



Fonts in L<sup>A</sup>T<sub>E</sub>X

Kailash Jajam

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# Fonts in L<sup>A</sup>T<sub>E</sub>X

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# Outline:

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## What is a font?

- in general terms:
  - collection of glyphs (characters, symbols) of a particular design
  - organized into families, series and individual shapes
  - can be accessed either by character code or by symbolic names
- in technical terms:
  - different representations depending on the point of view
  - T<sub>E</sub>X typesetter: described by T<sub>E</sub>X font metrics (TFM)
  - DVI driver: virtual fonts (VF), bitmaps fonts (PK), outline fonts (PFA/PFB or TTF)
  - PostScript: Type 1 (outlines), Type 3 (anything), Type 42 fonts (embedded TTF)
- font information consists of:
  - metric information (glyph metrics and global parameters)
  - glyph shapes (bitmaps and outlines)



# Font file formats

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- **Metafont:**
  - TFM, PL:  $\text{\TeX}$  font metrics (binary), property lists (textural)
  - VF, VPL: virtual fonts (binary), virtual property lists (textural)
  - GF, PK: generic fonts, packed fonts (bitmap formats)
- **PostScript Type 1 outline fonts:**
  - AFM: Adobe font metrics (textural)
  - PFM: printer font metrics (binary)
  - PFA: printer font ASCII (encoded glyph programs in textural formats)
  - PFB: printer font binary (encoded glyph programs in binary formats)
- **TrueType outline fonts:**
  - TTF: TrueType font (includes both metrics and glyph programs)
  - T42: Type 42 font, TrueType font embedded in PostScript wrapper



# How fonts work in general in $\text{\LaTeX}$ ?

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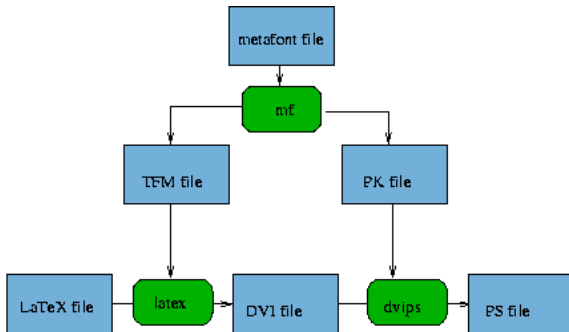


Figure:  $\text{\LaTeX}$ 's use of metafont fonts

- TFM and PK files are required.
- TFM file contains the information about size of each character and how the character will be affected by neighboring ones in addition to how elastic the space around the character.
- DVI file contains the coordinates of the characters but not the font shape and the shape of each character can be imparted in two ways:
  - as a bitmap: PK files hold bitmaps at set resolutions.
  - as a postscript character.



# Font packages in L<sup>A</sup>T<sub>E</sub>X

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Most L<sup>A</sup>T<sub>E</sub>X installations support at least the core set of 13 using the packages below:

- avant: AvantGrade font as default sans
- avantgar: ITC Avant Garde
- bookman: Bookman font as default roman
- chancery: Zapf Chancery font as default roman
- charter: default roman
- courier: default ttddefault
- helvetic: Helvetica font as default sans
- mathpazo: Palatino font as default roman
- mathptmx: Times font as default roman
- ncntrsbk: NewCenturySchlbk-Roman
- newcent: NewCenturySchoolbook font as default Roman
- palatcm: Palatino + Computer Modern math
- pifont: Pi font support (sepcial characters)
- utopia: Utopia font as default roman
- zapfchan: ITC Zapf Chancery as default roman

To use (for example) Helvetica, one just adds `\usepackage{helvet}`



# L<sup>A</sup>T<sub>E</sub>X font attributes

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Every text font in L<sup>A</sup>T<sub>E</sub>X has five attributes:

- encoding - This specifies the order that characters appear in the font (e.g. whether the 65th character is 'A'). The most common value for TeX font encoding is OT1. The other predefined option is T1 (extended T<sub>E</sub>X). There is also US ASCII (7 bit), ISO Latin-1 (8 bit), Adobe Standard Encoding, etc.
- family - The name for a collection of fonts, usually grouped under a common name by the font foundry. For example, 'Adobe Times' ptm and Knuth's 'Computer Modern Roman' cmr are font families.
- series - How heavy or expanded a font is. For example, 'medium weight', 'narrow' and 'bold extended' are all series.
- shape - The form of the letters within a font family. For example, 'italic', 'oblique' and 'upright' are all font shapes.
- size - The design size of the font, for example '10pt'.

The commands to change font attributes are illustrated by the following example:

```
\fontencoding{T1}  
\fontfamily{garamond}  
\fontseries{m}  
\fontshape{it}  
\fontsize{12}{15}  
\selectfont
```

This series of commands set the current font to medium weight italic garamond 12pt type with 15pt leading in the T1 encoding scheme, and the `\selectfont` command causes LaTeX to look in its mapping scheme for a metric corresponding



# Encoding vectors and Mapping schemes

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$\text{\LaTeX}$  typesets use a particular encoding vector and a particular font metric scaled to a particular size depending upon the values of these attributes.

- Encoding vector- a set of instructions to LaTeX detailing how particular symbols are to be constructed. For example, the T1 encoding vector file T1enc.def contains the following commands, among many others:

```
\DeclareFontEncoding{T1}{}{}  
\DeclareTextAccent{\'}{T1}{1}  
\DeclareTextSymbol{\ae}{T1}{230}  
\DeclareTextComposite{}{T1}{a}{228}
```

- Mapping schemes - Once a the relevent encoding vector is defined, you may want to set up a scheme which maps font attribute sets to font metrics. For example, the file T1garamond.fd contains the commands

```
\DeclareFontFamily{T1}{garamond}{}  
\DeclareFontShape{T1}{garamond}{m}{n}{<->garrm}{}  
\DeclareFontShape{T1}{garamond}{m}{it}{<->garit}{}
```





# Associated L<sup>A</sup>T<sub>E</sub>X utilities

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L<sup>A</sup>T<sub>E</sub>X packages to support new fonts usually contain detailed installation details:

- `afm2tfm` - This will create a TFM files of raw fonts and vpl files of virtual fonts from an AFM file.
- `ttf2tfm` - TrueType to TFM
- `ttf2afm` - TrueType to AFM
- `ttf2ptl` - TrueType to AFM and PFB
- `vptovf` - From a VPL file this creates vf and tfm files for virtual fonts.
- `mf` - processes a metafont file to produce TFM and PK files.



# T<sub>E</sub>X font names

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In the configuration files the fonts are codenamed. The naming scheme is `FNW{V}E{n}` where:

- F - is a one-letter abbreviation for the foundry (m = monotype, p = adobe, b = bitstream, f = free)
- N - is a two letter abbreviation for the font name (for example, ag = "avant garde")
- w - is the font weight (r = regular, b = bold, l = light d = demibold)
- v - is an optional slope variant (i = italic , o = oblique)
- E - is an abbreviation for the encoding (almost always 8a which is adobe standard encoding).
- N - is an optional width variant (n = narrow)

For example, the font Adobe Garamond demibold is `pgad8a`.



# Useful example

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In order to select another than the default typeface in LaTeX environment, it is necessary to include some commands in the preamble of the document.

Consider the following example:

```
\usepackage[T1]{fontenc}
\usepackage[light,math]{iwona}

\documentclass{book}
\newcommand\blah{blah blah blah}
\blah \blah

\renewcommand*\rmdefault{ppl}\normalfont\upshape
\blah \blah

\renewcommand*\rmdefault{iwona}\normalfont\upshape
\blah \blah

\end{document}
```



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Detailed description can be found at:

- <http://www.cl.cam.ac.uk/~rf10/pstex/latexcommands.htm>
- <http://www-h.eng.cam.ac.uk/help/tpl/textprocessing/fonts.html>
- <ftp://tug.ctan.org/tex-archive/fonts/utilities/fontinst/doc/talks/et99-font-tutorial.pdf>



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# Thank You