COMP496/901: Academic Presentation and Writing Skills Using LaTeX

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Acknowledgements

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  – Jan-Philipp Söhn
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  – Tobias Oetiker
Agenda

- The Principles of Declarative Formatting
- The Basics of Formatting in LaTeX
- Some Highlights
- LaTeX You Need To Know
Starting Points

- LaTeX is a typesetting system, not a word processor
- It is most suited to producing scientific and mathematical documents of high typographical quality
- The focus is on specifying what your text is, now how it should look: that’s someone else’s job
Author, Book Designer, and Typesetter: The Traditional Model

• The author gives manuscript to a publishing company.
• A book designer from the publishing company decides the layout of the document (column width, fonts, and so on).
• The book designer writes her instructions into the manuscript and gives it to a typesetter.
• The typesetter typesets the book according to these instructions.
Author, Book Designer, and Typesetter: Intelligent Design

• A human book designer tries to find out what the author had in mind when he or she wrote the text.

• She decides on the formatting of chapter headings, citations, examples, formulae, and so on based on her professional knowledge and the contents of the manuscript.
Author, Book Designer, and Typesetter: Using Technology

• LaTeX takes the role of the book designer and uses TeX as its typesetter.
• But LaTeX is only a relatively dumb program, so it needs more guidance.
• The author has to provide additional information which describes the logical structure of her work.
• This information is written into the text in the form of LaTeX commands.
• This is very different from the popular WYSIWYG approach you find in Word and other word processors.
The Pitfalls of Layout Design

- With WYSIWYG systems, authors often generate aesthetically pleasing documents with very little, or inconsistent, structure.
- LaTeX prevents such formatting errors by forcing the author to declare the logical structure of the document.
- LaTeX uses the logical structure to choose the most suitable layout.
- Logical mark-up also improves the portability of documents: journals can use stylesheets to translate the logical mark-up into their in-house layout style.
Some Typographic Issues

- Justification
- Orphans (have a future but no past)
- Widows (have a past but no future)
Advantages of \LaTeX\ over WYSIWYG

- Professionally crafted layouts are available
- The typesetting of mathematical formulae is supported in a convenient way
- Users need only to learn a few simple commands, which specify the logical structure of a document; they almost never need to tinker with the physical layout of the document
Advantages of LaTeX over WYSIWYG

• Complex structures such as footnotes, references, table of contents, and bibliographies can be generated easily
• For many typographical tasks not directly supported by basic LaTeX, there are free add-on packages
• LaTeX encourages authors to write well-structured texts
• LaTeX is highly portable and free
Disadvantages of LaTeX over WYSIWYG

- What you see is not what you get.
- But is this really a disadvantage? Why are you thinking about layout instead of content?
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A Minimal LaTeX File

\documentclass{article}
\begin{document}
Hello world!
\end{document}
LaTeX Input Files

- The input for LaTeX is a plain ASCII text file
- You can create it with any text editor
- It contains
  - the text of the document
  - commands which tell LaTeX how to typeset the text:
    - Spaces
    - Special characters
    - LaTeX commands
    - Comments
Spaces

- Whitespace characters (e.g. blank, tab, a single linebreak) are treated uniformly as space by LaTeX
- Several consecutive whitespace characters are treated as one space
- An empty line between two lines of text defines the end of a paragraph
- Several empty lines are treated in the same way as one empty line
Special Characters

- The following symbols are reserved characters: they either have a special meaning in LaTeX, or are not available in all the fonts
  \$ & % # _ { } \sim \wedge \backslash
- Some of these characters can be used in your documents by adding a prefix backslash:
  \$ & % # _ { } \backslash\$ \& \% \# \_ \{ \} \backslash\}
- The other symbols (and many more!) can be printed with special commands in mathematical formulae or as accents
LaTeX commands are case sensitive and take one of two formats:

- They start with a backslash \ and have a name consisting only of letters; command names are terminated by a space, a number or any other ‘non-letter’.

- They consist of a backslash and exactly one special character.
LaTeX Commands: Whitespace

LaTeX ignores whitespace after commands.

- If you want to get a space after a command, you have to put either {} and a blank or a special spacing command after the command name.

I read that Knuth divides people working with TeX into TeXnicians and TeXperts. Today is March 25th, 2004.

I read that Knuth divides people working with \TeX{} into \TeX{}nicians and \TeX{}perts. Today is \today.
LaTeX Commands: Specifying Arguments

- Some commands take a parameter which has to be given between curly braces { } after the command name.
- Some commands support optional parameters which are added after the command name in square brackets [ ].

This is *italicized* text.

This is \textit{italicized} text.
Comments

• When LaTeX encounters a % character while processing an input file, it ignores the rest of the present line

• This is useful for adding notes to the input file, which will not show up in the printed version
Input File Structure: The Preamble

• When LaTeX2e processes an input file it expects it to follow a certain structure. Every input file starts with the command:

\documentclass{...}

– This specifies what sort of document you intend to write (article, letter, book and so on)

• After that, you can include global style commands or you can load packages which add new features to the LaTeX system. To load a package you use the command:

\usepackage{...}
When all the setup work is done, you start the body of the text with the command:

\begin{document}

Now you enter the text mixed with some useful LaTeX commands.

At the end of the document you use the \end{document} command, which tells LaTeX to finish.

Anything which follows this command will be ignored by LaTeX.
A Simple Example

\documentclass[a4paper,11pt]{article}
\usepackage{latexsym}
\author{H.~Partl}
\title{minimalism}
\begin{document}
\maketitle
\tableofcontents
\section{Start}
Here begins my lovely article \ldots
\section{End}
\ldots{} and here it ends.
\end{document}
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Typesetting Mathematics

- LaTeX has a special mode for typesetting mathematics, called math mode.
- Within a paragraph, math mode is entered between $ characters, or by using the \begin{math} and \end{math} commands.

To find the square of the hypotenuse, add $a^2 + b^2 = c^2$. It’s as easy as that!
Typesetting Maths: Referring to Equations

• In a scholarly article or thesis, you will often want to number equations and refer to them in the text.
• This is done using the `equation` environment, and the `label` and `ref` commands:

\[ \varepsilon > 0. \] \hspace{1cm} (1)

From Equation 1 it follows that ...

\[ \ldots \] it is clear that

\begin{equation}
\varepsilon > 0. \\
\label{eq:eps}
\end{equation}

From Equation~\ref{eq:eps} it follows that \ldots
Including Graphics

• LaTeX2e includes a standard package for including PostScript graphics in your document. Load it using

\usepackage{graphics}

• An example that shows a figure being included:

\begin{figure}[ht]
\begin{center}
\includegraphics[width=140mm]{mypic.ps}
\end{center}
\caption{An example of a figure}
\label{fig:example}
\end{figure}
Bibliographies: Citations

- Articles can be cited in the text using the `\cite` command:

  By far the most commonly used feature is colour (e.g. \cite{NBE1993,JaV1996,SmC1996a}), usually computed in a colour space thought to be “perceptually accurate” (e.g. HSV \cite{SmC1996a} or CIE \cite{STL1997}).

- The details of the cited articles are stored in BibTeX format, in a .bib file

- BibTeX resolves the citations in the LaTeX file and generates the required bibliography
@book{AhR1975,  
  author = {N. Ahmed and K. Rao},  
  title = {Orthogonal transforms for digital signal processing},  
  publisher = {Springer-Verlag},  
  year = {1975},  
  address = {New York},  
}

@inproceedings{Aus1989,  
  author = {James Austin and A. Phantom and Also Phantom},  
  title = {High Speed Invariant Recognition Using Adaptive Neural Networks},  
  booktitle = {IEE 3rd International Conference on Image Processing and its Applications},  
  year = {1989},  
  pages = {28--32},  
  abstract = {A method is described which...},  
}
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Running LaTeX on the Command Line

>\texttt{latex test.tex}

This will create several files:

<table>
<thead>
<tr>
<th>File</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>test.aux</td>
<td>the auxiliary file that LaTeX will use in subsequent passes to resolve references to figures, tables, citations etc.</td>
</tr>
<tr>
<td>test.log</td>
<td>a log file that contains information about the LaTeX run</td>
</tr>
<tr>
<td>test.dvi</td>
<td>the DeVice Independent output file: this is the typeset document, ready for conversion to postscript or other printable formats</td>
</tr>
</tbody>
</table>
Structuring Your Document

- \chapter{…}
- \section{…}
- \subsection{…}
- \subsubsection{…}
- Using \label and \ref to refer to sections by number
- Unnumbered versions of the above environments
- Switching to appendices
List Environments

\begin{itemize}
\item ...
\item ...
\end{itemize}

Also:

• enumerate
• description
Tables and the Tabular Environment
Floats

- Figures
- Tables
- Referring to figures and tables
More Information

Check out the following links:

• For using LaTeX and setting up a LaTeX environment:

• For general info on using LaTeX and other related material: