

Introduction to \LaTeX

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Overview

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- Syntax
- Structure
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Introduction

Experience

What is your experience with \LaTeX ?

Expectations

What do you hope to get out of these lectures?

What is LaTeX?

LATEX is a document preparation system that allows authors to typeset and print documents using a predefined, professional layout.

Example

Example (Document structure)

```
\documentclass{article}  
\title{Introduction to \LaTeX}  
\author{Jordi Bieger}  
\date{14 September 2015}  
\begin{document}  
  \maketitle  
  \emph{Lorem} ipsum dolor sit amet.  
\end{document}
```


History

TeX

- ① Typesetting text and mathematical formulae
- ② Donald Knuth
- ③ 1978
- ④ τέχνη



LAT_EX

- ① Provides functionality on top of TeX to let authors easily use a predefined, professional layout
- ② Leslie Lamport
- ③ LAT_EX: 1984
- ④ LAT_EX 2_E: 1994



Commands

\LaTeX = plain text + commands

Command

`\commandname[option1][option2]...{argument1}{argument2}...`

Groups and switches

Switches are commands that apply to the rest of the group.

Compare

```
{\em This text will be emphasized.}
```

```
\emph{This text will be emphasized.}
```

Environments

For changes to a larger block of text **environments** can be defined.
They act like groups and can take arguments.

Environment

```
\begin{center}
```

This text will be centered.

```
\end{center}
```

Whitespace

Input	Output
<space>+	<space>
<tab>+	<space>
<linebreak>	<space>
<linebreak><linebreak>+	<linebreak>
\\"	<linebreak>
\LaTeX{} pert	\texttt{\LaTeX}pert
\LaTeX{}{} user	\texttt{\LaTeX} user
\LaTeX{}\\ user	\texttt{\LaTeX} user

Table: Whitespace treatment in \texttt{\LaTeX{}}

Special characters

Special characters

\$ % ^ & _ { } ~ \

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

<http://ctan.uib.no/info/symbols/comprehensive/symbols-a4.pdf>

Comments

Example (Comments)

```
This will be printed. % This won't be.
```

Example (Comment environment)

```
\usepackage{verbatim} % in the preamble
This will
\begin{comment}
not
\end{comment}
be printed.
```

Document structure

Example (Document structure)

```
% begin preamble
\documentclass{article}

\usepackage{amsmath}
\usepackage{graphicx}

% maybe (re)define commands

% end preamble

\begin{document}
  \title{Introduction to \LaTeX}
  \author{Jordi Bieger}
  \date{12 September 2014}
  \maketitle

  \emph{Lorem} ipsum dolor sit amet.
\end{document}
```

Preamble - Document class

```
\documentclass[11pt,twoside,a4paper]{article}
```

class	description
article	scientific articles
IEEEtran	IEEE Transactions
minimal	minimal format for debugging
report	long reports
book	complete books
beamer	presentations
???	often you'll be told

Table: built-in document classes

Preamble - Packages

`\usepackage[options]{package}`

or

`\usepackage{package1,package2,package3}`

Preamble - Useful packages

package	description
\usepackage[T1]{fontenc}	allows copy-pasting of UTF-8 characters
\usepackage{lmodern}	modern fonts
\usepackage[utf8]{inputenc}	directly type UTF-8
\usepackage{mathtools}	math
\usepackage{graphicx}	figures
\usepackage{subfig}	subfigures
\usepackage{float}	figure and table placement

Table: see also <http://www.ctan.org/>

Document - Top matter

Example (Top matter)

```
\title{Introduction to \LaTeX}
\author{Jordi Bieger \and Kristinn R. Þórisson}
\thanks{Reykjavik University}
\date{\today}
\maketitle
```

You can also use the `titlepage` environment and/or the `titling` package for more detailed formatting control.

Document - Abstract

Example (Abstract)

```
% Change the "name" of the abstract:  
\renewcommand{\abstractname}{Summary}  
\begin{abstract}  
Your abstract here.  
\end{abstract}
```

Document - Sections

type	level
\part	-1
\chapter	0
\section	1
\subsection	2
\subsubsection	3
\paragraph	4
\ subparagraph	5

Document - Sections

Example (Sections)

```
% only number sections and larger:  
\setcounter{secnumdepth}{1}  
% numbered and in TOC:  
\section[TOC Name]{Name in text}  
% not numbered:  
\section*{Name in text}  
% add to TOC anyway:  
\addcontentsline{toc}{section}{TOC Name}
```

Document - Table of contents

Example (Table of contents)

```
% only omit (sub)paragraphs:  
\setcounter{tocdepth}{3}  
% show TOC:  
\tableofcontents
```

Document - References

Example (Labeling)

```
\section{Results}  
\label{sec:results}
```

Example (Referencing)

```
\section{Introduction}  
Results will be discussed in Section~\ref{sec:results}.
```

Figures

Example (Figure)

```
\begin{figure}[h!] % htp or H with the float package
    \includegraphics[width=.5\columnwidth]{file}
    \caption{Caption goes here.}
    \label{fig:myfigure}
\end{figure}
```

Tables

Example (Table)

```
\begin{table}
  \begin{tabular}{l | c c || r}
    \toprule
    A & B & C & D \\
    \midrule
    a & b & c & d \\
    aa & bb & cc & dd \\
    \bottomrule
  \end{tabular}
  \caption{caption}
  \label{tbl:mytable}
\end{table}
```

Tables - Column alignment

spec	description
l	left align
c	center align
r	right align
p{width}	wrap + top align
m{width}	wrap + middle align
b{width}	wrap + bottom align
	vertical line
	double vertical line

Table: Column alignment specification

Tables - Inside

command	description
&	new column
\\"\\	new row
\hline	horizontal line
\toprule	top border
\midrule	middle separator
\bottomrule	bottom border
\newline	new line

Table: Table commands. \toprule, \midrule and \bottomrule require the `booktabs` package.

Math

You need to explicitly enter math mode to print mathematical formulae.

Use escaped parentheses `\(\)` to display math inline like $\sum_{i=0}^{\infty} 2^{-i} = 2$ in this sentence.

Use escaped brackets `\[\]` to display math in a separate unnumbered block like this:

$$\sum_{i=0}^{\infty} 2^{-i} = 2$$

Use the equation environment to display math in a numbered block that you can refer to like Equation 1:

$$\sum_{i=0}^{\infty} 2^{-i} = 2 \tag{1}$$

Math - Examples

input	output
<code>w_j^{i+1}</code>	w_j^{i+1}
<code>\left(\frac{1}{2}\right)</code>	$\left(\frac{1}{2}\right)$
<code>\cos(2\pi)</code>	$\cos(2\pi)$
<code>\DeclareMathOperator{\myfunction}{myfun}</code>	<code>myfunction(2π)</code>
<code>\text{where } x = 1</code>	<code>where $x = 1$</code>

Table: see also

<http://www.artofproblemsolving.com/Wiki/index.php/LaTeX:Symbols>

BibTeX

Example (references.bib)

```
@inproceedings{thorisson_constructionist_2009,  
  title = {From Constructionist to Constructivist {AI}},  
  url = {http://www.aaai.org/ocs/index.php/FSS/FSS09/paper/download/888/1320},  
  urldate = {2013-12-18},  
  booktitle = {{AAAI} Fall Symposium Series: Biologically Inspired Cognitive Architectures},  
  publisher = {{AAAI} press},  
  author = {Th\'orisson, Kristinn R.},  
  year = {2009},  
  keywords = {{AGI}, constructionist, constructivist},  
  pages = {175-183}  
},
```


Citation

Example (article.tex)

```
\citet*{thorisson_constructionist_2009}  
talk about  
AI~\citet{thorisson_constructionist_2009}.
```

Compilation

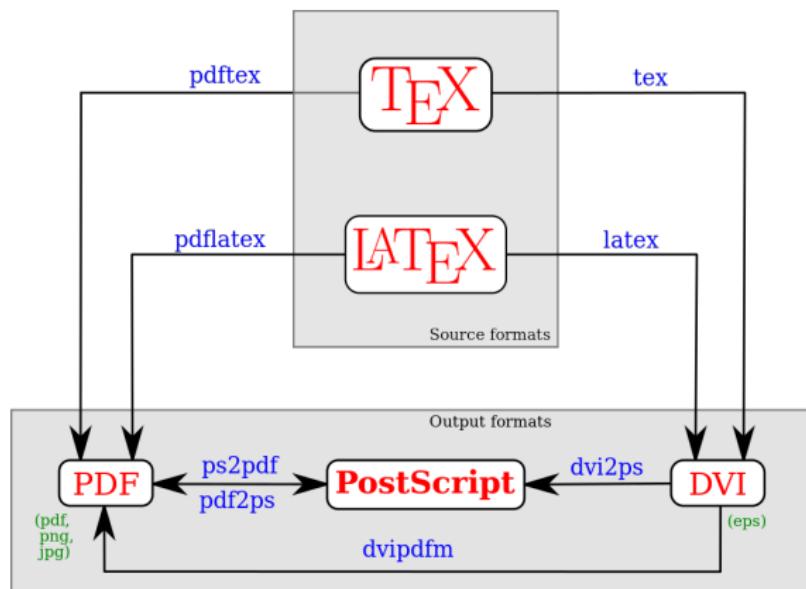


Figure: from <http://en.wikibooks.org/wiki/LaTeX/Basics>

Compilation - Commands

Example (command line)

```
pdflatex filename % see what you cited  
bibtex filename % extract relevant citations  
pdflatex filename % inject this information  
pdflatex filename % fix all references
```