LaTeX

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WHAT IS LaTeX?

Free scripting language for professional type-setting!

- Report, thesis, book (chapter), CV, presentations, …

TeX

- Typesetting program
- Developed by Donald Knuth (1978)

LaTeX

- TeX Macro package
  - Document processing system
  - Allows markup for document structure
- Originally written by Leslie Lamport (early 1980s)

WHY LaTeX?

Pros

Free!

Looks pretty, especially math

Consistent formatting
- Good for long documents, such as dissertation and books

Supporting ecosystem
- Most journals have their LaTeX *style* files

Good bibliography management
- Bibtex supported widely

Cons

Steep learning curve

Hard to learn, but powerful

***Can* meet most user requirements**
- but tricky to find out *how*

Not WYSIWYG
- Plain text with markup vs. Formatted text

GETTING STARTED

Setup

Offline mode

- Download and install
  - Backend: MikTeX
  - Frontend: Editor
    - TexStudio, WinEdt, Emacs, vi, TeXlipse, …

Online mode

- Overleaf
- ShareLaTeX

Hello World!

```
\documentclass{article}
\begin{document}
Hello World!
\end{document}
```

LaTeX SYNTAX

Spaces

- Don't matter

Reserved Characters

- # $ % ^ & _ { } ~ \
- \# \$ \% \^{} \& _ \{ \} \~{} \textbackslash{}

Groups

- Enclosed in {}

Environments

- \begin{env_name} … \end{env_name}

Commands

- \commandname[option1,option2,...]{argument1}{argument2}...

Comments

- %

DOCUMENT STRUCTURE

Preamble

- Document class
- Packages

Main document (\document environment)

- Table of contents
- Top matter (title, author, date, affiliation, …)
- Abstract
- Sections

Acknowledgement

Appendices

Bibliography

DOCUMENT CLASSES

`article`	For articles in scientific journals, presentations, short reports, program documentation, invitations, …
`IEEEtran`	For articles with the IEEE Transactions format
`proc`	A class for proceedings based on the article class
`report`	For longer reports containing several chapters, small books, thesis, …
`book`	For real books
`slides`	For slides
`memoir`	For changing sensibly the output of the document. It is based on the book class, but you can create any kind of document with it
`letter`	For writing letters
`beamer`	For writing presentations

DOCUMENT CLASS OPTIONS

`10pt, 11pt, 12pt`	Sets the size of the main font in the document. Default: 10pt.
`a4paper, letterpaper,...`	Defines the paper size. Default: letterpaper.
`fleqn`	Typesets displayed formulas left-aligned instead of centered.
`leqno`	Places the numbering of formulas on the left hand side instead of the right.
`twocolumn`	Instructs LaTeX to typeset the document in two columns instead of one.

PACKAGES

`\usepackage[option1,option2,option3]{"package_name"}`

\document ENVIRONMENT

Top matter

```
\documentclass[11pt,a4paper]{report}

\begin{document}
\title{How to Structure a LaTeX Document}
\author{Andrew Roberts}
\date{December 2004}
\maketitle
\end{document}
```

Sectioning Commands

Command	Level
\part{"part"}	-1
\chapter{"chapter"}	0
\section{"section"}	1
\subsection{"subsection"}	2
\subsubsection{"subsubsection"}	3
\paragraph{"paragraph"}	4
\subparagraph{"subparagraph"}	5

TEXT FORMATTING

Linespacing

- \baselinestretch

Non-breaking spaces (~)

Text mode

- superscript \textsuperscript{}
- subscript \textsubscript{}

Dashes and hyphens

PARAGRAPH FORMATTING

Paragraph alignment

Alignment	Environment	Command
Left justified	flushleft	\raggedright
Right justified	flushright	\raggedleft
Center	center	\centering

Typesetting URLs (\url)

COLORS

xcolor package for font color, text background, or page background

Coloured text

- \textcolor{declared-color}{text}
- {\color{declared-color}some text}

Coloured page

- \pagecolor{declared-color}

Coloured text background

- \colorbox{declared-color}{text}

Predefined colors

- black, blue, brown, cyan, darkgray, gray, green, lightgray, lime, magenta, olive, orange, pink, purple, red, teal, violet, white, yellow

FONT STYLES

LaTeX command	Equivalent switch	Output style	Remarks
\textnormal{...}	{\normalfont ...}	document font family	This is the default or normal font.
\emph{...}	{\em ...}	emphasis	Typically italics. Using emph{} inside of italic text removes the italics on the emphasized text.
\textrm{...}	{\rmfamily ...}	roman font family	
\textsf{...}	{\sffamily ...}	sans serif font family	
\texttt{...}	{\ttfamily ...}	teletypefont family	This is a fixed-width or monospace font.
\textup{...}	{\upshape ...}	upright shape	The same as the normal typeface.
\textit{...}	{\itshape ...}	italic shape	
\textsl{...}	{\slshape ...}	slanted shape	A skewed version of the normal typeface (similar to, but slightly different from, italics).
\textsc{...}	{\scshape ...}	SMALL CAPITALS	
\uppercase{...}		UPPERCASE (ALL CAPS)	Also \lowercase. There are some caveats, though; see here.
\textbf{...}	{\bfseries ...}	bold	
\textmd{...}	{\mdseries ...}	medium weight	The normal font weight.
\textlf{...}	{\lfseries ...}	light	A font weight lighter than normal. Not supported by all typefaces.

FONT SIZES

Command
\tiny
\scriptsize
\footnotesize
\small
\normalsize
\large
\Large
\LARGE
\huge
\Huge

LIST STRUCTURES

itemize for a bullet list

- \begin{itemize}
- \item \blindtext
- \item \blindtext
- \end{itemize}

enumerate for an enumerated list and

- \begin{enumerate}
- \item \blindtext
- \item \blindtext
- \end{enumerate}

description for a descriptive list.

- \begin{description}
- \item [Ant] …
- \item [Elephant] …
- \end{description}

TABLES

\begin{tabular}[pos]{table spec}

table spec	`l`	left-justified column
	`c`	centered column
	`r`	right-justified column
	`p{'width'}`	paragraph column with text vertically aligned at the top
	`m{'width'}`	paragraph column with text vertically aligned in the middle (requires array package)
	`b{'width'}`	paragraph column with text vertically aligned at the bottom (requires array package)
	|	vertical line
	||	double vertical line
pos	`b`	bottom
	`c`	center (default)
	`t`	top

FIGURES

graphicx package

\includegraphics command

LABELS AND CROSS-REFERENCING

\label{}

\ref{}

Best practice

- Add prefix depending on object type

MATHEMATICS

Packages

- \usepackage{amsmath}
- \usepackage{mathtools}

Environments

- $...$
- $$...$$
- equation
- align
- multline
- cases

Greek letters

- \alpha, \Alpha, \beta, \Beta, \gamma, \Gamma, …

Superscripts and subscripts

Fractions

Roots

Sums

Brackets resizing (automatic, manual)

Adding text to equations

ALGORITHMS

Packages

- algorithmic
- algorithmix

algorithm environment

BIBLIOGRAPHY MANAGEMENT

\cite{}

\bibliographystyle{}

\bibliography{bibfile}

ADDITIONAL PRACTICE

Lab/Home-work

- Try as many exercises from the following documents as possible:
  - https://web.mit.edu/~jgross/Public/latex/exercises.pdf
- Walk through the Latex thesis template of IIT Dharwad
  - Available on Intranet

ACKNOWLEDGEMENTS

https://en.wikibooks.org/wiki/LaTeX

https://sites.temple.edu/zedali/files/2017/07/Latex_Intro.pptx

http://www.stats.ox.ac.uk/pub/susan/cdt/LaTeX-exercises.pdf

REFERENCES

http://tug.org/

https://www.tug.org/tutorials/

https://ctan.org/

https://www.texfaq.org/

THANK YOU

Communication channels
- Google classroom
- Lecture feedback (anonymous)