Introduction to Latex

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July 29, 2016

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1 About Latex

LaTeX is a word processor and document markup language. It is distinguished from typical word processors such as Microsoft Word and Apple Pages in that the writer uses plain text as opposed to formatted text, relying on markup tagging conventions to define the general structure of a document (such as article, book, and letter), to stylise text throughout a document (such as **bold** and *italic*), and to add citations and cross-referencing. A **TeX** distribution such as **TeXlive** or **MikTeX** is used to produce an output file (such as PDF or DVI) suitable for printing or digital distribution.

LaTeX is used for the communication and publication of scientific documents in many fields, including mathematics, physics, computer science, statistics, economics, and political science.It also has a prominent role in the preparation and publication of books and articles that contain complex multilingual materials, such as Sanskrit and Arabic. **LaTeX** uses the **TeX** typesetting program for formatting its output, and is itself written in the **TeX** macro language.

LaTeX is widely used in academia. **LaTeX** can be used as a standalone document preparation system, or as an intermediate format. In the latter role, for example, it is often used as part of a pipeline for translating DocBook and other XML-based formats to PDF. The typesetting system offers programmable desktop publishing features and extensive facilities for automating most aspects of typesetting and desktop publishing, including numbering and cross-referencing of tables and figures, chapter and section headings, the inclusion of graphics, page layout, indexing and bibliographies.

Like **TeX**, **LaTeX** started as a writing tool for mathematicians and computer scientists, but from early in its development it has also been taken up by scholars who needed to write documents that include complex math expressions or non-Latin scripts, such as Arabic, Sanskrit and Chinese.

LaTeX is intended to provide a high-level language that accesses the power of **TeX**. LaTeX comprises a collection of TeX macros and a program to process **LaTeX** documents. Because the plain **TeX** formatting commands are elementary, it provides authors with ready-made commands for formatting and layout requirements such as chapter headings, footnotes,

for formatting and layout requirements such as chapter headings, footnotes, cross-references and bibliographies.

LaTeX was originally written in the early 1980s by **Leslie Lamport** at SRI International. The current version is LaTeX2e. **LaTeX** is free software and is distributed under the **LaTeX** Project Public License (LPPL) **(Source Wikipedia)**.

2 Opening and Compiling Tex Document

First create a **.tex** file using text editor such as **Vi** or **Gedit** or **Kile**.

2.1 Starting and Ending

A minimal input file looks like following

```
\documentclass{class}
\begin{document}
   your text...
\end {document}
```

where the class is a valid document class for **LaTeX**.

2.2 Compiling the LaTeX Document

We open the terminal and go to the directory in which our **.tex** file is stored and the we execute the command

```
pdflatex example.tex
```

3 Section

Sectioning commands provide the means to structure your text into units:

\part

\chapter

(report and book class only)

\section

\subsection

\subsubsection

\paragraph

\subparagraph

All sectioning commands take the same general form, e.g.,

\chapter[toctitle]{title}

In addition to providing the heading title in the main text, the section title can appear in two other places:

1. The table of contents.
2. The running head at the top of the page.

You may not want the same text in these places as in the main text. To handle this, the sectioning commands have an optional argument **toctitle** that, when given, specifies the text for these other places.

Also, all sectioning commands have *-forms that print title as usual, but do not include a number and do not make an entry in the table of contents.

For instance:

\section*{Preamble}

The **\appendix** command changes the way following sectional units are numbered. The **\appendix** command itself generates no text and does not affect the numbering of parts.

The normal use of this command is something like

\chapterA Chapter
...
\appendix
\chapterThe First Appendix

The secnumdepth counter controls printing of section numbers. The setting suppresses heading numbers at any depth >level, where chapter is level zero.

\setcounter{secnumdepth}{level}

4 Cross Reference

One reason for numbering things like figures and equations is to refer the reader to them, as in "Figure 3 for more details."

4.1 \label{key}

A **\label** command appearing in ordinary text assigns to key the number of the current sectional unit; one appearing inside a numbered environment assigns that number to key.

A key name can consist of any sequence of letters, digits, or punctuation characters. Upper and lowercase letters are distinguished.

To avoid accidentally creating two labels with the same name, it is common to use labels consisting of a prefix and a suffix separated by a colon or period. Some conventionally-used prefixes:

ch for chapter
sec for lower-level sectioning commands
fig for figures
tab for tables
eq for equations

4.2 \pageref{key}

The **\pageref { key }** command produces the page number of the place in the text where the corresponding **\label { key }** command appears.

4.3 \ref{key}

The **\ref** command produces the number of the sectional unit, equation, footnote, figure, . . . , of the corresponding **\label** command. It does not produce any text, such as the word 'Section'or 'Figure', just the bare number itself.

5 Fonts

5.1 Font Styles

A few of the font styles which are useful are listed below

1. \textrm (Roman)
2. *\textit (Italics)*
3. **\textbf (Bold)**
4. *\emph (Emphasis)*
5. `\texttt (Typewriter)`
6. \textnormal (Normal font)

Example to output text in bold we can type

\textbf{anything you type inside the curly braces will be outputed in bold}

5.2 Font Sizes

The following standard type size commands are supported by **LaTeX**.

Table 1: Font Sizes

Command	10pt	11pt	12pt
\tiny	5	6	6
\scriptsize	7	8	9
\footnotesize	9	10	10.95
\small	10	10.95	12
\normalize(default)	12	12	14.28
\large	14.4	14.4	17.28
\LARGE	17.28	17.28	20.74
\huge	20.74	20.74	24.88
\Huge	24.88	24.88	24.88

The commands as listed here are declaration forms. The scope of the declaration form lasts until the next type style command or the end of the current group.

6 Images

To insert an image we first need to include a package called **graphicx** after the documentclass as mentioned in section 2.1. To insert the image into the PDF we have to use the following commands

\begin{figure}[h]

\centering
\caption{Example Picture Created Using Dia}
\includegraphics[scale=0.7] {img.png}
\end{figure}

Figures are objects that are not part of the normal text, and are instead floated to a convenient place, such as the top of a page. Figures will not be split between two pages.

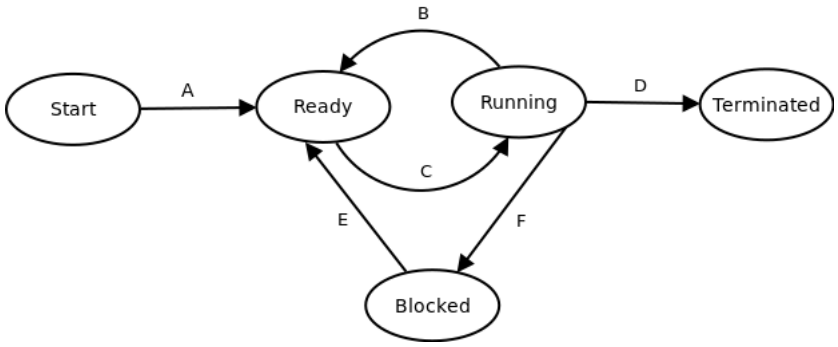


Figure 1: Example Picture Created Using Dia

7 Tables

7.1 Multi Row Tables

To combine rows the package multirow must be imported with
in your preamble, then you can use the **\multirow** command in your document:
\usepackage{multirow}

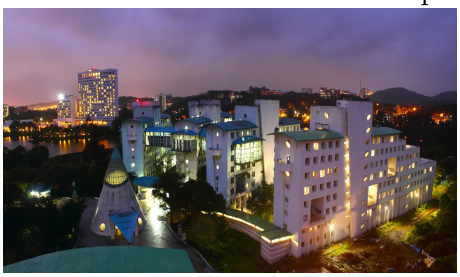
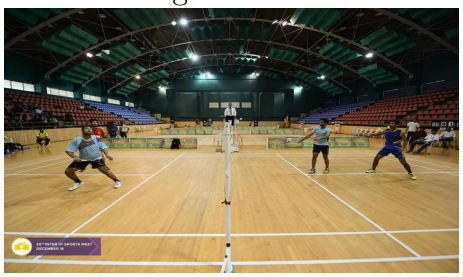
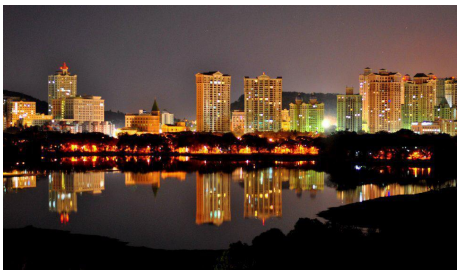
The table below includes mathematical notations, which you can produce by embedding the experession in $$delimiters. For subscript, use underscore and for superscript, use carrot.

Table 2: Example of Multi Row Table

Algorithms	**Time Complexity**
Bubble Sort	Best Case : O(n) Average Case : O(n^2) Worst Case : O(n^2)
Merge Sort	Best Case : O($n\ log_2(n)$) Average Case : O($n\ log_2(n)$) Worst Case : O($n\ log_2(n)$)
Quick Sort	Best Case : O($n\ log_2(n)$) Average Case : O($n\ log_2(n)$) Worst Case : O(n^2)

7.2 Table of Figures

Table 3: Example of Table of Figures


8 Conclusion

Thus by using **LaTeX** we can create reports, articles etc on the fly without worrying about the alignment, typeset etc making it very productive.**LaTeX** has become a popular tools among students, teachers, research scholars etc as it is a free software available on any Linux platform.