

# First L<sup>A</sup>T<sub>E</sub>Xsteps

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PvdH

Outline

Hard to start?

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Hello world  
Lets dig into it  
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Floating stuff

Types of floats  
Help, my float floats to much  
Wrapping text  
Mathematics

Advanced stuff

Tables and such

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## First steps

To start using L<sup>A</sup>T<sub>E</sub>X you must invest a little time to get accounted with a few concepts.

- ▶ A document has a structure.
- ▶ The basic structure is the same: preamble or frontmatter and the document proper.
- ▶ In the frontmatter you tell the system what type of document it is (as in book, report, article . . .) and components (as in libraries) you need.
- ▶ In the document proper you type or include or input that what makes up the content of this document.

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# Minimal L<sup>A</sup>T<sub>E</sub>X file

A hello world file with a picture would look like this.

```

1 \documentclass{article}
2 \usepackage{graphicx}
3 \usepackage[pdfTeX]{hyperref}
4 \author{Pieter van den Hombergh, John Doe}
5 \title{Hi folks}
6 \begin{document}
7 \maketitle
8 \tableofcontents
9
10 \section{Hello world}
11 Use a picture.
12
13 \includegraphics[width=.4\textwidth]{../figures/man_waving_2}
14
15 % you can comment too, introduced with the '%' character.
16 \end{document}

```

Hey, you speaker, comment on those numbered lines.

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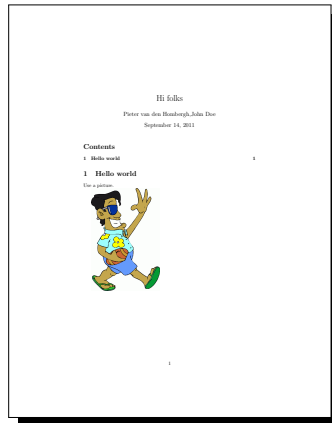
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# Hi, lads and lasses

The resulting document looks like this:



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# Simple no?

As you can see the elementary L<sup>A</sup>T<sub>E</sub>X file is not more complex than the typical html page.

```

<?xml version='1.0' encoding='utf-8' ?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
  "http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml" xml:lang="en" lang="en">
  <head>
    <title>front page fontysvenlo.org</title>
  </head>
  <body>
    <h1>Hello world</h1>
    Use a picture

    <img src='../figures/man_waving.2.png' alt='man_waving' />
  </body>
</html>

```

You also see that html (and xml) is more verbose.

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## What we already achieved

With this simple example you already get

- ▶ A nicely formatted page, filled out, a style (which you can change) and numbered pages.
- ▶ The content of the file is simple.
- ▶ This can be used to chop up a big problem/project into smaller easier jobs. Great for group work.

This is just one file. In the talk documents as components you saw `input` and `include`. Use

- ▶ use `input` anywhere.
  - ▶ If the file you input is not available, L<sup>A</sup>T<sub>E</sub>X will complain during compilation.
  - ▶ `input` can be nested.
- ▶ use `include` when to include things like chapters (in books, reports) or sections, even when they do not exists yet.
  - ▶ If the file does not exist T<sub>E</sub>X ignores it.
  - ▶ You can use `includeonly` to select only the chapters you want. E.g. speed up your test compilation with big documents.

## More elementary, Watson

A serious document would have more elements.

Of course you want a table of contents. With clickable<sup>1</sup> entries. And a document title, including author(s) name and so on.

- ▶ Add `title` and `author` in the **preamble**.
- ▶ Then add a `maketitle` command as the first thing after your `begin{document}`
- ▶ What you get is an author and compilation date (in american format 😞)

To add a table of contents, simply say `tableofcontents` and that's it.

To have this clickable in your pdfviewer, add `usepackage[pdfTeX]hyperref` to your preamble.

<sup>1</sup>in your pdf viewer

## Still elementary

Our file now has this contents

```

1 \documentclass{article}
2 \usepackage{graphicx}
3 \usepackage[pdfTeX]{hyperref}
4 \author{Pieter van den Hombergh,\John Doe}
5 \title{Hi lads and lasses}
6 \begin{document}
7 \maketitle
8 \tableofcontents
9
10 \section{Hello world}
11 Use a picture.
12
13 \includegraphics[width=.3\textwidth]{../figures/man_waving_2}
14
15 % you can comment too, introduced with the '%' character.
16 \section{Good bye}
17 Not much to say anymore.
18 \subsection{The end}
19 \subsubsection{Finally}
20 \end{document}

```

so it is still very basic.

## Typical document classes are

- book** For some literary work, a study book etc. Can have [parts](#), [chapters](#), [sections](#) and [subsections](#).
- report** For a typical project document, user manual, requirements document, your bachelors thesis etc. Can have [chapters](#), [sections](#) and [subsections](#).
- article** For smaller documents, e.g. something to include in a larger volume like a collection of articles, a scientific magazine etc. Can have [sections](#) and [subsections](#).
- letter** For even smaller documents, a letter, complete with letter head formatting, subject, addresses of addressee and sender etc. With some effort you can produce professional looking letters from a database. Example: some of you received a letter from SSB.

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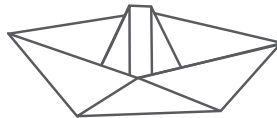
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## Wot? Water in my documentclass?

Relax, only paper ones:



In L<sup>A</sup>T<sub>E</sub>X the concept of floating elements is used. These are elements in your document to illustrate things, like figures (pictures), tables and such.  
 You want these elements to be placed in a optimal position on a page without causing a lot of white areas on the paper. Floats typically also have a [caption](#).

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## Lets give john a boat to play with

And some text too, using the package [lipsum](#) to insert some dummy text to make things look real.

```

10 \begin{figure}
11 \center
12 \includegraphics[width=.6\textwidth]{../figures/paperboat}
13 \caption{My boat design}
14 \end{figure}
15
16 \lipsum[3]

```

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## More control to floats

Floats tend to drift. That is only natural for things that float by their very nature.

First of all, T<sub>E</sub>X uses a algorithm to control where floats will land. It will use the size of the element (picture, table) in this computation. It determines where there is enough place left to “land” a float. Dependend of the aspect ratio of your float, you might want to specify its width or height to fit it in the intended box. If the natural or specified (in the `includegraphics` command options) size, it cannot be landed anywhere and will be postponed to the very end of the document, pushing any following floats towards the end too.

To control a bit more where floats are allowed to land, the float (like `figure`) has an optional argument (in `[]` brackets).

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## More float control

The default for the placement argument is `[tbp]`

- t Top, the top of a page
- b Bottom, the bottom of a page
- p A separate page of floats.

Sometimes you want more control.

- h You tell T<sub>E</sub>X to try **here** too.

if you add the package `usepackage{float}`, you can also use a capital H to have more control. In that case, use it as the *only* placement hint to L<sup>A</sup>T<sub>E</sub>Xlike this:

```
\begin{figure}[H]
```

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## If your figure is small

or just a way to liven up your dull text, you can also wrap text around the picture using `usepackage{wrapfig}` and the place the figure in the text like so:

```

2 \begin{wrapfigure}{r}{0.35\textwidth}
3   \begin{center}
4     \includegraphics[width=0.33\textwidth]{../figures/dumbledore.↵
      jpg}
5   \end{center}
6   \caption{A well known professor}
7 \end{wrapfigure}

```

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## T<sub>E</sub>X is made by a mathematician for mathematicians

Prof. Donald Knuth is a mathematician first and a computer scientist second.

His goal with T<sub>E</sub>X was to produce better layed out mathematics book pages than what was current at that time (1984).

The way you write formulas with a text editor is some what strange but very well readable:

```
\begin{displaymath}
  f(x) = \frac{1}{1+25 x^2}.
\end{displaymath}
```

which looks like:

$$f(x) = \frac{1}{1 + 25x^2}.$$

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## Using real math symbols

Always had problems finding the **all quantor** key. In L<sup>A</sup>T<sub>E</sub>X its easy, provided you can remember the english name.

For instance the following

```
\[
  \forall x \in X, \quad \exists y \leq \epsilon
\]
```

produces this output:

$$\forall x \in X, \quad \exists y \leq \epsilon$$

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## Often you need tables

The easy way: use a spreadsheet, define the table there, output to pdf (open or libre office have pdf export built in), trim the resulting page with **pdfcrop** and include the cropped output in the proper environment. Like so:

```
\begin{table}[H]
  \caption{My drinking habits%}
  \footnote{Of course those are not my real drinking habits.}
}
\includegraphics[height=20mm]{booze-crop.pdf}
\end{table}
```

Table : My drinking habits<sup>2</sup>

Type	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Water	1					1	
Coffee	6	4	4	5	3	3	2
Beer	1	1	1	1	1	1	
Wine				1		1	1

<sup>2</sup>Of course those are not my real drinking habits.

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# The L<sup>A</sup>T<sub>E</sub>X way

You can define your tables completely in L<sup>A</sup>T<sub>E</sub>X, it is simple enough, but you quickly loose oversight with wide tables. Actually the same thing you see in html when you have to format a table by hand.  
Here is the same table<sup>3</sup> in L<sup>A</sup>T<sub>E</sub>X.

```
}
\begin{tabular}{|c|c|c|c|c|c|c|c|}\hline %
Type & Mon & Tue & Wed & Thu & Fri & Sat & Sun \\\hline
coffee & 6 & 4 & 4 & 5 & 3 & 2 & 2 \\\hline
Beer & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\\hline
Wine & & & & 1 & & 1 & 1 \\\hline
\end{tabular}
```

Table : My drinking habits<sup>4</sup>

Type	Mon	Tue	Wed	Thu	Fri	Sat	Sun
coffee	6	4	4	5	3	2	2
Beer	1	1	1	1	1	1	1
Wine				1		1	1

<sup>3</sup>leaving formatting and color out

<sup>4</sup>Of course those are not my real drinking habits.

# Figures and tables are same?

You might have noticed that tables and figures behave the same in L<sup>A</sup>T<sub>E</sub>X. In fact these elements are floating environment which define the way they are placed and format their caption.

The content of either is up to you.

You can also use other float types such as code snippets (examples).

Each float can also occur in a list or table of contents of its own, so you may have a list of figures, a list of tables etc in you document. You may place these list anywhere you want by typically and the front or back of the main document.

# In a proper report you reference your sources

- ▶ Bibtex is the standard way to do that with L<sup>A</sup>T<sub>E</sub>X.
- ▶ Inside document you reference to a resource with the `cite` command.
- ▶ Bibtex use another file format to store its info on the resources (books, articles, website), but is normally edited with a text editor.
- ▶ There are graphical tools to ease this editing. JabRef is a Java implementation running on all platforms.
- ▶ You can find lots of resources on the Internet in bibtex format.

See example in samples.