An Introduction to LaTeX

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What is LaTeX

- Family of Programs designed to produce publication quality documents
- Original version written by Leslie Lamport in 1980ś
- Variant of TeX developed by Donald Knuth
- A typesetting program
  - The text is entered into the computer.
  - The input text is formatted into lines, paragraphs and pages.
  - The output text is displayed on the computer screen.
  - The final output is printed.

Why Use LaTeX

- Standard format used for academic purposes
- LaTeX is a Free Software
- Output is platform independent
- Results in beautiful document
- Easier to include theorems and mathematical formula
- Automatic numbering and cross-referencing of chapters, sections, figures, tables, etc.
- Many conferences and periodicals specify document format as LaTeX class file

Donald Knuth says that his aim in creating TeX is to beautifully typeset technical documents especially those containing a lot of Mathematics.

Assumptions

- GNU/Linux system with LaTeX installed (Kile, TeXLive)
- Google search

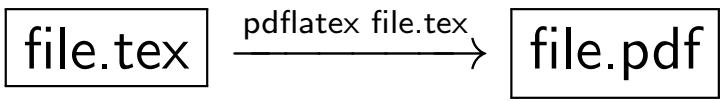
Getting Started

- **Bare-bone sample**

```
\documentclass{article}

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

- **Compilation Process**



Simple Typesetting

```
\documentclass{article}

\begin{document}
My first {\LARGE DOCUMENT}.
\end{document}
```

- \ is a special character in LaTeX.
- Words are separated by spaces and paragraphs are separated by newlines.
- Extra spaces are not displayed.

Special Symbols

- \\- Newline
- \textbackslash - Backslash
- % - Comment
- \pagebreak - New page

Text Positioning

ENVIRONMENTS - \begin{name} \end{name}

Some of the commonly used Environments are :-

- Center
- Flushleft
- FlushRight
- Quote
- Verbatim

Fonts

- **Font Family**
  - Roman - \textrm{text}
  - Sans Serif - \textsf{text}
  - TypeWriter - \texttt{text}
- **Font Series**
  - Medium - \textmd{text}
  - Boldface - \textbf{**text**}
- **Font Shape**
  - Upright - \textup{text}
  - Italics - \textit{*text*}
  - Small Cap - \textsc{TEXT}

Text Size

- tiny
- scriptsize
- footnotesize
- small
- normalsize
- large
- Large
- LARGE
- huge
- Huge

Document Class

\documentclass[options]{name}

- **Document Classes**
  - article
  - report
  - book
  - letter
  - beamer
- **Options**
  - Text Size - 10pt, 11pt or 12pt
  - onecolumn or twocolumn

Title

- \title
- \author (\and)
- \date
- \institute

Dividing the content

- \maketitle
- \tableofcontents
- \abstract
- \chapter
- \section
- \subsection
- \paragraph
- \subparagraph

Formatting

- Margins
- Font, size and style of different types of text
- Paragraph alignments and indentation
- Special environments

Lists

- Itemize
- Description
- Enumerate

Typesetting Mathematics

- Mathematics environment
  - Text within Dollar signs
  - Text within a \begin{maths} and a \end{maths}
- Superscripts - ^
- Subscripts - _
- Roots (\sqrt{25} or \sqrt [5]{25})
- Mathematics Symbols - circ, Box
- Matrices (amsmath) $\begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$ $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$

Typesetting Mathematics

- Greek Letters α, β, θ
- Binary operation symbols $\pm$, $\cup$, $\triangleleft$
- Relation Symbols $\leq$, $\subseteq$
- Arrow symbols $\leftarrow$, $\Rightarrow$, $\downarrow$
- Other symbols $\forall$, $\clubsuit$, ∞

Including Figures

- Using package graphics
- Add images and perform manipulations like rotation, scaling, etc.

Figure: Donald Knuth

Beamer

- Used to create slides
- This slide was created using LaTeXBeamer
- The syntax is similar to that of other LaTeXdocuments
- The document class used in beamer
- Use \pause to add breakpoints

Beamer

Minimal code

```
\documentclass{beamer}
\usetheme{Warsaw}

\begin{document}

\begin{frame}{Frame Name}
\ end{frame}

\begin{frame}{Frame Name}
\ end{frame}

\end{document}
```

Common Errors

- Braces of commands not closed
- No matching end for a begin environment
- Spelling mistakes in predefined tags like itemize, enumerate, etc.

Where Not To Use LaTeX

- Small document with very little maths equations.
- Heavy animation
- Embed movies or sounds
- Font Selection
- Required to work with variety of file fomats
- When required to collaborate with non-technical people

Conclusion

- Difficult to learn initially, but easier to make beautiful documents
- Incremental approach should be followed
- Documents are reusable and can be easily converted to slides

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Any questions