what is it not?

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ISGS LATEX Beginner's Morkshop 2016 Session 1 – Basics

Patrick Wolf patrick.wolf@informatik.uni-kl.de

November 25, 2016

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Introduction – TEX and LATEX

Some facts about TEX and LATEX (see [2]):

- TEXa is markup and programming language by Donald Knuth
- Knuth started the development of T_EXin 1977
- TEXis extremly stable
- LATEX can be understood as popular macro of TeX
- 'pronounced either "Lah-tech" or "Lay-tech" [2]



Donald Knuth [1]

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What is LATEX and what is it not?

- Lateral American Street, and the second secon
- Document has to be "programed"
- Multiple tools and programs are required
 - Compiler
 - Editor

What is LaTEX and what is it not?

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Comparison to Office Programs

Office

programs from Microsoft, LibreOffice, etc.

- allow quick writing
- What You See Is What You Get (WYSIWYG)
- easy to adjust appearance of every single letter



¹http://www.lyx.org/

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Comparison to Office Programs

Office

programs from Microsoft, LibreOffice, etc.

- allow quick writing
- What You See Is What You Get (WYSIWYG)
- easy to adjust appearance of every single letter

MT₌X

is not *one* program, but a set of tools.

- many text editors (from simple to powerful)
- document creation is done by a compiler (e.g. pdflatex)
- rudimentary WYSIWYG (with LyX¹)
- forces you to separate content from appearance



¹ http://www.lyx.org/

What is LATEX and what is it not?

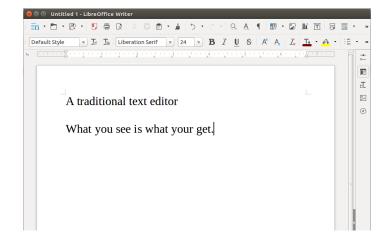
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Comparison – LATEX

Editor

itor PDF-Viewer





Compiler

Augment plbe-/usr/aburs/taller/tesef dist/fons/spez/poblic/mesfons/ca/car/ _ffre-/usr/aburs/tellup/tesef dist/fons/spez/poblic/mesfons/car/ar/ap-/usr/aburs/tellup/tesef dist/fons/spez/poblic/mesfons/car/ass10, pfbe-/usr/a-/usr/aburs/tellup/tesef dist/fons/spez/poblic/mesfons/car/ces10, pfbe-/usr/aburs/tellup/tesef _dist/fons/spez/poblic/mesfons/car/ces9, pfbe-/usr/aburs/tellup/tesef _tesef dist/fons/spez/poblic/mesfons/car/ces9, pfbe-/usr/aburs/tellup/tesef _ts/dosts/pspl/un/cours/ricurs/spez/poblic/mesfons/car/ces9, pfbe-/usr/aburs/tellup/tesef _ts/dosts/pspl/un/cours/ricurs/spez/psp-/usr/aburs/tellup/tesef _ts/dosts/pspl/un/cours/ricurs/spez/psp-/usr/aburs/tellup/tesef _ts/dosts/pspl/un/cours/spez/pspl/un/cours/spez/pspl/un/belvetic/mbrobs-_ts/dosts/pspl/un/car/aburs/tesef-dist/fons/spez/pspl/un/belvetic/mbrobs-_ts/dosts/pspl/un/car/aburs/tesef-dist/dosts/spez/pspl/un/belvetic/mbrobs-_ts/dosts/pspl/un/car/aburs/spez/pspl/un/belvetic/mbrobs-_ts/dosts/pspl/un/belvetic/mbrobs-_pspl/un/car/aburs/spez/pspl/un/belvetic/mbrobs-_pspl/un/belv

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Advantages of LATEX

- Documents always look good
- Automatic generation of table of contents, index of figures, index of keywords, bibliography, section numbers, ...
- Easy typesetting of mathematical formulas, tables, footnotes, . . .
- Referencing of figures, sections, bibliography, ...
- Easy definition of own commands and macros
- Separation of content and style
- Truly cross-platform
- Extensible!

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2. Installation

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Installation – Compiler

A LATEX compiler and editor must be installed:

Compiler

Tex Live (Linux) MiKTeX (Windows) MacTeX (iOS)

package: texlive-full http://www.miktex.org/ http://www.tug.org/

mactex/

Installation

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Macros Micro Typography Installation – Editor

Editor

Kile (Linux)

Texmaker (Linux)

Kile (Windows)

Texmaker (Windows)

Texmaker (iOS)

package: kile

package: texmaker

https://windows.kde.

org/

http://www.heise.de/

download/texmaker.html
http://www.macupdate.

com/app/mac/14641/

texmaker

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Commands and Environments

Commands are always specified using the same syntax:

\command[<optional args>] {<required args>}

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Commands and Environments

Environments

are used to enclose parts of the text:

```
\begin{<environment type>}[...]{...}
\end{<environment type>}
```

- you can have environments for images, citations, formulas, definitions, lists, ...
- they can be nested

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Blocks consist of curly braces enclosing some text:

{...}

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Basic Document

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



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Document with Header

\documentclass{article} \title{Hello World Document} \author{Guy Incognito \and Dame Edna} \begin { document } \maketitle Hello World! \end{document}



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Document with Some Text



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Document Classes

\documentclass[<options>]{<class name>}

book

two-sided; title page; parts, chapters, sections, paragraphs

report

one-sided; title page; chapters, sections, paragraphs

article

one-sided; sections and paragraphs only

letter

for letters

beamer

for slides

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Additional Options

\documentclass[<options>]{<class name>}

- 10pt / 11pt / 12pt
- letterpaper / a4paper / a5paper
- twocolumn, twoside, landscape
- draft

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Basic Document Structure

\documentclass[<options>] {<style>}

preamble: meta information packages macros

```
\begin{document}
  \maketitle
 \tableofcontents
  \chapter{<name>} ...
    \section{<name>} ...
      \subsection{<name>} ...
      \subsection{<name>} ...
    \section{<name>} ...
  \chapter{<name>} ...
\end{document}
```

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Compile commands

Files

- rootfile.tex
- input1.tex
- bibliography.bib

Compile commands

pdflatex <rootfile.tex> bibtex <rootfile.aux> makeindex <rootfile.idx> pdflatex <rootfile.tex> pdflatex <rootfile.tex>

Compile output

rootfile.pdf

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comments %

\textbackslash

<> \textless \textgreater

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comments %

<> \textless \textgreater
 \ \textbackslash

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comments

<> \textless \textgreater \textbackslash

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comments

<> \textless \textgreater \textbackslash

unbreakable space (soft) hyphenation hint \-

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International Characters

LATEX text was historically using ASCII characters

writing international characters using special notation:

this is good for portability

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International Characters

LATEX text was historically using ASCII characters

writing international characters using special notation:

- this is good for portability
- but cumbersome for users not writing in English:

• use \usepackage[utf8] {inputenc} in the preamble for convenient text input (more on packages later)

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Manual Breaks

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Manual Breaks

new paragraph //

//*

page break discouraged

\newpage (not stretching)

page breaks (without float handling)

\pagebreak[] (stretching)

page breaks (with float handling) \clearpage

\cleardoublepage

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Manual Breaks

new paragraph //

page break discouraged

page breaks

(without float handling)

page breaks

(with float handling)

line breaks

\clearpage

*

\newpage (not stretching) \pagebreak[] (stretching)

\cleardoublepage

\newline (not stretching)

\linebreak[] (stretching)

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Manual Breaks

new paragraph //

page break discouraged *

page breaks

\newpage (not stretching)

(without float handling)

\pagebreak[] (stretching)

page breaks (with float handling) \clearpage

\cleardoublepage

line breaks

\newline (not stretching)

\linebreak[] (stretching)

Note

\\ and \clearpage are sufficient for most cases.

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Font Sizes and

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Font Sizes

\tiny tinv scriptsize \scriptsize small \small normalsize \normalsize large \large Large \Large LARGE \LARGE

Note

Font size commands affect all of the following text, to return to the previous size automatically, use blocks:

```
{\small this is a small text}
```

\huae



Font Styles

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Families

Roman Family Sans Serif Family

Typewriter

Family

Series

Medium Series

Bold Face Series

\rmfamily

\sffamily

\ttfamily \texttt{...}

\mdseries

\bfseries \textbf{...}

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Font Styles

Shapes

Upright Shape \upshape

SMALL CAPS \scshape \textsc{...}

Remember

Use sparingly. Just because you *can* change the font size/style doesn't mean you *should*.

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Document Sections

Levels

\part
\chapter
\section
\subsection
\subsubsection
\paragraph
\subparagraph

Chapter 1

Chapter

.1 Section

1.1.1 Subsection

Subsubsection

Paragraph

Subparagraph Text Here!

- you don't have to use every level of hierarchy
- appending an asterisk (*) excludes the section from the table of contents

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Including of Files

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Files

```
document.tex
chapter_1.tex
chapter_2.tex
subfolder/chapter 3.tex
literature.bib
```

Include in document, tex

```
\input{chapter 1}
\input{chapter 2}
\input{subfolder/chapter 3}
```

\bibliography{literature.bib}

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Command

\tableofcontents

```
Contents
I Part
```

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Enumeration

\begin{enumerate}
 \item One
 \item Two
 \item[] Three
 \item Four
\end{enumerate}

- 1 One
- 2 Two
 Three
- 3 Four

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Basic Environments I

Enumeration

\begin{enumerate} \it.em One \it.em Two \item[] Three \item Four

\end{enumerate}

Itemization

\begin{itemize} \item One\linebreak and a half \it.em Two \end{itemize}

One

2 Two Three

G Four

One and a half

Two

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Basic Environments II

Description

\begin{description} \item[First Item] Explanation of 1st item \item[Second Item] Explanation of 2nd item \item[Third Item] You get the idea\dots \end{description}

First Item Explanation of 1st item Second Item Explanation of 2nd item Third Item You get the idea...

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Verbatim

\begin{verbatim} ... \end{verbatim}

Using monospaced font for coding examples

Short (inline) version: \verb | text | = text

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Basic Environments III

Verbatim

\begin{verbatim} ... \end{verbatim}

Using monospaced font for coding examples

Short (inline) version: \verb | text | = text

Verse / Quote / Quotation

\begin{quotation} ... \end{quotation}

This is a quotation.
It looks a little bit different than the other text.

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Equation

\begin{equation} ... \end{equation}

$$\lim_{n\to\infty}\frac{1}{n}=0\tag{1}$$

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Tabular

```
\begin{tabular}{crl}
 centered row&right&left\\[2mm]
 another centered row&with more&content\\
          anot.her
                      & row\\
\end{tabular}
```

```
centered row
                             right
                                    left
another centered row
                       with more
                                    content
                          another
        and
                                    row
```

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Figure

\begin{figure}
 \includegraphics{...}
 \caption{Figure}
\end{figure}



Figure: Figure

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end

Basic Environments VII

Algorithm (package: algorithm2e)

```
\begin{algorithm}
\ForEach{Task $i$} {
  Calculate Cost($i$)\;
  \left\{ Cost(\$i\$) \$ \right\} \left\{ Cost(\$a\$) \right\} 
     a = i :
\end{algorithm}
foreach Task i do
    Calculate Cost(i);
    if Cost(i) < Cost(a) then
        a = i:
```

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Labels & References

\footnote{...} creates a footnote²

• \footnote{...} creates a footnote² Referring to other elements of your text

\label{<labelname>}

\ref{<labelname>}, e.g. 3.6 (section number)

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\pageref{<labelname>}, e.g. 22 (page number)

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Labels & References

• \footnote{...} creates a footnote²

Referring to other elements of your text

\label{<labelname>}

\ref{<labelname>}, e.g. 3.6 (section number)

\pageref{<labelname>}, e.g. 22 (page number)

 Labels are counted separately for different environments (figures, tables, sections, ...)

Recommended conventions for label name prefixes

sec: for sections, etc...

eq: for equations/formulas

fig: for images

. . .



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Bibliography

\bibliography{<filename>}

BibTeX entry

```
in a file <filename>.bib
```

```
@Book {Lamport94,
  author = {Leslie Lamport},
  title
            = {LaTeX: A document preparation
        system: User's quide and reference },
 publisher = {Addison-Wesley},
            = \{1994\}
 year
```

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\cite{Lamport94}

yields e.g. [Lamport 94] or [1] (depending on style)

\nocite{Lamport94}
\nocite{**}

Bibliography style

\bibliographystyle{<style>}

- ada
- plain
- . .

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Commands

add in preamble \usepackage{makeidx} \makeindex

% add in body This is a key\index{key} and this is a sub-key\index{key!sub-key} \newpage and a bold key number \index{key|textbf}

\printindex

Index

key, 6, 7 sub-key 6

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Own Commands and Macros

Defining a new command is very easy:

\newcommand{\face}{:o)}

³ftp://ftp.fu-berlin.de/tex/CTAN/macros/latex/ contrib/todonotes/todonotes.pdf () () () () ()

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Own Commands and Macros

Defining a new command is very easy:

```
\newcommand{\face}{:o)}
```

- Now you can call \face to make a :o) appear
- Very useful e.g. for defining a \TODO marker:

```
\newcommand{\TODO}[1]
     {\textbf{TODO --- #1 --- TODO}}
```

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    {\textbf{TODO --- #1 --- TODO}}
```

• \TODO{find more examples}

TODO — find more examples! — TODO

(Hint: for TODOs have a look a the package todonotes³)

³ftp://ftp.fu-berlin.de/tex/CTAN/macros/latex/
contrib/todonotes/todonotes.pdf ←□→←♂→←毫→←毫→ € ◆○へ○

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Items sorted in ascending order by subtlety...

Set variables in math mode⁴

a, b, c

⁴we will have much fun with math mode in session 2

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a, b, c

there are 4 types of dashes:

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$$a\$$
, $b\$, $c\$

there are 4 types of dashes:

 Use non-breakable spaces between words and numbers

Figure
$$\sim \ref{\dots} \rightarrow Figure 1$$

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Hints for Micro Typography

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- Set variables in math mode⁴ a, b, c
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- Use non-breakable spaces between words and numbers

Figure $\sim \ref{\dots} \rightarrow Figure 1$

 Half space between number and unit 3\, cm → 3 cm instead of 3cm or 3 cm (even nicer: \unit and \unitfrac)

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Figure $\sim \ref{\dots} \rightarrow Figure 1$

- Half space between number and unit $3 \setminus$, cm \rightarrow 3 cm instead of 3cm or 3 cm (even nicer: \unit and \unitfrac)
- "Normal" space after abbreviations (when a period does not end a sentence) $e.\,q.\$ a duck $\rightarrow e.q.$ a duck

⁴we will have much fun with math mode in session 2 ⋅ ₹ → ⋅ ₹ → ⋅ ₹ → ∞ < ∾

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Thank you for your attention!

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Time for questions!

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