A brief introduction to LaTeX

Chris Bowers

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Maths mode 1

LaTeX has a special mode for writing mathematical text - `$`.

Example:

`$ E = mc^2 $` compiles to $E = mc^2$

There are lots of mathematical symbols which can be represented in math mode:

$\infty \hbar \sum \int \partial \beta \Psi$ ....

Each has a LaTeX representation

```
\infty \hbar \sum \int \partial \beta \Psi  ....
```

Math mode 2

There are also mathematical constructs:

`$\frac{top}{bottom}$` $\rightarrow \frac{top}{bottom}$

`$\sqrt[3]{val}$` $\rightarrow \sqrt[3]{val}$

Equations

- Equations can be embedded in the text using math mode ($)
- Sometime the equation is better enumerated separately.
- Done with the equation environment where math mode is assumed.

```
\begin{equation}
P = I^2 R = \frac{V^2}{R}
\end{equation}
```

$$P = I^2 R = \frac{V^2}{R} \tag{1}$$

Justification

Alignment	*Environment*	*Declaration*
Centred	`\begin{center}`	`\centering`
Left	`\begin{flushleft}`	`\raggedright`
Centred	`\begin{flushright}`	`\raggedleft`

Left

Centre

Right

Including source code

The \texttt{} is good for displaying source code.

But what about LaTeX code:

```
\begin{verbatim}

  But what about \LaTeX ~code:

\end{verbatim}
```

or

```
\verb|But what about \LaTeX ~code:|
```

Itemizing

```
\begin{itemize}
\item First item.
\item Second item.
\item Last item.
\end{itemize}
```

- First item.
- Second item.
- Last item.

Enumerating

```
\begin{enumerate}
\item First item.
\item Second item.
\item Last item.
\end{enumerate}
```

1. First item.
2. Second item.
3. Last item.

Nested itemization

```
\begin{itemize}
\item First item.
\begin{itemize}
\item Second item.
\end{itemize}
\item Last item.
\end{itemize}
```

- First item.
  - Second item.
- Last item.

Nested enumeration

```
\begin{enumerate}
\item First item.
\begin{enumerate}
\item Second item.
\end{enumerate}
\item Last item.
\end{enumerate}
```

1. First item.
    1.1 Second item.
2. Last item.

Labelling 1

You can insert labels anywhere in LaTeX that will refer to the enumerated value of the environment or section in which it is defined within.
Example:

```
\begin{figure}
\includegraphics{file.eps}
\caption{An example figure.}
\label{fig:examplefigure}
\end{figure}
```

Use `\ref{fig:examplefigure}` to refer to the above figure by its enumeration.

Labelling 2

You can also label chapters, sections or subsections, etc.
Example:

```
\section{A New Section}
\label{sec:ANewSection}

This new section can be refered to anywhere in
the document as section \ref{sec:ANewSection}.
......
```

LaTeX Bibliography

- One of the major features of LaTeX
- Two ways to add bibliography details:
  - *thebibliography* environment.
  - using an external BibTeX file.

thebibliography environment 1

```
\begin{thebibliography}

\bibitem{bullinaria2007} Bullinaria, J.A. (2007).
Understanding the Emergence of Modularity
in Neural Systems.
Cognitive Science, 31, 673-695

\bibitem{anotherpaper} ........

\end{thebibliography}
```

You can include a citation to an item in your bibliography by using `\cite{bullinaria2007}`.

thebibliography environment 2

Advantages of *thebibliography* environment:

- It keeps everything in one document.
- No additional tools required.
- Good for small numbers of unique entries.

Disadvantages:

- Needs to be maintained for each document.
- Need to worry about the order of the entries.
- Awkward for large number of entries.

BibTeX 1

- BibTeX generates a list of references from an existing bibliographic database (.bib)
- .bib is a plain text file format which stores individual entries for each bibliography item.

```
@entry-type { label,
        author = "author",
        title = "title",
        year = "year",
        journal = "journal title",
        volume = "vol",
        pages = "page numbers"
}
```

BibTeX 2

Example:

```
@article{bullinaria2007,
    author  = "John A. Bullinaria",
    title   = "Understanding the {E}mergence of {M}odularit
    year    = "2007",
    journal = "Cognitive Science",
    volume  = "31",
    pages   = "673--695"
}
```

Notice the curly brackets in the title. These help preserve capitalisation.

BibTeX 3

The following entry types are the most common for BibTex:

article	Journal or magazine.
book	A book with an explicit publisher.
inproceedings	An article in a conference proceedings.
inbook	A part of a book, chapter or section.
incollection	A part of a book having its own title.
manual	Technical document.
mastersthesis	A Master's thesis.
phdthesis	A Ph.D. thesis.
proceedings	The proceedings of a conference.
techreport	A report by institution in a numbered series.
unpublished	An author and title, but not formally published.
misc	everything else.

BibTeX 4

Each entry type requires a specific set of data entries. Examples include:

author	The name(s) of the author(s).
title	The title of the work.
year	The year of publication.
pages	Page numbers, separated by commas or double-hyphens.
journal	The journal or magazine the work was published in.
editor	The name(s) of the editor(s).
	and so on...

BibTex 5

Get into a good habit of keeping a bib file up to date and it will become a powerful research tool.

- Clearly these files can contain huge numbers of entries and grow very quickly.
- Many scripts and tools exists for this task.
- Such as *JabRef* - jabref.sourceforge.net

BibTex 6

To use .bib files with LaTeX:

```
%identify .bib file to be used.
\bibliography{bibliography.bib}

%define the bibliography and citation style to use.
\bibliographystyle{bibstyle}
```

BibTex 7

Advantages of BibTex:

- Can reuse same bibliography.
- Lots of tools to manage .bib files
- Important for literature searches.

Disadvantages:

- Have to ensure each entry is correct.
- Large file which can grow quickly.
- Requires multiple files and more complex compile sequence.

Which to use?

Generally, use BibTex unless its a document which is outside of your normal area of work/research.

Bibliography Styles

plain The default and results in numerical citations such as [1].

abbr Similar to plain but abbreviated things like the journal on proceedings title.

alpha Instead of numbers, generates a code from author and date [Nolf07].

There's lots more ....

Citations in LaTeX

Citing an entry in the bibliography is the same for both approaches:
`\cite{label}`
To compile the list of cited entries the document should be compiled as follows

1. `latex file.tex`
2. `bibtex biblio` (this is the .bib file but without the extension)
3. `latex file.tex`
4. `latex file.tex`