

Inserting external figures with GraphicP

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✧ Motivation ✧

The problem: When embedding external images to \TeX documents, the author must possess a detailed technical knowledge about the file formats, the converters, the embedders and specific quirks and incompatibilities between them. This makes the non-WYSIWYG image insertion job even hard, tiresome and slow.

Solution: write intelligent embedders and glue applications that know about and fix the quirks and incompatibilities of other software (such as dvips, dvi2pdf, Ghostscript, gv, xpdf and Acrobat Reader), and they hide these fixes from document authors by providing a unified interface.

New problems:

- ☞ \TeX graphics.sty has too many features to reimplement
- ☞ new interoperability problems appear over time
- ☞ it is still not a WYSIWYG solution
- ☞ deployment and education problems may arise

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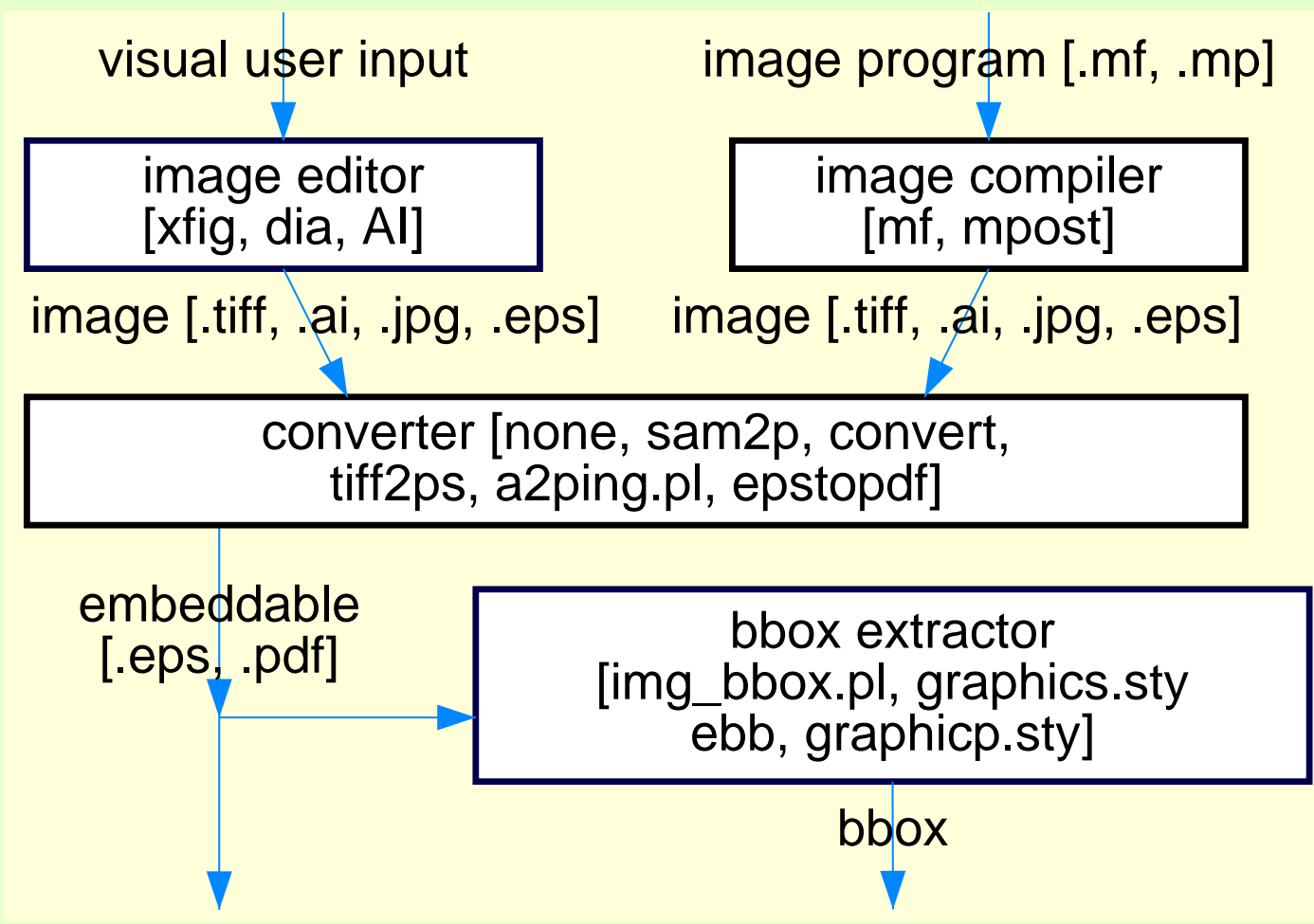
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✧ Image preprocessing ✧



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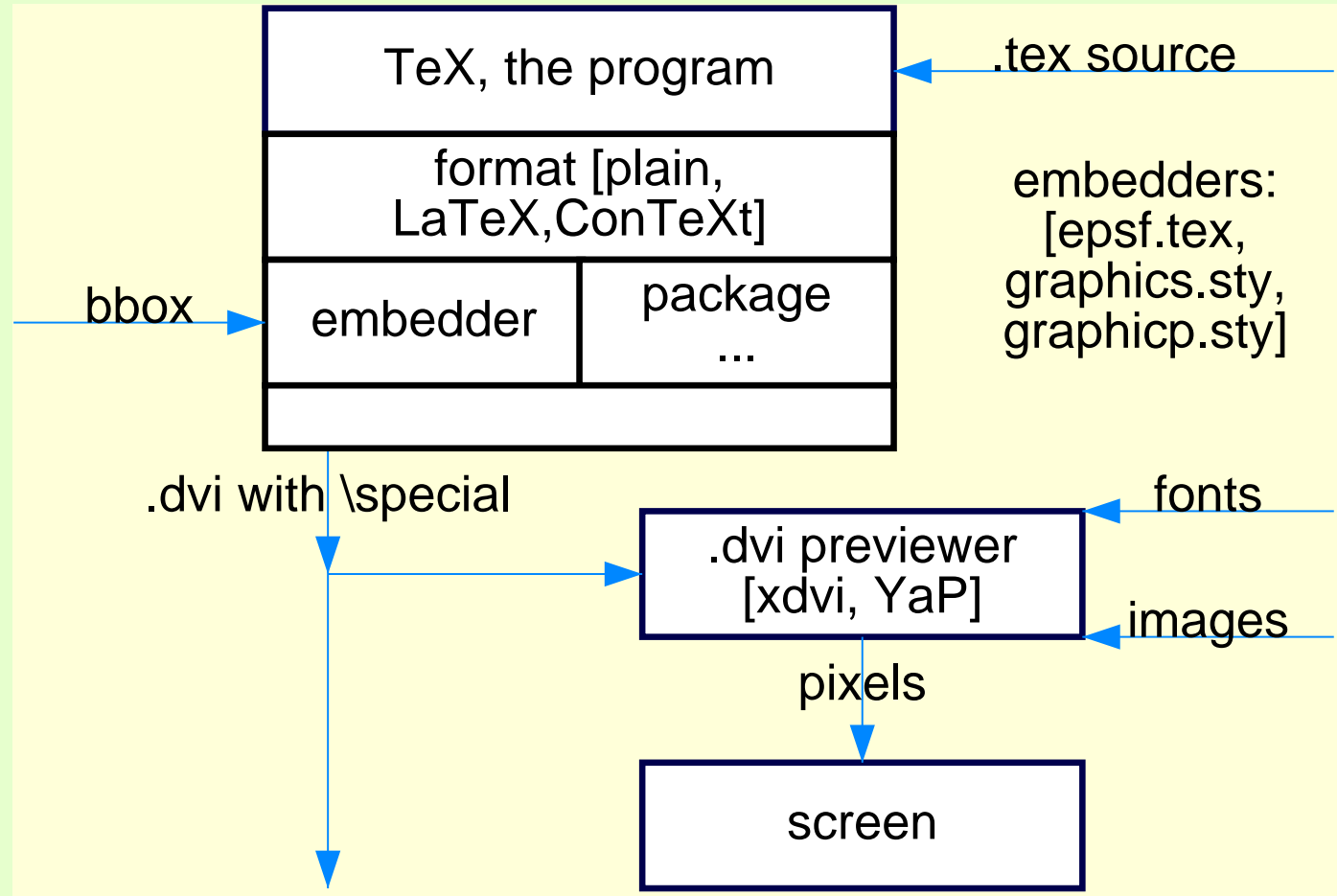
✧ Preprocessing problems ✧

- ☞ EPS output of graph drawing programs is not fully customizable
- ☞ visual image editors cannot insert labels typeset by $\text{T}_{\text{E}}\text{X}$ – or just the same size as the text body. Labels containing accented glyphs or math formulas are recommended to be typeset by $\text{T}_{\text{E}}\text{X}$. See `psfrag.sty` for a partial, EPS-only solution.
- ☞ editors cannot learn or enforce size, position and style constraints
- ☞ the learning curve is slow for image compilers
- ☞ the object and connector oriented, quick try-and-reshape figure development model doesn't work for METAPOST
- ☞ converters often create big output
- ☞ information is lost or some parts of the image change during the conversion. To work around this, `a2ping.pl` other programs with the appropriate parameters, and/or fixes the programs' output.
- ☞ `bbbox` extraction inside $\text{T}_{\text{E}}\text{X}$ may fail if the image file is binary
- ☞ one cannot easily copy-paste a figure between documents

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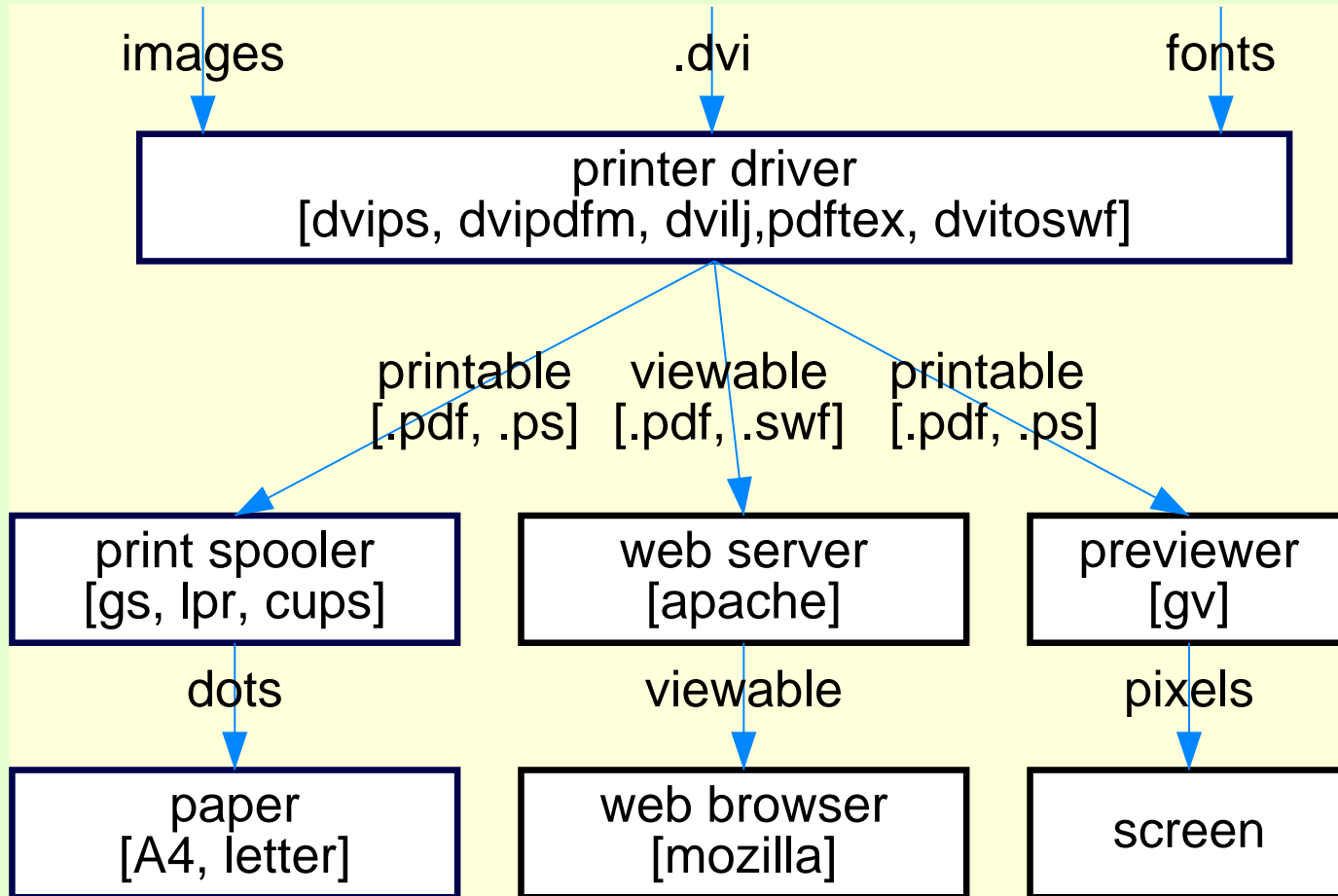


✂ Document compilation ✂



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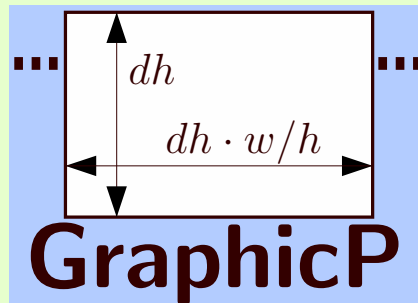
✂ Printing ✂



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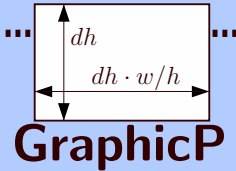
✂ GraphicP ✂

GraphicP is a system that provides an easy, fast and reliable method for including external images into \LaTeX and plain \TeX documents. The `\includegraphics` macro of GraphicP is a drop-in replacement of the same command of \LaTeX `graphics.sty` and `graphicx.sty`, but with many enhancements. Input images are usually in EPS or PDF format. Drivers for `xdvi`, `dvips`, `pdftex` and `dvipdfm` are included. Perl scripts are provided for conversion and faster `bbox` manipulations.



<http://www.inf.bme.hu/~pts/graphicp/>

GraphicP comes with an embedder (`graphicp.sty`), two bounding box extractors (`img_bbox.pl` and `pdfboxes.pl`) and a converter (`a2ping.pl`). GraphicP cooperates well with `sam2p`, a powerful raster image converter with quality EPS and PDF output.



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✧ Using it ✧

The syntax of `graphicp.sty` is similar to `graphics.sty`. The printer driver and the default image extension is autodetected in most cases. For example:

```
% foopage.tex
\documentclass{article}
\usepackage[dvips]{graphicp}
\begin{document}
  \begin{figure}
    \includegraphics[width=0.9\textwidth]{footown} % .eps or .pdf
    \caption{The map of Footown}
  \end{figure}
\end{document}
```

`a2ping.pl` can be used to convert between EPS and PDF. GraphicP works well with `dvips`, `dvipdfm` and `pdflatex`. For example:

```
~$ a2ping.pl footown.eps footown.pdf # image format conversion: .eps to .pdf
~$ latex foopage # gets bbox from .eps
~$ dvips foopage -o foopage.ps # embeds .eps
~$ dvipdfm foopage # embeds .pdf (or .eps if no .pdf)
~$ pdflatex foopage # gets bbox from .pdf, embeds .pdf
~$ _
```

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✧ Features of GraphicP – 1/3 ✧

- ✧ *runs on both plain T_EX and L_AT_EX*: contains a thin L_AT_EX compatibility layer (laemu.sty), and uses plain T_EX constructs wherever possible
- ✧ *more accurate scaling*: evaluates the actual width ($dh \cdot w/h$) more precisely. The multiplication is exact (multiplying two 15.16 bit fixed point numbers in 30.32 bit arithmetic), and division is exact iff the result is valid in 15.16 bit fixed point.
- ✧ *enforced dimensions*: specified width= and height= are exactly enforced, not affected by rounding errors
- ✧ *gives bbox hints*: puts two invisible (1 sp·1 sp white) boxes, so dvips -E will get the bbox right
- ✧ *file format detection*: doesn't rely on the extension, opens the file to detect the file format (METAPOST img.1 and an.image.pdf will work all right)

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✧ Features of GraphicP – 2/3 ✧

- ✧ *external bbox parsing*: `img_bbox.pl` extracts the `bbox` faster and more accurately. Its output can be read by `graphicp.sty`. `img_bbox.pl` reads PDF `/MediaBox` properly, and `pdfboxes.pl` can fix a PDF file to contain a more obvious `/MediaBox`
- ✧ *internal bbox parsing*: `graphicp.sty` does its best, but since \TeX reads a binary file line-by-line, it has limitations. Most EPS files work properly, even some PDFs do, but PNG, TIFF and JPEG require `pdf\TeX`
- ✧ *nonzero depth*: can move the image below the baseline, using negative `bbox` dimensions or options specified in image coordinate system (e.g. `lower=20` for `\includegraphics`)
- ✧ *avoids duplication*: using features of `dvipdfm` and recent `pdf\TeX`, `graphicp.sty` embeds each file exactly once, other instances will be references

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✧ Features of GraphicP – 3/3 ✧

- ✧ *METAPOST with all drivers*: the EPS output of METAPOST is quite simple, so it is autodetected and passed to ConT_EXt `supp-pdf.tex`, which can convert it to PDF on the fly. Accepts filenames written by METAPOST (`img.1`).
- ✧ *better Babel compatibility*: temporarily unactivates characters like " and ' that are made `\active` by Babel
- ✧ *versatile draft support*: there are many draft stlyes that embed a rectangle and/or the filename instead of the image
- ✧ *EPS fixups*: `a2ping.pl` can fix EPS files generated by broken software, and it can convert PS to EPS. Many other conversions are also included, relying on Ghostscript, `sam2p` and `pdftops`.
- ✧ *smart ExactBoundingBox handling*: finds and uses the most exact `bbox` information by default, but the order can be forced

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✂ Further work ✂

- ☞ *cropping*: the user should be able to define a rectangular viewport to the image – other parts should not be displayed
- ☞ *transformations*: flipping and rotation by $n \cdot 90^\circ$
- ☞ *imtrix*: a unified (EPS and PDF) way for replacing labels in images by $\text{T}_{\text{E}}\text{X}$ `\hboxes`
- ☞ *compatible with grahics.sty*: `bb=`, `totalheight=`, `keepaspectratio=`, `type=`, `ext=`, `read=`, `viewport=`
- ☞ *rewrite of a2ping.pl*: redesign it to make it modular and print a warning for unrespected command line options
- ☞ *make the bbox dots optional*
- ☞ *arithmetics*: do more complicated calculations than `0.9\textwidth`
- ☞ *testing*: with images from various sources

✂ Conclusion ✂

- ☞ GraphicP implements a subset of the functionality of graphics.sty, but does it better: more precisely, more automatically, and avoids some common bugs
- ☞ it contains a converter that makes conversion between EPS and PDF (and many other formats) easier for the user
- ☞ it is not restricted to \LaTeX
- ☞ it is platform independent (but Perl is recommended)
- ☞ it hasn't been tested exhaustively
- ☞ not all features of graphics.sty are covered
- ☞ not a framework, has only 3 drivers
- ☞ GraphicP is a serious alternative to graphics.sty, and parts of its code and ideas are useful for the future, ultimate \TeX embedder

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