

LaTeX: an introduction

LaTeX is a powerful but relatively unknown typesetting system.

Mike Unwalla explains where it came from and what it can do.

LaTeX is a powerful typesetting system, used for producing scientific and mathematical documents of high typographic quality. Unlike WYSIWYG tools such as FrameMaker and Word, it uses plain text files that contain formatting commands. It's big, open source, stable and used by many technical publishing companies. It's also relatively unknown in the technical writing community. This article overviews LaTeX, and directs you to sources of information.

History

Donald E Knuth (www-cs-faculty.stanford.edu/~knuth) designed a typesetting program called TeX in the 1970s especially for complex mathematical text. LaTeX is a macro package that allows authors to use TeX easily, and uses TeX as its formatting engine. It is available for most operating systems; for example, you can use it on low-specification PCs and Macs, as well as on powerful UNIX and VMS systems. There are many different implementations of LaTeX.

The word LaTeX is pronounced 'lay-tech' or 'lah-tech' ('ch' as in Scottish 'loch' or just hard 'k'), not 'latex' (as in rubber). In plain text, the typography is LaTeX. The sample document in the panel shows its typeset form.

The latest version is LaTeX2e, but because

```
\documentclass{article}
\begin{document}
A \textbf{bold \textit{Hello \LaTeX}} to start!
\end{document}
```

A bold *Hello* **LaTeX** to start!

this article describes general principles, I just use the word LaTeX.

Who uses it?

I first came across LaTeX in 1992, when fellow students were using it to write academic papers and theses. These days, it is widely used in the technical publishing industry for academic journals, particularly by mathematicians, physicists and other people who have complex notational requirements. For example, Elsevier, IEEE and the Royal Society all provide author guidelines for people who use LaTeX. One of my clients uses LaTeX to produce software documentation (see [pages 18-20 of the Autumn 2005 Communicator](#)) and so I needed to learn it.

Basic concepts

An author writes a LaTeX input file in a text editor and then compiles this using LaTeX. An input file contains text and commands for processing the text. There are some conceptual similarities to a markup language such as HTML. However, a fundamental difference is that LaTeX

is designed as a page layout language, unlike HTML which is functional markup. The whole point of LaTeX is to achieve perfect typographic output, which is not the purpose of HTML.

LaTeX produces device-independent DVI files, from which you can generate PDF and PostScript files using the utilities that usually come with a LaTeX installation. Typically, you can also create a PDF file directly, as shown in the next section.

There are GUI editors to help with creating input files, but many authors prefer to use high-performance text editors such as UltraEdit from IDM Computer Solutions Inc (www.ultraedit.com).


LaTeX is very fussy. A trivial mistake may mean that no output is generated and many error messages are displayed. You will need to check the error logs, fix the problem and recompile.

A sample document

The example code is very simple. It is contained in a plain text source document called `hello.tex`. The first line specifies the type of document. There are various standard classes, such as 'article', 'book' and 'letter', with pre-defined features that can be customised. The third line is the body of the document. The `\textbf` command indicates that the text enclosed in parentheses is bold. The `\textit` command indicates that the text enclosed in parentheses is italic. You can see how it is possible to nest commands. The `\LaTeX` command produces the typeset form of the word. To produce a PDF file, I typed `pdflatex hello.tex` at the DOS command prompt. This generated a PDF file, `hello.pdf`, containing the typeset text.

Obtaining more information

LaTeX is far more powerful and far more complex than this simple introduction suggests. The Comprehensive TeX Archive Network (CTAN) is the authority for materials that relate to TeX and LaTeX (www.ctan.org). You can download LaTeX free from CTAN, but I suggest buying *The LaTeX Companion* (Frank Mittelbach and Michel Goossens, 2004, Addison-Wesley, Boston). It's the definitive reference guide and contains a CD that has a complete LaTeX installation. *The Not So Short Introduction to LaTeX2e* (Tobias Oetiker, 2003) is a good starting point for learning how to create documents. Download it from www.ctan.org/tex-archive/info/lshort/english.

To convert documents between Microsoft Word and LaTeX, two tools from Chikrii Softlab (www.chikrii.com), Word2Tex and Tex2Word, might be useful to you. In the UK, purchase from Adept Scientific (www.adeptscience.co.uk). 

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