Dr. Sébastien Le Roux

What I am not going to talk about

0. Elastic materials: latex ?!

1. How to install LaTeX

2. How to install LaTeX extensions

3. How to check spelling in LaTeX files

The explanations are in my HowTo !

Check my web page @ IPCMS

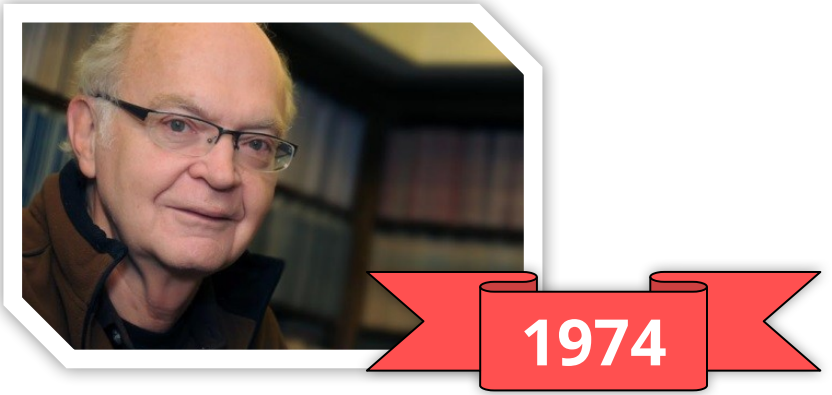
Basic tutorial to LaTeX programming

What I am going to talk about

1. What is LaTeX
2. The « *.tex » file
3. LaTeX essentials
4. First LaTeX document
5. LaTeX drawbacks and advantages

LaTeX?

Donald Knuth



In 1977 started to develop the computer typesetting system TeX

Leslie Lamport

In 1983 started to develop LaTeX short for LA mport TeX

LaTeX

LaTeX is a document markup language, the writer uses plain text (as opposed to formatted text), relying on markup tagging conventions to:

- Define the general structure of a document (such as book or article).
- Stylize text throughout a document (such as bold and italic).
- Insert objects in the document (such as tables and figures).
- Add citations and cross-referencing.

A TeX distribution such as **TeX Live**, **MiKTeX** or **MacTeX** is used to produce an output file (such as PS, PDF or DVI) suitable for printing or digital distribution.

The latest version of LaTeX is called LaTeX 2ε

WYSIWYG vs. LaTeX

With typical word processors such as Microsoft Word and LibreOffice Writer, ie. **WYSIWYG** editors:

"**W**hat **Y**ou **S**ee **I**s **W**hat **Y**ou **G**et"

One immediately visualize the formatted text and the final shape of the document on the screen.

With LaTeX :

- It is required to learn a programming language, or at least part of it, which scares most of the potential candidates.
- Few steps are required to obtain the final manuscript using the source file(s) in TeX language:

The sequence of these steps is called compilation

THE « *.TEX » FILE

Structure of the « * . tex » file

The LaTeX document:

- Is a basic text file
- Must have the « * . tex » extension
- Must follow the structure:

```
\documentclass{article}

% Some (important) information here

\begin{document}

Science is great, I love it !

\end{document}
```

$\Longrightarrow$ the document class

$\Longrightarrow$ the preamble section

$\Longrightarrow$ the article starts here

the main body section

$\Longrightarrow$ the article ends here

The document class – the first line of the « *.tex » file

```
\documentclass{article}
```

The command — Class name

```
\documentclass[a4paper,12pt]{article}
```

The command — Option(s), Between [ ], Separated by « , » — Class name

- **Among the default LaTeX classes:**

article
book
letter …

The document class – scientific editors

Each scientific editor provides a LaTeX class:

- The APS (PRB, PRL) and the AIP (JCP, APL) use revtex4.1:

```
\documentclass[prb,twocolumn,showkeys,showpacs,english]{revtex4-1}
```

- The IOP (JPCM, RPP) uses iopart:

```
\documentclass[jpcm,twocolumn,english]{iopart}
```

- The ACS uses achemso:

```
\documentclass[jacs,twocolumn,preprint,english]{achemso}
```

- Elsevier journals use elsarticle:

```
\documentclass[jncs,twocolumn,preprint,english,12pt]{elsarticle}
```

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The document class - example

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The document class - example

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```

PHYSICAL REVIEW B **86**, 224201 (2012)

Structural properties of glassy Ge_2Se_3 from first-principles molecular dynamics

Sébastien Le Roux, Assil Bouzid, Mauro Boero, and Carlo Massobrio
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(Received 31 July 2012; revised manuscript received 11 October 2012; published 19 December 2012)

The structural properties of glassy Ge_2Se_3 were studied in the framework of first-principles molecular dynamics by using the Becke-Lee-Yang-Parr scheme for the treatment of the exchange-correlation functional in density functional theory. Our results for the total neutron structure factor and the total pair distribution function are in very good agreement with the experimental results. When compared to the structural description obtained for liquid Ge_2Se_3, glassy Ge_2Se_3 is found to be characterized by a larger percentage of fourfold coordinated Ge atoms and a lower number of miscoordinations. However, Ge−Ge homopolar bonds inevitably occur due to the lack of Se atoms available, at this concentration, to form $GeSe_4$ tetrahedra. Focusing on the family of glasses Ge_xSe_{1-x}, the present results allow a comparison to be carried out in reciprocal and real space among three prototypical glassy structures. The first was obtained at the stoichiometric composition (glassy $GeSe_2$), the second at a Se-rich composition (glassy $GeSe_4$) and the third at a Ge-rich composition (glassy Ge_2Se_3). All networks are consistent with the "$8 - N$" rule, in particular, glassy $GeSe_4$, which exhibits the highest degree of chemical order. The electronic structure of glassy Ge_2Se_3 has been characterized by using the Wannier localized orbital formalism. The analysis of the Ge environment shows the presence of dangling, ionocovalent Ge−Se, and covalent bonds, the latter related to Ge−Ge connections.

DOI: 10.1103/PhysRevB.86.224201 PACS number(s): 61.43.Fs, 61.25.Em, 61.20.Ja, 71.15.Pd

I. INTRODUCTION

The atomic structure of the glasses Ge_xSe_{1-x} (or g-Ge_xSe_{1-x} in what follows) for $0 \leqslant x \leqslant 0.33$ can be viewed as the result of a continuous transition from a Se-rich phase (small x values), encompassing Se chains interconnected with $GeSe_4$ tetrahedra, to a full $GeSe_4$ tetrahedral network highly chemically ordered ($x = 0.33$), i.e., glassy $GeSe_2$. Moving to the $x \geqslant 0.33$ side of the composition range, g-Ge_xSe_{1-x} are known to form up to $x \leqslant 0.43$, a representative example being provided by g-Ge_2Se_3. A comparative analysis of diffraction data for g-Ge_xSe_{1-x} revealed that g-Ge_2Se_3 shares some notable features with g-$GeSe_3$, g-$GeSe_2$, and g-$GeSe_4$.[1] One can mention, in reciprocal space, the existence of a prepeak at $k \sim 1$ Å^{-1} in the number-number Bhatia-Thornton partial in recent years by using FPMD in conjunction with various recipes for the exchange-correlation functionals.[2–12]

Within this context, we take advantage of the availability of an extended set of FPMD trajectories produced for liquid Ge_2Se_3 to obtain g-Ge_2Se_3 at $T = 300$ K by rapid quenching from temperatures in the liquid state. Our comparative analysis follows a twofold strategy, namely the description of the structural modifications (a) when going from the liquid to the glass for a given composition ($x = 0.4$) and (b) with changing composition ($x = 0.2,\ 0.33,\ 0.4$) within the g-Ge_xSe_{1-x} family.

The paper is organized as follows. Our theoretical model is described in Sec. II. The results for the neutron total structure factor and the total pair correlation function of g-Ge_2Se_3 are presented and compared to the experimental

The preamble

- After the `\documentclass` command line
  and before the `\begin{document}` command.

The preamble contains:

- Packages declaration = LaTeX extensions that you need to use
- Commands that:
  - you need to use in the preamble, depending on:
    - the document class
    - package(s)
  - you need to create and use in the preamble.
  - you need to create to use in the main body of the manuscript.
- Files to be read by LaTeX before processing the document

The main body

- Between the `\begin{document}` and `\end{document}` commands.

The main body contains:

- Basic text
- LaTeX commands to:
  - Insert a title
  - Organize your document
  - Insert a math equation
  - Insert a table
  - Insert an image
  - Insert a list (like this one)
  - Insert an enumeration
  - Insert a reference to one of the above
  - Insert a file
  - Insert a bibliographic reference and a bibliography

Running LaTeX = compiling the « * . tex » file

❑ The tools that you will need:

- A text editor
- Working distributions of TeX and LaTeX 2ε
- TeX extensions that you might want to use (BibTeX, LaTeX2HTML ...)

❑ The compilation process:

Let us consider that you already prepared a TeX file for your manuscript. This file has to be a basic text file with the extension « * . tex »

Example: **manuscript.tex**

To visualize the manuscript requires to build it using this source file that contains the LaTeX commands and the text.

This building process is called compilation, depending on your OS and the tool you are using to prepare your document this can be achieved using different methods ...

The compilation process – using the command line

- Use the `latex` command (twice !):

```
user@localhost ~]$ latex manuscript

... many blabla

user@localhost ~]$ latex manuscript

... many blabla
```

It will produce 3 files (at least):

- `*.dvi` *device independent*, your manuscript.
- `*.log` LaTeX log journal with information about the last compilation.
- `*.aux` LaTeX auxiliary file.

- To produce a PS file:

```
user@localhost ~]$ dvips manuscript
```

- To produce a PDF file:

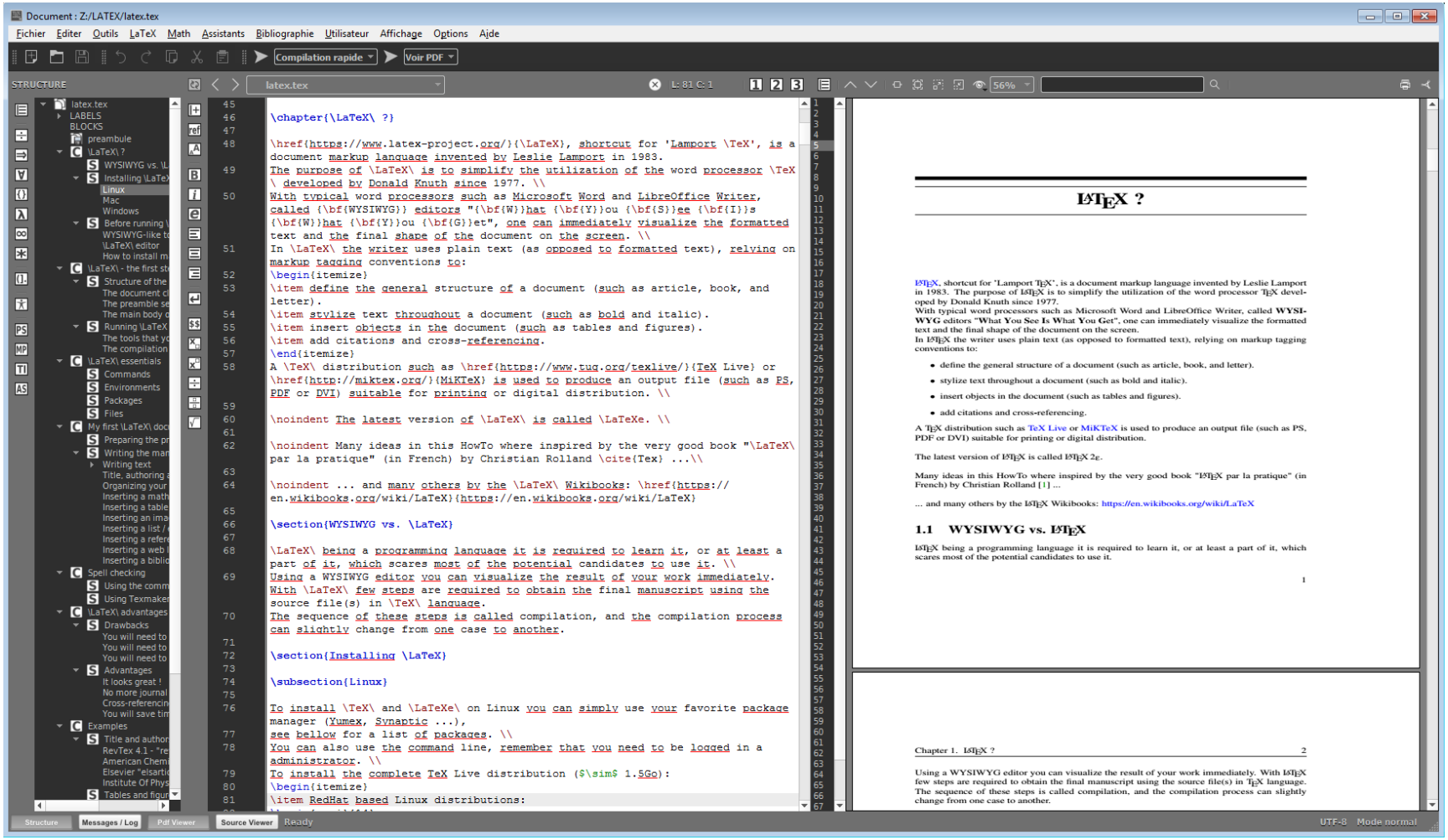
```
user@localhost ~]$ dvipdf manuscript
```

The compilation process – using a graphical interface

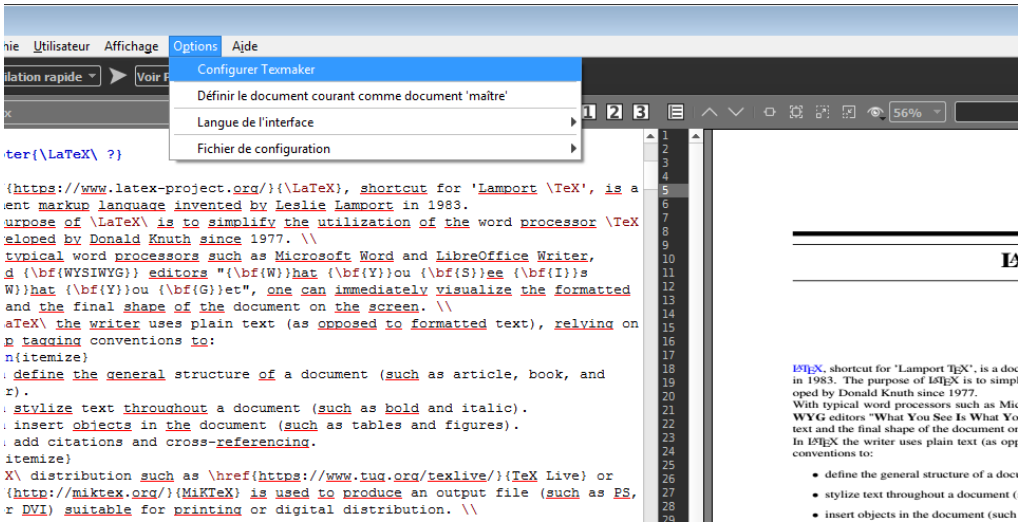
- Using tools dedicated to LaTeX :
  - Texmaker
  - TEXnicCenter
  - TeXstudio
  - …

- Open Source
- Multi-platform (Linux, Windows, Mac)

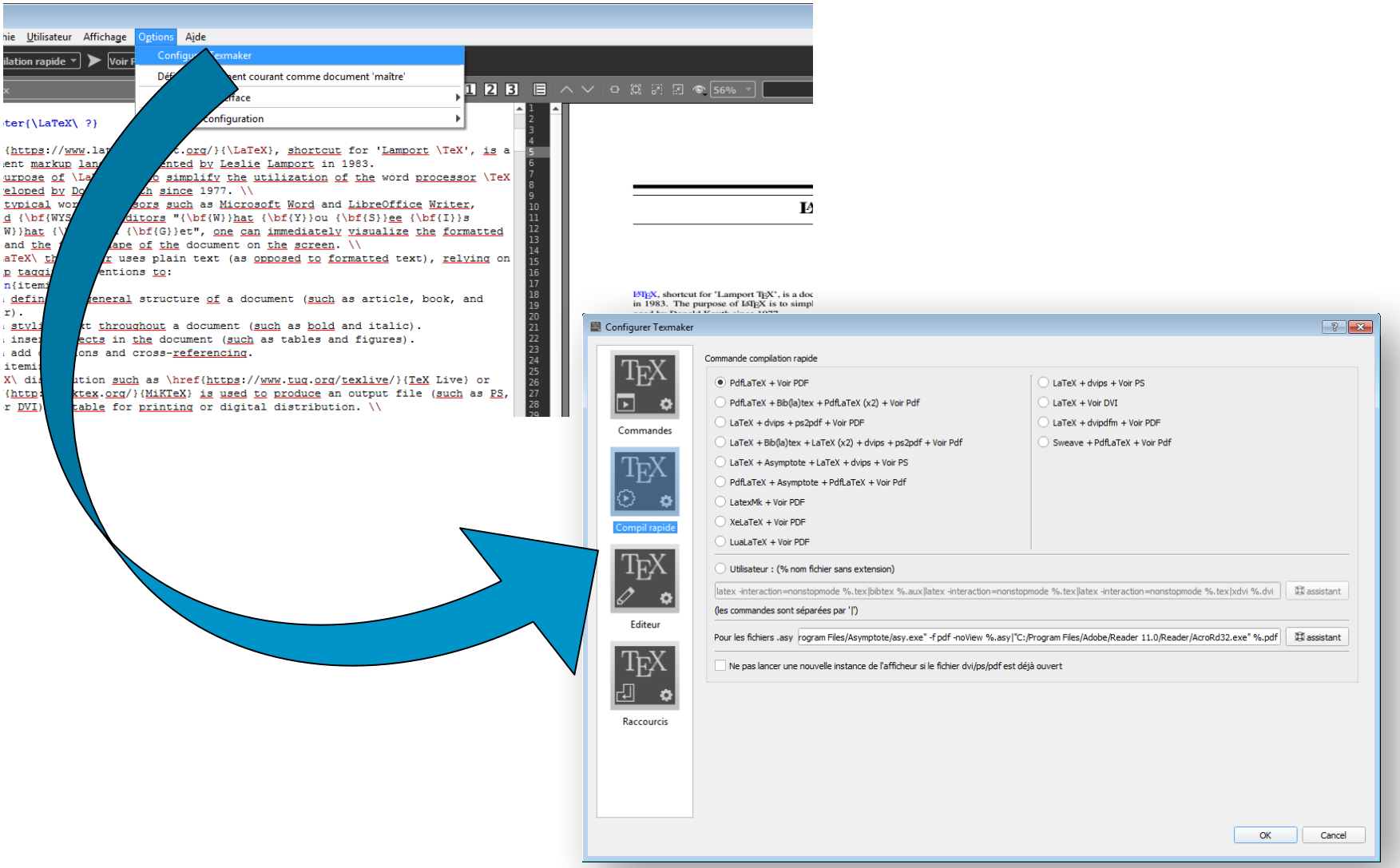
Texmaker – main window



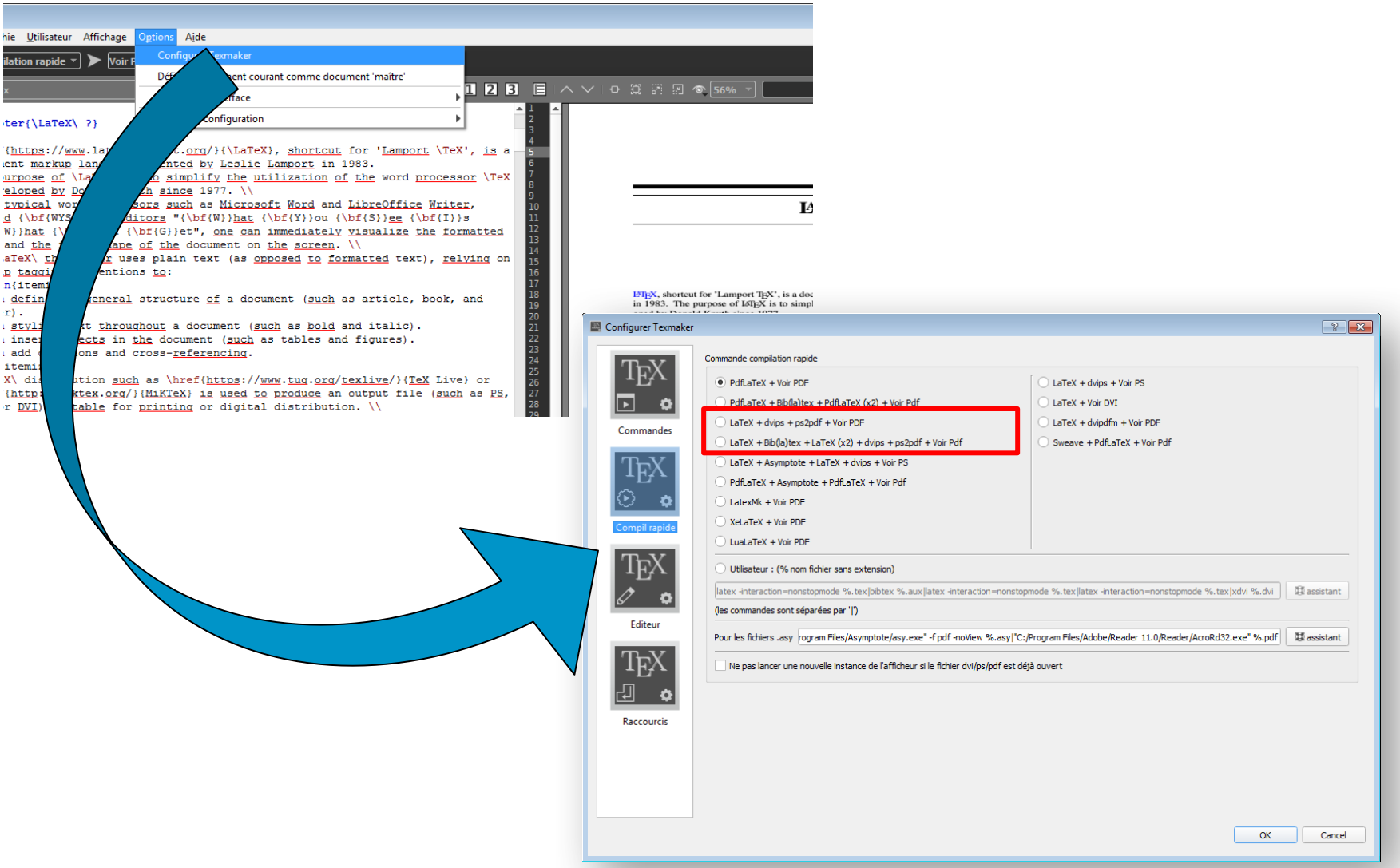
Texmaker – compilation options



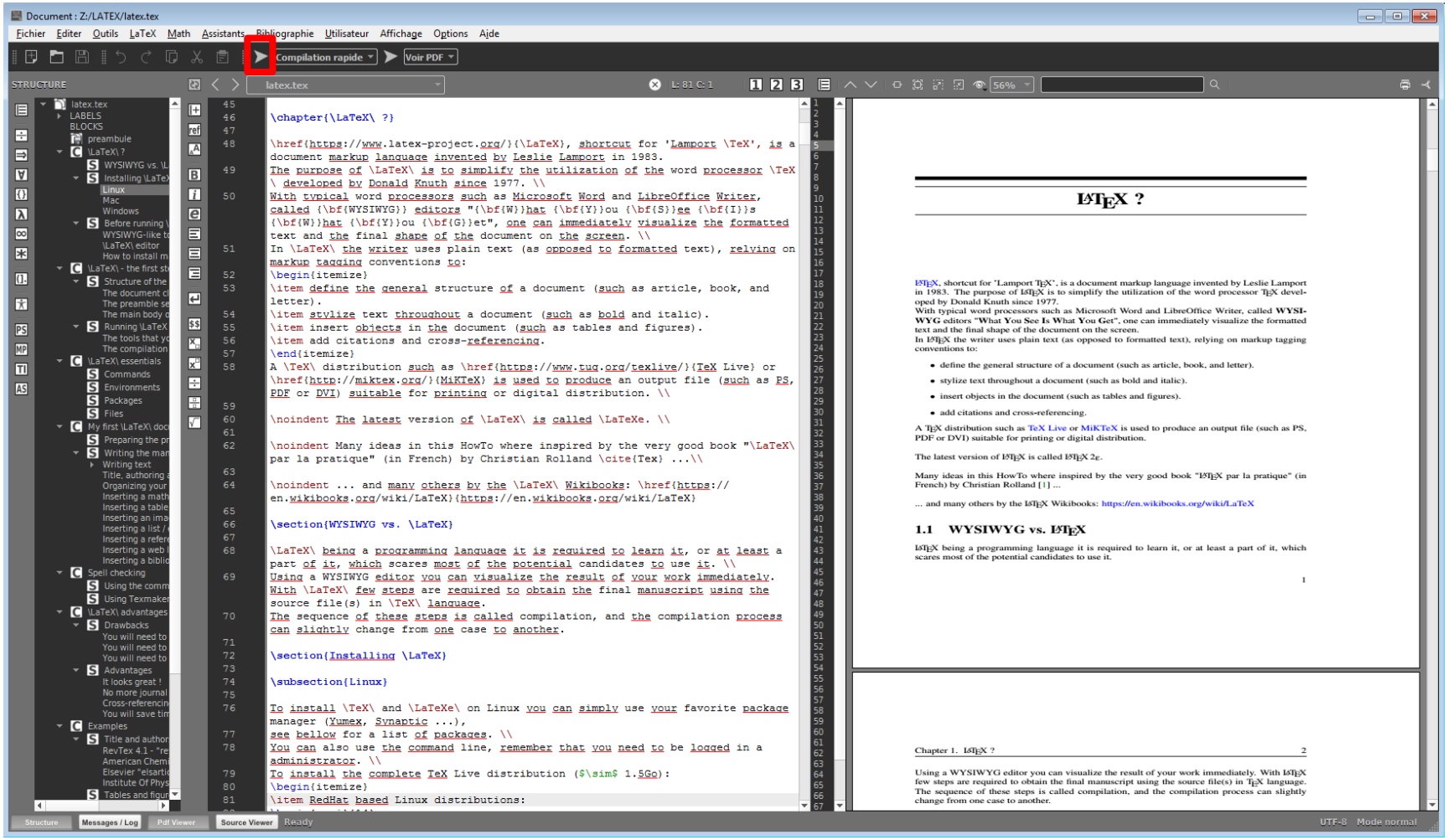
Texmaker – compilation options



Texmaker – compilation options



Texmaker – main window



LaTeX ESSENTIALS

Essentials ?

- The commands
- The environments
- The packages
- The files

Commands

- In LaTeX a command starts by the \ symbol:

```
\dosomething
```

- It can require an option, placed between {}

```
\dosomething{option}
```

- And even more than one:

```
\dosomething{option 1}{option 2}...
```

Creating your own command(s)

```
\newcommand{\MyCommand}{What-it-does}
```

To define a new command

The name of the new command

The action(s) of the new command

Example:

```
[(P$_2$O$_5$)$_{1-x}$ (B$_2$O$_3$)$_x$]$_{0.65}$
```

$$[(P_2O_5)_{1-x}\ (B_2O_3)_x]_{0.65}$$

```
\newcommand{\napo}{[(P$_2$O$_5$)$_{1-x}$ (B$_2$O$_3$)$_x$]$_{0.65}$}
```

As a result, each time that LaTeX will find the newly defined **\napo** command in the document, it will replace it by its content and print: $[(P_2O_5)_{1-x}\ (B_2O_3)_x]_{0.65}$.

Creating your own command(s) with option(s)

```
\newcommand{\MyCommand}[1]{What-it-does-#1}
```

Number of option(s)

Call to option using #num

```
\newcommand{\MyCommand}[2]{It-does-that-#1-and-this-#2}
```

Example:

```
\textcolor{col}{Text in color}
```

Is the LaTeX command to color some text using the color "*col*"

```
\newcommand{\green}[1]{\textcolor{green}{#1}}
```

```
To color some text in green use the command: \green{This in green !}
```

To color some text in green use the command: This in green !

Environments ...

- In LaTeX many commands exist, many of them being available without any particular requirement.
- However many others can only be used inside what is called an environment, ie. a part of the document where the standard behavior of LaTeX is modified to do particular things.
- Use the **\begin** and **\end** commands:

```
\begin{something}
I want do something special here !
\end{something}
```

You can insert: equations, tables, figures ...

.. and floating objects

- Floating objects can be moved in the document independently from the main text body.
- LaTeX will handle floating objects to maintain the best possible presentation, however there may be times when you disagree.
- In this case additional options, keyword letters and symbol, to the **\begin** command can be used to specify the position:

```
\begin{something}[htbp!]
I want do something special here !
\end{something}
```

.. and floating objects

```
\begin{something}[htbp!]
```

Option	What it does
h	Put the object here, i.e. "*approximately*" the same point that in the source text.
t	Put the object at the **top** of the page.
b	Put the object at the **bottom** of the page.
p	Put the object on an isolated **page**.
!	Override internal parameters to determine "*good*" positions (exact position).

Example:

```
\begin{table}[h!]
```

Will insert a table, **[h!]** = at the exact position it appears in the source text.

Packages

- Add-on features for LaTeX are known as packages. Dozens are pre-installed an can be used immediately.

- A package is a file or collection of files containing extra commands and programming which add new styling features or modify those already existing.

```
\usepackage{mypackage}
```

The command to use a package

The name of the package

```
\usepackage[option1,option2,option3]{mypackage}
```

The command to use a package

Option(s), between [ ], and separated by « , »

The name of the package

Files

- It can be cleaver to divide your LaTeX file in several pieces, for example information regarding each of the different chapters of your thesis could be in different files.
- Two different commands exist to insert a file in a LaTeX document, the **\input** and the **\include** commands.

Insert the file without condition:	Insert the file on a new page:
`\input{myfile}`	`\include{myfile}`
	+ activated / deactivate by:
	`\includeonly{myfile}`

Note: **myfile** without « *.tex » extension

Files - examples

```
\documentclass{book}

% Preamble section

\input{preamble}

\includeonly{intro, chapter1}

\begin{document}

% Main body section

\include{intro}

\include{chapter1}

\include{chapter2}

\include{conclu}

\end{document}
```

$\Longrightarrow$ reading the file: `preamble.tex`

$\Longrightarrow$ reading the file: `intro.tex`

$\Longrightarrow$ reading the file: `chapter1.tex`

$\Longrightarrow$ reading the file: `chapter2.tex`

$\Longrightarrow$ reading the file: `conclu.tex`

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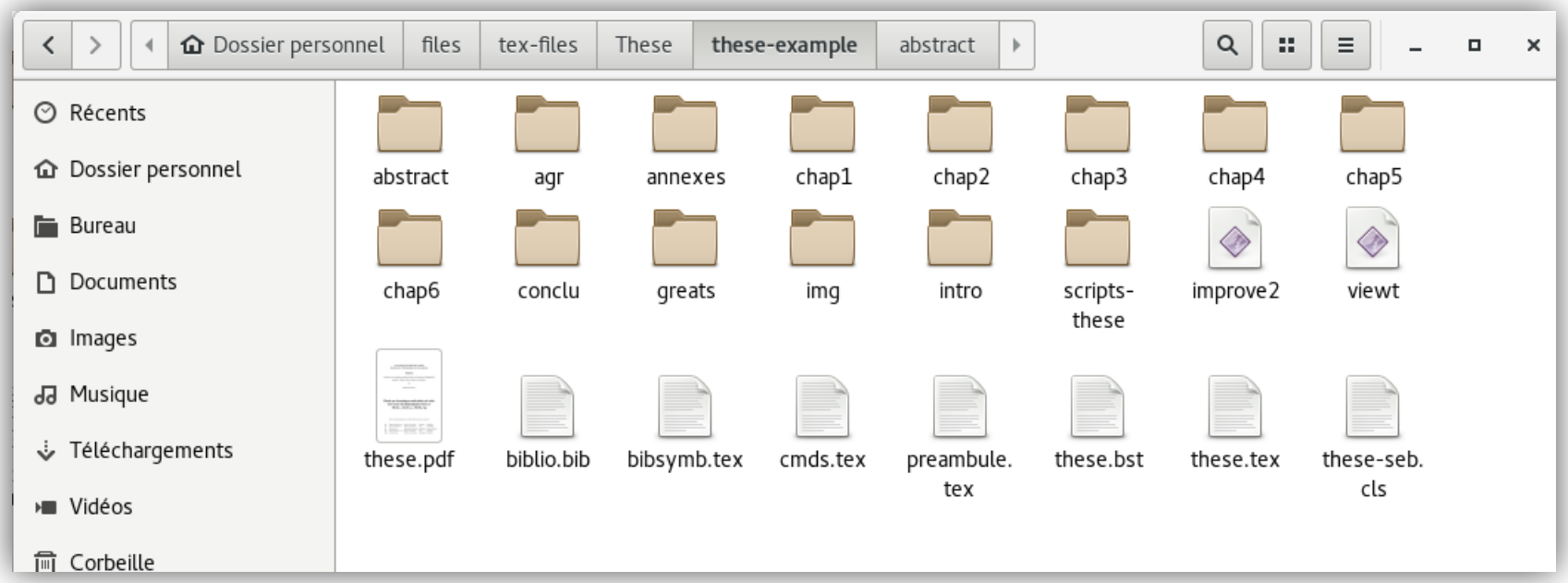
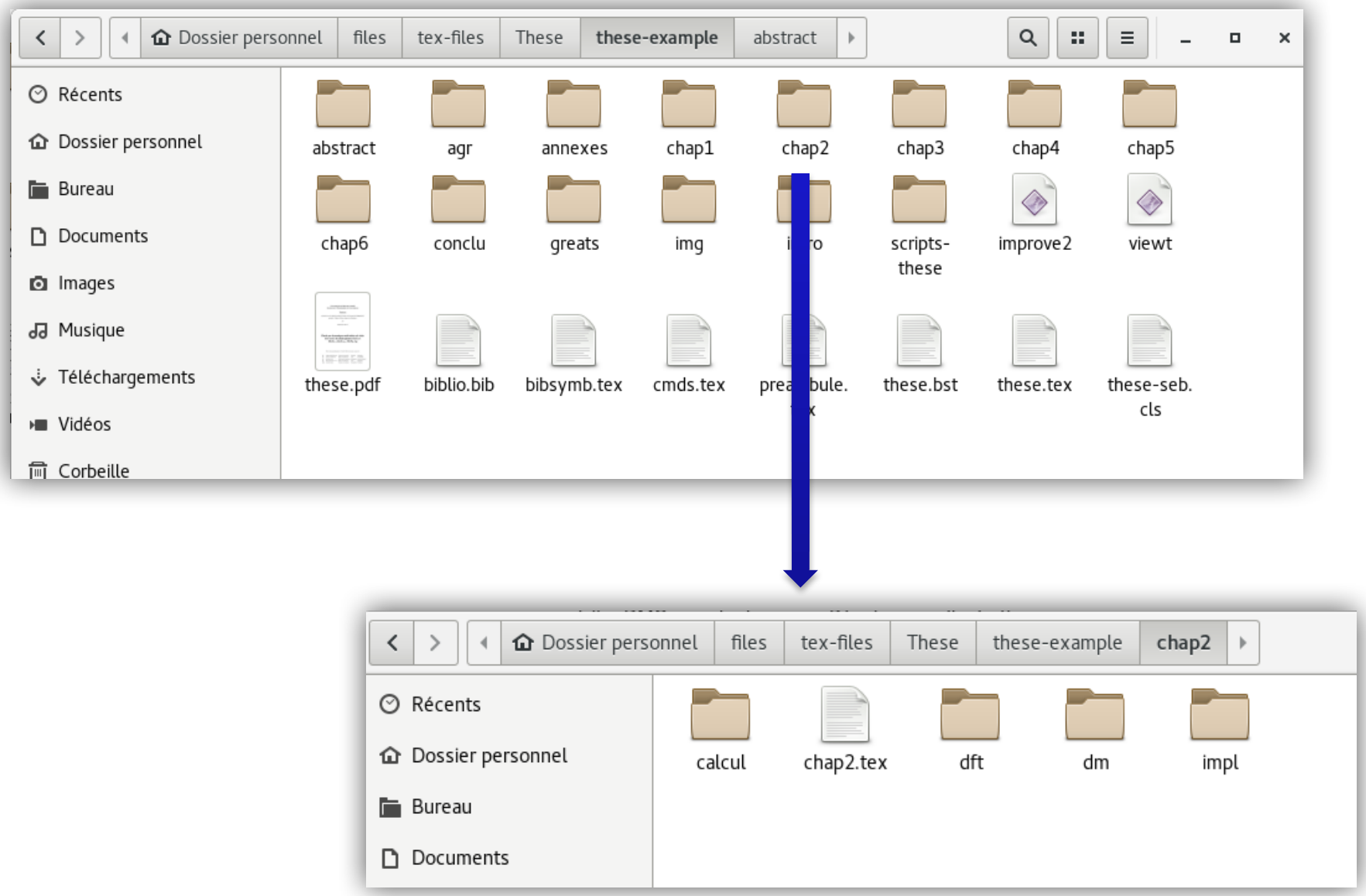
$\Longrightarrow$ reading the file: `chapter2.tex`

$\Longrightarrow$ reading the file: `conclu.tex`

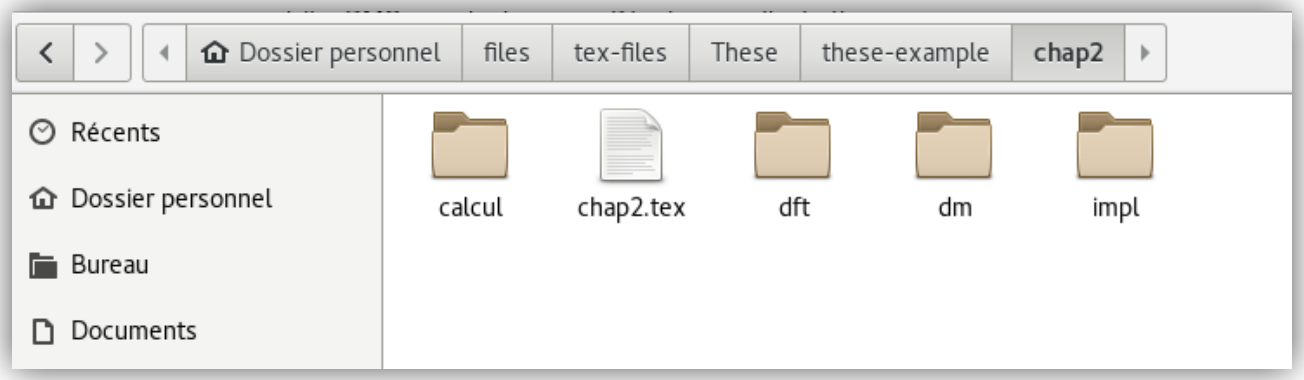
File structure example: the thesis !



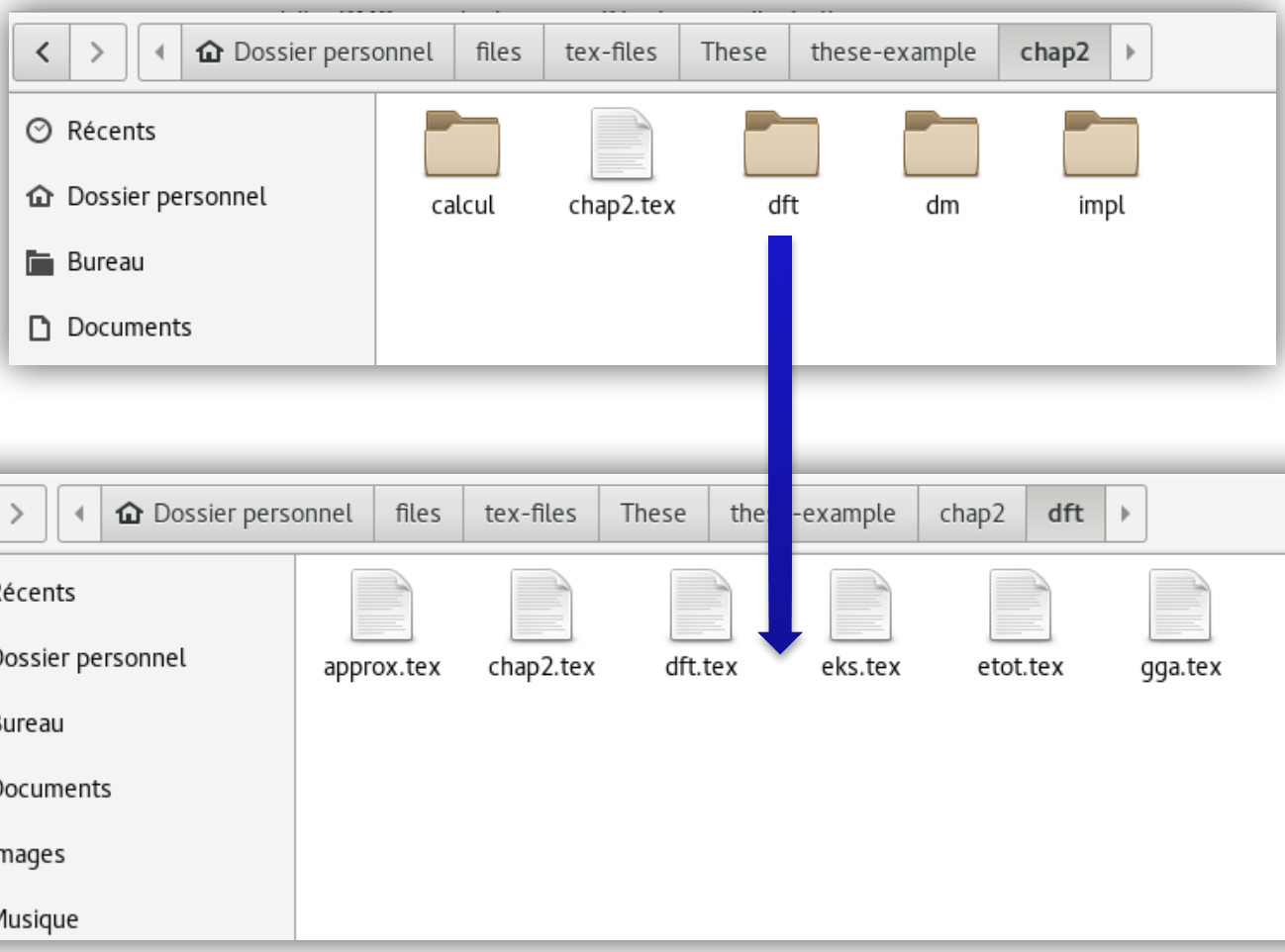
File structure example: the thesis !



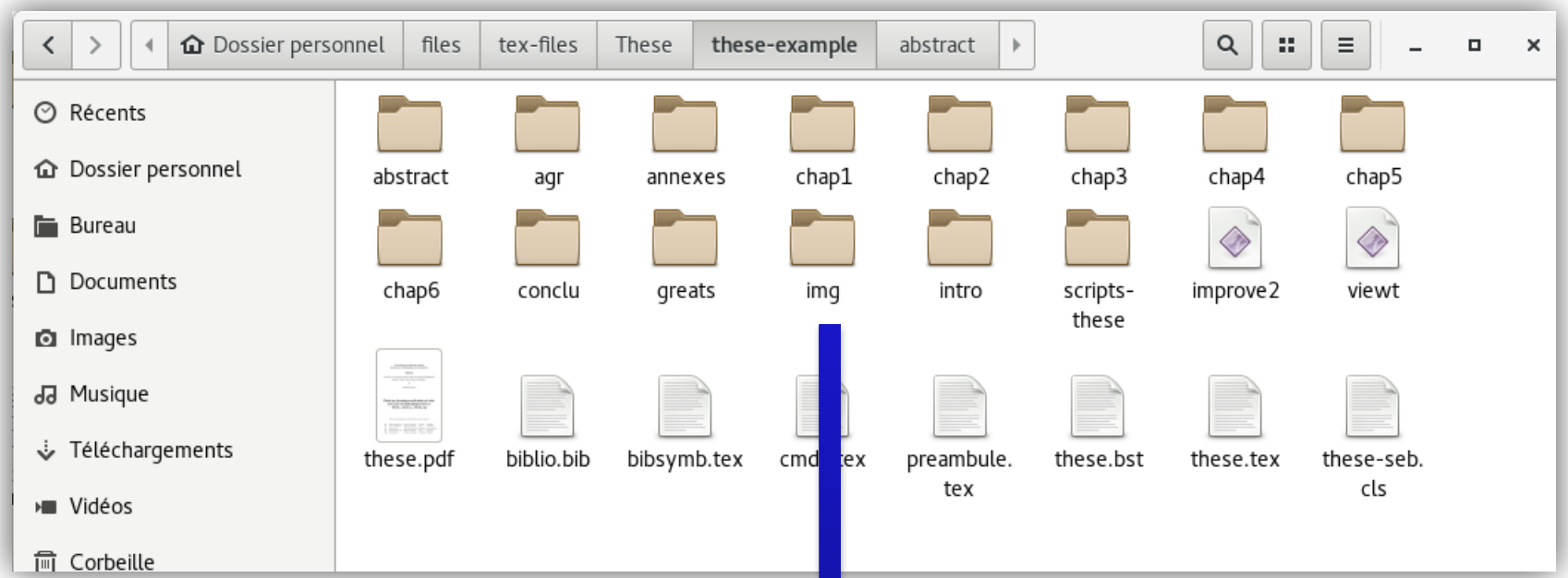
File structure example: the thesis ! – in “Chap2”

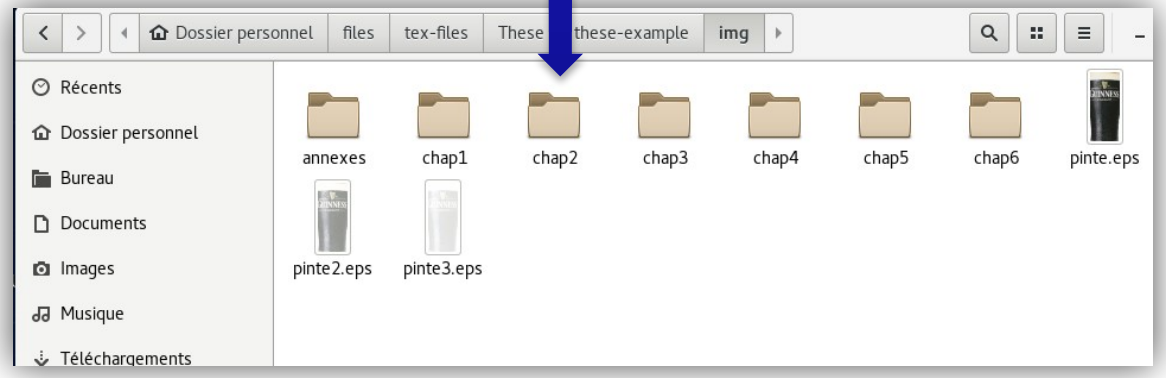


File structure example: the thesis ! – in “Chap2”

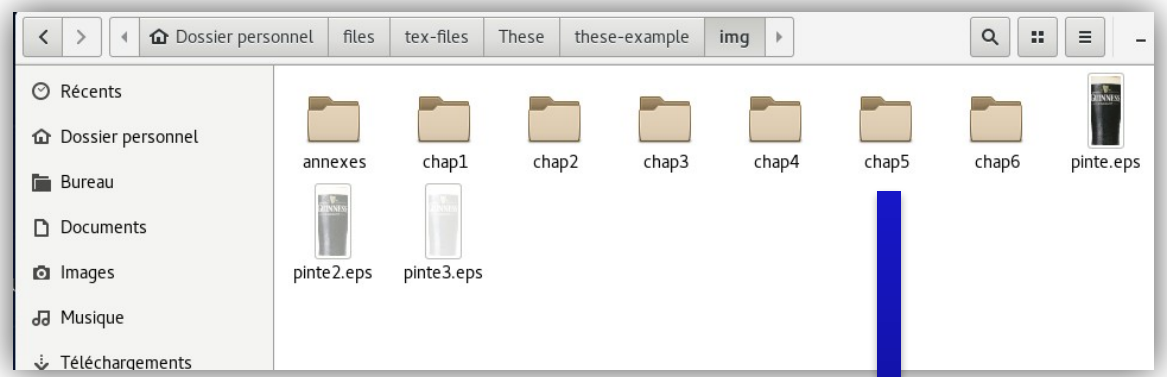


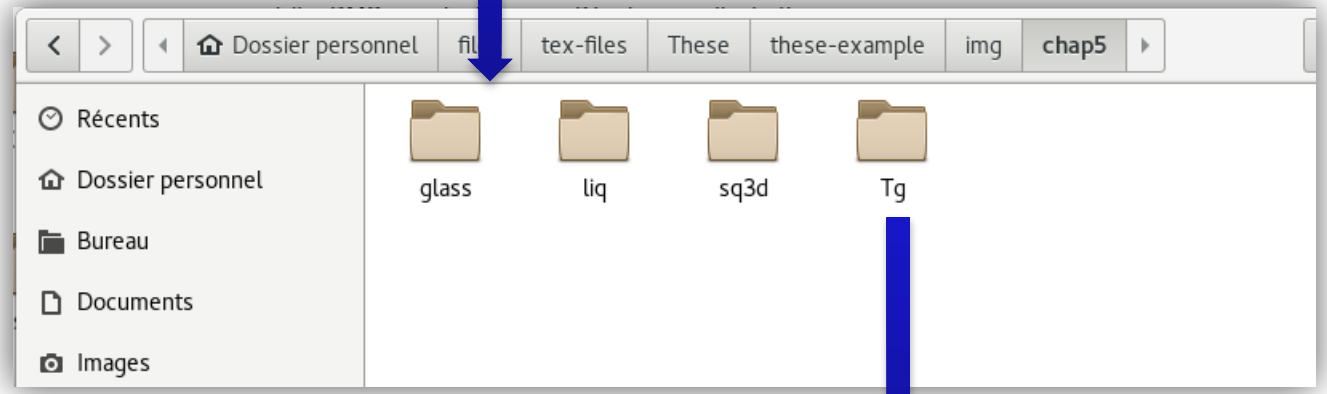
File structure example: the thesis !

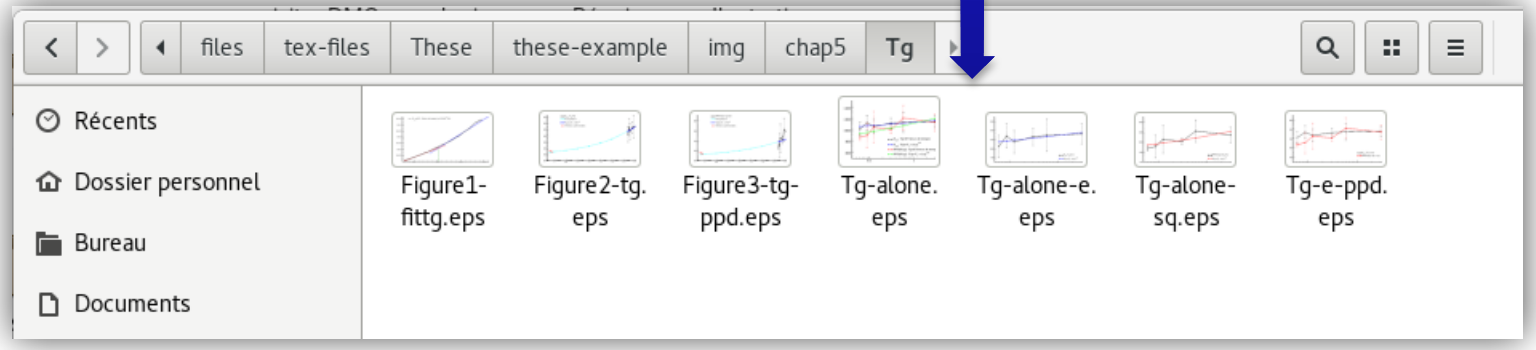




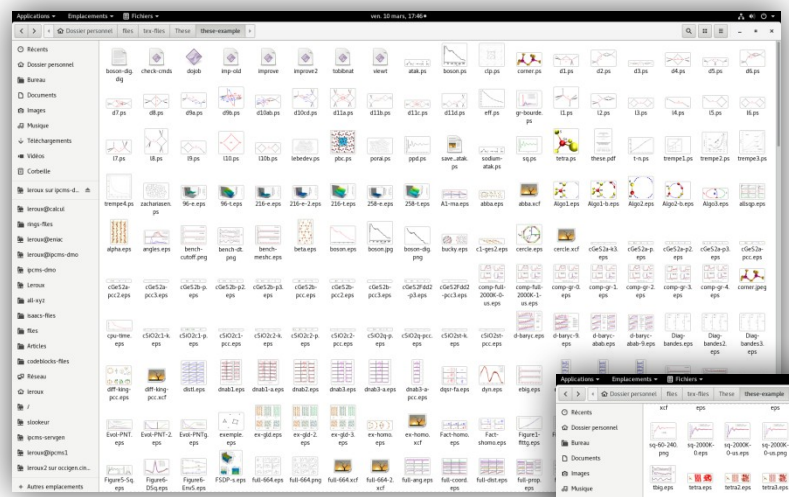
File structure example: the thesis ! – in “img”

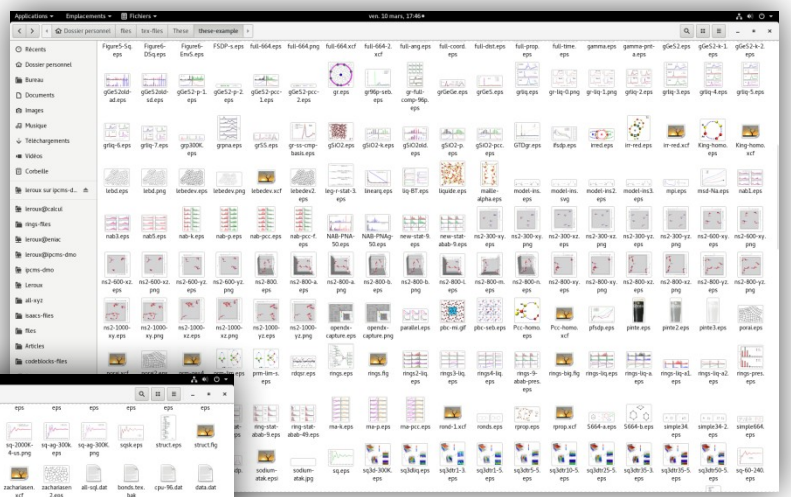


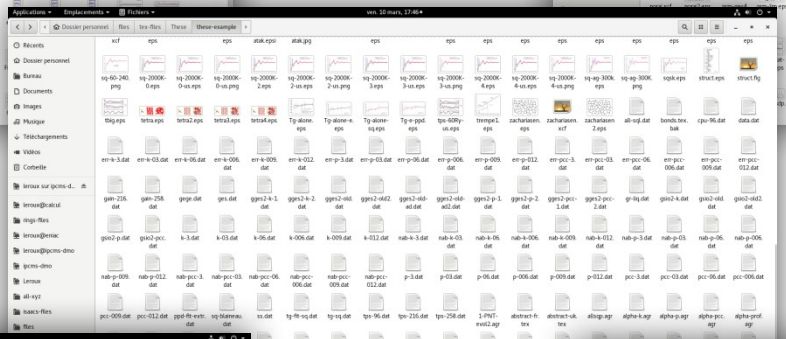


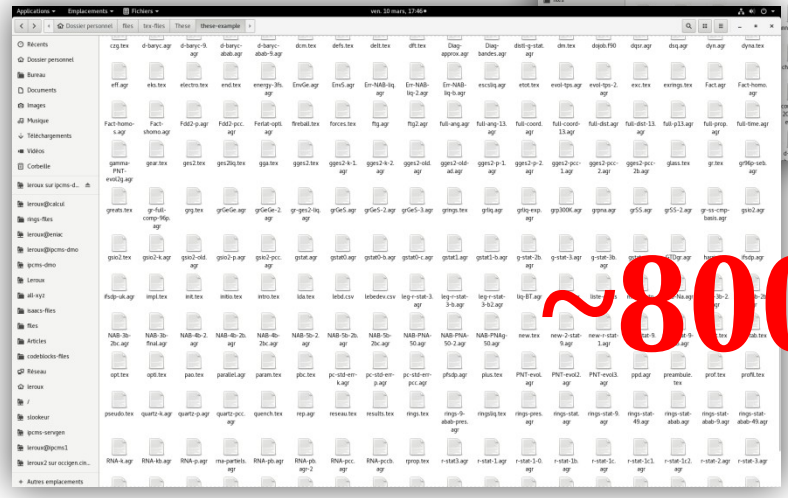


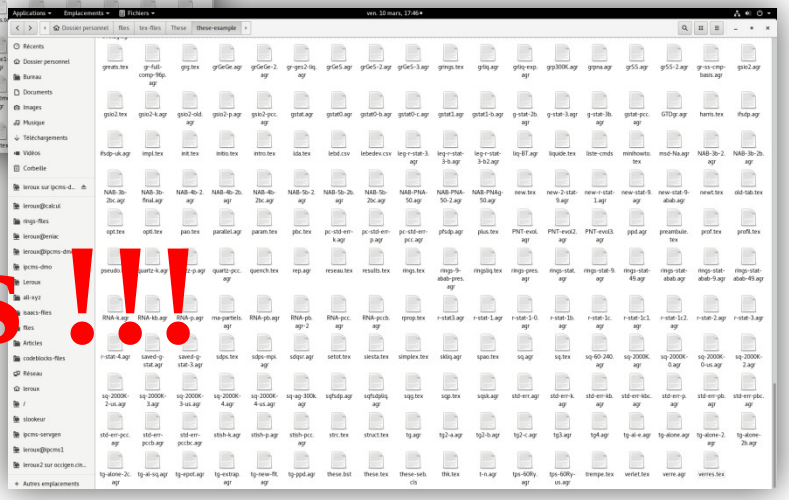
File structure example: the thesis … what if not organized ?!











~800 files !!!

FIRST

DOCUMENT

Preparing the preamble

```
\documentclass{article}

\input{preamble}

\begin{document}
```

« Preamble.tex » - example

```
%To have an input font encoding that support special characters
\usepackage[utf8]{inputenc}
%To have an output font encoding that support special characters
\usepackage[T1]{fontenc}
%To define the language of the document
\usepackage[english]{babel}
%Much better font for the PDF file
\usepackage{pslatex}
%Hyperlinks for the PDF file
\usepackage{hyperref}
\hypersetup{pdfauthor     = {Sébastien Le Roux},
            pdftitle      = {LaTeX tutorial},
            pdfsubject    = {LaTeX tutorial},
            pdfkeywords   = {LaTeX Users Manual Guide Basics Help},
            pdfcreator    = {LaTeX+DviPDF},
            pdfproducer   = {LaTeX+DviPDF},
            pdfstartview  = FitV,  % Adjust the document to the window at startup
            dvips         = true,  % Use hyperref with dvips
            colorlinks    = true,  % Colored hypertext links
            plainpages    = false, % Do page number anchors as plain arabic
            pagebackref   = true,  % Allows to add links in the bibliography ...
            backref       = page,  % .. that points toward the appropriate pages
            hyperindex    = true,  % Add hypertext links in the appendix
            linktocpage   = true,  % Links on the page numbers and not the text
            breaklinks    = true,  % To write the long hyperlinks on more than one line
            urlcolor      = blue,  % Color for external hyperlinks
            linkcolor     = red,   % Color for internal hyperlinks
            bookmarks     = true,  % To create the section marks pour Acrobat Reader
            bookmarksopen = false  % Is the document tree entirely opened at startup
}

%Insert images
\usepackage{graphicx}
%Colors
\usepackage{xcolor}
%Enumerations
\usepackage{enumerate}
% Mathematics
\usepackage{amsmath}
\usepackage{amssymb}
\usepackage{amscd}
\usepackage{theorem}
% Tables
\usepackage{hhline}
\usepackage{multirow}
\usepackage{tabls}
% To use landscape pages in a portrait document
\usepackage{lscape}
% Spaces between lines
\usepackage{setspace}
%\onehalfspacing
%\doublespacing
%\setstretch{3}
```

Preparing the manuscript

```
\begin{document}
```

We will focus on this part of the `*.tex` file

```
\end{document}
```

Writing text

- Special characters
- Basic commands
- Font size
- Font style
- Font color

Special characters

LaTeX considers some particular characters as commands:

\ # % ~ { } $ _ ^ &

- \ is the beginning of a command (ex: **\napo**)
- # is used when creating commands
- % starts a comments, everything that follow on the same line is not interpreted, read or compiled by LaTeX
- ~ creates a non-breaking space
- { and } beginning and the end of a command or an environment
- $, _ and ^ are used for mathematics
- & is used for tabular and table environments

Few basic, yet very useful commands

`\LaTeX`	to print LaTeX
`\TeX`	to print TeX
`\today`	to print the date, today is: December 16, 2015
`\\`	to force LaTeX to jump to the next line.
`\\[?cm]`	to force LaTeX to jump to the next line, with a space of ? cm
`\vspace[?cm]`	to force LaTeX to create a vertical space of ? cm
`\hspace[?cm]`	to force LaTeX to create a horizontal space of ? cm
`\newpage`	to force LaTeX to start a new page.
`\clearpage`	to force LaTeX to start a new page ...
	... and to print all pending objects (tables, figures ...) from the stack.
`\indent`	the first line of the upcoming paragraph should be shifted.
`\noindent`	the first line of the upcoming paragraph should not be shifted.

Few basic, yet very useful commands

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	... and to print all pending objects (tables, figures ...) from the stack.
`\indent`	the first line of the upcoming paragraph should be shifted.
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Font size

```
{\tiny Bigger}
{\scriptsize Bigger}
{\footnotesize Bigger}
{\small Bigger}
{\normalsize Bigger}
{\large Bigger}
{\Large Bigger}
{\LARGE Bigger}
{\huge Bigger}
{\Huge Bigger}
```

Font style

`\textrm{Roman}`	`{\rm Roman}`	(default)
`\textit{Italic}`	`{\it Italic}`	*Italic*
`\textsl{Sloping}`	`{\sl Sloping}`	*Sloping*
`\textbf{Bold}`	`{\bf Bold}`	**Bold**
`\textsc{Small capitals}`	`{\sc Small capitals}`	SMALL CAPITALS
`\emph{Emphasis}`	`{\em Emphasis}`	*Emphasis* *
`\texttt{Typewriter}`		`Typewriter`
`\uline{Underline}`		Underlined
`\uuline{Underline twice}`		Underlined twice
`\sout{Crossed}`		~~Crossed~~
`\xout{Shaded}`		Shaded

* the result depends on the font environment the command is used in:

- I write in Roman mode and I want to *emphasis this passage*
- *I write in Italic mode and I want to* emphasis this passage

Font color

- The command to change the font color is:

```
\textcolor{col}{My colored text here !}
```

The color name

The text to be colored

Where the color « **col** » has to be defined in the package « **xcolor** »

- You might want to define your own colors using:

```
\definecolor{my_green}{rgb}{0.0,0.6,0}
```

The color name

Coding

RGB code,
3 numbers [0.0 – 1.0]
separated by « , »

Before starting

- Authoring, title, abstract ...
- Organizing the manuscript

Authoring, title and abstract

```
% Give the title of your thesis / article
\title{My revolutionary science project}

% Name the authors
\author{M. Me, Y. You and H. He}

% You can even provide an abstract
\begin{abstract}
This great work is about to blow your mind !
\end{abstract}

% Now create the title page using all of the above
\maketitle
```

Organizing the manuscript – commands

Command		Document class
`\part`		book, article*
`\chapter`		book
`\section`		book, article*
`\subsection`	$\Longrightarrow$	book, article*
`\subsubsection`		book, article*
`\paragraph`		book, article*
`\subparagraph`		book, article*

* Including the `revtex4-1`, `iopart`, `elsarticle` and `achemso` classes.

Organizing the manuscript – usage

```
\section[Section shortname]{Section title}
```

Optional parameter to modify the section name in the Table Of Contents

Default section name

- **Automatic numbering**

```
\section{My great section}

\subsection{My great subsection}
```

$\Longrightarrow$

1 My great section

1.1 My great subsection

- **No numbering, using the * symbol**

```
\section*{My great section}

\subsection*{My great subsection}
```

$\Longrightarrow$

My great section

My great subsection

Organizing the manuscript – example

```
\chapter{My final chapter}

% Final chapter body

\section{My first section}

% First section body

\section{My second section}

% Second section body

\chapter*{Conclusion}

% The conclusion

\appendix

\chapter{Additional data}
```

Chapter 5
My final chapter

1 My first section

2 My second section

Conclusion

Appendix A
Additional data

Writing the manuscript

- Math and equations
- Tables
- Figures
- Lists
- Cross-referencing
- Bibliography

Insert an equation

- To insert a math equation use:
  - The simple, in-line, math mode: **$**math here**$** (**$** **$** symbols)

```
$\sum_{i=1}^{N} \frac{x-1}{\sqrt{\delta}} = \infty$
```

will be rendered like this in a text line, $\sum_{i=1}^{N} \frac{x-1}{\sqrt{\delta}} = \infty$, allowing to continue the discussion.

  - The **equation** environment

```
\begin{equation}
\sum_{i=1}^{N} \frac{x-1}{\sqrt{\delta}} = \infty
\end{equation}
```

$$\sum_{i=1}^{N} \frac{x-1}{\sqrt{\delta}} = \infty \tag{4.1}$$

Properties of the math mode

- Text letters (a,A → z,Z) are written in italic (*a,A* → *z,Z*), however numbers, symbols and punctuation signs are written in standard roman characters.

- Superscript writing using the ^ character
- Subscript writing using the _ character

```
$6.022\times10^{23}$ \\
CH$_3$CH$_2$OH \\
NH$_3^+$
```

→ 6.022×10^{23}
CH_3CH_2OH
NH_3^+

If no brackets, **{ }**, are used, then only the first letter/symbol/number following the ^ and the _ characters will be affected and upper-lower-scripted.

Math symbols

- Many, many, many symbols are accessible using commands:

– Greek letters: `\alpha` `\beta` `\gamma` `\Gamma` `\delta` `\Delta`

α β γ Γ δ Δ

– Math operators: `\sum` `\prod` `\frac{1}{2}` `\sqrt[x]{y}` `\int`

$\sum$ $\prod$ $\frac{1}{2}$ $\sqrt[x]{y}$ $\int$

– Math accents: `\vec{v}` `\dot{a}` `\bar{h}` `\widehat{abc}`

$\vec{v}$ $\dot{a}$ $\bar{h}$ $\widehat{abc}$

– Symbols: `\hbar` `\infty` `\times` `\div` `\pm`

$\hbar$ ∞ $\times$ $\div$ $\pm$

Insert a table

- To insert a table use:
  - The **table** environment to insert a caption (**\caption{}**)
  - The **tabular** environment to insert a column based layout:

```
\begin{tabular}{lcrp{2cm}}
```

  - l = left aligned column
  - c = centered column
  - r = right aligned column
  - p{2cm} = user specified column, 2 cm large

- As many letters as columns in the **tabular** environment
- In **tabular** environment the **&** symbol to separate columns
- In **tabular** environment the **** command end the line

Insert a table - example

```
\begin{table}
\begin{tabular}{l|cr||}
  & $\alpha$ & $\beta$ \\
\hline
\hline
a &  2.0 & $1\times10^{-4}$ \\
b & -3.0 & $\sqrt5$ \\
c &  1.0 & $1\times10^2$ \\
\hline
\end{tabular}
\caption{My interesting table}
\end{table}
```

	α	β
a	2.0	1×10^{-4}
b	-3.0	$\sqrt{5}$
c	1.0	1×10^2

Table 4.2 *My interesting table*

Insert a figure

- To insert a figure use:
  - The **figure** environment to insert a caption (**\caption{}**)
  - The **\includegraphics** command (by the **graphicx** package)

```
\begin{figure}
\includegraphics{image.eps}
\caption{My interesting figure}
\end{figure}
```

Figure 4.1 *My interesting figure*

Use Encapsulated Postscript « *.eps » images !!!

The \includegraphics command

```
\includegraphics[width=10cm,keepaspectratio=true,draft=true]{image.eps}
```

Optional parameters or keywords, between [ ] and separated by « , »

Image File name

- keepaspectratio=true
- scale=0.75
- width=5cm
- height=8cm
- angle=90
- draft=false, this is the default value, if you set this option on true the image is not inserted, instead you will see a blank space of the same size, this could be very useful when preparing a large manuscript with many images, like your thesis.
- natwidth=640, used to solve bounding box errors
- natheight=480, used to solve bounding box errors

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```
\includegraphics[width=10cm,keepaspectratio=true,draft=true]{image.eps}
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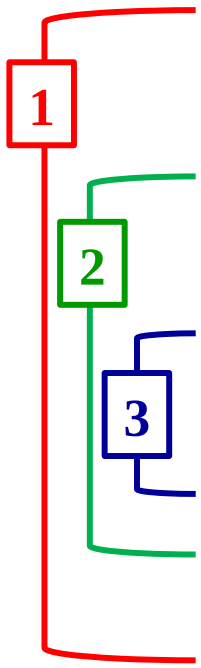
- natwidth=640, used to solve bounding box errors
- natheight=480, used to solve bounding box errors

Insert a list

- To insert a list use:
  - the **itemize** environment
  - The **\item** command



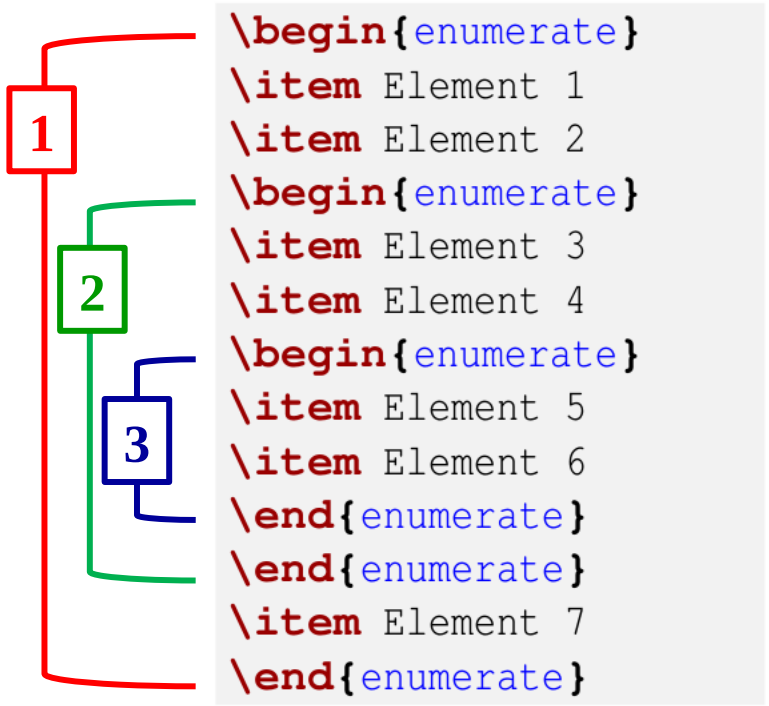

```
\begin{itemize}
\item Element 1
\item Element 2
\begin{itemize}
\item Element 3
\item Element 4
\begin{itemize}
\item Element 5
\item Element 6
\end{itemize}
\end{itemize}
\item Element 7
\end{itemize}
```

$\Longrightarrow$

- Element 1
- Element 2
  - Element 3
  - Element 4
    - Element 5
    - Element 6
- Element 7

Insert an enumeration

- To insert an enumeration use:
  - the **enumerate** environment
  - The **\item** command




```
\begin{enumerate}
\item Element 1
\item Element 2
\begin{enumerate}
\item Element 3
\item Element 4
\begin{enumerate}
\item Element 5
\item Element 6
\end{enumerate}
\end{enumerate}
\item Element 7
\end{enumerate}
```

$\Longrightarrow$

1. Element 1
2. Element 2
   (a) Element 3
   (b) Element 4
      i. Element 5
      ii. Element 6
3. Element 7

Cross-referencing

- To insert a cross-reference use:
  - The **`\label`** command to create a keyword associated with an object, or a section of the manuscript.
  - The **`\ref`** command to make reference to the keyword and therefore to the object or the section it-self

No numbering to be done !

Keywords must be unique !!!

Cross-referencing - example

```
\section{My third section}
\label{sec-3}

I like what's in figure \ref{pinte}

\section{My fourth section}




\begin{figure}
\includegraphics{image.eps}
\caption{\label{pinte}My interesting figure}
\end{figure}




As already said in section \ref{sec-3}

I like what's in figure \ref{pinte}
```

3 My third section

I like what's in figure 4.2

4 My fourth section

Figure 4.2 *My interesting figure*

As already said in section 3

I like what's in figure 4.2

Bibliography with LaTeX

To insert bibliographic references in your LaTeX manuscript use the **\cite** command:

```
The work in this article is good, really good,
it is even better than some previous work in Ref.\cite{old_work_a},
it will clearly be more cited that Ref.\cite{old_work_b}
```

To the keyword used in the **\cite** command corresponds an entry in the bibliography that you need to create.

To achieve this goal you have two methods:

- The **thebibliography** environment + the **\bibitem** command
- BibTeX

The « thebibliography » environment

```
The work in this article is good, really good,
it is even better than some previous work in Ref.\cite{old_work_a},
it will clearly be more cited that Ref.\cite{old_work_b}
```

Use the **thebibliography** environment **where** you want to insert the bibliography, references are defined using the **\bibitem** command

```
\begin{thebibliography}
\bibitem{old_work_a}
D. umb and I. diot,
J. Non-Smart. Sci. {\textbf{00}}, 0000-0007 (2015).
\bibitem{old_work_b}
R. Car and M. Parrinello,
Phys. Rev. Lett. {\textbf{55}}, 2471-2474 (1985).
\end{thebibliography}
```

- The keywords of the **\bibitem** command have to be unique
- You need to define the layout and stylize the bibliography yourself
- The entries have to be listed in the order you want them to appear

Using BibTeX

```
The work in this article is good, really good,
it is even better than some previous work in Ref.\cite{old_work_a},
it will clearly be more cited that Ref.\cite{old_work_b}
```

Use the **\bibliographystyle** and **\bibliography** commands where you want to insert the bibliography

```
\bibliographystyle{unsrt}
\bibliography{biblio}
```

- The **\bibliographystyle** command sets the style of the bibliography, it also defines how references are sorted.
- The **\bibliography** command tells LaTeX to import the file **biblio.bib** (the **.bib** extension being added automatically) using BibTeX to create the bibliography. This so-called BibTeX file contains all the elements of the bibliography.

The BibTeX file « *.bib »

BibTeX file contains all the elements of the bibliography, in the BibTeX format with entries that looks like:

```
@Article{old_work_b,
    author = "Car, R. and Parrinello, M.",
    journal = "Phys. Rev. Lett.",
    volume = 55,
    number = 22,
    pages = "2471-2474",
    numpages = 3,
    year = 1985,
    publisher = "American Physical Society"
}
```

- The first line starting with an `@` gives the document type, here an `article` (among others like: `book`, `phdthesis`, `proceedings`, `conference` ...) and the associated keyword here `old_work_b`
- The next lines are the fields to describe the bibliographic reference.

Why is BibTeX so great ?

- Most of the scientific editors provide the BibTeX entries for their publications, which means that you only need to browse their web sites, find the page of the appropriate article, and copy-paste the entry in your own BibTeX file, then simply use the corresponding keyword in your manuscript.

- No matter the number of entries in the BibTeX file, LaTeX and BibTeX will only use the ones cited in your article and ignore the others.

- You can use the same BibTeX file for all your works with LaTeX
  This means that you just need to do prepare an entry the first time you need the reference, then simply recall the appropriate keyword.

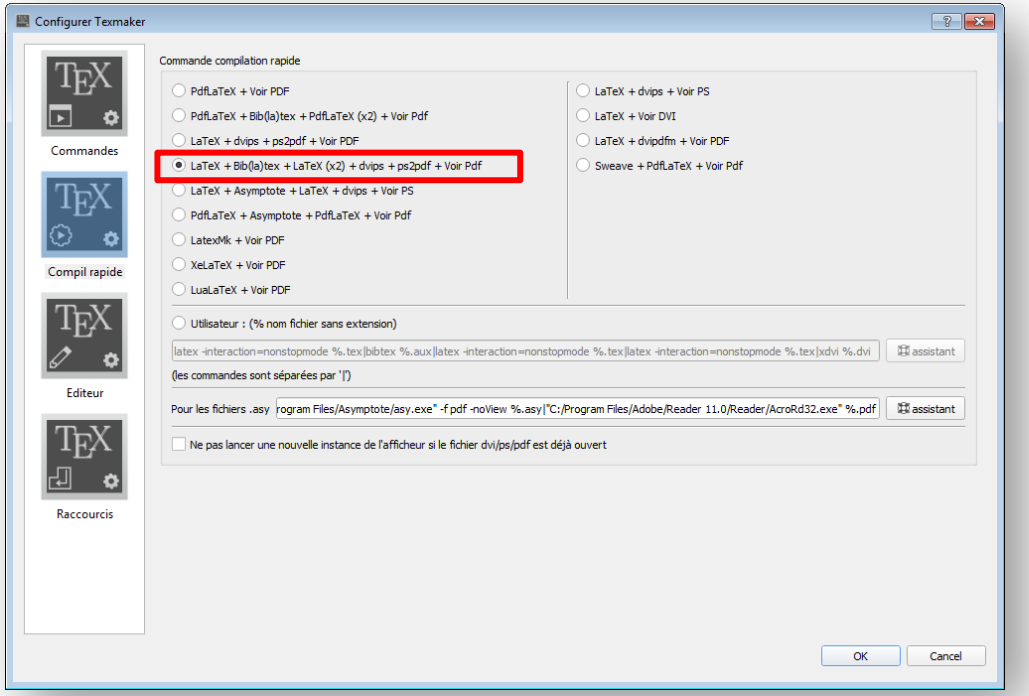
- No need to take care of the order of the entries in the BibTeX file, the citations in your bibliography will be sorted automatically.

The compilation process with BibTeX

For the command line:

```
user@localhost ~]$ latex manuscript
...
user@localhost ~]$ bibtex manuscript
...
user@localhost ~]$ latex manuscript
...
user@localhost ~]$ latex manuscript
...
```

For Texmaker:



DRAWBACKS …

… AND ADVANTAGES

Drawbacks

Programming
Patience
Organization

Drawbacks – programming ?!

It is obvious that the first thing about LaTeX is that you need to learn a bit about programming.

If your are not willing to spend some time learning how things are behind the curtains, well forget about LaTeX

Drawbacks – patience ?!

- Because you will not see immediately the result of your work.

Most people spend a lot of time going back and forth between the source file and the PDF file.

- Because you will waste time trying to find that f*****g command your are looking for.

That is the way it is, I wish I could tell you that you will be fluent in LaTeX by the end of the day, and the commands will come to you naturally. Nope. As everybody, and even after years of experience, you will still waste time to look for a particular command to do that particular thing you really need to do.

- Because when you will find that f*****g command it will not work.

And you will need to take time to install the package that contains this precious command that you really need.

- Because the compilation will fail, many time ...

Drawbacks – organization ?!

- To avoid to waste too much time debugging errors during the compilation process.
  The compilation will fail, many times, because of silly mistakes like:

– Forget to use an **\end** command to close a **\begin** command.
– To miss or have an extra symbol: **{**, **[**, **(**
– To miss or have an extra symbol: **}**, **]**, **)**
– To miss or have an extra symbol: **$**
– To miss or have an extra symbol: **&**

Trying to find where the error comes from, will be time consuming, and as much as possible you want to avoid that.

- Keep your working directory clean to know what is going on.

Think about creating sub-directory(ies) to sort and organize everything, it will be easier to find the information you might look for afterwards.

Advantages

If you are not too scared already,
then hope for you there is young TeX awan !

Your ally is the force in LaTeX ,
and a powerful ally it is !

May the force in LaTeX be with you !

Advantages

If you are not too scared already,
then hope for you there is young TeX awan !

Your ally is the force in LaTeX ,
and a powerful ally it is !

May the force in LaTeX be with you !

- **It looks great !**
- **No more journal layout problems !**
- **Cross-referencing and biblio. made easy !**
- **You will save time, a lot of time !**

Any questions ???