KU LEUVEN

Introduction to LaTeX

Extra

Contents

- New commands
- Space
- Counters
- More Packages
- Troubleshooting

Own commands

Creating commands

- Define some special commands to simplify repetitive and/or complex formatting.
  - This saves time and prevents errors
  - Good practice: Define new commands in the preamble or separate file (input)
  - Passing parameters is possible
- `\newcommand{\nameOfCommand}[numberOfInputs]{sequences}`
  Once you defined your command, you can use it as any other command:
  - `\newcommand{\water}{H$_2$O}`
    `The formula for water is \water.`
  - `\newcommand{\bb}[1]{\mathbb{#1}}`
    `The complex numbers  $\bb{C}$, the rational numbers $\bb{R}$`

Creating commands

- Commands may be redefined:
  - `\renewcommand{\Name}{def}`
  - redefine a command that already exists.
- *File: demo_newcommand_01.tex*
- *File: demo_newcommand_02.tex*

Space, units, lengths, dimensions

Length units

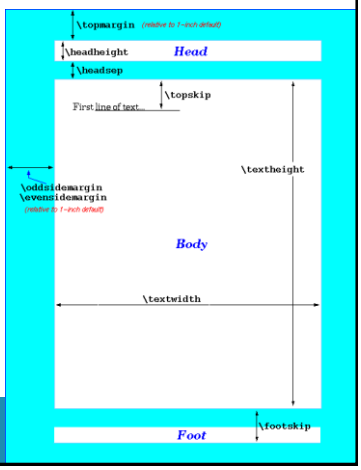
unit	Value
pt	a point is approximately 1/72.27 inch, that means about 0.0138 inch or 0.3515 mm (exactly point is defined as 1/864 of American printer's foot that is 249/250 of English foot)
mm	a millimeter
cm	a centimeter
in	inch
ex	roughly the height of an 'x' (lowercase) in the current font (it depends on the font used)
em	roughly the width of an 'M' (uppercase) in the current font (it depends on the font used)
mu	math unit equal to 1/18 em, where em is taken from the math symbols family

- There are a number of *lengths* within LaTeX.
- They store a length of some dimension and can be modified automatically or manually. These lengths can be used anywhere a measurement is required as an argument.
- Lengths are specified as a number followed by a unit.
- `12pt, 3cm`

Lengths

- Many predefined lengths. These definitions can be overriden with `\setlength{\lengthname}{value_in_specified_unit}`

Length	Description
\baselineskip	Vertical distance between lines in a paragraph
\columnsep	Distance between columns
\columnwidth	The width of a column
\evensidemargin	Margin of even pages, commonly used in two-sided documents such as books
\linewidth	Width of the line in the current environment.
\oddsidemargin	Margin of odd pages, commonly used in two-sided documents such as books
\paperwidth	Width of the page
\paperheight	Height of the page
\parindent	Paragraph indentation
\parskip	Vertical space between paragraphs
\tabcolsep	Separation between columns in a table (tabular environment)
\textheight	Height of the text area in the page
\textwidth	Width of the text area in the page
\topmargin	Length of the top margin



Lengths

- The value of a length can be queried by adding the control sequence `\the` directly in front of the relevant length control sequence: `\the\textwidth`
- lengths can be set to absolute values, relative (related to other LaTeX dimensions) values can also be used.
- `\includegraphics[width=0.2\textwidth]{fiets.jpg}`
- Other possible setting method `\addtolength{\textwidth}{2in}`
- https://en.wikibooks.org/wiki/LaTeX/Lengths

Spacing in between paragraphs

- LaTeX follows a specific set of rules when laying out the document.
- There are three fixed-length spacing control sequences, that can be applied when in vertical mode
  - `\smallskip` - inserts a small vertical space
  - `\medskip` - inserts a medium vertical space
  - `\bigskip` - inserts a large vertical space
- Use package parskip
  - `\usepackage{parskip}`
  - `\usepackage[indent]{parskip}`
- https://www.overleaf.com/learn/latex/Articles/How_to_change_paragraph_spacing_in_LaTeX

Spacing in between lines

- The `setspace` package provides commands and environments to change the spacing of your document's lines of text.
- the commands can be used in the document preamble, or within the document body to change spacing in part, or all, of your document:
  - `\singlespacing`
  - `\onehalfspacing`
  - `\doublespacing`

Blank spaces

- Insert horizontal blank spaces:
  - `\hspace{`***x****unit*`}`: Inserts a horizontal space whose length is x units (ex. 1cm)
  - `\hfill`: Inserts a blank space that will stretch accordingly to fill the space available
  - `\hrulefill`: fill with a ruler
  - `\dotfill`: fill with dots
- Insert vertical spaces:
  - `\vspace{`***x****unit*`}`: Inserts a vertical spaces whose length is is x units (ex. 1cm)
  - `\vfill`: Inserts a blank space that will stretch accordingly to fill the vertical space available.

Hands-on

- Use demo_margin_01
- Change \textwidth to 7 cm
- Make the text width negative via \setlength{\textwidth}{-14cm}
- What happens if a very large textwidth is used via \setlength{\textwidth}{100cm}?

Counter

- Counters are used to keep the right number attached to equations, pages, theorems, etc.
- Increase the value of the counter by number

```
\addtocounter{CounterName}{number}
```

- Set the counter value explicitly

```
\setcounter{CounterName}{number}
```

- Display the value of the counter

```
\theCounterName
```

- *File: demo_counter.tex*

Counter

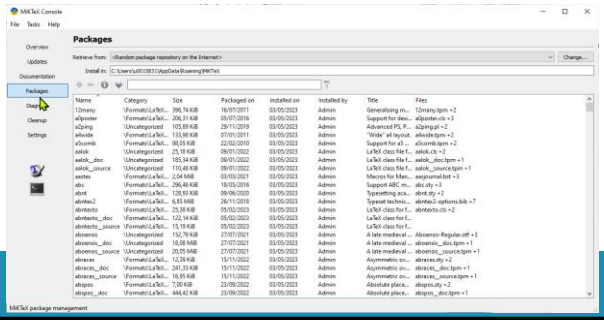
Usage	Name
For document structure	part chapter section subsection subsubsection paragraph subparagraph page
For floats	equation figure table
For footnotes	footnote mpfootnote
For the enumerate environment	enumi enumii enumiii enumiv

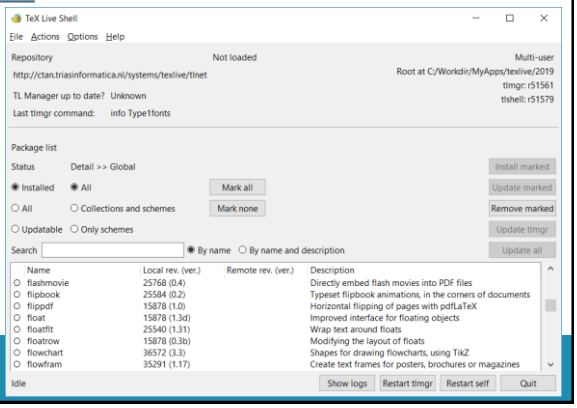
Packages

- basic LaTeX cannot solve all your problems.
  - If you want to include graphics, colored text or source code from a file into your document, you need to enhance the capabilities of LaTeX.
- Packages are used to alter or add features to the basic LaTeX behavior
  - Some packages will extend existing functions.
  - Some packages will add extra functions.
- Finding and configuring packages usually requires some mojo (and Google)
  - https://latex-ninja.com/2021/10/17/top-5-magic-latex-packages-you-didnt-know-about/

Packages

- > 6400 packages
- Check under MikTex, TeXLive
- https://en.wikibooks.org/wiki/LaTeX/Packages
- https://www.ctan.org/





Packages

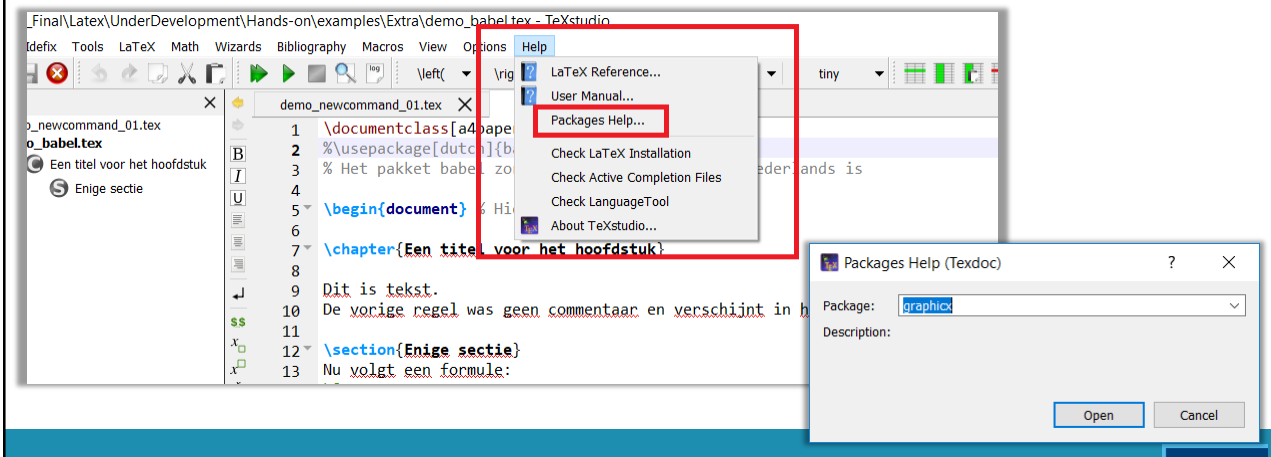
- Packages are activated with
  - `\usepackage[`*`options`*`]{`*`package`*`}`
  - *package* is the name of the package
  - *options* is a list of keywords that trigger special features in the package.
- Package contains at least:
  - *package.pdf*: documentation
  - *package.sty*: code

Package documentation

- most package documentation is provided as a PDF file
- If installed on your system, use `texdoc`
  - Included in your (La)text editor
  - Command prompt: `texdoc` followed by the name of the package.
    - `texdoc datetime`
  - texdoc online website https://texdoc.org/index.html
- if the documentation is not installed on your system, check CTAN. You can either navigate your way via
  - https://www.ctan.org/ or
  - https://www.ctan.org/pkg/*name*
    where *name* is the name of the package

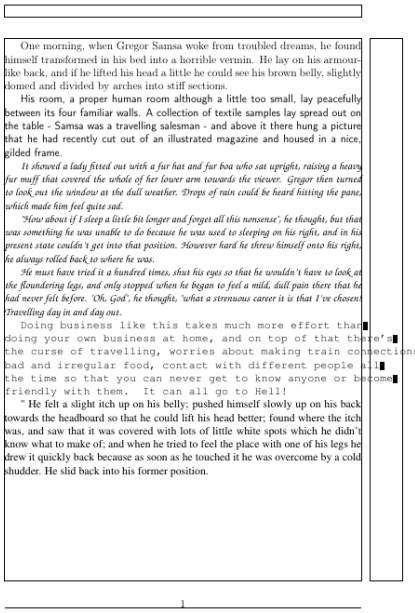
Package documentation

- TeXstudio provides an entry for documentation



Visualize the page layout

- Package `showframe`: display page margins load package and page frame is shown, eas to use
- *File: visualize_layout_01*
- Package `layout`: visualizes the layout, showing also the values of various LaTeX parameters which determine that layout. Command: `\layout`
- *File: visualize_layout_02*


One morning, when Gregor Samsa woke from troubled dreams, he found himself transformed in his bed into a horrible vermin. He lay on his armour-like back, and if he lifted his head a little he could see his brown belly, slightly domed and divided by arches into stiff sections.

His room, a proper human room although a little too small, lay peacefully between its four familiar walls. A collection of textile samples lay spread out on the table - Samsa was a travelling salesman - and above it there hung a picture that he had recently cut out of an illustrated magazine and housed in a nice, gilded frame.

It showed a lady fitted out with a fur hat and fur boa who sat upright, raising a heavy fur muff that covered the whole of her lower arm towards the viewer. Gregor then turned to look out the window at the dull weather. Drops of rain could be heard hitting the pane, which made him feel quite sad.

"How about if I sleep a little bit longer and forget all this nonsense", he thought, but that was something he was unable to do because he was used to sleeping on his right, and in his present state couldn't get into that position. However hard he threw himself onto his right, he always rolled back to where he was.

He must have tried it a hundred times, shut his eyes so that he wouldn't have to look at the floundering legs, and only stopped when he began to feel a mild, dull pain there that he had never felt before. "Oh, God", he thought, "what a strenuous career it is that I've chosen! Travelling day in and day out.

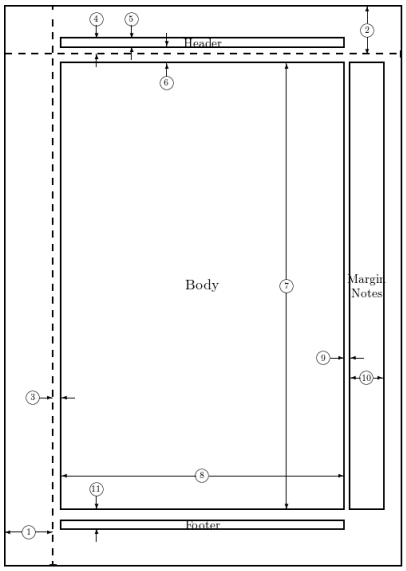
Doing business like this takes much more effort than doing your own business at home, and on top of that there's the curse of travelling, worries about making train connections, bad and irregular food, contact with different people all the time so that you can never get to know anyone or become friendly with them. It can all go to Hell!

" He felt a slight itch up on his belly; pushed himself slowly up on his back towards the headboard so that he could lift his head better; found where the itch was, and saw that it was covered with lots of little white spots which he didn't know what to make of; and when he tried to feel the place with one of his legs he drew it quickly back because as soon as he touched it he was overcome by a cold shudder. He slid back into his former position.

1

geometry

- `geometry` offers a simple way to change the length and layout of different elements such as the paper size, margins, orientation, etc.
- `\usepackage[a4paper, landscape, margin=2in]{geometry}`
- https://www.overleaf.com/learn/latex/Page_size_and_margins
- *File: demo_package_geometry*



Headers and footers

- `\pagestyle{option}`: changes the style from the current page on throughout the remainder of the document.
- `\thispagestyle{option}`: set style for a single page
- Options:
  - `plain`: page number in footer
  - `empty`: no page numbering
  - `headings`: running header on each page, depends on the documentclass
    - Book, report:
      - One-sided: - chapter
      - Two-sided: chapter section
    - Article:
      - One-sided: - chapter
      - Two-sided: chapter section
  - `myheadings`: specify what goes in the heading with the `\markboth` or `\markright`
- *File: header_layout_01*

fancyhdr

- Package `fancyhdr` provides several commands to customize the header and footer lines of your document
- Invoke with `\pagestyle{fancy}`
- `\fancyhead` for header and `\fancyfoot` for footer.
  - `\fancyhead[selectors]{output you want}`
- You can use multiple selectors optionally separated by a comma:
  - `E` even page
  - `O` odd page
  - `L` left side
  - `C` centered
  - `R` right side

fancyhdr

- Arguments to be used
- `\leftmark` name of current chapter.
- `\rightmark` name of current section.
- `\markboth` name of chapter, same as appearing in toc.
- `\markright` name of section, same as appearing in toc.
- `\thepage` page number.
- `\thechapter` current chapter number.
- `\thesection` current section number.
- *File: demo_package_fancyhdr.tex*

titlesec

- Package `titlesec` to customize chapters, sections and subsections style in an easy way.
- Get a quick intro at https://www.overleaf.com/learn/latex/Sections_and_chapters
- *File:demo_titlesec*

listings

- Use the `verbatim` package

```
\begin{verbatim}
   your
      code
   example
\end{verbatim}
```

- Use the `listings` package
  - Code formatting can be tweaked
- *File: demo_package_listings.tex*

showlabels

- Displays the name of the label next to the corresponding equation.
- 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
- Should be included after the packages amsmath and hyperref to work correctly with them.
- *File: demo_package_showlabels*

color

- Easiest way: use the package `color` or `xcolor`.
  - Both packages provide a common set of commands for color manipulation. `xcolor` is more flexible and supports a larger number of color models.
  - You can create your own colors. Check the documentation.
- The background color of the entire page can be easily changed with `\pagecolor`.
- *File: demo_xcolor_1.tex*

todonotes / cooltooltips

- todonotes
  - Add all the todos, create a list
  - *File: demo_todonotes.tex*
- cooltooltips
  - `\cooltooltip[<popup color>][<linkcolor>]{<subject>}{<message>}{<url>}{<tooltip>}{<text>}`
  - prints a box of color <link color> around <text>. Additionally, a popup of color <popup color> is displayed with a title <subject> and text <message> Hovering over <text> also brings up the tooltip <tooltip> and clicking the link takes you to <url>.
  - *File: demo_cooltooltips.tex*

endfloat

- Some journals require that tables and figures be separated from the text.
- The `endfloat` package moves all the figures and tables to the end of the document.
- `\usepackage{endfloat}`
- `\usepackage[nomarkers,tablesfirst,notablist]{endfloat}`

- *File: demo_endfloat.tex*

floatrow

- Center the float objects by default
- `\usepackage{floatrow}`

- Check endfloat example: demo_endfloat.tex
  - Use / skip the `floatrow` package and check the result
  - Rem. `floatrow` and `endfloat` interact, put `floatrow` first and `endfloat` after it

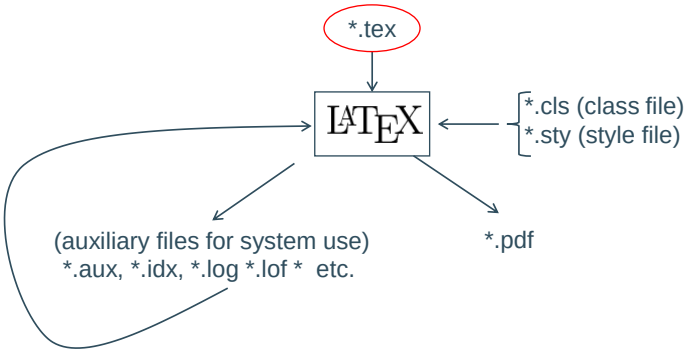
Common errors

- Preamble errors
- Missing or incorrect placement of }
- Blank lines or other spacing issues in math mode
- Forgetting about special characters, like $, %, & and quotation marks
- Misspelled environment or macro names
- Incorrect use of options or improper structure for an environment or macro
- Incorrect reference for numbering
- Mismatching braces, environments, “whatever”
- Schwartz: The art of LATEX problem solving, TUGboat, Volume 26 (2005), No. 1

Troubleshooting

- Insert ***\end{document}*** before the line with errors and move it further down the document until you identify the problem.
  Cody Chiuzan - http://people.musc.edu/~elg26/teaching/statcomputing.2013/statcomputingI.2013.htm
- Remove all auxiliary files

What do the file extensions mean?



Extension	Purpose
.tex	source file
.cls	class file
.sty	package/style file
.aux	auxiliary file
.log	a log file
.toc	table of contents file
.lot	a list of tables file
.lof	a list of figures file
.bib	a BibTeX source file. Such files contain the database from which the .bbl bibliography file is generated.
.bst	BibTeX style file
.bbl	LaTeX bibliography file
.blg	BibTeX log file
.idx	MakeIndex index source file
.ind	LaTeX index file
.ilg	MakeIndex log file