How to Create pdf Files Using LaTeX and pdfLaTeX

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Abstract

This is a short set of instructions on what is needed to create PostScript and pdf files that support active hyperlinks from LaTeX source files. I describe how to obtain and use some simple utilities that are available for use with normal LaTeX2ϵ, and also how to build a copy of pdfLaTeX for UNIX installations. The main purpose of these instructions is explain how to acquire and install the software needed to create files for publication in the electronic series Electronic Notes in Theoretical Computer Science, which is published on the web at the URL http://www.elsevier.nl/locate/entcs.

1 Introduction

This short note provides instructions on how to obtain and install the software that is needed for creating PostScript and pdf files that include active hyperlinks which viewed using Ghostview or GSview for PostScript files, and Adobe's Acrobat© or another pdf viewer, such as xpdf for viewing pdf files. The instructions detail which versions of the necessary utilities are needed to make everything work smoothly. We outline these in terms of the system on which the LaTeX implementation is running – either Windows or some flavor of UNIX, such as Linux. We do not have detailed instructions about Macintosh implementations, but we believe they would not be much different from the UNIX instructions, especially as the MacOS gravitates more and more toward UNIX.

2 What's this all about?

With the advent of the World Wide Web, *hyperlinks* – embedded links to other material on the web – have become a standard way of referencing ma-

terial available on the web. Anyone who uses the web is accustomed to these links which allow the user to click on an item to follow a link to some reference material, bring up an email program with an addressee's address pre-encoded, or that have similar effects.[1] One area where this technology is being used more and more is in electronic publishing, and as scientific journals lean more and more toward electronic dissemination, we can expect this trend to grow. One example is the area of electronic publications which are available exclusively on the web. And, as authors do more and more of the work of preparing papers for publication in such series using computer typesetting programs such as LaTeX, it is important to keep installations of the requisite programs as up-to-date as possible, to take advantage of new advances in this technology. In this short article, I outline what is needed to implement hyperlinks that allow smooth transitions within a document when it is viewed online, as well as to link your document to other material on the web. My comments are confined to how to do this using LaTeX as the computer typesetting package. Word processing packages such as Microsoft Word© or Sun's StarOffice© have similar features that can be utilized for this purpose.

3 What's Needed?

3.1 The Basics

The basic programs that are needed to create PostScript files and pdf files from LaTeX that support active hyperlinks when viewed online are:

- a recent version of LaTeX2ϵ (1999 or later), including
- a recent version of the hyperref package. This must be at least version 6.69d, which was issued in March, 2000,
- the public versions of Adobe's Type1 fonts. These are scalable fonts which ensure good images when translated into a pdf file and viewed on screen. Recent distributions of the TeX package include these fonts – you can see if there is a Type1 subdirectory among your font file directory for TeX.
- a recent version of dvips which includes the "-z" and the "-P pdf" options (any recent version of LaTeX2ϵ will include this).

These utilities are all that is needed to prepare a dvi file and a PostScript file that support active hyperlinks. In particular, the hyperref package automatically makes cross-references within a document prepared with LaTeX active when viewed with an appropriate viewer, and it also is easy to encode hyperlinks to other material on the web so that they become active as well. Take a look at the hyperref documentation that comes with the package to see how to do this.

[1] My email address `mislove@tulane.edu` is encoded in this way – clicking on it will allow you to send me an email automagically.

3.2 Creating The Files

Creating the dvi file

To create a dvi file that has hyperlinks embedded, you can use LaTeX2ϵ and be sure to include the command `\usepackage{hyperref}`. As the hyperref documentation says, you should load this package last in order to give hyperref the best chance of succeeding. There is ample documentation in the package to indicate how to properly markup hyperlinks. Actually, internal cross-references and footnotes, etc. are automagically active when compiled with hyperref, so it's only the hyperlinks to external documents that require special commands. Running LaTeX or pdfLaTeX on the source file will produce a dvi file that has the hyperlinks active.

Creating a PostScript file

To create a PostScript file that has active hyperlinks embedded in it, just invoke dvips with the "-z" option to create a ps file, as in

```
dvips -z paper.dvi -o paper.ps
```

This will create a file `paper.ps` with active hyperlinks from the file `paper.dvi`.

Creating pdf Files

Creating a pdf file with active hyperlinks from the file `paper.dvi` requires two commands: The first is

```
dvips -z -P pdf paper.dvi -o paper.ps
```

This creates a PostScript file that has fonts especially good for translation to a pdf file.[2] To create that file, you can use the program `ps2pdf`, as in

```
ps2pdf paper.ps
```

and the result will be a pdf file with active hyperlinks.

You also can use utilities that translate directly from dvi to pdf files. One such is `dvipdfm`, which is available on the web at `http://gaspra.kettering.edu/dvipdfm/`. There is an rpm file containing the precompiled binary for Linux systems, and this utility is already included in the MiKTeX package for Windows. But note that `dvipdfm` will *not* translate PostScript into pdf, so if your dvi has embedded PostScript or calls EPS files, then you will either have to use `dvips` followed by `ps2pdf` as described above, or else pdfLaTeX, which we next describe.

pdfLaTeX

A last way to create pdf files directly from LaTeX source files is to use the program pdfLaTeX. This has the advantage of using the correct Type1 fonts for on screen viewing, as well as creating bookmarks throughout the document for each section. On the other hand, pdfLaTeX requires extra work if you

[2] While this PostScript file can be viewed with any PostScript viewer, the output on the screen is not as good as using the command `dvips -z`.

want to include EPS graphics files in your document. A fuller description of this is included in the exampdf.tex file that accompanies the ENTCS generic package.

3.3 Viewing the Files

To view the files you have created that have active hyperlinks, you also need

- for dvi files, a recent dvi viewer that supports active hyperlinks,
- for PostScript files, a recent version of Ghostscript and a viewer, which either is Ghostview or GSview.
- for pdf files, either Adobe's Acrobat© Reader or another pdf viewer, such as xpdf. GSview and some other PostScript viewers also have the capability of viewing pdf files, but their current implementation of hyperlinks is not as well-developed as pdf viewers.

4 How to get and install the needed files

4.1 Windows

With Windows, installation is a snap – most programs include an automagic installation procedure, and MiKTEX and related software are no exception.

The Basics

If you are using Windows as your operating system, then an excellent LATEX package that contains all these components is MiKTEX, which is available from the nearest CTAN site. The basic CTAN site is `http://www.ctan.org`. This package is updated regularly, and it also contains the other components mentioned below that are needed to prepare pdf files with active hyperlinks. The dvi viewer Yap© is one that supports active hyperlinks.

Viewers

Ghostview and GSview are available at the Ghostscript home page http://www.cs.wisc.edu/~ghost

For pdf files, you can obtain Adobe's Acrobat© Reader from Adobe at http://www.adobe.com/readstep.html.

Editors

Using LATEX really requires having an editor that understands LATEX and that supports easy use of its features, and built-in calls to other programs for viewing files, etc. For Windows, one such program is WinEdt, which can be found at http://www.winedt.com. The program is shareware, which in the Windows world means you can use it free for a limited time, and then you have to purchase a license to avoid an annoying and increasingly more frequent

reminder that you haven't registered the product (and bought a license). It's worth checking out if you haven't tried it.

4.2 UNIX

For UNIX installations, unfortunately the most popular TEX package – teTEX – is not routinely updated, and so you may have to do some work to obtain the needed utilities. If your current installation has a recent version of LATEX – one from 1999 or later, then you already should be able to create dvi files and PostScript files that have active hyperlinks. If you need to update your installation, the best place to start searching for a newer version of teTEX is package is CTAN, http://www.tug.org/teTEX. TEX is a large package for UNIX systems, and the installation is straightforward, although not entirely without pitfalls. If you aren't accustomed to compiling and installing software from scratch on your system, it's probably best that you contact your system administrator and ask her or him to update the installation for you.

Even if you have the most recent version of teTEX (as of this writing, the more recent stable version is 1.0.7), you may have to update both LATEX and certainly pdfLATEX. LATEX was undergoing a semiannual update, but has recently switched to an annual update. For information about the latest release, look at http://www.latex-project.org.

pdfLATEX

For pdfLATEX, the source and binary distributions are available on the ftp site of the developer, Han The Than, ftp://ftp.muni.cz/pub/tex/local/cstug/thanh/pdftex/. There are precompiled binaries for some systems available on the site, and if there is one for your system, then you can simply download the `.zip` file, unpack it using `unzip`, and then consult the instruction manual `pdftex-*.pdf`, which includes instructions on where to place the binaries and how to build the format file for pdfLATEX (this is not included in the precompiled version; see the instructions below for building your own version of pdfLATEX [ix]).

If there is no precompiled binary for your system, than you will need to compile the updated version for your own UNIX system, and then install the resulting binaries and associated files. Unfortunately, the instructions on the site assume some familiarity with the process, and so some instructions are not included. Here is a complete list of how to update your current version of pdfLATEX:

(i) Download the latest version of the pdftex source from the site. Everything that's needed for this is contained in the file named `pdftex-nnnnn.tgz`.

(ii) Unpack the file in some working directory using the command `tar xzvf pdftex-nnnnn.tgz`.

(iii) Move to the resulting `src` directory and run `./configure --datadir=`

`/where/your/texmf/directory/is/located`, where the directory does not include texmf, but only the path that leads to it. For example, on Redhat Linux, the directory is `/usr/share`.

(iv) Move to the directory `texk/web2c` and run the command `make pdftexbin`.

(v) Backup the existing versions of `pdfetex` and `pdftex` on your system. You'll need to locate these using `whereis` or `which` – on Redhat Linux, they're in `/usr/bin`.

(vi) When make is complete, move the files `pdfetex` and `pdftex` to the directory where TEX binaries are located.

(vii) Backup the existing `pdfetex.fmt, pdfetex.pool, pdflatex.fmt, pdftex.fmt` and `pdftex.pool` files. These are located in the `/texmf/web2c` subdirectory of the directory you gave as `--datadir` in step (ii) above.

(viii) Move the new `pdfetex.fmt, pdfetex.pool, pdftex.fmt` and `pdftex.pool` files to the `/texmf/web2c` subdirectory of `--datadir` directory.

(ix) Create a new pdfLATEX for your system from the new `pdftex` by using the command `pdftex -ini -fmt=pdflatex latex.ltx`.

(x) Move `pdflatex.fmt` to the `/texmf/web2c` subdirectory of the directory you gave as `--datadir` in step (ii) above.

(xi) Test your new installation.

Viewers

Ghostscript and various associated PostScript viewers are available for UNIX systems from the site http:// www.cs.wisc.edu/~ghost. Unfortunately, even the most recent versions don't yet support hyperlinks completely. For example, I have just installed the most recent version of Ghostscript and of GSview on my Linux workstation – version 7.00 of the former and version 4.00 of the latter – and yet neither my version of Xdvi nor this version of GSview react properly when I click on hyperlinks. The former crashes (gracefully?), and the latter simply brings up a dialog box that says the link is "unknown". But I suspect these problems will soon be overcome, and I will be able to access hyperlinks embedded in the dvi and PostScript files I create.

For pdf files, you can obtain Adobe's Acrobat© Reader from Adobe at http://www.adobe.com/readstep.html.