The sfnt format

The font file format used by QuickDraw GX is known as sfnt, after the resource tag the Macintosh uses internally to track font data. The name sfnt itself stands for "spline font".

The sfnt is the same format TrueType fonts have used since they were first introduced on the Macintosh. Under GX, an sfnt file can contain a TrueType font, a PostScript Type 1 font, or other information; thus the more general name has been adopted.

Files

An sfnt file can take three forms:

The "suitcase" file in which fonts are commonly shipped

 File type: ffil

The individual font file

 File type: tfil

The "bass" file, which includes sfnt data in the data fork

 File type: bass

TrueEdit can open all three varieties of sfnt file (although it can only edit TrueType fonts). Note that sfnt is not the file type, but the tag of the font resource inside the file.

Tables

The sfnt file format is based on ***tables***. An sfnt file may contain many tables, each of which specifies a single aspect of the font such as glyph outlines, horizontal metrics, glyph effects, font family names, or other information.

The tables exist independently, each adding a single piece of functionality to the font. (A few important interdependencies are outlined later in this chapter.) In a broad sense, font development for QuickDraw GX consists simply of adding tables to an sfnt.

Each table is identified by a four-letter ***tag***which abbreviates its function. These tags are similar to those used for the file types, creator codes, and resource types familiar to Macintosh programmers. As with those tags, Apple has reserved all tags consisting of all lowercase letters for its own use.

> **There are some tags which appear to have three letters, e.g. cvt. These tags do in fact contain four characters, the last being a space.**

Guide to sfnt table tags

With the release of QuickDraw GX, 33 standard tables have been defined by Apple. A brief description of each table follows. Full definitions are included in the documents *The TrueType Font Format Specification* and *QuickDraw GX Font Formats.*

Tag	Meaning	Description
acnt	Accent attachment	Compact format for describing composite glyphs where the components are not transformed.
bdat	Bitmap data	Embedded bitmap data for multiple sizes and glyph ranges.
bloc	Bitmap location	Index to embedded bitmap data in bdat.
bsln	Baseline	Values which specify alignment between layout runs, used for both inter-script alignment and single-script effects like drop capitals.
cmap	Character to index mapping	Language- and script-specific character-to-glyph mapping.
cvar	CVT variation	Changes to the 'cvt ' table so that instructions can work under GX style variations.
cvt	Control value	List of key values, such as stem weights, referred to by a font's instructions.
fdsc	Font descriptors	Font self-identification values used for font and style matching.
feat	Feature name	Organization of glyph effects into user-visible features, and pointers to their names.
fmtx	Font metrics	Basic metrics information in control-point format, so it can be affected by instructions and style variations.
fpgm	Font program	Definitions of TrueType functions for use by a font's instructions.
fvar	Font variations	Directory to a font's GX style variation axes and instances.
glyf	Glyph data	Outline and instruction data for each glyph.
gvar	Glyph variations	Point position changes for each glyph under GX style variations.
hdmx	Horizontal device metrics	Cached integer metrics for specific pixel-per-em sizes (usually screen sizes).
head	Font header	Basic functional information for a font.
hhea	Horizontal header	Basic metrics and functional information for a horizontally-written font.
hmtx	Horizontal metrics	Left side bearing and advance width for each glyph (actual data, not a cache).
just	Justification	Justification classes, priorities, and actions for glyphs or ranges of glyphs.
kern	Kerning	Kerning data (context-specific glyph positioning).
lcar	Ligature caret	Insertion point information for glyphs composed of multiple characters.
loca	Index to location	Location of glyph data within the glyf table.
maxp	Maximum profile	Basic information on the font's instructions and required system resources.
mort	Glyph metamorphosis	Glyph effects including contextual and non-contextual substitution, rearrangement, and ligature formation.
name	Name	Localized name strings for the font and its effects.
opbd	Optical bounds	Values for each glyph to improve optical alignment at the edges of text.
OS/2	OS/2 header	Information required for cross-platform compatibility.
post	PostScript	PostScript names for each glyph, for compatibility with PostScript output devices.
prep	Preprogram	Instructions executed once for each change in font size, transformation, or variation.
prop	Glyph properties	Unicode directionality class, reordering, and hanging properties for each glyph.
trak	Tracking	Tracks for size-dependent global adjustment of spacing.
vhea	Vertical header	Basic metrics and functional information for a vertically-written font.
vmtx	Vertical metrics	Top bearing and advance height for each glyph.

Use of tables

Each table within an sfnt provides a specific element of functionality to a font. Some of the tables were defined with the original release of TrueType in 1991, while others are new with QuickDraw GX.

In addition to Apple, developers of font tools, font formats, and platforms have used the extensible nature of the sfnt to define their own proprietary tables.

TrueType 1.0

A TrueType 1.0 font, also called a ***simple font***, must contain the following nine basic tables for Macintosh compatibility:

Tag	Meaning
cmap	Character to index mapping
glyf	Glyph data
head	Font header
hhea	Horizontal header
hmtx	Horizontal metrics
loca	Index to location
maxp	Maximum profile
name	Name
post	PostScript

TrueType 1.0 defines four additional tables to be used for instruction data:

Tag	Meaning
cvt	Control value
fpgm	Font program
hdmx	Horizontal device metrics
prep	Preprogram

These four tables are optional, and may be omitted if your font contains no instruction data.

TrueType GX

TrueType GX defines 19 new tables which may be present in a font. There is no strict definition of a ***TrueType GX font***, except that it contains one or more of the tables defined for GX. The GX tables can be divided into several groups, according to what kinds of functionality they support. (This is not a strict division, as some tables support several different kinds of GX effects.)

Glyph effects are defined in two tables:

Tag	Meaning
feat	Feature name
mort	Glyph metamorphosis

Position effects require six tables:

Tag	Meaning
fmtx	Font metrics
just	Justification
kern	Kerning
lcar	Ligature caret
opbd	Optical bounds
trak	Tracking

Seven tables are used primarily for language and script support:

Tag	Meaning
acnt	Accent attachment
bdat	Bitmap data
bloc	Bitmap location
bsln	Baseline
prop	Glyph properties
vhea	Vertical header
vmtx	Vertical metrics

Style variations use three tables:

Tag	Meaning
cvar	CVT variation
fvar	Font variations
gvar	Glyph variations

The remaining two tables are used for font self-identification:

Tag	Meaning
fdsc	Font descriptors
OS/2	OS/2

Font tools

Because the table structure is so flexible, many font tools (including TrueEdit) define their own tables to store additional tool-specific information in an sfnt during font development.

TrueEdit's tables are:

Tag	Meaning
clas	Glyphs may be grouped together into named classes for ease of editing. This table contains those class names and associations. The clas table is not an officially defined TrueType GX table.
TR*nn*	TrueEdit source (where *nn* is a two-digit number). These tables are used by TrueEdit to store information about user choices for various editors.

Details of the TrueEdit source table formats are included in Appendix C.

The Apple tool RoyalT defines the tables edt0 and edt1 to store tool-specific information.

These tables contain no information relevant to the graphics system or to the end user, and only add to the font's size. Thus these tables should be stripped from a font before it is shipped to end users.

Keep a reference copy of the font with all tables intact, for use in later font development.

Other formats and platforms

The sfnt format was originally developed for TrueType fonts on the Macintosh. Since then, other sfnt tables have been defined for use with other platforms (such as Windows) and other font formats (such as PostScript Type 1). For more information, contact the developer of the platform or format.

Although, beginning with GX, PostScript Type 1 fonts for the Macintosh are shipped in the sfnt format, TrueEdit does not support them. You may be able to open the fonts and copy and paste tables between fonts, but you can't do actual GX development work.

TrueEdit may prevent you from opening a font which contains Type 1 tables. If you do succeed in opening the font, you should expect TrueEdit to crash at any time.

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