Introduction to Latex

A very quick look at typesetting documents

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(based on Troy D. Milner and Simon Cuce slides)

Introduction

- Essentially a Markup Language (like HTML, XML and RTF)
- An extension to TeX system
- TeX written by Donald Knuth in 70´s

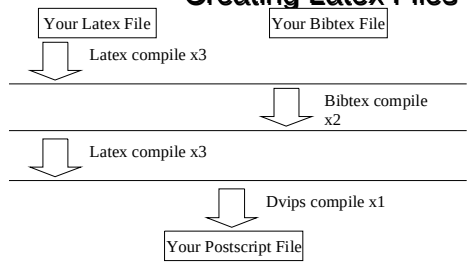
Latex vs. Word Processors

- High typeset quality
- Easy to include mathematical formulas
- Source file format is not bounded to a particular OS or platform
- Latex implementations exists for all platforms (DOS, Windows, Unices,..)
- Latex is free

Latex vs. Word Processors

- De facto standard for scientific publishing
- Very few bugs
- Good for large documents
- Can run even on 386 PC
- Not very easy to learn

Creating Latex Files



Latex File Structure

- Document Class
  Predefined Formats (article, report, book,..).
- Packages used
  Added Functionality (graphics, reference style,...).
- Main Body
  Text and Bibliography References.

The Basics

- Document Class
  `\documentclass[`*`options`*`]{class}`
  options = a4paper, 11pt, 12pt, 10pt, twocolumn, landscape,...
  class = article, report, book,...
- Packages
  `\usepackage{package name}`
  `epsfig = insert PS pictures into the document`
  `fancyhdr = easy definition of footer and header`

Body of Text

- Start with `\begin{document}`
- End with `\end{document}`
- Typesetting Text
  - `\\` or `\newline` and `\newpage`
  - Quotations
  - Bold `\textbf{.....}` or `\bf`
  - Italics `\emph{.....}` or `\textit{.....}` or \it
  - Underline `\underline{.....}` or `\ul`

Body of Text cont…

- Including Multiple Files
  - `\input{filename.tex}`

Format

- Sections
  - `\section{…}` = 1. Latex is Great
  - `\subsection{…}` = 1.1 Why Latex is Great
  - `\subsubsection{…}` = 1.1.1 Reason One
  - `\appendix` – changes numbering scheme
  - `\chapter{…}` – To be used with book and report document classes
- Titles, Authors and others
  - `\title{…}` `\author{…}`
  - `\footnote{…}`

Format Contd.

- `\maketitle` – Display Title and Author
- `\tableofcontents` – generates TOC
- `\listoftables` – generates LOT
- `\listoffigures` – generates LOF
- Labels
  - `\label{`*`marker`*`}` – Marker in document.
  - `\pageref{`*`marker`*`}` – Displays page no. of marker.
  - `\ref{`*`marker`*`}` – Displays section location of marker.
- Lists
  - Use either *enumerate*, *itemize* or *description*.

Lists

- Source
  - `\begin{itemize}`
  - `\item Apple`
  - `\item Orange`
  - `\end{itemize}`
- Result
  - Apple
  - Orange

Lists

- `Enumerate` instead of `itemize` gives a numbered list
- Lists can be nested

Environment

- Something between
  - `\begin{name}`
  - `\end{name}`
- Many commands, for example `\bf` affect the text until the end of environment
- Can be nested
- Examples:
  - `itemize, center, abstract`

Group

- Text between { and }
- Many commands work until the end of the group
- Source
  - put {one word \bf in bold} here
- Result
  - put one word **in bold** here

Alignment

- Environments `center, flushleft, flushright`
- Source
  - `\begin{flushright}`
  - `Right aligned`
  - `\end{flushright}`
- Result

`Right aligned`

Font size

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

Example of Latex document

```
\documentclass{article}
\title{Simple Example}
\author{Andrei Gurtov}
\date{March 2000}
\begin{document}
\maketitle
Hello world!
\end{document}
```

Tabular

- Columns
  - `\begin{tabular}{|…|…|}`
  - `\end{tabular}`
- Rows
  - & – Split text into columns
  - \\ – End a row
  - `\hline` – Draw line under row
  - e.g. `123123 & 34.00\\ \hline`

Two Columns

l = automatically adjust size, left justify
r = automatically adjust size, right justify
p = set size
e.g p{4.7cm}
c = center text

Example of a table

```
\begin{tabular}{|l|r|c|} \hline
Date & Price & Size \\ \hline
Yesterday & 5 & big \\ \hline
Today & 3 & small \\ \hline
\end{tabular}
```

Date	Price	Size
Yesterday	5	Big
Today	3	Small

Floating Bodies

- Floating bodies can stop splitting of tables and images over pages.

```
\begin{figure}[options]
\begin{table}[options]
```

Options (recommendations)
h = place here
t = place at top of page
b = place at bottom of page

- They will now appear in the LOF and LOT.

Example of floating figure

- \begin{figure}[ht]
- \centering\epsfig{file=uni.ps, width=5cm}
- \caption{University of Helsinki}
- \label{uni}
- \end{figure}

Figure~\ref{uni} shows...

Images

- Use epsfig package
- `\usepackage{epsfig}`
- Including images in main body
- `\epsfig{file=filename.eps, width=10cm, height=9cm, angle=90}`
- Creating EPS – Use xv and/or xfig.
- MS Power Point, save as GIF and convert to EPS.

Bibliography by hand

\begin{thebibliography}{}
\bibitem[Come95]{Come95} Comer, D. E., {\it Internetworking with TCP/IP: Principles, Protocols and Architecture}, volume 1, 3rd edition. Prentice–Hall, 1995.
\end{thebibliography}

Bibliography using Bibtex

- Bibliography information is stored in a *.bib file, in Bibtex format.
- Include chicago package
  - \usepackage{chicago}
- Set referencing style
  - \bibliographystyle{chicago}
- Create reference section by
  - \bibliography{bibfile with no extension}

Bibliography using Bibtex

@book{Come95,
author="D. E. Comer",
title={Internetworking with TCP/IP: Principles, Protocols and Architecture},
publisher="Prentice–Hall",
year=1995,
volume=1,
edition="Third"}

Bibliography contd.

- Citing references in text
  - `\cite{cuc98}` = (Cuce 1998)
  - `\citeN{cru98}` = Crud (1998)
  - `\shortcite{tom98}` = (Tom, et. al. 1998)
- Creating Bibtex Files
  - Use Emacs with extensions.
  - or copy Bibtex entries from bibliography database.

Some Math

```
\begin{center}
{\large
$$ y=\frac{a^3+2c_{x}}{1+\sqrt{b_{x}}} $$ \\
\vspace{0.2in}
$$ Q=\sum_{i=1}^{j}\int_{\mu}^{\infty}f(x_{j})dx
   $$ \\
\vspace{0.2in}
$$ \Psi = \oint_{-
   \infty}^{\infty}f_{xy}{(\frac{\partial
Qx}{\partial Qy})}^{\lim_{\pi}^ \prime} $$ \\ }
```

$$y = \frac{a^3 + 2c_x}{1 + \sqrt{b_x}}$$

$$Q = \sum_{i=1}^{j} \int_{\mu}^{\infty} f(x_j) dx$$

$$\Psi = \oint_{-\infty}^{\infty} f_{xy} (\frac{\partial Qx}{\partial Qy})^{\lim_{\pi}^{\prime}}$$

Tools

UNIX based systems
- xdvi, ghostview, fixps, emacs with latex/bibtex support.

Windows 98/NT
- Ghostview, Acrobat Distiller, Acrobat Reader, Scientific Workplace (not the best), the Bibtex viewer is good. Paint Shop Pro, Latex and Emacs

Conclusions

- Mathematical Formulas are easy.
- Avoid GUI latex creators. (Lyx, Klyx, Scientific Word).
- Use the bibtex search engine:
  http://www.cs.monsh.edu.au/mirrors/bibliography
- Consider converting Postscript files to PDF to conserve space.

Esimerkki

- **em esimerkki.tex**
- **latex esimerkki** (kääntää tiedoston tex–tiedostoksi)
- **dvips esimerkki** (tuottaa "device–independent Postscript" –tiedoston)
- **ghostview esimerkki** (tulostaa näytölle)
- **lpr –P7 esimerkki.ps** (tulostaa kirjoittimelle)