to set up the RGB-to-XYZ colorspace-conversion matrix (for programmers only)

- Chris Lilley's test pages for inlined PNG support with the IMG, EMBED (plug-in) and OBJECT tags
- Dan Pape and Scott Powers' web page of PNG test images
- Guy Schalnat's archive of test images
- Rich Franzen's library of PNG images (including several grayscale test patterns for measuring monitors)
- Rich Franzen's 24-bit Kodak pcd0992 test suite
- Paul Schmidt's repository of PNG images
- H. Paul Hammann's very wide PNG images
- Owen Barton's PNG images
- Serge Quelin's POV-Ray-generated PNG art
- Victor Engel's Page o' 16 Million Colors (256 small 256x256 images, ~760 bytes each, with a different color for each and every pixel)





- Nick Smith's comparison of photographic test images (PNG, JPEG, GIF, TIFF)
- Dan Farmer's SkyVase, rendered with **POV-Ray 3.0. beta.02.u** in 24-bit (197k) and 48-bit (841k) versions
- Greg's updated PNG logos, rendered with **POV-Ray 3.1g** for Linux, in black (876k) and white (853k); a single, full-scale ball from each image is displayed at right, and the POV-Ray sources (11k) are also available
- The PNG Image Test Suite, a set of reference PNG images with weird combinations of options, dimensions, etc., designed to stress PNG code implementations (includes many of the individual images listed above)
- Marco Schmidt's standard test images in PNG format (Lena, Goldhill, etc.)
- CraniumAbuse's XML-flavored **</GIF><PNG>** banner logos

The following are some miscellaneous pages related to PNG or image compression:

- Chris Nokleberg's PNG Metadata Server (submit a PNG-image URL on a form and get back a listing of the image's vital and non-vital info)
- How to set up PNG as a MIME type for external viewers (including Unix boxes, PCs and Macs); this page is part of Scott D. Nelson's WWW Viewer Test Page
- Yuzo Kato's PNG programming help site (*Japanese*)
- Claus Cyrny's PNG summary and tips (*German*)
- André-John Mas' proposal for a PNG-based portable icon format, PICO
- Soren Andersen's PNG tech stuff: browser auto-detection using Server-Side Includes, JavaScript, and a Perl/CGI hack to work around servers with broken MIME types
- Michael Lovitt's *Cross-Browser Variable Opacity with PNG: A Real Solution* on **A List Apart**, which discusses both JavaScript browser-detection methods and Microsoft's proprietary DirectX CSS extension to support PNG alpha and which has much followup discussion in the multipage forum ([2], [3], [4]), including links to Michael's CSS/non-JavaScript PNG alpha test page, Eddie Traversa's PNG Switcher, Erik Arvidsson's PNG Behavior page, Aaron "youngpup" Boodman's Sleight, Chris Ross-Gill's pngfix JavaScript, and Dennis Cheung's PNG HTC. See also Sean Foy's **PNGHack** on the toolkits page for a server-side means of providing MSIE with the proprietary DirectX extension code while serving standard HTML to all other browsers, Bob Osola's slick drop-in JavaScript approach (client-side), Ranjan's "pure" CSS solution, Dean Edwards' general CSS-fixup code (CSS plus JavaScript, correcting many MSIE compliance

bugs), and Justin Koivisto's server-side PHP auto-rewrite solution (which uses browser detection to rewrite only pages going to MSIE browsers). Jorge Nerín wrote up a very good (albeit slightly profane) summary, which is also available in its native Español.

- Yasunori Kondoh's PNG pages (includes Japanese translations of the PNG 1.0 and 1.2 specs and other PNG-related pages)
- Kerry Watson's PNG overview, including compression comparisons, three mini-reviews of Windows programs with PNG support, and lots of well-presented information
- Stephan T. Lavavej's Introduction to PNG, including a nice demonstration of interpolated display of interlaced PNGs (both bilinear and bicubic methods)
- Bill Bither's Benefits of the PNG Image Format page, including some nice alpha-transparency samples
- The PNG for Web site, including a nice comparison of image types and how web browsers handle them (*Japanese*; English translation)
- PNG/GIF/JPEG Analyzer (*Japanese*)
- Lasse "Tronic" Kärkkäinen's Web image formats page
- About.com (The Mining Company)'s PNG format and PNG graphic design pages
- Theo Pavlidis's pack4png Lossy Preprocessor for PNG (paper)
- Joel Janser's PNG alpha-transparency info site (*German*)

- Japanese gamma correction page
- HP/Microsoft sRGB Proposal (5 November 1996)
- IEC's Colour Measurement and Management in Multimedia Systems and Equipment (related to sRGB standardization; see in particular the PDF document entitled *4WD 61966-2-1: Part 2-1 Default RGB colour space - sRGB* of 28 May 1998)
- Color Profiles for CSS3 (W3C Working Draft to support ICC color profiles in Cascading Style Sheets, level 3)

- Image Processing Tools CD-ROM from Network Cybernetics Corporation
- Will Day's collection of GIF and LZW information and resources
- Victor Engel's Netscape color cube page (useful for choosing an image palette that won't be dithered when viewed with Netscape)

PNG is well suited to comic art, particularly the completely computer-rendered kind (as opposed to hand-drawn and later scanned), and a number of web comics are now available in PNG format, either exclusively or as one option. Most of those listed below were shamelessly borrowed from Christopher Wright's list of PNG comic strips:

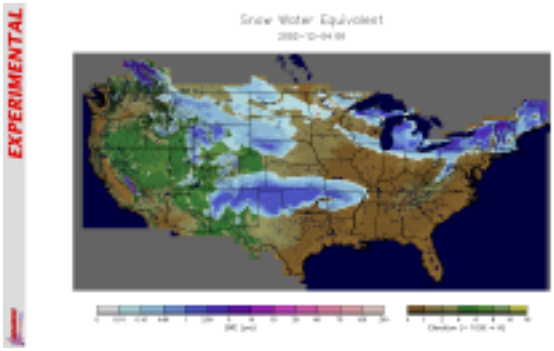
- John Allison's Bobbins

- Rudi Gunther's Deathworld
- R Stevens' diesel sweeties
- Mike Leffel's Fat Jesus
- Drake Emko and Jen Brodzik's Hackles (see also their "PNG Tips for Cartoonists")
- Christopher "Ubersoft" Wright's Help Desk
- Russ Williams' Ko Fight Club
- Scott and Amanda Kuehner's Look What I Brought Home
- Curtis Berry's Life at Bayside
- j. myers' Mr. Chuck Show
- Aaron Farber's Pentasmal
- Shawn McDonald's The Perfect Villain ("It's evil with a lowercase e.")
- Reinder Dijkhuis's Rogues of Clwyd-Rhan
- Greg Dean's Real Life
- Howard Tayler's Schlock Mercenary
- lx's TUX: Term Unix X
- Jeffrey J. Rowland's When I Grow Up
- "Pumpkin's" Web Comic site (*Japanese*) (uses PNG drawings and MNG animations)

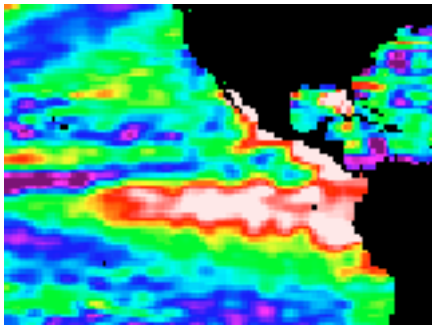
And here are some third-party web sites that have switched to PNG, in whole or in part. (This is by no means an exhaustive list, of course.)

- World Wide Web Consortium site (uses content negotiation to send PNGs only to browsers that can display them)
- Stefan Schneider's site (home of LatinByrd)
- Anja Drewitz's physics and photos pages (*German*)
- Mathew R. Ignash's Shrak, Dig Dug, Legend of Zelda and High Noon games pages
- Amiga News Network site
- NES Guru site
- Darren Salt's Pages with No Name
- Zed Too site
- (lantic) site
- Diana Todd's free Paint Shop Pro tubes site
- linuxpower.org's Enlightenment-CVS preview page
- Eldritch Press home page
- Bill Garrett's home page
- Hendrik Thole's home page and PNG-World site (*German*)
- Jason Summers' home page

- Transit Rider site
- Aplicaciones en Anatomía Patológica site
- Lee Skinner's Truecolor Fractals
- Gerhard Wesp's Truecolor Fractals (full-resolution versions)
- Karl-Heinz Zeller's Linux home page
- Collège Varsovie home page (*French*)
- Nairolf.Net site
- Burn All GIFs site



- James S. Huggins' Burn All GIFs, software patents and IPR site
- Enno Rehling's Burn All GIFs site
- Rick Matthews' JPG vs. GIF and How bad is JPG? pages
- Gerard Juyn's Triple-T site (home of **MNGeye**)
- BarnStormer Software site
- US National Weather Service's NOHRSC Experimental Snow Model maps
- NASA's Ocean ESIP Web Mapping Testbed (request PNGs by changing FORMAT substring to "FORMAT=png"; example: Pacific Ocean surface height on 1 August 1997 (during a major El Niño) in PNG format [14k] or GIF format [70k])



- FSU/TALUG Linux/PPP setup page
- GNOME AbiWord screenshots page
- Moody Motifs Christmas Garlands page
- Drama Net Club page
- Somekool's home page
- Ed McNierney's TopoZone map site ("17,335,561 PNG images and more on the way")
- S.T.L.'s GIMPS Banner Gallery (for the Great Internet Mersenne Prime Search)
- FairBanner site
- Mediascape's Artstream site
- Web3D Consortium's Universal Media site, PNG version
- SourceForge site
- GNOME site

- Konqueror site
- Puzzlemaker / Discovery Channel mazes
- Chocopuu site
- IBM's Linux Technology Center
- Panic's Audion faces page "uses PNGs with full transparency and DOM-driven DHTML that allows you to drag the images around on the website." (This feature works with at least Mozilla/Netscape 6.x and Mac MSIE 5.x [requires JavaScript to be enabled], and the alpha PNGs are ***really*** **nicely done**. Unfortunately, all of the images on subsequent pages are standard JPEGs. Thanks to Jeffrey Zeldman for the pointer, and thanks to Jeremy Bailey for the use of his "Link" design at right.)
- PhotoSelect site
- Web Colors site
- dioXaz's Sonic Discovery Resource (*French*)
- Yahoo! Finance stock charts (e.g., Dow Jones Industrial Average, 1-day view)
- Netcraft's Uptime Survey (e.g., lwn.net)
- Rich Franzen's PseudoGrey page
- Open Clip Art Project
- Ars Technica
- Matthias Mauch's MultiOS Browser Test (screenshots)
- Nikla Cci's Evoluption Mouse site
- Cor's ampsig site

The official PNG ftp site is hosted by Simple Systems in Texas, courtesy of Bob Friesenhahn. UUNET Technologies in Virginia (USA) is the host of the primary mirror of the original PNG ftp site, now deceased. (They are also host of the official Independent JPEG Group ftp site, by the way, and TIFF information is available there as well.) And the UK Mirror Service (formerly HENSA, the Higher Education National Software Archive) also has a mirror of the original PNG ftp site.

Here are some other PNG-related resources at this site:

- Introduction to PNG features
- Current Status of PNG
- History of PNG
- News (and more history) of the PNG Development Group

- PNG Technical Documentation
- *PNG: The Definitive Guide* and Related Books
- PNG-supporting Applications
- PNG Programming Information:
  - PNG-supporting Libraries and Toolkits
    - **libpng** home page
    - **zlib** home page
  - PNG Source Code
- PNG Images:
  - Willem's Test Suite of PNG Icons
  - PNG VRML Texture Suite in 2D
  - Ray-traced PNG Interlacing Demo
  - Miscellaneous Transparent Images using IMG Tags (also using OBJECT Tags)
  - Miscellaneous 32-bit RGBA PNGs
  - Browser Gamma- and Color-Correction Consistency Tests
- PNG home page
- MNG home page

Last modified 30 April 2006.

PNG Documentation

Herein lie links to various versions of the **PNG specification**; the closely related **MNG**, **JNG**, **zlib** and **deflate** specifications; the PNG reference library, **libpng**; the **ISO 8859-1** (``Latin-1'') character set used in PNG and MNG's old-style text chunks; and the complete online text of ***PNG: The Definitive Guide***.

Specifications

- PNG Specification (versions 1.0 through 1.2 and ISO/IEC/W3C), Extensions, and Register:
  - US (California) or local mirror site
  - US (Texas)
  - Netherlands
  - UK
  - France
  - Denmark
  - Russia

- MNG and JNG Specifications:
  - US (California)
  - US (Texas)
  - UK
  - France
  - Denmark
  - Russia

- zlib and Deflate Specifications:
  - France (Courbevoie)
  - France (Paris)

The libpng source distribution contains full documentation in plain text format, but the HTML translations by Deron Meranda (1.2.5) and Nicolas Roussel (1.0.3) may be browsed more conveniently online.

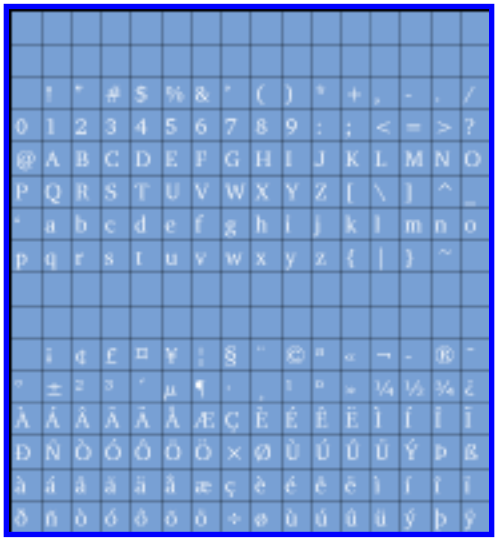
libpng Documentation

- libpng 1.2.5:
- US (California) or local mirror site (also via ftp)
- UK

- libpng 1.0.3:
- US (California) or local mirror site (also via ftp)
- UK

The ISO 8859-1 character set (also known as ``Latin-1'') is used by both PNG and MNG.

ISO 8859-1 Character Set



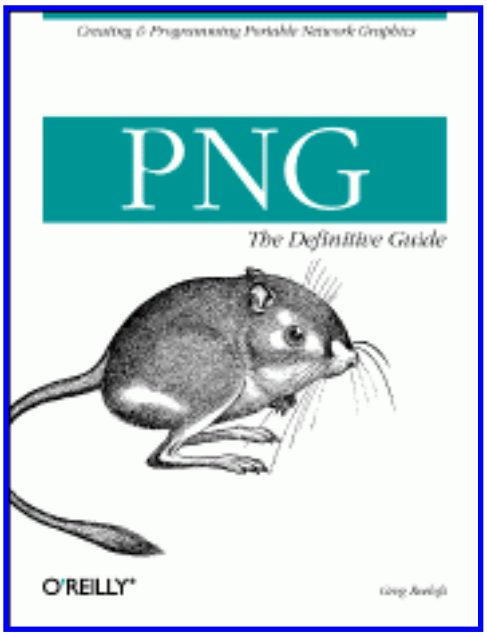
- Plain text:
- US (Texas)
- US (Texas)
- US (Virginia)
- UK

- PNG image (721 x 785; 8179 bytes):
- US (California) or local mirror site (also via ftp)
- US (Texas)
- US (Texas)
- US (Virginia)
- UK

- JPEG image (721 x 785; 52937 bytes):
- US (California) or local mirror site (also via ftp)
- US (Texas)
- US (Texas)
- US (Virginia)
- UK

The parts of the PNG book that describe application support are now rather dated (circa 1998-1999), but the information about PNG itself and about programming with libpng is still quite relevant. The complete text is available under the GNU Free Documentation License. (Thanks to O'Reilly and Associates for agreeing to relicense it.)

PNG: The Definitive Guide



- HTML format, multi-page:
- US (California) or local mirror site
- US (Texas)
- Netherlands
- UK
- France
- Denmark
- Russia

- HTML format, multi-page, downloadable zip archive:
- SourceForge mirrors (updates?)

- Associated material:
- Source code to demo programs
- Errata list
- Author's notes and timeline

Here are some related PNG pages at this site:

- Introduction to PNG features
- Current Status of PNG
- History of PNG
- News (and more history) of the PNG Development Group
- Related Specifications and Documentation:
  - zlib Technical Documentation
  - MNG Technical Documentation

- *PNG: The Definitive Guide* and Related Books
- PNG-supporting Applications
- PNG Programming Information:
  - PNG-supporting Libraries and Toolkits
    - **libpng** home page
    - **zlib** home page
  - PNG Source Code

- PNG Home Page
- **Complete PNG Site Map**

Last modified 12 July 2005.

Portable Network Graphics (PNG) Specification and Extensions

The original specification for PNG, **version 1.0**, was written by Thomas Boutell and Tom Lane, with contributions by many others. On 1 October 1996 it was released by the W3C as its first Recommendation, and on 15 January 1997 it was released by the IETF as RFC 2083.

Version 1.1 of the spec included a number of additions and significant technical clarifications:

- redefined gAMA to be in terms of the desired display output rather than the original scene, and revised all discussions of gamma and references to gamma accordingly
- added the iCCP, sPLT, and sRGB chunks
- extended the scope of the 31-bit limit on chunk lengths and image dimensions to apply to all four-byte unsigned integers, and disallowed the value -2^{31} (-2^31) in four-byte signed integers
- mentioned the possibility of dithering the alpha channel when converting it to binary transparency
- clarified that zlib window sizes smaller than 32K are valid
- updated the PNG web site URL and authors' email addresses
- performed non-technical editing and reformatting

(A complete list of the technical changes, in plain ASCII format, is also available.) The new sections were largely written by Adam Costello and Glenn Randers-Pehrson, and version 1.1 was released by the PNG Development Group on 31 December 1998.

On 9 February 1999 the iTXt chunk was approved for inclusion in the core specification. It was the sole technical change in **version 1.2** of the spec, which was edited by Glenn Randers-Pehrson and released by the PNG Development Group on 11 August 1999.

Most recently, a reformatted version with new figures and some small technical clarifications finally completed both the ISO/IEC standardization process and a second round of the W3C Recommendation process, some six or seven years(!) after it began the ISO process. On 10 November 2003 it was jointly released as **ISO/IEC 15948:2003** and the W3C's **PNG (Second Edition) Recommendation**. David A. Duce was the principal editor, with significant contributions from Adam Costello and figures by Chris Lilley.

Finally, in order to accommodate official, public extensions to the PNG spec (both chunks and text keywords), a separate **extensions document** is available. As an aid to keeping track of such extensions, a **register of PNG chunks and keywords** is available in the same location. It lists *all* public chunks and keywords, together with their dates of registration and the places where they are specified (either in the

core spec or in the extensions document).

All of the documents described above are available in multiple formats from their respective pages, summarized here in (mostly) chronological order:

- PNG Specification, version 1.0
- PNG Specification, version 1.1
- PNG Specification, version 1.2 (includes Gamma and Color tutorials)
- **PNG Specification, joint W3C and ISO/IEC version**
- **PNG Extensions and Register**

All PNG 1.x versions, including the joint ISO/IEC International Standard and W3C ``Second Edition,'' are backward and forward compatible. There are currently no plans for a ``PNG 2.0'' spec.

Here are some related PNG pages at this site:

- Introduction to PNG features
- Current Status of PNG
- History of PNG
- News (and more history) of the PNG Development Group
- Related Specifications and Documentation:
  - zlib Technical Documentation
  - PNG Technical Documentation
  - MNG Technical Documentation
- *PNG: The Definitive Guide* and Related Books
- PNG-supporting Applications
- PNG Programming Information:
  - PNG-supporting Libraries and Toolkits
    - **libpng** home page
    - **zlib** home page
  - PNG Source Code

- PNG Home Page
- **Complete PNG Site Map**

Last modified 3 January 2004 by newt@pobox.com , you betcha.

Specifications

The specifications for zlib and deflate were written by Peter Deutsch (Jean-loup co-authored the deflate spec), and Glenn Randers-Pehrson edited and submitted them to the Internet Engineering Task Force (IETF) as Internet Drafts. As of 22 May 1996, both have officially achieved RFC status. Variously formatted versions are available from many locations around the world, as is the related gzip specification (also written by Peter and also now an RFC).

- **zlib** specification, revision 3.3 (RFC 1950):

- HTML format:

- France
- US (Virginia)
- US (Texas)

- PDF format:

- France
- US (Virginia)
- US (Texas)
- IETF copy (US West)

- IETF copy (US Central)
- IETF copy (UK)
- IETF copy (Italy)
- IETF copy (South Africa)
- IETF copy (Australia)
- IETF copy (Japan)

- ASCII text:

- France
- US (Virginia)
- US (Texas)
- IETF copy (US West)
- IETF copy (US Central)
- IETF copy (Canada)
- IETF copy (UK)
- IETF copy (Italy)
- IETF copy (South Africa)
- IETF copy (Australia)
- IETF copy (Thailand)
- IETF copy (Japan)

- US letter-size PostScript:

- France
- US (Virginia)
- US (Texas)
- IETF copy (US West)
- IETF copy (US Central)
- IETF copy (UK)
- IETF copy (Italy)
- IETF copy (South Africa)
- IETF copy (Australia)
- IETF copy (Thailand)
- IETF copy (Japan)

- A4-size PostScript:

- France

- US (Virginia)
- US (Texas)

- **deflate** specification, revision 1.3 (RFC 1951):

- HTML format:

- France
- US (Virginia)
- US (Texas)

- PDF format:

- France
- US (Virginia)
- US (Texas)
- IETF copy (US West)
- IETF copy (US Central)
- IETF copy (UK)
- IETF copy (Italy)
- IETF copy (South Africa)
- IETF copy (Australia)
- IETF copy (Japan)

- ASCII text:

- France
- US (Virginia)
- US (Texas)
- IETF copy (US West)
- IETF copy (US Central)
- IETF copy (Canada)
- IETF copy (UK)
- IETF copy (Italy)
- IETF copy (South Africa)
- IETF copy (Australia)
- IETF copy (Thailand)

- IETF copy (Japan)

- US letter-size PostScript:

- France
- US (Virginia)
- US (Texas)
- IETF copy (US West)
- IETF copy (US Central)
- IETF copy (UK)
- IETF copy (Italy)
- IETF copy (South Africa)
- IETF copy (Australia)
- IETF copy (Thailand)
- IETF copy (Japan)

- A4-size PostScript:

- France
- US (Virginia)
- US (Texas)

- **gzip** specification, revision 4.3 (RFC 1952):

- HTML format:

- France
- US (Virginia)
- US (Texas)

- PDF format:

- France
- US (Virginia)
- US (Texas)
- IETF copy (US West)
- IETF copy (US Central)

- IETF copy (UK)
- IETF copy (Italy)
- IETF copy (South Africa)
- IETF copy (Australia)
- IETF copy (Japan)

- ASCII text:

- France
- US (Virginia)
- US (Texas)
- IETF copy (US West)
- IETF copy (US Central)
- IETF copy (Canada)
- IETF copy (UK)
- IETF copy (Italy)
- IETF copy (South Africa)
- IETF copy (Australia)
- IETF copy (Thailand)
- IETF copy (Japan)

- US letter-size PostScript:

- France
- US (Virginia)
- US (Texas)
- IETF copy (US West)
- IETF copy (US Central)
- IETF copy (UK)
- IETF copy (Italy)
- IETF copy (South Africa)
- IETF copy (Australia)
- IETF copy (Thailand)
- IETF copy (Japan)

- A4-size PostScript:

- France
- US (Virginia)

US (Texas)

Click here for an informal explanation of the deflate algorithm.
Click here to go to the PNG Documentation Page.
Click here to return to the zlib Home Page.

Last modified 13 April 2002

MNG Documentation

The specifications for MNG (**Multiple-image Network Graphics**), MNG-LC (low-complexity subset of MNG), MNG-VLC (very low-complexity subset), and JNG (**JPEG Network Graphics**, also a subset of MNG) were written by Glenn Randers-Pehrson, with contributions from various others. As of version 0.995, the spec was officially voted on and promoted to 1.0 status (effective 11 January 2001); it is considered to be a solid, stable specification. (See the MNG applications page for a list of supporting viewers, browsers, editors and programming libraries.)

The MNG spec itself is considered the definitive version; MNG-LC, MNG-VLC and JNG are all derived from the main document and are provided for the convenience of implementors. One possible implementation path to the full specification would be to start with MNG-VLC (which is defined not to include JNG support), then upgrade to MNG-LC, then add JNG support, and finally fill out the remaining features in the full MNG specification. Note that MNG-VLC is not necessarily very interesting to content-creators, but it does allow for transparency support.

Also note that, in addition to the technical documentation below, MNG is described in Chapter 12 of *PNG: The Definitive Guide*. If the links below don't work, check here or here for a more recent copy of the spec. (At this time, there is no separate extensions document comparable to that for PNG.)

MNG specification, version 1.0 (``Draft 80'')

- HTML format:
- US (California) or local mirror site (also in HTML 2.0 format)
- US (Texas)
- UK
- France

- ASCII text:
- US (California) or local mirror site
- US (Texas)
- UK
- France

- US letter-size PostScript:
- US (California) or local mirror site
- US (Texas)

- UK
- France

- Portable Document Format (PDF):
- US (California) or local mirror site
- US (Texas)
- UK
- France

MNG-LC specification, version 1.0 (extract from MNG spec)

- HTML format:
- US (California) or local mirror site (also in HTML 2.0 format)
- US (Texas)
- UK
- France

- ASCII text:
- US (California) or local mirror site
- US (Texas)
- UK
- France
- Japan (**Japanese translation of version 0.97**)

- US letter-size PostScript:
- US (California) or local mirror site
- US (Texas)
- UK
- France

- Portable Document Format (PDF):
- US (California) or local mirror site
- US (Texas)
- UK
- France

MNG-VLC specification, version 1.0 (extract from MNG spec)

- HTML format:
  - US (California) or local mirror site (also in HTML 2.0 format)
  - US (Texas)
  - UK
  - France
- ASCII text:
  - US (California) or local mirror site
  - US (Texas)
  - UK
  - France
- US letter-size PostScript:
  - US (California) or local mirror site
  - US (Texas)
  - UK
  - France
- Portable Document Format (PDF):
  - US (California) or local mirror site
  - US (Texas)
  - UK
  - France

JNG specification, version 1.0 (extract from MNG spec)

- HTML format:
  - US (California) or local mirror site (also in HTML 2.0 format)
  - US (Texas)
  - UK

- France

- ASCII text:
- US (California) or local mirror site
- US (Texas)
- UK
- France

- US letter-size PostScript:
- US (California) or local mirror site
- US (Texas)
- UK
- France

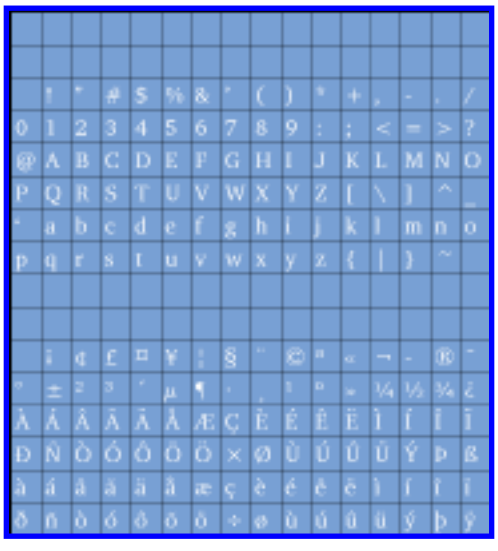
- Portable Document Format (PDF):
- US (California) or local mirror site
- US (Texas)
- UK
- France

The ISO 8859-1 character set (also known as ``Latin-1'') is used by both PNG and MNG.

ISO 8859-1 character set

- Plain text:
- US (California)
- US (Texas)
- US (Virginia)
- UK
- France

- PNG image (721 x 785; 8179 bytes):
- US (California)
- US (Texas)
- US (Virginia)
- UK



- France

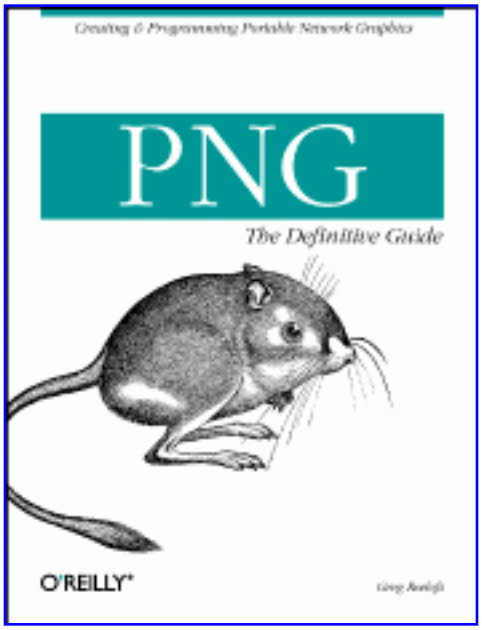
- JPEG image (721 x 785; 52937 bytes):
- US (California)
- US (Texas)
- US (Virginia)
- UK
- France

PNG documentation has its own web page.

Here are the other MNG-related resources at this site:

- News (and more history) of the MNG developers
  - MNG news items from 2001
  - MNG news items from 2000
  - MNG news items from 1999
  - MNG news items from 1998
  - MNG news items from 1997
  - MNG news items from 1996
- MNG-supporting Applications
- MNG and JNG Images
- Links to Other MNG Resources
- MNG home page
- PNG home page

Last modified 12 June 2005.



PNG: The Definitive Guide

ISBN 1-56592-542-4
Softcover
344 pages
$34.95
June 1999

(Out of print as of October 2001, alas.)
(Released online as of July 2003!) DOWNLOAD

By golly, a whole book devoted to PNG!

Indeed, ***PNG: The Definitive Guide*** is for real; Greg received his first copy on 24 June 1999. The book is 344 pages (352 if you count the catalog info in the back), plus four pages of really cool color plates, and the publisher is O'Reilly and Associates. (The cover animal originally was to be a "pnguin," but Tim O'Reilly declared that they're reserved for Linux books. Argh, *so close*...)

The book is divided into three main parts and is targetted at both designers and programmers. Part I, *Using PNG*, consists of six chapters and covers the main categories of PNG-supporting applications: image editors, viewers, converters, web browsers and servers, and 3D apps. Chapter 1 also provides a basic overview of image types and properties.

Part II, *The Design of PNG*, also consists of six chapters and looks in more detail at PNG as a file format. It covers not only PNG's fundamental chunk structure and compression technology but also its history, its animated cousin MNG, and some of the intricacies of cross-platform gamma and color correction.

Part III, *Programming with PNG* (four chapters), steps the reader through the design of three functional demo programs based on the free libpng C library: **rpng**, a very simple PNG viewer; **rpng2**, a progressive PNG viewer such as might be found in a web browser; and **wpng**, a basic program to convert RGB image data from binary PBMPLUS / NetPBM format into PNG format. The final chapter in this section lists a number of other PNG-supporting programming toolkits for various languages, including C, C++, Java, Perl, Python, tcl/tk, and Visual Basic.

Here's a quick directory to more detailed information on ***PNG: The Definitive Guide***:

- Detailed table of contents (now superseded by the online HTML edition)
- Source code
- Errata list
- Author's notes and a timeline
- Download complete text (HTML format)

Publisher and bookstore pages:

- **O'Reilly**
- **Amazon**
- **Barnes and Noble**
- **FatBrain** (formerly **Computer Literacy**)
- **Powell's** (still has new copies)

Reviews:

- **Dr. Dobb's Electronic Review of Computer Books**, August 1999 (Lou Grinzo)
- **Linux Journal**, January 2000 (Michael J. Hammel)

Related Books

Though ***PNG: The Definitive Guide*** is the only book devoted *solely* to PNG (to Greg's knowledge, anyway), a number of other books cover it in one or more chapters. Here are some of them.

Data Compression: The Complete Reference, 3rd Edition - David Salomon (March 2004)

Salomon added a four-page section on PNG in the third edition of his 900-page overview of compression techniques. The author's web site includes an additional 200 pages of freely downloadable auxiliary material (appendices) that were removed from this edition, as well as some other add-ons.

Lossless Compression Handbook - Khalid Sayood, ed. (December 2002)

This is a more academically oriented collection that covers lossless compression techniques from "generic data" to images to audio. Greg wrote the chapter on PNG image compression; it goes into considerably more technical detail than does the corresponding chapter in ***PNG: TDG***.

Designing CSS Web Pages - Christopher Schmitt (September 2002)

As the title suggests, the focus of Schmitt's book is on Cascading Style Sheets. However, the

author also covers a number of image formats, including PNG and SVG in one chapter.

Compressed Image File Formats: JPEG, PNG, GIF, XBM, BMP - John Miano (July 1999)

Miano's book is oriented toward programmers who want to write not only programs that support various image formats but also the underlying image decoders. His PNG codec is one of the few independent implementations outside of libpng; C++ source code is available from the book's web page.

Java 2D Graphics - Jonathan Knudsen (May 1999)

Knudsen's book is a higher-level programming text that covers numerous image-related concepts supported by the Java 2D API. Chapter 11 includes a section on how to write a PNG decoder.

Perl Graphics Programming - Shawn P. Wallace (December 2002)

Wallace's book is also a higher-level programming guide; while it does include a simple Perl module that can parse and check the CRCs of PNG chunks, it is primarily geared toward the use of existing libraries (such as libpng, zlib and ImageMagick) from various scripting languages, especially in the context of CGI (server-based) programming. This is basically the second edition of ***Programming Web Graphics with Perl and GNU Software*** (February 1999).

Web Design in a Nutshell - Jennifer Niederst (November 1998, September 2001)

Niederst's book lies on the other end of the spectrum; her PNG chapter is oriented toward web designers who want to know the basic features of PNG and a few of the browsers and applications that support it. The second edition, published in 2001, contains updated PNG information. (Jennifer is also the person who put Greg up to writing ***PNG: TDG***.)

Encyclopedia of Graphics File Formats, 2nd Edition - James D. Murray, William vanRyper (May 1996)

This 1100-page tome is a classic. Its PNG section is a good, readable summary of the main points of version 1.0 of the PNG specification, including one or two paragraphs on each of the PNG chunks that were defined at the time. In addition, both the spec and a (very old) version of libpng are included on the accompanying CD-ROM.

Windows and OS/2 Bitmapped Graphics - Steve Rimmer (July 1996)

Rimmer's book includes a CD-ROM with 16-bit and 32-bit Windows DLLs (and presumably OS/2 DLLs as well) for a number of image formats, including PNG. It is reported to work fine with Delphi, at least as of mid-1998. (This is the second edition; the first appears to have been published in January 1993--two years before PNG existed--with the title, ***Windows Bitmapped Graphics***.)

Here are some related PNG pages at this site:

-  Introduction to PNG features
-  Current Status of PNG
-  History of PNG
-  News (and more history) of the PNG Development Group
-  PNG Technical Documentation
  - zlib Technical Documentation
  - MNG Technical Documentation
-  PNG-supporting Applications
-  PNG Programming Information:
  - PNG-supporting Libraries and Toolkits
    - **libpng** home page
    - **zlib** home page
  - PNG Source Code

-  PNG Home Page
-  **Complete PNG Site Map**

Last modified 23 July 2006.

Browsers with PNG Support

The Web, of course, was one of the main targets for PNG support since progressive display is so important to those browsing over a low-speed link (like Greg, at the time). GIF's interlacing scheme isn't very good, and JPEG's progressive mode was still catching on; PNG's seven-pass, two-dimensional scheme was designed to fill this gap. Likewise, PNG's alpha-channel support (including "RGBA palette" mode) and support for automatic gamma correction are particularly useful on the Web--at least where supported by browsers. This page lists standard 2D browsers; see the appropriate pages for listings of VRML browsers and other 3D applications.

Here are quick links to the browser section on the PNG Status page and to the "Big Two" browsers on this one:

- Status of PNG Support in Browsers

- **Microsoft Internet Explorer** for Mac OS and for Windows (and formerly Unix)
- **Netscape Navigator** (and **Mozilla/Firefox/etc.**)

As with the other applications pages, links to home WWW sites or to downloadable versions are provided where known, but if a link is broken, check the location and see if an updated version is available (and please tell Greg!). Relevant operating systems or platforms are printed in (*parenthesized italics*). If the browser or plug-in includes HTML-editing capabilities that extend to converting or modifying images on the page, it is noted as "read/write" support.

These are listed alphabetically, more or less:

- **1X** [Science Traveller International] (*Win32*) - all versions; read-only; no transparency support as of version 0.12b; reportedly broken OBJECT support; may require ActiveX for all features.

- **Act** [Jan Verhoeven] (*Windows 9x/ME*) - version 5a (reportedly completely broken in versions 6-9); read-only; freeware.

- **AIR Mosaic** - see **SPRYNET Mosaic** below

- **Amaya** [W3C] (*Unix/X*, *Win32*) - all versions; read-only; broken, binary transparency in "normal" versions (colormapped images only; color-based rather than palette-index-based); alpha support in OpenGL versions for Windows (but no support for background images, only solid

colors); partially broken gamma support; good OBJECT support; reportedly poor dithering in 8-bit modes; freeware with source. (This is the W3C's testbed web client for new HTML, CSS, XML, and MathML features. It has both browsing and authoring [editing] capabilities, and it can create client-side image maps on inline PNGs.)

- **AMosaic** [AMosaic development team] (*Amiga*) - any version via a PNG DataType (see the miscellaneous apps page for a couple); read-only; requires MUI; freeware with source. (**This product has been discontinued.** Version 2.0, released in July 1995, apparently was the final release; the team then went on to create **IBrowse**, below.)

- **aMozillaX** [Free Amiga Organization] (*Amiga 68k/PPC*) - all versions; read-only. (**This product has been discontinued.**)

- **ANT Fresco** [ANT] (*RISC OS, others*) - all versions; read-only; binary transparency only; commercial. (This was the browser originally chosen for Oracle's Network Computer in early 1996. As of March 1999, ArgoNet had taken over sales and support of ANT software for RISC OS, but they themselves were subsequently bought out by Freedom2, and that arrangement appears to have ended. As of late 2001, ANT is once again selling Fresco, but this time to the embedded market--set-top box manufacturers, PDA makers, etc. Linux- and Windows-based demo versions are supposedly available upon request.)

- **AOL Browser** - see **Internet Explorer** below

- **Arachne** [Arachne Labs] (*DOS/386, Linux/SVGA, Linux/GGI*) - version 1.07(?) and later; read-only; no transparency support; shareware (freeware for non-commercial use). (PNG is not supported in the DOS version "on computers which are not compatible with i386"; the `16bit.apm` downgrade disables PNG support entirely. Linux versions require **ImageMagick convert** or possibly **png2bmp**.)

- **ArcWeb** [Stewart Brodie] (*RISC OS*) - version 1.70 and later; read-only

- **Arena** [W3C, Yggdrasil et al.] (*Unix/X*) - version 0.98b and later; read-only; **full alpha support** (except uses its own "sandy" background pattern; screenshots); full gamma support; full 16/48-bit PNG image support; progressive display of pages but not of individual images; freeware with source. (As of beta-3b, W3C development ceased in favor of **Amaya**, above; an Internet-based development team hosted at Yggdrasil's site took over. But that effort appears to have died, too, as of March 1998; a final, minimally changed version 0.3.62 was released in November 1998. PNG support is [partly?] broken in version 0.3.07 and later, but beta-3b is still available.)

- **Ariadna** [AMSD] (*Win32*) - version 1.2 and later; read-only. (NT/Alpha and Russian versions

also available.)

- **AWeb** [Yvon Rozijn] (*Amiga*) - any version via a PNG DataType (see the miscellaneous apps page for several), but better and faster support via the AWebPNG plug-in (progressive display, gamma correction, transparency and 24-bit support; 40k; included with AWeb 3.2 and later); read-only; does *not* require MUI; freeware (APL) with C source (CVS) as of 8 June 2002. Note that the AWebPNG plug-in was the third most popular Amiga download during March 1998--outstanding! (Click here if link breaks.)

- **Blazer** [Palm] (*Palm OS*) - version 4.0(?) and later; read-only; binary transparency with bad threshold (all non-opaque pixels treated as fully transparent); no gamma support; commercial. (This is the web browser that comes with the Treo 650, Tungsten, and Zira PDAs.)

- **Browse** [Acorn] (*RISC OS*) - all versions; read-only; **full alpha support** in version 1.25 and later (including RGBA backgrounds, blended with BGCOLOR); full gamma support; progressive display of interlaced images; commercial. (**This product has been discontinued.** Alas, Acorn officially died in June 1999, taking with it this greatest of all PNG-supporting browsers. Half of the company was bought by Pace Micro--along with the rights to Browse, apparently--and the remainder reformed as Element14, which has no web site as of early 2000.)

- **BrowseX** [Browsex Systems] (*Unix/X, Win32*) - all versions; read-only; binary transparency (only for completely transparent pixels); no gamma support; no progressive display; uses **Img**, **libpng** and **zlib**; freeware (Artistic) with source. (This is a Tcl/Tk-based browser with some handy features. As of October 2000, it's still in beta and occasionally crashes on pages with lots of images.)

- **CAB** [Application Systems Heidelberg] (*Atari TOS*) - version 2.8 and later; read-only; commercial. (This is a German browser, but all resources are also available in English and French as separate downloads.)

- **Chimera** [John Kilburg] (*Unix/X*) - any version? via external decoders (but images appear inlined); read-only; progressive display in 2.0 and later; freeware with source. (See Roman Czyborra's sample configuration for an example of how to set this up, especially the *convert* and *mailcap* files.)

- **Closure** [Gilbert Baumann] (*Unix/X*) - all versions; read-only; freeware (GPL) with source. (This is a web browser written entirely in Common Lisp [the Allegro variant is preferred], including a basic PNG decoder [`src/renderer/png-images.lisp`] and zlib/inflate implementation [`src/net/deflate.lisp`]. It appears to have died quietly in June 1999, however. Note that the home page does not link to the latest source code; see this directory for newer code.)

- **Communicator** - see **Netscape Navigator** below

- **CSCMail** [Steven "Count Zero" Kordik] (*Unix/GTK+*) - all versions; read-only; **full alpha support** (screenshots); requires **CscHTML**, **libpng** and **zlib**; freeware (GPL) with source. (This is an e-mail client written in Perl that has full HTML-viewing capability--in fact, it includes a simple web browser. See the toolkits page for details on the CscHTML widget.)

- **Device Mosaic** [OpenTV / Spyglass] (*Win32, VxWorks, Linux, OS-9000, pSOS, WinCE, EPOC, QNX, LynxOS*) - version 5.0 and later; read-only; binary transparency support (full alpha support coming ~Autumn 2002); no gamma support; no progressive display of interlacing; uses **libpng** and **zlib**; commercial.

- **Dillo** [Jorge Arellano Cid, Sebastian Geerken, Luca Rota, and others] (*Unix/GTK+*) - version 0.0.4 and later; read-only; full alpha support (except no support for background images as of version 0.8.1; 0.6.2 screenshots); full gamma support; freeware (GPL) with source.

- **Encompass** [Rodney Dawes] (*Unix/GNOME*) - all versions? read/write; no transparency support? uses **gdk-pixbuf**, **libpng** and **zlib**; freeware (GPL) with source. (Encompass can save images in PNG and JPEG format [possibly screenshots] as well as read them as part of a web page.)

- **Enhanced Mosaic** - see **Spyglass Mosaic** below

- **Epiphany** [Epiphany Developers] (*Unix/GNOME*) - all versions; read-only; **full alpha support** (presumably); freeware (GPL) with source. (Like **Galeon**, this browser is based on the the **Mozilla** rendering engine, a.k.a. Gecko, and requires both Mozilla and the GNOME environment to be installed in order to run. It is intended to have a quick, simple user interface and to conform to the GNOME accessibility guidelines [HIG].)

- **Firebird** - see **Mozilla** below

- **Firefox** - see **Mozilla** below

- **Flash 4 Player** [Macromedia] (*Win32, Mac PPC*) - version 4.0 beta 1 and later; read-only. (This is generally used as a plug-in for **Navigator** or **Internet Explorer**, but it may include stand-alone capabilities as well. Once 4.0 is officially released, the Linux, Solaris and Java versions will presumably be included, too. Note that PNG images are supported within Flash 4, but it is not clear that this plug-in can view PNGs outside of Flash 4 animations.)

- **Galeon** [Galeon Authors] (*Unix/GNOME*) - all versions; read-only; **full alpha support**

(presumably); freeware (GPL) with source. (Galeon actually uses the **Mozilla** rendering engine, a.k.a. Gecko, and requires both Mozilla and the GNOME environment to be installed in order to run.)

- **Grail** [Corporation for National Research Initiatives] (*Unix/X, Win32, Mac 68k/PPC*) - version 0.3b3 and later via the Python Imaging Library (PIL); read-only; freeware with source. (0.3b2 also supports PNG via a simple patch from Andre Derrick Balsa. **CNRI ceased development on Grail as of version 0.6, released 1 April 1999.**)

- **HTMLayout browse.exe** [Terra Informatica] (*Win32*) - all versions; read-only; **full alpha support**; uses **libpng** and **zlib**; commercial (freeware demo browser). (This is a freely downloadable sample application to demonstrate the commercial HTMLayout DLL, a lightweight HTML/CSS rendering component with no dependencies on other browsers or browser components. PNG is supported for both foreground and background images, including with alpha-transparency.)

- **IBrowse** [HiSOFT Systems] (*Amiga*) - version 1.2 and later natively, or any previous version via a PNG DataType (see the miscellaneous apps page for a couple); read-only; full alpha support? progressive display; requires MUI 3.8 or later; uses **libpng** and **zlib**; commercial.

- **iCab** [Alexander Clauss / iCab] (*Mac 68k/PPC*) - all versions? read-only; **full alpha support** in version 1.8 beta and later (screenshots); no gamma support; no progressive display; commercial (beta version is freely downloadable).

- **ICEbrowser** [ICEsoft] (*Java*) - version 5.0(?) and later; read-only; reportedly full alpha support; no gamma support; commercial. (This probably requires Java 2 SDK 1.3 for its PNG support. Prior to 2002, it was known as **ICE Browser** and was available separately; now it is a component within larger products.)

- **Internet Explorer** [Microsoft] (*Mac PPC, Mac OS X*) - version 5.0 and later; read-only; **full alpha support** (screenshots), though broken for tiled page- and table-background images smaller than 64x64 (switches to binary transparency for performance reasons [should be fixed in one of next two versions]; can work around bug by manually tiling image to be larger than 64 pixels in at least one dimension); gamma support, including sRGB, but inconsistent with HTML and CSS colors and unlabelled PNG and GIF images; reportedly ICC profile support (old version only?); progressive display of interlaced images (replicating method); broken default handling on OS X for standalone PNGs (versions 5.1 and 5.2 save to disk rather than view due to **QuickTime** bogosity; see Matthew Rothenberg's Mac OS X Hint for simple fix); uses **libpng** and **zlib**; freeware. (Note that AOL 5.0 is apparently built on MSIE 4.5 or earlier, so it has no PNG support at all. No word on later versions.)

- **Internet Explorer** [Microsoft] (*Win32*) - version 4.0b1 and later; read-only; **full alpha support** as of version 7.0b1 (screenshots), but broken alpha support in earlier versions;[1] inconsistent/ broken gamma support;[2] no ICC-profile (iCCP) support; no color-correction support; progressive display of interlaced images (replicating method); broken OBJECT support in version 4.x;[3] MNG support via Jason Summers' MNG4IE ActiveX control; version 4.0 crashes on large PNG chunks;[4] version 5.0 prints palette images with black (or dark gray) backgrounds under Win98, sometimes with radically altered colors;[5] fails to display PNG images used as CSS backgrounds;[6] fails to display PNG images of 4097 or 4098 bytes in size; sometimes completely loses ability to display PNGs (**see FAQ page for various fixes**); freeware. (Note that Microsoft claims version 4.0 "does not include the functionality to view .png files," which presumably refers to its inability to display standalone PNGs;[7] this is partly fixed in 5.0.[8] Note also that the Windows 3.x version of IE has no PNG support at all, but the IE-based AOL browser for Windows does, at least from version 4.0 onward. Both the **AOL Browser** and the **MSN Browser** are IE-based and share the same features and bugs. IE versions 4.01 and 5.0 were briefly available for Solaris/SPARC and HP-UX/PA-RISC, as well.) **Bugs and other feedback can be reported on the Microsoft product feedback page (which doesn't appear to require any personal information beyond an e-mail address).**
    1. simple transparency only, with bad threshold for transparency vs. opacity, and only for palette images; completely fails to render some transparent palette images (e.g., bottom four here), apparently due to nearly-but-not-quite-opaque alpha values; non-palette images are rendered fully opaque against a light gray background; 32-bit alpha transparency (but not palette alpha) supported in versions 5.5 through 6.x if and only if HTML *content* is rewritten to use Microsoft-specific DirectX extensions to CSS *(See also this extended discussion, Bob Osola's JavaScript/ conditional comment solution, Sean Foy's PNGHack ASP.Net custom controls, Jorge Nerín's quick summary, Ranjan's "pure" CSS solution, Dean Edwards' general MSIE-CSS-fixup code (CSS + JavaScript), and Justin Koivisto's PHP auto-rewrite solution. Further caveats for DirectX approach: if the PNG image's width and height attributes are missing, the width and height of the placeholder image will be used instead; if the placeholder image is missing, the browser's stock "missing-image" icon will be placed over the PNG.)*
    2. handles PNGs with gAMA chunks differently (inconsistently) from HTML and CSS colors, from unlabelled images (GIFs or PNGs), and from PNGs with sRGB chunks (see 7.0b1 screenshots)--apparently uses display-system gamma of approximately 1.93 instead of 2.2 (i.e., colors appear slightly dark)
    3. only if "Run ActiveX controls and plug-ins" security preference enabled; adds unnecessary scrollbars; version 4.0 renders *all* OBJECTs in nested set, not just outermost
    4. especially those created with the "Save" function in Macromedia **Fireworks**--use "Export" for final PNGs
    5. reportedly fixed in version 5.5, and doesn't affect NT or Win2k
    6. as reported by a W3C member; another user reports that version 5.0 and later does support this
    7. i.e., those that are simply referenced via links or opened from disk--it can view ones that are inlined on an HTML page via IMG tags just fine, and a registry hack is reported to fix the standalone problem

8. i.e., it works on some systems but not on others, and it's not directly related to running NT vs. Windows 9x but may have something to do with other PNG-capable viewers being installed

- **Kazehakase** [Hiroyuki Ikezoe and others] (*Unix/GNOME*) - all versions; read-only; **full alpha support** (presumably); freeware (GPL) with source. (Like **Galeon** and **Epiphany**, Kazehakase is based on the **Mozilla** rendering engine, a.k.a. Gecko. Unlike them, it appears not to require Mozilla to be installed separately. Differentiating features include remote-bookmark support, "rich" bookmarks [i.e., with images and fragments of page text], and full-text search in history.)

- **K-Meleon** [K-Meleon Team] (*Win32*) - all versions; read-only; **full alpha support** (presumably); freeware (GPL) with source. (K-Meleon actually uses the **Mozilla** rendering engine, a.k.a. Gecko. Unlike **Epiphany** and **Galeon**, it does not require Mozilla to be separately installed.)

- **Konqueror** [KDE developers] (*Unix/KDE*) - all versions? read-only; only binary transparency prior to version 3.0; full 32-bit alpha support as of version 3.0; binary transparency for palette images in versions through 3.2.2; broken single-shade transparency support for 16-bit grayscale; **MNG** support when compiled with Qt 2.2.0 or later and libmng; **JNG** support as of 14 October 2003; freeware (GPL) with source. (This was originally a file manager, **kfm**, with integrated web-browsing capabilities, but it has since grown into a very fast and complete web browser and a components-based file viewer.)

- **Links** [Twibright Labs] (*Unix/X, Linux/SVGA, Linux/fbdev, OS/2, Win32/X, Atheos*) - version 2.0 and later; read-only; requires **libpng** and **zlib**; freeware (GPL) with source. (This was originally a text-mode browser similar to **Lynx**, but an optional GUI interface with PNG [and other image-format] support was added in version 2.0.)

- **MindWalker** - see **Voyager** below

- **mMosaic** [Dauphin Gilles / NCSA X Mosaic Team] (*Unix/X*) - all versions; read-only; uses **libpng** and **zlib**; PNG dithering is poor (libpng problem); no progressive display; no alpha support; no simple transparency support; no gamma support; fails on 13 valid PNGs on PngSuite page; freeware with source. (This is an enhanced version of **NCSA X Mosaic 2.7b4**, extended by Gilles to support tables; Java applets [via the free Java virtual machine Kaffe]; and the free Motif clone, Lesstif.)

- **Mosaic 95** - see **SPRYNET Mosaic** below

- **Mozilla** [mozilla.org, Netscape Communications] (*Unix/X, Win32, Mac OS, etc.*) - all versions; read-only; **full alpha support** on Linux and Mac since 13 April 2000 and on Windows since 19 July 2000 (Linux screenshots), but poorer quality on sub-24-bit X displays; broken binary

transparency support in versions between June and August 2001 (bug 84980); dithered alpha as a fallback option on all platforms; full gamma support; **MNG** and **JNG** support from 12 June 2000 through 23 March 2001 and from 17 December 2001 through 12 June 2003 (in CVS, anyway; 0.9.7 release of 21 December 2001 did *not* include fix, and all 1.4 releases *did* have support); progressive display (replicating method; limits image size to dimensions of 8000 pixels; uses **libpng** and **zlib**; freeware (NPL/MPL/GPL) with source. (This is the mostly-rewritten-from-scratch code base on which are based **Netscape Navigator 6.0** and later, **Epiphany**, **Galeon**, **K-Meleon**, **Kazehakase**, and **Phoenix** a.k.a. **Mozilla Firebird** a.k.a. **Mozilla Firefox**.)

- **MOZZAM** [Steffen] (*Amiga*) - all versions; read-only; coming.

- **NCSA MacMosaic** [NCSA MacMosaic Team] (*Mac OS*) - version 3.0A1 and later; read-only; gamma support in version 3.0B3 and later; optional progressive display of interlaced images (either sparse or replicating method, or none at all); alpha support slightly buggy; freeware with source. (**This product has been discontinued.**)

- **NCSA X Mosaic** [NCSA X Mosaic Team] (*Unix/X*) - version 2.7b1 and later; read-only; PNG dithering is poor (libpng problem); no progressive display; no alpha support; no simple transparency support; no gamma support; freeware with source. (**This product has been discontinued.**)

- **NetFront** [ACCESS] (*PocketPC*, *Linux*) - version 2.5(?) and later; **MNG** support as of version 3.0; uses **libpng** and **zlib**; read-only; commercial. (This is an embedded web browser for PDAs, 2.5G and 3G cell phones, and other "Internet appliances." PNG and MNG support appear to be optional features, at least for the cell-phone versions.)

- **Netkit** [Netsurfer] (*NeXTStep/OpenStep*) - all versions; read-only. (**This product has been discontinued.** Netkit was actually an object-oriented toolkit for *creating* custom browsers; it looked pretty cool.)

- **NetPositive** [Be] (*BeOS*) - version 2.1 and later (uses new PNG Translator in BeOS 4.5); read-only; **full alpha support** as of version 2.2 (screenshots); no gamma support; no progressive display; no support for PNGs as HTML background images; commercial.

- **Netscape Navigator** [Netscape Communications] (*Unix/X, Win32, Mac OS, OS/2*) - version 4.04 and later; progressive display (replicating method); **full alpha** and gamma support as of version 6.0PR2 (see **Mozilla** above) but no transparency or gamma support whatsoever in version 4.x; nearly complete **MNG** and **JNG** support in version 6.0 and later (see MNG apps page for limitations and bugs) and in older versions via Jason Summers' MNG plug-in; versions 4.04 through 4.76 treat black as transparent in opaque palette images with a background chunk (test)

and reportedly do even worse with 64-bit RGBA images; limits image size to linear dimensions of 8000 pixels; attempts to display invalid PNGs; versions 4.04 through 4.5 have a bug in their "Accept" headers (missing comma) that causes Microsoft Internet Information Server (IIS) and Oracle Application Server not to send static PNG images (images dynamically generated by CGI or ASP scripts apparently are not affected; bug is fixed in version 4.51 and later); uses **libpng** and **zlib**; freeware. (Versions 2.0 and later also support PNG via the plug-ins listed below, but note that Netscape plug-ins currently do *not* support true inlined images--they only support images inlined with Netscape's non-standard EMBED tag, which is not usable by most other browsers, or with HTML 4.0's OBJECT tag, as long as HEIGHT and WIDTH attributes are included in the tag. In any case, Netscape 4.x's OBJECT support is broken, too. Version 6.0, however, is based on **Mozilla**, which has excellent OBJECT, PNG and MNG support [at least until the latter was removed again].)

- **PNG plug-in** [Giorgio Costa] (*OS/2*) - all versions; read-only; no transparency support; progressive display (replicating method); uses **libpng** and **zlib**; 369k (beta only; also via ftp: US, Italy)

- **QuickTime PNG plug-in** [Apple] (*Win32, Mac OS*) - version 3.0 and later; read-only; full gamma support? no transparency support; no progressive display. (The plug-in actually handles several media types. It also installs itself into every browser on the machine, including Internet Explorer; to remove, find the appropriate Plugins directory or directories and delete **npqtplugin.dll** .)

- **PNG Live plug-in** [Siegel & Gale] (*Win32*) - all versions; read-only; broken gamma support; alpha support in 2.0b1 and later (but broken: uses PNG background chunk instead of browser background); progressive display in 2.0b5 and later (replicating method); uses **libpng** and **zlib**. (Development on this product appears to have ceased as of June 1997, and the web site was shut down in early 1999--which is unfortunate since its alpha support was better than any other Netscape-compatible solution to date [as of September 1999]. Version 1.0 also worked with **Internet Explorer** 3.0 and supported PowerMacs as well as Win32. Version 2.0b5 was the final public release; the rumored PowerMac and Irix ports were never completed.)

- **KeyView Pro** [FTP Software / Verity] (*Windows 3.x, Win32*) - version 4.2 and later; read/write. [FTP Software sold KeyView to Verity in late 1997.]

- **Quick View Plus** [Stellent / Avantstar] (*Win32, embedded*) - version 4.5 and later; read-only; uses **zlib**. (This is apparently the *N*th-generation descendant of Mastersoft's **Viewer 95**. Mastersoft was acquired by Frame, which was acquired by Adobe, which renamed the viewer to **Adobe File Utilities by Mastersoft** before selling it to Inso in 1997, which may have merged it with their competing **Quick View Plus** viewer and licensed Jasc as a distributor in 1998. In July 2000 the QVP portion of Inso was sold to IntraNet Solutions,

which was subsequently either acquired by or renamed to Stellent, who ported it to various PDAs and cell phones and apparently also licensed it to Avanstar for retail sales. [As of as of early 2004, Jasc no longer distributes it.] Avanstar's version is available only for 32-bit Windows platforms and appears definitely *not* to support any sort of conversion.)

- **CSView Plugins** [CSU Software Solutions] (*Win32*) - all versions? read-only or read/write, depending; commercial. (**CSView40**, **CSView130** and **CSView150** all include stand-alone viewers and Netscape plug-ins. Some configurations include batch converters capable of writing PNG images, as well.)

- **PNG plug-in** [Sam Bushell] (*Mac OS*) - all versions; read-only; progressive display; uses **libpng** and **zlib** (beta only; superseded by QuickTime PNG plug-in above)

- **pngplug** [Silicon Graphics] (*SGI Irix/X*) - all versions; read-only; also supports RGB and MS BMP image formats. (This plug-in is available on the Irix 6.2 update CD, along with Netscape 2.0S and half a dozen other plug-ins.)

- **PNG Magick plug-in** [Rasca Gmelch] (*Unix/X*) - all versions; read-only; freeware. (This is still an alpha version; it requires **ImageMagick**'s *convert* utility. **This product has been discontinued.**)

- **FIGleaf Inline plug-in** [Carberry Technology / EBT] (*Win32*) - all versions; read-only; also supported CGM, RGB, TIFF, PBM/PGM/PPM, encapsulated PostScript, Group 4 fax, Sun raster and MS BMP and WMF image formats. (**This product has been discontinued.** The PNG support was flaky, anyway. Mac OS and Windows 3.x versions were never released.)

- **Panacea PNG plug-in** [Panacea Software] (*OS/2*) - all versions; read-only. (**This product has been discontinued.** It was only available as a beta for a couple of weeks before being pulled.)

- **NetSurf** [NetSurf developers] (*RISC OS*) - all versions; read-only; **full alpha support**; full gamma support; nearly complete **MNG** and **JNG** support; freeware (GPL) with source.

- **Netsurfer** [Netsurfer] (*NeXTStep/OpenStep*) - version 1.1 and later; read-only. (**This product has been discontinued.**)

- **OmniWeb** [Omni Development] (*NeXTStep/OpenStep, Mac OS X Server*) - version 2.0 and later; read-only; **full alpha support** in version 3.x and later, possibly some 2.x? (screenshots); full

gamma support; progressive display of interlaced images (sparse method); freeware as of version 4.0 (formerly commercial). (Versions prior to 3.0 or 3.1 were for NeXTStep/OpenStep only, and versions from 4.0 onward are for Mac OS X only.)

- **Opera** [Opera Software] (*Win32, OS/2, BeOS, Mac PPC, Mac OS X, Linux/X, Solaris/X, Symbian OS*) - version 3.51 and later (version 6.0 and later for Symbian); **full alpha support** in version 6.0 and later (screenshots); broken binary transparency in older versions (apparently only for palette-based images, where the *alpha value* of the first palette entry is misinterpreted as the *index* of the palette entry to be made fully transparent, a la GIF); progressive display (except transparent PNGs on Windows versions); full gamma support (assumes a file gamma of 1/2.0 for unlabelled PNGs, vs. 1/2.2 for GIFs and JPEGs; fixed in 6.1); bogus "out of place IHDR" errors and segfaults in Linux version 4.x or 5.x; read-only; adware/commercial. (Version 3.50 supported PNG only via old-style plug-ins, such as **PNG Live** 1.0, that supported neither transparency nor progressive display; see **Netscape Navigator** above. Version 3 and possibly 4 also supported Windows 3.x, but that support was dropped from more recent versions. Transparency support has not been verified in Symbian versions.)

- **Oregano** [Oregan Networks / Castle Technology] (*TV/STB, RISC OS*) - all versions; read-only; no support for PNG background images and only binary transparency in version 1; **full alpha support** as of version 2 (screenshots); full gamma support (except for palette images, apparently); commercial. (Version 2 is considered to be a nearly complete rewrite and is arguably a different browser.)

- **Phoenix** - see **Mozilla** above

- **Safari** [Apple] (*Mac OS X*) - all versions; read-only; **full alpha support**; full gamma support; freeware with partial source (back end only). (This is a lightweight web browser based on **Konqueror**'s rendering engine, KHTML. Note that the underlying OS version has some effect on PNG performance and conformance; for example, according to Dave Hyatt, Tiger's renderers are faster and fix some gamma issues in Panther.)

- **Sega Dreamcast Web Browser** [Planetweb] (*Sega Dreamcast*) - version 2.0 and later; read-only; **full alpha support**; no gamma support; progressive display; commercial.

- **SPRYNET Mosaic** [SPRY / CompuServe] (*Windows 3.x*) - all versions; read-only; full gamma support. (Also known as **Mosaic 95**, **Mosaic in a Box for Windows 95**, **SPRY Mosaic 4.0** and/or **AIR Mosaic**. This thing used to change names and web sites every couple of months and now appears to be completely dead.)

- **Spyglass Mosaic** [Spyglass] (*Windows 3.x, Windows NT, Mac OS, Unix/X*) - version 2.2; read-only. (This appears to have died as a consumer product but to have been resurrected as a variety

of embedded and server products. See **Device Mosaic** above and **Spyglass Prism** below.)

- **Spyglass Prism** [OpenTV / Spyglass] (*Solaris, Windows NT*) - all versions? read/write? commercial. (See also this December 1996 press release. Spyglass was acquired by OpenTV in July 2000.)

- **Termite** / **Webite** [DoggySoft] (*RISC OS*) - any version with David McCormack's **Progress** helper app, listed on the viewers page; read-only; commercial.

- **UdiWWW** [Bernd Richter] (*Windows 3.x, Win32*) - all versions since 29 September 1995; read-only (also see Stroud's review)

- **UP.Browser** [Phone.com] (*cell phones*) - version 3.2 and later; read-only; 8-bit (palette) support only; commercial. (This is a "microbrowser" for cell phones, especially those with color displays; version 3.2 is the first to support both PNG and color.)

- **ViewML** [Century Software, Monta Vista Software, et al.] (*Linux/X, Linux/MicroWindows*) - all versions; read-only; freeware (GPL) or commercial with source. (This is a lightweight web browser, especially suited to handhelds and embedded devices. As of late 2003, it is included as part of the PIXIL embedded environment.)

- **Voyager** [VaporWare] (*Amiga*) - version 2.7 and later (native), or any earlier version with a PNG DataType (see the miscellaneous apps page for a couple); read-only; progressive display; binary transparency (with bad threshold) in version 3.0; **full alpha support** in version 3.3.122 (beta) and later on "MorphOS" public beta; gamma correction enabled in version 2.96.39 and later; version 3.1 is claimed to have "heavily improved PNG support"; update 12.5 of the V³ Image Decoders fixes a transparency/alpha problem; requires MUI; uses **libpng** and **zlib**; commercial. (Also known as **MindWalker** in the Amiga Technologies Surfer Pack. Version 2.7 introduced native PNG support and was known as **VoyagerNG**; version 3.x is known as **V³**.)

- **WebC** [EBS] (*embedded, Win32*) - version 2.3 and later; read-only; **MNG** support as of version 2.4.3; uses **libmng**, **libpng**, and **zlib**; commercial (royalty-free) with C source.

- **Webster XL** [R-Comp] (*RISC OS*) - version 1.9(?) and later; read-only; full alpha support claimed (including RGBA background images); commercial.

- **WebTV** [WebTV Networks / Philips / Sony] (*WebTV*) - versions since January 1999? read-only; no progressive display; **full alpha support** in versions since August 2000(?) (apparently); 32-bit alpha support (9 transparency levels; screenshots) and binary transparency for palette images (first palette entry only, regardless of number of transparent colors) in older releases; CSS

background-image support; commercial. (This is a web browser embedded in a set-top box; it displays pages on a standard analog television set. See also the **WebTV Viewer** for Win32, below.)

- **WebTV Viewer** [WebTV Networks] (*Win32*) - all versions? read-only; **full alpha support** in version 2.5 build 117(?) and later; CSS background-image support; freeware. (This is really a developer tool for testing web pages against the limited resolution of **WebTV** hardware [above], but it's also one of the few Windows browsers to have excellent PNG support--along with **Mozilla** / **Netscape 6.x** and **Opera 6.x**, of course.)

- **WebView** [South Pacific Information Services] (*Windows 3.x, Win32*) - version 2.6 and later; read-only

- **WinCIM / `CSi CompuServe software'** [CompuServe] (*Windows 3.x*) - version 2.0.1 and later; read-only; progressive display of interlaced images (replicating method)

- **XEmacs** [Lucid, Sun, UIUC, etc.] (*Unix/X*) - version 19.14 and later; read-only; uses **libpng** and **zlib**. (This is lumped in with the browsers due to W3 mode.)

- **XMayday** [Axene] (*Unix/X*) - all versions; read-only; commercial. (This was an HTML browser for local files only; it was primarily intended to be used for viewing documentation in HTML format, including that accompanying Axene's other products on the office and business apps page. Version 1.2.3 was the final release. **As of March 1998, Axene appears to have folded.**)

- **X Mosaic** - see **NCSA X Mosaic** above

- **X-Smiles** [X-Smiles Developers] (*Java*) - all versions (if running on Java2D, i.e., JDK 1.3 and later); read-only; freeware (BSD) with source. (This is a "Java-based XML browser [that] is intended for both desktop use and embedded network devices and to support multimedia services.")

- **Zen** [Tomas Berndtsson] (*Linux/fbcon, Linux/GTK+*) - version 0.1.0 and later; read-only; freeware (GPL) with source.

Here are some related PNG pages at this site:

- PNG-supporting Applications
  - Image Viewers

- Image Editors
- Image Converters
- 3D Applications
- Games / Entertainment
- Office / Business Applications
- Scientific / Graphing Applications
- Miscellaneous Applications

- PNG support in VRML browsers
- PNG-supporting Hardware

- PNG Home Page
- **Complete PNG Site Map**

Last modified 21 October 2006.

Image Viewers with PNG Support

One of the biggest categories of PNG-supporting applications is image viewers; virtually every major operating system is represented. Note that PNG image editors can often be used as viewers, too; they just tend to be slower and may not display as nicely on 256-color systems. And there's considerable overlap between this page and the image-conversion page, since many viewers can save to different formats. A few of the viewers here even have minimal editing functions like cropping, color balance, etc. Follow the links for details. Ye have been warned...

As with the other applications pages, links to home WWW sites or to downloadable versions are provided where known, but if a link is broken, check the location and see if an updated version is available (and please tell Greg!). Relevant operating systems are printed in (*parenthesized italics*).

These are listed alphabetically, more or less:

- **1stGuide** [Guido Vollbeding] (*Atari*) - version 29.Aug.1995 and later; read-only; uses **libpng** and **zlib**; shareware. (Supports all Atari ST/TT/Falcon-compatible systems and views in all graphic resolutions, including true-color.)

- **ACDSee16** [ACD Systems] (*Windows 3.x*) - version 1.25 and later; read-only; no grayscale support prior to 1.31 beta 1 (not even recognized in version 1.3); full gamma support in version 1.31 beta 1 and later; progressive display of interlacing (sparse method); formerly known as **ACDSee**

- **ACDSee32** [ACD Systems] (*Win32*) - version 1.0 beta 3 and later; read/write (read-only prior to version 3.0); full gamma support; progressive display of interlacing (sparse method); broken grayscale+alpha support; ignores background chunk; version 3.0 writes PNGs with no IEND chunk (fixed in 3.1); commercial. (This was formerly known as **ACDSee 95**.)

- **Adobe File Utilities by Mastersoft** - see **Quick View Plus** below

- **Advanced Batch Converter** [Gold-Software Development] (*Win32*) - version 3.5(?) and later; read/write; **MNG** (read-only) and **JNG** (read/write) support; commercial.

- **Advanced Slide Show** [Gold-Software Development] (*Win32*) - all versions? read-only; **MNG** and **JNG** support; commercial.

- **AhaView** [Aha-soft] (*Win32*) - all versions; read/write as of version 2.0b; shareware. (Version 1.1 is freeware but has read-only support for PNG.)

- **AI Picture Explorer / AIPICX** [Applied Insights] (*Win32*) - all versions; read/write. (This app not only views images but also creates web pages with image thumbnails.)

- **AI Picture Utility / AIPICT** [Applied Insights] (*Win32*) - all versions; read/write

- **Alambik Viewer** [Alambik] (*Win32*) - all versions? read-only; freeware.

- **AlphaMix** [Willem van Schaik] (*Win32*) - all versions; read-only; full alpha support; freeware.

- **Alter Image 32** [Nun's Meadow Software] (*Win32*) - all versions; read/write; reportedly converts bi-level (1-bit) TIFFs into 24-bit PNGs.

- **Ashampoo Photo Commander** [Nikolaus Brennig] (*Windows 2k/XP/2003*) - all versions; read/write; **MNG** (read/write) and **JNG** (read-only) support; commercial. (This is the commercial successor to **SlowView**. It was previously known as **Mediafile Assistant**.)

- **AutoGraphicsHTML** [fCoder Group] (*Win32*) - all versions? read-only; **MNG** and **JNG** support as of version 5.7; commercial. (This is a utility to create web-based photo albums. The output format is restricted to GIF or JPEG, however.)

- **AutoVue** [Cimmetry Systems] (*DOS, Windows 3.x, Win32, Unix/X, Java*) - version 15.0(?) and later; read-only; commercial. (There are several flavors of this app--basic, **Professional**, **SolidModel**, etc.--plus a simpler version called **Panoramic!** and a Java version called **jVue**. It's not clear whether all of the listed platforms have been updated to support PNG.)

- **Axv** [David Ramboz] (*Unix/GTK+*) - all versions; read-only; freeware (GPL) with source.

- **BePNG** [Al Evans] (*BeOS DR8*) - all versions; read-only; freeware with source; 84k. (Resources [6k] and Metrowerks Codewarrior 8 sources [331k] in Mac archive format are also available. Not updated for current BeOS releases.)

- **BeShow** [Jeremy Moskovich] (*BeOS DR8*) - all versions with the translation kit (or Jon Watte's **Datatypes library**) and Simon Clarke's **PNGHandler** (see the toolkits page); read/write; 191k. (Not updated for current BeOS releases.)

- **Bitmap View** [Raceme / Christophe Boyanique] (*Atari*) - version 4.0(?) and later with the "PARX M&E modules"; read/write? shareware. (Apparently PARX ceased to exist as of 15

December 1997, with subsequent module updates provided by Frédéric Bayle and/or Eric Da Cunha. Reportedly versions of parx.sys since September 1998 support PNG, but they are almost impossible to find.)

- **Boxer** - see **ZBoxZ** below

- **Cameleo** [Caldera Graphics] (*Unix/X*) - version 2.2(?) and later; read/write; commercial. (There is also a LIGHT version.)

- **CCViewer** [Castillo Bueno Systems] (*Win32*) - version 4.2 and later; read/write; commercial.

- **Collection** [Caldera Graphics] (*Unix/X*) - all versions? read/write; commercial. (This is an image-management and database tool with viewing capabilities.)

- **CompuPic / CPIC** [Photodex] (*Windows 3.x, Win32, Mac PPC/68k, Linux*) - all versions; read/write; no gamma support; progressive display of interlaced images (replicating method)

- **CompuShow / CShow** [Bob Berry] (*DOS*) - version 9.01a and later; read/write; interlacing and low-bit-depth PNG-writing code broken in 9.01a; ignores gamma chunk but has generic option to adjust display gamma; progressive display of interlaced images (replicating method); 265k

- **CompuShow 2000! / 2Show** [Bob Berry] (*DOS*) - version 2.01a and later; read/write; bugs in versions prior to 2.03a; ignores gamma chunk but has generic option to adjust display gamma; progressive display of interlaced images (replicating method); 258k

- **ConGo** - see the image editors page

- **CryptaPix** [Kent Briggs / Briggs Softworks] (*Win32*) - version 1.0 and later; read/write in version 1.1b and later; shareware. (Versions prior to 2.0 were also available for Windows 3.x.)

- **CSView Plugins** [CSU Software Solutions] (*Win32*) - all versions? read-only or read/write, depending; commercial. (**CSView40**, **CSView130** and **CSView150** all include stand-alone viewers and Netscape plug-ins. Some configurations include batch converters capable of writing PNG images, as well. **This product has been discontinued.**)

- **DeBabelizer** [Equilibrium] (*Mac 68k/PPC*) - version 1.6.5 and later; read/write; claims full gamma support as of version 3.0; commercial.

- **DeBabelizer Pro** [Equilibrium] (*Win32*) - all versions; read/write; claims full gamma support as of version 4.5; commercial.

- **Display** [Jih-Shin Ho] (*DOS*) - version 1.88 and later; read/write; gamma support in beta version 1.90t2 and later. (Also on Simtel.Net mirrors: disp189a.zip [740k] and disp189b.zip [532k, optional]. See also the unofficial web page.)

- **Drag And View** [Canyon Software] (*Windows 3.x, Win32*) - version 2.0(?) and later; read-only; shareware.

- **DTPicView** [Edmund Vermeulen] (*BeOS*) - all versions with the translation kit (or Jon Watte's **Datatypes library**) and Simon Clarke's **PNGHandler** (see the toolkits page); read/write; progressive display in version 2.0 and later

- **Easy Thumbnails** [Fookes Software] (*Win32*) - all versions; read/write; freeware.

- **Electric Eyes** [Rasterman / Red Hat] (*Linux/GNOME*) - all versions? read/write? freeware (GPL) with source. (This viewer, like **Eye of Gnome** below, also has the ability to view large images [though possibly not as large as EoG]. The sources can be browsed directly from CVS.)

- **EyeBatch** [Atalasoft] (*Win32*) - all versions; full alpha support claimed; full gamma support; read/write; shareware. (This is a batch image processor and viewer; in addition to conversions, it can blur, sharpen, rotate, adjust contrast, and so forth.)

- **Eye of Gnome** [Federico Mena-Quintero] (*Unix/GNOME*) - all versions; read-only; freeware (GPL) with source. (This viewer has the ability to display extremely large images and will sprout scrollbars, if necessary, while keeping memory usage constant. The sources can be browsed directly from CVS.)

- **FishEye** [Willem van Schaik] (*Win32*) - all versions; read/write; uses **libpng** and **zlib**; shareware.

- **Flash 4 Player** [Macromedia] (*Win32, Mac PPC*) - version 4.0 beta 1 and later; read-only. (This is generally used as a plug-in for **Navigator** or **Internet Explorer**, but it may include stand-alone capabilities as well. Once 4.0 is officially released, the Linux, Solaris and Java versions will presumably be included, too. Note that PNG images are supported within Flash 4, but it is not clear that this plug-in can view PNGs outside of Flash 4 animations.)

- **FmView** [WinCorner] (*Win32*) - version 2.0 and later; read-only

- **FuturixImager** [Alexander S. Tereschenko] (*Win32*) - version 1.6 and later; read/write as of version 2.0b1 (read-only in 1.x); **MNG** (read-only) and **JNG** (read/write) support; write support for transparency in PNG and JNG as of version 2.01; uses **libmng**, **libpng**, and **zlib**; freeware.

(This was formerly known as **Futuris Imager**.)

- **Galleria** [Bitware Australia] (*OS/2*) - version 2.3(?) and later; read/write. (Shareware; must register to enable writing.)

- **GEM-View** [Dieter Fiebelkorn] (*Atari*) - version 3.0 and later with Eric Prevoteau's PNG load/save modules [37k]; read/write

- **GIF Construction Set** [Alchemy Mindworks] (*Windows 3.x, Win32*) - version 1.0d and later; read-only

- **GIFConverter** [Kevin Mitchell] (*Macintosh*) - version 2.4 and later; read/write; uses **libpng** and **zlib**; shareware.

- **GQview** [John Ellis] (*Unix/GTK+*) - all versions; read-only; requires **Imlib**, **libpng** and **zlib**; freeware (GPL) with source.

- **GrafCat** [Alchemy Mindworks] (*Windows 3.x, Win32*) - version 1.0e beta and later; read-only

- **GraphicConverter** - see the image editors page

- **Graphic Viewer** [PrimaSoft PC] (*Win32*) - all versions; read-only; integrates with Windows Explorer; freeware (but includes PrimaSoft ad at bottom of window)

- **Graphic Workshop Professional** [Alchemy Mindworks] (*Win32*) - version 1.1q and later; read/write; writes unnecessarily large palettes; writes invalid tEXt chunks (control characters; CR instead of LF); shareware. (Version 2.0a patch 42 is claimed to have solid PNG support, but various older versions didn't support gamma correction and [in very old versions] had compression and filtering bugs. The original **Graphic Workshop** was also available for DOS and 16-bit Windows.)

- **GraphX Viewer** [Group 42] (*Windows 3.x*) - version 1.51; read/write; full gamma support; shareware. (**This app is no longer under development.**)

- **GRAV** [Michael Knigge] (*Linux/SVGA*) - version 3.1 and later; read-only; requires **libpng** and **zlib**; bugs: 24-bit support completely broken, ignores GSVGAMODE variable, and still uses libpng 0.6 (version 3.5); ncurses, ELF and dithering problems in version 3.1

- **GRIP ICE** [Ivan Lee Herring] (*Windows 98/XP*) - all versions? read/write; uses **PNG Delphi / TPNGImage** (see the toolkits page); shareware. (The name stands for *Geographic Raster Image*

Processor / Investigate Classify Extrapolate. See also **Grafree** on the editors page.)

- **GTK See** [Lee Luyang (Hotaru) and Keziah Manson] (*Unix/GTK+*) - all versions; read-only? requires **libpng** and **zlib**; freeware (GPL) with source.

- **GV** [Tamotsu TOBITA] (*Win32, Windows 3.x*) - version 0.85 and later; read-only; **MNG** support; freeware. (This is a Japanese image viewer.)

- **HiJaak PRO** [Inset / Quarterdeck / IMSI] (*Win32*) - versions 95 and 4.0 and later; read-only. (This product was called **HiJaak 95** for one[?] release, possibly equivalent to version 3.0. It was later renamed "Pro," presumably after Inset was acquired by Quarterdeck, and then recapitalized "PRO" with its sale to IMSI.)

- **iBrowser** [fCoder Group] (*Win32*) - all versions? read-only; **MNG** and **JNG** support; commercial. (This is an thumbnail browser and image/animation viewer. It includes slideshow and desktop background [wallpaper] functions, and it can integrate into the Windows shell.)

- **Image32** [Mark Sproul] (*Mac PPC/68k*) - version 1.3.5 and later; read-only; shareware.

- **Image Alchemy** [Handmade Software] (*DOS, Macintosh, Unix/Motif*) - version 1.9 and later; read/write; no interlacing; grayscale broken in 1.9 beta; alpha transparency broken in 1.9 beta but claimed to be fully supported in version 1.10; full gamma and color correction? commercial. (This is primarily an image-conversion app, but the OpenLook- and Motif-based commercial versions for Sun, SGI and HP workstations also have viewing capabilities, as do the DOS version and the **now-terminated Macintosh port**. The DOS version requires a supported video card. There are also conversion-only versions for OS/2, Linux, BSD/OS, SCO Unix, Solaris/x86, AIX and Digital Unix.)

- **Image Browser Arctic** [Uticasoft / Jobin Rezai] (*Win32*) - version 3.0 and later; read/write as of version 4.2 (formerly read-only); freeware. (This is an image viewer with slideshow capability. Prior to version 4.2 it was known as **Image Browser**.)

- **ImageCommander** [Jasc] (*Windows 3.x, Win32*) - version 2.0 and later; read-only. (**This product has been discontinued.**)

- **ImageConverter Plus** [Evgeny Shamin / fCoder Group] (*Win32*) - version 3.3(?) and later; read/write; **MNG** and **JNG** support (read-only) as of version 6.0(?); commercial. (This is a GUI image-viewer and converter with some basic manipulation capabilities; it can also plug itself into the Windows Explorer/menu system. See also **2PNG** on the converters page.)

- **Image Engineer** [Simon Edwards / Marko Seppänen] (*Amiga*) - version 3.3 and later; read/write; uses the SuperView Library for reading and writing image formats (see the toolkits page); shareware. (This program also supports various forms of image manipulation, including motion blur, alpha compositing, sharpening, and embossing.)

- **Image Explorer** - see **Image Explorer Pro** or **Image Navigator** below

- **Image Explorer Pro** [CDH Productions] (*Win32*) - version 5.2(?) and later; read/write; commercial. (This viewer/converter claims to support MNG in addition to PNG, but reportedly that support is limited to reading single PNGs wrapped in MNG headers--i.e., MNG support is virtually non-existent.)

- **ImageJ** [Wayne Rasband] (*Java*) - version 1.09k and later with a plugin; read/write; requires JIMI; freeware with source. (This is a Java image-processing program geared toward scientific and medical imagery.)

- **ImageMagick display** [John Cristy] (*Unix/X, VMS/X, Win32/X*) - version 3.6.3 and later; read/write; full gamma support; full chromaticity support? broken support for sub-8-bit grayscale PNGs in versions prior to 5.1.0; minimal MNG support as of version 3.9.2 and full **MNG-LC** support (read/write) as of version 4.2.4 (broken in versions 5.2.7 through 5.3.6); **JNG** support as of version 5.5.2; requires **libpng** and **zlib**; freeware with source. (This is a multi-format viewer with the ability to display MNG-LC animations.)

- **Imagenation** [Spicer] (*Windows 3.x, Win32*) - version 4.2 and later; read/write

- **Image Navigator** [VIMAS Technologies] (*Win32*) - version 2.0(?) and later; read-only; freeware. (Apparently this was previously known as **Image Explorer**. It is also bundled with VIMAS' **Web Image Guru** optimizer; see the image converters page for details.)

- **imagENGine** [ISS] (*Win32*) - all versions; read/write; shareware. (This is a batch viewing/conversion application. It can do basic algorithmic manipulations, including blurring, sharpening, equalization, etc.)

- **ImageShow** [YNOP Talton] (*BeOS*) - all versions (apparently via a BeOS PNG Handler datatype-thing); read-only; freeware.

- **ImageViewer** [Plato Grande Software] (*Mac OS, Mac OS X*) - all versions? read-only? requires **QuickTime**; commercial.

- **Image Viewer** [Microsoft] (*Windows CE 3.0*) - all versions; read-only; freeware. (This

imaginatively named program is part of the **Plus! Pack** for H/PC Pro models.)

- **ImageWalker** [Zac Walker] (*Win32*) - all versions? read/write; **MNG** and **JNG** support (read-only); uses **libmng**, **libpng** and **zlib**; shareware.

- **Imagine!** [Andrikkos Software] (*Win32*) - version 1.2(?) and later; read/write; commercial. (This is a viewer/converter with basic manipulation capabilities, including resizing and rotation by an arbitrary angle.)

- **IMatch** [Mario Westphal] (*Win32*) - version 2.0(?) and later; read-only; shareware. (This is not merely an image-viewer but also an image-based database retrieval engine. It can find images based on similarity to a sketch or to other images.)

- **ImgView** [Jeff Prosise / PC Magazine] (*Win32*) - all versions; read-only; uses LEADTOOLS DLLs; freeware. (This extends Windows 9x/NT's "Quick View" [right-button-click] viewing function to include 7 image formats, including PNG. Source code to the frontend viewer is included, but it can't be recompiled without purchasing the LEADTOOLS DLLs [toolkits page].)

- **ImgViewer/32** [Arcata Pet Software] (*Win32*) - version 1.5(?) and later; read/write? gamma support? shareware.

- **Inzomia Viewer** [Inzomia] (*Win32*) - all versions? read-only; uses **libpng** and **zlib**; shareware (2.x) and freeware (1.x).

- **IrfanView32** [Skiljan Irfan] (*Win32*) - version 1.85 and later; read/write; **MNG** and **JNG** support as of version 3.70 (read-only?); mediocre compression in old versions (before 2001?); incorporates **PNGOUT** optimizer (plug-in) as of version 3.97; freeware (for non-commercial use).

- **IV / ImgView / Image Viewer** [Capt. Taura "LearFox" Milana] (*Unix/GTK+*) - version 0.1.8(?) and later; read/write? full alpha support; requires **Imlib**, **libpng** and **zlib**; freeware (GPL) with source.

- **IvanView** [Ivan A. Kotenev] (*Win32*) - version 1.1.22 and later; read/write; **MNG** (read-only) and **JNG** (read/write) support; commercial.

- **iView MediaPro** [iView Multimedia] (*Mac OS, Mac OS X*) - all versions? read/write; commercial.

- **JImageView** [Joseph McMurry] (*Java*) - all versions; read-only; full version requires JAI (see

toolkits page); freeware (GPL) with source.

- **JView** [Crunch Products] (*OS/2*) - all versions? read/write? commercial; 1.1M. (This product has been discontinued; see **Embellish** on the image editors page.)

- **Jsee** [Michael Graessle] (*Java*) - any version? read-only; uses Sixlegs Java PNG; requires Java 1.1 or later; freeware with source.

- **KeyView Pro** [FTP Software / Verity] (*Windows 3.x, Win32*) - version 4.2 and later; read/write. (FTP Software sold KeyView to Verity in late 1997. See also its entry as a **Netscape Navigator** plug-in on the browsers page.)

- **KView** [Sirtaj S. Kang] (*Unix/KDE*) - all versions? read-only (write support "coming soon"); freeware.

- **KPNG** [Ken Silverman] (*DOS/VESA*) - all versions; read-only; no 16-bps support; freeware. (This is a 32-bit DOS program to "view an entire directory of PNG files quickly." It requires support for 32-bit VESA modes.)

- **KSquirrel** [Baryshev "Krasu" Dmitry] (*Unix/KDE*) - all versions; read-only; **MNG** and **JNG** support as of version 0.6.0-pre9; requires libmng; freeware (GPL) with source.

- **LiView** [Philippe Thomas] (*BeOS*) - all versions? read-only (via the translation kit [or Jon Watte's **Datatypes library**] and Simon Clarke's **PNGHandler**: see the toolkits page)

- **Makaha** [Brandyware Software] (*Win32*) - all versions? read/write? shareware.

- **Mediafile Assistant** - see **Ashampoo Photo Commander** above

- **Moyager** [Gromada.com] (*Win32*) - all versions; read-only; freeware.

- **MRIcro** [Chris Rorden] (*Win32, Linux/X*) - all versions; read/write; freeware. (This is primarily a viewer for 2D and 3D medical formats--Analyze, DICOM, etc., which it can convert to 8-bit PNGs--but it can also view a number of generic 2D image formats, including PNG.)

- **Multiview** [Amiga] (*Amiga*) - any version via a PNG DataType (see the miscellaneous apps page for several); read-only.

- **MyAlbum** [DigitalMATRIX Software / Pierre Meindre] (*Win32*) - version 1.32 and later; read/write; no gamma support; uses **libpng** and **zlib**; freeware. (This is a photo album and slide-show

application that can additionally convert and resize images.)

- **Myriad Engineering Viewer** [Informative Graphics] (*Win32*) - version 4.1 and later; read-only; commercial. (This is a more generic viewer that is capable of displaying a large number of document, image, CAD, and 3D formats.)

- **NOMSSI Viewer / NView** [Jacques Nomssi Nzali] (*DOS*) - version 1.5 and later; read-only; shareware.

- **Nview/Nconvert/XnView** [Pierre-e Gougelet] (*Atari, DOS, Unix/X, Windows 3.x, Win32, OS/2, BeOS*) - version 2.70(?) and later (Nview/Nconvert) or all versions (XnView); read/write; **MNG** and **JNG** support (read-only) as of XnView version 1.61; freeware (for non-commercial use). (Nview and Nconvert are the older, command-line-only version; XnView is the newer windowed version. The primary release is in French, but dozens of translations are available. An English page is also available.)
- **Nview/Nconvert/XnView** [Pierre-e Gougelet] (*Atari, DOS, Unix/X, Windows 3.x, Win32, OS/2, BeOS*) - version 2.70(?) and later (Nview/Nconvert) or all versions (XnView); read/write; freeware (for non-commercial use). (Nview and Nconvert are the older, command-line-only version; XnView is the newer windowed version. The primary release is in French, but dozens of translations are available. An English page is also available.)

- **Panoramic!** - see **AutoVue** above

- **paul** [Andreas Tille] (*Unix/GTK+*) - all versions; read-only; freeware (GPL) with source. (This is an image viewer "specially designed for *sequences* of images.")

- **Peter's Viewer** [Peter Balogh] (*Windows CE*) - version 2.5 and later; read-only; freeware.

- **pho** [Akkana] (*Unix/GTK+*) - all versions? read/write; requires **gdk-pixbuf**, **libpng** and **zlib**; freeware (GPL) with source. (This is an image viewer "for viewing large numbers of images quickly, rotating or deleting some, and making notes about what to do with each image.")

- **Photon Picture Viewer / pv** [QNX Software Systems] (*QNX*) - all versions; read-only; no gamma support

- **Photonyx Viewer** [Chrome Imaging] (*Win32*) - version 2.0 and later; read-only; freeware

- **PicaView16** [ACD Systems] (*Windows 3.x*) - version 1.1 and later; read-only; no gamma support? (This viewer integrates into the Windows File Manager.)

- **PicaView32** [ACD Systems] (*Win32*) - version 1.1 and later; read-only; no gamma support? (This viewer integrates into the Windows Explorer menus.)

- **PictView** [Jan Patera] (*DOS*) - version 1.60(?) and later; read-only; freeware. (PictView also exists as a commercial library and as a plug-in to the Servant Salamander file manager.)

- **PicViewer** [Andrew Anoshkin] (*Win32*) - version 1.8(?) and later; read-only; shareware (also freeware **Lite** version)

- **PikView** [Andrew Richards] (*Unix/KDE*) - all versions; read-only; requires **libpng** and **zlib**; freeware (GPL) with source.

- **PiNGer** - see **ZBoxZ** below

- **PingPong** [Willem van Schaik] (*NeXTStep/OpenStep*) - all versions; read-only; full gamma support; both black (NeXT 68k) and white (Intel x86) binaries available; uses **libpng** and **zlib**; freeware

- **PixelGraphicLibrary** [Peter Beyersdorf] (*Win32*) - all versions; read/write. (This is primarily an image-manipulation library, but it also includes a simple demo viewer. See also the toolkits page. **This product has been discontinued.**)

- **PixFolio** [ACK Software] (*Windows 3.x, Win32*) - version 2.0 and later; read/write

- **PixiePlus** [Daniel "Mosfet" Duley] (*Unix/KDE3*) - all versions; read/write; full alpha support; requires **libpng** and **zlib**; freeware (QPL) with source. (This is an image manager with viewing, conversion, thumbnail, and manipulation capabilities, including support for batch-mode operations.)

- **PixView** [Techsoft] (*Win32*) - all versions? read-only? commercial. (This is a multi-format image viewer that can act as an MSIE plug-in, as well.)

- **PixWizard** [PixVision Software] (*Win32*) - version 1.10 and later; read/write? shareware. (This appears to be the 32-bit Windows version of **WinJPEG** and **PMJPEG** below.)

- **PK's Image Viewer (PkImgView)** [Pranjal Kumar Hazarika] (*Win32*) - all versions; read/write; uses **FreeImage**, **libpng**, and **zlib**; freeware.

- **Platypus Animator** [C Point] (*Win32*) - version 5.1 and later; read/write? shareware. (This is primarily a creation tool for AVI animations, including conversion from collections of PNG

stills, but it can also extract still images from AVIs [presumably including PNGs], and it can view individual frames or the entire animation.)

- **PMJPEG** [PixVision Software] (*OS/2*) - version 1.90 and later; read/write; no alpha support? shareware.

- **PMView** [Peter Nielsen] (*OS/2, Win32*) - version 0.92 and later; read/write; shareware.

- **!Png2Spr** [Tom Tanner] (*RISC OS*) - all versions; read/write; freeware. (This is a RISC OS PNG-to-sprite converter--and, as of version 1.20, a sprite-to-PNG converter, too. Newer versions have viewing capabilities.)

- **PNGDIB viewer** [Jason Summers] (*Win32*) - all versions; read/write; full alpha support in version 2.0.0 and later; full gamma support; requires **libpng** and **zlib**; freeware (BSD) with source. (This is primarily a "mini PNG/DIB conversion library" with two functions: one for converting PNG to DIB, and one for the reverse. Versions 1.1.0 and later also include a simple PNG viewer as a sample app.)

- **PNGImageViewer** [Neil Aggarwal] (*Java*) - any version; read-only; requires Java 1.1 or later

- **PNG/MNG Construction Set Professional** [Alchemy Mindworks] (*Win32*) - all versions; read/write; full(?) alpha support; **MNG** support; commercial. (This tool, the PNG/MNG equivalent of **GIF Construction Set** above, can be used to add alpha transparency to PNG images as well as to create, modify, and optimize MNG animations.)

- **PngThing** [Sergey Kucherov] (*Java*) - any version; read-only; requires Java 1.1 or later

- **PngUnit** [Edmund H. Hand, Jack Goman] (*Win32*) - all versions; read/write; freeware with source. (This is another Delphi wrapper for **libpng** and **zlib** based on Edmund Hand's PngImage.pas. It apparently includes a viewer with BMP-to-PNG conversion capability.)

- **PngView** [Anurag Ranjhan] (*Win32*) - all versions; read/write? (The author claimed that this was a viewer/editor that was still under development, but it has not been updated since March 1996 and is presumed dead. The editing functions probably never were finished, but this has not been verified.)

- **PngView** [TascalSoft] (*Windows CE*) - all versions; read-only; freeware.

- **PNGView** [Thomas Kabir] (*Win32*) - all versions; read-only; full alpha support; freeware with Visual Basic source. (This is primarily a sample viewer, **PNGView**, that apparently can

composite a transparent PNG image against a background image; but it also includes complete source code for a VB PNG-decoding library, **PNGlib**.)

- **PolyView** [Polybytes] (*Win32*) - version 2.40(?) and later; read/write

- **PowerThumber** [Ivan Petrovic] (*Win32*) - version 1.0 and later; read-only? freeware. (This is a thumbnail tool, as its name suggests; it appears to be intended primarily for the management of large image collections, though presumably it can [or will be able to] view single images at full scale, too. PNG support is not yet present in version 0.30.0 but is promised for version 1.0.)

- **PPShow** [Nico François] (*Amiga*) - any version via a PNG DataType (see the miscellaneous apps page for several); read-only; freeware; 79K. (Click here if link breaks.)

- **PPT** [Janne Jalkanen] (*Amiga*) - all versions? read/write; full 32-bit alpha support; freeware. (This is an image-processing and effects tool; it isn't quite a full image editor, but it comes close. It can read any flavor of PNG, but it writes only grayscale and truecolor, optionally with an alpha channel.)

- **PrintGF** [Cary Ravitz] (*DOS, Windows 3.x, Win32*) - version 1.24b and later; read-only; shareware. (This is primarily a printing utility for images, but it includes viewing capability on EGA, VGA and SVGA displays [and presumably anything with a Windows display driver]. **As of April 2004, development of this product has ended.**)

- **Progress** [David McCormack] (*RISC OS*) - version 0.45 and later; read-only; commercial. (This is a PNG helper app for the **Termite/Webite** browser, although it can also be used as a stand-alone viewer. Like Termite, it is no longer being developed; version 0.50 was the final release.)

- **QPict** [Rune Lindman] (*Mac 68k/PPC*) - version 3.0 and later; read/write; requires QuickTime 3.0 or later for reading and QuickTime 4.0 or later for writing; shareware.

- **QPNG** [Oliver Fromme] (*DOS*) - version 1.6c2 and later; read-only; full gamma support in 1.7b; freeware. (This is the free, PNG-only version of **QPV**; 1.7e was apparently the final release.)

- **QPV/386** [Oliver Fromme] (*DOS*) - version 1.6c and later (formerly **QPEG**); read-only; 1.6c limited to 32K sliding window (minor limitation, but fixed in 1.7a anyway); no gamma support in 1.6c or 1.7a; shareware. (Version 1.7e appears to have been the final release.)

- **Quick Image Viewer / qiv** [kLoGraFX] (*Unix/GTK+*) - all versions; read-only; full alpha support? requires **Imlib**, **libpng**, and **zlib**; freeware (GPL) with source.

- **QuickPic** [Frank Fejes] (*BeOS DR8*) - version 0.90 via Jon Watte's **Datatypes library** and Simon Clarke's **PNGHandler** (see the toolkits page); read-only. (Not updated for current BeOS releases.)

- **QuickShow Lite** [Alchemy Mindworks] (*Windows 3.x*) - version 1.1e and later; read-only

- **QuickTime PictureViewer** [Apple] (*Mac PPC/68k, Win32*) - version 3.0 and later; read/write as of version 4.0; full gamma support; full alpha support; uses **zlib**; freeware. (This viewer supersedes Sam Bushell's **Tiny Viewer**, a mini-app he included with his **QuickTime 2.5 PNG-Importer**--see the miscellaneous apps page. Sam was responsible for the PNG support in QuickTime 3.0, too. QuickTime's PNG support actually enables any QuickTime-aware application to view PNG images, including even **SimpleText**. On the export side, it can convert a PICT with an alpha channel to an RGBA PNG--unless the alpha channel is is completely transparent over the entire image, in which case it will be discarded.)

- **Quick View Plus** [Stellent / Avantstar] (*Win32, embedded*) - version 4.5 and later; read-only; uses **zlib**. (This is apparently the *N*th-generation descendant of Mastersoft's **Viewer 95**. Mastersoft was acquired by Frame, which was acquired by Adobe, which renamed the viewer to **Adobe File Utilities by Mastersoft** before selling it to Inso in 1997, which may have merged it with their competing **Quick View Plus** viewer and licensed Jasc as a distributor in 1998. In July 2000 the QVP portion of Inso was sold to IntraNet Solutions, which was subsequently either acquired by or renamed to Stellent, who ported it to various PDAs and cell phones and apparently also licensed it to Avanstar for retail sales. [As of as of early 2004, Jasc no longer distributes it.] Avanstar's version is available only for 32-bit Windows platforms and appears definitely *not* to support any sort of conversion.)

- **QVV** [Vladi `Cade' Belperchinov-Shabanski] (*Unix/Qt*) - all versions; read-only; freeware with source.

- **RealPlayer** [RealNetworks] (*Win32, Mac PPC, Linux/X*) - version 7.0 and later; read-only; freeware (**Basic**) or commercial (**Plus**).

- **ReaViewer** [ReaSoft] (*Win32*) - version 1.4(?) and later; read/write; commercial. (This is a viewer with batch-conversion capabilities.)

- **Riptide** [Vorton] (*Win32*) - all versions; read/write

- **RO-Viewer** [Thomas Middelkoop] (*Win32*) - all versions; read-only; uses **libpng** and **zlib**; freeware with C source.

- **rpng / rpng2** [Greg Roelofs] (*Unix/X*, *VMS/X*, *Win32*) - all versions; read-only; full alpha support; full gamma support; requires **libpng** and **zlib**; freeware (BSD) with source. (These are the demo PNG viewers described in Chapters 13 and 14 of ***PNG: The Definitive Guide***. The graphical front ends are *very* basic--no buttons, scrollbars, menus, or other widgets--but transparent images may be viewed against an optional background color in either program, and rpng2 additionally supports a web-page-like background pattern and progressive display. [rpng2 was designed to simulate the PNG decoder in a web browser.] The VMS port was done by Martin Zinser.)

- **SEA** [Bart Wakkee, Ralph Gortzen, Harold de Laat] (*DOS*) - version 1.0 and later; read/write; shareware; claimed to be much faster than even **QPV**. (Now distributed by Photodex.)

- **Showcase** [CQuick Technologies] (*Win32*) - all versions? read-only. (Version 1.2.00 is freeware; version 2.0 is commercial.)

- **ShowImg** [Richard Groult] (*Unix/KDE2*) - all versions; read/write? **MNG** support (read-only); requires **Qt**, **libpng**, and **zlib**; freeware (GPL) with source.

- **SimpleImage** [Chris Wood] (*Mac 68k/PPC*) - all versions? read/write with **QuickTime 4.0** or later; shareware.

- **SimpleText** - see **QuickTime PictureViewer** above

- **SlowView** [Nikolaus Brennig] (*Win32*) - version 0.6b1 (1.60 Dev) and later; read/write; alpha support; **MNG** support in 0.9.0 and later; writes bloated palettes when converting from PNG or BMP to PNG (GIF to PNG seems OK); writes invalid single-pixel PNGs; uses **libmng**, **libpng**, and **zlib**; freeware. (**This product has been discontinued.** See **Ashampoo Photo Commander** above.)

- **Smart Converter** [Acoll Software] (*Win32*) - version 1.4 and later; read/write; **MNG** (read-only) and **JNG** (read/write) support; shareware.

- **SnowView** [Snowbound Software] (*Win32*, *Java*) - all versions? read/write? commercial (OEM only). (The Java version is also known as **Snapplet**.)

- **Susie** [Takechin?] (*Win32*) - version 0.45a(?) and later; read-only? freeware. (This is a Japanese image viewer with PNG, MNG and/or JNG support via plug-ins, of which more than half a dozen are available -- from ChangTa (**PNG**), Hiroaki Watanabe (**PNG**), MIYASAKA Masaru (**PNG** with source), Tietew Windows Lab (**PNG**), Pearly Baroque (**PNG**/**MNG**/**JNG**), SATO "COCKY" Akihiro (**MNG**/**JNG**), A. Mezamashi (**MNG**), and SOGEN (**PNG**/**MNG**/**JNG**). The

Susie plug-in format, file extension `.spi`, seems to be something of a Japanese standard; for example, see also **Pmacs** and **Picture Effecter** on the image editors page.)

- **SVG Viewer** [Takahashi Masahiro (高橋 雅博)] (*Java*) - version 1999-09-20(?) and later; read-only; requires Java2 (JDK 1.2) and JAI 1.0; freeware with source. (This is a test viewer for SVG, but since PNG support is required for SVG conformance, it also counts as a kind of PNG viewer.)

- **SViewII / SuperView** [Andreas Kleinert] (*Amiga*) - version 5.0(?) and later; read/write; shareware. (This includes the **SuperView Library** for image import/export.)

- **TGV / Tascal Graphic Viewer** [TascalSoft] (*Windows CE 2.0+*) - all versions; read-only; shareware.

- **ThumbsPlus** [Cerious Software] (*Win32*) - version 3.0 beta 3 and later; read/write as of version 3.0g; full alpha support as of version 7(?), but no interlacing or transparency support for writing in version 3 (no info on intervening versions); text support; reportedly excellent compression, aside from saving unused palette entries (e.g., 256 for a 64-color image--fixed in version 4.10); broken conversion of GIF palettes in version 4.10 (example here); commercial (formerly shareware). (This program also has the ability to make web pages of thumbnails. Windows 3.x was supported in older versions, and a "final Macintosh beta" was available between 1998 and 2000, but as of 2005 there is no longer any trace of it.)

- **TIFFY View** [Art & Computer Hackbarth] (*Java*) - all versions; read-only; shareware. (This is a Java image-viewing applet with an associated toolkit and support for multiple formats; see **TIFFY Toolkit** on the toolkits page for details. Note that the related DOS viewer, TIFFY Pro, does *not* support PNG.)

- **Tiny Viewer** - see **QuickTime PictureViewer** above

- **tnailer** [William Rhodes] (*Perl*) - all versions; read/write; requires **PerlMagick**, **ImageMagick**, **libpng** and **zlib**; freeware (GPL) with source. (This is a command-line utility to create web pages of thumbnails from image collections, such as from a digital camera. It can also convert sizes and compression levels of larger images.)

- **ToyViewer** [Takeshi Ogihara] (*Mac OS X*, *NeXTStep/OpenStep*) - version 2.0(?) and later for NeXTStep, and all versions for Mac OS X; read/write; partial transparency support; support for writing text comments; freeware with source.

- **Translator** [John Kortink] (*RISC OS*) - version 8.0(?) and later; read/write; shareware.

- **Turbo Browser** [FileStream] (*Win32*) - version 7.2 and later; read/write; shareware. (This is a file manager, similar to Windows Explorer, but with file-transfer, HTML-editing, image-viewing, and image-conversion capabilities in addition to standard file-management functions. There is also a simpler version called **Turbo Browser Express**.)

- **TurboZIP** [FileStream] (*Win32*) - version 4.2 and later; read-only; shareware. (This is primarily a multiformat compressor/archiver, but it includes viewing capability for PNG images stored within archives, either standalone or as part of e-mail attachments. There is also a simpler version called **TurboZIP Express**.)

- **Ulead Viewer** [Ulead Systems] (*Windows 3.x*) - version 1.0 and later with UF2PNG.FIO plug-in; read/write; 1.1MB

- **VaryView** [CHEEWOO] (*Win32*) - all versions; read-only; shareware.

- **VeonPlayer** [Veon] (*Windows 9x*) - all versions; read-only; freeware. (VeonPlayer is available only as a browser plug-in for Navigator or Internet Explorer.)

- **VidFun** [Lawrence Gozum] (*Windows 3.x, Win32*) - version 1.5 and later; read/write; shareware.

- **view** [Andrzej Bialecki] (*FreeBSD/VGL*) - all versions; read-only; gamma support; freeware (BSD) with source. (This is a tiny viewer distributed as part of PicoBSD, the single-floppy subset of FreeBSD. It currently supports only PNG, although it has slideshow capabilities. The version in the FreeBSD CVS tree is slightly more up-to-date.)

- **ViewDT** [Cloanto] (*Amiga*) - any version with Cloanto's **PNG DataType** (included); read-only; transparency support; freeware with source; 67k. (This is just a demo viewer included with the DataType [which is *not* available in source-code form]; see the miscellaneous apps page for details. Cloanto also once had something called **Personal View**, but it seems not to exist anymore. They also once had a commercial PNG developer's kit for the Amiga, for which information was supposedly available via e-mail to 100145.15@compuserve.com or info@cloanto.it . Click here if the ViewDT link breaks.)

- **Viewer 95** - see **Quick View Plus** above

- **Viewer Pro!** [Brandyware Software] (*Windows 3.x*) - version 4.0(?) and later; read/write? freeware.

- **viewpng** [Glenn Randers-Pehrson] (*SGI Irix/X*) - all versions; read-only; includes early **MNG**

support; freeware. (Be sure to grab both **viewpng.gz** and **pnggzip.gz** . **This app is no longer under development.**)

- **ViewTEK** [Thomas Krehbiel] (*Amiga*) - any version via a PNG DataType (see the miscellaneous apps page for several); read-only; freeware; 425K. (Click here if link breaks.)

- **Visage** [Magnus Holmgren] (*Amiga*) - version 39.12 and later (natively), or any earlier version via a PNG DataType (see the miscellaneous apps page for several); read-only; full gamma support; full alpha support; progressive display of interlacing (four-pass replicating method)

- **Visere** [Digital Multi-Media Design] (*Win32*) - all versions; read/write; freeware.

- **VisualPng** [Willem van Schaik] (*Win32*) - all versions; read-only; requires **libpng** and **zlib**; freeware with source. (This is a very simple viewer designed to compile as an MSVC project in conjunction with the new DLL support in libpng 1.0.7. See also the related **FishEye** above.)

- **vPNG** [Viktar Pakhomau/Victor Pakhomov] (*Amiga 68k*) - all versions; read-only; for OS 3.0 and later; broken interlaced support; freeware for non-commercial use; 11k. (This is very closely related to **vPNG.datatype** on the toolkits page. Click here if link breaks.)

- **VuePrint** [Ed Hamrick] (*Win32*) - version 7.6 and later via the Microsoft Graphics Import Filters; read-only; shareware.

- **wb0** [Karel "Clock" Kulhavy] (*Linux/SVGA*) - version of 8 November 1999 and later; read-only; requires **libpng** and **zlib**; freeware (GPL) with source.

- **WebGraphics Optimizer** [Plenio Software Solutions] (*Win32*) - version 2.0(?) and later; read/write; no gamma support; no control over compression level or filtering (output was 10% bigger than input on one test image); broken 2-bit support; commercial.

- **WhimPro** [MoGrow] (*Win32*) - all versions; read/write; full alpha support; gamma support; shareware (freeware as an image viewer only). (This is a viewer/converter with a number of editing features, as well, including overlaying text.)

- **Windows Picture and Fax Viewer** [Microsoft] (*Windows XP*) - all versions; read-only? uses **libpng** and **zlib**; commercial.

- **WinJPEG** [PixVision Software] (*Windows 3.x*) - version 3.00 and later; read/write? shareware.

- **wxyzv** [David Flater] (*Unix/X*) - all versions; read-only; freeware (GPL) with C++ source.

- **xli** [Graeme Gill / Smarasderagd] (*Unix/X*) - version 1.17 and later (or version 1.16 with Smarasderagd's PNG patch); read-only; freeware with source. (Updated for **libpng** 0.90 and later.)

- **XnView** - see **Nview/Nconvert** above

- **XV** [John Bradley] (*Unix/X, VMS/X*) - version 3.10a and later with Greg Roelofs' jumbo patches (specifically, the enhancements one, whose PNG support is an extension of Alexander Lehmann and Andreas Dilger's old PNG patch version 1.2d); read/write; shareware with source. (XV 4.00 with full PNG support was supposed to have arrived around Christmas 1995. Perhaps John really meant Christmas 2005... A Win32 port apparently is [or was] underway at one point, too.)

- **Xzgv** [Russell Marks] (*Linux/GTK+*) - all versions? read-only; requires **Imlib**, **libpng** and **zlib**; freeware with source.

- **ZBoxZ** [Tom Zerucha] (*Palm OS*) - version 0.19x and later; read-only; requires **zlib**; freeware (GPL) with source. (This app was originally called **Boxer**, then **PiNGer**, now **ZBoxZ**; next week ...?)

- **Zgv** [Russell Marks] (*Linux/SVGA*) - version 2.7 and later; read-only; requires **libpng** and **zlib**; freeware (GPL) with source. (Bugs in 2.7: couldn't read interlaced PNGs at all; displayed 16-bit-per-sample PNGs incorrectly.)

- **Zoom Studio** [Inzomia] (*Win32*) - version 2.0(?) and later; read-only? commercial. (This is an image-gallery tool; it can show thumbnails or full images, manage collections, and export web pages.)

Here are some related PNG pages at this site:

- PNG-supporting Applications
  - Browsers
  - Image Editors
  - Image Converters
  - 3D Applications
  - Games / Entertainment
  - Office / Business Applications
  - Scientific / Graphing Applications

- Miscellaneous Applications
- PNG support in VRML browsers
- PNG-supporting Hardware

- PNG Home Page
- **Complete PNG Site Map**

Last modified 26 March 2006.

Image Editors with PNG Support

For the purposes of this page, an "image editor" is defined as a paint or drawing program that supports pixel-level editing (or the equivalent). As a general rule of thumb, if it's got a pencil or paint-brush tool, it's in; if it supplies only "algorithms" (such as sharpening, blurring, edge-detection, cropping, etc.), it's not. See the Image Converters page for applications in the latter class.

As on the other PNG-applications pages, links to home WWW sites or to downloadable versions are provided where known, but if a link is broken, check the location and see if an updated version is available (and please tell Greg!). Relevant operating systems are printed in (*parenthesized italics*).

These are listed alphabetically, more or less:

- **Ability Photopaint** [Ability Plus Software] (*Win32*, *Linux/X*) - all versions? read/write; commercial. (See also Corel's similarly named **Photo-Paint** below.)

- **Adesign** [Pierresoft] (*Win32*) - all versions; read/write; commercial.

- **Ameri-Imager** [ThinkTank Software] (*Win32*) - version 2.0(?) and later; read/write? **MNG** support; commercial. (This is an image and video editor that includes both PNG and MNG support.)

- **Applixware Graphics** - see **Applixware Office** on the office / business apps page

- **ArtEffect** [Haage & Partner Computer] (*Amiga*) - all versions; read/write; full alpha support.

- **ArtIcons** [Aha-soft] (*Win32*) - version 2.3 and later; read/write; full 32-bit alpha support as of version 3.22; shareware. (This is an icon editor for 32-bit Windows; PNG is fully supported in both the regular and the **Pro** versions, as well as the apparently related **IconXP** variant. Alpha support is relevant only to icons intended for Windows XP [and later], however.)

- **Artstream** [Mediascape] (*Irix/X, Linux/X*) - version 2.0 and later; read/write; full 32-bit alpha support; commercial. (This is primarily an OpenGL-based vector image editor, but it can include raster formats such as PNG in compositions, and it can save to various raster formats, including PNG. It can also import VRML models [which can have PNG textures]. The Linux port originally was expected to be in production release by early May 2000, but as of February 2002 it was still available only in beta [2.0] and alpha [2.1] forms.)

- **Aura** [NewTek / TVPaint Développement] (*Win32*) - version 2.0(?) and later; read/write; full 32-bit alpha support; commercial. (This is mainly an image editor, although it has extensions into the audio and video domains, too. **As of 31 March 2003, this product is no longer available separately from NewTek.** Apparently it is still available as part of NewTek's **Video Toaster** product, however, and standalone versions can be upgraded to TVPaint's **Mirage**, below.)

- **Becasso** [Sum Software] (*BeOS PPC/x86*) - version 1.1 and later; read/write (via the translation kit and Becasso's bundled PNG translator); full (32-bit) alpha support; no gamma support; commercial. (The PNG translator is also included in the free demo version.)

- **BePaint** [Kevin Hendrickson] (*BeOS*) - all versions; read/write (via Jon Watte's BeOS datatype library and Simon Clarke's PNG handler). (This app has not been updated since January 1997 and presumably no longer works with current BeOS releases.)

- **Canvas** [Deneba Software] (*Win32, Mac PPC, Linux/X*) - version 6.0 and later; read/write (read-only for Canvas 7 Linux beta); commercial.

- **Chaos Fx** [World of Newave] (*Win32*) - all versions? read/write; commercial.

- **Color It!** [MicroFrontier] (*Mac 68k/PPC*) - version 4.0 and later; read/write; commercial.

- **ColorWorks:WEB** [SPG] (*Win32*) - version 3.0(?) and later; read/write; commercial.

- **CompactDraw** [Mediachance] (*Win32*) - all versions; read/write; shareware. (This is a paint/draw program that supports both vector and bitmapped objects but apparently only exports bitmaps, including PNG. See **Real-DRAW**, below, for the "professional" version, or **Photo-Brush** for a photo-retouching editor.)

- **Composition** [Rob Davison / Clares Micro Supplies] (*RISC OS*) - version 1.15 and later; read/write; full 32-bit alpha support (including editing and combining alpha channels); uses **libpng**, **zlib** and **Spr2Png** (converters page); commercial. (This is an image-composition app, specifically designed to compose raster and vector images [and 3D models, too]. It can also generate drop-shadows and other alpha-channel effects. Free updates to the latest commercial version are available here.)

- **ConceptDraw** [Computer Systems Odessa] (*Mac OS X, Win32*) - version 1.7 and later; read/write; commercial. (This is a drawing and diagramming application oriented toward business and technical users.)

- **ConGo** [Matthias Matting] (*Win32*) - all versions; read/write; freeware. (This is an editor and

converter for Commodore 64 image formats; it can convert to/from various "Internet" formats, including PNG.)

- **CorelDRAW** [Corel] (*Win32, Mac PPC*) - version 7.0 and later (full version only); read/write; read-only alpha support in **DRAW** component (only for importing bitmaps, not exporting vector images); read/write alpha support (32-bit only) in **Photo-Paint** component; commercial. (The "**Select**" version 7 formerly bundled with scanners reportedly does *not* include PNG support.)

- **Corel Graphics Editor** - see **WordPerfect Office** on the office / business apps page

- **CorelXARA** [Xara] (*Windows 3.x, Win32*) - version 1.5; read/write; commercial. (Windows 3.x support requires win32s 1.3.) **This product has been discontinued.** See **Xara X** below.

- **Digital Image Pro** [Microsoft] (*Win32*) - all versions? read/write; commercial. (See also **Picture It!** below.)

- **D-Pixed** [DOIchan] (*Win32*) - all versions? with MIYASAKA Masaru's PNG loader/saver add-in; read/write; palette support only? uses **libpng** and **zlib**; freeware with source (add-in only). (This is a Japanese image editor.)

- **DrawPlus** [Serif] (*Win32*) - version 4.0 and later; write-only? commercial.

- **Embellish** [Dadaware] (*OS/2, Win32*) - all versions? read/write? terminal freeware (was commercial). (This editor shares some heritage with the excellent **JoeView** shareware image viewer for OS/2. **Development of this product was discontinued in December 1999, and Dadaware ceased operations.** The final commercial version was still available for a few more years, but as of late 2005, the domain is gone.)

- **Enhance** [MicroFrontier] (*Mac 68k/PPC*) - version 4.0 and later; read/write; no gamma support; commercial. (Enhance is a "Photoshop-like image editor" for Macintosh. The PNG support is still fairly basic.)

- **FilmFX** - see **Satori** below

- **Fireworks** [Macromedia] (*Win32, Mac*) - all versions; read/write (Fireworks' native file format, in fact); full alpha support, including *good* quantization to RGBA-palette mode in version 2.0; no gamma support; partial interlacing support; version 1.0 reportedly writes 1-bit images as 8-bit and includes spurious, incorrect sBIT chunk indicating 8-bit precision; commercial. (As of version 2.0, the quantization from 32-bit RGBA to 8-bit RGBA-palette appears to be perfect; Greg will do some personal testing soon. Even without that, this seems to be the best PNG-supporting image editor available as of mid-1999, though **The GIMP** is quite close. **Be sure to**

use "Export" rather than "Save" to create final PNGs for the Web! The "Save" versions include Fireworks object and state information, and not only are they huge, they also crash Windows Explorer and MSIE 4.0.)

- **Flash** [Macromedia] (*Win32, Mac PPC*) - version 4.0 and later; read/write; commercial. (This is an editor for the multimedia format of the same name, but Flash 4.0 and later include the capability to embed bitmapped images in PNG format into a Flash animation.)

- **FreeHand** [Macromedia] (*Win32, Mac PPC*) - version 7.0 and later; read/write; full alpha support; commercial. (According to Chris Lilley: "FreeHand has a rather nice interface when writing a PNG of a vector graphic - the amount of anti-aliasing (supersampling of pixels) and even the sampling method can be specified." Version 7.0 included **xRes** [below] and **Extreme3D** [3D apps page].)

- **FrontPage** - see **Image Composer** below

- **fxPAINT** [IOSPIRIT] (*Amiga*) - all versions; read/write; full alpha support as of version 2.0; commercial.

- **Gill** [Raph Levien, Larry Ewing, and others] (*Unix/GTK+*) - version of 1999-07-20 and later; read/write? full alpha support; requires **gdk-pixbuf**, **libpng** and **zlib**; freeware (GPL) with source. (This is a GNOME illustration app, a vector image editor that uses SVG as its native vector format. Since SVG in turn requires PNG for minimal conformance, Gill supports PNG, too. As of July 2000, the web pages imply that the PNG support is still read-only. **Development apparently ended sometime in 2000**.)

- **The GIMP** (**GNU Image Manipulation Program**) [Spencer Kimball, Peter Mattis, and many others] (*Unix/GTK+, Win32, OS/2, Mac OS X*) - versions 0.54, 0.60 and 0.99.7 and later; read/write; **MNG** support as of version 1.3.x (write-only); full alpha support (but also happily writes images with completely opaque alpha channels, needlessly harming compression efficiency); gamma support, but always writes 1.0 (incorrect for most systems) as of version 1.0.2 (this was fixed in version 1.1.7 of the PNG plug-in, which has its own release schedule); no support for palette-based transparency in stock 1.0.2 (but this is also fixed in version 1.1.7 of the PNG plug-in); good text support in PNG plug-in 1.1.7 (`Title`, `Author`, `Description`, `Copyright`, `Creation Time`, `Disclaimer`, `Warning`, `Source`, and `Comment` keywords); writes bKGD chunks even for opaque images (not a bug in itself, but triggers one in Netscape 4.x); uses **libpng** and **zlib**; freeware (GPL) with source. (The GIMP is a "free Photoshop-like image editor for X11," with built-in PNG support.)

- **GNOME-Iconedit** [Iain Holmes and Havoc Pennington] (*Unix/GTK+*) - all versions; read/write; full alpha support; requires **libpng** and **zlib**; freeware (GPL) with source. (This is an icon editor

with support for "icons" of any size. It is specifically designed to create and modify RGBA images.)

- **Grafree** - see **Imagem** below

- **GrafX** [Sunset Design / Eclipse] (*Win32*) - version 2.0 and later; read/write; palette-only support? freeware. (This appears to be a special-purpose image editor for "demos," standalone multimedia presentations. Judging by the screenshots, version 2 may be a port of an older DOS or Amiga version.)

- **GraphicConverter** [Lemke Software] (*Mac 68k/PPC, Mac OS X*) - version 2.1.4 and later; read/write; binary palette-transparency support; alpha-channel transparency support; gamma support as of version 4.0; text support as of version 4.0; no 16-bps support; shareware. (Comes in English, German, French, Danish, Dutch, Swedish, Norwegian, Italian, and Spanish versions. Older versions did not include complete image-editing capabilities and were listed on the viewers and converters pages.)

- **HoTMetaL PRO** [SoftQuad] (*Win32*) - version 3.0 (*Windows 3.x*) and later; read/write; commercial. This is more of a general-purpose web-page authoring tool, but as of version 3.0 it integrates image-editing features (in version 5.0, this is through the inclusion of Ulead's **PhotoImpact 3.02 SE**, below). See also **MetalWorks** below.

- **IconPainter** [Colin Mummery / EquitySoft] (*Java*) - version 1.3 and later; read/write; requires Java 2 and the Java Advanced Imaging API for PNG support; shareware. (Despite its name, this product does not restrict the size or number of colors in images to "typical icon" limits.)

- **IconWorkshop** [Axialis] (*Win32*) - version 6.0 and later; read/write; commercial. (This, as its name suggests, is an icon editor; it supports Windows [including Vista PNG-compressed icons], Mac OS X, and KDE and GNOME icon formats.)

- **IconXP** - see **ArtIcons** above

- **idrW** [Rean Botha] (*Win32*) - all versions; read/write; shareware/commercial. (This is a vector graphics editor; PNG is supported both for import [mainly so that raster images can be traced and converted to vector format?] and for export of finished images [though vector formats such as WMF are preferred].)

- **iGrafx Designer** [Micrografx] (*Win32*) - all versions? read/write; full 16-bit support? commercial. (This appears to be the high-end and/or next-generation version of **Picture Publisher** and **Webtricity**, below.)

- **Illustrator** [Adobe] (*Win32, Mac PPC*) - version 7.0 and later; read/write; hangs when reading a PNG image with a valid iCCP chunk (version 9.0); commercial. (Version 7.0 also supported Mac 68k.)

- **Image Broadway** [FileStream] (*Win32*) - version 3.0 and later; read/write; full alpha support; commercial.

- **Image Composer** [Microsoft] (*Win32*) - version 1.5 and later; read/write; full alpha support; reads images with invalid filter values as if filter type were `none'; commercial. (This is part of **FrontPage 98**. It was formerly known as **Altamira Composer** and may now be superseded by **PhotoDraw 2000** or **Photo Editor**, below.)

- **ImageForge PRO** [Cursor Arts] (*Win32*) - version 2.9(?) and later; read/write; transparency support as of version 2.94; shareware. (There's also a freeware version of this tool, called **ImageForge Basic** or just **ImageForge**.)

- **ImageFX** [Nova Design] (*Amiga*) - version 2.1a and later (natively), or any version via a PNG DataType (see the miscellaneous apps page for a couple); read/write; commercial.

- **Imagem** [Ivan Lee Herring] (*Windows 98*) - all versions? read/write; uses **PNG Delphi / TPNGImage** (see the toolkits page); freeware. (This was formerly known as **Grafree** and is also part of the **Image Locatable Holographics** package. See also **GRIP ICE** on the converters or viewers pages.)

- **imageN** [Pixoid / Pawel Szczerbina] (*Win32*) - version 1.4b(?) and later; read/write; freeware. (This is a full-featured image editor with a minimalist user interface and documentation.)

- **ImageReady** [Adobe] (*Win32, Mac PPC*) - all versions; read/write; full 32-bit alpha support; dithered binary transparency in palette PNGs; commercial.

- **ImageStudio** (*Amiga*) - version 2.1.1 and later with ImageStudioPNG add-on [88k]; read/write; shareware; 640k + 579k.

- **ImageStyler** [Adobe] (*Win32, Mac PPC*) - all versions; read/write; commercial.

- **Inkscape** [Inkscape developers] (*Unix/GTK+, Win32/GTK+*) - all versions? read/write; full alpha support? requires **libpng** and **zlib**; freeware (GPL) with source. (This is an "SVG editor with capabilities similar to Illustrator, CorelDraw, Visio, etc. Supported SVG features include basic shapes, paths, text, alpha blending, transforms, gradients, node editing, SVG-to-PNG export, grouping, and more." It is a fork of the **Sodipodi** project, which in turn was partly based on **Gill**.)

- **ivtools** [Stanford University and many others] (*Unix/X, Win32*) - version 0.9.5 and later; read-only? requires **pngtopnm**, **libpng** and **zlib**. (This is a "suite of free X Windows drawing editors for PostScript, TeX, and web graphics production, as well as an embeddable and extendable vector graphic shell.")

- **J-Painter** [Igor Zhukovsky] (*Java, WWW*) - all versions; read/write; no alpha support; requires Java (JDK) 1.1 or later; shareware. (This is a full paint-type applet that can be downloaded and embedded into web pages; the home page also includes an embedded copy that can be used to create a test PNG and e-mail the result to someone. [Very nice!])

- **Kai's Photo Soap** [MetaCreations] (*Win32*) - all versions; read/write; commercial. (This is a photo-retouching tool. The Mac/PPC version [1.0] has no native PNG support but will attempt to use a Photoshop PNG plug-in if it finds one; unfortunately, when it does so, it creates invalid PNG files [verified with Photoshop PNG plug-in 1.0d5]).

- **Kai's Power Tools** - see **Kai's Photo Soap** above and **xRes** below

- **Karbon14** [Rob Buis, Lenny Kudling, Benoit Vautrin, Tomislav Lukman] (*Unix/KDE*) - all versions? read/write with Qt Image IO Extension Library installed (read support only for application's icons?); freeware (GPL) with source. (This application replaces **Kontour**, below.)

- **KIllustrator** - see **Kontour** below

- **KImageShop** - see **Krita** below

- **Kontour** [Kai-Uwe Sattler] (*Unix/KDE*) - all versions? read/write with Qt Image IO Extension Library installed; freeware (GPL) with source. (Kontour was originally known as **KIllustrator**. As of 2005, it **"has been discontinued"**; its replacement is a new application, **Karbon14**, above.)

- **Krayon** - see **Krita** below

- **Krita** [Krita Team] (*Unix/KDE*) - all versions; read/write; full (non-palette) alpha support; full 16-bps support as of version 1.5 (coming); requires **ImageMagick**, **lcms**, **libpng**, and **zlib**; freeware (GPL) with source. (This is nominally part of **KOffice** and was originally known as **KImageShop**, then **Krayon**, and now **Krita**. A first preview release [pre-alpha] was announced in September 2004, followed by the first full release [1.4] in June 2005.)

- **LiveMotion** [Adobe] (*Win32, Mac PPC*) - all versions; read/write; commercial. (This is a Web-

oriented multimedia editing app with support for images, Flash animations and sound.)

- **MediaStudio Pro** [Ulead Systems] (*Win32*) - version 2.0 (*Windows 3.x*) and later; read/write; commercial.

- **Mirage** [TVPaint Développement] (*Win32, Mac OS X*) - all versions; read/write; full 32-bit alpha support; commercial. (This is the successor to **Aura**, above. Version 2.0 will support 16-bit-per-sample images and gamma correction.)

- **MS Paint** [Microsoft] (*Win32*) - versions in Windows XP(?) and later; read/write; commercial. (This is one of the "accessories" that has been bundled with Windows since its earliest days. PNG support is a relatively new feature, however.)

- **mvComicsMaker** [Michal Vagac] (*Linux/Qt*) - all versions? write-only? freeware with source. (This is a "free graphics editor for creating bitmap and vector animations under Linux." It can at least render to PNGs; it may also be able to read them.)

- **NeoPaint** [NeoSoft] (*Win32*) - version 4(?) and later; read/write; single-color transparency in 8-bit palette images (possibly broken in 1-bit and 4-bit); full 32-bit alpha transparency? no 16-bit support; shareware. (There is also an older DOS version, but it does not support PNG.)

- **NetStudio** [NetStudio] (*Win32*) - all versions; read/write; commercial.

- **OmniGraffle** [Omni Development] (*Mac OS X Server*) - all versions; write-only; full 32-bit alpha support; commercial/limited freeware. (This is an object-oriented drawing and charting program. "When you buy an app from us it gives you a warm, fuzzy feeling in your tummy, like if you ate some sweaters." See also **OmniWeb** on the browsers page.)

- **Painter** [Jan Verhoeven] (*Windows 9x/ME*) - version 22 and later; read/write; no transparency support? freeware.

- **Paint.Net** [Paint.Net developers] (*Win32.NET*) - all versions? read/write; full 32-bit alpha support as of version 2.1; freeware (MIT X11) with C# source.

- **Paint Shop Pro** [Jasc] (*Windows 3.x, Win32*) - version 3.01 and later; read/write; broken gamma and chromaticity support in 7.0 (writes zero values) and no gamma support in older versions; only simple (binary) transparency in version 3.x; 32-bit alpha support in version 4.0 and later (save with grayscale mask); "cheap" transparency (single-color RGB and grayscale) support in version 7.0 and later; no support for palette alpha (nor any plans to add support); writes unnecessarily large palettes and tRNS chunks (reportedly fixed in version 6.0); text support

(`Title`, `Author`, `Copyright`, and `Description` keywords); broken tIME support in version 6.0 (writes binary tIME data to "Creation Time" text chunk); uses **MNG** as its native "Animation Shop" format (up to date with current draft spec as of PSP7/AS3); commercial.

- **Personal Paint** [Cloanto] (*Amiga*) - version 6.3 and later; read/write; freeware, as of final 7.1b release (formerly commercial). (This was the first commercial app to ship with PNG support, in April 1995. Cloanto also made available a free **PNG DataType**, listed on the miscellaneous apps page, and had a commercial PNG toolkit for the Amiga, for which information was once available via e-mail to info@cloanto.com . As of early 2000, Personal Paint is available from Cloanto only as part of the **Amiga Forever** package, but it may be downloaded separately from Aminet or any of its mirrors.)

- **Photo-Brush** [Mediachance] (*Win32*) - all versions? read/write; shareware. (This is an image editor with special emphasis on photo-retouching. See also **CompactDraw**, above, and **Real-DRAW**, below.)

- **PhotoDesk** [Spacetech / Photodesk] (*RISC OS*) - version 3.0(?) and later; read/write; commercial.

- **PhotoDraw 2000** [Microsoft] (*Win32*) - all versions; read/write; commercial. (This was part of the Office 2000 suite and may have been the new name for **Image Composer** above. **This product has been discontinued.**)

- **Photo Editor** [Microsoft] (*Win32*) - all versions; read/write; full 32-bit alpha support; commercial. (This is another Microsoft image editor [see **PhotoDraw** above] and is similarly part of the Microsoft Office 97/2000/XP suite.)

- **Photogenics** [Paul Nolan / Idruna Software] (*Amiga, Linux, Win32, WinCE*) - version 2.0 and later (or version 1.2 with the **Photogenics PNG loader/saver**, listed on the toolkits page); read/write; full alpha support? full 16-bps support in **Photogenics HDR** 96-bit variant? commercial. (The PNG loader was "badly broken" in version 4.0, but the author reports that it was fixed as of version 4.1 or thereabouts [thanks to Oliver Roberts]. Photogenics was originally distributed by Almathera, which went out of business in early 1997; Paul Nolan, the original programmer, released version 4.0 on his own in April 1999 and version 5.0 under the Idruna name in 2001. Versions prior to 5.0 are available only for the Amiga.)

- **Photo>Graphics PRO** [TrueSpectra] (*OS/2, Win32*) - version 2.0 and later (OS/2) and version 1.1 (Win32); read/write; freeware (formerly commercial). (**This product has been discontinued as of 1 January 1999.** Until 31 December 1999, both versions were available from TrueSpectra's support page, but as of 1 January 2000, only the free registration keys are still visible. The key

for the OS/2 version (6.3 MB) is **TSPG20-000K-65WG8**, and that for the Win32 version (10 MB) is **TSPW10-000C0-2NY44** .)

- **PhotoImpact** [Ulead Systems] (*Win32*) - all versions; read/write; no gamma support; reads images with invalid filter values as if filter type were `none'; version 3.02 writes duplicate tEXt chunks and incorrectly writes "Author"-keyword chunks; commercial.

- **PhotoLine** [CiEBV / Computerinsel] (*Win32*) - version 2.2(?) and later; read/write; may still have problems with saving alpha channels; shareware.

- **Photonyx** [Chrome Imaging] (*Win32*) - all versions; read/write; commercial.

- **Photo-Paint** [Corel] (*Win32, Mac PPC*) - version 7.0 and later; read/write; full 32-bit alpha support in version 8.0 and later; ignores transparency in palette images; no 16-bit support (i.e., down-converts to 8-bit samples); commercial. (**This product is no longer available separately** but but only as part of **CorelDRAW Graphics Suite** above. See also the similarly named **Ability Photopaint** above.)

- **PhotoPlus** [Serif] (*Win32*) - version 6.0(?) and later; read/write? 32-bit alpha support; commercial.

- **PhotoSEAM** [Mediachance] (*Win32*) - all versions; read/write; shareware. (This is a limited version of **Photo-Brush**, above.)

- **Photoshop** [Adobe] (*Windows 3.x, Win32, Mac 68k/PPC*) - version 4.0 and later; read/write; full alpha support, but no palette transparency in versions prior to 5.5; broken gamma and chromaticity support in versions prior to 5.5 (gamma-writing appears to work in 4.0 only if the ambient-light setting is at `medium'; it is completely broken in 5.0--i.e., Photoshop records a value that is off by a factor of two, making images look far too dark; and gamma-reading is reportedly non-existent); broken iCCP support in 5.5 (writes faulty zlib wrapper on iCCP chunk, which can crash apps that use libpng 1.0.6's png_get_iCCP() function [fixed in 6.0]; can't read valid iCCP chunks); no support for PNG sRGB chunk (5.5 and later: uses iCCP chunk to store 2 KB sRGB profile instead of sRGB chunk to store single-byte "rendering intent"); partial 16-bps support as of 7.0 (read-only; broken in 5.5 and 6.x [high- and low-order bytes swapped] and non-existent in older versions; see Brendan Bolles' **SuperPNG** plug-in for full 16-bps read/write support); relatively poor compression in versions prior to 7.0 (slightly better but still not great in "Save for Web" mode); very slow compression in version 7.0; doesn't save text annotations; incapable of saving bi-level PNGs; commercial. See Chapter 4 of ***PNG: The Definitive Guide*** for information on making alpha-channel PNGs with Photoshop 4.0 and 5.0; technique should be applicable to later versions, as well. (Photoshop 3.0 for Windows is still supported via the **PNGForm.8BI** plug-in, but **Infinop's plug-in**, which provided equivalent support for PS 3.0 for

Mac, is no longer available. See also Macromedia's **xRes** below.)

- **PhotoStyler** [Adobe/Aldus] (*Windows 3.x*) - version 2.0 and later with Ulead UF2PNG.FIO plug-in; read/write; commercial. (Also see **Ulead Viewer** on the image viewers page. **PhotoStyler** died after Adobe's acquisition of Aldus.)

- **PhotoTiger** [Michael Moegn] (*OS/2*) - version 2.0(?) and later; read/write; shareware. (**As of 26 December 2002, this product is no longer available, and the company has ceased operations.**)

- **PhotoXL** - see **Satori** below

- **Picnic** [Peder Blekken] (*BeOS PPC*) - all versions; read/write; freeware. (This is a Photoshop/"GIMP-like paint/image-processing program." PNG is the *only* supported output format in version 0.4. Source code will eventually be made available.)

- **Picture Effecter** [Hiroaki Watanabe] (*Win32*) - all versions? read/write; uses **libpng** and **zlib**; freeware. (This is a Japanese special-effects tool, apparently, with support for colorspace conversions, convolutions, etc. It seems to be compatible with **Susie** image-format plug-ins [see the image viewers page], of which one is separately available at the link above, and it includes its own PNG export module. A tutorial/overview is also available.)

- **Picture It!** [Microsoft] (*Win32*) - version 2002(?) and later; read/write; commercial. (This is a basic image editor and print-shop application. See also **Digital Image Pro** above.)

- **Picture Publisher** [Micrografx] (*Win32*) - version 7.0 and later; read/write; commercial. (**Picture Publisher** is also incorporated into **Graphics Suite 2**, **Webtricity**, and "a few other suites published by Micrografx." See also **iGrafx Designer**, above.)

- **Picture Window** [Digital Light & Color] (*Win32*) - version 2.0(?) and later; read/write; read-only palette support; claims full 16-bit support (**Pro** version 2.5 and later); commercial.

- **Pixia** [Isao Maruoka] (*Win32*, *Linux/X*, *FreeBSD/X*) - version 1.9(?) and later; read/write; uses **libpng** and **zlib**; freeware. (This is the official English web site of a Japanese paint program. The Linux and FreeBSD versions are available only from the Japanese site.)

- **PixEdit** [Techsoft] (*Win32*) - all versions? read/write; commercial.

- **Pmacs** [ChangTa] (*Win32*) - all versions? read-only? alpha support? uses **libpng 0.95** and **zlib 1.0.4**; shareware.

- **PPT** - see the viewers or converters page

- **Real-DRAW** [Mediachance] (*Win32*) - all versions; read/write; 32-bit alpha transparency (claimed); shareware. (This is a higher-end paint/draw program than **CompactDraw**, above. It supports both vector and bitmapped objects and apparently can import and export both, too. See also **Photo-Brush**, above.)

- **RealWorld Icon Editor** [RealWorld Graphics] (*Win32, Win64*) - all versions; read/write; full alpha support (claimed); uses **libpng** and **zlib**; commercial.

- **Satori** [Spaceward Graphics] (*Win32*) - version 2.5 and later; read/write; full alpha support; full 16-bit support? commercial. (This is a high-end family of image-editing, compositing and special effects programs. **PhotoXL** is the scaled-down consumer version; **FilmFX** and **FilmFX64** are the high-end professional versions targeted at the film and video industry.)

- **Shake** [Nothing Real] (*Irix/X, Linux/X, Windows NT/2k*) - all versions; read/write; full 16-bit support; full alpha support; partial gamma support; color correction? commercial. (This is a high-end family of compositing and image-manipulation programs, used primarily for special effects in film. Version 1.0 consisted only of command-line tools, but 2.0 added a GUI interface. **Shake Render** is the medium-cost, command-line-only image-processing engine [for batch processing]. **Shake Lite** is the stripped-down, command-line-only version, but it is still capable of displaying and converting between a large number of image formats.)

- **Sketch** [Bernhard Herzog] (*Unix/X*) - all versions; read-only; freeware (GPL) with source. (This is a drawing program implemented in Python and therefore capable of importing any bitmapped image format supported by the **Python Imaging Library**--see the toolkits page for details.)

- **SmartDraw Photo** [SmartDraw.com] (*Win32*) - all versions; read/write; simple (binary) transparency support (both indexed and truecolor images); commercial. (See also its object-based sibling **SmartDraw** on the scientific / graphing apps page.)

- **Sodipodi** [Lauris Kaplinski and others] (*Unix/GTK+, Win32/GTK+*) - all versions? write-only? full alpha support? requires **libpng** and **zlib**; freeware (GPL) with C source. (This is a "vector-based drawing program" that uses SVG as its native format and that supports "antialiased display, alpha transparencies, vector fonts," etc. It was based in part on **Gill**; see also **Inkscape**.)

- **Take-1** [FileStream] (*Win32*) - version 2.0 and later; read/write; shareware. (This is a suite of "web-publishing tools," including an image editor, a [lossy] image optimizer/compressor, and an HTML editor.)

- **TuxPaint** [New Breed Software / Bill Kendrick] (*Linux/SDL, Win32/SDL, etc.*) - version 2002.08.23 and later; write-only? uses **SDL**, **libpng** and **zlib**; freeware (GPL) with source. (This is a paint program for children. It provides simple tools, a collection of clip art, and no access to the underlying file system. It should be easily portable to any OS with an SDL port--e.g., Mac OS, Mac OS X, etc.)

- **VideoStudio** [Ulead Systems] (*Win32*) - version 2.0 (*Windows 3.x*) and later; read/write; commercial.

- **Viscosity** [Jedor] (*Win32*) - all versions? read/write; full alpha support? commercial. (This is a full image editor, but it is primarily targeted at the creation of animations. PNG is supported as a still format.)

- **Visio** [Visio] (*Windows 3.x, Win32*) - version 4.1 and later (a patch [1.1M] with the new PNG and JPEG filters is available for users of version 4.0); read/write; commercial. (This is a suite of applications that includes **Visio Standard**, **Visio Technical**, **Visio Professional** and **Visio Enterprise**.)

- **WebImage** [Group 42] (*Windows 3.x, Win32*) - all versions; read/write; commercial. (Version 2.11 appears to be the final release; version 1.72 was the last for Windows 3.x.)

- **WebPainter** [Totally Hip Software] (*Mac PPC, Win32*) - version 3.0(?) and later; read/write; commercial.

- **Webstyle** [Xara] (*Win32*) - all versions; read/write; commercial. (This is an image editor specifically designed to produce web graphics; it appears to be what was formerly known as **Xara Webster** prior to version 3.)

- **Webtricity** [Micrografx] (*Win32*) - version 2.0(?) and later; read/write; commercial. (PNG support is via two included programs: **Picture Publisher** [above] and **Windows Draw**. See also **iGrafx Designer**, above.)

- **WinImages** [Black Belt Systems] (*Win32*) - version R5 and later; read/write; **MNG** support as of version R6 (write-only; read support expected in a subsequent maintenance update); commercial. (This is more of a special-effects and animation studio than a "normal" image editor.)

- **Wright Design** [Wright Technologies] (*Win32*) - all versions? read/write; commercial. (This image editor is targetted at "image compositing, photo retouching, vector drawing and typesetting/ page layout.")

- **Xara Webster** - see **Webstyle** above

- **Xara X** [Xara] (*Win32*) - all versions; read/write; commercial. (This was formerly known as **CorelXARA**.)

- **xart** [Rick Hohensee, David Koblas, Torsten Martinsen, Greg Roelofs] (*Unix/X*) - all versions; read/write; no alpha support; uses **libpng** and **zlib**; freeware with source. (This is Rick Hohensee's "mutant spawn" of **XPaint** (below), with emphasis on freehand drawing. This release appears to be a later version than that available from Rick's web page and may be the final version; 341K.)

- **xfig** [Supoj Sutanthavibul, Paul King, Brian V. Smith, and others] (*Unix/X*) - version 3.2.0 and later; read/write as of version 3.2.3d (older versions write-only); no transparency support; requires **pnmtopng** and **Ghostscript**; freeware (BSDish) with source. (This is a vector-based image editor, often used with TeX, that can nevertheless import a variety of bitmap formats. It uses the **TransFig** package for export, which in turn uses pnmtopng and/or Ghostscript for PNG support.)

- **XPaint** [David Koblas, Torsten Martinsen, Jean-Pierre Demailly, Greg Roelofs] (*Unix/X, OpenVMS/X*) - version 2.3.1-png and later (PNG support fully integrated as of version 2.4.2); read/write; no alpha support; uses **libpng** and **zlib**; freeware (BSDish) with source. (Torsten's old web pages are still available, but the old OpenVMS port [2.4.4] is not.)

- **XPhoto GIF Animator** [OmegaSoft] (*Win32*) - all versions; read/write; **MNG** support (read-only); commercial. (This is an image and animation editor, although it cannot write MNG images.)

- **xRes** [Macromedia / Fauve] (*Win32, Mac 68k/PPC*) - version 2.0 and later; read/write; full alpha support; no gamma support; commercial. (Version 2.0 was bundled with **Kai's Power Tools 3.0 SE**, and version 3.0 is part of **FreeHand 7** above.)

- **Zoner Draw** [Zoner] (*Win32*) - version 3.0(?) and later; read/write; commercial (version 4) or freeware (version 3).

Here are some related PNG pages at this site:

- PNG-supporting Applications
  - Browsers
  - Image Viewers

- Image Converters
- 3D Applications
- Games / Entertainment
- Office / Business Applications
- Scientific / Graphing Applications
- Miscellaneous Applications

- PNG support in VRML browsers
- PNG-supporting Hardware

- PNG Home Page
- **Complete PNG Site Map**

Last modified 7 May 2006.

Image-Conversion Applications with PNG Support

Many of the image-conversion applications listed here are also image viewers and are therefore listed on the PNG-supporting image-viewer page as well. Note also that image editors often have the ability to import and export many formats. Finally, not all of these applications convert both to and from the PNG format; the "read-only," "write-only" and "read/write" comments indicate the type of PNG support.

As on the other applications pages, links to home WWW sites or to downloadable versions are provided where known, but if a link is broken, check the location and see if an updated version is available (and please tell Greg!). Relevant operating systems are printed in (*parenthesized italics*), where "many" is defined as at least three of Unix, OS/2, Win32, DOS, Mac OS, etc.

These are listed alphabetically, more or less:

- **2PNG** [fCoder Group] (*Win32*) - all versions; read/write? full alpha support (including palette and 64-bit modes as of version 4.2); gamma support as of version 4.2; **MNG** and **JNG** support (read-only) as of version 2.0; commercial. (This is a non-graphical batch converter from various formats to PNG. The company sells other batch converters with read-only PNG support. See also **ImageConverter Plus** below.)

- **ACDSee32** [ACD Systems] (*Win32*) - version 1.0 beta 3 and later; read/write (read-only prior to version 3.0); full gamma support; progressive display of interlacing (sparse method); broken grayscale+alpha support; ignores background chunk; version 3.0 writes PNGs with no IEND chunk (fixed in 3.1); commercial. (This was formerly known as **ACDSee 95**.)

- **Adobe File Utilities by Mastersoft** - see **Quick View Plus** on the image viewers page

- **AdvanceCOMP** [Andrea Mazzoleni et al.] (*DOS, Win32, Linux*) - version 1.2 and later; read/write; **MNG** support; freeware (GPL) with source. (This is now a dedicated set of recompression utilities [optimizers], originally part of the **AdvanceSCAN** "command-line ROM manager" for various MAME game-engine implementations. It includes **AdvancePNG** and **AdvanceMNG** [or **advpng** and **advmng**], the latter of which is capable of splitting PNGs out of a MNG animation [as of version 1.6] and of converting a sequence of PNG images back into a single MNG [as of version 1.9]. advpng originally was called **zpng** and was part of the **AdvanceMAME** game emulator. Note that, as of version 1.9, it apparently still works only on non-interlaced palette, RGB, and RGBA PNGs [i.e., no grayscale, gray+alpha, or interlaced].)

- **Advanced Batch Converter** [Gold-Software Development] (*Win32*) - version 3.5(?) and later; read/write; **MNG** (read-only) and **JNG** (read/write) support; commercial.

- **Advanced Slide Show** [Gold-Software Development] (*Win32*) - all versions? read-only; **MNG** and **JNG** support; commercial.

- **AdvancePNG** - see **AdvanceCOMP** above

- **AdvanceSCAN** - see **AdvanceCOMP** above

- **AhaView** [Aha-soft] (*Win32*) - all versions; read/write as of version 2.0b; shareware. (Version 1.1 is freeware but has read-only support for PNG.)

- **AI Picture Explorer / AIPICX** [Applied Insights] (*Win32*) - all versions; read/write. (This app not only views images but also creates web pages with image thumbnails.)

- **AI Picture Utility / AIPICT** [Applied Insights] (*Win32*) - all versions; read/write

- **Alter Image 32** [Nun's Meadow Software] (*Win32*) - all versions; read/write; reportedly converts bi-level (1-bit) TIFFs into 24-bit PNGs.

- **A Mort les GIFs** [Damien Guillaume] (*Java*) - all versions; write-only; **MNG** support (write-only); no transparency support; freeware (GPL) with source. (This is a Java application to convert GIFs into PNGs or MNGs. It uses delta-encoding to compress the MNG streams as much as possible [which also loses any transparency], and two third-party MNG viewers are included, one in Java by Shinya IKEDA and one for Mac OS by Tarkvara Design. Note that the application is in French, but it's straightforward to use. It requires JDK 1.3 or later.)

- **any2png** [Juhapekka Tolvanen] (*Unix*) - all versions; write-only; requires **ImageMagick**, **gif2png**, **pngcrush** and **pngrewrite**; freeware (GPL) with source. (This is a Bourne-shell script to convert various image formats to PNG. It may work with Cygwin on Win32, also.)

- **Any to Icon** [Aha-soft] (*Win32*) - all versions; read-only; alpha support as of version 1.25; shareware. (Converts to Windows .ICO format; see also **Icon to Any** below.)

- **Ashampoo Photo Commander** [Nikolaus Brennig] (*Windows 2k/XP/2003*) - all versions; read/write; **MNG** (read/write) and **JNG** (read-only) support; commercial. (This is the commercial successor to **SlowView**. It was previously known as **Mediafile Assistant**.)

- **AutoGraphicsHTML** [fCoder Group] (*Win32*) - all versions? read-only; **MNG** and **JNG**

support as of version 5.7; commercial. (This is a utility to create web-based photo albums. The output format is restricted to GIF or JPEG, however.)

- **AutoImager** [Mystik Media] (*Win32*) - all versions; read/write; transparency support; commercial. (This is a batch conversion utility with image-manipulation capabilities. It includes a small preview display showing the effects of a given operation, although it's not really a full image viewer.)

- **Batch It! Pro** [AbleSoft] (*Win32*) - all versions; read/write; shareware. (PNG is also supported in version 2.0(?) and later of **Batch It!**.)

- **BeShow** [Jeremy Moskovich] (*BeOS DR8*) - all versions with the translation kit (or Jon Watte's **Datatypes library**) and Simon Clarke's **PNGHandler** (see the toolkits page); read/write; 191k. (Not updated for current BeOS releases.)

- **bmp2png / png2bmp** [MIYASAKA Masaru] (*DOS, Win32, Unix, etc.*) - all versions; read/write; interlacing support; simple transparency support as of version 1.60; alpha support as of version 1.62; requires **libpng** and **zlib**; freeware with C source. (This is a pair of command-line converters between Windows BMP format and PNG. For the sake of search commands, we'll mention bmptopng and pngtobmp, too.)

- **Cameleo** [Caldera Graphics] (*Unix/X*) - version 2.2(?) and later; read/write; commercial. (There is also a LIGHT version.)

- **CCViewer** [Castillo Bueno Systems] (*Win32*) - version 4.2 and later; read/write; commercial.

- **ColourEdit** [Julian Highfield] (*Mac OS/OpenDoc*) - all versions? read/write. (A Unix/Tcl/Tk port is reported to be 80% finished as of May 1998.)

- **CompuPic / CPIC** [Photodex] (*Windows 3.x, Win32, Mac PPC/68k, Linux*) - all versions; read/write; no gamma support; progressive display of interlaced images (replicating method)

- **CompuShow / CShow** [Bob Berry] (*DOS*) - version 9.01a and later; read/write; interlacing and low-bit-depth PNG-writing code broken in 9.01a; ignores gamma chunk but has generic option to adjust display gamma; progressive display of interlaced images (replicating method); 265k

- **CompuShow 2000! / 2Show** [Bob Berry] (*DOS*) - version 2.01a and later; read/write; bugs in versions prior to 2.03a; ignores gamma chunk but has generic option to adjust display gamma; progressive display of interlaced images (replicating method); 258k

- **ConGo** [Matthias Matting] (*Win32*) - all versions; read/write; freeware. (This is an editor and converter for Commodore 64 image formats; it can convert to/from various "Internet" formats, including PNG.)

- **Creator** [John Kortink] (*RISC OS*) - version 3.20 and later; read/write; no alpha or gamma support; shareware.

- **CryptaPix** [Kent Briggs / Briggs Softworks] (*Win32*) - version 1.0 and later; read/write in version 1.1b and later; shareware. (Versions prior to 2.0 were also available for Windows 3.x.)

- **CSView Plugins** [CSU Software Solutions] (*Win32*) - all versions? read-only or read/write, depending; commercial. (**CSView40**, **CSView130** and **CSView150** all include stand-alone viewers and Netscape plug-ins. Some configurations include batch converters capable of writing PNG images, as well.)

- **DeBabelizer** [Equilibrium] (*Mac 68k/PPC*) - version 1.6.5 and later; read/write; claims full gamma support as of version 3.0; commercial.

- **DeBabelizer Pro** [Equilibrium] (*Win32*) - all versions; read/write; claims full gamma support as of version 4.5; commercial.

- **dicom2** [Sébastien Barré] (*Win32, Linux, SunOS/Solaris*) - version 1.8 and later; write-only; uses **libpng** and **zlib**; freeware. (This tool converts medical images from either DICOM or ACR/NEMA format to PNG, BMP, TARGA, DICOM or raw formats. 12-bit grayscale images are upsampled to 16-bit PNGs.)

- **Display** [Jih-Shin Ho] (*DOS*) - version 1.88 and later; read/write; gamma support in beta version 1.90t2 and later. (Also on Simtel.Net mirrors: disp189a.zip [740k] and disp189b.zip [532k, optional]. See also the unofficial web page.)

- **Drag And View** [Canyon Software] (*Windows 3.x, Win32*) - version 2.0(?) and later; read-only; shareware.

- **DTA / Dave's TGA Animator** [David K. Mason] (*DOS, Windows 3.x*) - version 2.2 and later; read/write; shareware. (This handy utility converts single images into FLI/FLC animations and back again. It appears that version 3.0 will be the final release.)

- **DTPicView** [Edmund Vermeulen] (*BeOS*) - all versions with the translation kit (or Jon Watte's **Datatypes library**) and Simon Clarke's **PNGHandler** (see the toolkits page); read/write; progressive display in version 2.0 and later

- **dvipng** [Jan-Åke Larsson] (*Unix, Win32, etc.*) - all versions; write-only; requires **gd**, **libpng** and **zlib**; freeware (GPL) with source. (This creates PNG images from TeX DVI output. "It supports PK, VF, PostScript, and TrueType fonts, color, and PostScript inclusion.")

- **dvips** [Tomas Rokicki] (*Unix, Win32, etc.*) - version 5.86 and later with Dirk Krause's **bmeps** add-on (formerly known as **dvipskpng** or the **dvipsk + PNG** add-on); read-only; requires **libpng** and **zlib**; freeware with source. (dvips (k) converts from TeX's DVI format to PostScript; Dirk's add-on enables embedded PNG images to be converted properly, too, without external converters. See also **pdftex** below.)

- **Easy Graphics File Converter** [Hermetic Systems] (*Win32*) - all versions; read/write; uses **BMGLib**, **libpng** and **zlib**; commercial.

- **Easy Thumbnails** [Fookes Software] (*Win32*) - all versions; read/write; freeware.

- **ecg2png** [Lawrence E. Widman] (*Unix/Qt*) - all versions; write-only; requires **Qt**, **libpng**, **zlib**, and optionally **gd**; freeware (GPL) with source. (This app converts high-resolution electrocardiogram scans to more Web-friendly, three-color PNGs. It appears to use Qt for most of its reading and writing capabilities.)

- **eps2png** [Johan Vromans] (*Perl*) - all versions; write-only; requires **ghostscript** (which requires **libpng** and **zlib**); freeware (Artistic/GPL) with source. (This app converts encapsulated PostScript to PNG or other bitmap formats.)

- **EscapeE Professional** [RedTitan Technology] (*Win32*) - version 4.40 and later; write-only; commercial. (This is a converter from Hewlett-Packard Laserjet PCL and HPGL formats to other things, including PNG. Note that the lower-cost **Viewer** and **Transformer** variants do *not* support PNG, although the latter supports conversion to TIFF. See also **tiff2png** below.)

- **The Exorcist** [Nigel Stewart] (*Win32*) - any version; write-only; freeware. (This is a GUI version of **gif2png** that supports drag and drop, etc.)

- **EyeBatch** [Atalasoft] (*Win32*) - all versions; full alpha support claimed; full gamma support; read/write; shareware. (This is a batch image processor and viewer; in addition to conversions, it can blur, sharpen, rotate, adjust contrast, and so forth.)

- **Favorez** [WarpGear Software] (*Win32*) - all versions; write-only; binary transparency support as of version 1.1; shareware/adware. (This is a specialized program that lives in Internet Explorer's toolbar and creates a "favorites web page" from stored bookmarks; as part of that, it also converts "favicons" to PNG format.)

- **FishEye** [Willem van Schaik] (*Win32*) - all versions; read/write; uses **libpng** and **zlib**; shareware.

- **fly** [Martin Gleeson] (*Unix, Win32, etc.*) - version 2.0.0 and later; write-only; requires **gd**, **libpng** and **zlib**; freeware (BSDish) with C source. (This is a "text-to-image" converter; that is, it reads a text script with drawing commands and produces a corresponding raster image. It is primarily intended for use by CGI scripts. Older versions probably can be made to produce PNG output, too, simply by recompiling with a newer version of the **gd** library.)

- **FOP** [Apache Software Foundation] (*Java*) - version 0.20.3 and later; read-only? uses **JIMI**; freeware (Apache) with source. (This is a "print formatter driven by XSL formatting objects." Basically it's a command-line Java application to convert XML+XSL to PDF, SVG, PostScript, plain text, or any of several other formats. It can also be used to render directly to screen or printer. SVG and PNG images may be embedded in documents.)

- **Formati** [Jan Verhoeven] (*Win32*) - version 8 and later; read/write; full alpha support (both single, uniform value for entire image [e.g., 25% transparent] and via second image used as alpha mask); uses **PNG Delphi / TPNGImage** and **zlib**; freeware.

- **FuturixImager** [Alexander S. Tereschenko] (*Win32*) - version 1.6 and later; read/write as of version 2.0b1 (read-only in 1.x); **MNG** (read-only) and **JNG** (read/write) support; write support for transparency in PNG and JNG as of version 2.01; uses **libmng**, **libpng**, and **zlib**; freeware. (This was formerly known as **Futuris Imager**.)

- **Galleria** [Bitware Australia] (*OS/2*) - version 2.3(?) and later; read/write; shareware. (Write support requires shareware registration.)

- **GConvert** [G.D.G. Software] (*Win32*) - version 3.8.0 and later; write-only? shareware.

- **GEM-View** [Dieter Fiebelkorn] (*Atari*) - version 3.0 and later with Eric Prevoteau's PNG load/save modules [37k]; read/write

- **gerbv** - see the scientific and graphing apps page

- **Ghostscript** [Aladdin] (*Unix/X, VMS/X, DOS, OS/2, Win32, Windows 3.x, Mac PPC/68k, Amiga, Atari, RISC OS, SMS/QDOS, Plan 9, etc.*) - version 3.51 and later (may be broken in some versions prior to 4.0); write-only; requires **libpng** and **zlib**; freeware (AFPL/GPL) with source. (PNG support by Russell Lang.)

- **gif2png** [Alexander Lehmann, Greg Roelofs, Eric Raymond] (*Unix, Win32, DOS, Macintosh,*

Amiga, etc.) - the official GIF-to-PNG converter; requires **libpng** and **zlib**. (In addition to the Linux executables at the main link, gzip'd Solaris (51K) and SCO OpenServer (41k) binaries and a 32-bit Windows binary (112k) are available, and older executables for Amiga (403k), DOS (137k), and Macintosh (296k) are also available. See also **The Exorcist** above [a Win32 graphical port with drag-and-drop support] and the Japanese gif2png page.)

- **GIF Construction Set** [Alchemy Mindworks] (*Windows 3.x*) - version 1.0d and later; read-only

- **GIFConverter** [Kevin Mitchell] (*Macintosh*) - version 2.4 and later; read/write; uses **libpng** and **zlib**. (Prerelease available as of 25 September 1996.)

- **GifWizard** [Evgeny Shamin / fCoder Group] (*Win32*) - all versions; read-only; shareware. (This app converts various image formats to GIF.)

- **gj2png** [Neil Aggarwal] (*Java*) - any version; write-only; requires Java 1.1 or later

- **GraphicConverter** - see the image editors page

- **Graphic Workshop Professional** [Alchemy Mindworks] (*Win32*) - version 1.1q and later; read/write; writes unnecessarily large palettes; writes invalid tEXt chunks (control characters; CR instead of LF); shareware. (Version 2.0a patch 42 is claimed to have solid PNG support, but various older versions didn't support gamma correction and [in very old versions] had compression and filtering bugs. The original **Graphic Workshop** was also available for DOS and 16-bit Windows.)

- **GraphX Viewer** [Group 42] (*Windows 3.x*) - version 1.51; read/write; full gamma support; shareware. (**This app is no longer under development.**)

- **GRIP ICE** [Ivan Lee Herring] (*Windows 98/XP*) - all versions? read/write; uses **PNG Delphi / TPNGImage** (see the toolkits page); shareware. (The name stands for *Geographic Raster Image Processor / Investigate Classify Extrapolate*. See also **Grafree** on the editors page.)

- **HiJaak PRO** [Inset / Quarterdeck / IMSI] (*Win32*) - versions 95 and 4.0 and later; read-only. (This product was called **HiJaak 95** for one[?] release, possibly equivalent to version 3.0. It was later renamed "Pro," presumably after Inset was acquired by Quarterdeck, and then recapitalized "PRO" with its sale to IMSI. See also PC Magazine's *First Looks* review [95] or CNET's *Just In* review [Pro 4.0] for more information.)

- **hp2xx** [Heinz Werntges, Martin Kroeker] (*Unix, VMS, DOS, OS/2, Amiga, Atari, etc.*) - version 3.3.0 and later; write-only; requires **libpng** and **zlib**; freeware (GPL) with source. (This program

converts from HPGL to a variety of formats. The home page is fairly useless, but the sources can be downloaded directly from the GNU ftp site.)

- **Icons Control 2001** [Chris Doan] (*Win32*) - version 5.25(?) and later; read-only; shareware. (This utility converts images to Windows .ICO format. It was formerly known as **Icons Control 95** and **Icons Control 32**.)

- **Icon to Any** [Aha-soft] (*Win32*) - all versions; write-only; alpha support as of version 1.22; shareware. (Converts from Windows .ICO format; see also **Any to Icon** above.)

- **Image Alchemy** [Handmade Software] (*DOS, OS/2, Macintosh, Unix/Motif*) - version 1.9 and later; read/write; no interlacing; grayscale broken in 1.9 beta; alpha transparency broken in 1.9 beta but claimed to be fully supported in version 1.10; full gamma and color correction? commercial. (This is primarily an image-conversion app, but the OpenLook- and Motif-based commercial versions for Sun, SGI and HP workstations also have viewing capabilities, as do the DOS version and the **now-terminated Macintosh port**. The versions for OS/2, Linux, BSD/OS, SCO Unix, Solaris/x86, AIX and Digital Unix only do conversions.)

- **Image Alchemy** [Handmade Software] (*DOS, OS/2, Macintosh, Unix/Motif*) - version 1.9 and later; read/write; no interlacing; grayscale broken in 1.9 beta; alpha transparency broken in 1.9 beta but claimed to be fully supported in version 1.10; full gamma and color correction? (This is primarily an image-conversion app, but the OpenLook- and Motif-based commercial versions for Sun, SGI and HP workstations also have viewing capabilities, as do the DOS and **now-terminated Mac** versions. The versions for OS/2, Linux, BSD/OS, SCO Unix, Solaris/x86, AIX and Digital Unix only do conversions.)

- **Image Arithmetic** [Richard van Paasen] (*Windows 3.x, Win32*) - version 2.0 and later; read/write; shareware. (This is primarily used for combining images in various ways, but it appears to support straight image-conversion as well.)

- **Image Browser Arctic** [Uticasoft / Jobin Rezai] (*Win32*) - version 4.2 and later; read/write; freeware. (This is an image viewer/converter with slideshow capability.)

- **ImageConverter Plus** [Evgeny Shamin / fCoder Group] (*Win32*) - version 3.3(?) and later; read/write; **MNG** and **JNG** support (read-only) as of version 6.0(?); commercial. (This is a GUI image-viewer and converter with some basic manipulation capabilities; it can also plug itself into the Windows Explorer/menu system. See also **2PNG** above.)

- **Image Engineer** [Simon Edwards / Marko Seppänen] (*Amiga*) - version 3.3 and later; read/write; uses the **SuperView Library** for reading and writing image formats (see the toolkits page); shareware. (This program also supports various forms of image manipulation, including motion

blur, alpha compositing, sharpening, and embossing.)

- **Image Explorer Pro** [CDH Productions] (*Win32*) - version 5.2(?) and later; read/write; commercial. (This viewer/converter claims to support MNG in addition to PNG, but reportedly that support is limited to reading single PNGs wrapped in MNG headers--i.e., MNG support is virtually non-existent.)

- **ImageJ** [Wayne Rasband] (*Java*) - version 1.09k and later with a plugin; read/write; requires JIMI; freeware with source. (This is a Java image-processing program geared toward scientific and medical imagery.)

- **ImageMagick convert** [John Cristy] (*Unix/X, VMS/X, Win32/X, Mac OS*) - version 3.6.3 and later; read/write; full gamma support; full chromaticity support? broken support for sub-8-bit grayscale PNGs in versions prior to 5.1.0; minimal MNG support as of version 3.9.2 and full **MNG-LC** support (read/write) as of version 4.2.4 (broken in versions 5.2.7 through 5.3.6); **JNG** support as of version 5.5.2; requires **libpng** and **zlib**; freeware with source. (This is a multi-format converter with the ability to convert to MNG all GIF animations that do not use [the relatively rare] disposal method "restore to previous.")

- **Imagenation** [Spicer] (*Windows 3.x, Win32*) - version 4.2 and later; read/write

- **imagENGine** [ISS] (*Win32*) - all versions; read/write; shareware. (This is a batch viewing/conversion application. It can do basic algorithmic manipulations, including blurring, sharpening, equalization, etc.)

- **Image Optimizer** [xat.com] (*Win32*) - all versions; read/write (read-only for truecolor PNGs); no gamma support; no alpha support; writes unnecessarily large tRNS chunks; shareware. (This is a utility to compress images better, primarily by allowing--or forcing--the user to reduce the number of colors in an image. That is, it uses lossy methods, unlike **pngcrush** below. Reportedly it can only create palette PNGs.)

- **ImagePDF** [Apex Internet Software] (*Unix, Win32*) - all versions; read-only; "retains most relevant image tags," possibly including text annotations; commercial. (This is a command-line program and shared library/DLL that converts images to Adobe's PDF format.)

- **Images ASaP** [Pegasus Software] (*Win32*) - all versions? read/write? commercial. (This is an ASP control to dynamically manipulate and convert images uploaded from client browsers, and then make the modified versions available to the clients via a web server.)

- **ImageWalker** [Zac Walker] (*Win32*) - all versions? read/write; **MNG** and **JNG** support (read-only); uses **libmng**, **libpng** and **zlib**; shareware.

- **Imagine!** [Andrikkos Software] (*Win32*) - version 1.2(?) and later; read/write; commercial. (This is a viewer/converter with basic manipulation capabilities, including resizing and rotation by an arbitrary angle.)

- **imc** [Peter Verthez] (*Perl/Unix*) - version 4.0 and later; write-only; requires **GD.pm**, **gd**, **libpng** and **zlib**; freeware (GPL) with source. (This is an "image compiler," a.k.a. a text-to-PNG converter; it reads a very simple, custom image description format and writes it as a PNG image. It's designed for use on web sites; its language includes chart types. See also **SNG** below.)

- **img2pdf** [Greg Roelofs] (*Unix, Win32, OS/2, etc.*) - all versions; read-only; uses **Panda** (see toolkits page), **libpng** and **zlib**; freeware (GPL) with source. (This is a very simple program to convert one or more PNG, TIFF, and/or JPEG images into a single PDF document.)

- **img2png** [Guido Vollbeding] (*Atari*) - version 26.Jun.1998 and later; write-only; no grayscale support; no alpha support; uses **libpng** and **zlib**; freeware with source. (This is a "quick and dirty" program to convert Atari IMG format to PNG.)

- **IrfanView32** [Skiljan Irfan] (*Win32*) - version 1.85 and later; read/write; **MNG** and **JNG** support as of version 3.70 (read-only?); mediocre compression in old versions (before 2001?); incorporates **PNGOUT** optimizer (plug-in) as of version 3.97; freeware (for non-commercial use).

- **IvanView** [Ivan A. Kotenev] (*Win32*) - version 1.1.22 and later; read/write; **MNG** (read-only) and **JNG** (read/write) support; commercial.

- **iView MediaPro** [iView Multimedia] (*Mac OS, Mac OS X*) - all versions? read/write; commercial.

- **KeyView Pro** [FTP Software / Verity] (*Windows 3.x, Win32*) - version 4.2 and later; read/write. (FTP Software sold KeyView to Verity in late 1997. See also its entry as a **Netscape Navigator** plug-in on the browsers page.)

- **Konvertor** [Logipole.com] (*Win32*) - version 2.10(?) and later; read/write; **MNG** support; commercial. (This is a batch converter; a single-function GIF-to-PNG subset is also available. For the French version of the web page, follow the Logipole.com link above.)

- **LatinByrd** [Stefan Schneider Software] (*NeXT, NeXTStep/OpenStep 4.x for Mach*) - version II and later; write-only; can quantize and dither RGBA TIFF images to RGBA-palette PNG images. (The full version of the app also converts RTF and ASCII to HTML. The image-converter part

can use an image-filter application such as **ToyViewer** to view the intermediate results. Motorola, Intel, HP PA-RISC and SPARC versions are available.)

- **mag2png** [Zhidao] (*many*) - all versions; write-only; uses **libpng** and **zlib**; freeware with source. (This is a utility to convert from the Japanese MAG format [MAKIchan Graphic format] to PNG.)

- **Mastersoft converter** - see **Quick View Plus** on the image viewers page

- **Mediafile Assistant** - see **Ashampoo Photo Commander** above

- **MRIcro** [Chris Rorden] (*Win32, Linux/X*) - all versions; read/write; freeware. (This is primarily a viewer for 2D and 3D medical formats--Analyze, DICOM, etc., which it can convert to 8-bit PNGs--but it can also view a number of generic 2D image formats, including PNG.)

- **MyAlbum** [DigitalMATRIX Software / Pierre Meindre] (*Win32*) - version 1.32 and later; read/write; no gamma support; uses **libpng** and **zlib**; freeware. (This is a photo album and slide-show application that can additionally convert and resize images.)

- **NetPBM** / **PBMPlus** - see **pnmtopng** below

- **Nview/Nconvert/XnView** [Pierre-e Gougelet] (*Atari, DOS, Unix/X, Windows 3.x, Win32, OS/2, BeOS*) - version 2.70(?) and later (Nview/Nconvert) or all versions (XnView); read/write; **MNG** and **JNG** support (read-only) as of XnView version 1.61; freeware (for non-commercial use). (Nview and Nconvert are the older, command-line-only version; XnView is the newer windowed version. The primary release is in French, but dozens of translations are available. An English page is also available.)

- **OptiPNG** [Cosmin Truta] (*Unix, Win32*) - all versions; read/write; uses **libpng** and **zlib**; freeware (zlib/libpng) with source. (This is a command-line utility to compress PNG images better--i.e., it converts PNGs into smaller PNGs, completely losslessly, by optimizing the color type [e.g., RGB to gray, strip blank alpha, etc.] and the filtering and compression strategies. All tests are performed in memory, so it's fast. See also **pngcrush** and **pngrewrite** below.)

- **Panoweaver** [Panorama Technologies] (*Win32*) - all versions? read/write; commercial. (This is special-purpose converter to weave 360-degree [or 4-pi] panoramas out of standard images created with a fisheye lens. PNG is supported for both input and output images, and a Java applet is used for viewing the results.)

- **pdf2html** [Karel "Clock" Kulhavy] (*Unix*) - all versions; write-only; requires **Ghostscript**, **libpng** and **zlib**; freeware with source. (Unlike the similarly named **pdftohtml**, below, this utility

converts each PDF page to a single PNG image--with oversampling--and wraps the result in minimal HTML.)

- **pdftex / pdflatex** [Han The Thanh] (*Unix, Mac OS X, Win32*) - all versions? write-only? freeware with source. (This program converts **TeX** and **LaTeX** documents into Adobe PDF format, including embedded PNG images. The primary ftp site is no longer maintained and is difficult to reach; a final mirror snapshot is available at CTAN, while the most up-to-date sources are now buried within the TeX Live distribution. A pdftex support page is also available. See also **dvips** above.)

- **pdftohtml** [Gueorgui Ovtcharov, Rainer Dorsch] (*Unix*) - version 0.2 and later; write-only? requires **pnmtopng**, libpng, zlib and libjpeg; freeware (GPL) with source. (This converts PDF documents into HTML format, including embedded bitmap images--which are saved in either PNG or JPEG format. It is based on Xpdf. See also **pdf2html** above.)

- **pho** [Akkana] (*Unix/GTK+*) - all versions? read/write; requires **gdk-pixbuf**, **libpng** and **zlib**; freeware (GPL) with source. (This is an image viewer "for viewing large numbers of images quickly, rotating or deleting some, and making notes about what to do with each image.")

- **PicCon** [Morten Eriksen] (*Amiga*) - any version via a PNG DataType (see the miscellaneous apps page for several); read-only; shareware; 126k. (Click here if link breaks. Last updated in August 1994 for OS 2.04 [V37].)

- **PixelTex** [Stuart Williams / Virtuality] (*Win32*) - all versions; read-only; freeware. (This is a tool to convert from PNG and JPEG images to VRML97 PixelTexture nodes. PNG alpha/ transparency support is reportedly coming.)

- **PixFolio** [ACK Software] (*Windows 3.x, Win32*) - version 2.0 and later; read/write

- **PixiePlus** [Daniel "Mosfet" Duley] (*Unix/KDE3*) - all versions; read/write; full alpha support; requires **libpng** and **zlib**; freeware (QPL) with source. (This is an image manager with viewing, conversion, thumbnail, and manipulation capabilities, including support for batch-mode operations.)

- **PixJet** [Techsoft] (*Win32*) - all versions? write-only; commercial. (This is a special-purpose converter that acts as a Windows printer but instead converts whatever is being "printed" to various image formats, including PNG, PDF, etc.)

- **PixWizard** [PixVision Software] (*Win32*) - version 1.10 and later; read/write? shareware. (This appears to be the 32-bit Windows version of **WinJPEG** and **PMJPEG** below.)

- **PK's Image Viewer (PkImgView)** [Pranjal Kumar Hazarika] (*Win32*) - all versions; read/write; uses **FreeImage**, **libpng**, and **zlib**; freeware.

- **Platypus Animator** [C Point] (*Win32*) - version 5.1 and later; read/write? shareware. (This is primarily a creation tool for AVI animations, including conversion from collections of PNG stills, but it can also extract still images from AVIs [presumably including PNGs], and it can view individual frames or the entire animation.)

- **PlotMaker** [SailScience] (*Mac OS, Mac OS X*) - version 3 and later; read/write? commercial. (This is a specialized tool for reading CAD formats containing sail designs, arranging the panels for optimal use of sail fabric, and plotting the results. However, it can also export to various CAD formats and apparently can output PNG images as a special type of plot. It may be able to read PNG images associated with CAD models, as well, and it may be related to the identically named utility that ships with **ArchiCAD**, listed on the 3D apps page.)

- **PMJPEG** [PixVision Software] (*OS/2*) - version 1.90 and later; read/write; no alpha support? shareware.

- **PMView** [Peter Nielsen] (*OS/2, Win32*) - version 0.92 and later; read/write; shareware.

- **png2ansi** [Jan-Erik Finnberg] (*DOS, Unix, etc.*) - all versions; read-only; requires **libpng** and **zlib**; freeware with source. (This is a PNG-to-text converter. It uses ANSI escape codes to change colors and apparently assumes the presence of IBM PC 8-bit "graphics" characters.)

- **png2html** [Geoff Holden] (*Unix, etc.*) - all versions; read-only; requires **gd**, **libpng** and **zlib**; freeware (GPL) with source. (This is a rather twisted utility; it converts nice, compact PNG images, color or otherwise, into humongous HTML pages via lots and lots of <FONT> tags. It has much the same, sick appeal as Textmode Quake. :-))

- **png2html.php** [Mathew Johnston] (*PHP4*) - all versions; read-only; requires PHP4 gd module, **gd**, **libpng** and **zlib**; freeware with source. (This is a [web] server-side script to convert well-compressed PNG images into fairly bloated HTML. See also the C version above.)

- **png2ico** [Matthias Benkmann] (*Win32, Unix, etc.*) - all versions; read-only; requires **libpng** and **zlib**; freeware (GPL) with C++ source. (This is a command-line utility to convert one or more PNG images of appropriate resolution(s) into Windows .ICO format. See also **pngtoico** below.)

- **png2jpg** [Martin Mevald] (*Unix*) - all versions; read-only; requires **ImageMagick**, **libpng** and **zlib**; freeware with source. (This is an HTTP proxy to convert PNGs to JPEGs, presumably for use with older web browsers.)

- **png2linuxlogo** [Greg Roelofs] (*Linux, Unix, DOS, OS/2, Win32, etc.*) - all versions; read-only; freeware (BSD) with source. (This is a command-line utility to convert a properly dimensioned palette PNG into a text file suitable for replacing include/asm/linux_logo.h in standard Linux kernel distributions. The image will become the full-color boot logo once the kernel is recompiled and installed.)

- **!Png2Spr** [Tom Tanner] (*RISC OS*) - all versions; read/write; freeware. (This is a RISC OS PNG-to-sprite converter--and, as of version 1.20, a sprite-to-PNG converter, too. Newer versions have viewing capabilities. See also **PNGConv** and **Spr2Png** below.)

- **png2tiff** - see **ptot** below

- **png2txt** [NeuroWork] (*Unix, etc.*) - all versions; read-only; requires **libpng** and **zlib**; freeware (GPL) with source. (This is a small utility to convert PNG images into "ASCII art.")

- **PNG-Box** [Andreas Kleinert] (*Amiga 68k/PPC*) - any version; write-only; README file; uses the **SuperView Library** for reading and writing image formats (see the miscellaneous apps page); shareware. (This is a graphical any-to-PNG converter.)

- **PNGConv / Thingi** [Clares Micro Supplies] (*RISC OS*) - all versions; read-only; full alpha support; uses **libpng** and **zlib**; freeware. (This is a RISC OS PNG-to-sprite converter; see also **! Png2Spr** above.)

- **pngcp** - see **pngtools** below

- **pngcrush** [Glenn Randers-Pehrson] (*Unix, DOS, Win32, RISC OS, BeOS/x86, etc.*) - all versions; read/write; freeware (BSD) with source, as of version 1.2.0. (This is a command-line utility to compress PNG images better--i.e., it converts PNGs into smaller PNGs, completely losslessly, by optimizing the filtering and compression strategies. It can also remove specified chunks and fix PNG images affected by the Photoshop 5.0 gamma bug or the Photoshop 5.5 iCCP bug. It's especially handy in conjunction with apps like PS that are a bit weak on compression. See also **OptiPNG**, **PNGGauntlet**, **PNGOUT**, and **pngrewrite**.)

- **PNGGauntlet** [Number A Productions] (*Win32.NET*) - all versions; read/write; uses **PNGOUT**; freeware. (This is a GUI tool to to recompress PNG images better using PNGOUT. [Older versions also used pngrewrite.] See also **pngcrush**, **OptiPNG**, **pngrewrite**, and this enthusiastic forum posting.)

- **pngmeta** [Dave Beckett] (*Unix, etc.*) - all versions; read-only; requires **libpng** and **zlib**; freeware with source. (This is the official PNG meta-information extractor; it "converts" from PNG to

text--that is, it extracts information from the tEXt and zTXt chunks, such as for indexing by WWW search engines.)

- **PNG/MNG Construction Set Professional** [Alchemy Mindworks] (*Win32*) - all versions; read/write; **MNG** support (read/write); full(?) alpha support; commercial. (This tool, the PNG/MNG equivalent of **GIF Construction Set** above, can be used to add alpha transparency to PNG images as well as to create, modify, and optimize MNG animations.)

- **pngnq** [Stuart Coyle, Anthony Dekker, Greg Roelofs] (*Unix, etc.*) - all versions; read/write; freeware (BSD) with source. (This is a variation on **pngquant** below, a command-line utility to quantize and dither PNG images, especially 32-bit RGBA ones, to 8-bit palette images. pngnq uses the *NeuQuant* algorithm, which is said to have superior characteristics to pngquant's [and PBMPLUS's] median-cut algorithm.

- **PNGOUT** [Ken Silverman] (*Win32, Linux*) - all versions; read/write; freeware. (This is a command-line utility to compress PNG images better--i.e., it converts PNGs into smaller PNGs, completely losslessly, by optimizing the compression. It is reported to be more efficient than **pngcrush**. See also **PNGGauntlet**, **pngrewrite** and **OptiPNG**.)

- **PNG Pooper** [Anonymous Coward] (*BeOS*) - all versions with the translation kit; write-only; freeware (public domain) with source.

- **pngquant** [Greg Roelofs, Jef Poskanzer] (*Unix, DOS, Win32, etc.*) - all versions; read/write; freeware (BSD) with source. (This is a command-line utility to quantize and dither PNG images, especially 32-bit RGBA ones, to 8-bit [or smaller] palette images. Since PNG's palette is essentially RGBA-based [via the combination of PLTE and tRNS chunks], it is often possible to get by with only 8 bits for an image with partial transparency, rather than the usual 32 bits--and at a significant savings in file size. Very few tools support this mode, however, so pngquant was created to fill the void. Note that such down-conversions are lossy, just like down-conversion of a 24-bit RGB image to an 8-bit GIF or PNG is. See also Jens Wedin's pngquant page for Per Fahlén's Win32 GUI wrapper, **Manfred** [binary only, updated 16 March 2006], and **pngnq** above.)

- **pngrewrite** [Jason Summers] (*Unix, DOS, Win32, etc.*) - all versions; read/write; freeware with source. (This is a command-line utility to compress PNG images better by reducing bit depths and unnecessarily large palettes. It makes a nice complement to **pngcrush**, **PNGOUT**, and **OptiPNG** above and is used by **PNGGauntlet**.)

- **PNG rip** [Misha/ECS] (*Amiga*) - all versions; write-only; freeware. (This tiny utility searches for and extracts the first PNG image from inside an ECC animation.)

- **pngslice** [Jim J. Green] (*Unix, etc.*) - all versions; read/write; freeware (GPL) with source. (This is a command-line utility to slice an image into horizontal slices of a specified height *and* then to trim back either the left or right sides as far as possible without eating into the "main" part of the image. The result can then be embedded in a web page, and most CSS-supporting browsers will seem to "flow" text around the resulting irregular border.)

- **pngsplit** [Greg Roelofs] (*Unix, etc.*) - all versions; read-only; freeware (GPL) with source. (This is a simple utility to split a PNG, **MNG** or **JNG** image into its constituent chunks [and file signature], each one numbered for easy reassembly. For example, `foo.png` might become `foo.png.0000.sig`, `foo.png.0001.IHDR`, `foo.png.0002.IDAT`, and `foo.png.0003.IEND`; concatenating all the pieces reproduces the original file. pngsplit currently is distributed only as part of the **pngcheck** package [miscellaneous apps page], version 2.1.0 or later.)

- **png-tEXt.pl** [Greg Newton] (*Perl*) - all versions; read/write; freeware with source. (This is a command-line utility to add tEXt and zTXt chunks to PNG images. Officially supported keywords include *Author*, *Comment*, *Copyright*, *Creation Time*, *Description*, *Disclaimer*, *Software*, *Source*, *Title*, and *Warning*, but the utility also supports unregistered keywords.)

- **pngtoico** [H. Peter Anvin] (*Unix, DOS, Win32, etc.*) - all versions; read-only; binary transparency support; requires **libpng** and **zlib**; freeware (GPL) with source. (This is a command-line utility to convert PNG images to Windows icon format [.ico]. See also **png2ico** above.)

- **PNGTool** [Stephan Rupprecht] (*Amiga 68k/PPC*) - all versions; write-only; alpha support; uses **libpng** and **zlib**; freeware. (This is a utility to convert any datatype-supported image format to PNG. Click here if link breaks.)

- **pngtools** [Michael Still] (*Unix, etc.*) - all versions; read/write; freeware (GPL) with source. (This is a set of command-line tools similar to the ones that accompany libtiff. As of version 0.2, the tools include **pngchunks** [like tiffdump], **pngchunkdesc** [`decode' PNG chunk names], **pnginfo** [like tiffinfo], and **pngcp** [like tiffcp]. See also **pngcheck** on the miscellaneous apps page.)

- **PngUnit** [Edmund H. Hand, Jack Goman] (*Win32*) - all versions; read/write; freeware with source. (This is another Delphi wrapper for **libpng** and **zlib** based on Edmund Hand's PngImage.pas. It apparently includes a viewer with BMP-to-PNG conversion capability.)

- **pnmtopng** [Alexander Lehmann, Willem van Schaik, Greg Roelofs] (*Unix, Win32, OS/2?*) - all versions; read/write; full alpha support; full gamma support; full text support; requires **NetPBM** libraries, **libpng** and **zlib**; freeware with source. (This is the official PBMPLUS / NetPBM PNG-converter package [pnmtopng, pngtopnm]. For the sake of search commands, we'll mention pngtoppm and ppmtopng here, too. See also **wpng** below. Note that pnmtopng is effectively an optimizer, as well; it selects the most efficient color type, orders the palette [if any] to minimize

the number of transparent entries, etc.)

- **PolyView** [Polybytes] (*Win32*) - version 2.40(?) and later; read/write

- **PPT** [Janne Jalkanen] (*Amiga*) - all versions? read/write; full 32-bit alpha support; freeware. (This is an image-processing and effects tool; it isn't quite a full image editor, but it comes close. It can read any flavor of PNG, but it writes only grayscale and truecolor, optionally with an alpha channel.)

- **pstoedit** [Wolfgang Glunz] (*Unix, OS/2, Win32*) - version 3.21 and later; write-only; requires **libpng** and **zlib**; freeware (GPL) with source. (This utility converts PostScript or PDF to other vector formats or to PNG. In addition to libpng, it requires **Ghostscript**.)

- **pstopng** [Nelson Beebe] (*many*) - all versions; write-only; requires **ghostscript** and **pnmtopng** (both of which require **libpng** and **zlib**); freeware with source. (This app converts PostScript and encapsulated PostScript files or streams to PNG format.)

- **pstopngtops** [Nelson Beebe] (*many*) - all versions; internal only; requires **ghostscript** and **pnmtopng** (both of which require **libpng** and **zlib**); freeware with source. (This app converts PostScript and encapsulated PostScript files or streams to PNG format and then to [bitmapped] Encapsulated PostScript again.)

- **ptot** [Lee Daniel Crocker] (*Unix, DOS, OS/2, Win32*) - all versions; read-only; full alpha support? text support (*Author*, *Copyright*, *Software*, *Source*, and *Title* keywords); standalone (does *not* require any other libraries); freeware with source. (This is the official PNG-to-TIFF converter. See also **tiff2png** below.)

- **QPict** [Rune Lindman] (*Mac 68k/PPC*) - version 3.0 and later; read/write; requires QuickTime 3.0 or later for reading and QuickTime 4.0 or later for writing; shareware.

- **QuickTime PictureViewer** [Apple] (*Mac PPC/68k, Win32*) - version 3.0 and later; read/write as of version 4.0; full gamma support; full alpha support; uses **zlib**; freeware. (This viewer supersedes Sam Bushell's **Tiny Viewer**, a mini-app he included with his **QuickTime 2.5 PNG-Importer**--see the miscellaneous apps page. Sam was responsible for the PNG support in QuickTime 3.0, too. QuickTime's PNG support actually enables any QuickTime-aware application to view PNG images, including even **SimpleText**. On the export side, it can convert a PICT with an alpha channel to an RGBA PNG--unless the alpha channel is is completely transparent over the entire image, in which case it will be discarded.)

- **ReaConverter Pro** [ReaSoft] (*Win32*) - version 2.6(?) and later; read/write; commercial. (This is

a batch image converter.)

- **RealSlideshow** [RealNetworks] (*Win32*) - version 2.0 and later; read/write; freeware (**Basic**) or commercial (**Plus**). (As the name suggests, this is a slideshow program that can incorporate voice annotations and music; it can also convert to PNG.)

- **ReaViewer** [ReaSoft] (*Win32*) - version 1.4(?) and later; read/write; commercial. (This is a viewer with batch-conversion capabilities.)

- **Riptide** [Vorton] (*Win32*) - all versions; read/write

- **Saffron Document Server** [Dynalivery] (*Java*) - version of 5 May 2003 and later; write-only; commercial. (This is "virtual printer software" that can convert PostScript, XML formatting objects [XSL-FO], Java2D, etc., into HTML, PNG, SVG, PDF, and other formats.)

- **scr2png** [Nik Clayton] (*FreeBSD*) - all versions; write-only; requires **gd**, **libpng** and **zlib**; freeware (BSD) with source. (This converts "syscons screenshots generated by scrshot(1)" into PNG images and was originally called **shot2png**. The actual source code can be found here, and binaries are here.)

- **SEA** [Bart Wakkee, Ralph Gortzen, Harold de Laat] (*DOS*) - version 1.0 and later; read/write; shareware; claimed to be much faster than even **QPV**. (Now distributed by Photodex.)

- **shot2png** - see **scr2png** above

- **ShowImg** [Richard Groult] (*Unix/KDE2*) - all versions; read/write? **MNG** support (read-only); requires **Qt**, **libpng**, and **zlib**; freeware (GPL) with source.

- **SimpleImage** [Chris Wood] (*Mac 68k/PPC*) - all versions? read/write with **QuickTime 4.0** or later; shareware.

- **SlowView** [Nikolaus Brennig] (*Win32*) - version 0.6b1 (1.60 Dev) and later; read/write; alpha support; **MNG** support in 0.9.0 and later; writes bloated palettes when converting from PNG or BMP to PNG (GIF to PNG seems OK); writes invalid single-pixel PNGs; uses **libmng**, **libpng**, and **zlib**; freeware. (**This product has been discontinued.** See **Ashampoo Photo Commander** above.)

- **Smart Converter** [Acoll Software] (*Win32*) - version 1.4 and later; read/write; **MNG** (read-only) and **JNG** (read/write) support; shareware.

- **SmartSaver** [Ulead Systems] (*Win32*) - version 3.0 and later; read/write; full alpha support, including tRNS (translucency?) in palette and truecolor images; cannot write bi-level (1-bit) PNGs. (This is a utility to optimize the compression [not losslessly] and tweak the palettes and transparency of images; it can work as a plug-in to **Photoshop** et al., too. Version 3.0 is included in **PhotoImpact 4.0** as well as being sold stand-alone.)

- **SNG** [Eric S. Raymond] (*Unix, Win32, etc.*) - all versions; read/write; requires **libpng** and **zlib**; freeware (BSD) with source. (In light of the fact that no one else has done such a thing, this is the official PNG-to-text and text-to-PNG compiler/decompiler. It allows you to decompile a PNG to *Scriptable Network Graphics* format, edit (or delete or add) any chunks with a plain text editor, and recompile the result to PNG. For example, one could easily work around Netscape's bKGD bug by either deleting the bKGD chunk in a palette image or simply changing the black palette entry to (1,1,1). See also **imc** above.)

- **SnowBatch** [Snowbound Software] (*Win32*) - all versions? read/write; alpha support? commercial (OEM only). (This is a batch conversion program.)

- **SnowView** [Snowbound Software] (*Win32*, *Java*) - all versions? read/write? commercial (OEM only). (The Java version is also known as **Snapplet**.)

- **Spr2Png** [Darren Salt] (*RISC OS*) - all versions; read/write as of version 0.14 (formerly write-only); full transparency support, including extraction of alpha channels and auto-conversion of 32-bit RGBA to 8-bit RGBA-palette if there are 256 or fewer unique pixel values (as of version 0.08); gamma support; sBIT support as of version 0.17; freeware. (This is a RISC OS PNG-to-sprite, sprite-to-PNG, and [with RISC OS 3.50 or later] Draw-to-PNG converter; see also **! Png2Spr** and **PNGConv** above.)

- **SuperConvert** [Seven Hills Software / My eSource] (*Apple IIGS*) - version 4.0(?) and later; read/write; commercial.

- **SViewII / SuperView** [Andreas Kleinert] (*Amiga*) - version 5.0(?) and later; read/write; shareware. (This includes the **SuperView Library** for image import/export.)

- **svg2png** - see **Nautilus** on the miscellaneous apps page

- **SwiftConvert** [SwiftView] (*Win32, Linux/x86, Solaris, HP/UX*) - version 8.0(?) and later; write-only; commercial. (This is a PCL/HPGL/TIFF batch converter.)

- **SwiftView Pro** [SwiftView] (*Win32, Linux/x86, Solaris/x86*) - version 8.0(?) and later; write-only; commercial. (This is a PCL/HPGL/TIFF viewer with PNG export capability.)

- **Take-1** [FileStream] (*Win32*) - version 2.0 and later; read/write; shareware. (This is a suite of "web-publishing tools," including an image editor, a [lossy] image optimizer/compressor, and an HTML editor.)

- **Thingi** - see **PNGConv** above

- **ThumbNailer** [Smaller Animals Software] (*Win32*) - version 2.0 and later; read/write; full alpha support? claims full gamma support; background and text support; shareware.

- **ThumbsPlus** [Cerious Software] (*Win32*) - version 3.0 beta 3 and later; read/write as of version 3.0g; full alpha support as of version 7(?), but no interlacing or transparency support for writing in version 3 (no info on intervening versions); text support; reportedly excellent compression, aside from saving unused palette entries (e.g., 256 for a 64-color image--fixed in version 4.10); broken conversion of GIF palettes in version 4.10 (example here); commercial (formerly shareware). (This program also has the ability to make web pages of thumbnails. Windows 3.x was supported in older versions, and a "final Macintosh beta" was available between 1998 and 2000, but as of 2005 there is no longer any trace of it.)

- **tiff2png** [Willem van Schaik, Greg Roelofs] (*Unix, DOS, OS/2, Win32*) - all versions; write-only; full alpha support; gamma support; requires **libtiff**, **libpng**, **zlib**, and possibly **libjpeg** (depending on the libtiff version); freeware with source. (This is the official TIFF-to-PNG converter. See also **ptot** above.)

- **tnailer** [William Rhodes] (*Perl*) - all versions; read/write; requires **PerlMagick**, **ImageMagick**, **libpng** and **zlib**; freeware (GPL) with source. (This is a command-line utility to create web pages of thumbnails from image collections, such as from a digital camera. It can also convert sizes and compression levels of larger images.)

- **ToyViewer** [Takeshi Ogihara] (*Mac OS X*, *NeXTStep/OpenStep*) - version 2.0(?) and later for NeXTStep, and all versions for Mac OS X; read/write; partial transparency support; support for writing text comments; freeware with source.

- **Translator** [John Kortink] (*RISC OS*) - version 8.0(?) and later; read/write; shareware. (See also John's conversion-only **Creator** app above.)

- **Turbo Browser** [FileStream] (*Win32*) - version 7.2 and later; read/write; shareware. (This is a file manager, similar to Windows Explorer, but with file-transfer, HTML-editing, image-viewing, and image-conversion capabilities in addition to standard file-management functions. There is also a simpler version called **Turbo Browser Express**.)

- **TweakPNG** [Jason Summers] (*Win32*) - all versions; read/write; freeware (GPL) with source. (This is a "low-level utility for examining and modifying PNG image files.")

- **Ulead Viewer** [Ulead Systems] (*Windows 3.x*) - version 1.0 and later with UF2PNG.FIO plug-in; read/write; 1.1MB

- **Ultraconv** [Felix Schwarz] (*Amiga PPC/68k*) - version 1.6 and later (natively), or any earlier version via a PNG DataType (see the miscellaneous apps page for several); read/write; commercial as of version 3.0 (now **Ultraconv NG**).

- **VidFun** [Lawrence Gozum] (*Windows 3.x, Win32*) - version 1.5 and later; read/write; shareware

- **Vidget** [Newtek] (*Win32*) - all versions; read/write; freeware (still-image support only) or commercial (still images + video).

- **Viewer 95** - see **Quick View Plus** on the image viewers page

- **Visere** [Digital Multi-Media Design] (*Win32*) - all versions; read/write; freeware.

- **wbmptopng** [Simone Piunno] (*Unix, etc.*) - all versions; write-only; requires **libpng** and **zlib**; freeware (PBMPLUS) with source. (This is a Unix-style filter to convert WAP bitmaps to grayscale PNG images.)

- **Web Designer's Toolkit** [R-Comp] (*RISC OS*) - version 2(?) and later; write-only? no alpha support; commercial. (This is a multi-tool suite with a conversion component called **ImageConv** that converts RISC OS sprites to PNG format; the **WebTable** component "includes the same support for tables of images.")

- **WebGraphics Optimizer** [Plenio Software Solutions] (*Win32*) - version 2.0(?) and later; read/write; no gamma support; no control over compression level or filtering (output was 10% bigger than input on one test image); broken 2-bit support

- **Web Image Guru** [VIMAS Technologies] (*Win32*) - all versions? read/write; full alpha support (including quantization to 8-bit "RGBA palette"); commercial. (This optimizer supports both lossless and lossy modes [e.g., quantization and color reduction]; the lossless mode produces files comparable in size to **pngcrush**'s output. It also includes manual controls for those who wish to tinker with PNG filters directly, and it "can be run as Adobe PhotoShop plug-in module or as standalone application." The free **Image Navigator** viewer is included; see the image viewers page for details. **Web Imaging** is the fuller-featured professional version, with a plug-in architecture and more image-processing capabilities, and **Image Master** may fit somewhere in

between. All include batch-processing support.)

- **WhimPro** [MoGrow] (*Win32*) - all versions; read/write; full alpha support; gamma support; shareware (freeware as an image viewer only). (This is a viewer/converter with a number of editing features, as well, including overlaying text.)

- **WinJPEG** [PixVision Software] (*Windows 3.x*) - version 3.00 and later; read/write? shareware.

- **wmftopng** [Caolán McNamara] (*Unix, Win32, etc.*) - version 0.1.17 and later; write-only; requires **gd**, **libpng** and **zlib**; freeware (LGPL) with source. (This is just one part of the **libwmf** package, which is a toolkit for converting Windows MetaFiles [which are basically collections of Windows GDI calls] into various portable vector and raster image formats.)

- **wpng** [Greg Roelofs] (*Unix, Win32, OS/2, DOS*) - all versions; write-only; full alpha support; full gamma support; text support (*Author*, *Title*, *Description*, *Copyright*, *E-mail*, and *URL* keywords); requires **libpng** and **zlib** (but not **NetPBM**); freeware (BSD) with source. (This is the demo NetPBM-to-PNG converter described in Chapter 15 of *PNG: The Definitive Guide*. It is not nearly as complete as **pnmtopng** above, but it does support a few things pnmtopng does not: streaming conversion [low-memory-footprint] to non-interlaced PNG; automatic timestamping; interactive entry of text annotations; and support for a completely unofficial `P8' binary RGBA format. It is also explicitly designed to demonstrate good programming practices when using libpng.)

- **Xenomorph** [Ewald Krämer] (*Unix/Qt3*) - all versions; read/write; **MNG** support (read-only) via **Qt**; freeware (GPL) with C++ source. (This is a "floating-point image-processing [application] with an extensible set of filter kernels. It includes linear and polynomial (volterra) filters and morphologic filters." PNG is its only output format.)

- **Xnview** - see **Nview/Nconvert** above

- **xPNG / fixPNG** [Silicon Alley / Marijke van Gans] (*DOS*) - all versions; read/write; stand-alone (requires neither libraries *nor graphics capability*); freeware with x86 assembler source. (This pair of bundled utilities can list the contents of PNG chunks [fixPNG]; make the first color of a palette PNG fully transparent [xPNG], as is often the case in GIF images; and "fix" the CRC of any PNG chunk whose calculated value differs from the stored value [fixPNG]. The latter capability is convenient for those who binary-edit the chunks within PNG files...which Greg has been known to do. Note that some PNG CRC mismatches are truly due to corrupted data, however.)

- **XV** [John Bradley] (*Unix/X, VMS/X*) - version 3.10a and later with Greg Roelofs' jumbo patches (specifically, the enhancements one, whose PNG support is an extension of Alexander Lehmann

and Andreas Dilger's old PNG patch version 1.2d); read/write; shareware/commercial with C source. (XV 4.00 with full PNG support was supposed to have arrived around Christmas 1995, but development apparently came to a complete halt before that ever happened. A Win32 port apparently was underway at one point, too.)

- **zpng** - see **AdvanceCOMP** above

Here are some related PNG pages at this site:

- PNG-supporting Applications
  - Browsers
  - Image Viewers
  - Image Editors
  - 3D Applications
  - Games / Entertainment
  - Office / Business Applications
  - Scientific / Graphing Applications
  - Miscellaneous Applications
- PNG support in VRML browsers
- PNG-supporting Hardware

- PNG Home Page
- **Complete PNG Site Map**

Last modified 2 July 2006.

3D Applications with PNG Support

3D applications, from real-time VRML to high-end modeling apps to ray-tracers, are becoming increasingly popular, and textures are the usual means by which PNG images are supported.

As with the other PNG-applications pages, links to home WWW sites or to downloadable versions are provided where known, but if a link is broken, check the location and see if an updated version is available (and please tell Greg!). Relevant operating systems are printed in (*parenthesized italics*).

These are listed alphabetically, more or less:

- **3D-XplorMath** [Richard Palais and Hermann Karcher] (*Mac OS, Mac OS X*) - version 10.0 and later; write-only? freeware for non-commercial and academic use. (This is a mathematical visualization and exploration tool [``museum''] that can save visualizations in PNG format. It was originally called **3D-Filmstrip**.)

- **3D IMPACT!** [CrystalGraphics] (*Win32*) - all versions? write-only; freeware (standard version) and commercial (**Pro** version). (This is a 3D image- and animation-generator; it can extrude text, add bevels to existing artwork, and rotate them. The commercial version adds shadows, sparkles, and more sample material.)

- **3D Studio MAX** [Kinetix / Autodesk] (*Win32*) - version 1.1 and later; read/write; commercial. (This is a 3D modeler/animator.)

- **3DSMax4 VRML exporter** [blaxxun] (*Win32*) - version 4.4.1.0 and later; write-only? freeware. (This is an ``enhanced'' VRML exporter for **3D Studio MAX**; it makes use of some of the VRML extensions supported by blaxxun's VRML browser, **Contact**. PNG is one of the formats supported for exporting textures.)

- **AP 3D Object Editor** [Antti Pekonen] (*Win32*) - version 1.02.11 and later; read/write; freeware for non-commercial use. (This is a 3D modeler that can ``save images to PNG format'' and, as of version 1.03.02, read PNG images as textures.)

- **ArchiCAD** [Adobe] (*Win32*) - version 8 and later; read/write; commercial. (This is an architectural CAD program. It ships with another PNG-supporting utility with read/write capability, **PlotMaker**, which may or may not be related to the utility of the same name by SailScience, listed on the converters page.)

- **Atmosphere** [Adobe] (*Win32*) - all versions; read/write; no transparency support (as of build 67); commercial. (This is a 3D builder/browser package with an associated multiuser server [``community server'']. PNG is supported as a texture format, an icon format, and as the output format for the browser's built-in snapshot capability.)

- **Blender** [Ton Roosendaal / NeoGeo / NaN / Blender Foundation] (*Win32, Unix/X, Mac OS X*) - all versions? read-only? freeware (GPL) with source. (This is a popular--and originally commercial--3D modelling and rendering program.)

- **Blitz3D** [Blitz Research / Mark Sibly] (*Win32/DirectX*) - all versions? read-only; commercial. (This is an integrated development environment [IDE] incorporating a 3D game engine, design package, custom programming language [hybrid of BASIC and C], and compiler.)

- **Bryce** [MetaCreations] (*Win32, Mac PPC*) - version 4.0(?) and later; read/write; commercial. (This is a 3D modeler. PNG is supported as a texture format.)

- **Ca3D-Engine** [Carsten Fuchs] (*Win32, Linux/X*) - all versions? read-only? freeware/commercial. (This is an OpenGL-based 3D game engine; PNG is supported as a texture format.)

- **Cn3D** [National Center for Biotechnology Information] (*Win32, Unix/X, Mac OS*) - version 4.0 (?) and later; write-only; freeware with source. (This is a 3D molecular-visualization application that ``simultaneously displays structure, sequence, and alignment, and now has powerful annotation and alignment editing features.'' It can render directly to PNG, either high-resolution or via screenshots.)

- **Contact** [blaxxun / Bitmanagement Software] (*Win32*) - version 3.0 and later; read-only; alpha support; freeware with source (older version only). (This is a VRML browser/plug-in. See the VRML browsers page for details. Contact was originally called **CC3D** and **CCpro**. blaxxun became insolvent in mid-2002, and development of Contact was taken over by Bitmanagement. Version 5.1 is still available from the original site.)

- **Cortona** [ParallelGraphics] (*Win32*) - all versions; read-only; full alpha support; freeware. (This is a VRML browser/plug-in. See the VRML browsers page for details.)

- **Cosmo Player** [SGI] (*Irix/X*) - all versions; read-only; perfect alpha support; freeware. (This is a VRML browser/plug-in. See the VRML browsers page for details.)

- **Cosmo Player** [Paper Software / Netscape / SGI / Cosmo Software / Platinum Technology / Computer Associates] (*Windows 3.x, Win32, Mac PPC*) - all versions; read-only; alpha support; freeware. (This is a VRML browser/plug-in. See the VRML browsers page for details. The

Cosmo Player 1.0 betas were developed by SGI, but Cosmo Player 1.0 itself was basically a lightly modified version of Netscape's **Live3D**, which in turn was based on Paper Software's **WebFX**. Cosmo Player 2.0 was a complete rewrite by SGI, which then spun off the VRML team to form Cosmo Software, which was later acquired by Platinum [except for the Irix versions, above and below], which was then acquired by Computer Associates. *Ay carumba...* **This product is no longer under development, as such.** It was licensed by Nexternet and is now known as **Pivoron Player**; see below.)

- **Cosmo Worlds** [SGI / Cosmo Software / Platinum Technology / Computer Associates] (*Irix/X*, *Win32*) - all versions; read/write; full alpha support; commercial. (This is/was a high-end VRML 2.0 modeler. Version 1.1 for Irix and version 2.0 for Win32 are reported to support PNG textures perfectly. Note that SGI retained the rights to the Irix version, while the Windows version was acquired by Platinum in mid-1998 and then by Computer Associates in early 1999; the latter apparently is no longer available. See also **Cosmo Player** above.)

- **Crystal Space** [Jorrit Tyberghein and the Crystal Space Team] (*Unix/X, DOS, OS/2, Win32, BeOS, NeXTStep/OpenStep, Rhapsody, Mac OS, Amiga*) - version 0.10 and later; read-only; MNG support (read-only) as of version 0.96(?); uses **libpng**, **zlib** and optionally **libmng**; freeware (LGPL) with source. (This is an open-source 3D game engine written in C++ that compiles on multiple platforms; it also includes a number of demo levels. PNG support was added by Andrew Zabolotny.)

- **DINO** [Ansgar Philippsen] (*Unix/X*) - version 0.8.0 and later; write-only; freeware. (This is a scientific application for the visualization of structural biology--molecular structures, electron densities, etc. PNG is one of the supported 2D output formats.)

- **Extreme3D** [Macromedia] (*Win32, Macintosh*) - version 2.0 and later; read/write(?) for textures and backgrounds; write-only for rendered scenes (with interlacing and alpha support); commercial. (This is a 3D modeler/editor. Version 2.0 is part of **FreeHand Graphics Studio** on the image editors page.)

- **Flamingo** [Robert McNeel and Associates] (*Win32*) - all versions; read/write; commercial. (This is a radiosity and ray-tracing plug-in for **Rhinoceros**, below. PNG is supported as an input format for textures and as an output format for final, rendered images.)

- **Flounder** [Edward Vigmond] (*Unix/X*) - all versions; write-only; requires **libpng** and **zlib**; freeware with source. (This is a 4D data-visualization program that can render isosurfaces, slices, etc. Images or image sequences can be saved in PNG format.)

- **Font F/X** [DCSi / Electric Rain] (*Win32*) - version 1.1 and later; write-only; commercial. (This is a 3D font-rendering program that can export to various image formats.)

- **FontTwister** [Alexander and Matthias Neuber] (*Win32*) - all versions; read/write; full alpha support claimed; shareware. (This is an app for creating 3D text images. It supports reading PNGs as textures and writing them as finished images.)

- **FreeWRL** [Tuomas J. Lukka, John Stewart, etc.] (*Perl*) - all versions; read-only; requires **libpng** and **zlib**; freeware (LGPL) with source. (This is a VRML browser/plug-in. See the VRML browsers page for (out-of-date) details. Since FreeWRL is mostly written in Perl, it has dependencies on a large number of Perl modules [Digest-MD5, HTML-Parser, Image-Base, Image-Xpm, MIME-Base64, URI, libnet, libwww-perl], as well as Mesa3D, FreeType, the aforementioned libpng and zlib, and optionally JavaScript and Java.)

- **Internet[3D] Space Builder** [ParallelGraphics] (*Win32*) - version 3.0 and later; read/write? commercial. (This is a 3D modeling program that exports VRML 1.0 and 2.0 scenes. It supports PNG as a texture format.)

- **Gforge** [John Beale] (*Unix, DOS*) - version 1.1f and later; write-only; freeware with source. (This is a fractal terrain/surface generator that uses ``random fractal forgery'' a la Richard F. Voss; its output can be used in **POV-Ray** scenes. **Xforge** is the tcl/tk version. Gforge has been superseded by **HF-Lab** below.)

- **glpng** - see the Toolkits page

- **HF-Lab** [John Beale] (*Unix, DOS*) - version 0.84 and later; read/write; uses **libpng** and **zlib**; freeware with source. (This is a ``height field'' generator, used to create two-dimensional grayscale images that can be used as input to a 3D modeler--i.e., black corresponds to low-altitude terrain, white to high-altitude terrain, etc. HF-Lab is based on **Gforge** above.)

- **Jun for Java** [AOKI Atsushi, ODA Tomohiro, et al.] (*Java*) - version 316 and later; read-only? requires **JIMI** or **JAI**; freeware (GPL) with source. (This is an OpenGL-based ``graphic multimedia library with topology and geometry.'' There is also a Smalltalk version, but it is unclear whether that version supports PNG.)

- **OpenVRML / Lookat** [Chris Morley, Braden McDaniel, and others] (*Unix/X*, *Unix/Motif*, *Unix/GTK*, *Unix/Qt*, *Win32*, *Mac PPC*) - all versions; read-only; perfect alpha support; requires **libpng** and **zlib**; freeware (GPL et al.) with source. (This is a VRML library and several stand-alone VRML-browser front ends. See the VRML browsers page for details. The library [formerly known as **LibVRML97**] includes Lookat, a very basic Xlib/OpenGL browser, but there are also separate Motif, GTK, Qt, Windows, and Macintosh versions that are somewhat more user-friendly.)

- **LightWave 3D** [NewTek] (*Win32, Irix/X, Solaris/X, Mac PPC*) - version 4.x(?) and later with James G. Jones' PNG plug-in; read/write; full (32-bit) alpha support; no gamma support; reportedly buggy on Macintosh; commercial. (This is a 3D rendering and animation program.)

- **Liquid Reality** [DimensionX / Microsoft] (*Java*) - version 1.0b17; read-only; minimal transparency support; very unstable; freeware. (This was a VRML browser/plug-in. See the VRML browsers page for details. Liquid Reality was developed by DimensionX, which was then acquired by Microsoft. The latter eventually released a derivative product called Liquid Motion, which was itself discontinued on 26 January 2000. Liquid Reality 1.0b17 was the first and only version [beta] to support PNG.)

- **Live3D** - see **Cosmo Player** above

- **LiveArt** [Viewpoint Digital] (*Win32*) - version 98 and later; write-only; alpha support? commercial. (This is a ``3D clipart'' program, in a sense; its 3D models can be rotated and manipulated in the usual manner, but then it renders the models as if they were hand-drawn, and PNG is one of the supported output formats. The technology originated at Thinkfish [``What do you put in a thinktank?''], which was acquired by Viewpoint Datalabs, which is distinct from Viewpoint Digital but nevertheless apparently related in some twisted manner.)

- **Magma** - see **Reachin API** below

- **Mathematica** [Wolfram Research] (*Unix/X, NeXTStep, Win32, Macintosh*) - any version? with Jens-Peer Kuska's **PNGBitmap** package (freeware with source); read/write; alpha support; 16-bit support; commercial. (This is a ``fully integrated environment for technical computing.'' The PNG add-on allows Mathematica graphics elements to be saved as PNGs and PNGs to be used as textures for surfaces.)

- **MathGL3d** [Jens-Peer Kuska] (*Win32, Unix/X*) - version 1.1 and later; read/write; freeware. (This is an interactive viewer for **Mathematica** 3D elements that supports saving the rendered images as PNG. As of version 2.0, it also supports reading PNG images as textures on Mathematica objects and writing VRML 2.0 models and **POV-Ray** models with PNG textures.)

- **MicroStation/J** [Bentley Systems] (*Win32*) - version 8.0(?) and later; read/write? commercial. (This is a CAD program with 3D modeling support. PNG is probably supported as a format for background images and possibly for screenshots or ``web export.'')

- **Moonlight 3D Atelier** [Stephane Rehel and Alexandre Belhoste] (*Linux/X*) - version 0.9.2; read/write; freeware (2012k). (This is a 3D modeler/raytracer that can read PNG images as textures and write rendered images as PNGs. It is not clear whether 0.9.2 was the first version to support

PNG, but it was the last; **development of this product ended in 1999.** However, an earlier open-source release, version 0.5.3, was forked in January 2002 to become **Moonlight|3D**; it will be listed above when PNG support is restored.)

- **MSVRML** - see **WorldView** below

- **NatureView Express** - see **Visual Nature Studio** and **World Construction Set** below

- **Nendo** [Nichimen Graphics] (*Solaris/X, Win32*) - all versions; read/write; commercial. (This is a low-cost and reportedly excellent 3D modeling and paint tool with support for several 2D and 3D formats, including PNG and VRML 2.0.)

- **pf2wrl** [WareOnEarth] (*Irix*) - version 1.4(?) and later; write-only; freeware. (This is a command-line conversion utility for 3D files, specifically those supported by IRIS Performer. It converts all texture files [.rgb, .rgba, .int, .inta, or .bw] to PNG or JPEG format.)

- **Pivoron Player** [Nexternet] (*Win32*) - all versions; read-only; alpha support; freeware. (This is a VRML browser/plug-in. Version 1.0 is essentially identical to version 2.0 of **Cosmo Player**, which was the previous name for the browser; see above for its extensive history.)

- **PixelTex** [Stuart Williams / Virtuality] (*Win32*) - all versions; read-only; freeware. (This is a tool to convert from PNG and JPEG images to VRML97 PixelTexture nodes. PNG alpha/transparency support is reportedly coming.)

- **Poser** [MetaCreations / Curious Labs] (*Win32, Mac PPC*) - version 4.0(?) and later; read/write; fake transparency support (white = transparent); commercial. (This is a 3D application to pose and animate human and animal figures. PNG is supported only as a format for texture, bump and reflection maps, not as a format for exporting rendered images. Poser was purchased from Metacreations by Curious Labs between versions 4 and 5.)

- **POV-Ray** [POV-Ray Team] (*Unix, DOS, Macintosh, Amiga, OS/2, Win32*) - version 3.0 and later; read/write; full gamma support; partial, broken alpha support (only for anti-aliasing, not transparent objects, and premultiplied instead of non-premultiplied as required by PNG spec); up to 16 bits per channel (i.e., 48-bit truecolor); uses **libpng** and **zlib**; freeware with source. (This is one of the more famous ray-tracers in existence.)

- **Q3BSP** [John W. Ratcliff / Holger Grahn] (*Win32*) - version 1.1 and later; write-only; full 32-bit alpha support; uses **libpng** and **zlib**; freeware with source. (This is a Quake3-to-VRML converter. Quake 3 TGA textures are converted to RGBA PNGs.)

- **Quat** [Dirk Meyer] (*Unix/FLTK, Win32/FLTK*) - all versions? read/write; requires **zlib**; freeware

(GPL) with C/C++ source. (This is a generator of 3D quaternionic fractals. PNG is its sole image format, and it includes an independent C implementation of PNG-encoding/decoding functions. Development appears to have ceased in late 2002.)

- **Rational Reducer** [Systems in Motion] (*Win32, Linux/X, Irix/X*) - version 2.0 and later; read-only; commercial. (This is a polygon-reduction tool for VRML and other 3D formats. PNG is supported as a texture format for the models.)

- **Reachin API** [ReachIn Technologies] (*Windows NT, Irix/X*) - all versions; read/write; alpha support (read/write but not display); commercial. (This is a 3D API/toolkit for developing "multisensory"--at a minimum, visual and haptic--3D applications. PNG is the ``primary native graphics format." It was formerly known as **Magma**.)

- **Realsoft 3D** [Realsoft Graphics] (*Win32, Irix/X, Linux/X*) - version 5(?) and later; read-only? commercial. (This is a 3D modeling, rendering, and animation tool.)

- **RealWorld Icon Editor** [RealWorld Graphics] (*Win32, Win64*) - all versions; read/write; full alpha support (claimed); uses **libpng** and **zlib**; commercial.

- **Rhinoceros** [Robert McNeel and Associates] (*Win32*) - version 1.1 and later; read/write; commercial. (This is a NURBS-based 3D modeler. PNG is supported as an input format for textures and as an output format for the internal screen capture function. The related **Flamingo** plug-in, above, adds support to Rhino 2.0 [and later] for saving radiosity-based and ray-traced renderings in PNG format.)

- **Scene Express** - see **Visual Nature Studio** and **World Construction Set** below

- **Spazz3D** [Virtock Technologies] (*Win32*) - version 2.0 and later; read/write? transparency support; reportedly crashes on either gray RGB PNGs or true grayscale PNGs, possibly only with transparency; commercial. (This is a 3D modeller with VRML import and export capabilities.)

- **Tachyon** [John Stone] (*Unix, BeOS, Mac OS X, Windows NT/2k*) - version 0.93.2 and later; read/write; uses **libpng** and **zlib**; freeware (BSD) with source. (This is a ray-tracing library optimized for parallel and multiprocessor configurations. It can render to PNGs and apparently also read them for use as textures.)

- **Torch** [Newfire] (*Win32*) - all versions; read-only; dithered transparency support; freeware. (This was a VRML browser/plug-in specifically designed for 3D games. See the VRML browsers page for details. Torch flamed out when Newfire did [1999 or so].)

- **trueScape** [DigitalFlux Entertainment] (*Win32*) - all versions; read/write; commercial. (This is a

``realtime terrain-creation'' plugin for **trueSpace 4** or later [see below] that ``allows you to interactively sculpt terrains by drawing directly on the interface of the tsx.'' PNG and other image formats may be imported and exported as height maps.)

- **trueSpace** [Caligari] (*Win32*) - version 4.0 and later; read/write; commercial. (This is a 3D modeler/renderer with support for radiosity, NURBS, VRML 1.0 import and VRML 2.0 export, etc.; PNG support is apparently limited to textures and may not include alpha transparency.)

- **VERA** [Steve Marthouse / vrml3d.com] (*Win32*) - all versions? read/write; freeware. (This is a VRML 1.0/2.0 editor with partial support for reading and rendering VRML97 worlds--including PNG textures--and support for converting SFImage nodes [the data part of PixelTextures] to PNG, optionally with alpha transparency added on.)

- **Viscape Universal** [Superscape] (*Win32*) - version 5.60 and later; read-only; partial alpha support; freeware. (This is a VRML browser/plug-in. See the VRML browsers page for details.)

- **Visual Nature Studio** [3D Nature] (*Win32, Mac OS*) - version 2.0 and later; read-only? commercial. (This is a 3D landscape modeling tool geared toward geographical information systems [GIS]. VRML and 3DSMax export support is available via a separate **Scene Express** add-on, which also includes the **NatureView Express** standalone 3D viewer.)

- **Visual Sun Chart** [3-D Software] (*Windows 2k/XP*) - all versions? write-only; uses **Victor Image Processing Library** and **zlib**; commercial. (This is "solar geometry software," a modelling tool to visualize shading from trees or buildings at various times of day or of the year. It can export rendered images in PNG format.)

- **VRMLView** [Systems in Motion] (*Win32, Linux/X, Irix/X, HP-UX/X, BeOS*) - version 2.0 and later; read-only; partial alpha support; freeware. (This is a VRML browser/plug-in. See the VRML browsers page for details.)

- **white_dune** [Stephen F. White / Joerg "MUFTI" Scheurich] (*Unix/Motif*) - version 0.16 and later; read-only? full alpha support? requires **libpng** and **zlib**; freeware (GPL) with source. (This is a ``graphical VRML97 editor and animation tool.'' It uses code from **OpenVRML** for its PNG texture support.)

- **World Construction Set** [3D Nature] (*Win32, Mac OS*) - version 6.0 and later; read-only? commercial. (This is a 3D landscape modeling tool. VRML and 3DSMax export support is available via a separate **Scene Express** add-on, which also includes the **NatureView Express** standalone 3D viewer.)

- **WorldView** [Intervista / Platinum Technology / Computer Associates] (*Win32*, *Mac OS*) - version 2.0 and later; read-only; alpha support; freeware. (This is a VRML browser/plug-in. See the VRML browsers page for details. WorldView was developed by Intervista, which was acquired by Platinum in mid-1998, which in turn was acquired by Computer Associates in early 1999. **MSVRML** is a slightly modified version of WorldView distributed with some Windows 98 machines. **This product is no longer under development.**)

- **Xara3D** [Xara] (*Win32*) - version 2.0 and later; write-only? full alpha support; commercial. (This is a `slimware' app for creating 3D text images. It may also support reading PNGs as textures.)

- **XmLookat** - see **LibVRML97 / Lookat** above

Here are some related PNG pages at this site:

- PNG-supporting Applications
  - Browsers
  - Image Viewers
  - Image Editors
  - Image Converters
  - Games / Entertainment
  - Office / Business Applications
  - Scientific / Graphing Applications
  - Miscellaneous Applications
- PNG support in VRML browsers
- PNG-supporting Hardware

- PNG Home Page
- **Complete PNG Site Map**

Last modified 20 August 2006.

PNG Support in VRML Browsers

PNG texture-map support is required for minimal conformance with the Virtual Reality Modeling Language (VRML) 2.0 specification, so one might naïvely assume that by now, most ``VRML 2.0" or ``VRML97" (the ISO standard) browsers on the market would have perfect PNG support. Not so! Most of major browsers (that is, Cortona, Contact, Cosmo Player, WorldView, and LibVRML97/Lookat) do a fair job, but only three of them correctly render all of the basic texture/material combinations: Cosmo Player 2.1 for Irix, LibVRML97/Lookat 0.7.9 (or later--renamed to OpenVRML as of version 0.9.0), and Cortona 4.0.

To test such things, Greg created **pngboxes.wrl** (a.k.a. *PNG-in-the-Arse World*, as one of Greg's evil co-workers dubbed it), a simple world with various PNG, GIF and JPEG textures applied to boxes. (An 80k zipfile containing the world and all of its textures is available for download and local testing.) There's also some text to label the various texture types, and seven viewpoints are defined for easy navigation. According to Greg's eyeballs and Trapezium's Vorlon 1.2 tester, the world itself fully conforms to the VRML97 spec. This is approximately what it should look like from the Overview viewpoint:

closeups:

opaque materials:	[palette]	[8-bps truecolor]	[16-bps truecolor]
translucent materials:	[palette]	[8-bps truecolor]	[16-bps truecolor]

This screen shot was taken from Parallel Graphics' **Cortona 4.0** under Windows, which is tied with SGI's **Cosmo Player 2.1 for Irix** (1223x1002, 253k screenshot) and with Chris Morley's **LibVRML97 / Lookat** for full texture conformance (in this test world, anyway) but, like Cosmo, has better font support than LibVRML97. Click near the edges of the screenshot above to see the full-scale, completely lossless version (352k).

Clicking on one of the six texture-groupings in the image will take you to a page with the corresponding closeup view, as will the links below the image. (*Thanks to Jas Sandhu, David Story, Gregory Seidman and*

Veronica Roelofs for providing earlier sets. Greg S also used to maintain a very nice comparison table of VRML browser features; Sandy Ressler is now responsible for it.)

The tables below summarize Greg's (that is, local-Greg's) findings with regard to the current status of PNG support in various VRML browsers, whether stand-alone or plug-in versions. He'll do his best to keep this up to date as new browsers or new versions of old browsers appear, but there are limits to the amount of testing he can manage on his own. **For Win32 browsers, note that the level of texture support is often strongly dependent on the quality of the underlying display drivers and/or the DirectX implementation.**

OS	VRML browser (web browser)	PNG support?	comments
Win32	Community Place 2.0 (semi-stand-alone)	no	doesn't compose transparent gray textures with material colors; treats black as fully transparent in opaque GIF textures on translucent materials; doesn't scope DirectionalLights properly; doesn't appear to support ambient lighting (DirectionalLight ambientIntensity field); requires external browser for downloading
Win32	Contact 5.0 OpenGL (IE 5.0)	yes, partly	same bugs as 4.4, plus some
Win32	Contact 4.4 OpenGL (IE 5.0)	yes, partly	doesn't do texture transparency for RGBA-palette PNGs or single-shade-transparent grayscale PNGs, regardless of material transparency; doesn't compose gray+alpha palette PNGs or grayscale +alpha PNGs with material colors; doesn't compose grayscale textures with material colors if material has transparency; composes all transparent textures with underlying material transparency; renders gray+alpha palette PNGs with binary transparency at close range; can render opaque parts of overlapping transparent textures as transparent and/or fail to compose transparent gray textures with underlying material color (probably related to Cosmo/Irix's problem with `Nice Transparency' object-sorting) (tested on Dell OptiPlex GX1 PIII-550, NT 4.0 SP5, ATI Rage Pro OpenGL 1.1.0)

Win32	Contact 4.002 Direct3D (NN 4.04)	yes, mostly	renders RGBA-palette PNGs completely opaque, regardless of material transparency; doesn't compose gray+alpha palette PNGs with material colors; composes binary-transparency palette textures and single-shade-transparency grayscale textures with underlying material transparency; *MMX speed* mode appears to have serious interlacing bug with all textures; appears to resample large textures to smaller sizes in D3D *Hardware* mode (no ``pixel perfect'' capability at 1024x1024 on 8 MB Rage Pro), but in *High Quality* software mode, does ``pixel perfect'' textures even with odd sizes; in *Hardware* mode, can render opaque parts of overlapping transparent textures as transparent and/or fail to compose transparent gray textures with underlying material color (probably related to Cosmo/Irix's problem with `Nice Transparency' object-sorting); in *High Quality* software mode, uses binary transparency (stippled or ``screen door'' alpha). (*This is blaxxun's new name for their **CCpro / CC3D** client. It supports blaxxun's multi-user extensions in addition to standard VRML97.*)
Win32	Cortona 4.0 (IE 5.00.3103)	**yes**	(tested on Dell OptiPlex PIII-1GHz, Win2k, software renderer)
Win32	Cortona 3.1 (NC 4.75)	yes, mostly	same bugs as 3.0
Win32	Cortona 3.0 (NC 4.75)	yes, mostly	composes transparent GIF (palette) textures and single-shade-transparent gray and RGB PNG textures (8-bps and 16-bps) with underlying material transparency (tested on Dell OptiPlex GX1 PIII-550, NT 4.0 SP5, ``Render98'' and software OpenGL renderers)
Win32	Cortona 2.2 (NC 4.75)	yes, mostly	same bugs as 2.1
Win32	Cortona 2.1 (NN 4.08)	yes, mostly	doesn't do single-color 16-bps RGB transparency; composes transparent GIF (palette) textures and single-shade-transparent gray and RGB PNG textures (8-bps and 16-bps) with underlying material transparency (tested on Dell OptiPlex GX1 PIII-550, NT 4.0 SP5, ``Render98'' and software OpenGL renderers)

Win32	Cosmo HomeSpace Designer 2.5 (stand-alone)	no	uses GIFs with same names in place of opaque palette PNGs; uses JPEGs with same names in place of opaque 8-bps PNGs; doesn't support textures with transparency; doesn't support Text. (*This is Cosmo Software's new name for Paragraph's **Internet3D Space Builder**. It may have reverted to Paragraph with Cosmo's sale to Platinum.*)
Irix	Cosmo Player 2.1 (NN 4.61S)	**yes**	
Win32	Cosmo Player 2.1 (NC 4.04)	yes, mostly	with `Nice Transparency,' opaque textures fail to inherit underlying material transparency at some viewing angles (i.e., erratic `popping' behavior), and transparent gray textures sometimes *do* inherit underlying material transparency; without `Nice Transparency,' binary transparency
Mac	Cosmo Player 2.1b56 (NN 4.x)	yes, mostly	doesn't do 16-bps textures correctly; crashes while attempting to render **Shape { }** object; users should allocate 40 MB to Netscape to compensate for a memory leak. (*Thanks to Steve Guynup for testing this version.*)
Win32	Cosmo Player 1.0 (NC 4.0)	yes, mostly	interprets RGB as BGR (8-bit palette, 24- and 48-bit truecolor); binary transparency. (*This is basically **Live3D 2.0** but faster and with an improved color model. No word on possible differences between versions **1.0**, **1.0.1** and **1.0.2**.*)

OS	VRML browser (web browser)	PNG support?	comments
Linux	FreeWRL 0.13 (stand-alone)	not really	doesn't support textures on IndexedFaceSets, ElevationGrids or Extrusions; replicates JPEG textures (apparently) and uses in place of PNG textures; dies on GIF textures; doesn't support material transparency; doesn't honor center- and right-justification of Text; can't handle ``convex FALSE'' regardless of whether any non-convex polygons are included; doesn't scope DirectionalLights properly

Win32	GLView 3.02b (semi-stand-alone)	no	doesn't mix gray textures with material colors; doesn't render Text correctly; uses external web browser to retrieve textures. (*This browser no longer exists; see Blaxxun's **CC3D** above.*)
Win32	Internet3D Space Builder 2.1 (stand-alone)	no	uses GIFs with same names in place of opaque palette PNGs. (*Later versions are called **Cosmo HomeSpace Designer**; see above.*)
Linux	LibVRML97 / xmLookat 0.7.9 (stand-alone)	**yes**	spurious pixel in corner of one GIF color texture; doesn't center-justify or right-justify Text correctly; doesn't do font families (e.g, "SERIF")
Win32	Liquid Reality 1.0b17 (IE 3.02)	no	tries, but crashes browser on all PNGs except RGB and RGBA; doesn't do RGB and RGBA PNG textures correctly (appears to use pointer to JPEG buffer sometimes?); doesn't support material transparency; doesn't compose grayscale textures with material colors; doesn't scale Text; doesn't appear to support ambient lighting (DirectionalLight ambientIntensity field). (*This was the final release.*)
Solaris	Liquid Reality 1.0b17 (JDK 1.0.2 appletviewer)	not really	crashes/core-dumps on all PNGs except RGB and RGBA; doesn't do 16-bps textures correctly; doesn't compose grayscale textures with material colors; doesn't scale Text; doesn't support viewpoints; doesn't appear to support ambient lighting (DirectionalLight ambientIntensity field); weird transparency bug with green/red materials. (*This was the final release.*)
Win32	Live3D 2.0b5	(***Live3D** and **Cosmo Player** merged; see **Cosmo Player 1.0** above.*)	
Win32	Live3D 1.0 (NN 3.01)	no	
Win32	MSVRML b2 (IE 4.0b2)	yes, mostly	crashes on transparent palette PNGs; binary transparency; doesn't compose gray GIFs with material colors; appears to quantize palette textures unnecessarily on truecolor displays; uses 8-bit mode by default (select *Graphics -> Full color* to use truecolor on a truecolor display). (*This is a modified version of **WorldView 2.0**.*)
Win32	OZ Virtual 2.0b2 (stand-alone)	no	may try, but crashes on the VRML itself, apparently
Win32	OZ Virtual 1.0b3 (stand-alone)	no	

Win32	RealVR Traveler 1.1.2 (stand-alone)	no	ignores viewpoints; no transparency; minimal control (no translation) and poor lighting, so difficult to see anything
Win32	Torch 1.0b1 (NN 3.01)	yes, mostly	doesn't compose grayscale textures with material colors; treats black as transparent in (opaque) grayscale GIFs; dithered, binary alpha-transparency (i.e., better than plain binary transparency); 8-bit underlying color model regardless of display depth; doesn't support Text. (***Torch** died with Newfire, alas.*)

OS	VRML browser (web browser)	PNG support?	comments
Java	VermelGen beta 2 (stand-alone)	no	
Win32	Viscape Universal 5.60.0.4104 (NN 4.04)	yes, partly	doesn't compose grayscale textures with underlying material colors; doesn't compose opaque textures with underlying material transparency (Direct3D mode) or composes *all* textures with underlying transparency (OpenGL mode); doesn't do single-shade transparency in grayscale and RGB PNGs; renders palette-alpha PNGs opaque (mostly); doesn't support GIF textures (spec-compliant except that it doesn't render underlying material correctly, either--black or garbled)
Linux	VRMLView 2.0b1 (1998.08.03) (stand-alone)	yes, mostly	doesn't compose gray-palette textures with material colors; composes transparent gray PNGs with underlying material transparency; doesn't do 8-bps or 16-bps grayscale PNG transparency; doesn't do GIF transparency; renders opaque RGB textures, opaque palette textures and gray/transparent GIFs on translucent materials as completely transparent; textures turned off by default; extrudes Text into third dimension (many more polygons); ignores Background and Anchor nodes; broken viewpoint support (only Z coordinate honored?); polygon rendering-order bugs; requires Mesa 3.0 beta libraries
Win32	V-Realm Builder 2.1.18 (stand-alone)	no	

Linux	VRwave 0.9 (stand-alone)	no	
Linux	VRwave 0.7 (stand-alone)	no	doesn't support textures
Win32	WorldView 2.1 (IE 3.02)	yes, mostly	binary transparency; doesn't compose gray GIFs with material colors; composes transparent gray PNGs with underlying material transparency, and does not compose opaque textures with underlying material transparency (incorrect behavior); uses 8-bit mode by default (select *Graphics -> Full color* to use truecolor on a truecolor display); with hardware acceleration (Voodoo Rush, DirectX 5), no material transparency; with some hardware (ATI 3D Rage Pro AGP, DirectX 5, ``Feb 98'' video drivers), doesn't do transparency and doesn't display color JPEG box or any non-palette PNG boxes at all
Win32	WorldView 2.0 (NN 3.01)	yes, mostly	binary transparency; doesn't handle alpha-palette PNGs correctly; doesn't do GIF transparency unless `transparent color' is first palette entry; doesn't compose gray GIFs with material colors; appears to quantize palette textures unnecessarily on truecolor displays; uses 8-bit mode by default (select *Graphics -> Full color* to use truecolor on a truecolor display); with hardware acceleration (Rendition Vérité), doesn't display RGBA PNG boxes at all

The following browsers support only VRML 1.0:

OS	VRML browser (web browser)	PNG support?	comments
Win32	VR Scout 1.4 (NC 4.0b4)	no	VRML 1.0 only
Linux	VRweb 1.3 (stand-alone)	no	VRML 1.0 only
Win32	WebFX	(***WebFX*** *was purchased by Netscape and renamed* ***Live3D****, after which it merged with* ***Cosmo Player****; see above.*)	

Win32	Wirl 1.2 (stand-alone?)	no	VRML 1.0 only

Here are some related PNG pages at this site:

-  ImageTexture Examples on Opaque Materials:
  - Palette-Based Textures
  - 8-bps Grayscale and RGB Textures
  - 16-bps Grayscale and RGB Textures
-  ImageTexture Examples on Partially Transparent Materials:
  - Palette-Based Textures
  - 8-bps Grayscale and RGB Textures
  - 16-bps Grayscale and RGB Textures
-  3D Applications

-  PNG Home Page
-  **Complete PNG Site Map**

Last modified 9 June 2002.

 Games and Entertainment Applications with PNG Support

Applications listed here include games and game engines, screen savers, fractal generators, hobby programs, and so forth. Most of them only read or only write PNG images.

As with the other PNG-applications pages, links to home WWW sites or to downloadable versions are provided where known, but if a link is broken, check the location and see if an updated version is available (and please tell Greg!). Relevant operating systems are printed in (*parenthesized italics*).

These are listed alphabetically, more or less:

- **AdvanceMAME** [Andrea Mazzoleni et al.] (*DOS, Win32/SDL, Linux/SDL*) - all versions? read/write; **MNG** support (write-only) as of version 0.58.0; freeware (GPL) with source. (This is a "port of the MAME, MESS, and PacMAME emulators for [fixed-frequency monitors,] arcade monitors and TVs, but also for normal PC monitors." PNG appears to be supported as a format for certain game elements and for screenshots; MNG is supported as a "video" format for recording gameplay. Versions 0.58.0 through 0.61.1 also included the **zmng** [and probably **zpng**] recompression utility(ies); they are now known as **AdvanceMNG** and **AdvancePNG** and are part of the **AdvanceSCAN** package, listed on the converters page.)

- **AdvanceMENU** [Andrea Mazzoleni et al.] (*DOS, Win32/SDL, Linux/SDL*) - version 1.9.0(?) and later; read-only; **MNG** support; freeware (GPL) with source. (This is a graphical front end for **AdvanceMAME**, **MAME**, and other arcade emulators. It displays PNG images and MNG animations as thumbnails for launching various games.)

- **Aleph One** [Jason McGuiness] (*Win32*) - all versions; read/write; uses **libpng** and **zlib**; freeware. (This is a fractal generator with truecolor and multiprocessor support. It can read the images it creates and therefore has some image-viewing capabilities.)

- **ampsig** [Cor and PCheese] (*PHP/gd*) - all versions; write-only; alpha support; requires **gd**, **libpng**, and **zlib**; freeware with source. (This is a "dynamic signature generator," i.e., a webserver-based tool that can generate a graphical, personalized signature block for attachment to forum postings, etc. It is designed to connect to music players and thus include information about what the owner is currently listening to, but it can also include simple information such as the time/date, the server's uptime, the requestor's IP address, etc.)

- **Art Wall** [Ulead Systems] (*Windows 3.x*) - all versions; read-only; 1.5MB. (This is a screen saver.)

- **BeadPlan** [3-D Software / Carlos Portela and Anita Coleman] (*Win32*) - version 2.0 and later; read/write; uses **Victor Image Processing Library** and **zlib**. (This is just what it says: a program for planning bead patterns. It can export a final plan as a PNG image or use an existing PNG image as a background for conversion to a bead graph, which need not be an ordinary rectangular grid. **This product has been discontinued.**)

- **Blitz3D** - see the toolkits and libraries page

- **Ca3D-Engine** [Carsten Fuchs] (*Win32, Linux/X*) - all versions? read-only? freeware/commercial. (This is an OpenGL-based 3D game engine; PNG is supported as a texture format.)

- **Circus Linux** [New Breed Software] (*Linux/X, Win32, BeOS, Mac OS X, Mac OS, QNX, MorphOS, Dreamcast, etc.*) - version 0.0.3 and later; read-only; freeware (GPL) with source. (This is a game modeled on an Atari 2600 classic, `Circus Atari.' It uses PNG images for its bitmaps.)

- **ClanLib** - see the toolkits and libraries page

- **Crystal Space** - see the toolkits and libraries page

- **EasySok** [Ralf Schmelter] (*Unix/KDE3*) - all versions? write-only; **MNG** support; requires **Qt**, **libmng** and **zlib**; freeware (GPL) with source. (This is a version of the Sokoban puzzle-game. Played games may be saved as a sequence of PNGs [deprecated] or as a single MNG animation [preferred]. A sample MNG is available here [131k], albeit with the wrong MIME type.)

- **Fandango** [Alexander Hildyard / Digital Workshop] (*Win32*) - all versions; read-only; commercial. (This is a program to create screen savers.)

- **Fractal Domains** [Dennis C. De Mars] (*Mac PPC*) - version 1.2.2 and later; write-only; shareware.

- **FreeCraft** - see **Stratagus** below

- **GF1** [Kurt Van den Branden] (*Linux, Win32*) - version 1.02 and later; write-only; requires **gd**, **libpng** and **zlib**; freeware (GPL) with source. (This is "GIPF for One," a solitaire version of the strategy game GIPF. It allows the player to save the board position as a PNG image.)

- **gfract** [Osku Salerma] (*Unix/GTK*) - all versions; write-only; freeware with source. (This is a fractal generator with color-cycling and anti-aliasing.)

- **Gliftic** [Ransen Software] (*Win32*) - all versions; write-mostly; commercial. (This is a utility to generate abstract images parametrically; it can be used to create tiles, CD labels, or standalone images. Its PNG support is primarily for writing generated images, but it can also read PNGs to the limited extent of extracting color information ["color schemes"] for the generation process.)

- **Glito** [Emmanuel Debanne] (*Unix/X, Win32*) - all versions; write-only? **MNG** support; requires **FLTK**, **libmng**, **libpng**, and **zlib**; freeware (GPL) with source. (This is an "explorer of two-dimensional Iterated Function Systems" [IFSes, one type of fractals]. It can produce both static images in PNG format and animated sequences in MNG format.)

- **GLtron** [Andreas Umbach] (*Linux/X, Win32, Mac OS, Mac OS X*) - all versions? read-only? requires **SDL**, **libpng**, and **zlib**; freeware (GPL) with source. (This is an OpenGL version of the TRON lightcycle game. All of its textures are PNG images.)

- **Glulxe** [Andrew Plotkin, David Kinder, and others] (*Win32, Mac?*) - all versions? read-only; freeware with source. (This is the interpreter for Andrew Plotkin's Glulx, a portable, 32-bit virtual machine for interactive fiction [like Adventure or Zork]. PNG is supported as an image resource in at least the Windows version and possibly the Mac version, but, as of September 1999, not the Unix version. See also the Glulx archive and **Glk** on the toolkits page.)

- **GNU Backgammon** [Gary Wong, Joseph Heled, Jørn Thyssen, Øystein Johansen, Jim Segrave, David Montgomery] (*Unix/GTK+, Win32*) - versions since 30 November 2002? write-only; freeware (GPL) with source. (This is a backgammon game that can export board snapshots in PNG format.)

- **Graal** [Linux Cyberjoueurs] (*Win32, Linux/X, Mac OS X*) - version 2 and later; read-only; **MNG** support; alpha support; uses **libmng** (version 3 only) and **zlib**; freeware. (This is a massively multiplayer online role-playing game [MMORPG] that uses PNG images for tiled artwork and widgets and MNG animations for emoticons.)

- **GraFX Saver** [CDH Productions] (*Win32*) - version 2.5(?) and later; read-only? commercial. (This is a screen saver. It also claims to have MNG support, but reportedly that is limited to reading single PNGs wrapped in MNG headers--i.e., its MNG support is virtually non-existent.)

- **Hyperplay** [Kaz Sasayama] (*Unix/GTK, Win32, OS/2*) - version 1.1.11 and later; read/write? freeware (GPL as of version 1.3, LGPL before) with source. (This is a "multimedia authoring engine designed for graphical adventure-style games." **Version 1.1 was the final release to support OS/2 and Windows.** Version 1.3 and later releases support only POSIX systems, primarily Linux.)

- **HyperTADS** [Iain Merrick and Andrew Pontious] (*Mac OS*) - version 1.3(?) and later; read-only; requires **QuickTime 3** or later; freeware. (This is a Macintosh implementation of the "Text Adventure Development System," a toolkit for creating interactive fiction; see **TADS** below for details.)

- **JavaBrot** [Thomas Middelkoop] (*Java/Win32, Java/Linux, etc.*) - all versions; write-only; uses **libpng** and **zlib**; freeware with Java/C source.

- **Juggle Saver** [Envision] (*BeOS*) - all versions; read-only; commercial? (This is a screen saver.)

- **mapdraw** [David Haslam] (*Unix, etc.*) - all versions; write-only; requires **libpng** and **zlib**; freeware with source. (This is a tiny utility to convert **Wolfenstein 3D** game maps to either text or PNG format. It may also be known as **mapdump**.)

- **Murals** [PixVision Software] (*Win32*) - version 2.00(?) and later; read-only; shareware. (This is a multiformat wallpaper-changer. There is also a 16-bit Windows version, but it doesn't support PNG and doesn't seem to be available for download anyway.)

- **nwrk-matrix** [NeuroWork] (*Unix, etc.*) - version 0.8 and later; read-only; freeware (GPL) with source. (This is a mildly amusing entertainment app for ANSI terminals; it shows the animated green dropping-characters effect from *The Matrix*. PNG is supported as one of the two formats for the masks it uses, although as of version 0.9.2, the support is still a bit unstable. **This product has vanished.**)

- **PilotGOne** [Brian Brunswick, Sylvain Soliman, et al.] (*Palm OS*) - version 0.8.0 and later; read-only; freeware (GPL) with source. (This is a Go [a.k.a. WeiQi/Wei-Ch'i, Baduk] implementation and recording/playback utility for Go games.)

- **Projector** [Nun's Meadow Software] (*Win32*) - version 1.5f and later; read-only; shareware. (This is a screen saver / slideshow tool.)

- **Pueblo/UE** [Michael Roberts] (*Win32*) - version 2.60 and later; read-only; **MNG** support; full alpha support (via the OS--currently Windows 98/ME/2k/XP only); freeware with source. (This is a "multimedia MUD/MUSH/MOO/MUX (MU*) client," i.e., the user end of a multi-user, client-server gaming system. It can also act as a plain telnet client.)

- **Puzzlemaker** [Network Solution Developers] (*WWW/CGI*) - November 1998 and later; write-only; freeware. (This is a web-based puzzle-generator that now uses PNG format for its automatically created puzzles. Unfortunately the site also uses the Microsoft IIS 4.0 web server, which enforces a very strict HTTP header syntax; since all versions of Netscape Navigator prior to 4.51 have a typo in the PNG part of their Accept headers -- i.e., a missing comma -- the server

refuses to return anything to these older versions and the generated images appear broken. Upgrade to 4.51 or later to avoid the problem.)

- **Pygame** [Pete Shinners] (*Win32, Mac OS, Mac OS X, BeOS, Unix*) - all versions? read/write? full alpha support? requires **SDL**, **libpng** and **zlib**; freeware (LGPL) with source. (This is a Python-based multimedia library/toolkit written on top of SDL. It is primarily used for games, although there are also image viewers and other applications written with it.)

- **Quat** [Dirk Meyer] (*Unix/FLTK, Win32/FLTK*) - all versions? read/write; requires **zlib**; freeware (GPL) with C/C++ source. (This is a generator of 3D quaternionic fractals. PNG is its sole image format, and it includes an independent C implementation of PNG-encoding/decoding functions. Development appears to have ceased in late 2002.)

- **ScreenPaver** [Michael Lindell] (*Win32*) - version 3.0 and later; read-only; shareware. (This is a "make-your-own slideshow screen saver.")

- **Slides Shower** [Chris Doan] (*Windows 3.x, Win32*) - registered version 2.1a and later; read-only; shareware. (This is a "multimedia screen saver" that can also print to a Windows printer; the link points at the shareware version.)

- **Sphere** [Chad Austin] (*Win32*) - versions since April 2000; read/write; full alpha support; freeware with source. (This is a role-playing game (RPG) engine "specialized for making 2D, console-style RPGs." The engine uses PNG images for its tiles and sprites and is read-only, but the included sprite/tile editor saves in PNG format. There's also a SourceForge page with CVS access that doesn't appear to be linked anywhere on the main site.)

- **Stereograph** [Fabian Januszewski] (*Linux*) - version 0.17 and later; read/write; alpha support; requires **libpng** and **zlib**; freeware (GPL) with source. (This is a stereogram generator that can use PNG images as textures for stereograms and can write the finished results as PNG files.)

- **Stratagus** [Stratagus developers / Lutz "Johns" Sammer et al.] (*Linux, Win32, BSD, BeOS, Mac OS X, etc.*) - all versions; read/write; requires **libpng** and **zlib**; freeware (GPL) with source. (This is a two-dimensional, cell-based strategy-game engine similar to that of Warcraft or Starcraft, except the sprites and other graphics are in PNG format. The resulting games themselves are read-only [with respect to PNG], but the source archive also contains tools to allow game designers to convert images to PNG format [write-support]. Stratagus is a fork of the [now-dead] **FreeCraft** project, as are **Wargus**, **ProjectInferno**, and **Aleona's Tales**.)

- **Strifeshadow: Tournament Edition** [Ethermoon Entertainment] (*Win32*) - all versions; write-only; commercial. (This is a 2.5-dimensional "real-time strategy" game. PNG is supported as a screenshot format.) (coming Q1 2001)

- **Sympathy Crossword Grid Construction** [Bryson Limited / Ross Beresford] (*Win32*) - version 1.5 and later; write-only; commercial. (This is exactly what its name suggests, a program to create crossword puzzles. It can publish the finished puzzles in PNG format for the Web. A 16-bit Windows 3.x port may also exist, but it wasn't available as of July 2000.)

- **TaBazar** [Peer Smola] (*Win32*) - version 2.1 and later; write-only; commercial. (This is a "10-track tab[lature] editor and MIDI player for guitar and other string[ed] instruments." Edited sheet music can be exported in PNG format.)

- **TADS** [Michael Roberts] (*Win32*) - version 2.2(?) and later (HTML TADS only); read-only; transparency support as of version 2.5.4; full alpha support as of version 2.5.6 (via the OS--currently Windows 98/ME/2k/XP only); **MNG** support as of version 2.5.6; freeware with source. (This is the "Text Adventure Development System," a toolkit for creating interactive fiction similar to Adventure, Zork, etc. There is both a text-only version and an HTML-based version; the latter supports images and animations, including PNG and MNG. Note that the current development version, 3.0.4, does *not* yet include alpha or MNG support.)

- **TADSMap** [Andrew Pontious] (*Win32, Mac OS, etc.*) - all versions; read-only; requires a sufficiently recent HTML-TADS interpreter; freeware with TADS source. (This is a dynamic mapping module for text adventure systems. It uses PNG images and HTML to symbolically show a player's immediate surroundings in a game.)

- **Torque Game Engine SDK** [GarageGames.com] (*Win32, Mac OS, Mac OS X*) - all versions; read/write; full alpha support; uses **libpng** and **zlib**; commercial. (This is the Dynamix-developed game engine at the heart of **Tribes 2**, below, and originally was known as the **V12 Game Engine SDK**. It supports OpenGL and DirectX, networking, physics, etc. PNG is supported as a texture format [with alpha used for transparency or reflectance maps], as the basis for the GUI, and as an output format for screenshots and the integrated tools. Linux and OpenBSD ports are "under development.")

- **Tribes 2** [Dynamix / Sierra On-Line] (*Win32*) - all versions; read-only; full alpha support? commercial. (This is a multiplayer, OpenGL-based 3D game that uses the **Torque Game Engine**, above, and 32-bit PNG images for textures.)

- **V12 Game Engine SDK** - see **Torque Game Engine SDK** above

- **V-Chat** [Microsoft] (*Win32*) - version 1.1(?) and later; read-only. (This is an avatar-based chat system; the avatars are stored in PNG format.)

- **WallShow** [Jim Lawless] (*Win32*) - version 1.30(?) and later; read-only; shareware. (This is a

"wallpaper slideshow"; it can sequentially display various image formats as the desktop background.)

- **WWplus32** [Arcata Pet Software] (*Win32*) - version 3.0(?) and later; read-only; shareware. (This is a "wallpaper manager/changer"; it can sequentially display various image formats as the desktop background.)

- **WWSaver32** [Arcata Pet Software] (*Win32*) - version 3.0(?) and later; read-only; shareware. (This is a screensaver that displays image archives, including PNG format, optionally with associated audio.)

- **XaoS** [Jan Hubicka et al.] (*Unix/X, Amiga, BeOS, DOS, Hurd, Macintosh, OS/2, plan9*) - version 3.0 and later; write-only; freeware (GPL) with source. (This is a "fast, portable, real-time, interactive fractal zoomer.")

Here are some related PNG pages at this site:

- PNG-supporting Applications
  - Browsers
  - Image Viewers
  - Image Editors
  - Image Converters
  - 3D Applications
  - Office / Business Applications
  - Scientific / Graphing Applications
  - Miscellaneous Applications
- PNG support in VRML browsers
- PNG-supporting Hardware

- PNG Home Page
- **Complete PNG Site Map**

Last modified 19 August 2006.

Office / Business Applications with PNG Support

These products are typically referred to as "office" or "business" or "productivity" applications. For the most part their PNG support is limited to import (e.g., embedding a PNG image in a text document), but some also include presentation or illustration components that can create or modify PNG images.

As with the other PNG-applications pages, links to home WWW sites or to downloadable versions are provided where known, but if a link is broken, check the location and see if an updated version is available (and please tell Greg!). Relevant operating systems are printed in (*parenthesized italics*).

These are listed alphabetically, more or less:

- **AbiWord** [AbiSource] (*Win32, Linux, BeOS PPC/x86, FreeBSD, Solaris, etc.*) - all versions; read/write; uses **libpng** and **zlib**; freeware (GPL) with source. (This is a cross-platform, Open Source word processor that uses PNG as its native compressed image format.)

- **Anyware Desktop** - see **Applixware Office** below

- **Anyware / Applixware Office** [VistaSource] (*Unix/GTK+*) - version 4.4.1 and later; read/write; commercial. (This is a business applications suite with read/write PNG support in its **Graphics** and **Presents** components and [apparently] read-only support in its **Words** and other components. Prior to 2002, this suite was known simply as **Applixware Office**.)

- **Atlantis Word Processor** [Rising Sun Solutions] (*Win32*) - all versions; read/write; commercial. (This is also known as **Atlantis Ocean Mind**. In addition to reading and writing document formats with embedded PNGs, it can also export HTML with PNG images, and any individual image can be saved as a PNG via right-click menu option.)

- **AxPoint** [Matt Sergeant] (*Perl*) - all versions? read-only; uses **libpng** and **zlib**; freeware (Perl license) with source. (This is an XML-based tool for producing PDF presentations. It also supports SVG, JPEG, and a few other image formats.)

- **The Bat!** [RIT Research Labs] (*Win32*) - version 1.4(?) and later; read-only; reportedly no transparency support as of version 2.11; uses **libpng** and **zlib**; commercial. (This is an e-mail client that can display PNG attachments and inlined-PNG HTML messages.)

- **ConceptDraw Presenter** [Computer Systems Odessa] (*Mac OS, Mac OS X, Win32*) - all

versions; write-only; commercial. (This is a tool for making and showing business presentations [slide shows]. It includes some vector drawing tools and can export to PNG format.) an export format.)

- **ConceptDraw Project** [Computer Systems Odessa] (*Mac OS, Mac OS X, Win32*) - all versions; write-only; commercial. (This is a project-management tool, supporting Gantt charts, WBS charts, and so forth. PNG is supported as an export format.)

- **Corel Presentations** - see **WordPerfect Office** below

- **CSCMail** [Steven "Count Zero" Kordik] (*Unix/GTK+*) - all versions; read-only; full alpha support; requires **CscHTML**, **libpng** and **zlib**; freeware (GPL) with source. (This is an e-mail client written in Perl that has full HTML-viewing capability--in fact, it includes a simple web browser. See the toolkits page for details on the CscHTML widget.)

- **Excel** - see **Microsoft Office** below

- **Evolution** [Ximian] (*Unix/GTK+*) - all versions; read-only? uses **gdk-pixbuf**, **libpng**, and **zlib**; commercial/freeware (GPL) with source. (This is a "personal and workgroup information management" application with e-mail and calendar/scheduling functions, among other things.)

- **Final Writer** [SoftWood] (*Amiga*) - version 5.0 and later via a PNG DataType (see the toolkits page for a couple); read-only. (This is a word processor with image-import and other DTP capabilities.)

- **FrameMaker** [Adobe] (*Solaris/X, Win32*) - version 7.0(?) and later; read/write; commercial. (This is a desktop-publishing application with support for embedded PNGs and the ability to export any image format to PNG.)

- **GanttProject** [Alexandre Thomas and others] (*Java*) - version 1.8 and later; write-only? requires Java2 SDK 1.4.1 or later; freeware (GPL) with Java source. (This is an application for creating and manipulating project timetables via Gantt charts. It can export calendars in PNG format.)

- **ImPress** [Chris Jay Cox] (*Unix/X, Win32*) - version 1.1-b5 and later; write-only? requires **Img**, **libpng**, **zlib**, and possibly **pstoedit** (converters page); freeware (GPL) with source. (This is a Tcl/Tk-based page-layout application with both vector and raster support.)

- **KOffice** [KOffice Developers] (*Unix/KDE*) - all versions; read/write; freeware (GPL/LGPL) with source. (This is a business applications suite with embedding support for the full components, not just subsets. PNG is supported as an importable image format by many of the tools and as an exportable format by a few of them [KIllustrator, possibly KImageShop?].)

- **LazaLabl** [SoftCentre] (*Windows 3.x, Win32*) - version 2.6 and later; read/write; uses **libpng** and **zlib**. (This is an application for creating business cards, mailing labels, badges, etc.)

- **Lotus Notes** - see **Notes** below

- **MagicPoint** [WIDE Project] (*Unix/X*) - version 1.07a and later; read-only; **MNG** support as of version 1.08a; uses **libmng**, **lcms**, **libpng**, and **zlib**; freeware (BSD) with source. (This is a wonderful presentation app with a text-based file format; it allows MNG animations and PNG images to be embedded in presentations. Version 1.09a is still considered "alpha," but it is quite usable. A third-party **LaTeX** preprocessor is also available.)

- **Memo Writer Pro** [Universal Development Corporation] (*Windows 3.x, Win32*) - version 2.6(?) and later; read-only. (This appears to be a word processor DLL component plug-in thingumbob with support for various image formats via **ImageLib** [toolkits page].)

- **Microsoft Office** [Microsoft] (*Win32*) - version 97 and later; read/write; full alpha support as of version 2000 and in Photo Editor 97 (stippled alpha in Word 97 and Excel 97); tEXt support as of version 2000 (extracted to generate ALT text for web pages); uses **LEADTOOLS** and **zlib**; commercial. (This is Microsoft's business applications suite; it now uses PNG as its native compressed image format and also directly in its **PowerPoint**, **Excel**, **Word**, **Photo Editor**, and **OfficeArt** components. See the image editors page for details on the latter two. Note that PNG is part of the minimal "core" installation of Word, Excel and PowerPoint in **Office 2000**, so PNG support is always available in those components. Note also that *printing* support is at least partially dependent on printer drivers, not the application itself; see the PNG FAQ page for details.)

- **Nautilus** [Eazel] (*Unix/GTK*) - all versions; read-only; full alpha support; freeware (LGPL) with source. (This is a file manager and graphical shell that uses PNG for its icons. The sources are directly browsable via CVS. Note that the included **test-rsvg** test program can convert SVG images to RGBA PNGs.)

- **Notes** [IBM / Lotus] (*Win32, Mac PPC*) - version R5(?) and later; read-only? uses **libpng** and **zlib**; commercial. (This is an e-mail/calendar/groupware client with at least some web-browsing capability.)

- **OpenOffice.org** [Star Division / Sun / OpenOffice.org] (*Solaris, Linux, Win32, Mac OS X*) - all versions; read-only? freeware (GPL/LGPL/SISSL) with source. (This is the open-source version of **StarOffice**, below. Worldlabel has various free label templates, including PNG-format ones for OOo Draw.)

- **Oracle** [Oracle] (*Win32, Unix, etc.*) - version 8i and later; read-only? commercial. (This is a really *big* database. PNG support is provided via Inso's filtering technology, which "enables you to index most document formats" and to "convert documents to HTML.")

- **PageMaker** [Adobe] (*Win32*) - version 6.5 and later with PNG import filter add-on (100k); read-only; commercial. (This is a desktop publishing [page layout] application. The add-on allows PNG images to be incorporated into documents.)

- **PageStream** [Grasshopper] (*Amiga*) - version 3.0 and later with Wolf Faust's free Universal Filter add-on (872k); read/write; commercial. (This is a desktop publishing [page layout] application. The Universal Filter add-on allows PNG images [and other formats] to be incorporated into documents.)

- **PowerPoint** - see **Microsoft Office** above

- **QuarkXPress** [Quark] (*Win32*) - version 5.0 and later; write-only; commercial. (This is a desktop publishing (page layout) application. It now supports HTML export, and embedded images can be exported in PNG format.)

- **ROX-Filer** [Thomas Leonard] (*Unix/GTK*) - version 1.3.1(?) and later; read-only? full alpha support; freeware (GPL) with source. (This is a file manager that has been "fully converted to use PNG format images. Uses alpha-blending everywhere, allowing smooth edges to icons and semi-transparency." Its user interface is based on that of the [Acorn] RISC OS filer.)

- **SmartDraw** [SmartDraw.com] (*Win32*) - version 6.0 and later; read/write; commercial. (This is an office-oriented charting and diagramming application that can import and export in PNG format.)

- **StarOffice** [Star Division / Sun] (*Solaris, Linux, OS/2, Win32*) - version 5.1(?) and later; read-only? commercial. (This is a business applications suite, much like **Microsoft Office**; it includes word processing, spreadsheet, database, presentation, drawing and other components. Sun acquired it from Star Division and released the source code as **OpenOffice** [see above] in late 2000; OpenOffice and StarOffice share roughly the same relationship as Mozilla and Netscape Communicator 6+.)

- **Ted** [Mark de Does] (*Unix/X*) - version 2.0(?) and later; read-only (images written as part of documents, but native bitmap format not modified); freeware (GPL) with source. (This is a text editor and word processor with functionality somewhere between Microsoft Wordpad and Word. It can inline various image formats, including PNG, and save documents in RTF, PDF, HTML, or multipart MIME e-mail formats.)

- **Transsonic Presenter** [Transsonic] (*Win32*) - all versions? write-only? freeware; 2.2 MB. (This is a utility to convert **PowerPoint 97** slideshows to PNG or JPEG format with automatic HTML generation and optionally with a table of contents.)

- **Turbo Browser** [FileStream] (*Win32*) - version 7.2 and later; read/write; shareware. (This is a file manager, similar to Windows Explorer, but with file-transfer, HTML-editing, image-viewing, and image-conversion capabilities in addition to standard file-management functions. There is also a simpler version called **Turbo Browser Express**.)

- **Turnpike** [Turnpike] (*Windows 3.x, Win32*) - version 4.00 and later; read-only; commercial. (This is actually a mail and news client that understands some basic HTML; it isn't capable of browsing the Web, per se, although Internet Explorer is bundled with the CD-ROM version.)

- **Word** - see **Microsoft Office** above

- **WordPerfect Office** [Corel] (*Win32, Unix*) - version 8.0 and later; reportedly full alpha-transparency support but no support for transparency in palette PNGs; read/write; commercial. (This is, of course, a professional office suite anchored around **WordPerfect**, the word processor; it also includes **Corel Presentations** [which in turn includes an image editor called simply **Graphics Editor**] and other components. At least the word processor is capable of exporting HTML, as well. WordPerfect 6.1 for Windows 3.x also supports reading PNGs with cvww6x.exe and "`ScanForConverters=1`" in the [WPCorp] section of win.ini.)

- **XAllWrite** [Axene] (*Unix/X*) - all versions; read-only; commercial. (This was a word processor that supported the import of various bitmap formats, including PNG. Version 1.0.3 beta was the final release. **As of March 1998, Axene appears to have folded.**)

- **Xclamation** [Axene] (*Unix/X*) - version 1.3.1 and later; read-only; commercial. (This was a desktop publishing app that supported the import of various bitmap formats, including PNG. Version 1.4.3 was the final release. **As of March 1998, Axene appears to have folded.**)

Here are some related PNG pages at this site:

-  PNG-supporting Applications
  - Browsers
  - Image Viewers
  - Image Editors
  - Image Converters

    - 3D Applications
    - Games / Entertainment
    - Scientific / Graphing Applications
    - Miscellaneous Applications
- PNG support in VRML browsers
- PNG-supporting Hardware

- PNG Home Page
- **Complete PNG Site Map**

Last modified 22 September 2006.

Scientific, Plotting and Graphing Applications with PNG Support

These are scientific and technical programs for analyzing, manipulating, graphing and/or plotting data.

As with the other PNG-applications pages, links to home WWW sites or to downloadable versions are provided where known, but if a link is broken, check the location and see if an updated version is available (and please tell Greg!). Relevant operating systems are printed in (*parenthesized italics*).

These are listed alphabetically, more or less:

- **3D-XplorMath** [Richard Palais and Hermann Karcher] (*Mac OS, Mac OS X*) - version 10.0 and later; write-only? freeware for non-commercial and academic use. (This is a mathematical visualization and exploration tool ["museum"] that can save visualizations in PNG format. It was originally called **3D-Filmstrip**.)

- **ACE/gr** - see **Grace** below

- **ArchiCAD** - see the 3D applications page

- **CellProfiler** [Anne Carpenter, Thouis "Ray" Jones, and others] (*Win32, Mac OS X, MatLab*) - all versions; read/write; freeware with MatLab source. (This is image-analysis software for [biological] cells; it allows one to "quantitatively measure phenotypes from thousands of images automatically." PNG apparently is supported as one image type that can be analyzed.)

- **Ch Professional Edition** [SoftIntegration] (*Win32, Unix/X, Mac OS X?*) - all versions? write-only? commercial (freeware for academic use). (This is a numerical/plotting package with "2D/3D plotting supporting PNG." Ch itself is a proprietary, multiplatform C/C++ interpreter; see also the toolkits page for the **Ch PNG** add-on.)

- **ChartDirector** [Advanced Software Engineering] (*Win32, Linux, Solaris, FreeBSD, Mac OS X*) - all versions? write-only? shareware. (This is an object-oriented charting and graphics library with interfaces to C++, Python, Perl, PHP, and COM/ASP/VB/etc. The web site is completely PNG-based, too--most excellent.)

- **aiSee** [AbsInt] (*Win32, Unix/X, Mac OS X*) - version 2.1.60 and later; read/write as of version

2.1.87 (write-only in previous versions); commercial. (This is a tool to lay out and draw graphs, in the specialized computer-science and mathematical sense [i.e., graph theory]. It was "developed to visualize the internal data structures typically found in compilers," but it can also be applied to circuit diagrams, family trees, org charts, etc. Read support consists of displaying PNG [or NetPBM] icons in nodes.)

- **BrainVoyager** [Rainer Goebel / Brain Innovation] (*Win32, Unix/X, Mac OS X*) - version QX(?) and later; read/write? **MNG** support; commercial. (This is a medical imaging utility to manipulate brain scans, create 3D models, capture still images and animation/movie sequences, etc. PNG and MNG are supported for the capture functions [and presumably for playback, as well].)

- **Cn3D** [National Center for Biotechnology Information] (*Win32, Unix/X, Mac OS*) - version 4.0 (?) and later; write-only; freeware with source. (This is a 3D molecular-visualization application that "simultaneously displays structure, sequence, and alignment, and now has powerful annotation and alignment editing features." It can render directly to PNG, either high-resolution or via screenshots.)

- **CoPlot** [CoHort Software] (*Win32, Linux/Unix, Mac OS X, etc.*) - version 5.921 and later; read/write; commercial. (This is a "program for making publication-quality scientific graphs, maps, and technical drawings" in both 2D and 3D. The Linux/Unix and Mac OS X versions are marked "unofficial" only because they have not yet been fully tested [as of September 2001]. Since the program is Java-based, it should run on any platform with a solid JVM implementation.)

- **ComponentOne Chart** [ComponentOne] (*Win32*) - version 6.0(?) and later; write-only; commercial. (This is a presentation-graphics toolkit with both interactive and programmable interfaces. It can do both 2D and 3D charts and supports MSVC, Visual Basic, Delphi, and Borland C++ Builder. It was previously known as **Olectra Chart**.)

- **DeltaGraph** [Red Rock Software] (*Mac OS, Mac OS X, Win32*) - version 5(?) and later; write-only? commercial. (This is a graphing and charting application.)

- **DISLIN** [Helmut Michels] (*DOS, Unix, VMS, Win32*) - version 7.2 and later; write-only; freeware or commercial, depending on platform and compiler. (This is a high-level plotting library for data visualization. It can do both 2D and 3D plots and supports C, Fortran77, Fortran90, Java, Perl and Python.)

- **DNA-CGR** [Indraneel Majumdar] (*Linux/SVGA*) - version 0.2 and later; write-only; requires **libpng** and **zlib**; freeware (GPL) with source. (This is "a tool to visualise DNA and RNA sequences using Chaos Game Representation.")

- **DTM / Digital Terrain Mapping** [Ivan Lee Herring] (*Win32*) - all versions? write-only? uses **PNG Delphi / TPNGImage**; freeware with Pascal source. (This is a tool to display digital elevation models (DEMs) as maps.)

- **Flounder** [Edward Vigmond] (*Unix/X*) - all versions; write-only; requires **libpng** and **zlib**; freeware with source. (This is a 4D data-visualization program that can render isosurfaces, slices, etc. Images or image sequences can be saved in PNG format.)

- **g3data** [Jonas Frantz] (*Unix/GTK+*) - all versions? read-only? requires **imlib**, **libpng** and **zlib**; freeware (GPL) with source. (This is a program to help automate the extraction of data values from graphs.)

- **gerbv / Gerber Viewer** [Stefan Petersen, Andreas Andersson, Anders Eriksson] (*Unix/GTK+*) - version 0.0.9 and later; write-only; requires **gdk-pixbuf**, **libpng**, and **zlib**; freeware (GPL) with source. (This is a viewer for Gerber files, which is a format used by CAD programs for the layout of printed circuit boards [PCBs]. It can export multilayer circuit diagrams in PNG format.)

- **GIF/PNG-Creator** [Frank Oellien and Wolf-Dietrich Ihlenfeldt] (*WWW/CGI/Tcl*) - versions since 3 September 1998? write-only; text support (*Comment*, *SMILES*, *CACTVS*, and *MOLFILE*); freeware. (This is an online renderer [in the line-drawing sense] of chemical structures. It formerly used **gif2png** to create PNG images, but since 26 February 2000 it uses the **gd** library directly and also supports embedding of chemical structures in text comments.)

- **GINO** [Bradly Associates] (*Win32, Unix/X*) - version 5.0 and later; read/write; commercial. (This is a Fortran90 scientific graphics suite with OpenGL support.)

- **Gmsh** [Jean-François Remacle and Christophe Geuzaine] (*Win32, Linux/FLTK, Mac OS X*) - version 1.44 and later; write-only? freeware (GPL) with source. (This is a "three-dimensional finite element mesh generator with built-in pre- and post-processing facilities.")

- **gnuplot** [Thomas Williams, Colin Kelley et al.] (*Unix, VMS, OS/2, DOS, Windows 3.x, Amiga, OS-9/68k, Atari, Macintosh, Human68k*) - version 3.6 beta 261 and later; write-only; freeware (non-GPL) with source. (A FAQ list is also available.)

- **Grace** [Paul J. Turner / Grace Development Team] (*Unix/Motif, OS/2, VMS, Win32*) - version 5.0.3 and later; write-only; requires **libpng** and **zlib**; freeware (GPL) with source. (This is a 2D graphing tool with support for logarithmic axes, etc.; it can save plotted images in PNG format. It is derived from Paul Turner's **ACE/gr**, which was also known as **Xmgr**.)

- **GrADS** [Brian Doty] (*Unix/X*) - version 1.7(?) and later; write-only; requires **ImageMagick**, **libpng** and **zlib**; freeware (restricted) with source. (GrADS stands for "Grid Analysis and Display

System" and is an interactive tool "for the analysis and display of [4D] earth science data." PNG output is supported only via ImageMagick, and only if ImageMagick is compiled appropriately [which is not how the distributed binaries are compiled]. The Win32, DOS and Mac OS versions apparently do not support PNG at all.)

- **GraphViz** [AT&T Research] (*Unix, Win32, Mac OS X*) - all versions? write-only? requires **libpng** and **zlib**; freeware with source. (This is a collection of mostly command-line tools for visualization of directed and undirected graphs. At least some of the tools [like **dot**] support PNG export.)

- **GraPL** [Causeway Graphical Systems] (*Win32*) - version 1.3(?) and later; write-only? commercial. (This is a charting and graphing application that apparently can save its results in PNG format.)

- **GRASS** [U.S. Army Construction Engineering Research Laboratory / GRASS Development Team] (*Unix/X, Win32/Cygwin*) - version 5.0 (beta 7, 20 April 2000) and later; read/write; requires **libpng** and **zlib**; freeware (GPL) with source. (This is a "Geographical Information System (GIS) with raster, topological vector, image processing, and graphics production functionality.")

- **GRIP ICE** [Ivan Lee Herring] (*Windows 98/XP*) - all versions? read/write; uses **PNG Delphi / TPNGImage** (see the toolkits page); shareware. (The name stands for *Geographic Raster Image Processor / Investigate Classify Extrapolate*. See also **Grafree** on the editors page.)

- **IDL** [Research Systems] (*Unix/X, VMS, Win32, Macintosh*) - version 5.2 and later; read/write; commercial. (This is a 4GL application-development package for data analysis and visualization. PNG support is via "an API to read, query, and write PNG images." As of version 5.4, GIF support was dropped in favor of an enhanced `READ_PNG` that can now be "called as a procedure" [via IDL's interactive or scripting interface?] as well as as a function, thereby serving as a drop-in replacement for the older `READ_GIF`.)

- **IGOR** [WaveMetrics] (*Win32, Mac 68k/PPC*) - version 3.1 and later; read/write as of version 4 (write-only in earlier versions); commercial. (This is an interactive data-analysis and graphing package for scientific and engineering data. PNG is supported "either as an image for annotation or as raw data for analysis.")

- **KMatplot** [Kamil Dobkowski] (*Unix/KDE*) - all versions? read/write (read-only prior to version 0.2.2); freeware (GPL) with source. (This is a WYSIWYG "gnuplot-like tool for plotting data sets in [either] two or three dimensions.")

- **kst** [Barth Netterfield, George Staikos, et al.] (*Unix/KDE*) - all versions? write-only; freeware (GPL) with C/C++ source. (This is a "plotting and data viewing program" coming out of the astrophysics community. See also the KDE-Apps page.)

- **Mathematica** [Wolfram Research] (*Unix/X, NeXTStep, Win32, Macintosh*) - version 5.0 and later, or any version(?) with Jens-Peer Kuska's **PNGBitmap** package (freeware with source, uses **libpng** and **zlib**); read/write; alpha support and 16-bit support via **PNGBitmap** only; commercial. (This is a "fully integrated environment for technical computing." Jens' PNG add-on allows Mathematica graphics elements to be saved as PNGs and PNGs to be used as textures for surfaces. As of 22 March 2001, the add-on integrates seamlessly into Mathematica 4.x's Import[]/Export[] functions.)

- **mathmlrender** [Drew Bowering] (*Unix/GTK+*) - all versions; write-only; transparency support; requires **gd**, **libpng** and **zlib**); freeware (GPL) with C and C++ source. (This is a PHP4 extension to render MathML markup to either PNG or JPEG format to support older browsers.)

- **MATLAB** [MathWorks] (*Win32, Unix/X*) - version 5.3 (a.k.a. Release 11) and later; read/write; commercial. (This is an "integrated technical computing environment that combines numeric computation, advanced graphics and visualization, and a high-level programming language." The Macintosh and VMS versions are frozen at version 5.2 and therefore do not include PNG support. MathWorks also hosts a "technical computing portal" called Mathtools.net, with [JavaScript] links to many other sites of scientific and engineering interest.)

- **MRIcro** - see the image viewers or converters pages

- **MRTG / Multi Router Traffic Grapher** [Tobias Oetiker, Dave Rand and others] (*Unix, Win32*) - version 2.8.0 and later; write-only; requires **gd**, **libpng** and **zlib**; freeware (GPL) with source. (This is a tool that uses SNMP to retrieve statistics on network traffic from specified routers; it then automatically generates web pages with graphs in PNG format.)

- **myPACS** [Botond K. Szabo] (*Unix/CGI*) - version 0.11 and later; read-only? requires **ImageMagick**, **libpng** and **zlib**; freeware (GPL) with source. (This is a "web-based medical image management system." [PACS = "Picture Archiving and Communication System"] PNG is one of the supported image formats.)

- **Olectra Chart** - see **ComponentOne Chart** above

- **Origin** [OriginLab] (*Win32*) - version 6.0 and later; read/write as of version 6.1 (write-only in 6.0); commercial. (This is a "technical graphics and data-analysis package with integrated scripting language for automation." There is also a professional version called **OriginPro**.)

- **PHPLOT** [Afan Ottenheimer] (*Unix/PHP*) - all versions? write-only? requires **gd**, **libpng** and **zlib**; freeware (GPL/PHP) with source. (This is a server-side plotting/graphing tool inspired by the old FORTRAN PGPLOT library.)

- **Ping Plotter** [Nessoft] (*Win32*) - version 2.2 and later; write-only; shareware. (This is a graphical ping/traceroute tool that can save its graphs in PNG format, either manually or at intervals automatically. Version 1.x was freeware but had no PNG support.)

- **Ploticus** [Steve Grubb] (*Unix/X*) - version 1.2 and later; read/write; requires **libpng** and **zlib**; freeware (GPL) with source. (This is a script-driven plotting and charting program; it generates all sorts of 2D plots, charts and tables, and it can be used either interactively or in batch mode.)

- **plotutils** [Robert S. Maier, Nick Tufillaro, and others] (*Unix, etc.*) - version 2.4.1 and later; write-only; binary transparency support (alpha support coming); requires **libpng** and **zlib**; freeware (GPL) with source. (This is a set of vector-based plotting and conversion tools [and **ode**, a solver of systems of ordinary differential equations]. The tools are based on the included **libplot** library, which is listed on the toolkits and libraries page.)

- **PLplot** [Maurice J. LeBrun / Geoff Furnish / Alan W. Irwin] (*Unix*) - version 5.0.3 and later; write-only; requires **libpng** and **zlib**; freeware (LGPL) with source. (This is a "library of C functions that are useful for making scientific plots from programs written in C, C++, Fortran, Octave, Python, and Tcl/Tk.")

- **PNGwriter** [Paul Blackburn] (*any*) - all versions; read/write; 16-bit-per-sample support; requires **libpng** and **zlib**; freeware (GPL) with source. (This is a C++ class for plotting XY data and drawing basic shapes directly to a PNG file. It includes HSV conversion functions, text-rendering support, documentation in both English and Spanish, etc.)

- **PV-WAVE** [Visual Numerics] (*Unix, Win32, VMS*) - version 6.04 and later; read/write; commercial. (This is a scientific analysis and visualization suite.)

- **PyChart** [Yasushi Saito] (*Python*) - all versions? write-only; requires **Ghostscript**; freeware (GPL) with Python source. (This is a "Python library for creating high quality Encapsulated Postscript, PDF, PNG, or SVG charts. It currently supports line plots, bar plots, range-fill plots, and pie charts.")

- **R** [Robert Gentleman, Ross Ihaka, et al.] (*Unix/X, Win32*) - version 1.1.0 and later; write-only; freeware (GPL) with source. (This is a statistical computing and graphing language.)

- **RRDtool** [Tobi Oetiker] (*Unix, Win32*) - all versions? write-only; freeware (GPL) with source.

(This is a fast utility to "store and display time-series data" using a bounded amount of memory. It can be thought of as "a reimplementation of **MRTG**'s [above] graphing and logging features.")

- **SkyServer** [Sabine Plunder] (*WWW*) - all versions? write-only; **MNG** support; freeware. (This is "an online service [in German] for creating star charts of the night sky for astronomical use." One can select PNG format for stills or MNG format for animations involving time-lapse, panning, and/or zooming.)

- **Smallworld** [GE Network Solutions] (*Windows NT/2k/XP*) - all versions? read-only; commercial. (This is a set of tools for analyzing and displaying spatial information such as gas, electric and water distribution systems or telecommunications networks. PNG is supported via a "Spatial Object Manager" plug-in.)

- **SmartDraw** [SmartDraw.com] (*Win32*) - version 6.0 and later; read/write; commercial. (This is an office-oriented charting and diagramming application that can import and export in PNG format.)

- **Sysquake** [Calerga Sarl] (*Win32, Mac OS 9/X*) - version 2.3 and later; read/write; uses **libpng** and **zlib**; commercial. (This is a highly interactive visualization tool for simulating dynamic systems, exploring stability, controlling robots, etc.)

- **Sysquake Remote** [Calerga Sarl] (*WWW*) - all versions; write-only; uses **libpng** and **zlib**; commercial. (This is a web-based computational app [Apache module] with the ability to dynamically generate PNG graphs. An online example is available.)

- **Visual Sun Chart** [3-D Software] (*Windows 2k/XP*) - all versions? write-only; uses **Victor Image Processing Library** and **zlib**; commercial. (This is "solar geometry software," a modelling tool to visualize shading from trees or buildings at various times of day or of the year. It can export rendered images in PNG format.)

- **Vitalnet** [Expert Health Data Programming] (*WWW*) - versions since November 2001; write-only; commercial. (This is a "browser-based system for analyzing and disseminating health data, such as births, deaths, pregnancies, hospitalizations." The maps it generates are in PNG format.)

- **Webalizer** [Bradford L. Barrett] (*Unix, Mac PPC, OS/2, Win32*) - version 1.30-05 and later; write-only; requires **gd**, **libpng** and **zlib**; freeware (GPL) with source. (This is a web-statistics analysis and graphing tool; its output is web pages with PNG images.)

- **WhatsUp Gold** [Ipswitch] (*Win32*) - version 5.0 and later; write-only; commercial. (This is a network-monitoring utility that can display network maps in PNG format via its embedded web server. JPEG is the default format, but it can be switched to PNG mode "after making a change to

the registry," according to the company.)

- **xfig** - see the image editors page
- **Xmgr** - see **Grace** above
- **zimg** [Johannes Zellner] (*Unix, OS/2, etc.*) - version 1.2.0 and later; write-only; requires **gd**, **libpng** and **zlib**; freeware (GPL) with source. (This is a tool to create false-color 2D images from scalar data [f(x,y)]; for example, wind-speed data measured on a rectangular grid, or fluid pressure in a cross-section of a 3D simulation. The Unix-style man page is also available.)

Here are some related PNG pages at this site:

- PNG-supporting Applications
  - Browsers
  - Image Viewers
  - Image Editors
  - Image Converters
  - 3D Applications
  - Games / Entertainment
  - Office / Business Applications
  - Miscellaneous Applications
- PNG support in VRML browsers
- PNG-supporting Hardware

- PNG Home Page
- **Complete PNG Site Map**

Last modified 20 August 2006.

Miscellaneous Applications with PNG Support

These are applications that don't necessarily fit into the browser / viewer / editor / converter / 3D / entertainment / business / scientific categories. Occasionally a group of similar apps will be split out to form a new category; here is a list of ones that were listed here originally but have since moved:

AbiWord - office / business apps
Aleph One - games / entertainment
Art Wall - games / entertainment
The Bat! - office / business apps
BeadPlan - games / entertainment
Circus Linux - games / entertainment
ClanLib - toolkits / libraries
Corel Presentations - office / business apps
CryptaPix - image viewers
Excel - office / business apps
Fandango - games / entertainment
Final Writer - office / business apps
Font F/X - 3D apps
Fractal Domains - games / entertainment
GF1 - games / entertainment
gfract - games / entertainment
GIF/PNG-Creator - scientific / graphing apps
Glulxe - games / entertainment
gnuplot - scientific / graphing apps
Grace - scientific / graphing apps
Hyperplay - games / entertainment
IDL - scientific / graphing apps
IGOR - scientific / graphing apps
Juggle Saver - games / entertainment
LazaLabl - office / business apps
Mathematica - scientific / graphing apps
MATLAB - scientific / graphing apps
Memo Writer Pro - office / business apps
Microsoft Office - office / business apps
Mjølner System - toolkits / libraries
mmiogpng - toolkits / libraries
Photogenics PNG loader/saver - toolkits / libraries
Ploticus - scientific / graphing apps
PlotMaker - image converters
pngcrush - image converters
PNG DataType (Cloanto) - toolkits / libraries
PNG DataType (Kleinert) - toolkits / libraries
pngmeta - image converters
PowerPoint - office / business apps
PrintGF - image viewers
Progress - image viewers
Projector - games / entertainment
Puzzlemaker - games / entertainment
PV-WAVE - scientific / graphing apps
R - scientific / graphing apps
Slides Shower - games / entertainment
Sphere - games / entertainment
Squeak - toolkits / libraries
Stereograph - games / entertainment
StarOffice - office / business apps
Translation Kit - toolkits / libraries
Transsonic Presenter - office / business apps
Turnpike - office / business apps
uf2png.fio - toolkits / libraries
V-Chat - games / entertainment
WallShow - games / entertainment
WarpPNG.datatype - toolkits / libraries
Webalizer - scientific / graphing apps
Word - office / business apps

Nautilus - office / business apps
nwrk-matrix - games / entertainment
PageMaker - office / business apps
pdftex - image converters
pdftohtml - image converters
WordPerfect Office - office / business apps
WWplus32 - games / entertainment
WWSaver32 - games / entertainment
XAllWrite - office / business apps
XaoS - games / entertainment
Xclamation - office / business apps
XmHTML - toolkits / libraries
zimg - scientific / graphing apps

As with the other PNG-applications pages, links to home WWW sites or to downloadable versions are provided where known, but if a link is broken, check the location and see if an updated version is available (and please tell Greg!). Relevant operating systems are printed in (*parenthesized italics*).

These are listed alphabetically, more or less:

- **1st Impression** [Gromada.com] (*Windows 9x/ME*) - all versions? read-only; freeware. (This is a utility to change the startup and shutdown images every time Windows reboots. NT and 2000 are explicitly *not* supported.)

- **AAA Logo** [SWGSoft.com] (*Win32*) - all versions; read/write; commercial. (This is a logo-design application with both vector and raster support.)

- **addtRNS.cgi** [Tetsuro "techan" Imai] (*Perl*) - all versions; read/write; freeware with source. (This is a CGI script that adds simple [GIF-like] transparency to grayscale or RGB PNGs, or nice palette-alpha transparency to colormapped PNGs. See also the English page, which isn't updated quite as often.)

- **Apache Toolbox** [Bryan Andrews] (*Unix*) - all versions? read/write; uses **gd**, **libpng** and **zlib**; freeware with source. (This is basically an automated compilation system for building the **Apache** web server, loads of modules, and the requisite support libraries for all of the above. PNG support is mainly via **PHP** [see the toolkits page].)

- **Balthaser:Fx** [Balthaser Online] (*WWW*) - all versions? read-only; commercial. (This is an online Flash authoring tool with support for PNG import.)

- **BeOS** [Be] (*BeOS PPC/x86*) - version 4.5 and later; read/write; commercial. (This is Be's famed operating system, which includes a datatypes-like facility called the **Translation Kit**. As of Release 4.5, PNG support is included in it, making BeOS the first production OS to ship with native PNG support.)

- **Berlin Project** [Berlin Consortium] (*Linux/GGI*) - all versions; read-only? requires **libpng** and **zlib**; freeware (LGPL) with source. (This is a new windowing system with some very nice features; some consider it a likely successor to the X Window System, at least once it matures.)

- **ButtonWiz** [Joel Ryan Software] (*Win32*) - version 5.0 and later; write-only; shareware. (This is a program to generate custom buttons for web pages.)

- **Coala Professional** [Brighter Image] (*Win32*) - version 2.0(?) and later; read/write? iCCP support? commercial. (This is a "large-format color copying system." It works with both scanners and plotters, apparently with the option to write and read PNGs along the way. **Coala Light** does not include PNG support.)

- **Carracho** [Carracho Communications] (*Mac 68k/PPC*) - version PR4 and later; read-only; freeware? (This is a client/server pair that supports chat, news and file serving via a proprietary protocol. The client can view images natively, including PNG.)

- **Catalog** [Loic Dachary] (*Perl*) - version 1.03 and later; read-only? freeware (GPL) with source. (This is a system to "build and maintain Yahoo!-style catalogs." PNG support is apparently in the form of icons.)

- **Classics** [Jan Verhoeven] (*Windows 9x/ME*) - version 2(?) and later; read/write? freeware. (This is a "tool to allocate Classes, Teachers and ClassRooms all year round." PNG support is in the form of an offline HTML browser that can view PNGs, and the reporting function presumably can create such images.)

- **CompuLog** [Bob Berry] (*DOS*) - version 2.00 and later; read-only; shareware; 159k. (This is an image database that allows one to catalog images within a searchable database of thumbnails.)

- **Conjurer** [MidStream Technologies] (*Win32? BeOS x86?*) - all versions; read/write; commercial. (This is a digital media tool that is still under development as of April 2000. Its PNG support is inherited from the now-discontinued **Shöwboat**, below. rö design was renamed MidStream Technologies in early 2000.) (coming June 2000... supposedly)

- **CopyRightLeft** [Lionel P. Allorge] (*Win32*) - all versions; read/write; freeware (GPL) with source. (This is a utility to add a [graphical] copyright string to one or more images. That is, it modifies the the image pixels directly rather than adding or modifying any PNG text chunks.)

- **Crystal Button** [Crystal Button Software] (*Win32*) - version 1.2 and later; write-only; alpha support; shareware. (This is a program to generate custom buttons for web pages. Read support, in the form of using PNGs as textures, is coming "soon.")

- **CyberStudio** [GoLive] (*Mac PPC*) - version 3.0(?) and later; read-only. (This is an HTML editor. It does not support image-editing but may be able to write "low-res" PNGs [for Netscape's LOWSRC attribute?]. Reportedly it has problems with the intermediate-edit PNGs generated by Macromedia Fireworks 1.0.)

- **cyclo.cgi** [Tetsuro "techan" Imai] (*Perl*) - all versions? read-only; **MNG** support; freeware with source. (This is a CGI script that appears to take a list of still PNG images and display them in a slideshow by converting them on the fly to a looping MNG animation. See also the English page, which isn't updated quite as often.)

- **Digital Image Recovery** [Alexander Grau] (*Win32*) - all versions? read/write; freeware with source. (This is a file-recovery tool for media typically used in digital cameras--e.g., Compact Flash, SmartMedia, etc. It recognizes PNG and other common image types, although it doesn't appear capable of reconstructing a fragmented image. See also **Drive Rescue** below.)

- **DingoSearch** [SplitCycle Computing] (*Win32*) - all versions; read-only; **MNG** support; freeware (includes banner ads). (This is a client-side front end to multiple search engines. It supports PNG and MNG images for the banner ads it shows at the top of its window.)

- **Director** [Macromedia] (*Win32, Macintosh*) - version 6.0(?) and later; read-only; commercial. (This is a "multimedia production" editor that can import PNG images into its animated presentations.)

- **DIRT** [Infopreneur] (*Unix/X*) - all versions; read/write; full alpha support; requires **imlib2**, **libpng** and **zlib**; freeware (GPL) with source. (This is a "standalone web server" that can create "high-quality images on the fly." It uses XML templates for the images being created, and the templates can load existing images either for modification or as components to be incorporated into new images.)

- **DOSPRINT** [Simply the Best] (*Win32*) - version 2.0 and later; read-only; commercial. (This is a utility to allow DOS programs running under Windows to print to a Windows printer. Version 2.0 adds native support for various image formats, including PNG.)

- **Image::Dot** [Roland Giersig] (*Perl*) - all versions; write-only; stand-alone (requires neither libpng nor zlib); freeware (Artistic) with source. (This Perl module "provides 1x1 pixel PNG images of a certain RGB color (also with transparency) without relying on any external modules like GD, libpng or Compress::Zlib.")

- **Doxygen** [Dimitri van Heesch] (*Unix, Win32*) - version 1.2.14(?) and later (default image format as of version 1.2.15); read/write? includes **libpng** and **zlib**; freeware (GPL) with source. (This is

a "cross-platform, JavaDoc-like documentation system for C++, Java, C, and IDL" that "can be used to generate an on-line class browser (in HTML) and/or an off-line reference manual (in LaTeX or RTF) from a set of source files.")

- **Dreamweaver** [Macromedia] (*Win32, Macintosh*) - all versions; read-only; broken 1-bit, 2-bit and 4-bit palette support; commercial. (This is an HTML editor. It does not support image-editing.)

- **Drive Rescue** [Alexander Grau] (*Win32*) - all versions? read/write; freeware with source. (This is a file-recovery tool for Windows hard drives, both FAT and NTFS. It recognizes PNG and a number of other common media and archive types, although it is incapable of reconstructing fragmented files. See also **Digital Image Recovery** above.)

- **Easy Screen Capture** [Longfine Software Solutions] (*Win32*) - all versions? write-only; commercial. (This is just what it says: a screen-capture utility. PNG is one of four supported output formats.)

- **Elastic Reality** [Avid] (*Win32, Mac PPC, Irix/X*) - version 3.0 and later; read/write; full alpha support? commercial. (This is a special-effects tool with warping and morphing features; it supports images up to 64 bits deep.)

- **ESP Print Pro** [Easy Software Products] (*Unix*) - version 4.0(?) and later; read-only; uses **libpng** and **zlib**; commercial. (This is a cross-platform printing system that can print various image formats, including PNG, natively.)

- **Eterm** [Michael `KainX' Jennings, Tuomo Venäläinen] (*Unix/GTK*) - all versions; read-only; freeware with source. (This is a VT102 terminal emulator and xterm replacement; it supports PNG background images via **Imlib** [toolkits page]. It is associated with the Enlightenment project.)

- **EZ Optimizer** [CompuDesign] (*Win32*) - all versions; read/write; commercial. (This is a web tool that "compresses HTML, batch-optimizes JPEG, and converts images among the GIF, PNG and JPEG formats." The latter feature includes a facility to track down all references on a site to the old filenames and automatically update them.)

- **FBShot** [Stephan Beyer] (*Linux/fbcon*) - all versions; write-only; requires **libpng** and **zlib**; freeware (GPL) with source. (This is a screen-capture utility for the Linux frame-buffer device.)

- **file** [Ian Darwin, Christos Zoulas] (*Unix, OS/2, DOS, etc.*) - version 3.18 and later; read-only; freeware with source. (This is a command-line program to determine automatically the type and characteristics of all sorts of file formats, including images and compressed files or archives.)

- **file-insider.com** [Jean-Luc Halleux] (*WWW/CGI*) - all versions; read-only; **MNG** and **JNG** support as of 25 October 2002; text support, including compressed chunks; freeware. (This is a site that will print various information [e.g., dimensions, type, embedded comments] about images that are either uploaded or visible via the Web.)

- **FileSnoop** [Bruno Sonnino] (*Win32*) - all versions; read-only; **MNG** and **JNG** support; non-redistributable freeware (requires free registration, cookies, JavaScript) with source. (This is a utility to display file contents [e.g., in hexadecimal] and print useful information [e.g., image dimensions].)

- **FilmMagic Pro** [InkWell Software] (*Mac PPC*) - version 3.0 and later; read-only; commercial. (This is a basically a specialized printing system that sends its output to high-resolution film recorders.)

- **Freevo** [Krister Lagerström et al.] (*Linux/X*) - version 1.2.2 and later; read-only; freeware (GPL) with source. (This is a PVR/DVR [TiVo-like] application for Linux. It requires a TV tuner card and a relatively fast CPU for real-time video encoding.)

- **fxSCAN** [IOSPIRIT] (*Amiga*) - all versions; read/write; no alpha support; commercial. (This is primarily a scanning/OCR utility, but it also includes some image-manipulation capabilities and the ability to read and/or write [and therefore convert between] selected image formats.)

- **FXTV** [Randall Hopper] (*BSD/X*) - version 1.04 and later; read/write? freeware (BSD?) with source. (This is a TV-in-a-window application for FreeBSD, NetBSD, OpenBSD or BSDI. It can do video captures [stills] in PNG format and also can use PNG as an "intermediate video encoding format.")

- **GMask** [Tsuyoshi Furumizo] (*Win32*) - version 1.70 and later; read/write? transparency support? freeware. (According to the English download page, this is a tool for "removing masking tiles from JPEG, BMP and PNG files." Since normal JPEG/JFIF files don't support transparency, it is not clear what kind of "masking" is involved here. [If it were steganography, presumably it would *add* them...] A screenshot is available here.)

- **gnubiff** [Nicolas Rougier] (*Unix/GTK+*) - all versions? read-only; alpha support; freeware (GPL) with C++ source. (This is a mail notification program, similar to xbiff. PNG support is in the form of icons, including wide, multipanel ones that are used as animations as of version 1.4.0.)

- **GoLive** [Adobe] (*Win32, Mac PPC*) - version 5.0(?) and later; read-only? commercial. (This is an HTML editor and web-site design package.)

- **Gserver** [Gábor Szántó] (*Win32*) - all versions; write-only? **MNG** support; freeware. (This is a remote-computing / remote-control application, somewhat similar to PC Anywhere. It allows any web browser to view and control the Windows system running Gserver. Screen views apparently are made available as PNG images, video and animations apparently as MNG streams.)

- **HTML Editor++ 98** [CoffeeCup Software] (*Win32*) - version 5.1 and later; read/write? shareware. (This is an HTML editor with image-conversion to [and from?] PNG via its Image Companion module.)

- **Icon Archiver** [Alessandro Montalcini] (*Macintosh*) - version 2.0 and later; write-only; uses **libpng** and **zlib**; shareware. (This is an icon database that lets you export icons in PNG format, among other things.)

- **IDS** [John Moose] (*anything with a **Perl** port*) - all versions; read-only; requires **ImageMagick**, **libpng** and **zlib**; freeware (GPL) with source. (This is a Perl CGI script that "generates a multi-gallery photo-album web site on the fly." It automatically creates HTML with JPEG thumbnails of PNG, JPEG and GIF images [rather than using the format of each source image].)

- **Image Server** [TrueSpectra] (*WinNT/2k/XP, Solaris, Linux*) - all versions? read/write? commercial.

- **imghide** [Joost Witteveen] (*Unix, etc.*) - all versions; read/write; requires **libpng** and **zlib**; freeware (GPL) with source. (This is a steganographic tool; it hides arbitrary data files inside PNG images.)

- **Impressario** [Silicon Graphics] (*Irix/X*) - version 2.1(?) and later; read-only. (This is a printer manager; it supports PNG via the **ImageVision Library** above.)

- **InDesign** [Adobe] (*Win32, Mac PPC*) - version 1.5(?) and later; read-only? alpha support? commercial. (This is a page layout and design package, similar to QuarkXPress.)

- **InfoChannel IC100** [Scala] (*DOS, OS/2, Win32*) - all versions; read-only? commercial. (This is a multi-user, multimedia presentation package, supporting graphics, sound, animation, video, transition effects, and so forth. See also **Multimedia MM100** below.)

- **Internet Config** [Quinn `The Eskimo', Peter N. Lewis et al.] (*Macintosh*) - version 1.2 and later; assigns type `PNG ' rather than (registered) `PNGf' [supposedly fixed in version 1.4]. (This is a centralized configuration utility to allow one to update the Internet-related preferences of many applications in one place--for example, if the user's e-mail address changes.)

- **IPhotoMinusICC** [K. W. Lee] (*Win32*) - version 1.1 and later; read-only; freeware? (This is a color-correction application that can extract ICC profiles from images and [apparently] download them to some printers for better image reproduction.)

- **Itsbit** [Jeroen Reynders] (*many*) - all versions; write-only; requires **libpng** and **zlib**; freeware with C source. (This is a utility to convert the binary representation of an arbitrary file into a PNG image of user-specified width.)

- **Juno** [Juno] (*Win32*) - version 4.0(?) and later; read-only; free adware. (This is an ad-supported e-mail client and/or web browser; it is not known whether either one supports PNG images natively, but the accompanying popup ad server does.)

- **LibSuite** [Jan Verhoeven] (*Windows 9x/ME*) - all versions; read-only; freeware. (This is a "collection of library programs to keep track of things like: addresses, books, CDs, documents, images and sounds." PNG support is in the image component, called FotoLib.)

- **MainActor** [MainConcept] (*Win32, OS/2, Linux*) - version 2.0 and later; read/write; commercial. (This is a "multimedia processing package" for editing, composing and sequencing video and animations.)

- **Mapedit** [Tom Boutell] (*Windows 3.x, Win32, Unix/X, Macintosh*) - version 2.0 and later; read-only; shareware. (This is an application for making WWW image maps, either server-side or client-side, out of web pages with embedded images.)

- **MapInfo Professional** [MapInfo] (*Windows 3.x(?), Win32, Mac PPC(?)*) - version 5.5 and later; read-only? commercial. (This is a Geographic Information Systems (GIS) mapping and data analysis tool. PNG appears to be supported only as an illustration, not as a mapping layer.)

- **MetaCard** [MetaCard] (*Unix/X, Win32*) - version 2.2 and later; read-only. (This is a multimedia "card stack" and scripting language similar to Apple's HyperCard; it can import PNG images.)

- **move.cgi** [Tetsuro "techan" Imai] (*Perl*) - all versions? read-only; **MNG** support (write-only?); freeware with source. (This is a CGI script that takes a pair of equal-sized PNGs and apparently oscillates them either horizontally or vertically by converting them on the fly to a [nested] looping MNG animation. See also the English page, which isn't updated quite as often.)

- **Morph Man** [STOIK Software] (*Win32*) - all versions? read/write? (This is an image-morphing tool. It takes a start image and an end image and generates the intervening frames.)

- **Mortar** [Big Picture Multimedia] (*Win32*) - version 1.1 and later; read-only. (This is an HTML

editor/web-site builder with PNG support in the form of an image-map editor. Write support of some sort is coming in a future release.)

- **MultiMedia MM100/MM200** [Scala] (*DOS, OS/2, Windows 3.x, Win32*) - all versions; read-only? commercial. (This is a single-user, multimedia presentation package, supporting graphics, sound, animation, video, transition effects, and so forth. See also **InfoChannel IC100** above.)

- **NetStock** [SplitCycle Computing] (*Win32*) - version 1.51(?) and later; **MNG** support in version 1.54 and later; read-only; freeware (includes banner ads). (This is a "simple little stock and mutual fund Internet quote retrieval program." It supports PNG and MNG images for the banner ads it shows at the bottom of its window.)

- **NeverLost** [Klaus Voigt / Komputer Products of Value] (*Win32*) - version 2.0 and later; read/write; commercial. (This is a mapping and navigation program; it can read scanned maps in various raster formats and projections and combine them with real-time info from a GPS receiver.)

- **ObjectDock** [Stardock] (*Windows 2k/XP*) - all versions; read-only; freeware. (This is a utility that "allows you to have a nice animated launchbar/taskbar on your screen that reacts to your mouse when you mouse over it." That is, the icons under or near the cursor get bigger, much like Apple's task bar in Mac OS X.)

- **OmniPage** [ScanSoft] (*Win32, Mac OS X*) - all versions? write-only? **writes invalid zlib streams** (and therefore invalid PNGs); commercial. (This is a scanning/OCR utility bundled with many scanners. The zlib/deflate bug, which is evidenced by "distance too far" errors in decoders based on zlib 1.2.1 and later, has been verified in PNGs written by version 12 and by a possibly older SE version [10?] "circa 2002.")

- **Online Image-Processing** [Rolf Henkel] (*WWW/CGI*) - all versions? read-only; freeware. (This is a site that does color separations, contouring, segmentation, and other image-processing tasks on images specified by a URL. It appears to write JPEGs in all cases, and images are often [always?] scaled.)

- **Photon Desktop Manager / pdm** [QNX Software Systems] (*QNX*) - version 1.1 and later; read-only; commercial. (This program allows the use of PNG images for desktop backgrounds under the Photon microGUI.)

- **PHPoll** [Jesper Juhl] (*PHP*) - all versions; write-only; requires **PHP** with **gd** (and therefore **libpng** and **zlib**); freeware with source. (This is a "simple script for running polls on a web site." It can display its results as auto-generated PNG graphs.)

- **pngcheck** [Alexander Lehmann, Andreas Dilger, Greg Roelofs, and others] (*Unix, DOS, OS/2, Win32, Macintosh, Amiga, RISC OS, etc.*) - all versions; read/write; **MNG** and **JNG** support; stand-alone (requires neither libraries *nor graphics capability*, although can be linked with **zlib** for enhanced functionality); freeware (MIT/X11) with C source. (This is the official PNG integrity tester and dumper, with MNG/JNG extensions and optional [but highly recommended] zlib support. It can also be used to search for and optionally extract PNGs embedded in a larger data stream. Versions 2.1.0 and later include **pngsplit** and **png-fix-IDAT-windowsize** [both GPL].)

- **pngchunkdesc** and **pngchunks** - see **pngtools** on the image converters page

- **pnginfo** - see **pngtools** on the image converters page

- **PngSnapShot** [Guillaume Dargaud] (*Win32*) - all versions; write-only; freeware. (This is a screen-capture utility that is designed to be left unattended and to take screen shots at regular intervals.)

- **PNGstat** [John Dlugosz] (*anything with a **Perl** port*) - all versions; read-only; stand-alone (requires no libraries); freeware with source. (This is a PNG file-info dumper, somewhat similar to **file** and **pngcheck** above except written entirely in Perl.)

- **pngtester.cgi** [Tetsuro "techan" Imai] (*Perl*) - all versions? read-only; **MNG** and **JNG** support; freeware with source. (This is a CGI script that tests and dumps the contents of PNG, JNG and MNG images. See also the English page, which isn't updated quite as often.)

- **PocketPixPrint** [FieldSoftware] (*Windows CE 3.x*) - all versions; read-only; commercial. (This is an image-printing program for WinCE 3.x, a.k.a. Pocket PC.)

- **Print Screen Deluxe** [Janesway Electronics Software] (*Windows 3.x, Win32*) - version 3.0(?) and later; write-only. (This is a utility that does exactly what it says: print the screen to a printer or a file.)

- **Pronetha Application Server** [Timo Harju] (*Win32/Java*) - all versions; read-only; freeware for non-commercial use. (This is an "integrated development, deployment and execution environment" for creating distributed [client-server] applications. The server runs under Windows, but the client can run on any platform with Java 1.4. PNG is supported as a format for icons and application graphics; write support may appear in a later version.)

- **R.A.V.E.** [Corel] (*Win32, Mac PPC*) - version 10(?) and later; read-only; commercial. (This is an animation tool that is included only as part of **CorelDRAW**, listed on the image editors page. It can import a number of raster formats, including PNG.)

- **RavImageExport** [RavWare] (*Win32*) - all versions? write-only; commercial. (This is an "Xtra" for **Director** to allow export of a cast member or the Stage to various file formats.)

- **Reader** [Jan Verhoeven] (*Windows 9x/ME*) - all versions; read-only; freeware. (This is a creator and viewer for electronic books. Input is in HTML format and various image formats, including PNG. It's not clear in what format(s) the result is stored.)

- **RealSlideshow** [RealNetworks] (*Win32*) - version 2.0 and later; read/write; freeware (**Basic**) or commercial (**Plus**). (As the name suggests, this is a slideshow program that can incorporate voice annotations and music; it can also convert to PNG.)

- **Remind** [David F. Skoll / Roaring Penguin Software] (*Unix*) - version 3.0.21 and later; write-only; freeware (GPL) with source. (This is a reminder and calendar-generation program. It doesn't actually write PNGs, per se, but it uses four of them to show the phases of the moon in generated HTML calendars. It used to include OS/2, DOS and Amiga ports, but these are no longer being maintained.)

- **Repligator** [Owen Ransen] (*Win32*) - version 4.0 and later; read/write; shareware. (This is a special-effects program that takes existing images and modifies them in any of several dozen interesting ways.)

- **Rhapsody** [Apple] (*Macintosh*) - all versions; read/write; commercial. (This was Apple's NeXT-generation operating system [so to speak]. Ali Ozer claimed that PNG would be supported via Rhapsody's **NSImage AppKit class**, and Clifford Colby reported that PNG support was indeed included in DR1. That appeared to make Rhapsody the first OS to "ship" with native PNG support, although it's arguable in the case of a developer's release. Unfortunately Rhapsody appears to be mostly dead as of May 1998; the link now redirects to **Mac OS X Server**.)

- **sanecgi** [Thomas Boutell] (*Unix/Perl*) - all versions; write-only; freeware (GPL) with source. (This is a web-browser interface to SANE-compatible scanners; it operates via a Perl CGI script and various helper apps such as the **NetPBM** suite.)

- **ScreenShot** [Beale Street Group] (*Mac PPC*) - version 2.5(?) and later; write-only; commercial. (This is a screen-capture utility.)

- **scroll.cgi** [Tetsuro "techan" Imai] (*Perl*) - all versions? read-only; **MNG** and **JNG** support; freeware with source. (This is a CGI script that appears to take a list of still images, including PNG and JNG, and convert them on the fly into a scrolling, looping MNG animation. See also the English page, which isn't updated quite as often.)

- **Shöwboat** [rö design] (*Win32, BeOS x86*) - all versions; read/write; commercial. (This was a photo-album / digital-scrapbook package for combining images, animations and audio. PNG was supported both as an import/export format and as an internal format for file transport. **This product has been discontinued.** See **Conjurer** above.)

- **SiteCentral** [Knowledge Adventure] (*Windows 9x, Mac PPC*) - all versions? read/write; binary transparency support; uses **LEADTOOLS**; commercial. (This is a web-page editor that can import most types of PNG images and optionally can use PNGs in place of GIFs on output.)

- **SmartMorph** [MeeSoft] (*Win32*) - all versions? read/write; **MNG** support (read/write); freeware. (This is an image-morphing tool. It takes a start image and an end image and generates the intervening frames.)

- **SnagIt** [TechSmith] (*Win32*) - version 4.2.1 and later; read/write; commercial. (This is a utility to "capture and share anything on your screen." It goes beyond simple screen-captures, though; it can also perform some editing functions on the captured images (e.g., annotations) and capture web pages, including any inlined images.)

- **Snapz Pro** [Ambrosia Software] (*Mac 68k/PPC*) - version 2.0(?) and later; write-only; commercial. (This is a screen-capture utility with both manual and automatic [movie] modes.)

- **SWiSH** [DJJ Holdings] (*Win32*) - version 2.0(?) and later; read-only; commercial. (This is a Flash animation tool with support for PNG import.)

- **Touch-n-Buy** [Touch-N-Buy] (*WWW/embedded*) - versions since 2004(?); read-only; commercial. (This is an embedded/kiosk-style e-commerce application for touchscreen sales of prepaid phone and gift cards. It uses PNG for most of its images.)

- **Transparent PNG Generator** [Stian Grytøyr] (*WWW*) - all versions; read/write; freeware. (This is an online generator of single-color PNGs with partial transparency; the user can set both the color [in real-time!] and the transparency level, then view the image over various images and with text overlaid, and optionally download the generated image.)

- **txtcut.cgi** [Tetsuro "techan" Imai] (*Perl*) - all versions? read/write; freeware with source. (This is a CGI script that strips text chunks from a PNG images before serving them to the client browser. See also the English page, which isn't updated quite as often.)

- **UltraSnap** [Mediachance] (*Win32*) - all versions? read/write? shareware. (This is a screen-capture utility with some special-effects capabilities, such as beveling and shadows.)

- **USFlag** [Steven Marthouse / vrml3d.com] (*Win32, Unix, etc.*) - all versions; write-only; requires **libpng** and **zlib**; freeware (BSD) with source. (This is a command-line program that generates either bitmaps or VRML models of the US flag at arbitrary scales. PNG is one of the supported bitmap formats [possibly the only one].)

- **VeonStudio** [Veon] (*Win32*) - all versions; read/write? commercial. (This is another multimedia studio package, but geared toward the production of streaming content for the Web. See also **VeonPlayer** on the viewers page.)

- **vgrabbj** [Jens Gecius] (*Linux*) - version 0.3.0 and later; write-only; freeware (GPL) with source. (This is a video-capture application for Linux 2.4.x [or 2.2.x with the USB backport]; like **w3cam** below, it uses the Video4Linux API to capture video frames and optionally to generate a web page in which to display them. This one was specifically written for the Philips Vesta Pro USB webcam, but it should work with other USB cameras.)

- **VideoMach** [Gromada.com] (*Win32*) - version 2.0.0 and later; read-only; uses **libpng** and **zlib**; shareware. (This is a multimedia editing tool that supports converting videos to still images and the reverse; adding or extracting audio tracks; converting between formats and standards [e.g., PAL/NTSC]; adding special effects; etc.)

- **VideoteXt** [Martin Buck] (*Unix/X*) - version 0.6.971023 and later; write-only; freeware (GPL) with source. (This is a videotext decoder for various PC-based decoder cards; it was written for Linux and has been ported to FreeBSD.)

- **Video Toaster** [NewTek] (*Win32*) - version [2] build 3480i and later; read-only? **MNG** support; commercial. (This is a well-known video-editing application, originally written for the Amiga.)

- **w3cam** [Rasca Gmelch] (*Linux*) - all versions; write-only; freeware (GPL) with source. (This is a video-capture application for Linux 2.x (and up); it uses the Video4Linux API to capture video frames and optionally to generate a web page in which to display them.)

- **Windows** [Microsoft] (*Windows ME*) - version `ME' and later; read-only? commercial. (This is basically version 3 of Windows 98, and its shell supports thumbnailing, zooming, rotating, and printing PNG images, at least when they're stored in the "My Documents\My Pictures" subdirectory/folder. The older Windows 98/2000 also have some PNG support, but only via the **StretchDIBits** and **SetDIBitsToDevice** functions, only when the device context is a printer device, and only when the printer in question has a supporting driver--i.e., typically only for printers with native PNG support. Given all these restrictions, this was arguably more a case of hardware PNG support than of OS support. See also *Testing a Printer for JPEG or PNG Support* and *Sizing a JPEG or PNG Image*.)

- **WinSettings** [FileStream] (*Win32*) - version 3.0 and later; read/write? shareware. (This is a utility to personalize desktop settings, manage potential Internet privacy issues, etc. PNG support is presumably included within the desktop-background module and probably also as part of the screen-capture function.)

- **WumPNG / Dumping** [Oliver Fromme] (*Windows 3.x, DOS*) - all versions; read-only; freeware with source (older DOS version only); 163k. (This is a PNG file dumper, useful for testing PNG images. The source code is in Pascal.)

- **WWWis** [Alex Knowles] (*anything with a **Perl** port*) - version 1.8 and later; read-only; freeware (GPL) with source. (Based on gifsize by Andrew Tong; previously known as **WWWimagesize**.)

- **XEmacs** [Lucid / University of Illinois / Sun / Amdahl / the XEmacs Team] (*Unix/X*) - version 19.14 and later; read-only; freeware (GPL) with source. (This is a forked version of the infamous editor/browser/OS/kitchen sink.)

- **xine** [Günter Bartsch et al.] (*Unix/X*, *Win32*, *OS/2*) - version 0.3.2(?) and later; read-only; requires **libpng** and **zlib**; freeware (GPL) with source. (This is a movie player with support for DVD, VCD, various QuickTime codecs, etc. PNG is used for skins [among other things?].)

- **XVidCap** [Rasca Gmelch] (*Unix/X*) - version 0.3 and later; write-only; **MNG** support; freeware (GPL) with source. (This is a screen-capture application for X; it simply grabs rectangular areas of the display and saves them as individual frames on disk, optionally in PNG format, or as MNG animations.)

Here are some related PNG pages at this site:

- PNG-supporting Applications
  - Browsers
  - Image Viewers
  - Image Editors
  - Image Converters
  - 3D Applications
  - Games / Entertainment
  - Office / Business Applications
  - Scientific / Graphing Applications
- PNG support in VRML browsers

-  PNG-supporting Hardware

-  PNG Home Page
-  **Complete PNG Site Map**

Last modified 17 June 2006.

Hardware with PNG Support

These are devices with some form of PNG support, either natively or via a device-specific software package. There are probably many other such products, but individual web pages and even product names are much more difficult to discover in the case of hardware, and PNG support is rarely (if ever) noted explicitly.

As with the PNG-supporting applications pages, links to home WWW sites are provided where known, but if a link is broken, check the location and see if an updated product is available (and please tell Greg!). Relevant operating systems are printed in (*parenthesized italics*), though this tends to be a weak concept in the case of hardware. In particular, *MHEG-5* is listed for a number of the digital TV devices intended for the UK market; it is basically a next-generation teletext standard that supports bitmapped images and video in addition to text--rather like HTML, only different.

These are listed alphabetically, more or less:

- **Ceiva** [Ceiva Logic] (*embedded*) - all versions? read-only. (This is an "Internet-connected digital picture frame." The frame itself understands only JPEG format, but the Internet server to which it connects accepts pictures in various formats, including PNG.)

- **Color Phone C309H** [Hitachi] (*embedded*) - all versions; read-only; 8-bit (palette) support only. (This is a CDMA cell phone with a 120x143, 256-color screen. It uses UP.Browser [browsers page] for its PNG support. See also the press release for further information in English.)

- **DC 290** [Kodak Digital Science] (*embedded*) - all versions; read-only. (This is a digital still camera that supports watermarking captured images with a user-defined overlay; a utility creates a special watermark file when given a PNG image. Unfortunately, the camera supports only JPEG and TIFF as output formats.)

- **Digital Receiver D500** [Sony UK] (*MHEG-5*) - read-only; tri-level alpha support (0%, 50%, 100%). (This is a set-top box that decodes digital TV broadcasts for display on an existing TV set. PNG is supported as part of the UK profile for MHEG-5.)

- **Digital Receiver DTR 730-IM** [Pace Micro Technology] (*MHEG-5*) - read-only; tri-level alpha support? (This is a set-top box that decodes digital TV broadcasts for display on an existing TV set. PNG is supported as part of the UK profile for MHEG-5.)

- **Digital Receiver DTX 6370** [Philips] (*MHEG-5*) - read-only; tri-level alpha support? (This is a set-top box that decodes digital TV broadcasts for display on an existing TV set. PNG is supported as part of the UK profile for MHEG-5. The link also has information on a pair of integrated digital TVs--i.e., combined decoder and display.)

- **Dreamcast** [Sega] (*WWW*) - read-only with version 2.0 and later of Planetweb's web browser; **full alpha support**; no gamma support; progressive display. (This was a game console with Web access. **This product has been discontinued.**)

- **DVC 323** [Kodak Digital Science] (*embedded*) - all versions; write-only. (This is a digital video camera that supports several output formats for stills, including PNG. An older model, the **DVC 300**, also supported PNG.)

- **FD Trinitron WEGA** [Sony UK] (*MHEG-5*) - models KV-32DS60(S) and KV-28DS60(S); read-only; tri-level alpha support (0%, 50%, 100%). (This is an integrated digital TV set; PNG is supported as part of the UK profile for MHEG-5.)

- **FoneCam** [Moonlight Products] (*Win32*) - all versions? write-only; commercial. (This is a hardware/software combo: a modem/video-camera hybrid that captures still images, and dial-up retrieval/viewing software that saves the images in various formats.)

- **HD1000** [Roku] (*Linux*) - read-only; uses **libpng** and **zlib**. (This is a media player for displaying graphics and photos, video, and audio files on high-definition TV sets.)

- **i-Player** [Netgem] (*embedded*) - read-only; reportedly full alpha support. (This is a digital set-top box that incorporates a standard web browser. It appears to be the successor to or the new name for the **netbox**, below.)

- **J-PHONE handsets** [J-PHONE] (*embedded*) - all 2001+ versions? read-only; commercial. (These are Japanese cell phones with color displays and the ability to display PNG images and, in some models, JPEG images, **MNG** animations, sound clips, and possibly streaming video. High-end examples include the J-SA51 and J-SA52 handsets with embedded digital cameras. Check Babelfish for an English translation of the technical/compatibility page above.)

- **Mediamaster DVB 9850T** [Nokia] (*MHEG-5*) - read-only; tri-level alpha support? (This is a set-top box that decodes digital TV broadcasts for display on an existing TV set. PNG is supported as part of the UK profile for MHEG-5.)

- **Nokia 9210 Communicator** [Nokia] (*Symbian*) - all versions? read-only. (This is a cell phone with a keyboard and a reasonably large, 4096-color screen. It includes e-mail, web browsing, and

various office applications. PNG is supported both as a standalone image format and within the browser, presumably. The **9290** may have similar features.)

- **netbox** [Netgem] (*Linux*) - read-only; binary transparency. (This was a WebTV-like set-top box for interactive TV, web browsing, e-mail, audio playback, and related functions. It conformed to European standards, and a "(free) PC Linux-based version of the browser will be available soon." **This product has been discontinued.** It appears to have morphed into the **i-Player**, above.)

- **PlayStation Portable** [Sony] (*embedded*) - firmware version 1.0 and later; read-only; **full alpha support** as of version 2.0 (binary transparency prior to 2.0); no gamma support; commercial. (This is a handheld game console with a relatively complete embedded web browser.)

- **Snappy** [Play] (*Win32*) - version 3.0 and later; write-only; commercial. (This is a hardware/software combo: a video-capture device that captures still images from any video source--videocams, TVs, VCRs--and image-manipulation and enhancement software that saves the images in various formats. **This product has been discontinued, and the company is deceased.**)

- **WaveCapture** [Practical Electronic Tools] (*Windows 9x*) - all versions; write-only; commercial. (This is a hardware/software combo: an EISA data-capture card for Hewlett-Packard GPIB/IEEE-488 devices that can "print" high-resolution data to image files, and driver software that can convert and save to various image formats.)

- **WebTV** [WebTV Networks / Philips / Sony] (*WebTV*) - versions since January 1999? read-only; no progressive display; **full alpha support** in versions since August 2000(?) (apparently); 32-bit alpha support (9 transparency levels; screenshots) and binary transparency for palette images (first palette entry only, regardless of number of transparent colors) in older releases; CSS background-image support; commercial. (This is a web browser embedded in a set-top box; it displays pages on a standard analog television set. See also the **WebTV Viewer** for Win32 on the PNG browsers page.)

- **X-Box** [Microsoft] (*Windows NT?*) - all versions? read-only; uses **libpng** and **zlib**; commercial. (This is a Wintel-based game console, and at least the Dashboard app has PNG support.)

Here are some related PNG pages at this site:

- PNG-supporting Applications
  - Browsers

- Image Viewers
- Image Editors
- Image Converters
- 3D Applications
- Games / Entertainment
- Office / Business Applications
- Scientific / Graphing Applications
- Miscellaneous Applications

-  PNG Home Page
-  **Complete PNG Site Map**

Last modified 29 October 2005.

Programming Libraries and Toolkits with PNG Support

Application toolkits allow developers to add image-handling capabilities to their own applications; this page lists the ones that offer PNG support, either for reading or writing or both. Plug-ins and datatypes that are more relevant to end users are still listed on the miscellaneous apps and browsers pages.

As with the other PNG-applications pages, links to home WWW sites or to downloadable versions are provided where known, but if a link is broken, check the location and see if an updated version is available (and please tell Greg!). Relevant operating systems are printed in (*parenthesized italics*).

These are listed alphabetically, more or less:

- **7-Zip** [Igor Pavlov] (*many*) - all versions? freeware (LGPL) with C++ source. (This is primarily a compression-archiver utility, but it includes an independent implementation of the deflate algorithm used in PNG. [One would still have to add the zlib headers and Adler-32 checksum to the output stream before using it in PNG images, however.])

- **ActiveListBar** [Infragistics] (*Win32*) - all versions? read/write; commercial. (This is a navigation control with the look and feel of Outlook. PNG is supported for various icon sizes and presumably also for background images, etc.)

- **ActiveTreeView** [Infragistics] (*Win32*) - all versions? read-only; commercial. (This is an extension of the TreeView control that supports icons, background images, etc.)

- **akPNG.datatype** [Andreas Kleinert] (*Amiga 68k/PPC/Amithlon*) - all versions; read-only; transparency support (but no alpha support?); native PowerPC support available; uses **libpng** and **zlib**; freeware. (PPC versions prior to 45.x, formerly shareware, are now also freeware. Click here if links break.)

- **Animation MNG ActiveX** [JComSoft /Jin Hui] (*Win32*) - all versions; read-only; **MNG** support; shareware? (This is an ActiveX control for displaying PNG images and MNG animations. It appears to be a new product as of October 2002 and is available only by e-mail request.)

- **Blitz3D** [Blitz Research / Mark Sibly] (*Win32/DirectX*) - all versions? read-only; commercial. (This is an integrated development environment [IDE] incorporating a 3D game engine, design package, custom programming language [hybrid of BASIC and C], and compiler.)

- **Blorb** - see **Glk** below

- **BMGLib** [Scott Heiman] (*Win32*) - version 2000-04-07 and later; read/write; uses **libpng** and **zlib**; freeware with source. (This is a DLL that generally supports simple reading and writing of bitmaps, but with special emphasis on doing so in OpenGL programs.)

- **Ca3D-Engine** [Carsten Fuchs] (*Win32, Linux/X*) - all versions? read-only? freeware/commercial. (This is an OpenGL-based 3D game engine; PNG is supported as a texture format.)

- **CamlImages** [Jun Furuse and Pierre Weis] (*Caml*) - all versions; read/write; requires **libpng** and **zlib**; freeware (modified GPL) with source. (This is an image-processing library for Objective Caml [O'Caml].)

- **Carnegie Mellon Graphics** [Geoff Washburn, Mark Stehlik, Jevan Saks, Sabrina Haskell, Ed Latimer, et al.] (*Win32, Mac OS, Mac OS X, Unix*) - all versions? read-only? requires **libpng** and **zlib**; freeware (BSD) with source. (This is a "simple, cross-platform 2D API for C++." A Java version is being developed.)

- **Ch PNG** [Stephen Nestinger] (*Win32, Unix/X, Mac OS X?*) - all versions; read/write; freeware with C/Ch source (for PNG add-on only). (This is a "Ch interface to **libpng**." Ch is a proprietary, multiplatform C/C++ interpreter, and Ch PNG provides a wrapper for libpng that allows all of its functions to be called from a Ch program, too. Version 1.0 appears to support only Win32 and Linux, however.)

- **CImage** [Anthemion Software] (*Win32*) - all versions; read/write; freeware (BSD) with C++ source. (This is "an MFC class for manipulating images." It is based on code written by Alejandro Aguilar Sierra.)

- **ClanLib** [Magnus Norddahl, Daniel Vogel, et al.] (*Linux, Win32, BeOS*) - all versions; read-only; full alpha support? uses **libpng**, **zlib**, **Hermes** and optionally **ImageMagick**; freeware (LGPL) with source. (This is an SDK for developing games. PNG is an optional image format that can be used for any image-related task supported by the application, such as sprites or 3D texturing.)

- **Closure** [Gilbert Baumann] (*Unix/X*) - all versions; read-only; freeware (GPL) with source. (This is a web browser written entirely in Common Lisp [the Allegro variant is preferred], including a basic PNG decoder [`src/renderer/png-images.lisp`] and zlib/inflate implementation [`src/net/deflate.lisp`]. It appears to have died quietly in June 1999, however. Note that the home page does not link to the latest source code; see this directory for newer code. Also see **CL-PNG** below.)

- **CL-PNG** [Harald Musum] (*many*) - all versions; read/write; freeware (LGPL) with Common Lisp source. (This is another PNG and zlib implementation written in Common Lisp. It appears to have died in June 2001, however, about two weeks after it started.)

- **cl-zlib** [Alberto Riva] (*Linux, Win32*) - all versions; read/write; requires **zlib**; freeware (BSD) with Common Lisp source. (This is an Allegro Common Lisp wrapper for the regular zlib shared library or DLL. Like zlib, it provides no PNG support itself, but it can be used to implement a PNG encoder or decoder. See also the pure Lisp zlib implementation in **CL-PNG**, above.)

- **CMacPNG** [Noriyuki Horiuti] (*Mac PPC*) - all versions; read/write? requires **libpng** and **zlib**; freeware with C++ source. (This is a "class is for Macintosh to handle PNG files.")

- **ComponentOne Chart** [ComponentOne] (*Win32*) - version 6.0(?) and later; write-only; commercial. (This is a presentation-graphics toolkit with both interactive and programmable interfaces. It can do both 2D and 3D charts and supports MSVC, Visual Basic, Delphi, and Borland C++ Builder. It was previously known as **Olectra Chart**.)

- **Crystal Space** [Jorrit Tyberghein and the Crystal Space Team] (*Unix/X, DOS, OS/2, Win32, BeOS, NeXTStep/OpenStep, Rhapsody, Mac OS, Amiga*) - version 0.10 and later; read-only; **MNG** support (read-only) as of version 0.96(?); uses **libpng**, **zlib** and optionally **libmng**; freeware (LGPL) with source. (This is an open-source 3D game engine written in C++ that compiles on multiple platforms; it also includes a number of demo levels. PNG support was added by Andrew Zabolotny.)

- **CscHTML** [Steven "Count Zero" Kordik] (*Unix/GTK+*) - all versions; read-only; full alpha support; requires **libpng** and **zlib**; freeware (GPL) with source. (This is an HTML widget for GTK+, with both C and Perl bindings. It is used by the **CSCMail** browser/e-mail client.)

- **CWebImageDC** [Randy More] (*Win32*) - all versions; write-only; uses **libpng**, **zlib** and **HIPNG** [see below]; freeware. (This is an MFC wrapper class that "provides a memory-based device context into which an image may be drawn using standard [Win32] GDI calls. The resulting image may then be saved as either a PNG file or written to a CMemFile for insertion into a CHttpStream." Source and a demo project are included.)

- **CxImage** [Davide Pizzolato] (*Win32*) - all versions; read/write; uses **libpng**, **zlib** and **FreeImage** (see below); freeware with C++ source. (This is a C++ class to "load, save, display, and transform images in a very simple and fast way." It is Windows-specific due to "some particular constructors and the painting functions." Read/write **MNG** support is available as a separate CxImageMNG module.)

- **DaVinci Graphic Library** [Herd Software] (*Windows 3.x, Win32*) - all versions? read/write; full

16-bit support; no alpha support? shareware. (This is a set of DLLs and online documentation that supports conversion and manipulation of many bitmap and vector image formats. Alpha support appears to be limited to TIFF and BMP, at least as of version 3.0. German pages also available.)

- **DBPix** [ammara.com] (*Win32*) - all versions; read/write? shareware. (This is an ActiveX "image control for building database applications with picture-handling capabilities." It can store and retrieve compressed images in databases and recreated them on disk in various formats, including PNG, and it has Visual Basic, C++, and other language/application interfaces.)

- **Delphi** [Borland] (*Win32*) - version 6 and later; read/write; commercial/freeware. (Delphi's native PNG support is available via CLX only; the older VCL component library doesn't support it.)

- **DirectFB** [Denis Oliver Kropp, Andreas Hundt, and others] (*Linux/fb*) - all versions; read-only; freeware (LGPL) with source. (This is a "thin library that provides developers with hardware graphics acceleration, input device handling and abstraction, integrated windowing system with support for translucent windows and multiple display layers on top of the Linux framebuffer device." It includes bitmap and video loaders, including PNG.)

- **DirectX** [Microsoft] (*Win32*) - version 8 and later; read-only? uses **libpng** and **zlib**; commercial. (This is Microsoft's API to expose hardware-specific features to software, especially 3D acceleration to games. According to newsgroup postings by Tony Cox [e.g., on 21 May 2001 and 24 Sep 2001], "the D3DX utility library in DX 8.0 has a comprehensive bitmap file loader that understands lots of file formats, including PNG." Search Google for further info.)

- **DISLIN** [Helmut Michels] (*DOS, Unix, VMS, Win32*) - version 7.2 and later; write-only; freeware or commercial, depending on platform and compiler. (This is a high-level plotting library for data visualization. It can do both 2D and 3D plots and supports C, Fortran77, Fortran90, Java, Perl and Python.)

- **Doc-to-Net** [Skyline Tools] (*Win32*) - all versions? write-only; commercial. (This is a real-time conversion tool designed to be used as a CGI application; it allows scanned documents and "unsupported" image formats to be converted to PNG, GIF or JPEG on the fly and served to the user. It also supports some basic image-manipulation capabilities such as edge-detection and anti-aliasing.)

- **EZTwain Pro** [Dosadi / Spike McLarty] (*Win32*) - version 3.0 and later; read/write; uses **libpng** and **zlib**; commercial. (This is a DLL convenience wrapper for the TWAIN image-acquisition API, callable from most languages [including C/C++, Visual Basic, Visual FoxPro, Delphi, LabView, etc.]. It can read, write and scan to PNG.)

- **FabPAINT** [Fabrice Foray] (*Win32*) - all versions; write-only; uses **libpng** and **zlib**; freeware; 197k. (This is a drop-in replacement for the CAPAINT DLL, which appears to be part of the commercial **CA-Visual Objects** product [and which itself may have been based on an old version of Ulrich von Zadow's **PaintLib**, below]. In addition to PNG, it includes support for TIFF and JPEG.)

- **FreeImage** [Floris van den Berg / Hervé Drolon] (*Win32, Linux/Qt, Mac OS X*) - all versions; read/write; alpha support; **MNG** and **JNG** support (read-only) as of version 2.1.0; ICC profile support as of version 3.2.0; 16-bps support as of version 3.7.0; uses **libmng**, **libpng** and **zlib**; freeware (GPL or FIPL) with C++ source. (This is a library/DLL with support for reading and writing multiple image formats, including PNG; it also has a growing number of image-manipulation capabilities. Ease of use has been a design goal.)

- **FXPy** [Lyle Johnson] (*Win32, Unix, etc.*) - version 0.99.118 and later; read/write? requires **libpng** and **zlib**; freeware (LGPL) with source. (This is a "Python extension module that provides an interface to the FOX GUI library.")

- **gd** [Thomas Boutell] (*many*) - version 1.6 and later (or version 1.2 or 1.3 with Greg's gd1.2-png-addon or gd1.3-png-addon); read/write; palette support only in versions prior to 2.0; nearly full alpha support in version 2.0 and later (7 bits rather than 8; only binary transparency in earlier versions); requires **libpng** and **zlib**; freeware (BSDish) with source. (This is a popular drawing library written in C. Traditionally it was GIF-only, with PNG support planned for version 2.0, but Unisys legal action in 1999 prompted the author [*who was also leader of the original PNG development effort*] to add PNG to the 1.x series, replacing the old GIF support. Version 1.6 had broken transparency and RGB support, no grayscale support, and in some cases wrote larger palettes than it needed to, but those problems were fixed in 1.6.1 and later releases. Support for JPEG and Windows BMP formats was added in version 1.8.)

- **GDFP** [Mike Bradbery] (*many*) - all versions; write-only; requires **gd**, **libpng** and **zlib**; freeware (EFFL) with source. (This is a FreePascal interface to the **gd** library above.)

- **GDI+** [Microsoft] (*Win32, Win64*) - all versions; read/write; commercial (incorporated into Windows XP and later, and available as a downloadable add-on for apps targeted at Windows 98 and later). (This is the device-independent graphics API built into newer versions of Microsoft Windows.)

- **gdk-pixbuf** [Federico Mena-Quintero and others] (*Unix/GTK*) - all versions; read-only? full alpha support? requires **libpng** and **zlib**; freeware (LGPL) with source. (This is a GDK library that can load various image formats and render them into various drawables and buffers with optional scaling and compositing. Reportedly it will be integrated into GTK+ 1.4.)

- **GD.pm** [Lincoln D. Stein] (*Perl*) - version 1.20 and later; write-only; requires **gd**, **libpng** and **zlib**; freeware (Artistic) with source. (This is a Perl wrapper for the **gd** library above. Despite the claim on the home page, newer versions may be available at CPAN.)

- **Glk** [Andrew Plotkin, David Kinder, and others] (*Unix/X, Win32, etc.*) - all versions? read-only; freeware. (This is an "interface standard for interactive fiction," a la Adventure and Zork; there are a number of platform-specific libraries that implement it, including XGlk and Windows Glk. Technically, PNG support is required only by the Blorb resource-file layer, but "the Glk portable I/O library uses Blorb as a resource format." See also the Glk archive and **Glulxe** on the miscellaneous apps page.)

- **glpng** [Ben Wyatt] (*Win32, etc.*) - all versions; read-only; requires **libpng** and **zlib**; freeware (zlib license) with source. (This is a utility library to load PNG images and bind them to OpenGL textures. Reportedly it is also a good general-purpose example of how to use textures in OpenGL. As of early 2000, it still includes the source code for **libpng 1.0.2** and **zlib 1.1.3**, plus a static Win32 library [glpng.lib].)

- **GraphApp** [Lachlan "Loki" Patrick] (*Unix/X, Win32*) - version 3 and later; read/write? uses **libpng** and **zlib**; freeware (BSDish) with source. (This is a cross-platform GUI toolkit with particular emphasis on internationalization and Unicode support. It includes GNU's Unifont, stored in PNG format.)

- **GraphicEx** [Mike Lischke] (*Win32*) - version 8.0 and later; read-only; includes a Pascal port of **zlib**; freeware for non-commercial use, with source. (This is a Delphi [Pascal] extension to load various image formats, including PNG.)

- **GraphiX/FP** [Michael Knapp] (*DOS, Win32, Linux/SVGA*) - version 3.0 and later; read-only (write support planned); freeware (LGPL) with Pascal/assembler source. (This is a direct-hardware-access SVGA graphics library for FreePascal, with mouse support, font support, image-handling and image-manipulation capabilities. There is also an older version of GraphiX for Borland Pascal 7, but it does *not* support PNG.)

- **GtkHTML** [Anders Carlsson, Ettore Perazzoli, Jonas Borgström, Radek Doulik, Larry Ewing, Miguel de Icaza, and others] (*Unix/GTK*) - all versions; read-only; requires **gdk-pixbuf**, **libpng** and **zlib**; freeware (LGPL) with source. (This is a "lightweight HTML rendering/printing/editing engine." It was originally based on the KHTML widget by Torben Weis, Josip A. Gracin, and Martin Jones.)

- **HIPNG** [Alan Algustyniak] (*Win32*) - all versions; write-only; freeware. (This is a Windows-specific static library that simplifies writing a PNG image to a single call. It has two interfaces,

one for converting Windows DIBs to PNGs and another for writing raw data to a PNG file. C++ source code and a static Win32 library are included. See PNG Source Code and Libraries for **libpng** and **zlib**, which are also required.)

- **HTMLayout** [Terra Informatica] (*Win32*) - all versions; read-only; full alpha support; uses **libpng** and **zlib**; commercial. (This is a lightweight HTML/CSS rendering component [DLL] with no dependencies on other browsers or browser components. PNG is supported for both foreground and background images, including with alpha-transparency. A demo browser app is freely available for download.)

- **Ilib** [Craig Knudsen] (*many*) - version 1.1.2 and later; read/write; truecolor support only; no transparency support; requires **libpng** and **zlib**; freeware (GPL) with source. (This is another drawing library, similar to **gd** [above] in basic functionality, but with broader image-format support, different font support [X11 BDF fonts instead of TrueType], and different sample apps [including a contact-sheet generator for indexing images]. It also comes with a Perl interface.)

- **ImageEn** [Hyrix Technologies] (*Win32*) - version 1.2(?) and later; read/write; shareware. (This is a "component suite for image processing, viewing and analysis" that works with Borland Delphi 3 and 4 and C++ Builder 3 and 4. A corresponding component suite for Visual Basic, **ImageEn OCX**, is also available.)

- **ImageFileLib** [Michael Vinther] (*Win32*) - all versions(?); read/write; **MNG** support; freeware with Pascal source. (This is a Delphi library to read and write several image formats, including PNG and MNG. It does not appear to support the more complex MNG features such as JNG and delta-encoding.)

- **Image Format Library** - see **ImageVision Library** below

- **ImageGear** [AccuSoft] (*Unix, OS/2, Macintosh, Windows 3.x, Win32*) - version 6.0 and later; read/write; full alpha support? (This is a programming library supporting numerous image formats, both display and conversion; it includes Visual Basic and ActiveX controls/DLLs/whatever, Java support--both classes and Beans--and claims to be fast.)

- **ImageLib** [Skyline Tools] (*Windows 3.x, Win32*) - all versions? read-only? commercial. (This is a Windows-specific DLL with Delphi support; it claims "support for most PNG formats.")

- **Image Library** [Colosseum Builders / John Miano] (*many*) - version of 1 May 1998 and later; read/write; alpha support; older versions write invalid zlib streams (and therefore invalid PNGs--fixed as of version 4.2); freeware with C++ source and, as of version 4.0, Delphi Pascal source, as well. (This is a library of C++ and Pascal sources for various image formats, including PNG. It includes Win32 executables and MSVC and Borland makefiles. The zlib/deflate bug was

evidenced by "distance too far" errors in decoders based on zlib 1.2.1 and later, which do stricter bounds-checking than older versions did. Note that, as of June 2006, the latest version of the library [4.3] is actually on the author's source code page, not the main page listed above.)

- **ImageMagick** [John Cristy] (*Unix, VMS, Win32, Macintosh*) - version 3.6.3 and later; read/write; full gamma support; full chromaticity support? broken support for sub-8-bit grayscale PNGs in versions prior to 5.1.0; minimal MNG support as of version 3.9.2 and full **MNG-LC** support (read/write) as of version 4.2.4 (broken in versions 5.2.7 through 5.3.6); **JNG** support as of version 5.5.2; requires **libpng** and **zlib**; freeware with source. (See also Bob Friesenhahn's C++ interface to ImageMagick, **Magick++**.)

- **ImageMan ActiveX Suite** [Data Technologies] (*Windows 3.x, Win32*) - all versions? read/write. (This is a set of Visual Basic and ActiveX controls/DLLs/whatever, for image manipulation and conversion.)

- **ImagePDF** [Apex Internet Software] (*Unix, Win32*) - all versions; read-only; "retains most relevant image tags," possibly including text annotations; commercial. (This is a command-line program and shared library/DLL that converts images to Adobe's PDF format.)

- **Imager** [Arnar Mar Hrafnkelsson] (*Perl*) - version 0.05 and later; read/write; full alpha support as of version 0.31; requires **libpng** and **zlib**; freeware (Artistic) with source. (This is a multi-image-format Perl module written in C. Imager's feature set is similar to that of **gd** and its Perl interfaces; it provides read/write support for several formats and supports image-blending, gradients, fonts, and so forth.)

- **Imagery** [Ursus Computing] (*Windows 3.x, Win32*) - version 1.0 and later; read/write? (This was an image-manipulation library with file support for PNG, JPEG, TIFF, etc.; various modification tools [blur, edge-detect, contrast, resample, etc.]; and some demo apps, including a viewer. It is now part of **PiXCL Tools**, below.)

- **ImageScript** [Jan Verhoeven] (*Windows 9x/ME*) - version 2 and later; read/write? freeware. (This is a "tool to convert, resize, copy and move" various image formats, including PNG, "under control of a script that you can create from, e.g., Delphi, VB, MS Access 97, etc.")

- **ImageVision Library** [Silicon Graphics] (*IRIX*) - version 3.0 and later; read/write? uses **libpng** and **zlib**. (This is a multi-format image manipulation library, also known as "IL." It uses SGI's **Image Format Library** to actually read and write image files; IFL is also available for Windows 9x/NT. IL 3.1.1 apparently corresponds to IFL 1.1.1, etc.)

- **ImageX** [Fath Software] (*Win32*) - version 2.0 and later; read/write; commercial. (This is an ActiveX control [OCX] for import, export, and conversion of various image formats. It can be

used with Visual Basic, Visual C++, Access, Delphi, etc.)

- **Img** [Jan Nijtmans] (*Unix/X, Win32*) - version 1.0 and later; read/write; uses **libpng** and **zlib**; freeware with source. (This is a multi-format image-processing extension for **Tcl / Tk**. Versions of Tk prior to 8.3 required a patch in order to support the writing of alpha/transparency info; as of version 8.3, the patch is integrated into the core package.)

- **ImgDLL** [Smaller Animals Software] (*Win32*) - version 3.7(?) and later; read/write; full alpha and gamma support claimed; uses **libpng** and **zlib**; commercial. (This is a multi-format, file-based image-processing DLL/LIB for use with VC++, Visual Basic, etc. It has been mostly superseded by **ImgSource**, below.)

- **ImgSource** [Smaller Animals Software] (*Win32*) - all versions; read/write; full alpha and gamma support claimed; uses **libpng** and **zlib**; commercial. (This is a multi-format image-processing DLL/LIB for use with VC++, Visual Basic, etc. Unlike the older **ImgDLL** [above], ImgSource can read images from and write them to arbitrary sources, and it has more processing functions.)

- **ImgX** [Designer Controls] (*Win32*) - all versions? read/write; commercial; requires separate purchase of **ImgSource**, above. (This is an ActiveX DLL for Visual Basic that supports various forms of image manipulation.)

- **Imlib** [Red Hat Advanced Development Labs, Enlightenment team] (*Unix/X, Unix/GTK*) - all versions? read-only; partial alpha support (only binary transparency); requires **libpng** and **zlib**; freeware (GPL) with source. (This is a "general image-loading and rendering library" that transparently handles many formats without the need for the programmer to know any details of the formats or of the interfaces to their programming libraries; claimed to be fast.)

- **Io** [Steve Dekorte] (*Unix/X, Win32, Mac OS X*) - version 2002-11-24 and later; read-only? uses **libpng** and **zlib**; freeware (BSD) with source. (This is a "small prototype-based programming language" [and desktop environment] inspired by SmallTalk and other object-oriented languages.)

- **janGraphics.dll** [Jan Verhoeven] (*Windows 9x/ME*) - all versions? read/write; freeware. (This is a "multi-threaded COM-object to convert between the [bmp,gif,png,jpg] image file formats, including (optional) resizing, GIF transparency and JPEG compression quality adjustment." It can be used with Visual Basic, Delphi, MS Office apps, etc.)

- **Java Advanced Imaging API** [Javasoft/Sun] (*Java*) - version EA2 and later; requires Java 2 SDK (a.k.a. JDK 1.2 or later); read/write; full alpha support; full gamma support; read/write sRGB support (all gamma and chromaticity properties made available to app, but actual pixel-modification is limited to gamma); no iCCP support. (This is native PNG support in a standard

Java extension; it does not use native code other than **zlib** [which is built into Java since JDK 1.1]. See also the documentation on the PNGEncodeParam and PNGDecodeParam classes, which provide a nice overview of the scope of the API. The API is available in two parts, one for image I/O [including PNG] and one for the rest of JAI's image-processing classes. The first can be used independently of the second. Note also that this is distinct from the native ImageProducer PNG support coming to the Java 2 / JDK 1.3 core [see the 4 May 1999 entry on the PNG News page] and that a new image-I/O API is being developed that will be independent of JAI. Some information about the latter is available here, though it is no longer completely accurate.)

- **Java Image Content Handlers** [ADI Limited / Justin Couch] (*Java*) - all versions; read-only; uses **libpng** and **zlib**; freeware (LGPL) with C++ source. (This is reportedly a fast and efficient image library--it uses native libraries for decoding--with support for PNG, JPEG, TIFF, GIF, BMP, TGA and PBM/PGM/PPM. As supplied, it is designed for Java 2 [JDK 1.2], but source code is included, and it can be trivially modified to work with JDK 1.1. Write support will probably appear in a separate package. As of October 2001, code newer than the stable 1.0 release is available only via CVS, as noted on this page.)

- **Java PNG** [VisualTek] (*Java*) - all versions; read/write. (This is apparently a free-for-non-commercial-use PNG library, but its license is rather confused. It claims to be distributed under the terms of the GNU General Public License but includes no source code and has some sort of 30-day evaluation period; the web page also indicates that only GPL'd programs may use it freely. No info on JDK requirements.)

- **JIMI** [Activated Intelligence / Sun Microsystems] (*Java*) - all versions; read/write; freeware (formerly commercial). (This is an image toolkit supporting a number of formats, including PNG, either "natively" or via Java's ImageProducer / ImageConsumer model. PNG support was originally based on Jason Marshall's **PNGImageProducer** source code. JIMI was acquired by Sun in mid-August 1999.)

- **JIU / Java Imaging Utilities** [Marco Schmidt] (*Java 1.1+*) - version 0.12.0 and later; read/write; 16 bps support; tEXt, pHYs, and tIME support; no transparency support; freeware (GPL) with Java source. (This is an image-processing library with a number of image-manipulation features.)

- **Jun for Java** [AOKI Atsushi, ODA Tomohiro, et al.] (*Java*) - version 316 and later; read-only? requires **JIMI** or **JAI**; freeware (GPL) with source. (This is an OpenGL-based "graphic multimedia library with topology and geometry." There is also a Smalltalk version, but it is unclear whether that version supports PNG.)

- **JVG / Java Vector Graphics** [Faidon Oy-Ab] (*Java*) - version 1.0 and later; read/write (write-only in 1.0 beta 1); shareware, but 1.0 beta 1 is still available and freeware, and PNG support will be free "soon" (possibly as part of the Java Image Saving package).

- **Kylix** [Borland] (*Linux/X*) - all versions; read/write; commercial/freeware. (Kylix's native PNG support apparently is fairly well hidden, but Chris Rorden has documented the procedure to register the format. He also has a link to Peter Haas's page of Delphi PNG and MNG libraries.)

- **lcms** [Martí Maria Saguer] (*Win32, Unix, etc.*) - version 1.03 and later; freeware (LGPL) with source. (This is a small, independently developed color management system with read-only support for a "wide subset" of ICC profiles. Originally it was not in any way specific to PNG, but versions since 1.03 can read embedded ICC profiles in PNG images [iCCP chunk].)

- **LEADTOOLS** [LEAD Technologies] (*Windows 3.x, Win32*) - various versions from 1997 and later; read/write; no 16-bit-per-sample color support; no 2-bit support; full 8-bit alpha support; commercial. (This is a programming library supporting the compression and decompression of numerous image formats; it also comes in Visual Basic and ActiveX flavors. At one time it supported DOS and OS/2, but there was no sign of either as of October 1998.)

- **libAfterImage** [Sasha Vasko] (*Unix/X*) - all versions? read/write (read-only prior to version 0.81); full alpha support claimed; requires **libpng** and **zlib**; freeware (GPL) with source. (This is an "image-loading, storing, blending, rendering and manipulation library for X"; claimed to be fast.)

- **libferris** [Ben Martin] (*Unix/X*) - version 0.4.0(?) and later; read-only; alpha support; requires **libpng** and **zlib**; freeware (GPL) with source. (This is a C++ virtual-filesystem implementation with support for OS/2-like extended attributes [EAs] about files. PNG support is in the form of EA metainfo.)

- **libgraph** [JP Rosevear] (*Unix, etc.*) - all versions; write-only; requires **gd**, **libpng**, and **zlib**; freeware (GPL) with source. (This is a programming library that provides "generic graph-building capablities." The original web page claimed that it supported only Unix-like systems, but it should be generic enough to compile under Windows or most other OSes, too. **This product is no longer under development.**)

- **libmng** [Gerard Juyn] (*Unix, Win32, etc.*) - all versions; read/write; **MNG** and **JNG** support; requires **zlib** and optionally **libjpeg** (JNG) and **lcms** (color correction); freeware (zlib/libpng) with source. (This is the official MNG/JNG reference library, and it includes PNG support, too. The CVS tree is browsable online. There is also a MASM32 add-on available from the download page.)

- **libplot** [Robert S. Maier and others] (*Unix, etc.*) - version 2.4.1 and later; write-only; binary transparency support (alpha support coming); requires **libpng** and **zlib**; freeware (GPL) with source. (This is a plotting/graphing library similar to **gd** above except oriented toward vector

drawing rather than raster. It is part of the GNU **plotutils** package, which is listed on the scientific / graphing apps page.)

- **libpng** [Guy Eric Schalnat, Andreas Dilger, Glenn Randers-Pehrson, and others] (*many*) - all versions; requires **zlib** (below); freeware (BSDish) with ANSI C source. (This is the official PNG reference library. It is used by virtually all freeware and shareware PNG-supporting applications and in many commercial apps. A Visual Basic interface/module is separately available [under Sample Code: VB Standard Modules].)

- **libpr0n** [Pavlov, tor, saari, et al.] (*many*) - all versions; read-only; **MNG** and **JNG** support; requires **libmng**, **libpng**, and **zlib**; freeware (MPL) with C++ source. (This is a variant of and possible successor to **Mozilla**'s imglib, specifically designed "to render pornographic images in an efficient way." Source code is available from Mozilla's CVS tree.)

- **libwmf** - see **wmftopng** on the converters page

- **List & Label** [combit] (*Win32*) - version 10(?) and later; write-only? commercial. (This is a "report generator," apparently designed to plug into various database engines and produce reports of some sort. It is reported to have PNG support, though there is no indication of this on the web site.)

- **Magma** - see **Reachin API** below

- **Mirage Image Library** [Paul Legan] (*Win32*) - all versions; read/write; shareware. (This is a library, apparently for Delphi, with basic image import/export and display functions. A companion library, **ImageFX** [no relation to the Amiga editor], adds image-manipulation functions but has no file support of its own.)

- **Mjølner System** [Mjølner Informatics] (*Win32, Linux, Solaris, Mac PPC*) - version 5.2.2(?) and later; read-only? freeware. (This is a graphical programming environment for the object-oriented language **BETA**. As of version 5.2.2, PNG is the "native Pixmap format," but it's possible that older versions had some level of PNG support, too. Older versions were also available for IRIX and HP-UX.)

- **mmiogpng** [Giorgio Costa] (*OS/2*) - all versions; read-only; uses **libpng 0.85** and **zlib 0.95**; 164k. (This is a PNG-reading extension to OS/2's MMPM/2 multimedia subsystem, much like an Amiga datatype or a BeOS translator. Version 0.7 beta appears to be the first and only release. Also available via ftp: US, Italy).

- **MNG Translator** [YNOP Talton] (*BeOS x86*) - version 1.4 and later; read-only? **MNG** and **JNG**

support; uses **libmng**, **libjpeg**, and **zlib**; freeware with source (on request). (This is an add-on to the BeOS **Translation Kit**; it supports MNG, JNG and optionally PNG. The German download page is here.)

- **MST Image** [Yurij S. Musatenko] (*DOS, Windows 3.x, Win32, OS/2, Unix*) - version 3.3(?) and later; read/write; discards alpha/transparency information; uses **libpng** and **zlib**; freeware with source. (This is a multi-platform C++ library. As of mid-1999, the library was available as both a freely downloadable, non-commercial-use version and as a paid, commercial version; only the latter included PNG support. As of March 2000 [version 3.34], the library is completely open-source.)

- **Multimedia Conversion Library / MCL** [Gromada.com] (*Win32*) - version 2.0.0(?) and later; read/write; commercial. (This is a conversion library for various image, video and audio formats. PNG is supported, but MNG is not [as of version 2.3.2].)

- **NCTImageStudio** [NCT Software] (*Win32*) - all versions? read/write; shareware. (This is a set of ActiveX controls for image conversion and manipulation. It supports Visual Basic, MSVC++, Borland C++ Builder, Delphi, etc.)

- **NexgenIPL** [Binary Technologies] (*Win32*) - all versions; read/write; freeware. (This is an image-processing library for MSVC++. It supports multiple image formats and image-manipulation capabilities, and it includes several demo apps.)

- **Olectra Chart** - see **ComponentOne Chart** above

- **PaintLib** [Ulrich von Zadow] (*DOS, Windows 3.x, Win32, Unix, etc.*) - version 1.3 and later; read/write. (This is a portable "C++ class library for image file decoding and manipulation. It currently supports the PNG, TGA, TIFF, JPEG/JFIF, Windows BMP, and Mac PICT formats." Version 2.0 adds an ActiveX control. PaintLib is available with full source code and ready-to-go makefiles for DOS, Win32 and SunOS; sources for the ActiveX control only compile under Win32, of course.)

- **Panda** [Michael Still] (*Unix, Win32, etc.*) - version 0.4 RC2 and later; read-only (write support in the sense that PDF files support PNG internally); uses **libpng** and **zlib**; freeware (GPL) with source. (This is a library for generating PDF files.)

- **Photogenics PNG loader/saver** [Jolyon Ralph] (*Amiga*) - version 0.9; read/write; uses **libpng** and **zlib**; read-only support for grayscale/monochrome and interlacing; 43k. (This is a "GIO" plug-in for **Photogenics 1.2** only. Versions 2.0 and later include native PNG support; see the image editors page for details. Click here if link breaks.)

- **PHP** [PHP Development Team] (*Unix*, *Win32*) - version 3.0.13 and later; read/write; uses **gd**, **libpng** and **zlib**; freeware (BSDish) with source. (This is called a "hypertext preprocessor," but it's really a server-side programming language that can be embedded within web pages. It supports reading PNGs for their dimensions and creating PNGs dynamically. See also **Apache Toolbox** on the miscellaneous apps page.)

- **PIL** - see **Python Imaging Library** below

- **PiXCL Tools** [VYSOR Integration] (*Win32*) - version 4.0 and later; read-only; shareware. (This is an "interpreted image-processing and graphics language toolkit" for creating multimedia presentations, demos and imaging applications, especially for satellite data. It incorporates an updated version of Ursus Computing's **Imagery**, which was once a standalone product [above]. The API for the PiXCL DLL is also available.)

- **PixelGraphicLibrary** [Peter Beyersdorf] (*Win32*) - all versions; read/write; shareware. (This is an image-manipulation library specifically for use with Delphi 2 and 3; it can read and write PNG images. It also includes a simple demo viewer. **This product has been discontinued.**)

- **PLplot** [Maurice J. LeBrun / Geoff Furnish / Alan W. Irwin] (*Unix*) - version 5.0.3 and later; write-only; requires **libpng** and **zlib**; freeware (LGPL) with source. (This is a "library of C functions that are useful for making scientific plots from programs written in C, C++, Fortran, Octave, Python, and Tcl/Tk.")

- **PNG DataType #1** [Cloanto] (*Amiga*) - all versions; read-only; 8-bit only prior to version 43.2 (24-bit tag extensions supported in 43.2 and later); transparency support; includes sample DataType-based image viewer (**ViewDT**) with source code; 67k. (A datatype is a standardized DLL-type thing that allows any image-handling application under AmigaOS 3.0 or later to understand PNG images automagically, without recompilation. Also see **Personal Paint** on the image editors page. Click here if link breaks.)

- **PNG DataType #2** - see **akPNG.datatype** above

- **PNG DataType #3** - see **WarpPNG.datatype** below

- **PNG DataType #4** [Gunther Nikl] (*Amiga*) - all versions; read-only; for OS 3.0 and later; transparency support; gamma support; uses **libpng** and **zlib**; freeware (for non-commercial use) with source; 140k. (Click here if link breaks.)

- **PNG DataType #5** - see **vPNG.datatype** below

- **PNG Delphi / TPNGImage** [Gustavo Daud] (*Win32*) - all versions; read/write; full alpha

support (including single-shade/color transparency in grayscale and RGB images as of version 1.428); gamma support; interlacing support (write) as of version 1.42; text support; includes **zlib** compiled object files and Pascal wrapper; freeware with source. (This is a Delphi 5 [Pascal] component for loading and saving PNG images, with multilingual error messages [English, Portuguese and German]. Older copies of the code are available from various Delphi freeware sites. See also **TNGImage** below.)

- **PNGDIB** [Jason Summers] (*Win32*) - all versions; read/write; full alpha support in version 2.0.0 and later; full gamma support; requires **libpng** and **zlib**; freeware (BSD) with source. (This is primarily a "mini PNG/DIB conversion library" with two functions: one for converting PNG to DIB, and one for the reverse. Versions 1.1.0 and later also include a simple PNG viewer as a sample app.)

- **PngEncoder** [J. David Eisenberg] (*Java*) - all versions; write-only; 32-bit alpha support; requires JDK 1.1 (PngEncoder) or JDK 1.2 (PngEncoderB); freeware (LGPL) with source.

- **PNGgraph.pm** [Steve Bonds] (*Perl*) - version 1.10 and later; write-only? freeware (Artistic) with source. (This is a Perl module to draw bar, line and pie charts in PNG format. It is based on Martien Verbruggen's GIFgraph 1.10 and requires Lincoln Stein's GD.pm. Judging by the CHANGES file, this version appears to predate Dmitry Ovsyanko's port [below] by about three weeks.)

- **PNGgraph.pm** [Dmitry Ovsyanko] (*Perl*) - version 1.11 and later; write-only? freeware (Artistic or GPL) with source. (This is a Perl module to draw bar, line and pie charts in PNG format. It is "98% based" on Martien Verbruggen's GIFgraph 1.20 and requires Lincoln Stein's GD.pm. This was apparently developed independently of Steve Bonds' port [above], despite having the same name and version number.)

- **PNGHack** [Sean M. Foy] (*Win32*) - all versions; "read/write"; "alpha support"; freeware (LGPL) with source. (This is a "collection of ASP.NET Web Custom Controls for rendering cross-browser image references in HTML." Specifically, it's a server-side method of providing normal browsers with normal HTML but MSIE/Windows with the proprietary DirectX/CSS extensions it requires in order to render PNG transparency correctly. [Hence "hack."])

- **PNGHandler** [Simon Clarke] (*BeOS*) - all versions; read/write; full alpha support? no 16-bps support; freeware. (Older versions require Jon Watte's BeOS **Datatypes library** [239K], but current releases use the Be Translation Kit. PNGHandler may have been renamed to **PNGTranslator** as of version 1.20.)

- **PNGImageProducer** [Jason Marshall] (*Java*) - version 0.88 (final public release) and earlier; requires java.util.zip (a.k.a. **zlib** 1.0.4) from JDK 1.1 or later; freeware with source; 55k. (Sun's

JIMI is partly based on this.)

- **PNG_IO** [Steve Sangwine] (*many*) - all versions; read/write; requires **zlib**; freeware (GPL) with source. (This is a basic, high-level Ada 95 package for reading and writing PNG files. It is neither a clone of nor a wrapper for libpng; for example, versions prior to 3.3 did not support writing interlaced images, though they could read them. PNG_IO can write gamma, sRGB, and several other ancillary chunks.)

- **Pnglets** [Roger E. Critchlow, Jr.] (*JavaScript*) - all versions; write-only; freeware (GPL) with source. (This is a PNG drawing library written in JavaScript [not Java!]; it can be used to create client-side line drawings on the fly, without either libpng or zlib. Pnglets was inspired by and is partly based on algorithms in the **gd** library above, but the package draws from other sources as well and predates gd's PNG support.)

- **PNGLIB** [Edmund H. Hand, Uberto Barbini, Eric Engler] (*Win32*) - all versions; read/write; requires **libpng** and **zlib**; freeware with source code. (This is a Delphi wrapper for **libpng** and **zlib**. It appears to have a bug in writing the PNG IEND chunk [failure to include the length field], though this is strange given its use of libpng.)

- **PNGlib** [Thomas Kabir] (*Win32*) - all versions; read-only; full alpha support; freeware with Visual Basic source. (This is primarily a sample viewer, **PNGView**, that apparently can composite a transparent PNG image against a background image; but it also includes complete source code for a VB PNG-decoding library, **PNGlib**.)

- **PngUnit** [Edmund H. Hand, Jack Goman] (*Win32*) - all versions; read/write; freeware with source. (This is another Delphi wrapper for **libpng** and **zlib** based on Edmund Hand's PngImage. pas. It apparently includes a viewer with BMP-to-PNG conversion capability.)

- **PNGwriter** [Paul Blackburn] (*any*) - all versions; read/write; 16-bit-per-sample support; requires **libpng** and **zlib**; freeware (GPL) with source. (This is a C++ class for plotting XY data and drawing basic shapes directly to a PNG file. It includes HSV conversion functions, documentation in both English and Spanish, etc. It's also available from SourceForge.)

- **PowerDoc** [D-Type] (*Win32*) - all versions? read/write; commercial. (This is a vector-based graphics library for creating and rendering "professional, high-quality, and resolution-independent documents of any kind." It can import and export PNG images. An ASP variant can do [web] server-side rendering for IIS Active Server Pages.)

- **PrinterCE** [FieldSoftware] (*Windows CE 3.x*) - version 2.0(?) and later; read-only; commercial. (This is a PNG-supporting printing module for WinCE 3.x, a.k.a. Pocket PC. The toolkit is also available for older WinCE platforms, but without PNG support.)

- **Pygame** [Pete Shinners] (*Win32, Mac OS, Mac OS X, BeOS, Unix*) - all versions? read/write? full alpha support? requires **SDL**, **libpng** and **zlib**; freeware (LGPL) with source. (This is a Python-based multimedia library/toolkit written on top of SDL. It is primarily used for games, although there are also image viewers and other applications written with it.)

- **Python Imaging Library** [Secret Labs AB / Fredrik Lundh] (*Unix, Win32*) - version 0.2b3 (read-only) and later; read/write in version 0.2b4 and later; requires **zlib**; freeware (BSDish) with source. (PIL is an image-manipulation library for the Python interpreted programming language, with extensive file-format support and a powerful Image class supporting lots of image manipulation and processing methods, including stuff for on-the-fly image generation. It can also support **Tcl / Tk** if the **tkinter** package is installed, and it may once have supported Mac OS.)

- **QHTM** [GipsySoft] (*Win32*) - all versions; read-only; no transparency support. (This is Russell Freeman's "Quick, Light HTML Control"; it allows one to display a subset of HTML within an application. PNG is the only image format currently supported.)

- **Qt** [Trolltech] (*Unix/X, Win32, BeOS x86*) - version 2.0 and later, or version 1.4x with the Qt Image IO Extension Library (commercial only); read/write? **MNG** and **JNG** support (read-only?) as of version 2.2.0; uses **libmng**, **libjpeg**, and **zlib**; freeware (Free Edition: QPL) or commercial (Professional Edition) with source. (This is a C++ GUI toolkit, perhaps best known for its use in KDE under Linux.)

- **QuickTime** [Apple] (*Mac PPC/68k, Win32*) - version 3.0 and later; read/write as of 4.0; full gamma support; full alpha support; breaks **Internet Explorer**'s handling of standalone PNGs on Mac OS X (quick fix); uses **zlib**; freeware. Also version 2.5 for Macintosh with Sam Bushell's **QuickTime PNG-Importer**; read-only. (This amounts to a PNG plug-in for Mac and Windows apps; it allows any application that knows about QuickTime graphic importers--even **SimpleText**--to read PNG files and, as of version 4.0, write them (presumably). Note that the alpha support does *not* extend to QuickTime's use as an old-style Netscape plug-in. The included **PictureViewer** app can be used to view and convert PNG images.)

- **RasterMaster** [Snowbound Software] (*Win32, Java, Unix, Mac OS, Mac OS X*) - version 7.0(?) and later; read/write; commercial. (This is an imaging toolkit with with support for multiple platforms and languages, including C/C++, Java, and ActiveX.)

- **RbPNGLib** [Noriyuki Horiuti] (*Mac PPC*) - all versions; read/write; alpha support; gamma support; text support; requires **libpng** and **zlib**; freeware with C++ source. (This is a plug-in for REALbasic 2.1 through 3.x; it allows REALbasic programs to read and write PNGs.)

- **Reachin API** [ReachIn Technologies] (*Windows NT, IRIX/X*) - all versions; read/write; alpha

support (read/write but not display); commercial. (This is a 3D API/toolkit for developing "multisensory"--at a minimum, visual and haptic--3D applications. PNG is the "primary native graphics format." It was formerly known as **Magma**.)

- **Simple DirectMedia Layer** [Sam Lantinga] (*Linux, Win9x/NT, BeOS, Mac*) - version 0.10 and later; read-only; uses **libpng** and **zlib**; freeware. (This is a "free, cross-platform, multi-media development API." It is used in a number of games, including **Hopkins F.B.I.**, **Civilization: Call To Power**, **Myth II: Soulblighter**, and others. PNG support is indirectly provided by the ImgLib demo in the accompanying demos/examples archive. Philippe Lavoie wrote the PNG decoder code on which the ImgLib example is based.)

- **Sixlegs Java PNG** [Six-Legged Software] (*Java*) - all versions; read-only; freeware (LGPL) with Java source. (This is Chris Nokleberg's Java 1.1 PNG package, including source code. Version 0.6 supported transparency, gamma correction, progressive display, grayscale conversion, etc. Version 0.7 added support for sRGB, iCCP, and private chunk-handling. Version 0.8 added support for oFFs, pCAL, sBIT, sCAL and sPLT. Version 0.9 reduced memory usage and added support for iTXt. Version 1.0[a] was the first version released with full source code under the LGPL and included a workaround for a bug in IE4 and IE5. Version 1.1 added support for gIFg and gIFx. Write support is now planned for a separate package.)

- **Squeak** [Apple Computer / Squeak Central] (*Mac OS, Mac OS X, Unix/X, Win32, RISC OS, BeOS, OS/2, DOS, etc.*) - version 3.0(?) and later; read/write? freeware with source. (This is a graphical programming environment for the object-oriented language **Smalltalk-80**. It includes a full complement of 2D image capabilities, including PNG support.)

- **SuperView Library** [Andreas Kleinert] (*Amiga*) - version 15.0(?) and later; read/write; shareware. (This is part of the **SViewII** application package, formerly called **SuperView**; the library reads and writes many image formats.)

- **THBImage Professional Edition** [THBComponentware] (*Win32*) - all versions; read/write as of version 2.0 (previously read-only); alpha support as of version 2.0; commercial. (This is a set of ActiveX components with various image-manipulation capabilities, including scaling and compositing, for use with VC++, Visual Basic, and MS Access. PNG is one of the supported raster formats. Note that the **Standard Edition** does not support PNG.)

- **TIFFY Toolkit** [Art & Computer Hackbarth] (*Java*) - all versions; read-only; shareware. (This is a Java image-viewing toolkit with support for PNG, TIFF, GIF, JPEG and BMP and reportedly a small memory footprint. A demo viewer, **TIFFY View**, is also available via the viewers page.)

- **Titan** [Dan Brown] (*Linux, Win32*) - all versions? read/write; freeware. (This is a "portable image handler for OpenPTC." It is distributed as C++ source code.)

- **TNGImage** [Gerard Juyn, Scott Price, Peter J. Haas] (*Win32*) - all versions; read/write; **MNG** and **JNG** support; uses **libmng**, **libjpeg**, **lcms**, and **zlib**; freeware (zlib/libpng) with Pascal source. (This is a Delphi 3/4/5/6 component for loading and saving PNG, MNG and JNG images. `libmng.dll`, containing all four required libraries, is included. Linux/Kylix support is coming in version 1.2.)

- **Translation Kit** - see **BeOS** on the miscellaneous apps page

- **TwistedPixel** [Bananas Software] (*Win32*) - version 0.9 and later; read/write. (This is an ActiveX control [OCX] for display/conversion/editing of various image formats. It can be used with Visual Basic, Visual C++, Access, Delphi, etc.)

- **uf2png.fio** [Ulead Systems] (*Windows 3.x*) - all versions; read/write; freeware; 79k. (This is an add-on module for all Ulead image products [including **Ulead Viewer** on the image viewers page] and for Adobe/Aldus **PhotoStyler** [on the image editors page]. There may be a newer version on Ulead's very slow ftp site; the version above is the first non-beta release, v1.1, dated 15 September 1995 internally and 10 January 1996 on the ftp site.)

- **UltraWebSuite** [Infragistics] (*Win32*) - all versions? read/write? commercial. (This is a suite of server-side forms controls for ASP.NET; PNG is supported in the UltraWebChart and UltraWebNavigator components.)

- **UltraWinSuite** [Infragistics] (*Win32*) - all versions? write-only? commercial. (This is a suite of forms components for .NET; PNG is supported in the UltraWinChart, UltraWinTree, and UltraWinListBar components.)

- **Victor Image Processing Library** [Catenary Systems] (*Windows 3.x, Win32*) - version 5.0 and later, or version 4.x with a separate add-on; read/write; no alpha support (only single-color/GIF-like transparency); commercial. (This is a Windows DLL that can read and write various image formats. Apparently only the Win32 version is still under development; the last 16-bit Windows release was 4.25, and the DOS static library has never been updated past version 3.7.)

- **Virtual Print Engine** [IDEAL Software] (*Win32*) - all versions; read/write; commercial. (This is a toolkit and API to create electronic documents; it can both import and export PNG images, although the primary output format is PDF. Of the five flavors, PNG is supported in all but the lowest [Standard]. The site is available in German, too.)

- **vPNG.datatype** [Viktar Pakhomau/Victor Pakhomov] (*Amiga 68k*) - all versions; read-only; for OS 3.0 and later; broken interlaced support; freeware for non-commercial use; 11k. (This is very

closely related to the **vPNG** viewer on the viewers page. Click here if link breaks.)

- **WarpPNG.datatype** [Oliver Roberts] (*Amiga 68k/PPC*) - all versions; read-only; supports 68k, WarpOS and MorphOS; alpha support; gamma support; uses **libpng** and **zlib**; freeware.

- **wimg** [Yudong Yang] (*Win32*) - all versions; read/write? full alpha support? requires **libpng** and **zlib**; freeware with source code; 179k. (This is a multi-format image-processing library. A README file is available, and the archive also may be downloaded here.)

- **WinSView** [Andreas Kleinert] (*Win32, Linux*) - all versions; read/write; uses **libpng** and **zlib**; shareware. (This is a C++ class library with an MFC GUI front end [Windows version]; it is a port of the Amiga **SuperView Library** above. The class library is generic and may be ported to other platforms such as BeOS and QNX.) (coming)

- **wv** [Caolán McNamara] (*Unix, Win32, Amiga, VMS, OS/2*) - version 0.4.0 and later; read/write? requires **libpng** and **zlib** (and optionally **ImageMagick**); freeware (GPL) with source. (This is a library to read and parse Microsoft Word documents, versions 6 through 9 [a.k.a. 6, 95, 97, 2000]. It also goes by the name **wvWare** and was formerly known as **mswordview**.)

- **wxWindows** [wxWindows team] (*Win32, Unix/X, Unix/GTK+, Unix/Motif, Mac OS, Mac OS X, OS/2*) - version 2.0 and later; read/write? uses **libpng** and **zlib**; freeware (LGPLish) with source. (This is a cross-platform C++ GUI toolkit. Subprojects include **wxPython**.)

- **XmHTML** [Ripley Software Development] (*Unix/X*) - all versions; read-only; full gamma support; full alpha support; some progressive support, but better version coming; freeware (LGPL) with source. (This is a Motif widget capable of displaying HTML 3.2 documents, including images; it's currently in beta. A page demonstrating its PNG capabilities is also available.)

- **zlib** [Jean-loup Gailly and Mark Adler] (*many*) - all versions; freeware (BSDish) with K&R source. (This is the official compression library for PNG; it was originally designed specifically for PNG, though it has subsequently become widely used in many other settings. zlib itself provides no PNG support, but it is required for practically all PNG apps distributed as source code, and it is used in most PNG-supporting commercial apps.)

Here are some related PNG pages at this site:

-  PNG Programming Information:
  - PNG Source Code

- *PNG: TDG* Demo Source Code
- PNG Support in Mozilla

- PNG Technical Documentation
  - zlib Technical Documentation
  - MNG Technical Documentation
- *PNG: The Definitive Guide* and Related Books

- PNG Home Page
- **Complete PNG Site Map**

Last modified 20 August 2006.

libpng

libpng is the official PNG reference library. It supports almost all PNG features, is extensible, and has been extensively tested for over 11 years. The home site for development versions (i.e., may be buggy or subject to change or include experimental features) is http://libpng.sourceforge.net/, and the place to go for questions about the library is the **png-mng-implement** mailing list.

libpng is available as ANSI C source code and requires **zlib 1.0.4** or later (**1.2.3** or **1.1.4** recommended due to potential security vulnerabilities in earlier versions). The current public release, **libpng 1.2.12**, fixes a number of small bugs since the 1.2.8 release in 2004 and includes the configure script (in the source distribution) by default.

See the bottom of this page for warnings about **security and crash bugs** in versions up through **libpng 1.2.7**.

In addition to the main library sources, libpng includes the rpng, rpng2 and wpng demo programs, the pngminus demo program, a subset of Willem van Schaik's PngSuite test images, Willem's VisualPng demo program, and Intel's MMX-optimized routines for faster decoding on x86-class CPUs (currently for Microsoft Visual C++ and GNU C only; the two versions are equivalent aside from a thread-safety issue in the latter port).

Current version:	**1.2.12**
Authors:	Guy Eric Schalnat, Andreas Dilger, Glenn Randers-Pehrson (current maintainer), and others
License:	Open Source
Platforms:	Unix, DOS, OS/2, Windows, Mac OS, BeOS, Amiga, etc.
README:	local web site http://www.libpng.org/pub/png/src/ http://prdownloads.sourceforge.net/libpng/ ftp://ftp.simplesystems.org/pub/libpng/png/src/
Manual:	plain text format HTML format (version 1.2.5, courtesy of Deron Meranda) MS Word format (version 1.2.0, courtesy of Pierre Delaage)

Mailing list:	png-mng-implement

Source code:

prdownloads.sourceforge.net	.tar.bz2	.tar.gz	.zip
ftp.simplesystems.org	.tar.bz2	.tar.gz	.zip
archive sizes (bytes):	*621295*	*518856*	*629323*

MD5 checksums:

```
2287cfaad53a714acdf6eb75a7c1d15f  libpng-1.2.12.tar.bz2
e82f39e46aac34a1ca559c79322979be  libpng-1.2.12.tar.gz
5bd1c1ecff09a1e1455f0d84a4bd517c  libpng-1.2.12-no-config.tar.bz2
0b0695396ecd7c34e1f248d88fda5586  libpng-1.2.12-no-config.tar.gz
7f08f150407627288bbbd13d9c63d69f  lpng1212.zip
```

Patches:

Beta code: http://libpng.sourceforge.net/

Current binaries:

operating system	*platform*	*version*
Linux (.rpm) (libpng3, dev, dev3)	many	1.2.12-
HP-UX	PA-RISC,IA64	1.2.12-

(these are "unofficial" binaries compiled by third parties)

Older binaries:

operating system	*platform*	*version*
GnuWin32	x86	1.2.8-
Linux (.deb)	many	1.2.8-
Linux (.rpm) (libpng3, dev, dev3)	many	1.2.8-
Solaris 2.5-9	SPARC,x86	1.2.8-
Mac OS X	PowerPC	1.2.8-
Mac OS X	PowerPC	1.2.8
FreeBSD (.tgz)	x86	1.2.8
SCO OpenServer 5	x86	1.2.4
Amiga/StormC 4	68k/PPC	1.2.3
Windows CE	many	1.2.3
Linux (.zip)	x86/glibc	1.2.1

(these are "unofficial" binaries compiled by third parties)

Supporting libraries:	zlib

Security and Crash Bugs in Older Versions

Vulnerability Warning

Versions up through 1.2.11 and 1.0.19 have a buffer-overrun vulnerability when a particular error message is triggered. The overrun is always by exactly two bytes ('k' and NULL) so it seems highly unlikely that it could be used for anything more nefarious than denial of service (e.g., crashing your browser when you visit a site displaying a specially crafted PNG). Nevertheless, it's worth fixing, and versions **libpng 1.2.12** and **libpng 1.0.20**, released 27 June 2006, do just that. (Note that 1.2.11 and 1.0.19 erroneously claimed to include the fix, but in fact it had been inadvertently omitted.)

The same releases (and their immediate predecessors) also fix an out-of-bounds (by one) memory read and a second buffer overrun, this one in the code that *writes* the sCAL chunk (which is rather rare in any case).

There have been other issues in older versions released in 2004:

Crash Warning

Versions 1.2.7, 1.2.6, 1.0.17, and 1.0.16 have a bug that will cause applications that strip the alpha channel (while reading a PNG) to crash. The bug is fixed in versions **1.2.8** and **1.0.18**, which were released on 3 December 2004.

The release before that fixed another bug, this one in the PNG-writing code:

Broken-Image Warning

Versions 1.2.6 and 1.0.16 can write an invalid zlib header within the PNG datastream. This is not quite as bad as it sounds since the two-byte header can be corrected fairly easily (e.g., use pngcrush to rewrite the images and, perhaps, compress them slightly better, or run the *png-fix-IDAT-windowsize* utility bundled with pngcheck 2.1.0 or later), but some applications will display the images incorrectly. Microsoft Word and Internet Explorer are known to be affected. A libpng patch is available, and versions **1.2.7** and **1.0.17** (incorporating the fix) were released on 11 September 2004.

Finally--and most important--there were several security vulnerabilities present in versions of libpng prior to 1.2.6 and 1.0.16, one of which is **quite dangerous**:

Vulnerability Warning

On 4 August 2004 a new **jumbo security patch** was released to address several potential vulnerabilities in libpng, at least one of which is *quite serious*. It was followed on 15 August by the full **libpng 1.2.6** and **libpng 1.0.16** releases, which, like subsequent releases, incorporate the fix. All users are strongly urged to upgrade to the latest release of libpng or to patch any affected applications as soon as possible. *(Graphical browsers and e-mail clients are particularly at risk.)* Get the latest releases or an appropriate combo patch either from SourceForge (headings 1.2.5-security-patches and 1.2.5and-older-sec-patchs) or from Simple Systems.

Here's the CERT advisory, along with the relevant CERT and CVE vulnerability pages:

- **CERT VU#388984** (CVE CAN-2004-0597) (this is the **serious** one!)
- CERT VU#160448 (CVE CAN-2004-0599)
- CERT VU#236656 (CVE CAN-2004-0598)
- CERT VU#286464 (CVE CAN-2004-0599)
- CERT VU#477512 (CVE CAN-2004-0599)
- CERT VU#817368 (CVE CAN-2004-0597)

These vulnerabilities were discovered by Chris Evans and are also described in his alert. (Many thanks to Chris for notifying the libpng team and for providing time to fix the bugs before the public announcement!)

- PNG Home Page
- **Complete PNG Site Map**

---

*Last modified 22 July 2006. Please direct libpng comments and questions to the **png-mng-implement** mailing list.*

A Massively Spiffy Yet Delicately Unobtrusive Compression Library (Also Free, Not to Mention Unencumbered by Patents)

(*Not* Related to the Linux zlibc Compressing File-I/O Library)

Welcome to the **zlib** home page, web pages originally created by Greg Roelofs and maintained by Mark Adler. If this page seems suspiciously similar to the PNG Home Page, rest assured that the similarity is *completely* coincidental. No, really.

zlib was written by Jean-loup Gailly (compression) and Mark Adler (decompression).

Current release:

zlib 1.2.3

July 18, 2005

Version 1.2.3 eliminates potential security vulnerabilities in zlib 1.2.1 and 1.2.2, so all users of those versions should *upgrade immediately*. The following important fixes are provided in zlib 1.2.3 over 1.2.1 and 1.2.2:

- Eliminate a potential security vulnerability when decoding invalid compressed data
- Eliminate a potential security vulnerability when decoding specially crafted compressed data
- Fix a bug when decompressing dynamic blocks with no distance codes

- Fix crc check bug in gzread() after gzungetc()
- Do not return an error when using gzread() on an empty file

Version 1.2.x adds many improvements and features to zlib. Here are some highlights:

- inflate is about 20% faster and minimizes memory allocation
- crc32 is about 50% faster
- New, improved, and supported DLL interface and DLL FAQ
- New functions and functionality:
    - deflate() and inflate() will now optionally encode and decode gzip streams
    - raw deflate() and inflate() now documented and supported
    - New inflateBack() functions for call-back interface -- faster than inflate()
    - Z_BLOCK flush option and new return information added to inflate to facilitate appending to deflate streams
    - raw deflate() now accepts a dictionary -- for appending
    - deflatePrime() for starting deflate output mid-byte -- for appending
    - Z_RLE strategy for run-length encoding -- option for PNG compression
    - gzclearerr() and gzungetc(), analogous to stdio functions
    - inflateCopy() added, analogous to deflateCopy()
    - deflateBound() and compressBound() for maximum size of compressed data
    - zlibCompileFlags() to provide compilation information
- More supported architectures and improved shared library support
- Many more FAQ entries
- Several new and updated contributions in the contrib directory

You can also look at the complete Change Log.

Versions 1.1.4 and later eliminate an earlier potential security vulnerability, see details here. Any software that is linked against or derived from an earlier version of zlib should be upgraded immediately. A partial list of over 500 applications using zlib is given here (uncompressed).

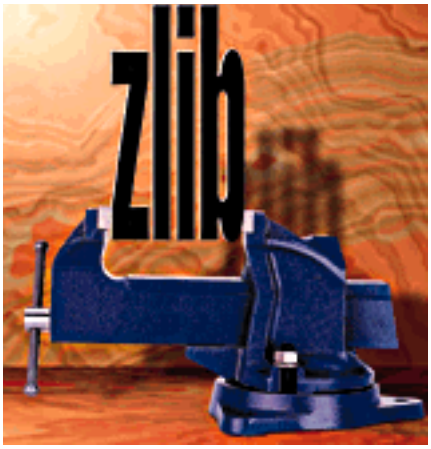
Canonical URL: **http://zlib.net/** (US)

Mirror sites:

- http://www.gzip.org/zlib/

---

zlib is designed to be a free, general-purpose, legally unencumbered -- that



is, not covered by any patents -- lossless data-compression library for use on virtually any computer hardware and operating system. The zlib data format is itself portable across platforms. Unlike the LZW compression method used in Unix *compress*(1) and in the GIF image format, the compression method currently used in zlib essentially never expands the data. (LZW can double or triple the file size in extreme cases.) zlib's memory footprint is also independent of the input data and can be reduced, if necessary, at some cost in compression. A more precise, technical discussion of both points is available on another page.

zlib was written by Jean-loup Gailly (compression) and Mark Adler (decompression). Jean-loup is also the primary author/maintainer of *gzip*(1), the author of the comp.compression FAQ list and the former maintainer of Info-ZIP's Zip; Mark is also the author of gzip's and UnZip's main decompression routines and was the original author of Zip. Not surprisingly, the compression algorithm used in zlib is essentially the same as that in gzip and Zip, namely, the `deflate' method that originated in PKWARE's PKZIP 2.x.

Mark and Jean-loup can be reached by e-mail at zlib@gzip.org. Please read the **FAQ** and the **manual** before asking us for help. We are getting too many questions which already have an answer in the *zlib* documentation.

Greg, Mark and/or Jean-loup will add some more stuff here when they think of something to add. For now this page is mainly a pointer to zlib itself and to the official zlib and deflate documentation. Note that the specifications both achieved official Internet RFC status in May 1996, and zlib itself was adopted in version 1.1 of the Java Development Kit (JDK), both as a raw class and as a component of the JAR archive format.

The lovely zlib-vise image above was provided courtesy of Bruce Gardner, art director of Dr. Dobb's Journal. It appears in Mark Nelson's article in the January 1997 issue (see below).

The current release is publicly available here:

- **zlib** source code, version 1.2.3, tar.gz format (485K, MD5 checksum debc62758716a169df9f62e6ab2bc634):
  - US (www.zlib.net)
  - France (www.gzip.org)
  - Pick a mirror (prdownloads.sourceforge.net)

- **zlib** source code, version 1.2.3, tar.bz2 format (415K, MD5 checksum dee233bf288ee795ac96a98cc2e369b6):
  - US (www.zlib.net)
  - France (www.gzip.org)
  - Pick a mirror (prdownloads.sourceforge.net)
- **zlib** source code, version 1.2.3, zipfile format (570K, MD5 checksum abbd0f2b456206da5e3ffd179324413a):
  - US (www.zlib.net)
  - France (www.gzip.org)
  - Pick a mirror (prdownloads.sourceforge.net)
- **zlib** compiled DLL, version 1.2.3, zipfile format (79K, MD5 checksum cc7fa97f9c19386bb701acc79d0abbca):
  - US (www.zlib.net)
  - France (www.gzip.org)
  - Pick a mirror (prdownloads.sourceforge.net)

NOTE: zlib does not currently support window sizes of 256 bytes (windowBits == 8). A 512-byte window is the smallest the encoder can use. (Most applications use the default 32,768-byte window size for best compression.)

Note that zlib is an integral part of libpng and has been tested extensively as part of many PNG-supporting applications.

---

zlib Information

- **zlib Frequently Asked Questions**
- Zlib-announce mailing list

  New versions of zlib are announced on this list.
- Zlib-devel mailing list

  Please do not send questions or comments about zlib to this mailing list. Send those directly to the authors at zlib@gzip.org after checking the FAQ and the manual, of course. The zlib-devel list is for the development of zlib—members are contributors to and testers of new versions of zlib.
- zlib Manual
- zlib Usage Example

- zlib Technical Details
- zlib-Related Specifications
- zlib's Deflate Algorithm
- zlib License

Related External Links

- unofficial (contributed) patches and binaries (not tested by zlib team)
- zlib for Linux, both shared and static plus headers (RPM format, many architectures)
- zlib for HP-UX 10.20 and 11.00 (shared library and headers)
  (alternatively here: HP-UX 10.20 and HP-UX 11.00)
- zlib for SGI Irix 6.x (shared library and headers)
- zlib for Solaris
- zlib for Solaris (alternate)
- zlib for Digital Unix 4.0
- zlib for SCO Open Server 5.0
- zlib for BeOS R5
- zlib for Mac OS X: zlib is already included as part of Mac OS X
- zlib for Mac OS
- zlib for OS/2 (DLL and static version for emx 0.9c, 46k)
  (click here if link breaks)
- zlib for Palm Pilot
- zlib for Newton OS
- zlib for Windows CE
- zlib for RIM BlackBerry
- zlib for Windows 9x/NT/2000/XP/2003 (DLL version, plus related utilities)
- zlib for Windows 9x/NT (DLL and static version)
- zlib for .NET
- Mark Nelson's ZlibTool article and Win32 source code for Dr. Dobb's Journal (January 1997)
- zlib C++ wrapper for the `gz*` functions.
- C++ zlib and gzip filters in an iostream framework.
- zlib 32-bit OCX and 16-bit DLL (Visual Basic interface, source code and binaries, 84k)
- zlib 32-bit OCX (C++ source and binaries for use with Visual Basic 4.x or Delphi 2.0)
  (unsupported VB5 binary also available)
- zlib Pascal port (Pascal source, tested with Turbo Pascal 7.0 and Delphi 3.02)
  (not tested by us, but looks complete and well-maintained)
- zlib Delphi 5 interface

(includes compiled object files and corresponding C++ Builder 5 project files)

- zlib Perl interface (source code; look for Compress-Zlib*.tar.gz)
- zlib Python interface (online manual; part of the standard library as of Python 1.5)
- zlib Tcl interface mkZiplib
- zlib Java interface (see also JAR format)
- zlib reimplementation in pure Java

  (not tested by us, but looks like a good alternative to java.util.zip)
- Mark Nelson's JavaZip article (with source code) for Dr. Dobb's Journal (December 1997)
- Gilles Vollant's zlib-based mini-zip and mini-unzip

  (see also Info-ZIP's UnZip, which optionally can be compiled with zlib)
- Scott Ludwig's zlib-based CExe executable compressor for Win32
- zlib technical issues, including spec errors
- zlib information in Japanese
- zlib information in Russian
- *Real World Scanning and Halftones* (second edition includes a section on zlib)
- Markus Oberhumer's LZO `real-time' data compression library

  (not tested by us, but looks like a good alternative if you need more speed and less compression)
- libbzip2

  (not tested by us, but looks like a good alternative if you need more compression and less speed)
- PPP Deflate Protocol (RFC 1979)
- Info-ZIP Home Page
- Portable Network Graphics (PNG) Home Page
- *gzip* Home Page
- DataCompression.info
- comp.compression Frequently Asked Questions list

---

*Send comments or questions about **zlib** to the authors at zlib@gzip.org after checking **FAQ** and **manual**.*

*Please report broken links to madler@alumni.caltech.edu (PGP key). Last updated **June 28th, 2006**.*

Mirror site hosted by **France Teaser**.
zlib.org domain name donated by Andrew Green.

libmng - The MNG reference library & related info

libmng 1.0.9 released | CCRC.WUSTL down and subsequent new Mailing lists

- General
  - Introduction
  - Background info
  - Windows32© corner
  - Message to webmasters
  - Developers corner
  - Code samples
  - How to contact
  - Testimonials
- News
  - 2005
  - 2004
  - 2003
  - 2002
  - 2001
  - 2000
- Links
  - People
  - Japanese resources
  - Related
  - Misc. Applications
  - GIF free! websites
  - Japanese translation services
- Downloads
  - 1) libmng public release
  - 2) libmng (misc)
  - Applications
  - Browsers
  - Libraries & Components
  - Plugins & ActiveX
  - Ports & Packages
- FAQ
  - libmng
  - Dynamic MNG
  - Windows(r)
  - TNGImage (Delphi)
- Test-suites
  - MNG (Multiple-image Network Graphics)
  - JNG (JPEG Network Graphics)

PNG Source Code

For those of you who like to go the do-it-yourself route, here are the tools to make your PNG code go (some of which may also be provided with ready-to-go executables). Some of the code, particularly by members of the PNG Development Group, is still kept up to date at the primary Simple Systems ftp site or its UK mirror, but for most things check the appropriate PNG Applications pages for current links. (This page was previously called *Code from the PNG Development Group* and later *PNG Source Code and Libraries*. Now it is simply a list of applications, libraries and toolkits that include source code, with more complete descriptions on the relevant PNG applications pages. The two main PNG-related libraries, **libpng** and **zlib**, are linked directly and are still maintained by members of the PNG Group, though.)

Latest releases:

libpng 1.2.12 [license]
zlib 1.2.3 [Y2K] [license]

Libraries and Toolkits

The following programming libraries, toolkits, DLLs and Java classes all include source code and are listed on the toolkits page. Operating-system support is listed in (*parenthesized italics*), and toolkits that do not derive their PNG support from another listed library (typically libpng)--although they may or may not require zlib--are so noted. (See also **Quat** in the 3D section for another independent, zlib-based, C implementation of a PNG codec.)

- **AxPoint** (*Perl*) - XML-based PDF presentation tool
- **7-Zip** (*many*) - C++ deflate implementation
- **BMGLib** (*Win32*)
- **CamlImages** (*Caml*)
- **Carnegie Mellon Graphics** (*Win32, Mac OS, Mac OS X, Unix*)
- **Ch PNG** ( )
- **CImage** (*Win32*)
- **ClanLib** (*Linux, Win32, BeOS*)
- **Closure** (*Unix/X*) - independent Common Lisp source code

- **CL-PNG** (*many*) - independent Common Lisp source code
- **cl-zlib** (*Linux, Win32*)
- **CMacPNG** (*Mac PPC*) - C++ PNG class
- **Crystal Space** (*many*) - 3D game engine
- **CscHTML** (*Unix/GTK+*) - HTML widget for GTK+
- **CWebImageDC** (*Win32*)
- **CxImage** (*Win32*) - C++ multi-format image class
- **DirectFB** ( )
- **FreeImage** (*Win32, Linux/Qt, Mac OS X*)
- **FXPy** (*many*)
- **gd** (*many*)
- **GDFP** (*many*)
- **gdk-pixbuf** (*Unix/GTK*)
- **GD.pm** (*Perl*)
- **glpng** (*many*)
- **GraphApp** (*Unix/X, Win32*)
- **GraphicEx** (*Win32*) - independent Pascal source code
- **GraphiX/FP** (*DOS, Win32, Linux/SVGA*) - independent Pascal source code
- **GtkHTML** (*Unix/GTK+*) - HTML 4.0 widget for GTK+
- **Ilib** (*many*)
- **ImageFileLib** ( )
- **Image Library** (*many*) - independent C++ source code
- **ImageMagick** (*many*)
- **Imager** (*Perl*)
- **Img** (*Unix/X, Win32*)
- **Imlib** (*Unix/X, Unix/GTK*)
- **Io** (*Unix/X, Win32, Mac OS X*) - OO programming language
- **Java Image Content Handlers** (*Java*)
- **JIU / Java Imaging Utilities** ( )
- **Jun for Java** (*Java*) - 3D graphic/multimedia-application framework
- **lcms** (*Win32, Linux*) - color-management system
- **libAfterImage** (*Unix/X*)
- **libferris** (*Unix/X*)
- **libgraph** (*many*)
- **libmng** (*Unix, Win32*) - independent C source code
- **libplot** (*many*)
- **libpng** (*many*) - independent C source code
- **libpr0n** (*many*)
- **MNG Translator** (*BeOS*) - OS extension for MNG/JNG/PNG images
- **MST Image** (*many*)
- **Panda** (*Unix, Win32, etc.*)
- **PHP** (*Unix, Win32*)
- **PLplot** (*Unix*)

- **PNG DataType (#4)** (*Amiga*)
- **PNG Delphi / TPNGImage** (*Win32*) - independent Pascal source code
- **PNGDIB** (*Win32*)
- **PngEncoder** (*Java*) - independent Java source code
- **PNGgraph.pm (1)** (*Perl*)
- **PNGgraph.pm (2)** (*Perl*)
- **PNGImageProducer** (*Java*) - independent Java source code
- **PNG_IO** (*many*) - independent Ada 95 source code
- **Pnglets** (*JavaScript*) - independent JavaScript source code
- **PNGLIB** (*Win32*)
- **PNGlib** (*Win32*) - independent Visual Basic source code
- **PngUnit** (*Win32*)
- **PNGwriter** (*any*) - C++ class for plotting and graphing
- **Pygame** (*Win32, Mac OS, Mac OS X, BeOS, Unix*)
- **Qt** (*Unix/X, Win32, BeOS*) - GUI toolkit
- **RbPNGLib** (*Mac PPC*) - C++ PNG plug-in for REALbasic
- **Sixlegs Java PNG** (*Java*) - independent Java source code
- **Squeak** (*many*) - independent(?) Smalltalk-80 source code
- **TNGImage** (*Win32*)
- **wimg** (*Win32*)
- **wv** (*Unix, Win32, Amiga, VMS, OS/2*)
- **wxWindows** (*many*) - C++ GUI toolkit
- **XmHTML** (*Unix/X*) - HTML 3.2 widget for Motif
- **zlib** (*many*) - primary deflate/zlib implementation

Browsers

The following web browsers all include source code and are listed on the browsers page. Operating-system support is listed in (*parenthesized italics*):

- **Amaya** (*Unix/X, Win32*)
- **AMosaic** (*Amiga*)
- **Arena** (*Unix/X*)
- **AWeb** (*Amiga*)
- **BrowseX** (*Unix/X, Win32*)
- **Chimera** (*Unix/X*)
- **Closure** (*Unix/X*)
- **CSCMail** (*Unix/GTK+*)
- **Dillo** (*Unix/GTK+*)
- **Encompass** (*Unix/GNOME*)
- **Epiphany** (*Unix/GNOME*)

- **Galeon** (*Unix/GNOME*)
- **Grail** (*Unix/X, Win32, Mac OS*)
- **Kazehakase** ( )
- **K-Meleon** (*Win32*)
- **Konqueror** (*Unix/KDE*)
- **Links** ( )
- **mMosaic** (*Unix/X*)
- **Mozilla** (*Unix/X, Win32, Mac PPC, OS/2, BeOS, RISC OS*)
- **NCSA MacMosaic** (*Mac OS*)
- **NCSA X Mosaic** (*Unix/X*)
- **NetSurf** ( )
- **Safari** (*Mac OS X*)
- **ViewML** (*Linux/X, Linux/MicroWindows*)
- **X-Smiles** (*Java*)
- **Zen** (*Linux/fbcon, Linux/GTK+*)

Viewers

The following image viewers all include source code and are listed on the viewers page. Operating-system support is listed in (*parenthesized italics*):

- **Axv** (*Unix/GTK+*)
- **BePNG** (*BeOS*)
- **Electric Eyes** (*Linux/GNOME*)
- **Eye of Gnome** (*Unix/GNOME*)
- **GQview** (*Unix/GTK+*)
- **GTK See** ( )
- **ImageJ** (*Java*)
- **ImageMagick display** (*Unix/X, VMS/X, Win32*)
- **IV / ImgView / Image Viewer** (*Unix/GTK+*)
- **JImageView** (*Java*)
- **Jsee** (*Java*)
- **KSquirrel** ( )
- **paul** (*Unix/GTK+*)
- **pho** (*Unix/GTK+*)
- **PikView** (*Unix/KDE*)
- **PixiePlus** (*Unix/KDE3*)
- **PNGDIB viewer** (*Win32*)
- **PngUnit** (*Win32*)
- **PNGView** (*Win32*)
- **Quick Image Viewer / qiv** (*Unix/GTK+*)

- **RO-Viewer** (*Win32*)
- **rpng / rpng2** (*Unix/X, VMS/X, Win32*)
- **ShowImg** (*Unix/KDE2*)
- **SVG Viewer** (*Java*)
- **tnailer** (*Perl*)
- **ToyViewer** (*Mac OS X, NeXTStep/OpenStep*)
- **view** (*FreeBSD/VGL*)
- **ViewDT** (*Amiga*) - front end only; requires binary datatype
- **VisualPng** (*Win32*)
- **wb0** (*Linux/SVGA*)
- **wxyzv** (*Unix/X*)
- **xli** (*Unix/X*)
- **XV** (*Unix, VMS*)
- **Xzgv** (*Linux/GTK+*)
- **ZBoxZ** (*Palm OS*)
- **Zgv** (*Linux/SVGA*)

Image Editors

The following image editors all include source code and are listed on the editors page. Operating-system support is listed in (*parenthesized italics*):

- **D-Pixed PNG add-in** (*Win32*)
- **Gill** (*Unix/GTK+*)
- **The GIMP** (*Unix/GTK+, Win32, OS/2*)
- **GNOME-Iconedit** (*Unix/GTK+*)
- **Inkscape** (*Unix/GTK+, Win32/GTK+*)
- **ivtools** (*Unix/X, Win32*)
- **Karbon14** ( )
- **Kontour** (*Unix/KDE*)
- **Krita** (*Unix/KDE*) - formerly known as **KImageShop** and **Krayon**
- **mvComicsMaker** (*Linux/Qt*)
- **Paint.Net** ( )
- **Sketch** (*Unix/X*)
- **Sodipodi** (*Unix/GTK+, Win32/GTK+*)
- **TuxPaint** (*Linux/SDL, Win32/SDL, etc.*)
- **xart** (*Unix/X*)
- **xfig** (*Unix/X*)
- **XPaint** (*Unix/X*)

Converters

The following image converters all include source code and are listed on the converters page. Operating-system support is listed in (*parenthesized italics*):

- **AdvanceCOMP** (*DOS, Win32, Linux*) - recompresses PNG and MNG images
- **A Mort les GIFs** (*Java*) - converts GIF to PNG and MNG
- **any2png** (*Unix, Win32/Cygwin*) - converts various formats to PNG
- **bmp2png / png2bmp** (*DOS, Win32*) - converts between PNG and Windows BMP
- **dvipng** (*Unix, Win32, etc.*) - converts TeX DVI format to PNG
- **dvips** (*Unix, Win32, etc.*) - converts TeX DVI format to PostScript
- **ecg2png** (*Unix/Qt*) - converts electrocardiogram scans to PNG
- **eps2png** (*Perl*) - converts encapsulated PostScript to PNG
- **FOP** (*Java*) - converts XML+XSL to PDF, SVG, PostScript, etc.
- **Ghostscript** (*many*) - converts PostScript to various formats
- **gif2png** (*many*) - converts GIF to PNG
- **hp2xx** (*many*) - converts HPGL to PNG
- **ImageJ** (*Java*) - converts various formats to various other formats
- **ImageMagick convert** (*many*) - converts various formats to various other formats
- **imc** (*Unix*) - converts text commands to PNG
- **img2pdf** (*many*) - converts PNG, TIFF, JPEG images to PDF
- **img2png** (*Atari*) - converts Atari IMG to PNG
- **mag2png** ( ) -
- **OptiPNG** (*Unix, Win32*) - shrinks (optimizes) PNGs losslessly
- **pdf2html** (*Unix*) - converts PDF to PNG (and HTML)
- **pdftex / pdflatex** (*Unix, Mac OS X, Win32*) - TeX-to-PDF converter
- **pdftohtml** (*Unix*) - PDF-to-HTML converter
- **pho** (*Unix/GTK+*) - converts and rotates various formats
- **PixiePlus** (*Unix/KDE3*) - converts various formats to various other formats
- **png2ansi** (*DOS, Unix, etc.*) - converts PNG to ASCII text with ANSI control codes
- **png2html** (*many*) - converts PNG to (really big) HTML
- **png2html.php** (*PHP4*) - converts PNG to (really big) HTML
- **png2ico** (*many*) - converts PNG to Windows ICO
- **png2jpg** (*Unix*) - HTTP proxy to convert PNG to JPEG
- **png2linuxlogo** (*many*) - converts PNG to linux_logo.h
- **png2txt** (*many*) - converts PNG to 80-column ASCII text
- **pngcrush** (*many*) - shrinks PNGs losslessly by optimizing the filtering and compression strategies
- **pngmeta** (*many*) - converts PNG text annotations to HTML, XML, etc.
- **pngnq** (*many*) - shrinks PNGs by quantizing/dithering 32-bit RGBA to 8-bit RGBA-palette (NeuQuant algorithm)

- **PNG Pooper** (*BeOS*) - converts various formats to PNG using the Translation Kit
- **pngquant** (*many*) - shrinks PNGs by quantizing/dithering 32-bit RGBA to 8-bit RGBA-palette (median-cut algorithm)
- **pngrewrite** (*many*) - shrinks PNGs by reducing unnecessarily large palettes and bit depths
- **pngslice** (*many*) - slices PNG into several and truncates right (or left) sides
- **pngsplit** (*many*) - breaks PNG, MNG or JNG into constituent chunks
- **png-tEXt.pl** (*Perl*) - adds text chunks to PNG images
- **pngtoico** (*many*) - converts PNG to Windows ICO
- **pngtools** ( ) -
- **PngUnit** (*Win32*) - converts Windows BMP to PNG
- **pnmtopng** (*many*) - converts PBM/PGM/PPM to and from PNG
- **pstoedit** (*Unix, OS/2, Win32*) - converts PostScript and PDF to PNG and other things
- **pstopng** (*many*) - converts PostScript to PNG
- **pstopngtops** (*many*) - converts PostScript to PNG to bitmapped Encapsulated PostScript
- **ptot** (*many*) - converts PNG to TIFF
- **scr2png** (*FreeBSD*) - converts FreeBSD screenshots to PNG
- **ShowImg** (*Unix/KDE2*) - converts various formats to various other formats
- **SNG** (*many*) - converts PNG to and from editable text
- **svg2png** (*Unix/GTK+*) - converts SVG to PNG
- **tiff2png** (*many*) - converts TIFF to PNG
- **tnailer** (*Perl*) - converts PNGs and JPEGs to thumbnails and other sizes
- **ToyViewer** (*Mac OS X, NeXTStep/OpenStep*) - converts various formats to various other formats
- **TweakPNG** (*Win32*) - lists and modifies PNGs
- **wbmptopng** (*many*) - converts WAP bitmaps to grayscale PNG
- **wmftopng** (*many*) - converts WMF to PNG
- **wpng** (*many*) - converts PGM/PPM to PNG
- **Xenomorph** (*Unix/Qt3*) - filters PNG, MNG or JPEG images; writes PNG
- **xPNG / fixPNG** (*DOS*) - modifies PNGs
- **XV** (*Unix, VMS*) - converts various formats to various other formats

---

3D and VRML

The following 3D applications all include source code and are listed on the 3D apps page. The VRML browsers are also listed on the VRML browsers page. Operating-system support is listed in (*parenthesized italics*):

- **Blender** ( ) -
- **Cn3D** (*Win32, Unix/X, Mac OS*) - 3D molecular structure viewer
- **Contact** (*Win32*) - VRML browser
- **Crystal Space** (*many*) - 3D game engine

- **Flounder** (*Unix/X*) - 4D data-visualization program
- **FreeWRL** (*Perl*) - VRML browser with HMD support
- **Gforge** (*Unix, DOS*) - fractal terrain generator
- **HF-Lab** (*Unix, DOS*) - fractal height-field generator
- **Jun for Java** (*Java*) - 3D graphic/multimedia-application framework
- **Mathematica PNGBitmap** (*Unix/X, Win32, Mac OS*) - texture-import/file-export add-on
- **Moonlight|3D** ( ) -
- **OpenVRML / Lookat** (*Unix/X, Win32*) - VRML library and browser
- **POV-Ray** (*many*) - ray-tracer (photorealistic renderer)
- **Q3BSP** (*Win32*) - Quake 3 to VRML converter
- **Quat** (*Unix/FLTK, Win32/FLTK*) - 3D quaternion fractal generator
- **Tachyon** (*many*) - parallel/multiprocessor ray-tracer library
- **white_dune** (*Unix/Motif*) - VRML editor and animation tool

---

Games and Entertainment

The following games and entertainment applications all include source code and are listed on the games / entertainment page. Operating-system support is listed in (*parenthesized italics*):

- **AdvanceMAME** (*DOS, Win32/SDL, Linux/SDL*) - arcade emulator
- **AdvanceMENU** (*DOS, Win32/SDL, Linux/SDL*) - front end / game launcher for arcade emulators
- **ampsig** ( )
- **Circus Linux** (*Linux/X*) - arcade game
- **EasySok** (*Unix/KDE3*) - Sokoban game (recording capability)
- **GF1** (*Linux, Win32*) - solitaire strategy game
- **gfract** (*Unix/GTK+*) - fractal generator
- **Glito** (*Unix/X, Win32*) - IFS (fractal) explorer
- **GLtron** (*Linux/X, Win32, Mac OS, Mac OS X*) - TRON lightcycle game
- **Glulxe** (*Win32, Mac?*) - interpreter for interactive fiction (e.g., Zork)
- **GNU Backgammon** (*Unix/GTK+, Win32*) - backgammon game
- **Hyperplay** (*Unix/GTK+, Win32, OS/2*) - engine for interactive fiction (e.g., Zork)
- **JavaBrot** (*Java/Win32, Java/Linux, etc.*) - fractal generator
- **mapdraw** (*many*) - renders *Wolfenstein 3D* game maps in text or PNG format
- **nwrk-matrix** (*many*) - displays dropping-characters effect from *The Matrix*
- **PilotGOne** (*Palm OS*) - Go game, recorder/playback utility
- **Pueblo/UE** ( )
- **Pygame** (*many*) - Python- and SDL-based multimedia library/toolkit
- **Quat** (*Unix/FLTK, Win32/FLTK*) - 3D quaternion fractal generator
- **Sphere** (*Win32*) - tile-based, role-playing game (RPG) engine

- **Stereograph** (*Linux*) - stereogram generator
- **Stratagus** (*Linux, Win32, BSD, BeOS, Mac OS X*) - cell-based strategy-game engine
- **TADS** (*Win32*) - development system for interactive fiction
- **TADSMap** (*many*) - mapping add-on for interactive fiction
- **XaoS** (*many*) - fractal generator/zoomer

Office / Business

The following office and productivity applications all include source code and are listed on the office / business apps page. Operating-system support is listed in (*parenthesized italics*):

- **AbiWord** (*Win32, Unix/X, BeOS*) - word processor
- **Anyware / Applixware Office** ( ) -
- **AxPoint** (*Perl*) - XML-based PDF presentation tool
- **Balsa** ( ) -
- **Evolution** ( ) -
- **GanttProject** (*Java*) - project-planning/Gantt-chart tool
- **ImPress** (*Win32, Unix/X*) - page-layout app
- **KOffice** (*Unix/KDE*) - office suite
- **MagicPoint** (*Unix/X*) - text-based presentation app
- **Nautilus** (*Unix/GTK+*) - file manager and graphical shell
- **OpenOffice.org** (*Unix/X, Mac OS X, Win32*) - office suite
- **ROX-Filer** (*Unix/GTK*) - file manager
- **Ted** (*Unix/X*) - text editor/word processor

Scientific / Graphing

The following scientific, technical and graphing applications all include source code and are listed on the scientific / graphing apps page. Operating-system support is listed in (*parenthesized italics*):

- **CellProfiler** (*Win32, Mac OS X, MatLab*) - image analysis of biological cells
- **Cn3D** (*Win32, Unix/X, Mac OS*) - 3D molecular structure viewer
- **DNA-CGR** (*Linux/SVGA*) - DNA/RNA-sequence visualization tool
- **DTM / Digital Terrain Mapping** (*Win32*) - digital elevation map viewer
- **Flounder** (*Unix/X*) - 4D data-visualization program
- **g3data** (*Unix/GTK+*) - utility to automate extraction of data values from graphs

- **gerbv / Gerber Viewer** (*Unix/GTK+*) - CAD viewer for printed circuit board layouts
- **Gmsh** ( ) -
- **gnuplot** (*many*) - plotting and graphing program
- **Grace** (*Unix/Motif, OS/2, VMS, Win32*) - 2D graphing program
- **GrADS** (*Unix/X*) - 4D data analysis and visualization tool
- **GraphViz** (*Unix, Win32, Mac OS X*) - suite of 2D graph-visualization tools
- **GRASS** (*Unix/X, Win32/Cygwin*) - Geographic Information System
- **KMatplot** (*Unix/KDE*) - WYSIWYG plotting and graphing program
- **kst** (*Unix/KDE*) - data plotting and graphing program
- **Mathematica PNGBitmap** (*Unix/X, Win32, Mac OS*) - texture-import/file-export add-on
- **mathmlrender** (*Unix/GTK+*) - MathML renderer for PHP4
- **MRTG / Multi Router Traffic Grapher** (*Unix, Win32*) - network-stats graphing utility
- **myPACS** (*Unix/CGI*) - web-based medical image-management system
- **PHPLOT** (*Unix/PHP*) - plotting and graphing program
- **Ploticus** (*Unix/X*) - plotting and charting program
- **plotutils** (*many*) - vector-based plotting and conversion tools, ODE solver, etc.
- **PLplot** (*Unix*)
- **PNGwriter** (*any*) - C++ class for plotting and graphing
- **PyChart** ( ) -
- **R** (*Unix/X, Win32*) - statistical computing and graphing language
- **RRDtool** ( ) -
- **Webalizer** (*Unix, Mac PPC, OS/2, Win32*) - web-stats analysis and graphing utility
- **zimg** (*Unix, OS/2, etc.*) - false-color 2D plotting program

---

Miscellaneous

The following miscellaneous applications all include source code and are listed on the miscellaneous apps page. Operating-system support is listed in (*parenthesized italics*):

- **addtRNS.cgi** (*Perl*) - transparency-adding CGI script
- **Apache Toolbox** (*Unix*) - automated build tool for Apache web server
- **Berlin Project** (*Linux/GGI*) - advanced windowing system
- **Catalog** (*Perl*) - hierarchical-catalog maintenance system
- **CopyRightLeft** (*Win32*) - utility to add copyright string to pixel data
- **cyclo.cgi** (*Perl*) - PNG-to-animated-MNG CGI script
- **Digital Image Recovery** (*Win32*) - file-recovery tool for digital photos on flash cards
- **DIRT** (*Unix/X*) - web server with on-the-fly image creation
- **Image::Dot** ( ) -
- **Doxygen** (*Unix, Win32*) - multi-language documentation system
- **Drive Rescue** (*Win32*) - file-recovery tool for FAT and NTFS hard drives
- **Eterm** (*Unix/GTK+*) - VT102 terminal emulator

- **FBShot** (*Linux/fbcon*) - screen-capture utility
- **file** (*many*) - file-type identifier
- **FileSnoop** (*Win32*) - file-dumping and sniffing utility
- **Freevo** (*Linux/X*) - PVR/DVR (TiVo-like) application
- **FXTV** (*BSD/X*) - TV-in-a-window application
- **GMask** (*Win32*) - "masking tiles" remover
- **gnubiff** ( ) -
- **IDS** (*Perl*) - CGI script to create photo galleries
- **imghide** (*many*) - steganographic utility
- **Itsbit** ( ) -
- **move.cgi** (*Perl*) - PNG-to-scrolling-MNG CGI script
- **PHPoll** (*PHP*) - web-voting utility
- **pngcheck** (*many*) - PNG tester/dumper
- **PNGstat** (*Perl*) - PNG info-dumper
- **pngtester.cgi** (*Perl*) - PNG/JNG/MNG-testing CGI script
- **Remind** (*Unix*) - reminder and calendar-generating program
- **sanecgi** (*Unix/Perl*) - Web interface to scanners
- **scroll.cgi** (*Perl*) - PNG-to-scrolling-MNG CGI script
- **txtcut.cgi** (*Perl*) - text-chunk-stripping CGI script
- **USFlag** (*Win32, Unix*) - utility to create scaled US flags
- **vgrabbj** (*Linux*) - USB video-capture utility
- **VideoteXt** (*Unix/X*) - videotext decoder
- **w3cam** (*Linux*) - video-capture utility with Web interface
- **WumPNG / Dumping** (*DOS*) - PNG tester/dumper
- **WWWis** (*Perl*) - HTML IMG-sizer script
- **XEmacs** (*Unix/X*) - editor / kitchen sink
- **xine** (*Unix/X, Win32, OS/2*) - movie player (DVD, VCD, QuickTime, ...)
- **XVidCap** (*Unix/X*) - screen-capture utility

MNG

The following MNG-supporting applications all include source code and are listed on the MNG apps pages. Operating-system support is listed in (*parenthesized italics*):

- **AdvanceCOMP** (*DOS, Win32, Linux*) - recompresses PNG and MNG images
- **AdvanceMAME** (*DOS, Win32/SDL, Linux/SDL*) - arcade emulator
- **AdvanceMENU** (*DOS, Win32/SDL, Linux/SDL*) - front end / game launcher for arcade emulator
- **A Mort les GIFs** (*Java*) - converts GIF to PNG and MNG
- **blinkentools** (*Win32, Mac OS X, Unix*) - text-to-MNG converter
- **bootsplash** ( ) -
- **Crystal Space** (*many*) - 3D game engine

- **CxImage** (*Win32*) - C++ multi-format image class
- **cyclo.cgi** (*Perl*) - PNG-to-animated-MNG CGI script
- **EasySok** (*Unix/KDE3*) - Sokoban game (recording capability)
- **FileSnoop** (*Win32*) - file-dumping and sniffing utility
- **FreeImage** (*Win32*) - image toolkit
- **The GIMP** (*Unix/GTK+, Win32, OS/2*) - image/animation editor
- **Glito** (*Unix/X, Win32*) - IFS (fractal) explorer
- **ImageFileLib** ( ) -
- **ImageMagick** (*many*) - MNG viewer/converter
- **Konqueror** (*Unix/KDE*) - web browser
- **KSquirrel** ( ) -
- **lcms** (*Unix, Win32, etc.*) - color management system
- **libmng** (*Unix, Win32*) - MNG reference library (in C)
- **libpr0n** (*many*) - Mozilla image-rendering library (in C++)
- **MagicPoint** (*Unix/X*) - presentation app
- **MicroPlayer / µ-Player** (*Java*) - MNG viewer applet
- **MINGLIB** (*many*) - MNG library (in Pascal)
- **MNG4IE** (*Win32*) - MNG ActiveX control for Internet Explorer
- **mngcntr.cgi** ( ) -
- **MNG Compiler** (*Perl, Win32*) - text/PNG-to-MNG converter
- **MNGcount** (*Perl*) - web-page counter
- **MNGEdit** (*Win32*) - MNG animation editor
- **MNGeye** ( ) -
- **MNG-LC Player** (*Java*) - MNG viewer
- **mngplay** (*Unix/X, Win32, BeOS, Mac OS*) - MNG viewer
- **MNGPLG** (*Win32*) - MNG plug-in for Netscape
- **MNG Plug-in** (*Linux/Qt*) - MNG plug-in for Netscape
- **MNG QuickTime Component** ( ) -
- **MNG Translator** (*BeOS*) - OS extension for MNG/JNG/PNG images
- **mngview** (*Win32*) - MNG viewer (in Pascal)
- **move.cgi** (*Perl*) - PNG-to-scrolling-MNG CGI script
- **Mozilla** (*Unix/X, Win32, Mac PPC, OS/2, BeOS, RISC OS*) - web browser
- **pngcheck** (*many*) - MNG dumper/tester
- **pngtester.cgi** (*Perl*) - PNG/JNG/MNG-testing CGI script
- **Pueblo/UE** ( ) -
- **Qt** (*Unix/X, Win32, BeOS*) - GUI toolkit
- **QuickTime MNG Component** (*Mac OS X, Mac OS, Win32*) - MNG plug-in to QuickTime framework
- **scroll.cgi** (*Perl*) - PNG-to-scrolling-MNG CGI script
- **ShowImg** (*Unix/KDE2*) - image viewer and converter
- **TADS** (*Win32*) - development system for interactive fiction
- **TNGImage** (*Win32*) - PNG/MNG/JNG Delphi (Pascal) component
- **x11rec** (*Unix/X*) - screen-capture utility

- **Xenomorph** (*Unix/Qt3*) - filters PNG, MNG or JPEG images; writes PNG
- **XVidCap** (*Unix/X*) - screen-capture utility

Here are some related PNG pages at this site:

- PNG-supporting Applications
  - Browsers
  - Image Viewers
  - Image Editors
  - Image Converters
  - 3D Applications
  - Games / Entertainment
  - Office / Business Applications
  - Scientific / Graphing Applications
  - Miscellaneous Applications
- PNG support in VRML browsers
- PNG-supporting Hardware
- PNG Programming Information:
  - PNG-supporting Libraries and Toolkits
    - **libpng** home page
    - **zlib** home page
  - PNG Support in Mozilla

- PNG Home Page
- **Complete PNG Site Map**

Last modified 2 July 2006.

PNG Suite from Willem van Schaik

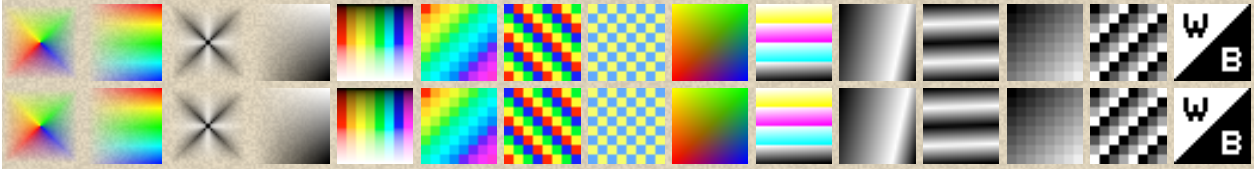
This is Willem van Schaik's suite of PNG icons for testing PNG decoder engines, PNG viewers, and PNG browsers. Most of the icons are 32x32, and they run the gamut from 1-bit to 64-bit depth; grayscale, colormapped and truecolor; interlaced or not; and with or without simple transparency, full transparency (alpha channel), background chunks, histograms, gamma or chromaticity data, comments, time stamps, and physical pixel dimensions. There are even three invalid PNG images included, one 0x0 in size and the other two corrupted by non-binary transfers.

Archives containing the full suite can be found in this directory; links to the actual files can be found on the miscellaneous-links PNG page.

> Note that all images are referenced with the standard HTML **IMG** tag, not **OBJECT** or Netscape's **EMBED**; that means this page will *not* display properly with any PNG plug-in due to bugs (er, that is, *limitations*) in Netscape's plug-in architecture.

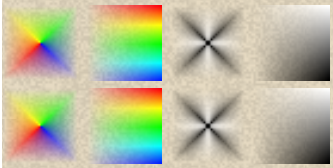
See also Willem's PNG Suite page (Netherlands) for a multi-page version of this page with GIF images for comparison. (Note that the gamma-correction PNG images will necessarily look somewhat different from the corresponding GIF images unless your display characteristics are similar to those of a NeXT.) Willem previously also had an older, separate set of pages (using **EMBED**) for testing Netscape and/or Internet Explorer PNG plug-ins.

Basic PNG image types, non-interlaced* and interlaced:

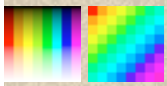


Alpha-channel images with and without background chunks:

The two rows should look identical in browsers that handle transparency correctly. In a normal image viewer (one with no preferred background, i.e., ***not*** a web browser), the top four icons should have backgrounds of yellow, white, gray and black, respectively; this will be visible on the left sides of all four images and around the periphery of the first and third icons (the two "X" images). The icons in the bottom row will generally default to a black background in *non*-browser image viewers.



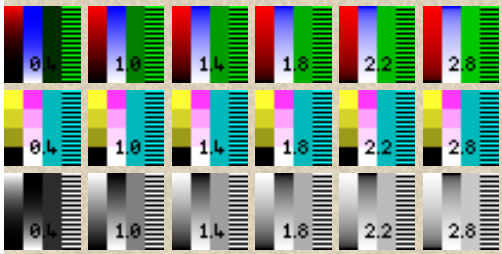
Histogram-chunk images:



Chromaticity-chunk images:

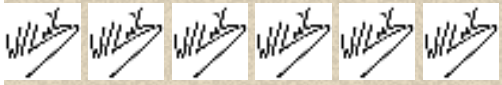
Images with different gamma chunks:

All six columns will look essentially identical (not counting the printed numbers) if your browser does gamma correction. Within each icon, the two rightmost bars (one solid color and one with alternating black and max-intensity horizontal lines) will appear to be approximately the same color, *assuming your browser's gamma correction is correct for your monitor*. If your browser just dumps the raw pixel data on screen, the icons to the left will have darker bars than those to the right.

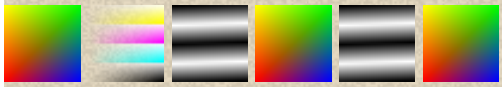


Images with different compression filters:

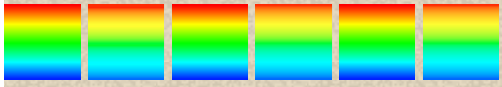
Images with comments or time stamps:



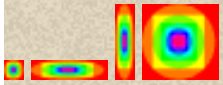
Images with ancillary (suggested) palettes:



Images with significant-bits chunks, both colormapped and truecolor:



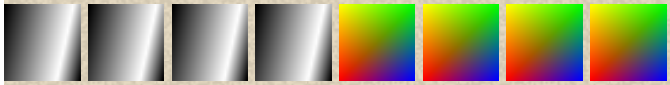
Images with non-square pixels and/or pixels with physical dimensions:



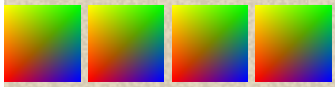
1x1 to 9x9 and 32x32 to 40x40 images, non-interlaced and interlaced:

Images with simple transparency and various background chunks:

Images with different numbers and sizes of IDAT chunks:



Images with different compression levels:



Invalid and/or corrupted PNG images:

Excerpt from PNG Suite Documentation

```
3.1     Basic format test files (non-interlaced)
------------------------------------------------

        basn0g01    -   black & white
        basn0g02    -   2 bit (4 level) grayscale
        basn0g04    -   4 bit (16 level) grayscale
        basn0g08    -   8 bit (256 level) grayscale
        basn0g16    -   16 bit (64k level) grayscale
        basn2c08    -   3x8 bits rgb color
```

basn2c16 - 3x16 bits rgb color
basn3p01 - 1 bit (2 color) paletted
basn3p02 - 2 bit (4 color) paletted
basn3p04 - 4 bit (16 color) paletted
basn3p08 - 8 bit (256 color) paletted
basn4a08 - 8 bit grayscale + 8 bit alpha-channel
basn4a16 - 16 bit grayscale + 16 bit alpha-channel
basn6a08 - 3x8 bits rgb color + 8 bit alpha-channel
basn6a16 - 3x16 bits rgb color + 16 bit alpha-channel

3.2 Basic format test files (Adam-7 interlaced)

basi0g01 - black & white
basi0g02 - 2 bit (4 level) grayscale
basi0g04 - 4 bit (16 level) grayscale
basi0g08 - 8 bit (256 level) grayscale
basi0g16 - 16 bit (64k level) grayscale
basi2c08 - 3x8 bits rgb color
basi2c16 - 3x16 bits rgb color
basi3p01 - 1 bit (2 color) paletted
basi3p02 - 2 bit (4 color) paletted
basi3p04 - 4 bit (16 color) paletted
basi3p08 - 8 bit (256 color) paletted
basi4a08 - 8 bit grayscale + 8 bit alpha-channel
basi4a16 - 16 bit grayscale + 16 bit alpha-channel
basi6a08 - 3x8 bits rgb color + 8 bit alpha-channel
basi6a16 - 3x16 bits rgb color + 16 bit alpha-channel

3.3 Size test files

s01n3p01 - 1x1 paletted file, no interlacing
s02n3p01 - 2x2 paletted file, no interlacing
s03n3p01 - 3x3 paletted file, no interlacing
s04n3p01 - 4x4 paletted file, no interlacing
s05n3p02 - 5x5 paletted file, no interlacing
s06n3p02 - 6x6 paletted file, no interlacing
s07n3p02 - 7x7 paletted file, no interlacing
s08n3p02 - 8x8 paletted file, no interlacing
s09n3p02 - 9x9 paletted file, no interlacing
s32n3p04 - 32x32 paletted file, no interlacing
s33n3p04 - 33x33 paletted file, no interlacing
s34n3p04 - 34x34 paletted file, no interlacing
s35n3p04 - 35x35 paletted file, no interlacing

```
        s36n3p04    -   36x36 paletted file, no interlacing
        s37n3p04    -   37x37 paletted file, no interlacing
        s38n3p04    -   38x38 paletted file, no interlacing
        s39n3p04    -   39x39 paletted file, no interlacing
        s40n3p04    -   40x40 paletted file, no interlacing

        s01i3p01    -   1x1 paletted file, interlaced
        s02i3p01    -   2x2 paletted file, interlaced
        s03i3p01    -   3x3 paletted file, interlaced
        s04i3p01    -   4x4 paletted file, interlaced
        s05i3p02    -   5x5 paletted file, interlaced
        s06i3p02    -   6x6 paletted file, interlaced
        s07i3p02    -   7x7 paletted file, interlaced
        s08i3p02    -   8x8 paletted file, interlaced
        s09i3p02    -   9x9 paletted file, interlaced
        s32i3p04    -   32x32 paletted file, interlaced
        s33i3p04    -   33x33 paletted file, interlaced
        s34i3p04    -   34x34 paletted file, interlaced
        s35i3p04    -   35x35 paletted file, interlaced
        s36i3p04    -   36x36 paletted file, interlaced
        s37i3p04    -   37x37 paletted file, interlaced
        s38i3p04    -   38x38 paletted file, interlaced
        s39i3p04    -   39x39 paletted file, interlaced
        s40i3p04    -   40x40 paletted file, interlaced



3.4     Alpha-channel (and background) test files
------------------------------------------------

        bgbn4a08    -   8 bit grayscale, alpha, black background chunk
        bggn4a16    -   16 bit grayscale, alpha, gray background chunk
        bgwn6a08    -   3x8 bits rgb color, alpha, white background chunk
        bgyn6a16    -   3x16 bits rgb color, alpha, yellow background chunk

        bgai4a08    -   8 bit grayscale, alpha, no background chunk
        bgai4a16    -   16 bit grayscale, alpha, no background chunk
        bgan6a08    -   3x8 bits rgb color, alpha, no background chunk
        bgan6a16    -   3x16 bits rgb color, alpha, no background chunk



3.5     Transparency (and background) test files
-----------------------------------------------

        tp0n1g08    -   not transparent for reference (logo on gray)
        tbbn1g04    -   transparent, black background chunk
        tbwn1g16    -   transparent, white background chunk
        tp0n2c08    -   not transparent for reference (logo on gray)
```

```
       tbrn2c08    -   transparent, red background chunk
       tbgn2c16    -   transparent, green background chunk
       tbbn2c16    -   transparent, blue background chunk
       tp0n3p08    -   not transparent for reference (logo on gray)
       tp1n3p08    -   transparent, but no background chunk
       tbbn3p08    -   transparent, black background chunk
       tbgn3p08    -   transparent, light-gray background chunk
       tbwn3p08    -   transparent, white background chunk
       tbyn3p08    -   transparent, yellow background chunk



3.6    Gamma test files
------------------------

       g03n0g16    -   grayscale, file-gamma = 0.35
       g04n0g16    -   grayscale, file-gamma = 0.45
       g05n0g16    -   grayscale, file-gamma = 0.55
       g07n0g16    -   grayscale, file-gamma = 0.70
       g10n0g16    -   grayscale, file-gamma = 1.00
       g25n0g16    -   grayscale, file-gamma = 2.50
       g03n2c08    -   color, file-gamma = 0.35
       g04n2c08    -   color, file-gamma = 0.45
       g05n2c08    -   color, file-gamma = 0.55
       g07n2c08    -   color, file-gamma = 0.70
       g10n2c08    -   color, file-gamma = 1.00
       g25n2c08    -   color, file-gamma = 2.50
       g03n3p04    -   paletted, file-gamma = 0.35
       g04n3p04    -   paletted, file-gamma = 0.45
       g05n3p04    -   paletted, file-gamma = 0.55
       g07n3p04    -   paletted, file-gamma = 0.70
       g10n3p04    -   paletted, file-gamma = 1.00
       g25n3p04    -   paletted, file-gamma = 2.50



3.7    Filtering test files
----------------------------

       f00n0g08    -   grayscale, no interlacing, filter-type 0
       f01n0g08    -   grayscale, no interlacing, filter-type 1
       f02n0g08    -   grayscale, no interlacing, filter-type 2
       f03n0g08    -   grayscale, no interlacing, filter-type 3
       f04n0g08    -   grayscale, no interlacing, filter-type 4
       f00n2c08    -   color, no interlacing, filter-type 0
       f01n2c08    -   color, no interlacing, filter-type 1
       f02n2c08    -   color, no interlacing, filter-type 2
       f03n2c08    -   color, no interlacing, filter-type 3
       f04n2c08    -   color, no interlacing, filter-type 4
```

3.8 Additional palette chunk test files

pp0n2c16	-	six-cube palette-chunk in true-color image
pp0n6a08	-	six-cube palette-chunk in true-color+alpha image
ps1n0g08	-	six-cube suggested palette (1 byte) in grayscale image
ps1n2c16	-	six-cube suggested palette (1 byte) in true-color image
ps2n0g08	-	six-cube suggested palette (2 bytes) in grayscale image
ps2n2c16	-	six-cube suggested palette (2 bytes) in true-color image

3.9 Ancillary chunks test files

cs5n2c08	-	color, 5 significant bits
cs8n2c08	-	color, 8 significant bits (reference)
cs3n2c16	-	color, 13 significant bits
cs3n3p08	-	paletted, 3 significant bits
cs5n3p08	-	paletted, 5 significant bits
cs8n3p08	-	paletted, 8 significant bits (reference)
cdfn2c08	-	physical pixel dimensions, 8x32 flat pixels
cdhn2c08	-	physical pixel dimensions, 32x8 high pixels
cdsn2c08	-	physical pixel dimensions, 8x8 square pixels
cdun2c08	-	physical pixel dimensions, 1000 pixels per 1 meter
ccwn2c08	-	chroma chunk w:0.3127,0.3290 r:0.64,0.33 g:0.30,0.60 b:0.15,0.06
ccwn3p08	-	chroma chunk w:0.3127,0.3290 r:0.64,0.33 g:0.30,0.60 b:0.15,0.06
ch1n3p04	-	histogram 15 colors
ch2n3p08	-	histogram 256 colors
cm7n0g04	-	modification time, 01-jan-1970 00:00:00
cm9n0g04	-	modification time, 31-dec-1999 23:59:59
cm0n0g04	-	modification time, 01-jan-2000 12:34:56
ct0n0g04	-	no textual data
ct1n0g04	-	with textual data
ctzn0g04	-	with compressed textual data

```
3.10    Chunk ordering
----------------------

        oi1n0g16    -   grayscale mother image with 1 idat-chunk
        oi2n0g16    -   grayscale image with 2 idat-chunks
        oi4n0g16    -   grayscale image with 4 unequal sized idat-chunks
        oi9n0g16    -   grayscale image with all idat-chunks length one
        oi1n2c16    -   color mother image with 1 idat-chunk
        oi2n2c16    -   color image with 2 idat-chunks
        oi4n2c16    -   color image with 4 unequal sized idat-chunks
        oi9n2c16    -   color image with all idat-chunks length one



3.11    Compression level
-------------------------

        z00n2c08    -   color, no interlacing, compression level 0 (none)
        z03n2c08    -   color, no interlacing, compression level 3
        z06n2c08    -   color, no interlacing, compression level 6 (default)
        z09n2c08    -   color, no interlacing, compression level 9 (maximum)



3.12    Corrupted files
-----------------------

        x00n0g01    -   empty 0x0 grayscale file
        xcrn0g04    -   added cr bytes
        xlfn0g04    -   converted cr bytes to lf and removed all NULs
```

Here are some related PNG pages at this site:

-  PNG Images:
  - Willem's PNG Suite without broken PNGs
  - PNG VRML Texture Suite in 2D
  - Ray-traced PNG Interlacing Demo
  - Miscellaneous Transparent Images using IMG Tags
    - also with a background image
  - Miscellaneous Transparent Images using OBJECT Tags
    - also with a background image
    - also strict HTML 4.0 version

- Photographic PNGs with Alpha Transparency:
  - Icicles
  - Redbrush flower
  - Magnolia tree
  - Horned Owl

- PNG Home Page
- **Complete PNG Site Map**

---

*Or, as Vince Sabio would say, "straight-laced."

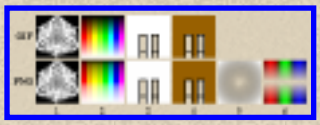
Last modified 23 April 2006.

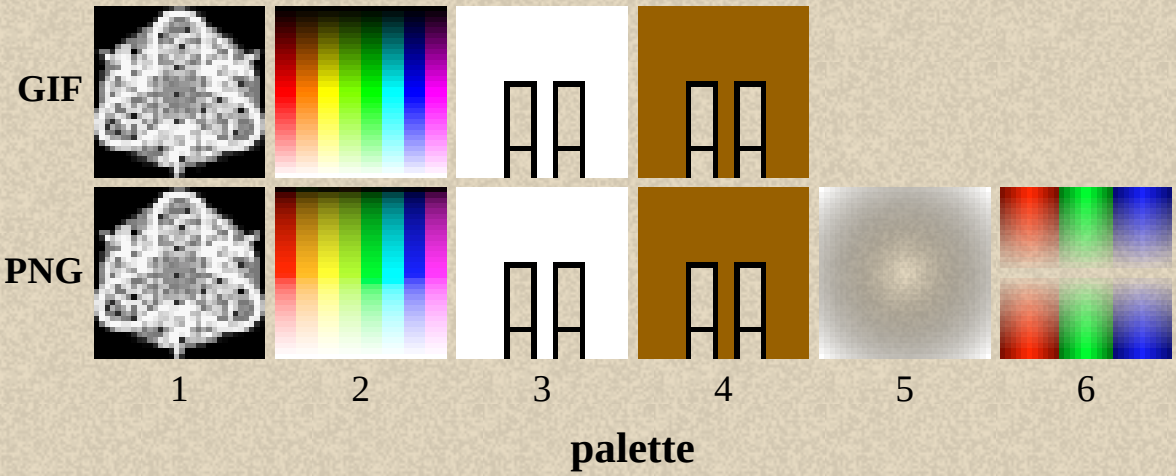
PNG VRML Textures in 2D

This set of icons is a superset of the basic, non-interlaced set from Willem's PngSuite. They are used in Greg's VRML test world (VRML plug-in or external browser required) to test PNG, JPEG and GIF texture conformance in VRML browsers, with mixed but improving results. But insofar as this set extends Willem's suite in a couple of areas, they may also be useful for testing 2D viewers such as web browsers.

Of the 18 PNG textures, 9 are new. Some of them, such as the gray palette images, are not formally distinguished from their colored brethren in the PNG specification, but they are within the VRML97 spec. Others, such as the RGBA-palette images and single-color-transparency truecolor images, are distinct subsets within both specs. Note that while all of the images are displayed here at 64x64, most of them are actually 32x32, while one is 128x128. The exceptions are noted below in the key.

Palette-based



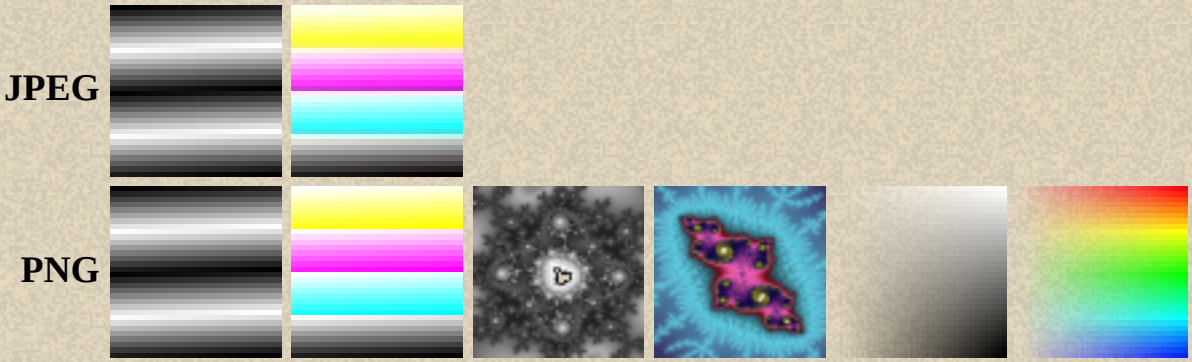


This first set is palette-based (a.k.a. colormapped or indexed-color). There are three pairs of images, each consisting of a gray texture (odd-numbered) and a color texture (even-numbered). The two on the left are opaque; the two in the middle have single-color binary transparency (GIF-style); and the two on the right are RGBA-palette PNGs with multiple levels of transparency. Equivalent GIF textures are provided for the first four. In image #5, the transparency level of each pixel happens to correspond directly to the shade of gray. In image #6, the 17 colors vary horizontally, while the 15 transparency levels vary vertically. (The 256th palette entry in #6 is reserved for the default background color--bright orange--which should not appear in either a web browser or a VRML browser.)

The small image at the upper right is a link to a 25k screenshot showing how the set *should* look; it was

taken with a Mozilla nightly build (2000-09-01-08-M18) under Linux. Other Mozilla screenshots showing its nice rendering of alpha transparency are also available.

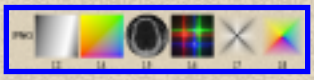
8-bps Grayscale and RGB

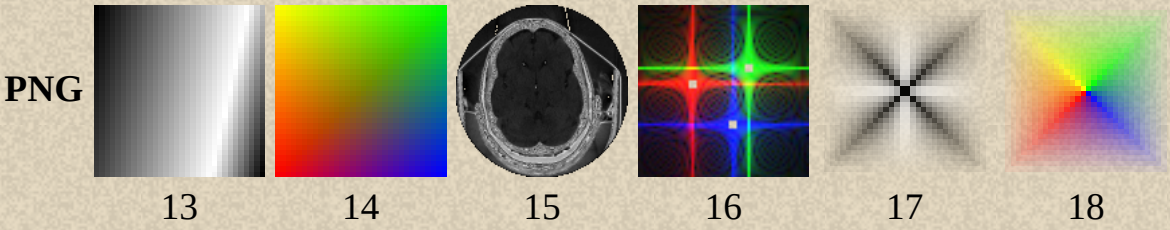


8-bit-per-sample truecolor

The second set consists of 8-bit grayscale and 24-bit RGB textures, optionally with an 8-bit alpha channel. As in the first set, the left pair is opaque; the middle pair has single-color binary transparency; and the right pair has alpha (variable) transparency. (In both this set and the final one, the left and right pairs are from Willem's PngSuite.) Note that the transparency in the middle pair is limited to a handful of pixels in each case. For the grayscale image, the transparency lies within the central Mandelbrot; for the color image, it lies within the yellow regions along the ``northwest-southeast'' diagonal. Only the opaque PNGs have JPEG equivalents; normal JPEG/JFIF does not support any kind of transparency.

16-bps Grayscale and RGB





16-bit-per-sample truecolor

The third set consists of 16-bit grayscale and 48-bit RGB textures, optionally including a 16-bit alpha channel. In image #15 (an actual CT scan of a human brain), the transparency is in the corners--plus a single pixel in the middle--leaving a circular image visible. In image #16, the transparency is in three

3x3 squares, one at the center of each of the stars. There are no equivalent GIF or JPEG textures; GIF doesn't support anything other than 8 bits per sample, and JPEG supports only 8-bit and 12-bit channels. (TIFF supports 16-bit samples but is itself supported by almost no web or VRML browsers.)

Key:

1. palette, gray, opaque, 32x32
2. palette, color, opaque, 32x32
3. palette, gray, single-shade binary transparency in ``windows", 32x32
4. palette, color, single-color binary transparency in ``windows", 32x32
5. palette, gray, alpha-transparency fading radially from transparent center to edge of image, 32x32
6. palette, color, alpha-transparency fading vertically from transparent equator to top/bottom edges, 32x32

7. 8-bit grayscale, opaque, 32x32
8. 24-bit RGB, opaque, 32x32
9. 8-bit grayscale, single-shade binary transparency in central Mandelbrot, 64x64
10. 24-bit RGB, single-color binary transparency within two yellow spots, 64x64
11. 16-bit grayscale + alpha, alpha-transparency fading horizontally from transparent left edge, 32x32
12. 32-bit RGBA, alpha-transparency fading horizontally from transparent left edge, 32x32

13. 16-bit grayscale, opaque, 32x32
14. 48-bit RGB, opaque, 32x32
15. 16-bit grayscale, single-shade binary transparency in corners, 128x128
16. 48-bit RGB, single-color binary transparency at center of stars, 64x64
17. 32-bit grayscale + alpha, alpha-transparency fading from transparent edges inward, 32x32
18. 64-bit RGBA, alpha-transparency fading from transparent edges inward, 32x32

Here are some related PNG pages at this site:

-  PNG Images:
  - Willem van Schaik's Test Suite of PNG Icons
    - also without broken PNGs
  - Ray-traced PNG Interlacing Demo
  - Miscellaneous Transparent Images using IMG Tags
    - also with a background image

- Miscellaneous Transparent Images using OBJECT Tags
  - also with a background image
  - also strict HTML 4.0 version
- Photographic PNGs with Alpha Transparency:
  - Icicles
  - Redbrush flower
  - Magnolia tree
  - Horned Owl

-  PNG Home Page
-  **Complete PNG Site Map**

Last modified 30 April 2006.

How PNG's Two-Dimensional Interlacing Works (PNG Version with MNG and MPEG Animations)

Thousands of people ask Greg every day, ``Just how *does* two-dimensional interlacing work in the Portable Network Graphics specification, and what does it mean to my sex life?" Fortunately Greg is in a unique position (so to speak) to answer this question once and for all; it can now be laid (as it were) to rest.

To demonstrate the stupendously complicated procedure known as **Adam7 interlacing** in a manner that even the tiniest brain cell can comprehend, Greg has produced a set of accordingly tiny images demonstrating the concept. Oliver Fromme, another PNG author and also the developer of the **QPV** viewer for DOS (formerly **QPEG**), is to be congratulated for the hard work in creating the original shelf +balls logo that was the basis for this demonstration. Thanks also to Alexander Lehmann for the MPEG animation (101k) of the process and to Glenn Randers-Pehrson for the MNG animation (214k).

> All of the images on this page, with the exception of the tiny `PNG' icons near the bottom, are actual interlaced PNG images. As of May 1997, the PNG images are inlined both via the old IMG tag and also via the newer OBJECT tag; new versions of Navigator respect the latter but not the former when loading plugins. As of December 1999, all OBJECT tags have been removed except on the image above; most browsers still don't support the tag correctly.
>
> Note that, although the inlined PNG images are either the same size as or smaller than their GIF counterparts (even taking into account the more complex interlacing scheme), the linked PNG images are **much** larger than the corresponding JPEG versions. Lossy compression really does make a huge difference -- between 5x and 6x for the small

images and anywhere from a factor of three to a factor of eight for the four large ones. The sizes are indicated here and there on this page; unless you **really** want the huge PNG versions, go visit the JPEG version of this page to pick up the convenient, byte-sized JPEGs.

And a big thanks to Dan Pape of UIUC for hosting the large PNG images for so many years (from 1995 to 1999, about 4.5MB total). Dan also did most of the work in adding PNG support to the once mighty **X Mosaic** browser.

We begin with a plain wooden shelf representing the image that is to be interlaced. It contains an 8x8 array of indentations representing one unit of interlacing; the full image would contain many of these blocks, tiling the entire picture. Next we add a clear, three-dimensional ``PNG'' overlay (just because we can) and the first ``pixel'' in the upper lefthand corner:

Pass 2 breaks the square symmetry (like all of the even-numbered passes) by adding another pixel; pass 3 restores the symmetry by adding two more pixels; and pass 4 breaks it again by adding four pixels:

Pass 5 again restores the symmetry (do you sense a pattern here?), pass 6 breaks it, and finally pass 7 completes the image with 32 new pixels:

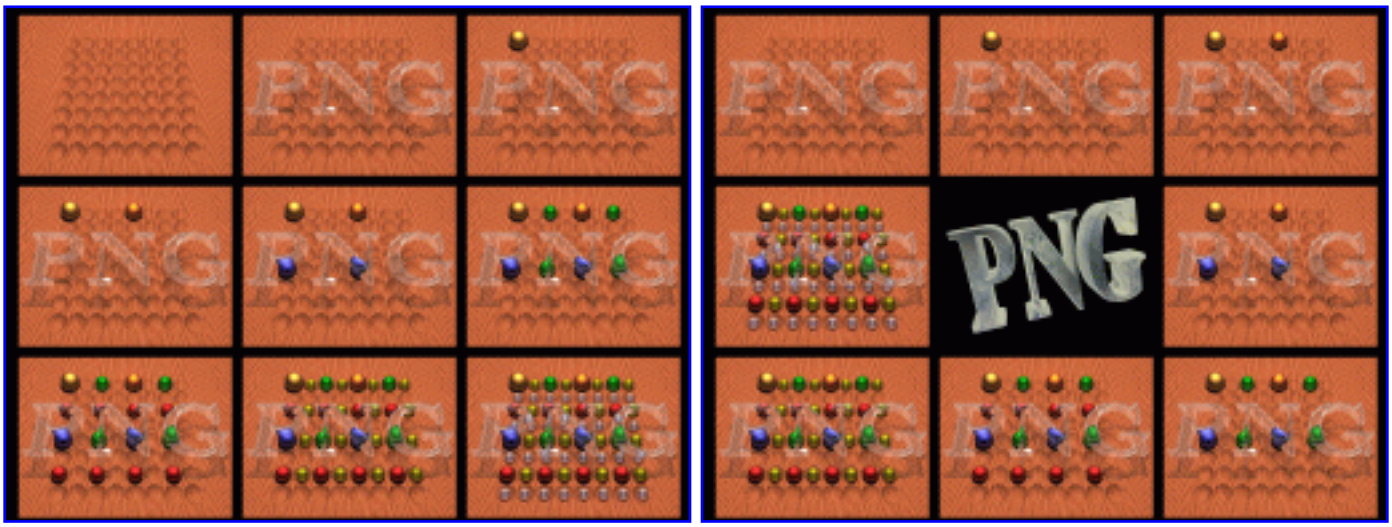
Note that the first pass transmits only 1/64 of the data; in other words, one gets a rough overall view of the image 8 times faster than the corresponding GIF one-dimensional interlacing scheme. Both schemes transmit half of the image data in the final pass. And in some informal tests Greg performed recently, medium-size text became readable twice as quickly with PNG interlacing as with GIF (on PNG's fifth pass of seven; on GIF's third pass of four).

Note also that each of the little images above may be clicked to retrieve the corresponding 24-bit

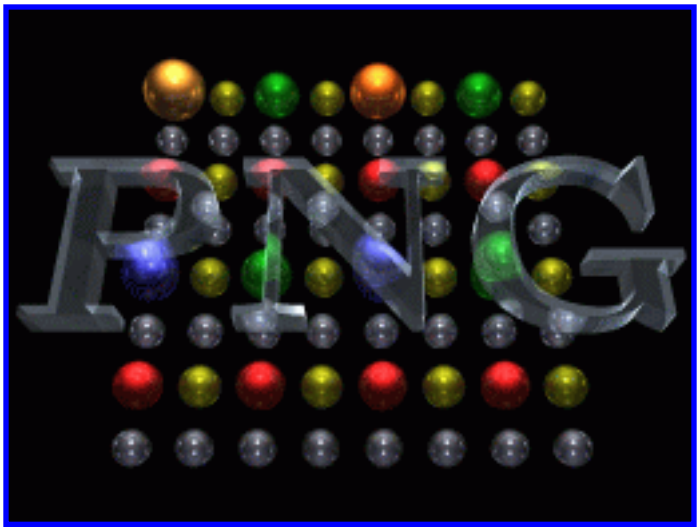
320x240 PNG image; all of the PNGs are interlaced and are between 120k and 155k in size. (For comparison, the JPEG versions accessible from the other page are all less than 30k.) The larger images will look something like the one at the top of this page, only much nicer for those of you with high-color or true-color displays. The title image is itself a link to the full 1024x768, 1.4MB PNG version (as opposed to the lossy 1024x768 JPEG version that is only 171k, or the original uncompressed 1024x768 TGA that's 2.3MB).

All of these images were generated with **POV-Ray** 2.2 under Linux 1.2.1. The 320x240 images averaged about 40 minutes each on a 486-33; the 1024x768 monster required over 12 hours. The POV-Ray source files for all nine images are also available (74k zipfile).

Finally, here are a couple of gratuitous PNG collages of the little images, both with links to the full 1024x768 PNG versions (about 680k and 750k, respectively; the JPEG versions are about 200k each):



The second one seems to be the more popular of the two. (The central image in the second collage is a small, inverted version of a raytraced logo by Neal Kettler.) Oops, here's another gratuitous PNG picture:



This one should make a **dandy** black concert t-shirt. The 1024x768 PNG version is 515k (the JPEG is only 76k) and makes a **stupendously cool** screen background.

Here are the other PNG-related resources at this site:

- This page with JPEG images instead of PNG (animated 412k title image)
- Introduction to PNG features
- History of PNG
- News (and more history) of the PNG Development Group
  - PNG news items from 1999
  - PNG news items from 1998
  - PNG news items from 1997
  - PNG news items from 1996
  - PNG news items from 1995
- PNG Technical Documentation
  - zlib Technical Documentation
  - MNG Technical Documentation
- *PNG: The Definitive Guide* and Related Books
- PNG-supporting Applications
  - WWW and Online Browsers
  - Image Viewers
  - Image Editors
  - Image Converters
  - 3D Applications
  - Miscellaneous Applications

- PNG support in VRML browsers
- PNG-supporting Hardware
- PNG Programming Information:
  - PNG-supporting Libraries and Toolkits
    - **libpng** home page
    - **zlib** home page
  - PNG Source Code
  - PNG Support in Mozilla
- PNG Images:
  - Willem's Test Suite of PNG Icons
  - Miscellaneous Transparent Images using IMG Tags (also with a background image)
    - Mac IE 5.0 screen shots
    - Mac iCab 1.9 screen shots
    - Linux Mozilla 2000-04-14 screen shots
    - BeOS NetPositive 2.2 screen shots
  - Miscellaneous Transparent Images using OBJECT Tags (also with a background image)
  - Photographic PNGs with Alpha Transparency:
    - Icicles
    - Redbrush flower
    - Magnolia tree
    - Horned Owl
- Links to other PNG resources (mailing lists, more images, etc.)
- PNG home page
- MNG home page

Last modified 12 June 2005.

Greg was just kidding about the sex-life part. No, really. There is no evidence whatsoever that use of PNG interlacing can lead to better sex, although Greg is certainly working hard at it. So to speak.

Miscellaneous Transparent PNG Images using IMG Tags

Does your browser suck? Check out the following screenshots to see what this page *should* look like (except for this box, of course):

- Internet Explorer 5.0 for Mac OS
- iCab 1.9 for Mac OS
- OmniWeb 3.1rc2 for Mac OS X Server
- Opera 6.0b1/TP1 for Windows and Linux
- NetPositive 2.2 for BeOS
- Mozilla 2000-04-14 for Linux
- CSCMail 1.7.8 for Linux
- Dillo 0.6.2 for Linux

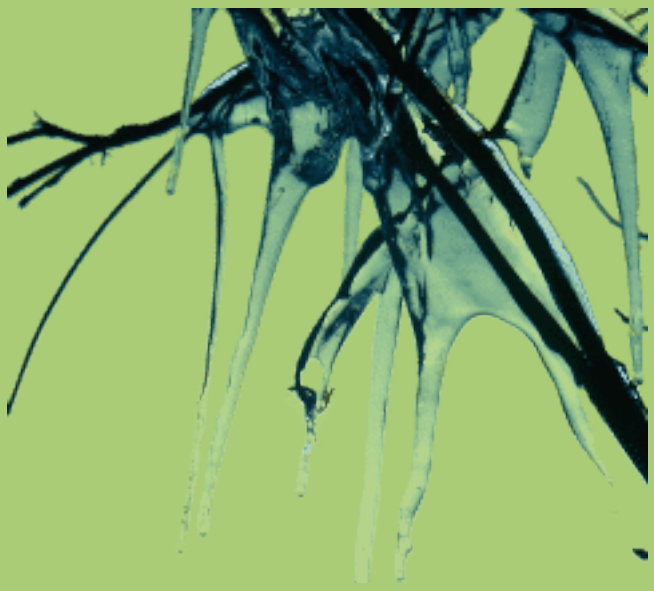
Mac IE5's rendering is the best since it not only does full alpha-transparency but also gamma and color correction. See the PNG-Supporting Browsers page for details.

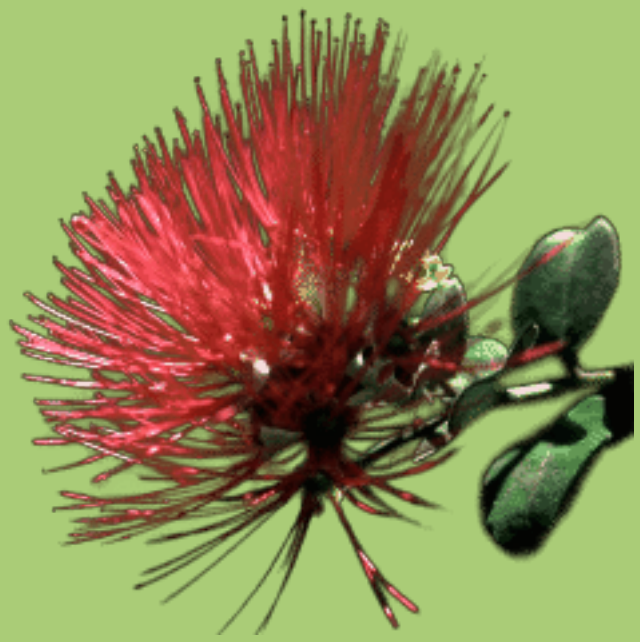
This set is provided courtesy of Stefan Schneider. If the two images on the right are transparent but the one on the left has a black background, the browser was probably compiled with a buggy version of **libpng**. The bug is fixed in libpng 0.96 and later, and a trivial patch is available (for browser implementors, that is) for earlier versions of libpng.

The image on the right is a full 32-bit RGBA image (that is, truecolor with a full alpha channel). The two on the left are 8-bit palette images with full transparency chunks--in other words, their palettes are effectively RGBA values instead of the normal RGB. The one on the left has a 256-entry palette, while the one in the center has 255 entries; both were created with Stefan's **LatinByrd** application.

As a nice demonstration of the power of the palette-alpha images, here's a composite JPEG image of the toucan on top of his twin, provided by Glenn Randers-Pehrson. Note how the shadow of the toucan in front falls across his buddy:

The following set is provided by Greg's colleague, Pieter van der Meulen. All of these images are interlaced, have transparency, and should be rendered with the same green background as the page. If the images have obvious rectangular borders (due to the color specified in the bKGD chunk), the browser is broken. (The images *should* use their respective bKGD colors when viewed in a stand-alone image viewer with no default background of its own, however.)





These images are quarter-scale, interlaced, RGBA-palette (8-bit) versions of the original 32-bit RGBA images; each is between 35k and 70k. Click on any of them to bring up a page with the corresponding half-scale version of the image (also 8-bit), which in turn is linked to the full-size, 32-bit version. The conversion to 8-bit palette mode was accomplished by means of modified versions of some of the **NetPBM** tools.

[gratuitous link to Willem's test page with a large, interlaced image]

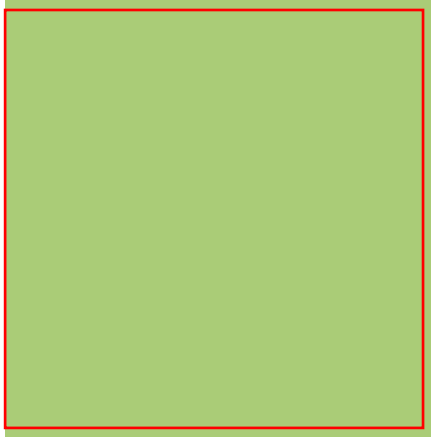
Here are some related PNG pages at this site:

- PNG Images:
  - Miscellaneous Transparent Images using IMG Tags
    - also with a background image
  - Miscellaneous Transparent Images using OBJECT Tags
    - also with a background image
    - also strict HTML 4.0 version
  - Photographic PNGs with Alpha Transparency:
    - Icicles
    - Redbrush flower
    - Magnolia tree
    - Horned Owl
  - Miscellaneous 32-bit RGBA PNGs
  - PNG VRML Texture Suite in 2D
  - Willem van Schaik's Test Suite of PNG Icons
    - also without broken PNGs
- Screenshots of Browsers and PNG Transparency:
  - Internet Explorer 5.0 for Mac OS
  - iCab 1.9 beta for Mac OS
  - OmniWeb 3.1rc2 for Mac OS X Server
  - Arena beta 3b for Linux
  - Mozilla 2000-04-14 for Linux
    - also using random-dithered binary transparency
  - CSCMail 1.7.8 for Linux
  - Dillo 0.6.2 for Linux
  - Konqueror 3.0 for Linux
  - Opera 6.0b1/TP1 for Windows and Linux
  - NetPositive 2.2 for BeOS
  - WebTV

- PNG Home Page
- **Complete PNG Site Map**

Last modified 30 April 2006.

Miscellaneous Transparent PNG Images using OBJECT Tags



All of these images (except where otherwise noted) are displayed via PNGs in IMG tags, embedded in OBJECT containers that reference the same PNGs. They should therefore show up both in browsers with native PNG support and in newer Netscape-like browsers with PNG plug-ins. The following links point at reduced-size JPEG screenshots of this page; more specfically, the first two show the old version of this page (using OBJECTS), while the remaining four show the up-to-date but non-OBJECT version of this page:

- **Arena 0.3b** screenshot (no support for HTML background color; older version of this page)
- **Acorn Browse 1.25** screenshot (perfect!)
- **Mac Internet Explorer 5.0** screenshot (perfect!)
- **iCab 1.9 beta** screenshot (pretty good!)
- **OmniWeb 3.1rc2** screenshot (pretty good!)
- **Mozilla 2000-04-14** screenshot (pretty good!)
- **Mozilla 2000-04-14** screenshot (shows random-dither approach to PNG transparency)

However...regardless of what this page *should* look like, support for OBJECT tags appears to be broken in all recent versions of the Big Two browsers (that is, **Netscape Navigator** and **Microsoft Internet Explorer**). In particular:

- Navigator 4.04 (a.k.a. the browser portion of Communicator) is the first version to have native PNG support, but it invokes it only for the innermost IMG PNG, not for the outermost OBJECT PNG. This behavior can be seen in the PNG/GIF/PNG penguin above (which is displayed as a PNG) in combination with the PNG/JPEG/GIF icon below (which is displayed as a GIF, i.e., the innermost IMG). In addition, 4.04 has no support for transparency, but that's a separate issue. (All versions through 4.72 behave the same way.)
- Navigator 4.0 through 4.03 work fine with the outer OBJECT PNG if they have the Siegel & Gale PNG plug-in (Windows 95/NT) installed, but they fail to revert to the inner OBJECT GIF or JPEG

if they do *not* have a PNG plug-in. This is incorrect behavior according to section 13.3.1 (objects portion) of the W3C's HTML 4.0 Recommendation, which is the only version of HTML supporting WIDTH and HEIGHT attributes in the OBJECT tag (which in turn is what Netscape requires for plug-in support).
- Navigator 3.x and earlier ignore *all* OBJECTs; their plug-ins only work with the proprietary EMBED tag.

- MSIE 5.0 for Windows thinks it needs ActiveX controls enabled (Internet Options -> Run ActiveX controls and plug-ins) in order to render OBJECT images, but it will do so when given "permission." However, it will *not* do so for PNG images, only for JPEGs or GIFs; it provides no transparency support (images are rendered against a white background); and even worse, it adds a border and scrollbars to perfectly sized images. (And if ActiveX controls are *not* enabled, it will render the enclosed IMG as intended, but it will also pop up a warning box every time the page is displayed.)
- MSIE 4.01 not only thinks it needs an ActiveX control to render OBJECT PNGs but also fails to render enclosed IMG GIFs. And in the penguin ``IMG within an OBJECT within another OBJECT'' example at the top of this page, MSIE 4.01 somehow thinks the nested objects should *both* be rendered, but it fails to do so for either one until the user clicks on them (and then only the GIF is rendered; clicking on the PNG once again pops up the ActiveX error box).
- MSIE 4.0 pops up an error message about being ``unable to load plug-in'' and in some cases crashes entirely, particularly when scrolling down to the IceAlpha image below. Apparently the plug-in in question is the S&G version installed in *Netscape's* directory; MSIE co-opts it without permission.
- MSIE 3.x and earlier have no native support for PNG and ignore images in OBJECT tags.

See the PNG-Supporting Browsers page for links to these and other browsers and plug-ins.

Here's some sample HTML code to show how to do this nesting trick:

```
<OBJECT WIDTH="162" HEIGHT="150" DATA="foo.png" TYPE="image/png">
   <IMG WIDTH="162" HEIGHT="150" SRC="foo.png" ALT="[image of a foo]">
</OBJECT>
```

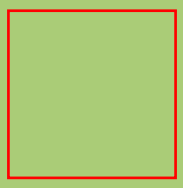
Note that the WIDTH and HEIGHT attributes of the OBJECT tag are *required* in order for Netscape Navigator 4.x to invoke the appropriate PNG plug-in. Omitting either attribute in one OBJECT PNG will cause Navigator to ignore it and all subsequent OBJECT PNGs as well.

Also note that OBJECTs are containers and can contain other OBJECTs, so one can play tricks like sandwiching an OBJECT JPEG between the OBJECT PNG and the IMG PNG. This should allow an OBJECT-sensitive browser without any PNG support (e.g., Navigator without a PNG plug-in) to display the JPEG version of the image instead, while still allowing browsers with either native PNG support or PNG plug-in support to use the PNG. (Note the key word `should'; as noted above, Navigator 4.x fails to

do so.) The penguin image at the top of this page uses a trick similar to the following:

```
<OBJECT WIDTH="162" HEIGHT="150" DATA="foo.png" TYPE="image/png">
<OBJECT WIDTH="162" HEIGHT="150" DATA="foo.jpg" TYPE="image/jpeg">
   <IMG WIDTH="162" HEIGHT="150" SRC="foo.png" ALT="[image of a foo]">
</OBJECT>
</OBJECT>
```

The following test is similar, except that the innermost IMG is a GIF. OBJECT-aware browsers like Navigator 4.x and MSIE 4.x *should* display either the outer PNG or the middle JPEG, and the image should be centered regardless:



This set is provided courtesy of Stefan Schneider. If the two images on the right are transparent but the one on the left has a black background, the browser was probably compiled with a buggy version of **libpng**. The bug is fixed in libpng 0.96 and later, and a trivial patch is available (for browser implementors, that is) for earlier versions of libpng.

The image on the right is a full 32-bit RGBA image (that is, truecolor with a full alpha channel). The two on the left are 8-bit palette images with full transparency chunks--in other words, their palettes are effectively RGBA values instead of the normal RGB. The one on the left has a 256-entry palette, while the one in the center has 255 entries; both were created with Stefan's **LatinByrd** application.

As a nice demonstration of the power of the palette-alpha images, here's a composite JPEG image of the toucan on top of his twin, provided by Glenn Randers-Pehrson. Note how the shadow of the toucan in front falls across his buddy:

The following set is provided by Greg's colleague, Pieter van der Meulen. All of these images are interlaced, have transparency, and should be rendered with the same green background as the page. If the images have obvious rectangular borders (due to the color specified in the bKGD chunk), the browser is broken. (The images *should* use their respective bKGD colors when viewed in a stand-alone image viewer with no default background of its own, however.)


These images are quarter-scale, interlaced, RGBA-palette (8-bit) versions of the original 32-bit RGBA images; each is between 35k and 70k. Click on any of them to bring up a page with the corresponding half-scale version of the image (also 8-bit), which in turn is linked to the full-size, 32-bit version. The conversion to 8-bit palette mode was accomplished by means of modified versions of some of the **NetPBM** tools.

[gratuitous link to Willem's test page with a large, interlaced image]

Here are some related PNG pages at this site:

- PNG Images:
  - Miscellaneous Transparent Images using IMG Tags
    - also with a background image
  - Miscellaneous Transparent Images using OBJECT Tags
    - also with a background image
    - also strict HTML 4.0 version
  - Photographic PNGs with Alpha Transparency:
    - Icicles
    - Redbrush flower
    - Magnolia tree
    - Horned Owl
  - Miscellaneous 32-bit RGBA PNGs
  - PNG VRML Texture Suite in 2D
  - Willem van Schaik's Test Suite of PNG Icons

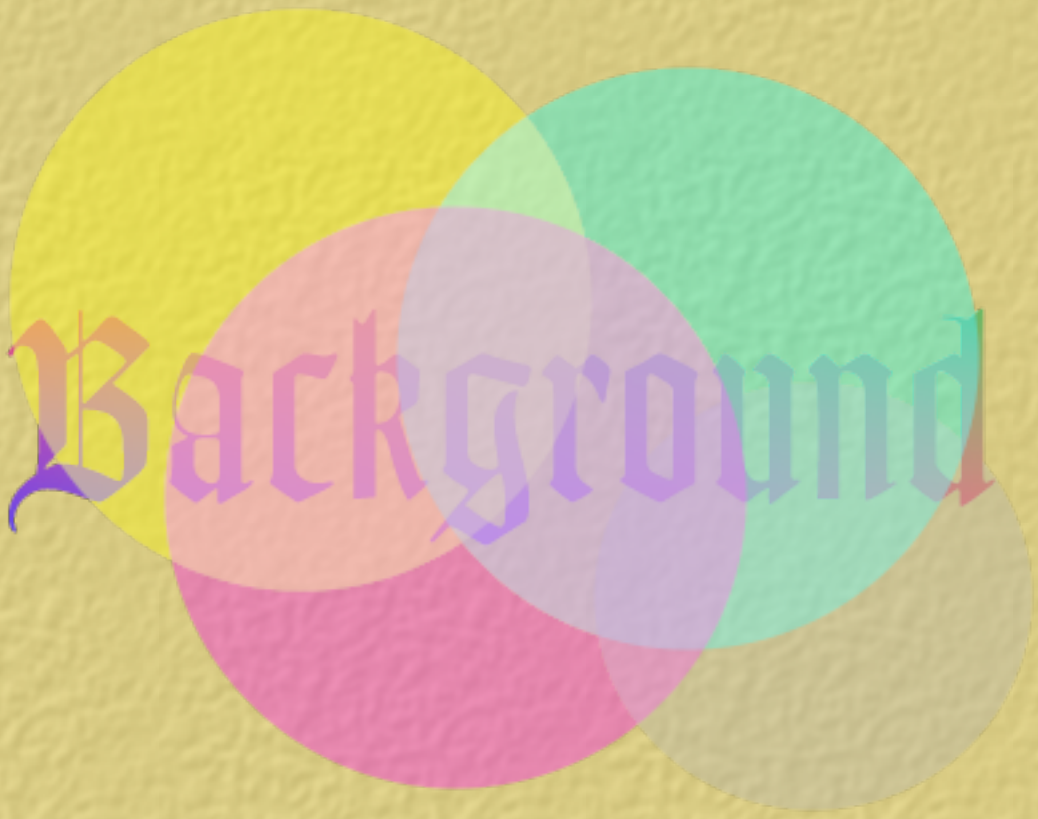
- also without broken PNGs
- Screenshots of Browsers and PNG Transparency:
  - Internet Explorer 5.0 for Mac OS
  - iCab 1.9 beta for Mac OS
  - OmniWeb 3.1rc2 for Mac OS X Server
  - Arena beta 3b for Linux
  - Mozilla 2000-04-14 for Linux
    - also using random-dithered binary transparency
  - CSCMail 1.7.8 for Linux
  - Dillo 0.6.2 for Linux
  - Konqueror 3.0 for Linux
  - Opera 6.0b1/TP1 for Windows and Linux
  - NetPositive 2.2 for BeOS
  - WebTV

- PNG Home Page
- **Complete PNG Site Map**

Last modified 12 June 2005.

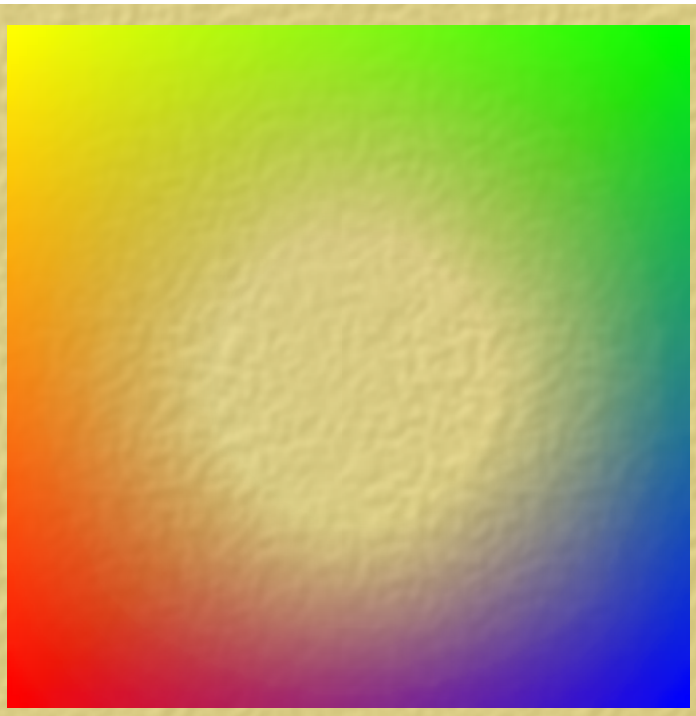
32-bit RGBA PNGs

These images, unlike many of the others on this site, are full 32-bit RGBA PNGs (i.e., not palette-based). Some browsers, such as WebTV, may handle these better than indexed images.

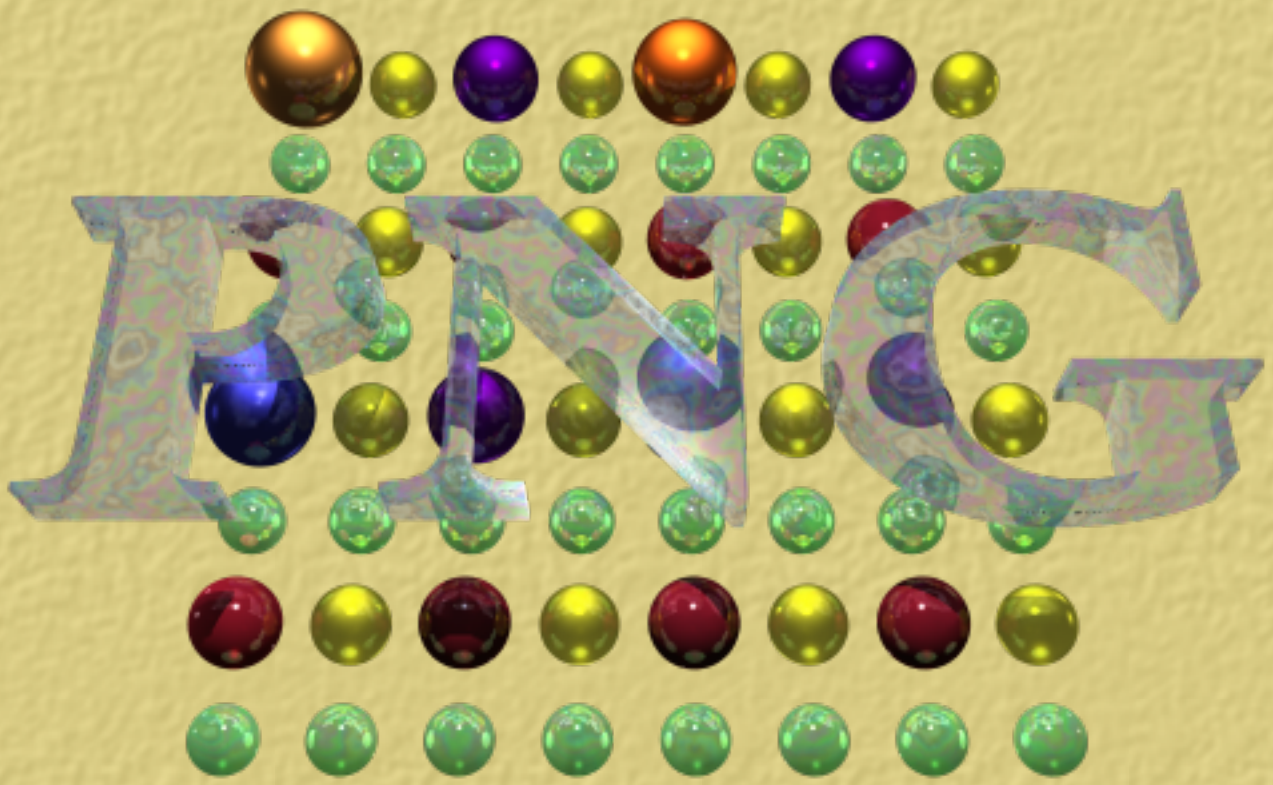


This image is by Anthony Atkielski. It has basic, multi-level transparency: the outer parts are completely transparent, the text is completely opaque, and each region bounded by circles has one of three levels of (constant) partial transparency.

This lovely image was created by Diana Todd using various 2D and 3D tools, including Paint Shop Pro; it's available from her Free Tubes site (*Scenes* category), along with more than 3800 other PSP tubes in PNG format. The globe has varying levels of transparency, and the legs of the stand are antialiased.



This pair is from Willem van Schaik's AlphaMix program (for Windows), which allows one to composite alpha-PNGs against other images or against a checkered background. Any quantization of alpha levels by the browser (as in at least some versions of WebTV) should be quite apparent on the smooth, radial alpha channels of these images.



Here's a new rendering of the classic PNG logo, this time using POV-Ray 3.5 (beta 10), which finally can produce images with *real* alpha transparency. Greg banged this out in a couple of hours spread over a few days, and it shows--the ``PNG'' letters could use more contrast and ideally an internal glow (a la VRML's emissive property) in place of the iridescence in order to look good on any background. But this is good enough for now...

Here are some other pages at this site with PNG images:

- Photographic PNGs with Alpha Transparency:
  - Redbrush flower (*Ohia Lehua*)
  - Magnolia tree
  - Horned Owl
- Miscellaneous Transparent Images using IMG Tags (also with a background image)
  - Mac IE 5.0 screen shots
  - Mac iCab 1.9 screen shots
  - Linux Mozilla 2000-04-14 screen shots
  - BeOS NetPositive 2.2 screen shots

-  Miscellaneous Transparent Images using OBJECT Tags (also with a background image and strict HTML 4.0 version)
-  Ray-traced PNG Interlacing Demo (also JPEG version)
-  Willem's Test Suite of PNG Icons
-  Links to other PNG resources (more images)

-  PNG Home Page
-  **Complete PNG Site Map**

Last modified 30 April 2006.