Raster, Vector, and TrueType Fonts

Previous versions of Windows had two types of fonts: raster and vector. Windows version 3.1 introduces a third type—TrueType fonts.

Raster fonts are stored as bitmaps. These bitmaps are designed for output devices of a particular resolution. GDI typically synthesizes bold, italic, underline, and strikeout characteristics for raster fonts; however, the results are not always attractive. When GDI must change the size of a raster font, aliasing problems can also reduce the attrac
tiveness of the text. Raster fonts are useful for specialized applications in which TrueType fonts are not available. Another possible advantage to using raster fonts derives from the large number of raster fonts that are often present on a user's system; an application could look for the name of a particular specialized or decorative font and use a TrueType font if the specified font was not present.

When an application requests an italic or bold font that is not available, GDI synthesizes the font by transforming the character bitmaps. When an application using only raster fonts requests a point size that is not available, GDI also transforms the bitmaps to produce the font. Because TrueType font families include bold, italic, and bold italic
fonts, and because TrueType fonts are scalable to any requested point size, GDI does not synthesize fonts as frequently as it did for earlier versions of Windows. For more information about this subject, see Section 18.2.5, “Font Mapper.”

Windows version 3.1 contains a new set of raster fonts. This set, called Small Fonts, is for use at resolutions of less than 8 points. Although TrueType fonts can be scaled to less than 8 points, glyphs this small may not be legible enough for regular use. Because glyphs this small contain very little detail, it is more efficient to use the raster small fonts than to scale TrueType fonts to the small size. (GDI synthesizes bold and italic attributes for the raster small fonts, when necessary.)

Vector fonts are stored as collections of GDI calls. They are time-consuming to generate but are useful for such devices as plotters, on which bitmapped characters cannot be used. (By drawing lines, GDI can simulate vector fonts on a device that does not directly support them.) Prior to the introduction of TrueType fonts, vector fonts were also us
eful for applications that used very large or distorted characters or characters that needed to be perpendicular to a base line that was at an angle across the display surface.

TrueType fonts are stored as collections of points and hints that define character outlines. (Hints are algorithms that distort scaled font outlines to improve the appearance of the bitmaps at specific resolutions.) When an application requests a TrueType font, the TrueType rasterizer uses the outline and the hints to produce a bitmap of the size
requested by the application.

The default font for a device context is the System font, a proportionally spaced raster font representing characters in the Windows character set. Its font name is System. Windows uses the System font for menus, window titles, and other text. It is possible to have multiple fonts in the system that have the same name (for example, a Courier device font and a Courier GDI raster font). However, applications typically do not present a font name to the user more than once—instead, they discard duplicates. Applications can control which font is presented to the user when duplicate font nam
es occur by using the lfOutPrecision member of the LOGFONT structure.

Suport For Truetype by MS Windows 3.1

The information below applies to the Microsoft Windows Software Development Kit for Windows version 3.1:

Summary:
Microsoft Windows version 3.1 supports TrueType, a scalable font technology developed by Apple Computer and adapted to Windows by Microsoft. This lists the files in the Software/Data Library that provide technical documentation and tools for TrueType.
Note: To widely disseminate information about TrueType, these files are being distributed through a number of sources.

Each archived file can be found in the Software/Data Library by searching on the name of the file, the Q number of this article, or the file-specific S number listed in the table below. Each file was archived using the PKware file-compression utility.

TTSPEC1	S13442	TrueType Font Files Spec (1 of 3)
TTSPEC2	S13443	TrueType Font Files Spec (2 of 3)
TTSPEC3	S13444	TrueType Font Files Spec (3 of 3)
TTFDUMP	S13445	TrueType Font Display Utility
TTFNAME	S13446	Source Code Parses TrueType Fonts
TTWIN	S13451	TrueType Extensions to Windows
EMBEDDIN	S13447	TrueType Font Embedding Document
TTTALK	S13452	TrueType Technical Talks 1 & 2

LUCIDA S13448 Lucida Font Typographic Info

More Information:
"The TrueType Font Files Specifications" is a 400-page book that details the following:
- How to construct a TrueType font from scratch (or build a font construction tool)
- The TrueType programming language
- The format of each subtable in the .TTF file and illustrations of table contents.

The TrueType specification is available in Microsoft Word for Windows 2.0 format. Windows 3.1 is required to print this document. The TTSPEC1 archive includes a README.DOC file with printing instructions. Work is under way to convert this document into a Windows Help file for online reference.

The TrueType specification is distributed as three archive files: TTSPEC1, TTSPEC2, and TTSPEC3. These files require 2.5 megabytes (MB) after decompression.
TTFDUMP contains a program for MS-DOS that displays the contents of a TrueType font. TTFDUMP can display an entire font or specific subtables. The TTFDUMP tool, in combination with the TrueType font specifications above, provides information to efficiently debug or explore any TrueType font.

For example, the TTFDUMP utility can display the "cmap" table (that maps character codes to glyph indices) of a font with the following command:

ttfdump <fontname>.ttf -tcmap -nx

The TTFDUMP utility provides a usage message when no parameters are specified.
The TTFNAME file contains C source code that demonstrates how an application can parse the contents of a TrueType font. Although this particular example opens a font file and locates the font name in the "name" table, it could be readily extended to parse any other structure in a font file. The TTFNAME archive also contains many useful header files that define structures corresponding to the tables of a TrueType font file. This code can be used in an application to parse the TrueType data stream returned by the GetFontData function in Windows 3.1.

The TTWIN archive contains a 31-page Word for Windows 2.0 document targeted to an application developer who is interested in the capabilities that TrueType adds to Windows 3.1. This document contains many illustrations.

The EMBEDDIN archive contains a text file that describes all the information required for an application developer to add TrueType font embedding capabilities to an application. Font embedding enables an application to bundle TrueType fonts with a document. If a document is transferred to another system,

bundled fonts are available for document display and printing regardless of the fonts installed on the target machine.

The TTTALK archive contains the TrueType Technical Talks 1 and 2. These text files describe some of the internal details of TrueType as implemented in Windows 3.1. The first document discusses processing from the time the user presses a key on the keyboard until the character appears on the screen. This processing includes scaling, hinting, drop-out control, caching, and blitting. The second document describes a unique feature of TrueType called non-linear scaling. Nonlinear scaling enables a font vendor to overcome some of the physical limitations of low-resolution output devices.

The LUCIDA archive contains useful typographic information about the 22 Lucida fonts included with the Microsoft TrueType Font Pack for Windows. This file provides tips on line layout, mixing and matching fonts in the Lucida font family, and some history for each typeface.

This information was written by the designers of the Lucida font, Chuck Bigelow and Kris Holmes.

TrueType Fonts Reading List

The information below applies to the Microsoft Windows Software Development Kit for Windows version 3.1

Summary:
This section contains a list of documents available from Microsoft that discuss TrueType fonts with reference to their use in Microsoft Windows operating system version 3.1.
The documents are broadly classified into three categories on the basis of their technical scope. Documents in the "End User" category have information about using TrueType fonts for the Windows 3.1 end user. Documents in the "Application Developer" category discuss the impact of TrueType fonts on Windows applications and contain technical details that let application developers use, and take advantage of, TrueType font technology in their applications. Documents in the "Font/Tool/Curious Developer" category contain information useful to developers interested in developing their own TrueType fonts or font-development tools, or interested in knowing about the inner workings of the TrueType font technology.

Each entry contains information to help the reader obtain a copy of the document. Many of the following documents will be available as part of the upcoming Microsoft Developer Network (MSDN) CD. For more information about this CD, call the Microsoft Developer Services Team at (800) 227-4679.

End User Oriented Documents

Title: *"Fonts in Windows 3.1"*

What to expect: This section gives a comprehensive introduction to the font technologies (including TrueType) used in Windows 3.1.

Finding a hardcopy: This document is available as an application note (WW0528); call Microsoft Product Support Services at (206) 637-7098 to request this application note. It is also available in the Software/Data Library (on CompuServe [GO MSL] and Microsoft OnLine) as document S13367. Similar information can also be found in Chapter 9, "Fonts," of the "Microsoft Windows Resource Kit" manual.

Title: *"Microsoft TrueType Font Pack User's Guide"*

What to expect: This document contains notes on installing and using TrueType fonts, designing documents with TrueType fonts, and a brief history of the TryeType font technology.

Finding a copy: This document is shipped with the Microsoft TrueType Font Pack for Windows. The font pack is an assortment of 44 TrueType fonts. Call Microsoft Consumer Sales at (800) 426-9400 for purchasing information.

Application Developer Oriented Documents

Title: Chapter 18, *"Fonts," in the "Guide to Programming"*

What to expect: This document contains a gentle introduction to using fonts in applications. It begins with a discussion of the fundamentals of fonts, introduces the three font technologies used in Windows 3.1 (with an emphasis on TrueType fonts), discusses TrueType font technology in the context of WYSIWYG and document/printer/platform portability, and finally delves into the details of using fonts (with due attention paid to TrueType) in Windows 3.1 applications.

Finding a copy: This manual is shipped with the Windows 3.1 Software Development Kit (SDK). All the information is also available in the SDK 3.1 online documentation (WIN31WH.HLP) under the subject headings "Font Fundamentals," "Fonts in Windows," "TrueType Font Technology," and "Using Fonts in Applications."

Title: *"Windows Font Mapping"*
Author: Ron Gery

What to expect: This document discusses the Windows 3.1 font mapper and how it controls the realization of fonts. Attention is paid to selecting TrueType fonts

and the effect of having TrueType fonts on the fonts selected by applications developed for Windows 3.0 (which does not have TrueType fonts).
Finding a copy: This document is available as part of the MSDN CD.

Title: *"Using TrueType"*
Author: Ron Gery
What to expect: This document gives a basic introduction to using TrueType in an application under Windows 3.1. It discusses most of the TrueType functions, enumerating and selecting TrueType fonts, positioning TrueType characters in documents, and page layout.

Finding a copy: This document is available as part of the MSDN CD. It is also available on CompuServe as file T2API.ZIP in LIB 8 of the MSDNLIB forum.

Title: "TrueType and Microsoft Windows Version 3.1"
Authors: David Weise and Dennis Adler

What to expect: This document introduces some font concepts and details the various aspects of using TrueType fonts in applications developed for Windows 3.1.
Finding a copy: This document is available as part of the MSDN CD. It is also available in the Software/Data Library (on CompuServe [GO MSL] and Microsoft OnLine) as document S13451 and on CompuServe as file TT.ZIP in LIB 8 of the MSDNLIB forum.

Font/Tool/Curious Developer Oriented Documents

Title: *"Advanced TrueType: GetGlyphOutline"*
Author: Ron Gery

What to expect: This document presents an explanation of the GetGlyphOutline function. It complements the definition of GetGlyphOutline found in the Windows SDK 3.1 reference manual and extends the definition by providing explanations for those portions of the GetGlyphOutline function that were omitted in the SDK 3.1 manual.

Finding a copy: This document is available as part of the MSDN CD and on CompuServe as file GLYPH.ZIP in LIB 1 (and eventually in LIB 9) of the WINSDK forum.

Title: *"An Introduction to Digital Typography Using TrueType"*
Author: George Moore

What to expect: This transcript of a technical talk lists the basic steps that a typical computer system goes through in order to display characters on the output device and details these steps for TrueType fonts in Windows 3.1.

Finding a copy: This document is available as part of the MSDN CD and as in the Software/Data Library (CompuServe [GO MSL] and Microsoft OnLine) document S13452.

Title: *"Linear vs. Nonlinear Scaling"*
Author: George Moore

What to expect: This transcript of a technical talk describes the importance of being able to nonlinearly scale a font. It discusses how a TrueType font vendor can use nonlinear scaling so that low-resolution devices can display high-quality TrueType fonts.

Finding a copy: This document is available in the Software/Data Library (CompuServe [GO MSL] and Microsoft OnLine) as document S13452.

Title: *"TrueType Font Files Specification Version 1.0"*

What to expect: This specification details how to construct a TrueType font from scratch (or build a tool to do so), the TrueType programming language, and the complete format of each subtable contained in the .TTF file. It also contains illustrations.

Finding a copy: This document is spread over three documents (S13442, S13443, S13444) and is available in the Software/Data Library (CompuServe [GO MSL) and Microsoft OnLine). This specification is also available on CompuServe as a Windows 3.1 Help file (TTHELP.ZIP) in LIB 1 (and eventually in LIB 9) of the WINSDK forum.
Additional reference words: 3.10 true type
KBCategory:
KBSubcategory: GdiTTCustom

TrueType Font Converters and Editors

Summary:
The text below lists a number of commercial software tools that convert existing fonts to TrueType fonts or help build new fonts. The tools are listed in alphabetical order by name. None of these tools is recommended over any other, nor over any that are absent from the list. Each of the tools has its own strengths and weaknesses. Before making any purchase, examine the tool and its documentation to see if it meets your needs. This list will be updated as more tools become available.

Some of the following tools run on an Apple Macintosh while others run on an

IBM PC/AT or compatible computer. The same TrueType font can run on a Macintosh or with Microsoft Windows operating system version 3.1.

To convert a font from the Macintosh to Windows 3.1, save the data fork from a Macintosh font to a file, copy the file to an MS-DOS-formatted disk, give the file a .TTF file extension, and use the Windows 3.1 Control Panel to install the font.

The products included here are manufactured by vendors independent of Microsoft; we make no warranty, implied or otherwise, regarding these products' performance or reliability.

AllType V 1.0
Author:
Atech Software
5964 La Place Court, Suite 125 Carlsbad, CA 92008
(619) 438-6883
Description: Character-based application running under MS-DOS. Converts almost any font format to any other. Supported formats include TrueType, Type-1, Type-3, Nimbus Q, and Intellifont.
AllType V 1.0 is available from the Microsoft Library.

Evolution 2.0 for Macintosh
Author:
Image Club Graphics, Inc.
1902 11th St. SE, Suite 5
Calgary, Alberta, Canada T2G 3G2 (403) 262-8008
Description: Converts almost any font format to any other. Supported formats include TrueType, Type-1, and Type-3.

FontMonger for Windows
FontMonger for Macintosh
Author:
Ares Software
561 Pilgrim Drive, Suite D
Foster City, CA 94404
(415) 578-9090
Description: Converts almost any font format to any other. Supported formats include TrueType, Type-1, Type-3, and Intellifont. Also provides minor font editing by creating composite characters or rearranging the characters in a font.
FontMonger for Macintosh V 1.0.5 is available from the Microsoft Library.

Incubator for Windows

Author:
Type Solutions, Inc.
91 Plaistow Rd

Plaistow, NH 03865
(603) 382-6400
Description: Supports adding effects to TrueType fonts. Contact Type Solutions for more information.

Metamorphosis Professional for Macintosh
Author:
Altsys Corp.
269 W. Renner Rd
Richardson, TX 75080
(214) 680-2060
Description: Converts almost any font format to any other. Supported formats include TrueType, Type-1, Type-3, and PICT format. One interesting feature allows the user to read a Type-1 font from the ROM of an Apple LaserWriter printer and convert the font to another format.

FONT EDITORS

Fontographer 3.5 for Windows
Fontographer 3.5 for Macintosh
Author:
Altsys Corp.
269 W. Renner Rd
Richardson, TX 75080
(214) 680-2060
Description: A complete font editing tool. Supports creating a font from scratch and modifying existing fonts. Supports a variety of formats including TrueType and Type-1. Includes an autohinter. Windows version shipped of July 1992.

FontStudio 2.0 for Macintosh
Author:
Letraset Graphic Design Software
40 Eisenhower Dr
Paramus, NJ 07653
(800) 343-TYPE or (201) 845-6100
Description: A complete font editing tool. Supports creating fonts from scratch and modifying existing fonts. Supports a variety of formats including TrueType and Type-1. Includes an autohinter.

TypeMan 1.0 for Macintosh
Author:
Type Solutions, Inc.
91 Plaistow Rd
Plaistow, NH 03865
(603) 382-6400

Description: Designed for font foundries, this tool provides precise control over the hints in a font and includes an autohinter. Supports specifying a font in a high-level programming language, which the tool compiles to the binary TrueType format.

End.