Document Engineering with TEX and METAPOST

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1 The Software

1.1 TEX

TEX is a program by Donald Knuth that allows the computer to do high-quality typesetting of documents.

- text-based interface
- conceptual model of document presentation: boxes, glue, penalties
- stable, free, intimidating

1.2 pdfTEX

- a re-implementation of TEX: pdf instead of dvi output
- pdf is the *Portable Document Format*, a file format designed by Adobe Systems, Inc.

1.3 METAPOST

- a programming language for generating graphics
  - a declarative, math-smart programming language
  - vector graphics
- by John Hobby, Knuth's star student
- based on METAFONT
- works very well with TEX thanks to Hans Hagen

1.4 ConTEXt

- macropackage (like LATEX is)
- high-level document features, e.g. indices, quire collation
- up-to-date features, e.g. hyperlinks, colors, graphics
- no feature conflict, e.g. LATEX's multicol package breaks the TOC
- slower

2 Applications

2.1 pdftex from perl

- safely make a unique temp dir
- make a file with TeX code in the temp dir
- run tex in subshell in temp dir on TeX source file
- slirp resulting pdf file into memory and serve
- clean up

- complex documents may benefit from using a template file in the second step.
- running the subshell from perl:

```
my $error =
 system ("cd /tmp/foo-003 && pdftex foo.tex < /dev/null");
```

2.2 pdfTeX and METAPOST

- same steps as in the "**pdftex from perl**" example
- also put file with METAPOST code into temp dir
- also run mpost in subshell in temp dir on METAPOST source file before running TeX
- TeX source will include a command that uses the METAPOST figure, e.g. ...

```
\convertMPtoPDF {foo.1}
```


- again, templates can help keep things managable by keeping perl code simple: e.g., bulk of METAPOST code stays in template file instead of the perl source.
- Be meticulous with error checking to avoid hopeless sinking feeling if something goes wrong.

2.3 optimizing

using pdfTEX and two METAPOST figures for efficiency

Two MP figures: one for unchanging stuff (*static* content); and one for the stuff that will change with each run (*dynamic* content).

same steps as in the "**pdfTEX and METAPOST**" example, except ...

- put file with METAPOST code for dynamic content into temp dir
- create symlink to the preprocessed METAPOST figure for the static content
- run mpost in subshell in temp dir on the METAPOST source file for dynamic content
- TEX source will include a command that uses both METAPOST figures, superimposing the dynamic one over the static one.

  This is done with TEX boxes of zero height and depth. For us, Ed's "supersmash" macro handles it.

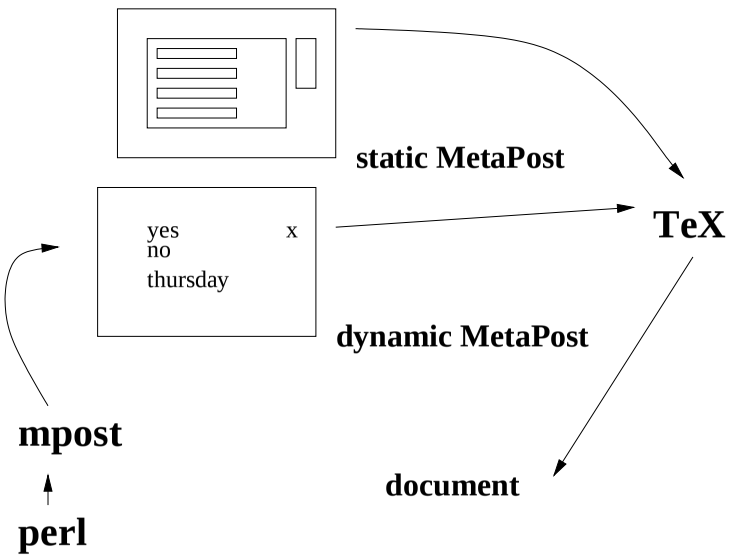

Figure 1 Using Two MetaPost figures

Advantages of using two MP figures:

- static content, like the background of a form, needn't be generated from source at every runtime.
- dynamic content changes with each run and so the MP figure is generated at runtime.

3 Resources

3.1 Online

- TUG, The TEX User Group
  `http://www.tug.org/`
  - CTAN: the Comprehensive TEX Archive Network
    Good for finding software.
  - pdfTEX mailing list archive
    `http://www.tug.org/cgi-bin/lwgate/pdftex/`
  - METAPOST links
    `http://www.tug.org/metapost.html`
- Pragma-ADE, makers of ConTEXt
  `http://www.pragma-ade.nl/`

- `comp.text.tex`

  Usenet group where TEX questions are answered (sometimes).
- teTEX Mailing list

  Thomas Esser's excellent TEX distribution has its own mailing list:

  `<Majordomo@majordomo.informatik.uni-hannover.de>`

  ... and it is archived on the web:

  `http://www.mail-archive.com/`

3.2 Offline

- *The TEXbook*, Donald Knuth.

  Authoritative and quirkily fun book by the creator of TEX introduces TEX and the powerful *plain* macropackage.[1]

[1] Plain is the nicest macropackage for creating non-standard documents that must process quickly.

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