LaTeX

Or: How to easily produce well-structured documents

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LaTeX?

What it is:

- Typesetting package: Sets the type on a page.
- Handles references/ bibliography
- Handles formulas (Chemical/ Mathematical)
- Handles image layout
- Handles page layout

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What it is not:

- Editor
- Spell-checker
- Graphical environment

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Philosophy

Doing *ONLY ONE* thing, but doing it right

What can you do with it?

For example:

- Write your Thesis
- Write Articles
- Make posters
- Make presentations

How does it work?

Inputs

- File containing the text (.tex)
- Eventual bibliography (.bib)
- Eventual images (.jpg,.pdf,.eps,...)

Outputs

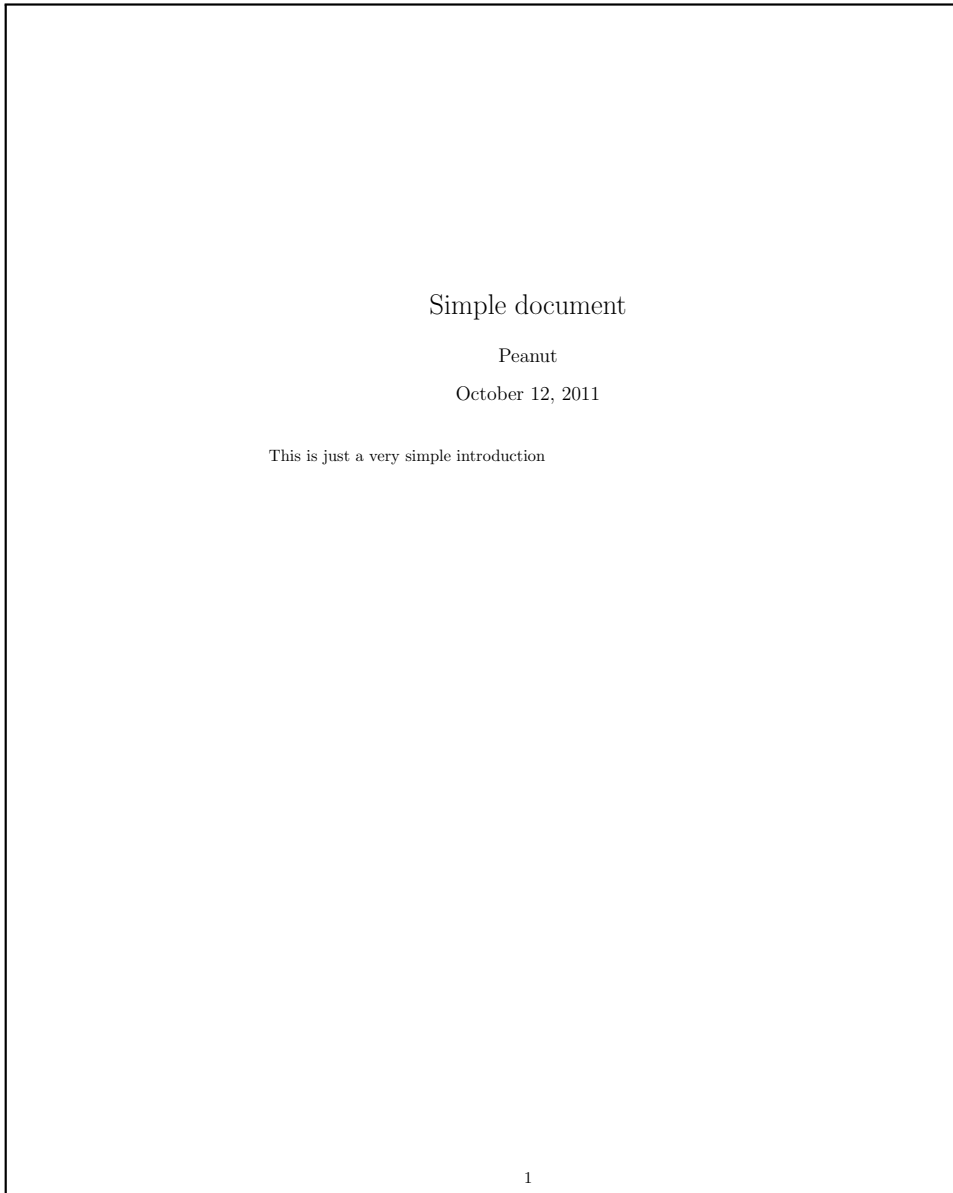
A DVI or PDF file

Most basic output ever

```
\documentclass{article}
\title{Simple document}
\author{Peanut}
\begin{document}
\maketitle

This is just a very simple
introduction

\end{document}
```



Documents have structure

Articles

- Section
- Subsection
- Paragraph

Book

- Chapter

Markup

- `\section{Numbered section title}`
- `\section*{Unnumbered section title}`

Most basic file with sections

```
\documentclass{article}
\title{Simple document}
\author{Peanut}
\begin{document}
\maketitle

This is just a very simple introduction

\section*{Introduction}
Well this would be the introduction to your document
\section{Development}
In here you would go to great lenghts to descibe your work.
\subsection{Detail}
And you would go into more detail. Into subsections.
\subsubsection{Finer detail}
Would be developped in sub-subsections.

\end{document}
```

Most basic output with sections

Simple document

Peanut

October 12, 2011

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Introduction

Well this would be the introduction to your document

1 Development

In here you would go to great lenghts to descibe your work.

1.1 Detail

And you would go into more detail. Into subsections.

1.1.1 Finer detail

Would be developped in sub-subsections.

Fonts can be changed

Markup

- emph{text} $\rightarrow$ *text*
- textbf{text} $\rightarrow$ **text**
- textit{text} $\rightarrow$ *text*

Input file for changing fonts

```
\documentclass{article}
\title{Simple document}
\author{Peanut}
\begin{document}
\maketitle

This is just a very simple introduction

\section*{Introduction}
Well this would be the \emph{introduction} to your document
\section{Development}
In here you \textbf{would} go to great lengths to descibe your work.
\subsection{Detail}
And you would go into more \textit{detail}. Into subsections.
\subsubsection{Finer detail}
Would be developed in sub-subsections.

\end{document}
```

Changing fonts

Simple document

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This is just a very simple introduction

Introduction

Well this would be the *introduction* to your document

1 Development

In here you **would** go to great lengths to descibe your work.

1.1 Detail

And you would go into more *detail*. Into subsections.

1.1.1 Finer detail

Would be developed in sub-subsections.

Handling formulas I

Markup

- All in between two dollar signs $
- **math** environment
- Extensive library of symbols

Example

$\sum_{i=1}^{\infty} P(X_i)$ given by:

```
$ \sum_{i=1}^{\infty}P(X_i)$
```

Handling formulas II

Example

$$\begin{bmatrix} 0 & \cdots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \cdots & 0 \end{bmatrix}$$

given by:

```
\begin{math}
  \begin{bmatrix}
    0 & \cdots & 0 \\
    \vdots & \ddots & \vdots \\
    0 & \cdots & 0
  \end{bmatrix}
\end{math}
```

File structure

Importing other files

- `\input{filename}` pastes the contents of the file.
- Then you can have one file per chapter or section

Including Graphics

Simple graphic

```
\begin{center}
  \includegraphics[width=0.5\textwidth]{keyboard.jpg}
\end{center}
```

Including Graphics

Graphic with caption

```
\begin{figure}[h]
  \centering
  \includegraphics[width=0.4\textwidth]{keyboard.jpg}
  \caption{A picture of a keyboard}
  \label{pic:keyboard}
\end{figure}
```

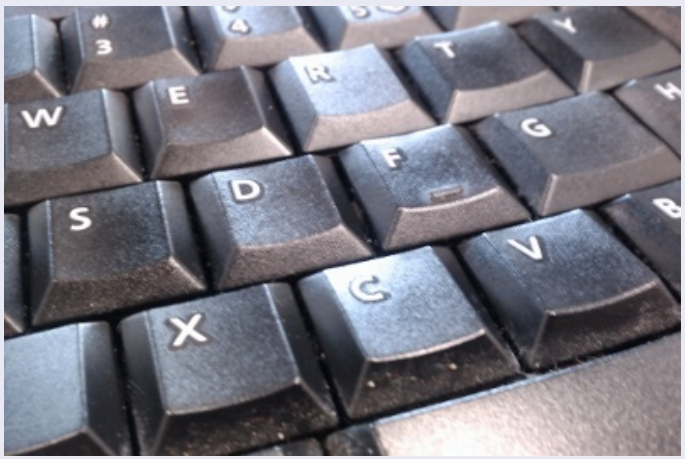


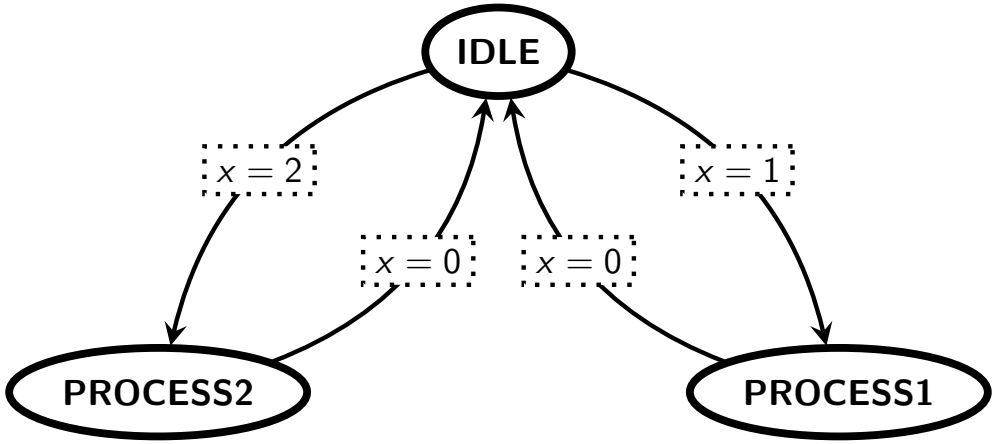
Figure: A picture of a keyboard

How to generate images

LaTeX only takes care of the layout to generate figures you have other tools

- Metapost $\rightarrow$ Generating vectorial graphics
- Tikz $\rightarrow$ Generating pretty vectorial graphics
- gnuplot $\rightarrow$ Generating graphs

Generating graphics with TikZ



TikZ description

```
[Declarations...]
\begin{tikzpicture}[node distance = 30 ex]
 \node[fsmstate] (IDLE) {IDLE};
 \node[fsmstate,below right of = IDLE] (P1) {PROCESS1};
 \node[fsmstate,below left  of = IDLE] (P2) {PROCESS2};

 \draw[arc,bend left ] (IDLE) to node[tr] {$x=1$} (P1);
 \draw[arc,bend right] (IDLE) to node[tr] {$x=2$} (P2);
 \draw[arc,bend left ] (P1)   to node[tr] {$x=0$} (IDLE);
 \draw[arc,bend right] (P2)   to node[tr] {$x=0$} (IDLE);
\end{tikzpicture}
```

Including Tables

Simple Table

```
\begin{tabular}{ l | c | r }
  l    & c    & r   \\ \hline
  11   & 2222 & 3   \\
  4444 & 55   & 666 \\
  7    & 8    & 99  \\
\end{tabular}
```

l	c	r
11	2222	3
4444	55	666
7	8	99

Referencing

First create a label

```
\begin{equation}
 \label{eq:x}
 x = a_0 + b_0
\end{equation}
```

Then use it for referencing

```
As shown in Equation \ref{eq:x}, ...
```

Output

$$x = a_0 + b_0 \tag{1}$$

As shown in Equation 1, ...

Some useful commands

`\tableofcontents`	generates table of content
`\listoffigures`	generates list of figures
`\listoftables`	generates list of tables
`\footnotesize`	small text
`\normalsize`	normal size text

This is cool: But how do I get it?

Linux

- Most distributions have a packages such as **texlive** or **texlive-full**
- All major editors support LaTeX(Syntax highlighting)
- Lyx integrated environment for LaTeX(Should exist as a package)

Mac OS-X

- MacTex.
- MacTex includes texlive, and the TeXShop editor.

Windows

- MikTex
- TexLive (More compatible if you share the tex files)
- TeXNicCenter as an editor

Conclusion

What LaTeX does

- Typesets text and images
- Manages references and bibliography
- Typesets images
- Builds indexes, Table of contents, Tables of figures
- Facilitates a consistent layout
- Integrates well with other tools

What LaTeX does not

- Handle annimations
- Supply a visual environment
- Make coffee in the morning

Learning materials

http://www.utwente.nl/p-nut

- These slides with tex source files
- All examples
- A sample thesis template (Thanks Ana)

On the internet

- Google $\rightarrow$ Large community of users
- http://www.texample.net/
- http://en.wikibooks.org/wiki/LaTeX
- http://en.wikipedia.org/wiki/PGF/TikZ