

Ghostscript 9.16

May 6, 2015

1 Introduction

The Ghostscript package in MacTeX-2015 was extensively revised to add support for Chinese, Japanese, and Korean fonts. We were initially contacted by Munehiro Yamamoto, who offered solutions to Ghostscript problems with Japanese typesetting. Extensive work was done by Kuroki Yusuke, Bruno Voisin, and Norbert Preining to perfect these solutions for the release of the MacTeX installation of Ghostscript 9.16.

Ghostscript is an open source interpreter for Adobe's Postscript and PDF page description languages. This software is optional for many TeX users, since modern engines like PdfTeX, XeTeX, and LuaTeX can directly output pdf files.

Before these engines were developed, it was common to typeset by calling TeX or LaTeX to convert a source document into a dvi file, and then calling dvips to convert this dvi file into a postscript file, and then calling Ghostscript to convert this postscript file into a pdf file. This procedure is still recommended when a project contains many eps illustrations, or when the pstricks package is used to directly insert postscript into the source file.

Ghostscript is also used for graphic conversion to and from eps format, by the tex4ht engine to convert TeX documents into html, and by the X11 windowing system to rasterize eps illustrations.

2 Fonts in Ghostscript

Ghostscript comes with the “base 35” fonts required for Postscript and the “base 14” fonts required for PDF. These include Times, Helvetica, Courier, etc. In recent years, these fonts were compiled directly into the source and invisible to the outside world.

This year Ghostscript was compiled using the sequence

```
./configure --disable-compile-inits
make
sudo make install
```

The extra flag for the configure stage makes the Ghostscript fonts visible in `/usr/local/share/ghostscript/9.16/Resource/Fonts`.

It is possible to reconfigure Ghostscript without recompiling it by adding extra files to the Resource directory just mentioned. In particular, more fonts and links to fonts can be added to make them known to the interpreter. For the straightforward TeX applications mentioned earlier when Ghostscript converts postscript to pdf, additional fonts are not required because they are embedded in the postscript file being converted.

There are a small number of cases, mostly involving text in illustrations, where Ghostscript needs access to the text fonts. In 2012, Bruno Voisin reconfigured our Ghostscript distribution to provide links to the most common pfb font files in TeX Live.

3 CJK Fonts

The situation changes dramatically in China, Japan, and Korea due to the large number of characters in these languages. It is possible to typeset these languages with XeTeX or LuaTeX. But a different approach evolved in these countries historically, with typesetting done using one of the sequences

```
TeX + dvips + ps2pdf
TeX + dvipdfmx
```

In these sequences, the standard TeX engine is often replaced by special versions of the program.

(The program `dvipdfmx` is related to the program `xdvipdfmx` used in the final step of XeTeX typesetting, but the considerations below only apply to `dvipdfmx`.)

As used in the Far East, the first of these approaches requires Ghostscript. Moreover, the fonts are not embedded in the file processed by Ghostscript, so Ghostscript needs direct access to the fonts being used, which are usually fonts installed in the user's operating system rather than TeX Live fonts.

This requirement is met for Japanese in this year's distribution of Ghostscript. The new configuration occurs in `/usr/local/share/ghostscript/9.16/Resource`. The configuration involves adding 18 links to OS X system fonts to `Resource/CIDFont`, adding 4 links to TeX Live fonts to `Resource/CIDFSubst`, adding 2,248 "font snippets" to `Resource/Font`, and adding two special files, "cidfmap.local" and "cidfmap.aliases", to `Resource/Init`.

Unfortunately, the support for Chinese and Korean in this release is less extensive. The above participants spent a lot of time trying to extend their configuration to these countries, but much more testing is needed from users familiar with Chinese and Korean fonts.

Norbert Preining wrote a script to search a users computer and extend our configuration to support additional fonts discovered there. The script works for Japanese and to some extent for Chinese and Korean, and will be extended over the year, provided users test and report problems to him. To find the script and read more details, go to www.preining.info/blog/software-projects/cjk-fonts-ghostscript/

Preining's script is now a package in TeX Live 2015; see `cjk-gs-integrate`.

4 More Information for Users in Japan

The additions give access to the following font sets of the `jfontmaps` package (as documented in `/Library/TeX/Documentation/texmf-doc/fonts/jfontmaps/README`, opened in the Terminal window via "texdoc jfontmaps") :

```
nofonts
hiragino
hiragino-pron
morisawa (substituted by hiragino-pron)
ipa
ipaex
```

`yu-osx`

The `yu-osx` set has been reported to exhibit problems depending on the Ghostscript and OS X versions.

Users can switch between sets for both `dvips` and `dvipdfmx` by using the `kanji-config-updmap` tool, for example via

```
sudo kanji-config-updmap-sys hiragino-pron
```

for a system-wide setup, and

```
kanji-config-updmap hiragino-pron
```

for a user-specific setup.

For the setup to be functional for `dvipdfmx`, the user needs to create symlinks as explained in the README file. These symlinks are to the Japanese OS X fonts and are placed inside `/Library/TeX/Local/fonts/opentype` for a system-wide setup and `~/Library/texmf/fonts/opentype` for a user-specific setup.