

# Introduction into L<sup>A</sup>T<sub>E</sub>X

Florian Kemmer

3rd March 2014

# Who am I?

## About me

- MSc *Network Systems Engineering*
- worked one year in Academia
- studied in Germany and Austria with focus on Computer Networks and Security

## Contact

florian.kemmer@postgrad.plymouth.ac.uk  
<http://www.fkemmer.de>

## My L<sup>A</sup>T<sub>E</sub>X-Experience

- used for more than a decade
- for every piece of text
  - letters
  - cvs
  - courseworks
  - undergrad dissertation
  - presentations

# Table of Contents

- 1 L<sup>A</sup>T<sub>E</sub>X
- 2 Setup
- 3 Hands on
- 4 My favourites

- 1 L<sup>A</sup>T<sub>E</sub>X
  - History
  - features
- 2 Setup
- 3 Hands on
- 4 My favourites

# What is LaTeX?

*“LaTeX uses the TeX typesetting program for formatting its output, and is itself written in the TeX macro language.”*

— Wikipedia

# What is T<sub>E</sub>X?

Donald E. Knuth wanted to write a book:

*“(...) we wanted to produce documents that were not just nice, but actually the best. (...) The second major goal was archival: to create systems that would be independent of changes in printing technology as much as possible. (...) I wanted to design something that would be still usable in 100 years.”*

— Donald E. Knuth: Digital Typography, p. 559

# What is T<sub>E</sub>X?

- developed by Donald Ervin Knuth (late 1970s)
- typesetting system
- version number converges at  $\pi$   
currently: 3.1415926 (Debian Wheezy)  
version= $\pi$  after his death (bugs become features)
- documents are “compiled”

# What is T<sub>E</sub>X?

*Q: “If you were young again, would you start writing TeX again or would you use Microsoft Word, or another word processor?”*

*A: “I hope to die before I have to use Microsoft Word.”*

— Harald Koenig asking Donald E. Knuth



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

*“L<sup>A</sup>T<sub>E</sub>X uses the T<sub>E</sub>X typesetting program for formatting its output, and is itself written in the T<sub>E</sub>X macro language.”*

— Wikipedia

- started by Leslie Lamport in 1980s
- defines macros to simplify usage of T<sub>E</sub>X
- enforces document structure

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

- markup language  $\Rightarrow$  no WYSIWYG!
- very strong in typesetting mathematical formulas
- separation of content and style
- scales easily
- considered to have a steep learning curve

# Type face

## Microsoft Word 2008

Call me Ishmael. Some years ago – never mind how long precisely – having little or no money in my purse, and nothing particular to interest me on shore, I thought I would sail about a little and see the watery part of the world. It is a way I have of driving off the spleen, and regulating the circulation. Whenever I find myself growing grim about the mouth; whenever it is a damp, drizzly November in my soul; whenever I find myself involuntarily pausing before coffin warehouses, and bringing up the rear of every funeral I meet; and especially whenever my hypos get such an upper hand of me, that it requires a strong moral principle to prevent me from deliberately stepping into the street, and methodically knocking people's hats off – then, I account it high time to get to sea as soon as I can. This is my substitute for pistol and ball. With a philosophical flourish Cato throws himself upon his sword; I quietly take to the ship. There is nothing surprising in this. If they but knew it, almost all men in their degree, some time or other, cherish very nearly the same feelings towards the ocean with me.

## Adobe InDesign CS4

Call me Ishmael. Some years ago – never mind how long precisely – having little or no money in my purse, and nothing particular to interest me on shore, I thought I would sail about a little and see the watery part of the world. It is a way I have of driving off the spleen, and regulating the circulation. Whenever I find myself growing grim about the mouth; whenever it is a damp, drizzly November in my soul; whenever I find myself involuntarily pausing before coffin warehouses, and bringing up the rear of every funeral I meet; and especially whenever my hypos get such an upper hand of me, that it requires a strong moral principle to prevent me from deliberately stepping into the street, and methodically knocking people's hats off – then, I account it high time to get to sea as soon as I can. This is my substitute for pistol and ball. With a philosophical flourish Cato throws himself upon his sword; I quietly take to the ship. There is nothing surprising in this. If they but knew it, almost all men in their degree, some time or other, cherish very nearly the same feelings towards the ocean with me.

## pdf-L<sup>A</sup>T<sub>E</sub>X 3.1415926

Call me Ishmael. Some years ago – never mind how long precisely – having little or no money in my purse, and nothing particular to interest me on shore, I thought I would sail about a little and see the watery part of the world. It is a way I have of driving off the spleen, and regulating the circulation. Whenever I find myself growing grim about the mouth; whenever it is a damp, drizzly November in my soul; whenever I find myself involuntarily pausing before coffin warehouses, and bringing up the rear of every funeral I meet; and especially whenever my hypos get such an upper hand of me, that it requires a strong moral principle to prevent me from deliberately stepping into the street, and methodically knocking people's hats off – then, I account it high time to get to sea as soon as I can. This is my substitute for pistol and ball. With a philosophical flourish Cato throws himself upon his sword; I quietly take to the ship. There is nothing surprising in this. If they but knew it, almost all men in their degree, some time or other, cherish very nearly the same feelings towards the ocean with me.

Source and more: Zink Typography

## Compiling the document

```
% pdflatex example.tex
```

- 1 LaTeX
- 2 Setup
  - Installation
  - Editors
- 3 Hands on
- 4 My favourites

# Linux

use your favourite packet manager

# Windows

# MacOS



# “Feature Requirements”

- read/write plain text
- Syntax Highlighting
- Outliner
- Hotkeys
- Spell checker<sup>1</sup>

---

<sup>1</sup>well, not exactly a requirement for LaTeX, but for good documents...

# vim

# TeXlipse

# TeXniC Center

- 1 LaTeX
- 2 Setup
- 3 Hands on**
  - Hello, World
  - tables
  - figures
  - source codes
  - modular documents
- 4 My favourites

# Hello, World

```
\documentclass{scrbook}  
  
\begin{document}  
  Hello, World  
\end{document}
```



Hello, World

# structure of commands

`\commandname[optional parameters]{required parameters}`

- `\begin{environment}` (e.g. “document”)
- `\textbf{bold}` → **bold**
- `\emph{emphasised}` → *emphasised*

# Hello, title page

```
\documentclass[a4paper,  
              11pt,  
              ]{scrbook}  
  
\title{Introduction into \LaTeX}  
\author{Florian Kemmer}  
\date{\today}  
  
\begin{document}  
  \maketitle  
\end{document}
```

## Introduction into LaTeX

Florian Kemmer

March 2, 2014



# Hello, structure

- `\part[short]{long title}`
- `\chapter[short]{long title}`
- `\section[short]{long title}`
- `\subsection[short]{long title}`
- `\subsubsection[short]{long title}`

# Hello, toc

```

\documentclass[a4paper ,
              11pt ,
              ]{scrbook}

\usepackage[UKenglish]{babel}
\usepackage{blindtext}

\title{Introduction into \LaTeX}
\author{Florian Kemmer}
\date{\today}

\begin{document}
  \maketitle

  \tableofcontents

  \blinddocument
\end{document}
  
```

## Contents

<b>1</b>	<b>Heading on level 0 (chapter)</b>	<b>5</b>
1.1	Heading on level 1 (section)	5
1.1.1	Heading on level 2 (subsection)	5
1.2	Lists	6
1.2.1	Example for list (itemize)	6
1.2.2	Example for list (enumerate)	7
1.2.3	Example for list (description)	7

# Hello, maths

```
\[
\lim_{x \to 0} \left\{ \frac{e^x - 1}{2x} \right\}
\overset{\left[ \frac{0}{0} \right]}{\underset{\mathrm{H}}{=}}
\lim_{x \to 0} \frac{e^x}{2} = \frac{1}{2}
\]
```

$$\lim_{x \rightarrow 0} \frac{e^x - 1}{2x} \stackrel{\left[ \frac{0}{0} \right]}{\underset{\text{H}}{=}} \lim_{x \rightarrow 0} \frac{e^x}{2} = \frac{1}{2}$$

```
\begin{alignat}{2}
\sigma_1 & \&= x + y & \quad & \\
\sigma_2 & \&= \frac{x}{y} & \quad & \\
\sigma_1' & \&= & & \\
& \frac{\partial x + y}{\partial x} & \& & \\
\sigma_2' & \&= & & \\
& \frac{\partial \frac{x}{y}}{\partial x} & \& & \\
\end{alignat}
```

$$\sigma_1 = x + y \quad \sigma_2 = \frac{x}{y} \quad (1)$$

$$\sigma_1' = \frac{\partial x + y}{\partial x} \quad \sigma_2' = \frac{\partial \frac{x}{y}}{\partial x} \quad (2)$$

# tables

- not the most funny part
- lots and lots of different packages
  - tabular
  - tabularx
  - tabu
  - longtable
  - longtabu
  - table

# tables I

```

\begin{tabular}{l | c || r }
  \hline
  1 & 2 & 3 \\ \hline
  4 & 5 & 6 \\ \hline
  7 & 8 & 9 \\ \hline
\end{tabular}
  
```

1	2	3
4	5	6
7	8	9

Source: Wikibooks

## tables II

```

\begin{tabular}{cc|c|c|c|c|l}
  \cline{3-6}
  & & \multicolumn{4}{|c|}{Primes} & \\\ \cline{3-6}
  & & 2 & 3 & 5 & 7 & \\\ \cline{1-6}
  \multicolumn{1}{|c|}{ }{\multirow{2}{*}{Powers} } & & & & & & & \\
  \multicolumn{1}{|c|}{ }{504} & & 3 & 2 & 0 & 1 & & \\\ \cline{2-6}
  \multicolumn{1}{|c|}{ }{ } & & & & & & & & \\
  \multicolumn{1}{|c|}{ }{540} & & 2 & 3 & 1 & 0 & & \\\ \cline{1-6}
  \multicolumn{1}{|c|}{ }{\multirow{2}{*}{Powers} } & & & & & & & \\
  \multicolumn{1}{|c|}{ }{gcd} & & 2 & 2 & 0 & 0 & min & \\\ \cline{2-6}
  \multicolumn{1}{|c|}{ }{ } & & & & & & & & \\
  \multicolumn{1}{|c|}{ }{lcm} & & 3 & 3 & 1 & 1 & max & \\\ \cline{1-6}
\end{tabular}

```

Source: Wikibooks

# tables II

		Primes				
		2	3	5	7	
Powers	504	3	2	0	1	
	540	2	3	1	0	
Powers	gcd	2	2	0	0	min
	lcm	3	3	1	1	max

## tables III

```

\begin{table}[htbp]
\caption{easier option for tables}
\begin{tabular}{|r|r|r|}
\hline
\multicolumn{1}{|l|}{EstimatedRTT} & \multicolumn{1}{|l|}{DevRTT} & \multicolumn{1}{|l|}{T
0,000035 & 0 & \textit{0,000035} \\ \hline
\textit{0,000047} & \textit{0,000021} & \textit{0,000131} \\ \hline
\textit{0,000050625} & \textit{2,209375E-005} & \textit{0,000139} \\ \hline
\textit{0,0061015469} & \textit{0,0106056836} & \textit{0,0485242813} \\ \hline
\textit{0,0123038535} & \textit{0,0188082993} & \textit{0,0875370508} \\ \hline
\textit{0,0107899968} & \textit{0,0167554737} & \textit{0,0778118916} \\ \hline
\textit{0,0094483722} & \textit{0,0149144483} & \textit{0,0691061655} \\ \hline
\textit{0,0347714507} & \textit{0,0555012236} & \textit{0,256776345} \\ \hline
\end{tabular}
\label{tab:example}
\end{table}

```

Source: My Assignment last term



## tables III

Table 1: easier option for tables

EstimatedRTT	DevRTT	TimeoutInterval
0,000035	0	<i>0,000035</i>
<i>0,000047</i>	<i>0,000021</i>	<i>0,000131</i>
<i>0,000050625</i>	<i>2,209375E-005</i>	<i>0,000139</i>
<i>0,0061015469</i>	<i>0,0106056836</i>	<i>0,0485242813</i>
<i>0,0123038535</i>	<i>0,0188082993</i>	<i>0,0875370508</i>
<i>0,0107899968</i>	<i>0,0167554737</i>	<i>0,0778118916</i>
<i>0,0094483722</i>	<i>0,0149144483</i>	<i>0,0691061655</i>
<i>0,0347714507</i>	<i>0,0555012236</i>	<i>0,256776345</i>

## tables – the rescue

- `calc2latex`
- `excel2latex`
- and many more. . .

## tables – the rescue

	D	E	F
4			
5	<u>EstimatedRTT</u>	<u>DevRTT</u>	<u>TimeoutInterval</u>
6	0,000035	0	0,000035
7	0,000047	0,000021	0,000131
8	0,000050625	2,209375E-005	0,000139
9	0,0061015469	0,0106056836	0,048524281
10	0,0123038535	0,0188082993	0,087537051
11	0,0107899968	0,0167554737	0,077811892
12	0,0094483722	0,0149144483	0,069106166
13	0,0347714507	0,0555012236	0,256776345
14			

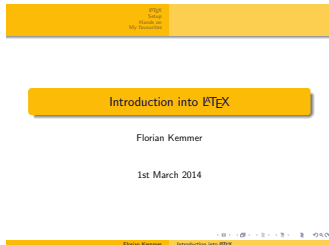
# Figures I

```
\includegraphics{example}
```

- requires `\usepackage{graphicx}` in preamble
- no need to type file extension
- doesn't understand all formats

# Figures II

```
\includegraphics[height=0.8\textheight,  
width=0.8\textwidth,  
keepaspectratio,  
{fig/intro}
```



## Figures III

```
\begin{figure}
  \includegraphics[angle=90,
    height=0.4\textheight,
    width=0.4\textwidth,
    keepaspectratio,
    ]{fig/intro}
  \caption{An interesting figure that
    most certainly shows something}
  \label{fig:exampleFigure}
\end{figure}
```

Figure `\ref{fig:exampleFigure}` shows...

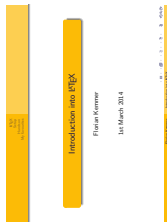


Figure 1: An interesting figure that most certainly shows something

Figure 1 shows...

# package listings

- `\lstinline|example|`
- `\begin{lstlisting}`
- `...`
- `\end{lstlisting}`
- `\lstinputlisting{path/to/file}`

# listings options

- Syntax highlighting
- range of lines when including from file
- colours, tab sizes, line breaks and line break markers, ...



# get things organised

- you wouldn't want to have one single big file
- use `\input{file}` instead
- also useful to keep tables et al. in separate files

```
\begin{document}

\begin{frame}
  \titlepage
\end{frame}

\input{slides/history}
\input{slides/whyisitgreat}
\input{slides/setup}
\input{slides/handson}
\input{slides/myfavsv}

\end{document}
```

- 1 L<sup>A</sup>T<sub>E</sub>X
- 2 Setup
- 3 Hands on
- 4 My favourites**
  - Revision Control
  - Reference Management

## It's source code – use revision control (git)

- history
- synchronisation
- backup
- collaboration

## access everywhere

- Laptop
- vServer via SSH
- mobile phone (nope, no joke!)

# References in L<sup>A</sup>T<sub>E</sub>X

- this could easily be a separate talk
- multiple extensions, such as BiBTeX, biblatex, biber
- reference management made easy ;-)

## References: Usage in text

- `\usepackage{biblatex}`
- `\addbibresource{bib.bib}`
- `\parencite{label}`  
`\textcite{label}`
- `\printbibliography`

# Bibliography file

```
@article{Xiao2009,  
  title = {Wireless Network Security},  
  volume = {2009},  
  issn = {1687-1499},  
  url = {http://jwcn.eurasipjournals.com/content/2009/1/532434},  
  doi = {10.1155/2009/532434},  
  issue = {1},  
  pages = {532434},  
  journaltitle = {EURASIP Journal on Wireless Communications and \  
    Networking},  
  author = {Xiao, Yang and Chen, Hui and Yang, Shuhui and Lin, Yi-Bing \  
    and Du, Ding-Zhu},  
  urldate = {2013-12-09},  
  date = {2009},  
  file = {Xiao et al. - 2009 - Wireless Network \  
    Security.pdf:/home/flo/.zotero/zotero/rjmjuh2p.default/zotero/storage/67X5O  
    et al. - 2009 - Wireless Network Security.pdf:application/pdf}  
}
```

*PLEASE* don't create these files manually ;-)

# References: Example usage

```
\usepackage[backend=biber]{biblatex}
\addbibresource{bib.bib}
\begin{document}
\section{Introduction}
  As \textcite{Xiao2009} argue, \ldots
  Moreover, it has been proven that something is true \parencite{Xiao2009}
\printbibliography
\end{document}
```



# References: Output

## 1 Introduction

As Xiao et al. [1] argue, ...

Moreover, it has been proven that something is true [1]

## References

- [1] Yang Xiao et al. “Wireless Network Security”. In: *EURASIP Journal on Wireless Communications and Networking* 2009 (1 2009), p. 532434. ISSN: 1687-1499. DOI: 10.1155/2009/532434. URL: <http://jwcn.eurasipjournals.com/content/2009/1/532434> (visited on 12/09/2013).

# References: Output in Harvard

```
\usepackage[style=authoryear ,
             backend=biber ,
             bibencoding=utf8 ,
             maxcitenames=3,
             maxbibnames=99,
             doi=true ,
             firstinits=true ,
             uniquename=init ,    % avoids warning — crashes anything?
             dashed=false ,
             isbn=false]{biblatex}
\DeclareNameAlias{sortname}{last-first}           % having always: Surname, Initials
%\DeclareFieldFormat[article]{title}{\mkbibemph{#1}} % make article titles in quotes
\DeclareFieldFormat[unpublished]{title}{\mkbibemph{#1}} % make unpublished (presentation) titles in quotes
\renewcommand*{\nameyear delim}{\addcomma\space} % add the comma between author and year
\DeclareLanguageMapping{british}{british-apa}

% don't display months/day in reference list , even if given in database
\AtEveryBibitem{%
  \clearfield{day}%
  \clearfield{month}%
  \clearfield{endday}%
  \clearfield{endmonth}%
}
```

# References: Output in Harvard

## 1 Introduction

As Xiao et al. (2009) argue, ...

Moreover, it has been proven that something is true (Xiao et al., 2009)

## References

Xiao, Y., Chen, H., Yang, S., Lin, B., and Du, D.-Z. (2009). “Wireless Network Security”. In: *EURASIP Journal on Wireless Communications and Networking* 2009 (1), p. 532434. DOI: 10.1155/2009/532434. URL: <http://jwcn.eurasipjournals.com/content/2009/1/532434> (visited on 12/09/2013).

The End...

Thank you very much!

Questions?

## ... or not? More information

- slides will be online
- package documentation
- Google!
- Wikibooks

## Final recommendation

- If you've never used L<sup>A</sup>T<sub>E</sub>X: Don't start for your Masters dissertation
- If you've only tried L<sup>A</sup>T<sub>E</sub>X: Don't start for your Masters dissertation ⇒ You could use it for the Paper to force Paul Dowland to learn L<sup>A</sup>T<sub>E</sub>X:D
- If you're using L<sup>A</sup>T<sub>E</sub>X: Go on