

# Ghostscript 9.50

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## 1 Introduction

The Ghostscript package in MacTeX-2020 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 through 9.50.

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/9.50/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.

Norbert Preining wrote a script to search a users computer and extend our configuration to support additional fonts discovered there. To read about the development of this script, go to [www.preining.info/blog/software-projects/cjk-fonts-ghostscript/](http://www.preining.info/blog/software-projects/cjk-fonts-ghostscript/)

Preining's script is now a package in TeX Live 2020, called `cjk-gs-integrate`. Since this script is in TeX Live, it can be updated not just yearly but throughout the year. Running the script is easy. Open Terminal in `/Applications/Utilities` and issue the following command:

```
sudo cjk-gs-integrate
```