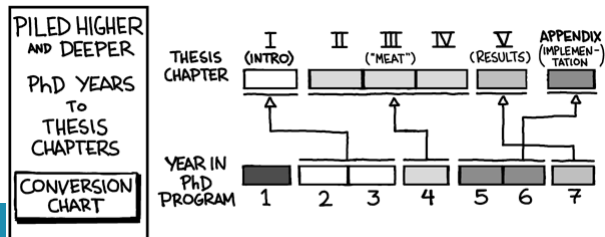
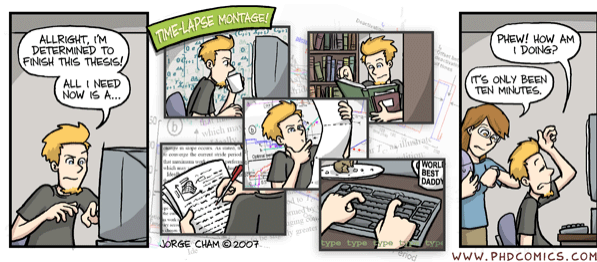


Introduction to LaTeX

Large projects

Contents

- Include pdf
- Cross referencing
- Indexing
- Hyperlinks
- Glossaries
- Proclamations
- In the margin



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Include pdf files

Package pdfpages

- Include .pdf figures using the `graphicx` package and the `\includegraphics` command.
- Package `pdfpages`
- Include a range of pages from a pdf file
 - `\usepackage{pdfpages}`
 - `\includepdf[options]{file.pdf}`
 - Default: first page of document
 - All pages: `[pages=-]`
 - Range: `[pages=last-1]` `[pages=2-8]`
 - List: `[pages={3, 6, 1}]`
 - Multiple pages: `nup=axb \includepdf[nup=2x2, pages=1-7]{file.pdf}`

Package pdfpages

- Option `pagecommand`: execute a LaTeX command on the pages included
- `\includepdf[pagecommand={\thispagestyle{empty}}]{file}`
- `\includepdf[scale=0.7,pages=1, pagecommand=\chapter{Some data}]{data.pdf}`
- Check the documentation: <https://ctan.org/pkg/pdfpages>
- File: *pdfpages_demo_01*

Cross referencing

Cross referencing

- Reference almost anything that is labeled (sections, figures, formulas)
- 3 kinds of referencing:
 - *cross-references* which are internal references between elements within a document,
 - *bibliographic citations* which are references to external documents
 - *indexing* of selected words and expressions.
- LaTeX will take care of numbering, updating it whenever necessary.

Labels

- Ingredients
 - `\label{marker}` give the object a *marker*
 - `\ref{marker}` reference the object you have *marked*
 - `\pageref{marker}` It will print the number of the page where the object is.
 - Common practice to structure the label naming
 - **chap:** chapter
 - **sec:** section
 - **fig:** figure
 - **tab:** table
 - **eq:** equation
- ```
\label{fig:my_figure}
```

## Labels and references

- Label the item
  - `\section{...} \label{sec:sec-name}`
  - `\begin{equation} ... \label{eq:eq-name} \end{equation}`
- Having created the labels, refer to the objects using `\ref{label-name}`
- Run the compilation several times
- *File: demo\_label*
- *File: demo\_referencing\_01*

## Label and floats

- Use the `\label` command to cross-reference:

```
\begin{figure}
\includegraphics{. . . }
\caption{This is Donald}
\label{Donald}
\end{figure}
```
- **Warning:** If you want to label a figure / table, add the label **after the caption** but **inside the floating environment**. If it is declared outside, it will give the section number.

# Referencing equations

- The command `\ref` is defined in the LaTeX Kernel. The command `\eqref` is defined by `amsmath` (`mathtools`).
- `\eqref` puts brackets around the reference number. It's also places the references in in `\upshape` (or `\textup`), to match the equation reference exactly.

```
\documentclass{article}
\usepackage{amsmath}
\begin{document}
\begin{equation}
a^2+b^2=c^2\label{eq:1}
\end{equation}
\verb+\eqref{eq:1} vs \ref{eq:1}+: \eqref{eq:1} vs \ref{eq:1}
\verb+\textit{\eqref{eq:1} vs \ref{eq:1}}+: \textit{\eqref{eq:1} vs \ref{eq:1}}
```

$$a^2 + b^2 = c^2$$

`\eqref{eq:1}` vs `\ref{eq:1}`: (1) vs 1  
`\textit{\eqref{eq:1} vs \ref{eq:1}}`: (1) *vs* 1

- File: `demo_eqref`

# Package showlabels



- Use `showlabels` package to get a view on the labels used
- `\usepackage[options]{showlabels}`
- Available options are:
  - `outer` [default]—all notes are placed in the text's outer margin
  - `inner`—inner margin
  - `left`—left margin
  - `right`—right margin
  - `marginal` [default]—put notes in the margin
  - `inline`—put notes inline, as much as possible, and ignore any of the margin-placement options above
  - `nolabel`—do not insert a marginal note for `\label` commands
  - `draft` [default]—does nothing, partner of...
  - `final`—turns off all the package's functionality

# Indexing

## Index

- An index is an alphabetical list of words and expressions with the pages of the document upon which they are to be found.
- Index creation involves some work, but LaTeX still makes it easier than doing it by hand.
- The standard procedure:
  - Include `\usepackage{makeidx}` and `\makeindex` (to start the indexing) in the preamble.
  - Include `\index{entry}` commands wherever you want an index entry.
  - Put a `\printindex` command where the index is to appear, normally before the `\end{document}` command.

# Index

- Use `makeindex`.
  - Tag keywords in the LaTeX source as index entries.
  - These tags cause LaTeX to record index information in an auxiliary (.idx) file.
  - Run `makeindex` to process this file to create an index that can be typeset by LaTeX.
  - Check `.ind` file containing the list of entries
- <https://en.wikibooks.org/wiki/LaTeX/Indexing>
- <https://www.overleaf.com/learn/latex/Indices>

## Makeindex procedure

- TeXstudio: build + Tools>Index + build
- if you are using a command prompt, you will need to do:
  - `pdflatex filename.tex`
  - `makeindex filename.idx`
  - `pdflatex filename.tex`
- If you are also using BibTeX, you will need to do:
  - `pdflatex filename.tex`
  - `bibtex filename`
  - `makeindex filename.idx`
  - `pdflatex filename.tex`
  - `pdflatex filename.tex`



## Entries and sub-entries

- Mark words to be indexed by enclosing them in a `\index` command, the text has to be repeated.

```
Superconductors\index{superconductor} conduct
electricity with zero resistance\index{resistance}.
```

- You can make an index with sub-entries, and sub-sub entries.

- The general form of `\index` is:

```
\index{main_entry !sub_entry !sub_sub_entry }
```

- For example, an index entry of the form:

```
\index{provinces!Ontario}
\index{provinces!Saskatchewan}
\index{provinces!British Columbia}
```

- *File: index\_demo\_01*

## Interactive references with hyperref

# Hyperlinks

- `\usepackage{hyperref}`
- When producing a PDF file, `hyperref` package converts all references into hyperlinks that can be followed.
- Be careful when importing `hyperref`: usually it has to be the last package to be imported (but before `geometry`).
- <https://www.overleaf.com/learn/latex/Hyperlinks>

## Hyperref: setting parameters

- Use `hypersetup` (in preamble) to set some parameters
- Every parameter must be comma-separated and the syntax must be in the format `parameter=value`.
- `\hypersetup` : specify parameters
  - `colorlinks=true`
    - Links will be colored (default red).
  - `linkcolor=blue`
    - Internal links, those generated by cross-referenced elements, are displayed in blue.
  - `filecolor=magenta`
    - Links to local files will be shown in magenta color
  - `urlcolor=cyan`
    - Links to web sites are set to cyan

| option                | description                        | possible values | default value |
|-----------------------|------------------------------------|-----------------|---------------|
| <b>Link options:</b>  |                                    |                 |               |
| colorlinks=<boolean>  | colored link text instead of frame |                 | false         |
| linkcolor=<color>     | links withing document             |                 | red           |
| anchorcolor =<color>  | color of text links                |                 | black         |
| citecolor=<color>     | literature references              |                 | green         |
| filecolor=<color>     | Local files                        |                 | magenta       |
| pagecolor=<color>     | other opages                       |                 | red           |
| urlcolor=<color>      | external URL links                 |                 | cyan          |
| frenchlinks=<boolean> | small caps, instead of color       |                 | false         |

## Hyperlink (web)files

- Links to a web address can be added using:
  - `\url` command to display the actual link
  - `\href` to use a hidden link and show a word/sentence instead.
- `\href{https://www.kuleuven.be}{Some Link}`
- `\url{https://www.kuleuven.be}`
  - This will show the url passed as parameter and make it into a link, useful if you will print the document
- The commands `\href` and `\url` can also be used to open local files

## Inserting links manually

- Cross-referenced elements become links once `hyperref` is imported,
  - References to `\label` used in the document will create links
- Use `hypertarget` and `hyperlink` to create links manually
  - `\hypertarget` specifies the target (anchor) with an identifier
  - `\hyperlink` refers to the specifier
- *File: demo\_hyperref\_1*
- *File: demo\_hyperref\_2*
- *File: demo\_hyperref\_3*

## Glossaries

# Glossaries and Acronyms

- **Glossary:** an *alphabetical* list of terms in a particular domain of knowledge with the definition / explanation for those terms
- **Acronym:** an *abbreviation* formed from the initial letters of other words and pronounced as a word (*ASCII*, *NASA* )
- A possible extension: references to the locations in the text where those terms are used.
- <https://en.wikibooks.org/wiki/LaTeX/Glossary>
- <https://www.overleaf.com/learn/latex/Glossaries>
- <https://tug.ctan.org/macros/latex2e/contrib/glossaries/glossariesbegin.pdf>

# Glossaries

- Standard procedure
  - Use package glossaries in preamble
    - `\usepackage{glossaries}`
    - `\makeglossaries`
    - after `\usepackage{hyperref}` if present
  - Create an entry (name + description) with the command `\newglossaryentry`
  - Reference the term with the command `\gls` produces the name of the term given the label
  - generate the glossaries, use the command `\printglossaries`

# Glossaries commands

- Syntax new entry:

```
\newglossaryentry{label}
{
 name={name},
 description={description},
 other options, ...
}
```

```
\newglossaryentry{maths}
{
 name={mathematics},
 description={Mathematics is
what mathematicians do}}
```

- `\gls{ }`: print the term, lowercase. Ex. `\gls{maths}` renders as *mathematics*
- `\Gls{ }`: same as `\gls` but the first letter will be printed in uppercase. Ex. `\Gls{maths}` renders as *Mathematics*
- `\glspl{ }`: same as `\gls` but the term is put in plural. Ex. `\glspl{formula}` renders as *formulas*
- `\Glspl{ }`: same as `\Gls` but the term is put in its plural form. Ex. `\Glspl{formula}` renders as *Formulas*

# Glossaries procedure

- TeXstudio: build + Tools>glossary + build
- if you are using a command prompt, you will need to do:
  - `pdflatex filename.tex`
  - `makeglossaries filename.idx`
  - `pdflatex filename.tex`
- <http://texblog.org/2014/01/15/glossary-and-list-of-acronyms-with-latex/>

# Acronyms

- To use acronyms an additional parameter must be used when importing the glossaries package.

```
\usepackage[acronym]{glossaries}
```

- `\newacronym` to create an acronym
- `\printglossary[type=\acronymtype]` to print the list of acronyms

# Acronyms

- `\newacronym` to create an acronym

```
\newacronym{label}{short name}{long name}
```

- `\newacronym{gcd}{GCD}{Greatest Common Divisor}`

- `\acrlong{ }` renders the phrase which the acronym stands for. Ex. `\acrlong{gcd}` prints *Greatest Common Divisor*.

- `\acrshort{ }` renders the short name. Ex. `\acrshort{gcd}` prints as *GCD*.

- `\acrfull{ }` prints both, the acronym and its definition. Ex. `\acrfull{lcm}` renders as *Least Common Multiple (LCM)*

## Example files

- *File: demo\_glossaries\_simple.tex*
- *File: demo\_glossaries.tex*
- *File: demo\_acronyms\_glossaries.tex*

## Proclamations



# Proclamations (theorem-like constructs)

- To produce nicely formatted theorems, propositions, lemmas, etc.
- 2 step procedure:
  - In the preamble, use a `\newtheorem` command to define the proclamation.
    - Syntax: `\newtheorem{name}{title}`
    - name: *environment* name
    - title: recurring title of the proclamation (Lemma, Exercise, etc.)
  - `\newtheorem{thrm}{Theorem}`
    - name of the environment that is defined (thrm), the second one is the word that will be printed (Theorem)
  - In the document body
    - Use: `\begin{thrm} ... \end{thrm}`.
    - The second argument (Theorem) is used to label the statement (title).
  - autonumbering
- [https://www.overleaf.com/learn/latex/Theorems\\_and\\_proofs](https://www.overleaf.com/learn/latex/Theorems_and_proofs)

# Proclamations

- LaTeX automatically numbers theorems consecutively (independent of chapters, etc.)
  - Use `*` to suppress
  - `\newtheorem*{thm2}{Theorem}`
  - *File: demo\_theorem\_1.tex*
- In general, every `\newtheorem` has its own counter.
  - The automatic numbering can be linked to other counters.
  - `\newtheorem{cor}[theorem]{Corollary}`
  - *File: demo\_theorem\_2.tex*

# Proclamations

- Theorem numbers can be linked with sections, subsections, chapters...

```
\newtheorem{sectheorem}{Theorem}[section]
```

- Named theorem: pass the name as a parameter

```
\begin{theorem}[The first one]
```

```
This is an important theorem.
```

```
\end{theorem}
```

- *File: demo\_theorem\_3.tex*

# Proclamations

- Generate a list of theorems

- Package: thmtools

- `\listoftheorems`

- *File: demo\_theorem\_4.tex*

# Proclamations

- proof environment
  - Used for proofs.
  - Typesetting somewhat different from theorem
  - Ends with  $\square$

```
\begin{proof}
```

This is obvious.

```
\end{proof}
```
- *File: demo\_proof.tex*

# Other environments

- quote
  - for short quotations consisting of a single paragraph
  - slightly indented from left and right, i.e. line length slightly reduced compared to the rest of the text
- quotation
  - for longer quotations consisting of more than one paragraph.
  - also slightly indented from left and right
  - first line of a new paragraph indented
- verse
  - for poems
  - single lines explicitly terminated by `\\`
  - very long lines are indented in the following lines and thus marked as belonging together
- *File : demo\_other\_environments*

## In the margin

## footnote

- The `\footnote` command places the numbered footnote text at the bottom of the current page.
- `\footnote{footnote text}`
- Referencing is possible
  - Place label inside the note
- *File: demo\_footnote.tex*
- Numbering tweaks – see also `package{chngcntr}`
  - Article: 1, 2, ...
  - Book, report: no reset per chapter
- *File: demo\_footnote\_number.tex*

## endnotes

- No footnotes at the bottom of the page, but at the end of the document.
  - `\usepackage{endnotes}`
  - `\let\footnote=\endnote`
- In the document where you want the notes to be printed
  - `\newpage`
  - `\theendnotes`
- *File: demo\_endnotes.tex*
- <https://www.sixhat.net/latex-continuous-footnote-numbers-and-footnote-to-endnote-conversion.html>

## Margin note

- Create notes in the margin is a really nice/cool feature in LaTeX.
- Edward Tufte: *it lets you keep your notes near your content, which is a good thing.*
- Only short text!
- `\marginpar`
- *File: demo\_marginpar.tex*
- `marginnote` package can be used for more flexibility.
- `\marginnote{This note will appear in the margin.}`
- *File: demo\_marginnote.tex*

# Numbering



- Some document elements (e.g., figures in the book class) are numbered per chapter (figure 1.1, 1.2, 2.1, ...).  
How to achieve continuous numbering (figure 1, 2, 3, ...)?
- Some document elements (e.g., figures in the article class) are numbered continuously.  
How to achieve per-section numbering?
- Use package `chngcntr`
- <https://tex.stackexchange.com/questions/28333/continuous-v-per-chapter-section-numbering-of-figures-tables-and-other-docume>
- *File: MyLargeDoc-numbering*
- *File: MyArticle-numbering*

# Extra commands



- Only in documentclass `book`
- `\frontmatter` turns off chapter numbering and uses roman numerals for page numbers;
- `\mainmatter` turns on chapter numbering, resets page numbering and uses arabic numerals for page numbers;
- `\appendix` resets chapter numbering, uses letters for chapter numbers and doesn't fiddle with page numbering;
- `\backmatter` turns off chapter numbering and doesn't fiddle with page numbering.
  - Don't use `\appendix` after `\backmatter`, because chapter numbering has already been turned off by `\backmatter`.
- *File: MyLargeBook-input.tex*

• Taken from: <http://tex.stackexchange.com/questions/20538/what-is-the-right-order-when-using-frontmatter-tableofcontents-mainmatter>