

# Step by step, installing a ttf-font for PdfTeX

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## 1. How to install a ttf-font

### 1.1. Why

One of the defaults of LaTeX is the . . . LaTeX-made appearance of the documents you build, although it is easy to particularise LaTeX documents. For instance, everyone can modify the margins; and in this document you can see home-made section headers.

There are also a lot of fonts in your LaTeX distribution, as *palatino* that I often use. And, if we can easily find a lot of free ttf-fonts, we can also use these with success in pdfTeX. . . This text is made, for instance, with the fonts **BookAntiqua**, **Maiandra** and **Luximono** as roman, sans-serif and teletype.

I suppose you work with LaTeX2e and use Cork-encoding, also called T1: at the beginning of your TeX-files, you have `\usepackage[T1]{fontenc}`.

Our job is to have the commands like `\textbf{. . .}` working properly with your ttf fonts.

We install these fonts for PdfTeX, it can use ttf-files, but, it cannot, today, build slanted or extended ones.

It is a pity to work with a bad word processor because you want to use some ttf fonts and you are unable to install them in pdfTeX. Do not forget that these bad word processors cannot make a ligature or use a kerning by pairs table!

### 1.2. It is easier than you think

First, installing Truetype font is easier than you think. Often, we read a lot of nonsense about this: how impossible it is to get easily the kerning table of a ttf font with PdfTeX, or how PdfTeX cannot use virtual fonts. . . It is not the truth!

In these pages, we describe step by step how to install a TrueType font, and I chose, Perpetua Windows standard, as an example.

I am going to install the four fonts you get with Windows: medium and bold, upright or italic. The small caps will become bold, and the slanted italic.

I'll call the font family ppt.

The process I describe runs with a lot of ttf fonts but not all of them. . .

### 1.3. How to use these fonts

To use as default font, type

```
\usepackage{perpetua}
```

in the preamble.

To use locally, type

```
{\fontfamily{ppt}\selectfont ... }
```

with your text inside.

## 2. Our full example: installing Perpetua

### 2.1. The ttf-files you can get

I get four fonts Perpetua, medium upright and bold upright, medium italic and bold italic, respectively:

```
Perpetua.ttf Perpetuabd.ttf Perpetuait.ttf Perpetuabi.ttf
```

### 2.2. Files to build

To run as usual with pdfTeX, we need several files:

- A fd file, as Font Definition, that, with
  - the **encoding**, here T1,
  - the **family**, here ppt,
  - the **weight**, here medium-m or bold-b,
  - and the **shape**, here upright-n or italic-it,

determines the internal LaTeX-name of the font!

Our fd file, **necessarily**, will be: t1ppt.fd

- A map file. We have to append the reference to this map file in the config file of LaTeX, or append the lines of this map file at the end of the psfonts.map file that pdfTeX read. This file links between the ttf files and the internal fonts names of LaTeX.
- A tfm file for each font file.  
In our example, Perpetua, we have four ttf files, and we have to build four tfm files.
- We can also write a sty file, a package to use these fonts as default. We'll name it perpetua.sty

### 2.3. The fd-file

The family font is ppt.

We are going to put the fd file, here t1ppt.fd, in

```
/localtexmf/tex/LaTeX/psnfss/
```

It goes like:

```
\ProvidesFile{t1ppt.fd}
  [2005/03/10 font definitions for T1/ppt.]

\DeclareFontFamily{T1}{ppt}{}

\DeclareFontShape{T1}{ppt}{m} {n} {<-> pptmn8t }      {}
\DeclareFontShape{T1}{ppt}{b} {n} {<-> pptbn8t }      {}
\DeclareFontShape{T1}{ppt}{m} {it} {<-> pptmit8t }     {}
\DeclareFontShape{T1}{ppt}{b} {it} {<-> pptbit8t }     {}
```

```

\DeclareFontShape{T1}{ppt}{m}{sc}{<-> ssub * ppt/b/n} {}
\DeclareFontShape{T1}{ppt}{m}{sl}{<-> ssub * ppt/m/it}{}

\DeclareFontShape{T1}{ppt}{sb}{n} {<-> ssub * ppt/b/n} {}
\DeclareFontShape{T1}{ppt}{sb}{sc}{<-> ssub * ppt/b/n} {}
\DeclareFontShape{T1}{ppt}{sb}{sl}{<-> ssub * ppt/b/it}{}
\DeclareFontShape{T1}{ppt}{sb}{it}{<-> ssub * ppt/b/it}{}

\DeclareFontShape{T1}{ppt}{b}{sc} {<->ssub * ppt/b/n} {}
\DeclareFontShape{T1}{ppt}{b}{sl} {<->ssub * ppt/b/it} {}

\DeclareFontShape{T1}{ppt}{bx}{n} {<->ssub * ppt/b/n} {}
\DeclareFontShape{T1}{ppt}{bx}{sc}{<->ssub * ppt/b/n} {}
\DeclareFontShape{T1}{ppt}{bx}{sl}{<->ssub * ppt/b/it} {}
\DeclareFontShape{T1}{ppt}{bx}{it}{<->ssub * ppt/b/it} {}
\endinput

```

Look at the substitutions. Slanted became italic, small caps became bold, as semi-bold and extra-bold. The <-> means that this file has to be used with all sizes. Each font is described by:

- a **family name**, here: ppt;
- a **weight**, here: m, sb, b, bx as medium, semi-bold, bold and extra-bold;
- a **shape**, here: n, it, sl, sc as upright, italic, slanted et small caps;
- and an **encoding**, here: 8t as T1 encoding.

The LaTeX names of these fonts are:

```
pptmn8t pptbn8t pptmit8t pptbit8t
```

## 2.4. The map-file

Make a Perpetua.map file including only these lines:

```

pptmn8t Perpetua <Perpetua.ttf <T1-WGL4.enc
pptbn8t PerpetuaBold <Perpetuabd.ttf <T1-WGL4.enc
pptmit8t PerpetuaItalique <Perpetuait.ttf <T1-WGL4.enc
pptbit8t PerpetuaBoldItalique <Perpetuabi.ttf <T1-WGL4.enc

```

At first, for a "temporary" use, let the file Perpetua.map in your current directory and insert in the preamble of your document :

```
\pdfmapfile{+Perpetua.map}
```

Elsewhere, install "definitively" the map file is more difficult than the other files:

- With a web2c distribution, execute updmap:

```
updmap --enable Map=Perpetua.map
```

and/or, as *root*:

```
updmap-sys --enable Map=Perpetua.map
```

- With MikTeX, follow these instructions :

<http://docs.miktex.org/manual/advanced.html#psfonts>

The encoding file T1-WGL4.enc directly built a T1 encoded LaTeX font. The readable names are indifferent, in fact (no space!).

## 2.5. The tfm files

Running `ttf2tfm` and `vptovf` built the `tfm` files (TeX Fonts Metrics).

I do not change the names of the `ttf` files, because I cannot do it, but I rename the LaTeX internal fonts as usual, — which is not necessary in fact..

We open a temporary working directory, with a copy of our `ttf` files and the encoding file `T1-WGL4.enc` we find in the `texmf` directory.

To build the `tfm` files, run:

```
ttf2tfm Perpetua.ttf -q -T T1-WGL4.enc -v Perpetua.vpl Perpetua.tfm
vptovf Perpetua.vpl Perpetua.vf Perpetua.tfm
```

The first line built, from the `ttf` file, a `vpl` file and an uninteresting `tfm` file with no lig nor kerning table.

The second line built, from the `vpl` file, a `vf` file uninteresting for us, and the good `tfm` file.

We do the same with the three other `ttf` files.

Then, we rename the `tfm` file, as in the lines of the `map` file. Respectively:

```
pptmn8t.tfm pptbn8t.tfm pptmit8t.tfm pptbit8t.tfm
```

We can erase other files.

To read a `tfm` file, we have to translate it into a `pl` file, "human"-readable.

```
tftopl pptmn8t.tfm pptmn8t.pl
```

We open the `pl` file with a basic text editor. There we can see the lig and kerning table.

For instance:

```
(LIGTABLE
```

```
...
```

```
(LABEL C f)
```

```
(LIG C l 0 35)
```

```
(LIG C i 0 34)
```

```
(KRN 0 47 R 0.055)
```

```
(STOP)
```

```
...
```

```
(LABEL C y)
```

```
(KRN 0 56 R -0.064)
```

```
(KRN 0 54 R -0.064)
```

```
(STOP)
```

```
)
```

It is easy to read, Octal 34 is the ligature `fi`, `f` followed by `i` changes to become Octal 34...

Octal 47 is quote, slightly moved to the right after an `f`.

Octal 56 is period, slightly moved to the left after an `y`...

## 2.6. The sty file

Our `perpetua.sty` is very simple:

```
\ProvidesPackage{perpetua}[2005/03/10 C.Caignaert
  LaTeX package loading Perpetua TTF font]
\renewcommand{\rmdefault}{ppt}
\endinput
```

That's all folks!

## 2.7. Where to put all these files ?

- `sty` in `localtexmf/tex/latex/psnfss/`
- `fd` in `localtexmf/tex/latex/psnfss/`
- `map` in `localtexmf/tex/pdftex/config/`
- `tfm` in `localtexmf/fonts/tfm/truetype/Perpetua/` for instance, or in a sub-directory of `localtexmf/fonts/tfm/`
- `ttf` in `localtexmf/fonts/truetype/Perpetua/` for instance, or in a sub-directory of `localtexmf/fonts/`

And now, refresh your LaTeX data base... And be sure that LaTeX finds these files! Sometimes, we have to move the file `T1-WGL4.enc` into `localtexmf/pdftex/enc/` or `localtexmf/tex/enc/` or `localtexmf/enc/...`

## 2.8. Test of Perpetua

Essai de « — Perpetua — ».

Tout, finir, fleur, efficace, affolé, efflanqué, ambiguë, cœur, Avantage.

La police est bien accentuée, ligaturée et crénée.

**Essai en gras**

*Essai en italique*

***Essai en gras italique.***

## 2.9. Small ajustement

These fonts seem too small...

We re-open the `fd` file, and alter the four first lines:

```
\ProvidesFile{t1ppt.fd}
  [2005/03/10 font definitions for T1/ppt.]

\DeclareFontFamily{T1}{ppt}{}

\DeclareFontShape{T1}{ppt}{m} {n}{<-> s * [1.21] pptmn8t }{}
\DeclareFontShape{T1}{ppt}{b} {n}{<-> s * [1.21] pptbn8t }{}
\DeclareFontShape{T1}{ppt}{m} {it}{<-> s * [1.21] pptmit8t }{}
\DeclareFontShape{T1}{ppt}{b} {it}{<-> s * [1.21] pptbit8t }{}
```

```

\DeclareFontShape{T1}{ppt}{m}{sc}{<-> ssub * ppt/b/n} {}
\DeclareFontShape{T1}{ppt}{m}{sl}{<-> ssub * ppt/m/it}{}

\DeclareFontShape{T1}{ppt}{sb}{n} {<-> ssub * ppt/b/n} {}
\DeclareFontShape{T1}{ppt}{sb}{sc}{<-> ssub * ppt/b/n} {}
\DeclareFontShape{T1}{ppt}{sb}{sl}{<-> ssub * ppt/b/it}{}
\DeclareFontShape{T1}{ppt}{sb}{it}{<-> ssub * ppt/b/it}{}

\DeclareFontShape{T1}{ppt}{b}{sc} {<->ssub * ppt/b/n} {}
\DeclareFontShape{T1}{ppt}{b}{sl} {<->ssub * ppt/b/it} {}

\DeclareFontShape{T1}{ppt}{bx}{n} {<->ssub * ppt/b/n} {}
\DeclareFontShape{T1}{ppt}{bx}{sc}{<->ssub * ppt/b/n} {}
\DeclareFontShape{T1}{ppt}{bx}{sl}{<->ssub * ppt/b/it} {}
\DeclareFontShape{T1}{ppt}{bx}{it}{<->ssub * ppt/b/it} {}
\endinput

```

and we test again:

Essai de « — Perpetua — ».

Tout, finir, fleur, efficace, affolé, efflanqué, ambiguë, cœur, Avantage.

La police est bien accentuée, ligaturée et crénée.

**Essai en gras**

*Essai en italique*

***Essai en gras italique.***

## 2.10. Trouble shooting

First, read the log file and look for a mistake in your job. For instance, spaces (or underscore, etc) in the font names and the readable names of the map files are forbidden.

Do not forget that T1-WGL4 is not the universal encoding table, but the most usual. . . It is possible that, with some fonts, it is not running correctly. . .

## 2.11. No kerning table. . .

As bad word processors cannot use kerning by pair tables, some fonts have no kerning table and we may and must "hand" build such a table. It requires some previous experience; usually, we copy the kerning table from a similar font.

First, we have to translate the tfm file into a pl file and edit this one, as before.

We modify the (LIGTABLE. . . section of the pl file.

Then, we translate back:

```
pltotf pptmn8t.pl pptmn8t.tfm
```

and we test.

An other way is using a font editor with auto-kerning capacities.

We don't have to do that with Perpetua because this font has a correct kerning table!

Do not forget that there is no kern with teletype and some script fonts. But, a roman or sans-serif font **needs** a kerning table.

## 3. pdfTeX versus LaTeX-dvips ?

### 3.1. pdfTeX

pdfTeX is using directly ttf fonts, it's the main quality of it. So, the prints are fine as the display with Xpdf or Acroread. . .

### 3.2. LaTeX-dvips

When we use a ttf font, dvips build the corresponding pk font. The prints are fine, but, when you convert ps files into pdf files, the display is very poor. And, the ps or pdf files became very heavy.

But, we can use the following options of ttf2tfm:

- slant a font, option -s, for instance:

```
ttf2tfm Perpetua.ttf -q -s 0.167 -T T1-WGL4.enc -v pptmsl8t.vpl pptmsl.tfm
vptovf pptmsl8t.vpl pptmsl8t.vf pptmsl8t.tfm
```

don't forget the corresponding line of the map file

```
pptmsl PerpetuaSlant Slant=0.167 <Perpetua.ttf <T1-WGL4.enc
```

- extend or compress a font, option -x, for instance:

```
ttf2tfm Perpetua.ttf -q -x 0.75 -T T1-WGL4.enc -v pptmc8t.vpl pptmc.tfm
vptovf pptmc8t.vpl pptmc8t.vf pptmc8t.tfm
```

don't forget the corresponding line of the map file

```
pptmc PerpetuaCondense Extend=0.75 <Perpetua.ttf <T1-WGL4.enc
```

- built a small caps font, option -V instead of -v, for instance:

```
ttf2tfm Perpetua.ttf -q -T T1-WGL4.enc -V pptmsc8t.vpl pptmsc.tfm
vptovf pptmsc8t.vpl pptmsc8t.vf pptmsc8t.tfm
```

don't forget the corresponding line of the map file,

```
pptmsc PerpetuaSmallCaps <Perpetua.ttf <T1-WGL4.enc
```

To run, here, we have to install the vf file<sup>1</sup>.

Look at the fonts names...

If you build a new font, don't forget to modify the fd file. . .

In the fd file, you have to use the xxxxxx8t.xxx names!

The working map file is often:

```
/texmf/dvips/config/psfonts.map
```

---

<sup>1</sup>To slant or compress-extend a font, I think it is not necessary if all build files get the same name, but I don't test it.

### 3.3. Choose

You choose what you want..

I am working with pdf files and my choice is easy to do!

## 4. A little help to install your font

### 4.1. First step

At first, you have to choose a font family name, often 3 or 4 letters, here `ffn`. You will change `ffn` by your family name.

Copy your `psfonts.map` in your `localtexmf/tex/pdftex/config/`

Open a working directory and copy your `ttf` files and the encoding `T1-WGL4.enc` file.

### 4.2. The fd-file

Download from my site: <http://c.caignaert.free.fr/latex> five shells of `fd` files:

- `mn.fd`
- `mn-bn.fd`
- `mn-mit.fd`
- `mn-bn-mit.fd`
- `mn-bn-mit-bit.fd`

Probably, one of them is good for you, according to your fonts.

Change everywhere `xxx` into `ffn`, save it as `t1ffn.fd`

Copy this file in `localtexmf/tex/latex/psnfss/`

### 4.3. The map-file

You'll also find five shells:

- `mn.map`
- `mn-bn.map`
- `mn-mit.map`
- `mn-bn-mit.map`
- `mn-bn-mit-bit.map`

Choose the good file according to your fonts.

Change everywhere `xxx` into `ffn`, `FontDescription` into your font description (no space!)

`FontName` into the name of your font.

Append these lines at the end of your `local psfonts.map` and save it.



#### 4.4. The tfm-files

With Linux, open a console to make the conversions as in the example.

If you are working with MikTeX and TeXnicCenter, you can easily write a batch. The trick is to use the output profile facilities of TeXnicCenter.

Click   then

MikTeX ask a  answered: TTF -> TFM.

In  click  only.

You have 6 lines to write, respectively:

- C:\texmf\miktex\bin\ttf2tfm.exe
- "%bm.ttf" -q -T T1-WGL4.enc -v "%bm.vpl" "%bm.tfm"  
exactly;
- C:\texmf\miktex\bin\vptovf.exe
- "%bm.vpl" "%bm.vf" "%bm.tfm"  
exactly;
- C:\texmf\miktex\bin\tftopl.exe
- "%bm.tfm" "%bm.pl"  
exactly.

Click  <sup>2</sup>

To build the good tfm in your working directory, with TeXnicCenter, open a file named as your font, with any extension and anything inside.

Select your new profile and click

Do not be afraid of the warnings, at least 15! Use this profile with all your ttf fonts.

If you need a kerning table, open the pl file and you can see if you have got one. If not, append one as described before.

Now rename your tfm file as in your map file, for instance ffnmn8t.tfm, et copy your tfm file into the correct directory.

To append a kerning table, write 2 new profiles: P1 -> TFM and TFM -> PL each with only the first 2 lines.

To do that, click

and

#### 4.5. The sty-package

It is very easy, you can do it yourself!

The main line is:

```
\renewcommand{\rmdefault}{ffn} for a roman or script font, or  
\renewcommand{\sfdefault}{ffn} for a sans-serif font, or,  
\renewcommand{\ttdefault}{ffn} for a teletype font.
```

---

<sup>2</sup>In fact, we don't need the two last lines. Then, open the vpl file to see the kerning table.

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*If you enjoy the job,  
please send some gift at UNICEF or Red Cross or . . .*

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