HPS

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LaTeX Crash Course

Reports and Presentations with LaTeX

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Definition

LaTeX is

- a document preparation system
- an extension of the **TEX** Typesetting system
- written as plain text and compiled to a PDF
- widely used in academia (especially cs, physics, maths, chemistry)
- pronounced *Lah-tech* or *Lay-tech*
- completely Open source (initial release 1984)

Source: https://www.latex-project.org/

Compiling

.tex → pdflatex dateiname.tex → .pdf
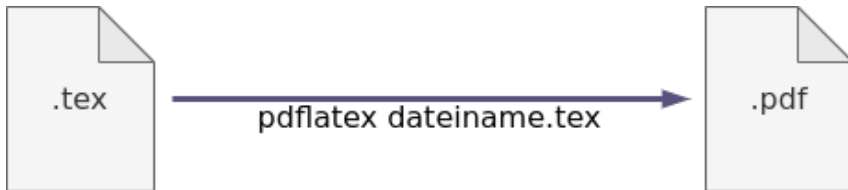
- Terminal command: `pdflatex dateiname.tex`
- Requires a LaTeX installation

Installation

- Operating system independently available
- Install via **TeX Live** or **MiKTeX**
- Local edits via LaTeX editor such as **TeXstudio**
- Web App via **Overleaf** or **ShareLaTeX**
  sharelatex.gwdg.de

Hello World in LaTeX

Tex

```latex
1  \documentclass[12pt]{article}
2  \begin{document}
3          \Huge
4          Hallo Welt!
5  \end{document}
```

Hallo Welt!

Basic Elements

Basisaufbau jedes Dokuments:

```Tex
1  \documentclass{article}
2  % ... preamble
3  \begin{document}
4  % ... content
5  \end{document}
```

- Lots of classes:
  article (Reports),
  scrbook (Books),
  beamer (Presentations),
  ...
- Content between
  \begin{document} and
  \end{document}
- Before that global settings

Commands

command[...]{...}

- command → Name of the command
- Empty braces can be dropped
- Required parameters are in {...}
- Optional parameters are in [...]

Options for \documentclass[...]{article}

- Font size: 10pt, 11pt, 12pt
- Paper format: a4paper, a5paper, a6paper
- Column number: onecolumn, twocolumn
- Example: \documentclass[12pt, twocolumn]{article}

Environments

```
\begin{...} ... \end{...}
```

- Environments are active between \begin and \end
- document: Environment with the printed content
- Example environments:
  - ▶ Maths formulas
  - ▶ Tables
  - ▶ Enumerations
  - ▶ Quotes

Enumerations

```
\begin{itemize}
 \item ...
 ...
\end{itemize}
```

■ Simple not-numbered list

■ For numbered lists use enumerate

■ For bullet points on slides (like this)

Tip: Use your own enumeration symbol \item[...]
     Here \item[Tip:]

Maths formulas

Many options for writing formulas:

```
1  Let \(3+2=5\).\\
2  \[x*x = x^2\]
3
4  Equation system:
5  \begin{align}
6        (x + y)^2 &= (x+y)(x+y)\\
7        &= x^2 + 2xy + y^2
8  \end{align}
```

Let $3 + 2 = 5$.

$$x * x = x^2$$

Equation system:

$$(x + y)^2 = (x + y)(x + y)$$
$$= x^2 + 2xy + y^2$$

algin uses & to align multiple lines.

https:
//latex.wikia.org/wiki/List_of_LaTeX_environments

Example Formulas

- `\frac{}{}` : Fractions, e.g., $\frac{1}{3}$
- `\sqrt{}` : Roots, z.B. $\sqrt{2}$
- `\pi` : π
- `\leq` : Inequalities, e.g., $\leq$
- `\sum_{i=0}^{n}` `i+1` : Sums, e.g., $\sum_{i=0}^{n} i + 1$
- `\int_0^1` `x^2` : Integrals, e.g., $\int_0^1 x^2$

References

"Non-reproducible single occurrences are of no significance to science."

— Karl Popper, The Logic of Scientific Discovery, 2002, p. 66

Popper and Jason, *The Logic of Scientific Discovery*

When to use LaTeX

- ■ Seminar reports, thesis, paper
- ■ Presentations
- ■ Letters, CV
- ■ Exercise Sheets
- ■ Books
- ■ Anything with formulas

We provide templates:
https://hps.vi4io.org/teaching/ressources/start

References

Popper, Karl Raimund and Gary James Jason. *The Logic of Scientific Discovery*. Psychology Press, 2002. 548 pp. ISBN: 978-0-415-27844-7.