Writing papers and thesis using LaTeX2e

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What is LaTeX?

- LaTeXis a document preparation system for the TeXtypesetting program.
- Programmable desktop publishing, which automates most of the typesetting.
- LaTeXproduce beautiful documents, especially mathematics

$$i\hbar\frac{\partial}{\partial t}\Psi(r,t) = \left[\frac{-\hbar^2}{2\mu}\nabla^2 + V(r,t)\right]\Psi(r,t)$$

$$E^2 = (pc)^2 + (m_0c^2)^2$$

- LaTeXis WYSIWYM (What You See is What You Mean)

Can you see beyond the WYSIWYG bubble?

At first sight it must seem intolerably degrading for Zen — however the reader may understand this word — to be associated with anything so mundane as archery. Even if he were willing to make a big concession, and to find archery distinguished as an "art," he would scarcely feel inclined to look behind this art for anything more than a decidedly sporting form of prowess. He therefore expects to be told something about the amazing feats of Japanese trick-artists who have the advantage of being able to rely on a time-honored and unbroken tradition in the use of bow and arrow. For in the Far East it is only a few generations since the old means of combat were replaced by modern weapons, and familiarity in the handling of them by no means fell into disuse, but went on propagating itself, and has since been cultivated in ever widening circles. Might one not expect, therefore, a description of the special ways in which archery is pursued today as a national sport in Japan?

Nothing could be more mistaken than this expectation. By archery in the traditional sense, which he esteems as an art and honors as a national heritage, the Japanese does not understand a sport but, strange as this may sound at first, a religious ritual. And consequently, by the "art" of archery he does not mean the ability of the sportsman, which can be controlled, more or less, by bodily exercises, but an ability whose origin is to be sought in spiritual exercises and whose aim consists in hitting a spiritual goal, so that fundamentally the marksman aims at himself and may even succeed in hitting himself.

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LaTeX Pros and Cons

Pros

- It's free and works on Macs, Windows, Unix/Linux.
- LaTeX files are ASCII and are portable.
- The typesetting is better, especially the maths.
- Style changes are neater in LaTeX.

Cons

- Special/Modern Font selection is difficult, but one can use XeTeX.
- LaTeX is not good at flowing text around pictures.
- LaTeX encourages (almost insists on) structured writing and the separation of style from content. This is not the way that many people (especially non-programmers) are used to working.
- Without a WYSIWYG front end, it's not always easy to find out how to do things.

Developers

- 

  Donald Knuth, 1977, TEX Version 3.141592

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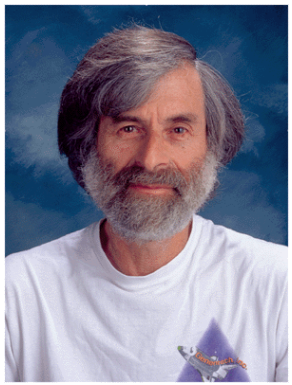
  Hermann Zapf

- 

  Leslie Lamport, LATEX2e

LaTeX Structure

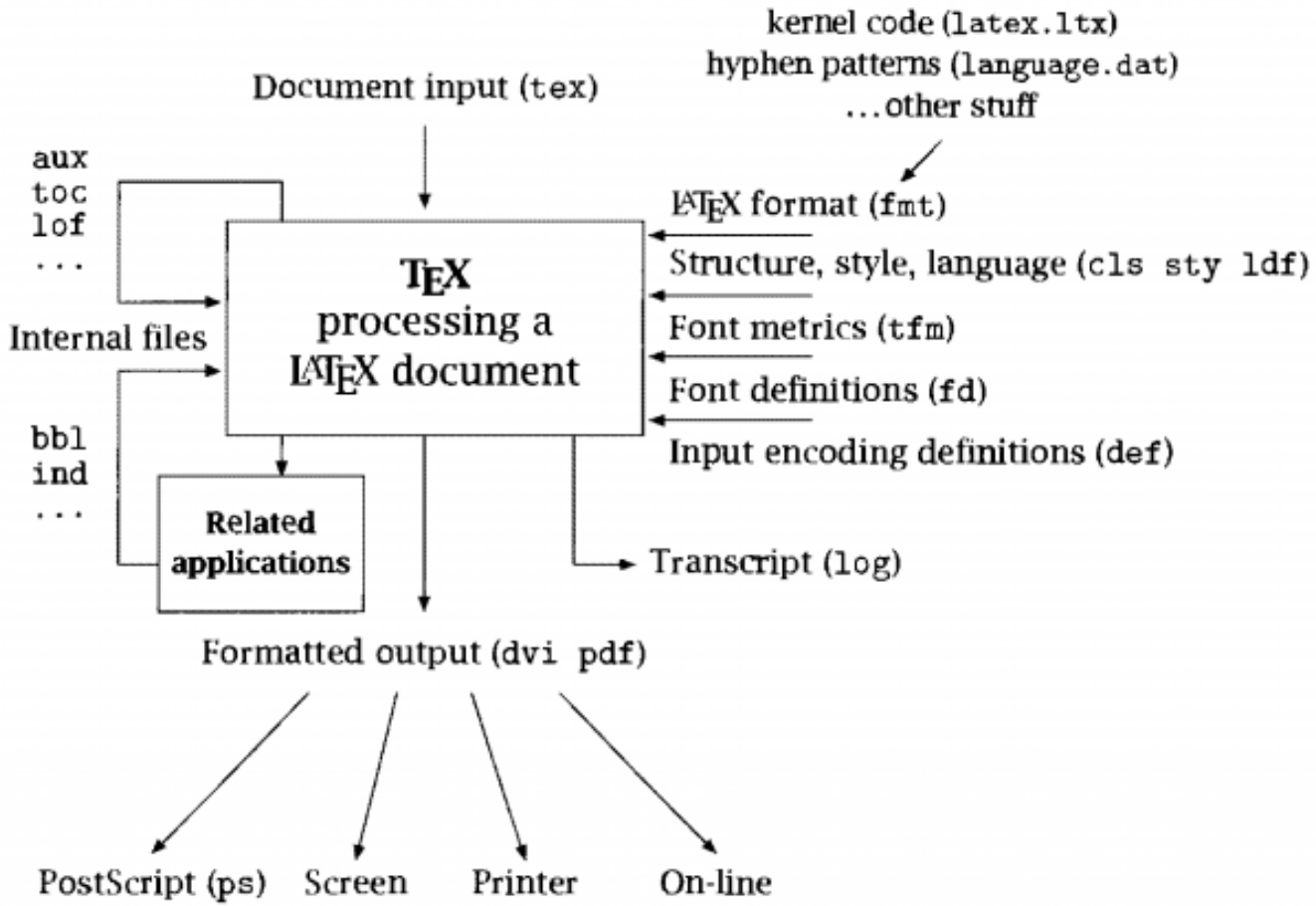


Figure 1.1: Data flow in the LaTeX system

\documentclass{}

article	articles in scientific journals, presentations, short reports, program documentation, invitations, ...
IEEEtran	IEEE Transactions format.
proc	A class for proceedings based on the article class.
minimal	Is as small as it can get. It only sets a page size and a base font. It is mainly used for debugging purposes.
report	For longer reports containing several chapters, small books, thesis, ...
book	For real books.
slides	For slides. The class uses big sans serif letters.
memoir	For changing sensibly the output of the document. It is based on the book class, but you can create any kind of document with it
letter	For writing letters.
beamer	For writing presentations

Article, Report and Book

Article		report	
section	**numbering**	**section**	**numbering**
\part	0	\part	-1
\chapter	0	\section	1
\section	1	\subsection	2
\subsection	2	\subsubsection	3
\subsubsection	3	\paragraph	4
\paragraph	4	\subparagraph	5
\subparagraph	5		

\documentclass[**options**]{}

Xpt	Sets the size of the main font in the document. Default: 10pt.
a4paper, letterpaper	Defines the paper size. Default: letter/A4.
fleqn	displays formulas left-aligned instead of centered.
leqno	Places the numbering of formulas on the left hand side instead of the right.
titlepage, notitlepage	Specifies whether a new page should be started after the document title or not. The article class does not start a new page by default, while report and book do.
onecolumn, twocolumn	Instructs LaTeX to typeset the document in one column or two columns.

\documentclass[**options**]{} cont . . .

twoside, oneside	double or single sided output. Article and report are single sided and the book is double sided by default.
landscape	Changes the layout of the document to print in landscape mode.
openright, openany	Makes chapters begin either only on right hand pages or on the next page available. This does not work with the article class, as it does not know about chapters.
draft	Draft - no images.

Fonts

- \tiny
- \scriptsize
- \footnotesize
- \small
- \normalsize
- \large
- \Large
- \LARGE
- \huge
- \Huge

Restricted Characters

Character	How to type in LaTeX
#	\#
&	\&
$	\$
%	\%
\	$\backslash$
_	_
{	\{
}	\}

Ligatures

fire flower fjörd

Figure: MS Word

fire flower fjörd

Figure: LaTeX

D.Taraborelli (2008), The Beauty of LaTeX

Equations

The Energy-Momentum Relation: $E^2 = (m_0 c^2)^2 + (pc)^2$

$$f(x) = \sin^2 x + \frac{\tan x}{\log x} + \mathbf{X}^T \times \mathbf{X} \tag{1}$$

$$\iint_0^\infty f(x,y)\,dx\,dy$$

$$\begin{aligned} y &= ax + b \\ y+1 &= ax + (b+1) && (2) \\ &= ax + (b+2) - 1 && (3) \end{aligned}$$

Equations cont. . .

$$f(x) = a1x_1 + a2x_2 + a3x_3 + a_4x_4 + \sqrt{a1x_1 + a2x_2 + a3x_3 + a_4x_4} + a1x_1 + a2x_2 + a3x_3 + a_4x_4 + a1x_1 + a2x_2 + a3x_3 + a_4x_4 \quad (4)$$

$$A_{m,n} = \begin{pmatrix} a_{1,1} & a_{1,2} & \cdots & a_{1,n} \\ a_{2,1} & a_{2,2} & \cdots & a_{2,n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{m,1} & a_{m,2} & \cdots & a_{m,n} \end{pmatrix} \quad (5)$$

Matrix

Environment name	**Surrounding delimiter**
pmatrix	$(matrix)$
bmatrix	$[matrix]$
Bmatrix	$\{matrix\}$
vmatrix	$\|matrix\|$
Vmatrix	$\|\|matrix\|\|$

Table Environment

Option	Description
l	left-justified column
c	centered column
r	right-justified column
p{'width'}	paragraph column with text vertically aligned at the top
m{'width'}	paragraph column with text vertically aligned in the middle
b{'width'}	paragraph column with text vertically aligned at the bottom
—	vertical line
——	double vertical line
&	column separator
\\	start new row (additional space may be specified after \\ using square brackets, such as \\[6pt])
\hline	horizontal line
\newline	start a new line within a cell (in a paragraph column)
\cline{i-j}	partial horizontal line beginning in column i and ending in column j

Table

Table: Table without borders

1	2	3
4	5	6
7	8	9

Table: Table with borders

1	2	3
4	5	6
7	8	9

Table

Without specifying width for last column:

Day	Min Temp	Max Temp	Summary
Monday	11C	22C	A clear day with lots of sunshine. However
Tuesday	9C	19C	Cloudy with rain, across many northern reg
Wednesday	10C	21C	Rain will still linger for the morning. Cond

Table

Without specifying width for last column: With width specified:

Day	Min Temp	Max Temp	Summary
Monday	11C	22C	A clear day with lots of sunshine. However, the strong breeze will bring down the temperatures.
Tuesday	9C	19C	Cloudy with rain, across many northern regions. Clear spells across most of Scotland and Northern Ireland, but rain reaching the far northwest.
Wednesday	10C	21C	Rain will still linger for the morning. Conditions will improve by early afternoon and continue throughout the evening.

Multiple Columns

Team	P	W	D	L	F	A	Pts
Manchester United	6	4	0	2	10	5	12
Celtic	6	3	0	3	8	9	9
Benfica	6	2	1	3	7	8	7
FC Copenhagen	6	2	1	3	5	8	7

Multi-Column

Team sheet	
GK	Paul Robinson
LB	Lucus Radebe
DC	Michael Duberry
DC	Dominic Matteo
RB	Dider Domi
MC	David Batty
MC	Eirik Bakke
MC	Jody Morris
FW	Jamie McMaster
ST	Alan Smith
ST	Mark Viduka

Useful Tips

- LyX WYSIWYG LaTeX editor (please dont kill me!)
- Libre Office / OpenOffice Word to LaTeX conversion
- RTF2LaTeX to convert doc to LaTeXfiles
- Tired of finding the symbol name try http://detexify.kirelabs.org/classify.html
- BibTex for Word - http://www.ee.ic.ac.uk/hp/staff/dmb/perl/index.html
- Tex Formula Addin for Powerpoint
  http://www.ee.ic.ac.uk/hp/staff/dmb/perl/index.html

Acknowlegements

This LaTeXfor Beginners course is loosely based on and examples from:

- WikiBook on LaTeX: https://en.wikibooks.org/wiki/LaTeX
- CUED Textprocessing: http://www.eng.cam.ac.uk/help/tpl/textprocessing/
- UCS Course on LaTeX 2_ε: http://www.ucs.cam.ac.uk/docs/course-notes/unix-courses/earlier/latex