Introduction to LaTeX

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What is LaTeX?

Donald Knuth was unhappy with the current state of affairs and started developing TeX in the late 1970s to typeset his own books on computer programming.

LaTeX is a document preparation system for TeX written by Leslie Lamport to make it easier to create common documents: books, reports, articles, letters, etc.

Why use LaTeX?

- Underlying document is plain text and TeX/LaTeX hasn't changed significantly in many years
- Separates content from layout
- Easy to handle the document structure: example numbering, cross-references, bibliography, etc.
- Easy to typeset special characters (e.g., IPA) and mathematics
- Many packages exist for linguists (numbered examples, trees, AVMs)
- Produces publication-quality documents

How to Produce a Document

To produce the viewable file `document.dvi` from `document.tex`:

```
% latex document[.tex]
```

To print it:

```
% dvips [-Pcopier200/2d] document[.dvi]
```

To convert it to a postscript file:

```
% dvips -o document.ps document[.dvi]
```

To create a PDF file from `document.tex` instead:

```
% pdflatex document[.tex]
```

How to View a Document

To view a DVI file:

```
% xdvi document[.dvi]
```

To view a PS file:

```
% gv document[.ps]
```

To view a PDF:

```
% xpdf document.pdf
% acroread document.pdf
```

LaTeX Implementations in Various OSs

- Unix/Linux/Mac: teTeX
  - Unix/Linux: use your distribution's package manager
  - Mac: `fink install tetex`
- Windows
  - MiKTeX: http://www.miktex.org/
  - integrated editor: TeXnicCenter http://www.toolscenter.org/

Conventions and Special Characters

- capitalization matters
- commands start with backslash
  `\bf`
- curly braces are used around required arguments
  `\documentclass{article}`
- square brackets are used around optional arguments
  `\documentclass[11pt]{article}`
- % is used to comment out a line
- `{ } $ & _ # %` all have special meanings in various enviroments
  - use a \ in front of them to type them directly
  - `\$ \#`, etc.
- use verbatim (shown later) to use ˆ or ˜
- whitespace doesn't really matter, but a blank line starts a new paragraph

Basic Document Structure

```
\documentclass{article}
\title{Example \LaTeX{} Document}
\author{Adriane Boyd}
\date{\today}
\begin{document}

\maketitle

This shows the default article layout used by \LaTeX.  It
looks like a generic journal article.

\end{document}
```

Sample Document

Example LaTeX Document

Adriane Boyd

January 20, 2007

This shows the default article layout used by LaTeX. It looks like a generic journal article.

Font Face

Short font face
inside braces: `{\it word}`

```
\it italics
\sl slanted
\bf bold
\tt typewriter
\em emphasized
```

Longer font face
outside braces (preferred):
`\textit{word}`

```
\textit italics
\textsl slanted
\textbf bold
\texttt typewrite
\textsf sans-serif
\textsc small caps
\emph emphasized
```

Font Size

Font size
inside braces: `{\large word}`

```
\tiny
\scriptsize
\footnotesize
\small
\normalsize
\large
\Large
\LARGE
\huge
\Huge
```

Font Formatting Examples

`\textit{italics}`	*italics*
`\textbf{bold}`	**bold**
`{\Large Large}`	Large
`{\Huge Huge}`	Huge
`\emph{emph}`	*emph*

Article Structure

- Header/Preamble – everything before `\begin{document}`
  - `\title{Title}`
  - `\author{Author}`
  - `\date{\today}`
- Body – everything between `\begin{document}` and `\end{document}`
  - `\maketitle`
  - `\begin{abstract}`, `\end{abstract}`
  - `\section{Section Heading}`
  - `\subsubsection{Subsection Heading}`
  - `\subsubsubsection{Subsubsubsection Heading}`
  - `\paragraph{Unnumbered Paragraph Heading}`

Article Structure

```
\documentclass{article}
\title{Example \LaTeX{} Document}
\author{Adriane Boyd}
\date{\today}
\begin{document}

\maketitle

\begin{abstract}
This is an abstract.
\end{abstract}
```

Article Structure, cont.

```
\section{Introduction}

This shows the default article layout used by \LaTeX.
It looks like a generic journal article.

\section{Conclusion}

Not much to say.

\end{document}
```

Article Structure Example

Example LaTeX Document

Adriane Boyd

January 20, 2007

Abstract

This is an abstract.

1 Introduction

This shows the default article layout used by LaTeX. It looks like a generic journal article.

2 Conclusion

Not much to say.

Article with Subsections

```
\documentclass{article}
\begin{document}

\section{Introduction}

This shows the default article layout used by \LaTeX.
It looks like a generic journal article.

\subsection{Numbered subsection}

Point A.

\subsection*{Unnumbered subsection}

Point B.

\section{Conclusion}
```

Article with Subsection Example

1 Introduction

This shows the default article layout used by LaTeX. It looks like a generic journal article.

1.1 Numbered subsection

Point A.

Unnumbered subsection

Point B.

2 Conclusion

Not much to say.

Footnotes

```
\documentclass{article}
\begin{document}

\section{Introduction}

This shows the default article layout used by \LaTeX.
It looks like a generic journal\footnote{Insert
the first footnote.} article.

\section{Conclusion}

Not much to say\footnote{Footnote number two.}.

\end{document}
```

Footnotes Example

1 Introduction

This shows the default article layout used by LaTeX. It looks like a generic journal[1] article.

2 Conclusion

Not much to say[2].

[1] Insert the first footnote.
[2] Footnote number two

Verbatim

- single word: `\verb!asdf!`
  `asdf`
- multiple lines:

```
\begin{verbatim}
monospace text
multiple lines
\end{verbatim}
```

Quotes

```
\documentclass{article}
\begin{document}
\section{Introduction}

This shows the default article layout used by \LaTeX.
It looks like a ‘generic’ journal article.

\begin{quote}
‘‘This quote will be indented.’’
\end{quote}

Normal text (with the beginning of the paragraph indented)
continues here.  The next line will show that the beginning
indentation.
```

Quotes Example

1 Introduction

This shows the default article layout used by LaTeX. It looks like a 'generic' journal article.

> "This quote will be indented."

Normal text (with the beginning of the paragraph indented) continues here. The next line will show the paragraph indent.

2 Conclusion

Not much to say.

Itemized Lists

```
\begin{itemize}
\item Item A
\item Item B
  \begin{itemize}
  \item Item C
    \begin{itemize}
    \item Item D
    \item Item E
    \end{itemize}
  \item Item F
  \end{itemize}
\item G
\end{itemize}
```

Itemized List Example

- Item A
- Item B
  - Item C
    - Item D
    - Item E
  - Item F
- Item G

Enumerated Lists

```
\begin{enumerate}
\item Item A
\item Item B
  \begin{enumerate}
  \item Item C
    \begin{enumerate}
    \item Item D
    \item Item E
    \end{enumerate}
  \item Item F
  \end{enumerate}
\item G
\end{enumerate}
```

Enumerated List Example

1. Item A
2. Item B
   (a) Item C
      i. Item D
      ii. Item E
   (b) Item F
3. Item G

Tabular Environment

Basic structure:

- define column layout (l - left, c - center, r - right, p{size} - paragraph)
- use vertical bar for vertical line separating columns
- in each row, & separates two columns
- \\ ends each row
- use `\hline` between rows for a horizontal line

```
\begin{tabular}{|l l|c r|}
\hline
A & B & C & D \\
\hline
longer & words & reveal & justification \\
\hline
\end{tabular}
```

Tabular Example

A	B	C	D
longer	words	reveal	justification

```
\begin{tabular}{|l l|c r|}
\hline
A & B & C & D \\
\hline
longer & words & reveal & justification \\
\hline
\end{tabular}
```

Tables

```
\section{Results}

I present my findings in the following table:

\begin{table}[h!]
\begin{center}
\begin{tabular}{|l l|l l|}
\hline
A & B & C & D \\
\hline
E & F & G & H \\
\hline
\end{tabular}
\end{center}
\label{table:alphabet}
\caption{The alphabet}
\end{table}
```

Tables Example

1 Results

I present my findings in the following table:

A	B	C	D
E	F	G	H

Table 1: The alphabet

Figures, Floats

Figures are similar to tables, except use `\begin{figure}`, `\end{figure}`.

- Tables and figures are called “floats” because they do not necessarily appear in the running text. Usually, you want them at the top of the page or on a separate page if they are large.
- The optional argument after `\begin{table}[]` lets you control where they go.
  - `\begin{table}[h]` – here, in the running text
  - `\begin{table}[t]` – top of the page
  - `\begin{table}[b]` – bottom of the page
  - `\begin{table}[p]` – separate floats page
  - `\begin{table}[tb]` – either at the top or bottom
  - `\begin{table}[t!]` – insist on top placement

Referencing Tables, Figures, and Sections

- use `\label{name}` inside a table, figure, or section to be able to refer to the number elsewhere
- use `\ref{name}` where you want to cite the table, etc.

```
\section{Introduction}
\label{sec:intro}
\begin{figure}
A figure can include anything you want...
\label{fig:asdf}
\caption{ASDF}
\end{figure}

In Section~\ref{sec:intro}, I refer you to Figure~\ref{fig:asdf}.
```

References Example

A figure can include anything you want...

Figure 1: ASDF

1 Introduction

In Section 1, I refer you to Figure 1.

Bibliography

- The tool `bibtex` is used to handle bibliographies.
- A plain text file ending in `.bib` stores all entries.
- Example entry:

```
@inproceedings{dubey-2003,
  title =       {Probabilistic Parsing Using Sister-Head
                 Dependencies},
  author =      {Amit Dubey and Frank Keller},
  booktitle =   {Proceedings of the 41th Annual Meeting of the
                 Association for Computational Linguistics},
  year =        {2003}
}
```

(See http://en.wikipedia.org/wiki/BibTeX for all types of entries.)

Citation, Bibliograph Style

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

Something about sister-head lexicalization in PCFG parsing
of German \cite{dubey-2003}.

\bibliographystyle{apalike}
\bibliography{project}
```

Using BibTeX

In order to gather the needed citations from the document, get the right bibliography entries, insert all the citations, and create the bibliography, you need to run `latex` and `bibtex` on `document.tex` in the following order:

```
% latex document
% bibtex document
% latex document
% latex document
```

Every time you add a citation to a new article, you'll need to repeat this. If you've just added another citation to an article you've already mentioned (or added a new label and reference), you'll just need to run `latex` twice to insert the citation.

Citation Example

1 Introduction

Something about sister-head lexicalization in PCFG parsing of German [Dubey and Keller, 2003].

References

[Dubey and Keller, 2003] Dubey, A. and Keller, F. (2003). Probabilistic parsing using sister-head dependencies. In *Proceedings of the 41th Annual Meeting of the Association for Computational Linguistics*.

For more advanced citation formatting options, check out `natbib`

Frequently Used Layout Options

Use these before `\begin{document}`:

- `\documentclass[11pt,twocolumn]{article}` to change article layout
- `\usepackage{times}` to use Times instead of default font
- `\pagestyle{empty}` to remove page numbers and other headers/footers
- `\usepackage{setspace}` to make double-spacing possible
  - add `\doublespacing` below it in preamble
- `\usepackage{fullpage}` to set up 1 in margins

Alignment

- environments
  - `\begin{center}`
  - `\begin{flushleft}`
  - `\begin{flushright}`
- within preamble or document to change current alignment
  - `\centering`
  - `\raggedright`
  - `\raggedleft`

Controlling Whitespace

It is usually best to let LaTeX do the formatting for you, but you may want to have more control:

- `\\`, `\newline` – new line
- `\pagebreak`, `\newpage` – new page
- `\noindent` – do not indent the current line
- to have paragraphs separated with whitespace instead of using indented paragraphs:

```
\setlength{\parindent}{0ex}
\setlength{\parskip}{1ex}
```

Numbered Examples

`\usepackage{gb4e}` (or Detmar's gb4e+)

```
\begin{exe}
\ex\label{ex:name} My name is Adriane.
\end{exe}
```

(1) My name is Adriane.

Examples and Subexamples with Judgements

```
\begin{exe}
  \ex[]{My name is Adriane.}
  \ex[*]{My name Adriane.}
  \ex\begin{xlist}
        \ex Ich hei\ss e Adriane.
        \ex Engem Adriennek h\'ivnak.
     \end{xlist}
\end{exe}
```

(1) My name is Adriane.

(2) * My name Adriane.

(3) a. Ich heiße Adriane.

b. Engem Adriennek hívnak.

Examples with Glosses and Translations

```
\begin{exe}
  \ex\begin{xlist}
       \ex\gll Ich hei\ss e Adriane. \\
               I {am called} Adriane \\
          \glt ‘My name is Adriane.’
       \ex\gll Engem Adriennek h\’ivnak. \\
               me Adriane {they call} \\
          \glt ‘My name is Adriane.’
     \end{xlist}
\end{exe}
```

Examples with Glosses and Translations

(1) a. Ich heiße Adriane.
I am called Adriane
'My name is Adriane.'

b. Engem Adriennek hívnak.
me Adriane they call
'My name is Adriane.'

Accents

\'a	á
\`a	à
\^a	â
\v{a}	ǎ
\~a	ã
\"a	ä
\H{o}	ő
\'{\i}	í
\aa	å
\ae	æ

To type 8-bit Latin1 characters directly:

```
\usepackage[latin1]{inputenc}
```

IPA

- include TIPA package: `\usepackage{tipa}`

```
[\textsecstress\textepsilon kspl\textschwa
\textprimstress ne\textsci\textesh\textschwa n]
```

[ˌɛksplə'neɪʃən]

```
\textipa{[""Ekspl@"neIS@n]}
```

[ˌɛksplə'neɪʃən]

See full documentation (especially the appendix) at:
http://www.essex.ac.uk/linguistics/clmt/latex4ling/tipa/tipaman.pdf

Including Graphics

- `\usepackage{graphicx}` for `latex`
  `\usepackage[pdftex]{graphicx}` for `pdflatex`
- you can include many types of files: `.ps`, `.eps`, `.pdf`, `.png`
- you can convert files with `convert` from ImageMagick:
  `convert image.jpg image.eps`

```
\includegraphics[width=.3\textwidth]{image.eps}
```

More `includegraphics` Options

- `angle, width, height, scale, trim`

```
\includegraphics[height=1in, angle=45]{image.eps}
```

More Information

- LaTeX for Linguists:
  http://www.essex.ac.uk/linguistics/clmt/latex4ling/
  - styles and packages from autosegmental diagrams to AVMs
- nice LaTeX reference sheet:
  - http://www.stdout.org/~winston/latex/
- longer introductions:
  - http://www.andy-roberts.net/misc/latex/
    http://www.eng.cam.ac.uk/help/tpl/textprocessing/latex_guide.dvi
- to create presentations with LaTeX Beamer:
  http://latex-beamer.sf.net
- as always, google `latex tutorial` or something in that vein and you will find plenty of information