

# Introduction to L<sup>A</sup>T<sub>E</sub>X

Edsko de Vries (edsko@edsko.net)

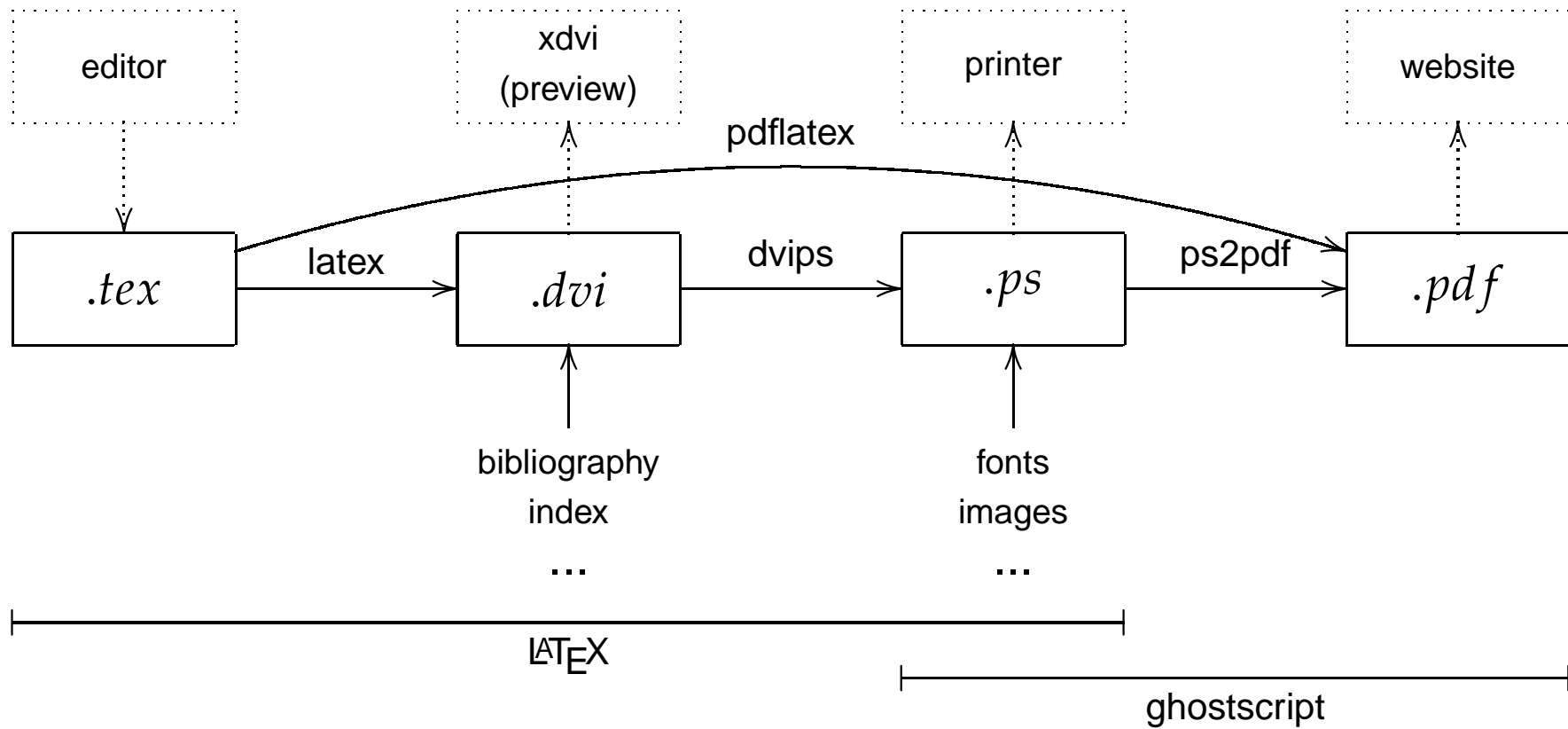
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# Introduction to $\text{\LaTeX}$ : The Basics

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- Linux/Solaris/other UNIX variants

`http://www.tug.org/teTeX`

- Windows

`http://www.miktex.org`

- Ghostscript (any platform)

`http://www.ghostscript.com`

- Specialised L<sup>A</sup>T<sub>E</sub>X packages (e.g., listings)

`http://www.ctan.org`

```
1 \documentclass{article}
2
3 \begin{document}
4 Hello, World
5 \end{document}
```

Other important document classes: report, book, letter.

```
1 \documentclass{report}
2 % This is a comment (ignored)
3 \begin{document}
4
5 \chapter{First Chapter} % Another comment
6 \section{First Section}
7 bla
8 \section{Second Section}
9 more bla
10 \chapter{Second Chapter}
11 final bla
12
13 \end{document}
```

*page 1*

Chapter 1

# First Chapter

## 1.1 First Section

bla

## 1.2 Second Section

more bla

*page 2*

Chapter 2

# Second Chapter

final bla

---

## Table of Contents

---

To get a table of contents of this document, all we do is

```
\tableofcontents
```

L<sup>A</sup>T<sub>E</sub>X will typeset

<b>1</b>	<b>First Chapter</b>	<b>2</b>
1.1	First Section .....	2
1.2	Second Section .....	2
<b>2</b>	<b>Second Chapter</b>	<b>3</b>

```
1 \textrm{roman} \textsf{sans serif} \texttt{typewriter}
2 \textmd{medium} \textbf{bold}
3 \textit{italic} \textsc{small caps} \textsl{slanted}
4
5 {\small
6 \textrm{\textbf{\textit{Roman, Bold, Italic}}}}
7 }
```

roman sans serif typewriter

medium **bold**

*italic* SMALL CAPS *slanted*

***Roman, Bold, Italic***

**Also:** tiny, scriptsize, footnotesize, small, normalsize,  
large, Large, LARGE, huge, Huge

```
1 \begin{itemize}
2 \item First item
3 \item Second item
4 \end{itemize}
```

This yields

- First item
- Second item

Use `\begin{enumerate}` to get a numbered list instead.

It is possible to nest lists.

```

1 \begin{tabular}{lcr}
2 Cell 1.1 & Cell 1.2 & Cell 1.3 \\
3 2.1      & 2.2          & 2.3      \\
4 3.1      & 3.3          & 3.3      \\
5 \end{tabular}

```

Or with a frame

```

1 \begin{tabular}{||l|c|r||} \hline\hline
2 Cell 1.1 & Cell 1.2 & Cell 1.3 \\ \hline
3 2.1      & 2.2      & 2.3      \\ \cline{2-3}
4 3.1      & 3.3      & 3.3      \\ \hline\hline
5 \end{tabular}

```

Cell 1.1    Cell 1.2    Cell 1.3  
 2.1            2.2            2.3  
 3.1            3.3            3.3

Cell 1.1	Cell 1.2	Cell 1.3
2.1	2.2	2.3
3.1	3.3	3.3

- Have a look at the `hhline` package for nicer double vertical lines
- For table cells that span multiple lines:

```
\begin{tabular}{lp{0.8\linewidth}}
```

This defines a table with two columns; the width of the first is calculated from the contents, the width of the second is 80% of the line width. Content in the second column can span multiple lines if necessary.

If you have a very wide table, you can typeset it by itself on a single page, rotated 90°:

```
1 \documentclass{article}
2 \usepackage{lscape}
3
4 \begin{document}
5
6 \begin{landscape}
7 ... some very wide table ...
8 \end{landscape}
9
10 \end{document}
```

---

## Footnotes and Marginal Notes

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This `\footnote{Explanation}` is an example of a footnote and a `\marginpar{Example}` note.

This will typeset to something like

Example	This <sup>1</sup> is an example of a footnote and a marginal note.
	⋮
	<hr/> Explanation

```
1 \chapter{First Chapter}
2 \section{Introduction}
3 \label{sec:Introduction}
4 bla
5
6 \chapter{Second Chapter}
7 In section \ref{sec:Introduction} (on page
8 \pageref{sec:Introduction}), we explained..
```

Will give for chapter 2:

```
In section 1.1 (on page 2), we explained..
```

If running `latex` outputs the warning:

```
LaTeX Warning: Label(s) may have changed.
```

```
Rerun to get cross-references right.
```

Simply run `latex` again until it disappears.

---

## Simple Mathematical Formulae

---

```
1 Identity: $f(x) = x$ or $\lambda x . x$ \\  
2 Division: $$g(x,y) = \frac{x}{y}$$  
3  
4 \begin{equation}  
5 \forall F \in \Lambda, \exists X \in \Lambda .  
6 FX = X \quad \text{(Fixed point theorem)}  
7 \end{equation}
```

Identity:  $f(x) = x$  or  $\lambda x.x$

Division:

$$g(x,y) = \frac{x}{y}$$

$$\forall F \in \Lambda, \exists X \in \Lambda. FX = X \quad \text{(Fixed point theorem)} \quad (1)$$

---

## Simple Mathematical Formulae (ctd.)

---

```
1 \begin{equation}
2 \sum_{n=0}^i \sqrt{n^i}
3 \label{eq:summation}
4 \end{equation}
5
6 In equation \ref{eq:summation}, ...
```

$$\sum_{n=0}^i \sqrt{n^i} \quad (2)$$

In equation 2, ...

This is just the tip of the iceberg; see the  $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\text{T}\mathcal{E}\mathcal{X}$  package (often `amslatex.dvi`) and the symbol overview `symbols.dvi` (including such symbols as  $\pm$ ,  $\forall$ ,  $\dagger$ ,  $\bowtie$ ,  $\emptyset$ ,  $\int$ ,  $\rightarrow$ ,  $\dots$ ) for more information

```
1 \documentclass{article}
2 \usepackage{graphicx}
3
4 \begin{document}
5
6 \includegraphics{image1.eps}
7 \includegraphics[width=2cm]{image2.eps}
8 \includegraphics[width=2cm,height=3cm]{image3.eps}
9
10 \end{document}
```

When using `latex/xdvi/dvips/ps2pdf`:

- Best way: convert image to EPS (Encapsulated PostScript) format
- Can be done with Gimp, ImageMagick, ...
- Also possible to use BMP, but *must* specify *both* width and height of image. Also: `xdvi` cannot display BMP files
- Not possible to use JPG, PNG or GIF format (will get `no BoundingBox` error message)

When using `pdflatex`:

- Convert image to PNG or JPG format
- Not possible to use EPS, GIF or BMP format (will get `Unknown graphics extension error message`)

Note: `\includegraphics{image}` (without extension): let Latex choose which format it wants.

- `latex` will try `image.eps` or otherwise `image.bmp`
- `pdflatex` will try `image.png` or otherwise `image.jpg`

Useful when using both `latex` and `pdflatex`

Note that some graphics programs (`xfig`, `gnuplot`) can export to native Latex format.

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## Typesetting Simple Listings

---

```
\usepackage{listings}
```

```
1 \lstset{basicstyle=\tt,tabsize=3,numbers=left,%  
2     numberstyle=\tiny,showstringspaces=false}  
3  
4 \begin{lstlisting}[language=java]  
5 // The world famous Hello World program  
6  
7 public class HelloWorld {  
8     public static void main(String args[]) {  
9         System.out.println("Hello world");  
10    }  
11 }  
12 \end{lstlisting}
```

---

## Typesetting Simple Listings (ctd.)

---

```
1 // The world famous Hello World program
2
3 public class HelloWorld {
4     public static void main(String args[]) {
5         System.out.println("Hello world");
6     }
7 }
```

See `listings` package for more information.

(Might not be installed; see <http://www.atscire.de>)

- Getting Started with  $\text{\LaTeX}$

`http://www.maths.tcd.ie/~dwilkins/LaTeXPrimer`

- $\text{teTeX}$ : A Documentation Guide

`http://www.math.upenn.edu/tex\_docs/newhelpindex.html`

- $\text{\TeX}$  Frequently Asked Questions

`http://www.tex.ac.uk/cgi-bin/texfaq2html`

- The  $\text{\LaTeX}$  Companion. *Goossens, Mittelbach, Samarin*, Addison-Wesley
- The  $\text{\LaTeX}$  Graphics Companion. *Goossens, Rahtz, Mittelbach*, Addison-Wesley