

Introduction to \LaTeX

Workshop

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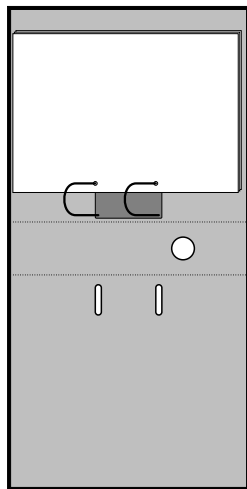
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B_IB_T_EX

CTAN

Background

- Writing reports, papers, theses, articles, ...
- Office text processors: Microsoft Office Word, LibreOffice Writer, WPS Office Words, Calligra Words etc.
- Seemingly good software?
- But has irritations...
- Professionals use $\text{T}_{\text{E}}\text{X}$, a markup language for making documents
- Why?



Issues with Office

- Images: they never stay in place, go above text, outside of caption boxes, etc.
- Copy-pasting text (or worse, tables) leads to formatting problems
- Different office programs render the same files differently
- Bibliography management is a hassle, citation styles are too rigid
- Math formulas handled by another program altogether
- Reformatting (for publishing etc.) is tricky
- Large documents/images become very slow
- \TeX solves that, and more: it's fun!



TEX

- A typesetting system made in 1978 (MS Word: 1990)
 - \LaTeX (1984): additions to base \TeX for ease of use
 - Con \TeX t (1996, Dutch): additions to \TeX for more control
- Document files are plain text (`.tex`, source code, markup)
- An engine (compiler) is used to turn it into a standard read-only document (PDF, PS)
 - pdf \LaTeX
 - X \TeX
- Highly extensible, heavily package-oriented: “there’s a package for that”
- Available as a distribution: collection of engines and packages
- Free and open-source software, cross-platform



Example

```
\documentclass[12pt]{article}
\usepackage{amsmath}
\title{\LaTeX}
\date{}
\begin{document}
  \maketitle
  \LaTeX{} is a document preparation system for
  the \TeX{} typesetting program. It offers
  programmable desktop publishing features and
  extensive facilities for automating most
  aspects of typesetting and desktop publishing,
  including numbering and
cross-referencing,
  tables and figures, page layout,
  bibliographies, and much more.

  \LaTeX{} was
  originally written in 1984 by Leslie Lamport
  and has become the
dominant method for using
  \TeX; few people write in plain \TeX{} anymore.
  The current version is \LaTeXe.

  % This is a comment, not shown in final output.
  % The following shows typesetting
power of LaTeX:
  \begin{align}
    E_0 &= mc^2 \\
  \end{align}

  %%
    E &= \frac{mc^2}{\sqrt{1-\frac{v^2}{c^2}}}
  \end{align}

  % Same in built-in LaTeX math:
  $$ E_0 = mc^2 $$
  $$ E = \frac{mc^2}{\sqrt{1-\frac{v^2}{c^2}}} $$
\end{document}
```

\LaTeX

\LaTeX is a document preparation system for the \TeX typesetting program. It offers programmable desktop publishing features and extensive facilities for automating most aspects of typesetting and desktop publishing, including numbering and cross-referencing, tables and figures, page layout, bibliographies, and much more.

\LaTeX was originally written in 1984 by Leslie Lamport and has become the dominant method for using \TeX ; few people write in plain \TeX anymore. The current version is $\text{\LaTeX} 2_{\epsilon}$.

$$E_0 = mc^2 \quad (1)$$

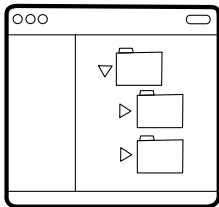
$$E = \frac{mc^2}{\sqrt{1 - \frac{v^2}{c^2}}} \quad (2)$$

$$E_0 = mc^2$$

$$E = \frac{mc^2}{\sqrt{1 - \frac{v^2}{c^2}}}$$

Graphical user interfaces

- Quick access to formatting, math, table creation macros, spell checking, word wrap, search, compiling, viewing the result
- Cross-platform GUIs, such as:
 - [Texmaker](#) and [TeXstudio](#)
 - [Kile](#)
 - [LyX](#)
- All depend on an already installed T_EX distribution (i.e. T_EX Live) to work!
 - Linux distributions provide T_EX Live (and GUIs) out of the box via package managers
 - T_EX Live installer for Windows [available](#)
 - macOS can use MacT_EX



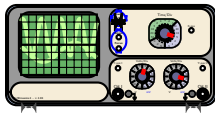
Collaborative editing

- Web-based editors (a la Google Docs) available
 - Overleaf, Papeeria, Authorea, ...
 - Most require payment for private repositories
 - University-wide Overleaf Pro license in progress, to be activated by June
- Git (thanks to plain text)
 - GitHub, GitLab, own server, ...
 - Beware of merge conflicts: split chapters into separate files, one line per sentence
 - Useful even when writing alone: no more problems with backups and multiple versions
- Both combined!



Drawbacks

- Learning curve: pays off in the long run
- Confusing errors (if any!)
 - Auxiliary files in working directory may help: `.log` for engines, `.blg` for BibTeX
 - Overfull `\hboxes`: text interpreted as a character/box; if it cannot be broken up nicely, warns you
 - File '`<package>.sty`' not found. means you don't have the package installed
- Quirkiness:
 - pdfL^AT_EX doesn't support UTF-8 symbols
 - Need packages for handling image formats etc.
- People who are unwilling to learn to use collaborative L^AT_EX editors or PDF editors



Want to learn more?

- WikiBooks:
<https://en.wikibooks.org/wiki/LaTeX>
- CTAN: <http://ctan.org>
- Stack Exchange: <http://tex.stackexchange.com/>
- This presentation and examples:
<https://github.com/GreatEmerald/tex-workshop>
- [Paper for Advanced Earth Observation course](#)
- [Master thesis and first PhD paper](#)
- PhD thesis template:
https://github.com/bbrede/Wageningen_PhD_thesis_template



Questions?

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Practical

You can look at, compile and edit the examples given in the following slides on Overleaf.

1. Register and log into Overleaf:
<https://www.overleaf.com/>
2. Follow the invitation link:
<https://bit.ly/2RWIH4T>
3. Read-only; to make your own copy, click “**Menu**” at the top left, then “**Copy project**” (you must be **logged in!**)



Text and math

(example.tex, utf8.tex)

- \TeX is plain text: no formatting is preserved when pasting
- Whitespace is ignored, unless two new lines
- Inline maths capability with math-specific styles, syntax is fairly intuitive
- UTF-8 support is better in \XeLaTeX , e.g. text in Chinese

Formatting

(ISPRStguidelines_authors.tex)

- Formatting can be global or local
 - Global formatting is done in the file header: page margins, line spacing, font size, etc.; geometry package
 - Local formatting is done inline with special commands like `\texttt`, `\textbf`, `\textit`
 - Experts enjoy semantic styles by defining new commands: `\newcommand{\code}[1]{\texttt{#1}}`
- Journals often provide .cls style templates or template .tex files
 - `<filename>.cls`: use `\documenttype{<filename>}`
 - `<filename>.tex`: possibly use `\input{<filename>}`, edit or use as a reference
 - Example: ISPRS provides .cls files and an example .tex

Figures

(figures.tex)

- \LaTeX has a figure environment that makes it easy to include figures and refer to them
- The position of figures is determined automatically – no problem to add more text
- \TeX is optimised for vector graphics (PDF, EPS, SVG), avoid rasters
- `hyperref` package allows following references within the PDF

BIBTEX

(bibliography.tex)

- A system that handles all things bibliography
- Database of bibliography is stored in plain text, .bib files, one may copy-paste entries from Google Scholar
- Reference managers (Zotero, Mendeley, EndNote etc.) can export to BibTeX format
- Cite entries by referring to their aliases
- The default citing package is rigid, use natbib or biblatex for customisability
- Integrates with hyperref
- Two-step process; might need two compilation rounds

More packages!

(`acronyms.tex`, `changes.tex`, `gantt.tex`)

- CTAN: Comprehensive T_EX Archive Network (<http://ctan.org>)
- 5836 packages at the moment of writing! (was 5199 in 2017)
 - `changes`: adding edit suggestions and comments!
 - `glossaries`: Acronym management!
 - `pgfgantt`: Gantt charts! Useful for writing proposals.
 - `tikz`: flowcharts and other vector graphics!
 - `textcomp`: symbols °, ©, ... for pdfL^AT_EX
 - `qrcode`: QR code generation!
 - `knitr`: embed R code into T_EX!
 - Allows putting the output of *R* commands into plain text, no more copy-pasting results
 - Exact same tool as for `.Rmd`, handles `.Rtex` too
 - Actually an *R* package implementing a T_EX engine
 - `beamer`: Presentations! Like this one!