LaTeX Workshop

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LaTeX

- A document typesetting system –

- Open Source software

    ◇ available Windows, Unix/Linux, Mac,

- high-quality: camera-ready output

- can produce a number of different outputs PostScript, PDF, HTML, etc

- there exists packages that support thesis, music, chemistry,....

Benefits of LaTeX

- Excellent for producing thesis quality, journal article, conference paper

- can produce books and online content (HTML, PDF)

- Standard styles (such as IEEE) available

- High quality results with little effort

- trivial to modify article from one style to another (see experiment)

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How does it work? What do you need?

- Authors write documents – require editor turn extensions on in your computer

- Run a LATEXprocessor to produce a device-independent file (dvi) or run `pdflatex` to produce a `pdf` or run `xelatex` to produce `pdf` (when using images that are `.eps`)

- for a dvi file use a previewer like YAP to view the dvi file

- Edit, Process, Preview cycle during production

- **what do we need? editor....textpad, notepad, emacs, VI editor, crimson editor,texworks...**

- to `pdflatex` use texworks or...
    - open command window, change the directory to folder containing file
  `cd C:\Documents and Settings\bk\Desktop\latex_work`
  execute the `pdflatex   file_name` command

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Where to get it

Miktex http://miktex.org/

to download http://miktex.org/download

download installer

run

will download latex, ...

also texworks a editor, latex builder, etc

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What does "tex" look like? (from wikipedia)

```
\documentclass[12pt]{article}
\usepackage{amsmath}
\title{\LaTeX}
\date{}
\begin{document}
  \maketitle
  \LaTeX{} is a document preparation system for the \TeX{}
  typesetting program. It offers programmable desktop publishing
  features and extensive facilities for automating most aspects of
  typesetting and desktop publishing, including numbering and
  cross-referencing, tables and figures, page layout, bibliographies,
  and much more. \LaTeX{} was originally written in 1984 by Leslie
  Lamport and has become the dominant method for using \TeX; few
  people write in plain \TeX{} anymore. The current version is
  \LaTeXe.

  % This is a comment, it is not shown in the final output.
   The following shows a little of the typesetting power of LaTeX
  \begin{align}
    E &= mc^2      \\
    m &= \frac{m_0}{\sqrt{1-\frac{v^2}{c^2}}}
  \end{align}
\end{document}
```

LaTeX is designed to separate content from presentation

The author should focus on the text and structure

Layout, fonts and presentation determined by style

De facto standard for many disciplines in academia

Also gaining acceptance in publishing houses Computer Science, Engineering, Physics, Mathematics all have very demanding typesetting requirements

LaTeX allows publishers to provide style file and produce high-quality consistent results for conferences, journals, etc.

Many commands are followed by arguments

```
\command{argument}
```

```
\section*{My first document}
\url{http://www.silmaril.ie/downloads/}
```

Defining the Document

LATEX needs the document to be defined in order to properly process the document. This is the first item defined in a LaTeX document and it's defined with the command

```
\documentclass[options]{class}.
```

Document Classes

article: for conference and other presentations, short reports, anything written that's relatively small and less formatted (around 1-20 pages, no chapter breaks)

report: for longer works containing several chapters, small books, PhD dissertations, Master's theses book for real books

seminar: for slides.

10pt, 11pt, 12pt: This sets the size of the main font in the document. If no option is specified, 10pt is assumed.

letterpaper, legalpaper: This defines the paper size. The default size is letterpaper. a5paper, b5paper, executivepaper, and legalpaper can be specified.

fleqn: This is used for papers with mathematical formulae. This typesets displayed formulae left-aligned instead of centred. leqno Places the numbering of formulae on the left hand side instead of the right.

titlepage, notitlepage: This specifies whether a new page should be started after the document title or not. The article class does not start a new page by default, while report and book do.

onecolumn, twocolumn: This tells LaTeX to typeset the document in one column or two columns and is used most often for specific typesetting needs.

twoside, oneside: This specifies whether double or single sided output should be generated. The classes article and report are single sided and the book class is double sided by default. Note that this option concerns the style of the document only. The option twoside does not tell the printer you use that it should actually make a two-sided printout.

landscape: This changes the layout of the document to print in landscape mode.

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openright, openany: This makes chapters begin either only on right hand pages or on the next page available. This does not work with the article class, as it does not know about chapters. The report class by default starts chapters on the next page available and the book class starts them on right hand pages.

Page Styles

LATEX supports three predefined header/footer combinations, which are often called page styles. The style parameter of the command defines which one to use. The command to call a page style is:

```
\pagestyle{style}
```

The predefined page styles are:

plain: This prints the page numbers on the bottom of the page, in the middle of the footer. This is the default page style.

headings: This prints the current chapter heading and the page number in the header on each page, while the footer remains empty. (This is the style used in this document)

empty: This sets both the header and the footer to be empty.

LATEX preamble

```
\documentclass[12pt]{article}
\usepackage{url,graphicx,amsmath}
\begin{document}
```

your text will lie between `\begin{document}` and `\end{document}`

for every `\begin{..}` there should be a `\end{...}`

```
\documentclass[12pt]{article}
\usepackage{palatino,url}
\begin{document}
\section*{My first document}
This is a short example of a \LaTeX\ document
I wrote on \today. It shows a few simple features
of automated typesetting, including

\begin{itemize}
\item setting the default font to 12pt;
\item specifing 'article' type formatting;
\item using the palatino typeface;
\item adding special formatting for URLs;
\item formatting a deading in 'section' style;
\item using the \LaTeX\ logo;
\item generating today's date;
\item centering and italicizing;
\item autonumbering the pages.
\end{itemize}

\subsection*{More information}

This example was taken from 'Formatting Information,'
which you can download from \url{http://www.silmaril.ie/downloads/}
and use as a teach-yourself guide.

\clearpage

\begin{center}
```

```
\itshape Have a nice day!
\end{center}

\end{document}
```

My first document

This is a short example of a LATEX document I wrote on February 16, 2015. It shows a few simple features of automated typesetting, including

- setting the default font to 12pt;

- specifing 'article' type formatting;

- using the palatino typeface;

- adding special formatting for URLs;

- formatting a deading in 'section' style;

- using the LATEX logo;

- generating today's date;

- centering and italicizing;

- autonumbering the pages.

More information

This example was taken from 'Formatting Information,' which you can download from <http://www.silmaril.ie/downloads/> and use as a teach-yourself guide.

Have a nice day!

Symbols

- Extensive symbol libraries available

Graphics

- Import: photos, graphs, diagrams, charts, etc.

- Generate: diagrams, figures, etc.

- Formats: many common image formats supported

Bibliography

- BibTeX is a textual database of references

- Bibliographies are generated for each document

- Citation style determined by bib style

- EndNote can export to BibTeX

- Online citation databases provide BibTeX references

Transparencies

SKIP

- This presentation was produced with LaTeX and seminar packages

- Easily produce slides

- Generate for online viewing or printing to transparencies

- Various styles available

- Customize layout, fonts, colors, etc

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Output

LaTeX can generate a variety of output formats

DVI: device independent (preview, print, convert)

HTML: produce online books and articles

PostScript: for printing

PDF: online display, presentations, exchange

Links

To download LATEXfor the PC/Windows

```
http://miktex.org/
```

Purdue Thesis Class

```
https://engineering.purdue.edu/~mark/puthesis/
```

Quick introduction

- there are a number of reserved symbols

- `$`

  the $ initiates math mode, the $ terminates math mode

  example

```
my favorite function is
$f(x) =\log x +\cos 2\theta +\frac{x-2}{2x+1}$
```

output is

my favorite function is $f(x) = \log x + \cos 2\theta + \frac{x-2}{2x+1}$

- A paragraph is created by inserting a blank line (a single blank line cause a new paragraph, there is no additional effect by having more than one blank line

  - % will comment out all content on the line to the right of %

  - \\ starts a new line, this has a difference between starting a paragraph

  - empty line starts a new paragraph

- multiple empty lines are equivalent to one empty line,

α	`\alpha`	θ	`\theta`	o	`o`	τ	`\tau`
β	`\beta`	ϑ	`\vartheta`	π	`\pi`	υ	`\upsilon`
γ	`\gamma`	γ	`\gamma`	ϖ	`\varpi`	ϕ	`\phi`
δ	`\delta`	κ	`\kappa`	ρ	`\rho`	φ	`\varphi`
ϵ	`\epsilon`	λ	`\lambda`	ϱ	`\varrho`	χ	`\chi`
ε	`\varepsilon`	μ	`\mu`	σ	`\sigma`	ψ	`\psi`
ζ	`\zeta`	ν	`\nu`	ς	`\varsigma`	ω	`\omega`
η	`\eta`	ξ	`\xi`				
Γ	`\Gamma`	Λ	`\Lambda`	Σ	`\Sigma`	Ψ	`\Psi`
Δ	`\Delta`	Ξ	`\Xi`	Υ	`\Upsilon`	Ω	`\Omega`
Θ	`\Theta`	Π	`\Pi`	Φ	`\Phi`		

Table 1: Greek Letters

$\pm$	`\pm`	$\cap$	`\cap`	$\diamond$	`\diamond`	$\oplus$	`\oplus`
$\mp$	`\mp`	$\cup$	`\cup`	$\triangle$	`\bigtriangleup`	$\ominus$	`\ominus`
$\times$	`\times`	$\uplus$	`\uplus`	$\triangledown$	`\bigtriangledown`	$\otimes$	`\otimes`
$\div$	`\div`	$\sqcap$	`\sqcap`	$\triangleleft$	`\triangleleft`	$\oslash$	`\oslash`
$\ast$	`\ast`	$\sqcup$	`\sqcup`	$\triangleright$	`\triangleright`	$\odot$	`\odot`
$\star$	`\star`	$\vee$	`\vee`	$\lhd$	`\lhd`^{b}	$\bigcirc$	`\bigcirc`
$\circ$	`\circ`	$\wedge$	`\wedge`	$\rhd$	`\rhd`^{b}	$\dagger$	`\dagger`
$\bullet$	`\bullet`	$\setminus$	`\setminus`	$\unlhd$	`\unlhd`^{b}	$\ddagger$	`\ddagger`
$\cdot$	`\cdot`	$\wr$	`\wr`	$\unrhd$	`\unrhd`^{b}	$\amalg$	`\amalg`
$+$	`+`	$-$	`-`				

^{b} Not predefined in a format based on `basefont.tex`. Use one of the style options
`oldlfont`, `newlfont`, `amsfonts` or `amssymb`.

Table 2: Binary Operation Symbols

$\leq$	`\leq`	$\geq$	`\geq`	$\equiv$	`\equiv`	$\models$	`\models`
$\prec$	`\prec`	$\succ$	`\succ`	$\sim$	`\sim`	$\perp$	`\perp`
$\preceq$	`\preceq`	$\succeq$	`\succeq`	$\simeq$	`\simeq`	$\mid$	`\mid`
$\ll$	`\ll`	$\gg$	`\gg`	$\asymp$	`\asymp`	$\parallel$	`\parallel`
$\subset$	`\subset`	$\supset$	`\supset`	$\approx$	`\approx`	$\bowtie$	`\bowtie`
$\subseteq$	`\subseteq`	$\supseteq$	`\supseteq`	$\cong$	`\cong`	$\bowtie$	`\Join`^{b}
$\sqsubset$	`\sqsubset`^{b}	$\sqsupset$	`\sqsupset`^{b}	$\neq$	`\neq`	$\smile$	`\smile`
$\sqsubseteq$	`\sqsubseteq`	$\sqsupseteq$	`\sqsupseteq`	$\doteq$	`\doteq`	$\frown$	`\frown`
$\in$	`\in`	$\ni$	`\ni`	$\propto$	`\propto`	$=$	`=`
$\vdash$	`\vdash`	$\dashv$	`\dashv`	$<$	`<`	$>$	`>`
$:$	`:`						

^{b} Not predefined in a format based on `basefont.tex`. Use one of the style options
`oldlfont`, `newlfont`, `amsfonts` or `amssymb`.

Table 3: Relation Symbols

| , | , | ; | ; | : | \colon | . | \ldotp | · | \cdotp |

<div align="center">Table 4: Punctuation Symbols</div>

←	\leftarrow	⟵	\longleftarrow	↑	\uparrow
⇐	\Leftarrow	⟸	\Longleftarrow	⇑	\Uparrow
→	\rightarrow	⟶	\longrightarrow	↓	\downarrow
⇒	\Rightarrow	⟹	\Longrightarrow	⇓	\Downarrow
↔	\leftrightarrow	⟷	\longleftrightarrow	↕	\updownarrow
⇔	\Leftrightarrow	⟺	\Longleftrightarrow	⇕	\Updownarrow
↦	\mapsto	⟼	\longmapsto	↗	\nearrow
↩	\hookleftarrow	↪	\hookrightarrow	↘	\searrow
↼	\leftharpoonup	⇀	\rightharpoonup	↙	\swarrow
↽	\leftharpoondown	⇁	\rightharpoondown	↖	\nwarrow
⇌	\rightleftharpoons	⇝	\leadsto[b]		

[b] Not predefined in a format based on `basefont.tex`. Use one of the style options `oldlfont`, `newlfont`, `amsfonts` or `amssymb`.

<div align="center">Table 5: Arrow Symbols</div>

...	`\ldots`	$\cdots$	`\cdots`	$\vdots$	`\vdots`	$\ddots$	`\ddots`
$\aleph$	`\aleph`	$\prime$	`\prime`	$\forall$	`\forall`	∞	`\infty`
$\hbar$	`\hbar`	$\emptyset$	`\emptyset`	$\exists$	`\exists`	$\Box$	`\Box`^{b}
$\imath$	`\imath`	∇	`\nabla`	$\neg$	`\neg`	$\Diamond$	`\Diamond`^{b}
$\jmath$	`\jmath`	$\surd$	`\surd`	$\flat$	`\flat`	$\triangle$	`\triangle`
ℓ	`\ell`	$\top$	`\top`	$\natural$	`\natural`	$\clubsuit$	`\clubsuit`
$\wp$	`\wp`	$\bot$	`\bot`	$\sharp$	`\sharp`	$\diamondsuit$	`\diamondsuit`
$\Re$	`\Re`	$\|$	`|`	$\backslash$	`\backslash`	$\heartsuit$	`\heartsuit`
$\Im$	`\Im`	$\angle$	`\angle`	∂	`\partial`	$\spadesuit$	`\spadesuit`
$\mho$	`\mho`^{b}	.	`.`	$\mid$	`|`		

^{b} Not predefined in a format based on `basefont.tex`. Use one of the style options
`oldlfont`, `newlfont`, `amsfonts` or `amssymb`.

Table 6: Miscellaneous Symbols

$\sum$	\sum	$\bigcap$	\bigcap	$\odot$	\bigodot		
$\prod$	\prod	$\bigcup$	\bigcup	$\otimes$	\bigotimes		
$\coprod$	\coprod	$\bigsqcup$	\bigsqcup	$\oplus$	\bigoplus		
$\int$	\int	$\bigvee$	\bigvee	$\biguplus$	\biguplus		
$\oint$	\oint	$\bigwedge$	\bigwedge				

Table 7: Variable-sized Symbols

\arccos	\cos	\csc	\exp	\ker	\limsup	\min	\sinh
\arcsin	\cosh	\deg	\gcd	\lg	\ln	\Pr	\sup
\arctan	\cot	\det	\hom	\lim	\log	\sec	\tan
\arg	\coth	\dim	\inf	\liminf	\max	\sin	\tanh

Table 8: Log-like Symbols

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(	(	)	)	↑	\uparrow	⇑	\Uparrow
[	[	]	]	↓	\downarrow	⇓	\Downarrow
{	\{	}	\}	↕	\updownarrow	⇕	\Updownarrow
⌊	\lfloor	⌋	\rfloor	⌈	\lceil	⌉	\rceil
⟨	\langle	⟩	\rangle	/	/	\	\backslash
|	|	‖	|

Table 9: Delimiters

⎱	\rmoustache	⎰	\lmoustache	⎭	\rgroup	⎰	\lgroup
|	\arrowvert	‖	\Arrowvert	⎮	\bracevert

Table 10: Large Delimiters

$\hat{a}$	`\hat{a}`	$\acute{a}$	`\acute{a}`	$\bar{a}$	`\bar{a}`	$\dot{a}$	`\dot{a}`	$\breve{a}$	`\breve{a}`
$\check{a}$	`\check{a}`	$\grave{a}$	`\grave{a}`	$\vec{a}$	`\vec{a}`	$\ddot{a}$	`\ddot{a}`	$\tilde{a}$	`\tilde{a}`

<div align="center">Table 11: Math mode accents</div>

$\widetilde{abc}$	`\widetilde{abc}`	$\widehat{abc}$	`\widehat{abc}`
$\overleftarrow{abc}$	`\overleftarrow{abc}`	$\overrightarrow{abc}$	`\overrightarrow{abc}`
$\overline{abc}$	`\overline{abc}`	$\underline{abc}$	`\underline{abc}`
$\overbrace{abc}$	`\overbrace{abc}`	$\underbrace{abc}$	`\underbrace{abc}`
$\sqrt{abc}$	`\sqrt{abc}`	$\sqrt[n]{abc}$	`\sqrt[n]{abc}`
f'	`f'`	$\frac{abc}{xyz}$	`\frac{abc}{xyz}`

<div align="center">Table 12: Some other constructions</div>