Hochschule
Bonn-Rhein-Sieg
University of Applied Sciences

b-it Bonn-Aachen International Center for Information Technology

Introduction to LaTeX

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Prachi Sheth

Topics

- What makes LaTeX different?
- Necessary Packages
- Starting Point - Preamble
- Text formatting & Fonts
- Lists
- Tables & Math
- Images
- Frames
- Creating an article
- BibTeX

What makes LaTeX different?

LaTeX is a high-quality typesetting system commonly used for technical and scientific documents. It offers:

- **Professional typesetting**: Beautiful and consistent handling of complex documents.
- **Focus on content**: Authors can focus on the content and structure rather than formatting.
- **Mathematical capabilities**: Easily handles mathematical symbols and formulas.
- **Cross-referencing**: Automatic generation of tables of contents, lists of figures, citations, etc.

Necessary Packages

LaTeX offers a variety of packages that extend its functionality. Some commonly used packages:

- amsmath, amssymb, amsfonts - Advanced mathematical features.
- graphicx - Inserts images.
- tcolorbox - Creates customizable colored boxes.
- tikz - Creates high-quality diagrams.
- booktabs - Enhanced tables with more refined formatting.
- enumitem - advanced customization of lists
- inputenc - allows the use of non-ASCII characters

Starting Point - Preamble

The preamble is the section of a LaTeX document where you define document-wide settings and load packages.

- Document Class: Determines the type of document (e.g., article, report, beamer). `\documentclass{ }`
- Packages: `\usepackage{ }` to include additional features.
- Title
- Author
- Date

Text Formatting & Fonts

LaTeX allows various ways to format text and control fonts:

- Bold text: `\textbf{}` → **Bold Text**
- Italic text: `\textit{}` → *Italic Text*
- Underlining: `\underline{}` → Underlined Text

Lists

LaTeX offers different types of lists:

- Itemized list: `\begin{itemize}`
  - First item `\item`
  - Second item
    - » third item `\end{itemize}`
- Enumerated list: `\begin{enumerate}`
  1. First item
  2. Second item
- Description list: `\begin{description}`

LaTeX A typesetting system.
BibTeX A tool for managing references.

Tables & Math

LaTeX is a powerful tool in creating mathematical equations and professional-looking tables.

Tables:

- Use `tabular` environment for tables.
- `\hline` for horizontal lines.
- `booktabs` for professional table design.

data 1	data 2
a	b

Math:

- Inline math: $E = mc^2$
- Display math:

$$\int_0^\infty e^{-x^2} dx = \frac{\sqrt{\pi}}{2}$$

Images

Including images in LaTeX is simple with the `graphicx` package.

- Use `\includegraphics` to insert an image.
- Options include width, height, and scaling.

Example:

Text Blocks

A plain block

This is a plain block - block

An example block

This is an example block - exampleblock

An alert block

This is an alert block - alertblock

This is a colored box - tcolorbox

Article

LaTeX is often used for writing scientific papers and articles. To create an article:

- Start with `\documentclass{article}`.
- `\tableofcontents` will generate the table of content that includes your sections, and subsections.
- Structure the content with sections and subsections `\section{}`, `\subsection{}`, `\subsubsection{}`.

BibTeX

BibTeX is used to manage references in LaTeX.

- Create a separate .bib file with your references.
- Use `\cite{key}` to cite sources in your document.
- Bibliography style can be customized. E.g.: `\bibliographystyle{IEEEtran}`
- this is cited [1]

References

Y. Wang, “Physical space is finite,” **Journal of Modern Physics**, vol. 15, no. 5, pp. 550–595, 2024.