Tools Seminar

Week 4 - LaTeX Configuration & Usage*

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*This slide is based on pppppass's ToolsSeminar in PKU

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Introduction

What is TEX and LATEX?

1. TEX is a typesetting system originally designed by Donald Knuth. (*The Art of Computer Programming*)
2. LATEX is a typesetting system based on TEX designed originally designed by Lesile Lamport.
3. Basic idea of TEX and LATEX: "What you think is what you get", distinguished from "What you see is what you get" (WYSISYG)
4. Programming mechanism of TEX and LATEX is based on macros.

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When not to use LATEX: the material is highly unstructured

TeX & LaTeX Engines

- TeXLive (cross-platform), MacTeX (Mac OSX), MikTeX (Windows)
- CTeX (Chinese)
- Overleaf / shareLaTeX (online)

Basic Structure of a Document

1. Command `\documentclass{...}`: `article`, `ctexart` and `beamer`
2. Preamble: definitions and `\usepackage{...}`s
3. Top matters: `\title{...}`, `\author{...}` and `\date{...}`
4. Begin a document environment: `\begin{document}`
5. Section: `\section{...}`, `\subsection{...}` and so on
6. Paragraphs separated by a single blank line
7. End a document environment: `\end{document}`

* Demo

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Basic Typesetting

Text Formatting

1. Comments: `%`
2. Special characters: `\&`, `\_`
3. Whitespace: `~`, `\ `, `\!`, `\hspace{...}`
   Use *two* blank lines to initiate a new paragraph (newline only adds one whitespace for English)
4. Paragraphs: `\\` (no indent), `\par` (indent), and two blank lines (indent)
5. Orthogonal coordinates of fonts:
   English: `\textbf{...}`, `\textrm{...}`, `\textit{...}`
   Chinese: `\kaishu`, `\heiti`
6. Emphasize: `\emph{...}`
7. Font size: `\tiny`, `\small`, `\large`, `\Large`, `\LARGE`
8. Align: `\centering`, `\raggedright`

Basic Environments

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

1. Quotes: `quote`
2. Lists: `enumerate`, `itemize` and package `enumitem`
3. Theorems: `\newtheorem` and package `ntheorem`
4. Verbatim: `\verb'...'`
5. Program lists: `lstlisting` and package `listings` / `minted`

Mathematical Symbols

Use $ for inline formulas, and \[\] for displayed ones

1. Types: normal texts, operators, binary operators, relations accents
2. Fonts: `\mathrm{...}`, `\mathbf{...}`
3. Normal symbols: `\exists`, `\forall`
4. Operators: `\log`, `\sin`
5. Binary operators: `+`, `\setminus`, `\otimes`
6. Relations: `\le`, `\equiv`, `\approx`
7. Whitespace: `\,`, `\!`
   frequently used: `\mathop{\mathrm{d}\!} x`

Function lists: https://katex.org/docs/supported.html

Formula Structures

1. Subscript and superscript: `_` and `^`
2. Fraction and binominals: `\frac{...}{...}`, `\binom{...}{...}`
3. Roots and radicals: `\sqrt{...}`
4. Huge operators: `\sum`, `\product`, `\bigoplus`
5. Delimiters: `\left`, `\right`, and brakets like `\lfloor`
6. Matrices: environment `matrix`, `bmatrix` and package `amsmath`

Mathematical Environments

1. Basic equations: environment `equation`
2. Matrices: environment `matrix`, `bmatrix`
3. If-cases: environment `cases`
4. Gathered equations: environment `gather`
5. Aligned equations: environment `align`
6. Formulas in formulas: environment `split`, `gathered` and `aligned`

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Further Topics

Bibliography

1. BibTeX
2. Footnote: `\footnote{...}`
3. Cite: `\cite{...}`
4. Display: `\bibliography{...}`

Floats

1. Environment `figure`
2. Environment `table`
3. Package `graphicx`
4. `[htbp]`, package `float` and `[H]`

Tables

1. Environment `tabular` and `array`
2. Column formats: e.g. `|c|rrrlr|`
3. Align: `&` and `\\`
4. Row lines: `\hline`

Other Useful Packages

1. Layout: `geometry`
2. Longer table: `longtable`
3. Algorithms: `algorithm2e` or `algorithm`
4. Hyper-links: `hyperref`
5. Include .pdf files: `pdfpages`

Other Useful Things

- Markdown $\times$ LaTeX(Web support)
  - KaTeX
  - MathJax
- VS Code $\times$ LaTeX
  - Make sure you have installed TeXLive first
  - LaTeX Workshop Extension