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PNG Proposed sPLT Chunk, draft 19961107

File: png-proposed-sPLT-19961107.txt

Status of this Memo

This document is an informal draft of the PNG development group.

Comments on this document can be sent to the PNG specification maintainers at

or at

`png-list@dworkin.wustl.edu.`

Distribution of this memo is unlimited.

At present, the latest version of this document is available on the World Wide Web from

`ftp://swrinde.nde.swri.edu/pub/png-group/documents/.`

Notices

Changes from the 23 October 1996 sPLT draft (version 19961023):

- Revisions to clarify relationship to PLTE/hIST.
- Clarified interpretation of spAL in grayscale and indexed-color cases.

Abstract

This document describes a special-purpose chunk type, sPLT, that has been proposed for use in various PNG (Portable Network Graphics) applications. It has not yet been approved for registration by the PNG developers, and therefore is experimental and its format is subject to change.

Contents

1 Introduction

The chunk described here has been proposed to the PNG development group. Its definition is subject to change until such time as the group formally registers it. No decoder is required or expected to implement this chunk except for experimental or evaluation purposes. Comments on this proposal, and new proposals for additional chunk types, should be sent to the PNG specification maintainers at `png-info@uunet.uu.net`. The basic PNG specification is available from the W3C archive at `http://www.w3.org/pub/WWW/TR/REC-png.html`.

2 Using Proposed PNG Chunks

The chunk described in this document has not yet been registered by the PNG maintainers. Therefore it has a lower-case letter in the second position of the chunkname. It is an **experimental** chunk and the format is subject to change. If and when it becomes registered, the second letter of the chunk name will become uppercase, and the "signature" field, if present, and its zero-byte terminator will be deleted. The chunk description will be moved either to a PNG extensions document or to the core PNG specification. There will be no further change to the chunk format after it has been registered.

Whenever you use an unregistered chunk you should also include a `tEXt` chunk describing it, for example:

```
tEXtComment\0
This file contains a spAL chunk written according to
the format given in Version 19961022 of the PNG Proposed sPLT
Chunk document.
```

3 Summary of Proposed Chunk

This table summarizes some properties of the proposed chunk described in this document.

Chunk name	Multiple OK?	Ordering constraints
spAL	Yes	Before IDAT

4 Proposed Chunk Specification

This section provides the detailed specification for the proposed chunk.

4.1 `spAL` Suggested Palette

This chunk can be used to suggest a reduced palette to be used when the display device is not capable of displaying the full range of colors present in the image. If present, it provides a recommended set of colors, with alpha and frequency information, that can be used to construct a reduced palette to which the PNG image can be quantized.

This chunk's contents are a zero-byte-terminated text string that names the palette [followed by a 20-byte signature and a zero-byte terminator] and a 1-byte spAL_sample_depth integer, followed by a series of palette entries, each a six-byte or ten-byte series containing five unsigned integers:

```
n bytes:      (Latin-1 text) palette_name
1 byte:       (null) terminator

[ 20 bytes:  signature ("PNG group 1996-10-22")
  1 byte:     (null) separator ]

1 byte:       (unsigned integer)  spAL_sample_depth
             must be 8 or 16

1 or 2 bytes:  (unsigned integer)  red intensity
           0:   black
           etc.
           255 or 65535: full red intensity
```

```
1 or 2 bytes:  (unsigned integer)  green intensity

1 or 2 bytes:  (unsigned integer)  blue intensity

1 or 2 bytes:  (unsigned integer)  alpha
           0: fully transparent
           etc.
           255 or 65535: fully opaque

2 bytes:    (unsigned integer)  frequency
           (relative frequency of occurrence)
etc.
```

There can be any number of entries; a decoder determines the number of entries from the remaining chunk length after the "palette_name" field and its zero-byte terminator [, the "signature" and its zero-byte terminator], and the `spAL_sample_depth` byte. This length not divisible by six (if `spAL_sample_depth==8`) or by ten (if `spAL_sample_depth==16`) is an error. Entries must appear in decreasing order of "frequency". There is no requirement that the entries all be used by the image, nor that they all be different.

The "palette_name" (e.g. "256 color including Macintosh default", "256 color including Windows-3.1 default", "Optimal 512") identifies the palette. It may help applications or people to choose the appropriate suggested palette when more than one appears in a PNG file. The "palette_name" string must follow the same restrictions imposed on `tEXt` keywords: it must consist only of printable Latin-1 characters and must not have leading or trailing blanks, but can have single embedded blanks. There must be at least one and no more than 79 characters in the name. Names are case-sensitive.

The red, green, and blue values are not premultiplied by alpha, nor are they precomposited against any background. This differs from the treatment of suggested palettes represented by `PLTE`: in an image that uses transparency, `spAL` provides suggested uncomposited color values, while a suggested-palette `PLTE` provides suggested colors after compositing against the `bKGD` color. A decoder can build a target palette by compositing `spAL` palette entries against any background color or set of background colors that it chooses. It can then composite the truecolor PNG image against the desired background, and finally quantize the composited image into the target palette.

Each frequency entry is proportional to the fraction of pixels in the image that are closest to that palette entry, without regard to any compositing against a background palette. The exact scale factor is chosen by the encoder, but should be chosen so that the range of individual values reasonably fills the range 0 to 65535. It is acceptable to artificially inflate the "frequency" values for "important" colors such as those in a company logo or in the facial features of a portrait. Zero is a valid value for frequency, meaning the color is "least important" or that it is rarely if ever used. But when all of the frequency values are zero, the "frequency" is undefined.

The palette uses 8 bits or 16 bits (1 or 2 bytes) per value according to the number given in the `spAL_sample_depth` field, regardless of the image bit depth specification. Decoders wishing to construct a palette with a different bit depth can accomplish this by scaling the RGBA entries, as described under "[link] Sample depth rescaling" in the PNG specification. The palette samples have the same gamma and chromaticity values as those of the PNG image.

`spAL` can appear for any color type. It is expected, but not actually required, that all entries in an `spAL` for a grayscale PNG will have R=G=B, and that all entries will have the maximum alpha value in a PNG that does not have transparency (no `tRNS` chunk nor alpha channel). [Would it be smarter to just require these statements to be true?] In an indexed-color (color type 3) PNG, `PLTE` defines the full color range of the PNG image, but `spAL` can be used to define alternative reduced palettes for viewers that are unable to display all the colors present in the `PLTE` chunk.

If `spAL` appears, it must precede the first `IDAT` chunk. There can be multiple `spAL` chunks, but if so they must have different palette_names.

Note: The core PNG specification recommends the use of `PLTE` and `hIST` chunks to define suggested palettes for truecolor images. This is still allowed, but `spAL` provides a more flexible solution:

- With `spAL`, there can be multiple suggested palettes. A decoder may choose an appropriate palette based on name or number of entries.
- In an RGBA (color type 6) PNG, `PLTE` represents a palette already composited against the `bKGD` color, so it is only useful for display against that background color. The `spAL` chunk provides an uncomposited palette, which is useful for display against backgrounds of the decoder's choice.
- Since `spAL` is a noncritical chunk, a PNG editor can add or modify suggested palettes without being forced to discard unknown unsafe-to-copy chunks.
- `spAL` is allowed in PNG files of color types 0, 3, and 4, whereas `PLTE` cannot be used to provide reduced palettes in these cases.
- More than 256 entries can appear in `spAL`.

In PNG files of color types 2 and 6, an `spAL`-aware decoder should treat `PLTE` and `hIST` as equivalent to a nameless 8-bit `spAL` with all entries fully opaque (alpha = 255). An encoder that uses `spAL` may choose to write a `PLTE`/`hIST` suggested palette as well, for backwards compatibility with decoders that do not recognize `spAL`. Note that `hIST` defines the frequency of `PLTE` entries, not the entries of `spAL`.

5 Discussion

This discussion does not form a part of the proposed specification and will not appear in the final documentation.

5.1 `spAL` Discussion

It is proposed to register the chunk as `sPLT` and to include it in the "PNG extensions" document. The registered version will not include the "signature" field and its zero-byte terminator, and the final specification will not contain any material from this document that is included in square brackets ("[...]").

The format of this chunk has not changed since version 19961022 of this document. The chunk was originally called `spLT` but the name was changed to `spAL` in the 19960927 version of the png-proposed-chunks document when the format changed from the April 1996 (960406) version of the format.

Gamma field: In the 19960927 version, a “gamma” field was added, primarily for use in multiple-image formats. This seemed to introduce more problems than it resolved, so it has been removed from the present proposal, and multiple-image formats can define a variant of sPLT (with a different chunk name such as “gPLT”) that has a gamma field, if necessary.

Signature field: In the 19960927 version, a “signature” field was added to distinguish the September version from the April version. Since the 19961008 version has the identical format to the April version, no “signature” field was needed, and it was removed.

Zero “frequency”: There have been changes to the interpretation of frequency==0.

Palette sample depth: Changed from 16 bits to 8 or 16 bits in the 19961022 version. Since the format changed, the chunk name was changed back to `spAL` again and a new “signature” field was added. Test implementations can safely distinguish among the April 1996 version (spLT, no signature), the September 27 version (spAL, 1996-09-14 signature), and this version (spAL, 1996-10-22 signature).

The 19961107 draft clarifies the interaction of spAL with PLTE: in color types 2 and 6, PLTE should be treated as if it were (another) spAL. The meaning of spAL in color types 0, 3, and 4 is also clarified.

6 Security considerations

Security considerations are addressed in the basic PNG specification, `http://www.w3.org/pub/WWW/TR/REC-png.html`.

The same precautions taken when displaying `tEXt` data should be taken when displaying the text contained in the “palette_name” [and “signature”] string of the `spAL` chunk. Viewers should not display this string directly without first checking for the presence of nonprintable characters, and for the <ESC> character in particular.

No known additional security hazards are posed by the chunks described here.

7 Credits

Trademarks

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- Windows is a trademark of MicroSoft Corp.

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End of PNG Proposed sPLT Chunk Listing. Expires 07 May 1997.