

Introduction to LaTeX

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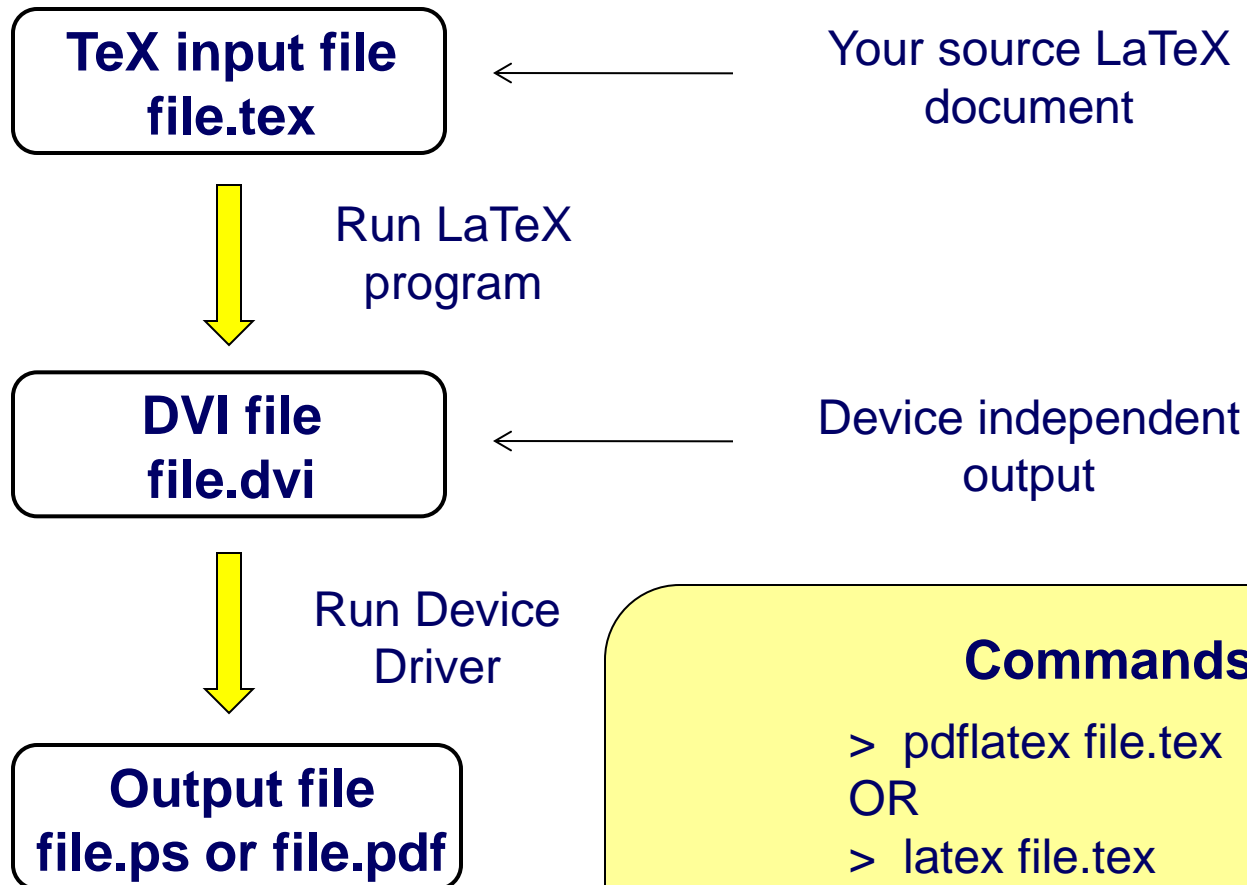
LaTeX

- TeX is essentially a Markup Language (like HTML, CSS, JSON, XML and RTF)
- TeX written by Donald Knuth in 70's
 - A revolution in typesetting
- LaTeX is an extension of TeX
 - Macro packages to make TeX easier to use

LaTeX

- High typeset quality
- Easy to include math formulas
- Latex is free
- Source file format is not bounded to a particular OS or platform
 - Latex implementations exists for all platforms (Windows *MikTeX*, Mac OsX, Linux)
 - Web, e.g., <https://www.sharelatex.com>

Process to Create a Document Using LaTeX



Commands

- > pdflatex file.tex
- OR
- > latex file.tex
- > dvips file.dvi
- > ps2pdf file.ps

How to Setup LaTeX for Windows

- Download and install MikTeX

<http://www.miktex.org> (also comes with a good editor)

- Install Ghostscript and Gsview

<http://pages.cs.wisc.edu/~ghost>

- Install Acrobat Reader

- For Mac Users: TeXShop, iTeXMac, Texmaker

LaTeX in the Cloud

- Make a free account at [Sharelatex.com](https://www.sharelatex.com)
- it also lets you save your latex sources in your Google Drive or Dropbox

LaTeX

- Start with a skeleton document:

```
\documentclass{article}
```

```
\begin{document}
```

First document. This is a simple example, with no extra parameters or packages included.

```
\end{document}
```

- The first line of code declares the type of document, in this case is a *article*.
- Then enclosed in the `\begin{document}` `\end{document}` tags you must write the text of your document.

LaTeX

- The preamble of a document lets you define the type of document you are writing, the language, the size of font

```
\documentclass{article}
```

```
\title{Simple Example}
```

```
\author{Paul Fodor}
```

```
\date{January 2016}
```

```
\begin{document}
```

```
\maketitle
```

```
Hello world!
```

```
\end{document}
```


LaTeX

- Basic formatting: abstract, paragraphs and newlines:

```
\begin{abstract}
```

This is a simple paragraph at the beginning of the document.

```
\end{abstract}
```

Two newlines start another paragraph.

And I can brake\\ the lines \\and continue in a new line.

LaTeX

- Comments: sometimes it's necessary to add comments to your LATEX code for readability
 - put a % before the comment and LATEX will ignore that text

```
\documentclass{article}
```

```
% HW document
```

```
\begin{document} % Here begins the body of the document
```

LaTeX

- Reserved characters

- The following symbol characters are reserved by LATEX because they introduce a command and have a special meaning

Character	Function	How to print it
#	Macro parameter	<code>\#</code>
\$	Math mode	<code>\\$</code>
%	Comment	<code>\%</code>
^	Superscript (in math mode)	<code>\^{} </code> or <code>\$\textasciicircum\$</code>
&	Separate column entries in tables	<code>\&</code>
_	Subscript (in math mode)	<code>_</code>
{ }	Processing block	<code>\{ \}</code>
~	Unbreakable space, use it whenever you want to leave a space which is unbreakable	<code>\$\textasciitilde\$</code> or <code>\~{ }</code>
\	Starting commands, which extend until the first non-alphanumerical character	<code>\$\textbackslash\$</code> or <code>\$\backslash\$</code>

LaTeX

- LATEX allows two writing modes for mathematical expressions:

- the inline mode: `$ $`, `\(\)`, or `\begin{math} \end{math}`

In physics, the mass-energy equivalence is stated by the equation $E=mc^2$, discovered in 1905 by Albert Einstein.

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- the displayed mode: `\[\]`, `$$ $$`, `\begin{displaymath} \end{displaymath}` or `\begin{equation} \end{equation}`

The mass-energy equivalence is described by the famous equation

$$E=mc^2$$

discovered in 1905 by Albert Einstein.

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LaTeX

- Common maths symbols:

description	code	examples
Greek letters	<code>\alpha \beta \gamma \rho \sigma \delta \epsilon</code>	$\alpha \beta \gamma \rho \sigma \delta \epsilon$
Binary operators	<code>\times \otimes \oplus \cup \cap</code>	$\times \otimes \oplus \cup \cap$
Relation operators	<code>< > \subset \supset \subseteq \supseteq</code>	$< > \subset \supset \subseteq \supseteq$
Others	<code>\int \oint \sum \prod</code>	$\int \oint \sum \prod$

`\[\int\limits_0^1 x^2 + y^2 \, dx \]`

`\[a_1^2 + a_2^2 = a_3^2 \]`

`\[\sum_{i=1}^{\infty} \frac{1}{n^s} = \prod_p \frac{1}{1 - p^{-s}} \]`

$$\int_0^1 x^2 + y^2 \, dx$$

$$a_1^2 + a_2^2 = a_3^2$$

$$\sum_{i=1}^{\infty} \frac{1}{n^s} = \prod_p \frac{1}{1 - p^{-s}}$$

LaTeX

- More examples:

LaTeX markup	Renders as
<code>a_{n_i}</code>	a_{n_i}
<code>\int_{i=1}^n</code>	$\int_{i=1}^n$
<code>\sum_{i=1}^{\infty}</code>	$\sum_{i=1}^{\infty}$
<code>\prod_{i=1}^n</code>	$\prod_{i=1}^n$
<code>\cup_{i=1}^n</code>	$\cup_{i=1}^n$
<code>\cap_{i=1}^n</code>	$\cap_{i=1}^n$
<code>\oint_{i=1}^n</code>	$\oint_{i=1}^n$
<code>\coprod_{i=1}^n</code>	$\coprod_{i=1}^n$

Font size

`\tiny` `\scriptsize` `\footnotesize`

`\small` `\normalsize`

`\large` `\Large`

`\LARGE` `\huge`

`\Huge`

Tabular

- Columns

- `\begin{tabular}{|...|...|}`
- `\end{tabular}`

Two Columns



- Rows

- `&` - Split text into columns
- `\\` - End a row
- `\hline` - Draw line under row
- e.g. `123123 & 34.00\\ \hline`

`l` = automatically adjust size, left justify
`r` = automatically adjust size, right justify
`p` = set size
 e.g `p{4.7cm}`
`c` = centre text

Example of table

```
\begin{tabular}{|l|r|c|} \hline
Date & Price & Size \\ \hline
Yesterday & 5 & big \\ \hline
Today & 3 & small \\ \hline
\end{tabular}
```

Date	Price	Size
Yesterday	5	Big
Today	3	Small

Standard Environments

```
\begin{env_name}  
stuff  
\end{enc_name}
```

Environment name (env_name) can be document, itemize, enumerate, tabular, etc.

```
\begin{itemize}  
  \item The first item  
  \item The second item  
\end{itemize}
```



- The first item
- The second item

```
\begin{enumerate}  
  \item The first item  
  \item The second item  
\end{enumerate}
```



- 1) The first item
- 2) The second item

Figures

You can insert figures in pdf, jpg, eps, and other formats into your document.

```
\begin{figure}
  \centering
  \includegraphics {name of the figure file}
  \caption{Put the caption here}
\end{figure}
```

Multiple figures can be inserted using \subfigure

Cross Referencing

LaTeX generates numbers for Theorem, Equation, Section, Figure and other environments automatically. You can access them with `\label` and `\ref`

```
\section{Introduction} \label{sec:intro}
```

....

In Section `\ref{sec:intro}`, we

Reference and Citation

The `\thebibliography` environment produces a bibliography or reference list. In the article style, this reference list is labeled "References"; in the report style, it is labeled "Bibliography".

```
\begin{thebibliography} {widest-label}
```

```
\bibitem[label]{cite_key}
```

```
...
```

```
\end{thebibliography}
```

widest-label: Text that, when printed, is approximately as wide as the widest item label produces by the `\bibitem` commands.

Bibliography by hand

```
\begin{thebibliography} {}
```

```
\bibitem[Come95]{Come95} Comer,  
D. E., {\it Internetworking with TCP/IP:  
Principles, Protocols and Architecture},  
volume 1, 3rd edition. Prentice-Hall,  
1995.
```

```
\end{thebibliography}
```

Bibliography using Bibtex

- Bibliography information is stored in a *.bib file, in Bibtex format.
- Include chicago package
 - `\usepackage{chicago}`
- Set referencing style
 - `\bibliographystyle{chicago}`
- Create reference section by
 - `\bibliography{bibfile with no extension}`

Bibliography using Bibtex

```
@book{Come95,  
author="D. E. Comer",  
title={Internetworking with TCP/IP: Principles,  
  Protocols and Architecture},  
publisher="Prentice-Hall",  
year=1995,  
volume=1,  
edition="Third"}
```


Bibliography using Bibtex

- Citing references in text
 - `\cite{cuc98}` = (Cuce 1998)
 - `\citeN{cru98}` = Crud (1998)
 - `\shortcite{tom98}` = (Tom, et. al. 1998)
- Creating Bibtex Files
 - Use Emacs with extensions.
 - or copy Bibtex entries from bibliography database.