

# Writing papers and thesis using L<sup>A</sup>T<sub>E</sub>X2e

## Part I: Introduction to L<sup>A</sup>T<sub>E</sub>X

Krishna Kumar \*<sup>1</sup>

<sup>1</sup>King's College  
University of Cambridge

King's Computing Workshop, January 2014

---

<sup>1</sup>kks32@cam.ac.uk

# What is L<sup>A</sup>T<sub>E</sub>X?

- L<sup>A</sup>T<sub>E</sub>X is a document preparation system for the T<sub>E</sub>X typesetting program.
- Programmable desktop publishing, which automates most of the typesetting.
- L<sup>A</sup>T<sub>E</sub>X produce beautiful documents, especially mathematics

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

$$E^2 = (pc)^2 + (m_0 c^2)^2$$

- L<sup>A</sup>T<sub>E</sub>X is 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.

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 the 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 methods, 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.

# Ligatures

fire flower fjörd

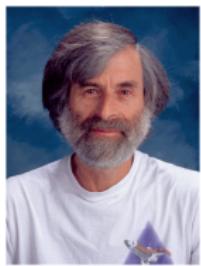
Figure: MS Word

fire flower fjörd

Figure:  $\text{\LaTeX}$

D.Taraborelli (2008), The Beauty of  $\text{\LaTeX}$

# Developers

- Donald Knuth, 1977,  $\text{\TeX}$  Version 3.141592
- Hermann Zapf
- Leslie Lamport,  $\text{\LaTeX}2\text{e}$ 

# How L<sup>A</sup>T<sub>E</sub>X works? - The Magic

- You write your document in plain text with commands that describe its structure and meaning.
- The L<sup>A</sup>T<sub>E</sub>X program processes your text and commands to produce a beautifully formatted document.



# \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 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.

## More examples of commands and their output...

```
\begin{itemize}  
\item Despicable Me  
\item Wall-E  
\item Tangled  
\end{itemize}
```

- Despicable Me
- Wall-E
- Tangled

```
\begin{figure}  
\includegraphics{figs/minion}  
\end{figure}
```



```
\begin{equation}  
\alpha = \beta + 1  
\end{equation}
```

$$\alpha = \beta + 1 \quad (1)$$

# Getting Started

- A minimal  $\text{\LaTeX}$  document:

```
\documentclass{article}  
\begin{document}  
Hello World! % your content goes here...  
\end{document}
```

- Commands start with a *backslash* 
- Every document starts with a `\documentclass` command.
- The *argument* in curly braces  tells  $\text{\LaTeX}$  what kind of document we are creating: an `article`.
- A percent sign  starts a *comment* —  $\text{\LaTeX}$  will ignore the rest of the line.

# Let's try that ...

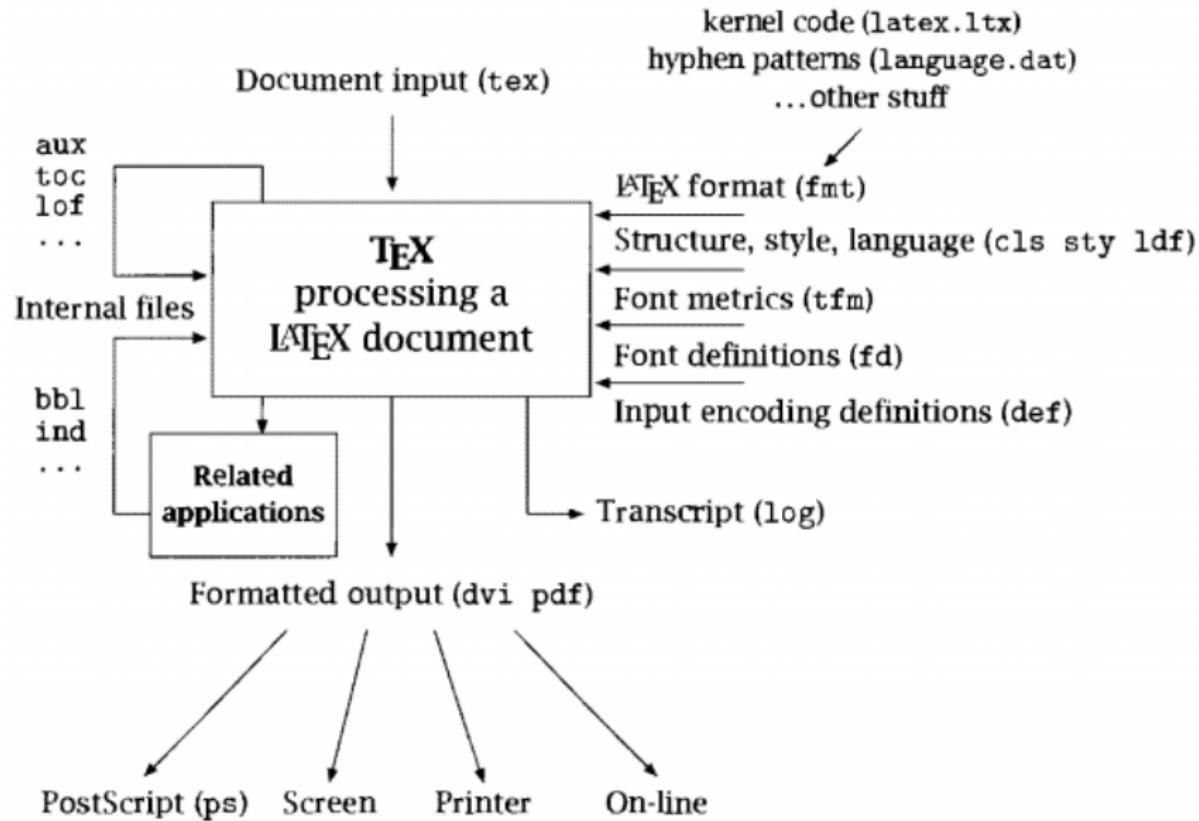
- `writelATEX` is a website for writing documents in `LATEX`.
- It 'compiles' your `LATEX` automatically to show you the results.

Click here to open the example document in `writelATEX`

Or go to this URL: <https://www.writelatex.com/docs/1778557gcvcyt/clone>  
For best results, please use Google Chrome or a recent FireFox.

- If you would like to try out the exercise on your machine. Go to `Exercises` / `Ex1_Hello.tex`

# LaTeX Structure - The Magic



# \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

# Fonts

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

# Restricted Characters

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

# Useful Tips

- LyX WYSIWYG LaTeX editor (please dont kill me!)
- Libre Office / OpenOffice Word to LaTeX conversion
- RTF2LaTeX to convert doc to  $\text{\LaTeX}$  files
- 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>

# Acknowledgements

This  $\text{\LaTeX}$ for Beginners course is loosely based on and examples from:

- WikiBook on  $\text{\LaTeX}$ : <https://en.wikibooks.org/wiki/LaTeX>
- CUED Textprocessing: <http://www.eng.cam.ac.uk/help/tpl/textprocessing/>
- UCS Course on  $\text{\LaTeX} 2\epsilon$ :  
<http://www.ucs.cam.ac.uk/docs/course-notes/unix-courses/earlier/latex>