Published by *APT Kerala*
Article ID 220501 Vol. **1**, 2022, (pp. 1-5)

Upskill Yourself

Preparing Structured Document Using LaTeX

Noble P. Abraham* & Deena Mary Luke†

1. Introduction

LaTeX is a document preparation system, that focuses on structuring the content in a logical manner than a visually appealing outcome. It is a high-quality typesetting system with specific features designed for the production of technical and scientific documents. LaTeX is the de facto standard for the communication and publication of scientific documents. LaTeX is available as a free software.

In this tutorial, we give a brief overview of capabilities of LaTeX typesetting and various kinds of standard documents / templates.

2. Capabilities of LaTeX

LaTeX is built up based on the concept that the authors get on with writing the document, without having to worry about the document design or layout; leaving design aspects to document designers. Moreover, it enables embedding logical document structure and meta information within the document. Let's work with a simple example document[1] and see how this is achieved.

The following code when compiled and converted to suitable format would look like as in Fig 2. However, looking at the code, we can infer meta information about the document such as the type of document, title, author(s) and the date of preparing the document. Also we can see the hierarchical structure of the document; the abstract, various section(s), subsection(s) and the bibliography.

The document source specifies parts of the *article* using specific commands and does not mention how to format each part. Title of the article is formatted with a bigger font size, distinguishing it from the list of authors. Each of the sections / subsections are formatted uniformly as per hierarchy and numbered sequentially. Also we can note that a citation included in the article is listed under the heading *References*.

*Department of Physics, Mar Thoma College, Tiruvalla, Email: noblepa@gmail.com
†Mar Thoma Vocational Higher Secondary School, Kunnam, Vechoochira, Ranni, Email: deenaluke9@gmail.com

```
1 \documentclass{article}
2
3 \title{Preparing Structured Document using {\LaTeX }}
4 \author{Noble P Abraham \& Deena Mary Luke}
5 \date{June 2022}
6
7 \begin{document}
8
9 \maketitle
10
11 \begin{abstract}
12    This is the abstract of the article.
13 \end{abstract}
14
15 \section{Introduction}
16 This article is about LaTeX and preparing documents
17 using LaTeX \cite{latexsite}.
18
19 \subsection{Motivation}
20 Here we list the motivation behind preparing this article.
21
22 \section{Conclusion}
23 We conclude the article in this section.
24
25 \begin{thebibliography}{1}
26 \bibitem{latexsite} https://www.latex-project.org/about/
27 \end{thebibliography}
28
29 \end{document}
```

Fig. 1. A Sample LaTeX Code. The rendered output is given in Fig. 2. (Note that line number is given at the beginning of each line.)

Now let's list some of the capabilities of LaTeX while preparing any document.[2]

- Logical structuring of the document.
- Automatic numbering of sections / equations / floating elements, such as figures or tables.
- Neat rendering of complicated mathematical expressions, chemical formulae.
- Clean and hassle free table placement and alignment.
- Beautiful rendering of document front matter.
- Lucid generation of table of contents, table of figures, etc.
- Generation of bibliography / index in the back matter.
- Consistency in the layout throughout the document.

Preparing Structured Document using LaTeX

Noble P Abraham & Deena Mary Luke

June 2022

Abstract

This is the abstract of the article.

1 Introduction

This article is about LaTeX and preparing documents using LaTeX [1].

1.1 Motivation

Here we list the motivation behind preparing this article.

2 Conclusion

We conclude the article in this section.

References

[1] https://www.latex-project.org/about/

Fig. 2. Rendered output of the code given in Fig. 1.

- Availability of packages to extend features such as footnotes, diagrams, large tables, etc.
- Easily adapt changes in look and feel of the document, without changing the actual content.

LaTeX is capable of producing a number of various kinds of documents that every knowledgeable person, such as an academician, a researcher or a creative writer, would need. Table 1 lists some of the most common types of documents and the *documentclass* specifier to be used.

3. Understanding Contents of a Typical LaTeX Document

Now let us closely examine the code given in Fig. 1.The code begins with a command `\documentclass{article}`. This command specifies the template or class of the document that we are preparing. Some of the popular document classes are given in Table 1 and a comprehensive list is available at CTAN.

We can see, at line number 7, `\begin{document}` and `\end{document}` directives, at line number 29. The contents between these two directives are the actual content of the final output. Any content above `\begin{document} ... \end{document}` environment is not directly visible in the document and is known as *preamble* of the document. In the preamble, we can see `\title{}`, `\author{}`, `\date{}` directives. These meta information are included in the document using the directive `\maketitle` (given in line 9). The preamble is a place to include packages / commands to specify extension of the features in the document; such as special formatting or customization of standard directives

The document is an academic / scientific article, so specification of *abstract* is facilitated by `\begin{abstract} ... \end{abstract}` environment.

The various parts (sections) of article, is specified by `\section{}` or `\subsection{}`. Note that, numbering or formatting of the section title is not done in the document.

Referencing, at line number 17, is done with the help of the directive `\cite{}`. The `\begin{thebibliography} ... \end{thebibliography}` environement (see line number 25); lists the bibliography items, arranged in the preferred format. The argument of the `\cite{}` directive is the label of the bibliographic item (see line 26), i.e., `latexsite`.

It can be noted that extra or additional spaces in the code is not reflected in the rendered final output. A blank line in the code implies that the next line is in a new paragraph. The next line therefore will be indented, as per the style of the `documentclass` in use.

Table 1. Some common types of documents rendered using LaTeX.

The `documentclass` specifier	**Type of Document**
`article`	Articles in scientific journals, short reports, programme documentation, ...
`report`	Reports containing several chapters, project summary, small books, thesis, ...
`book`	Books
`letter`	Letters
`slides`	Slide shows
`beamer`	Presentations
`proc`	Conference proceedings
`exam`	Question papers
`cv` or `resume`	Curriculum Vitae

4. Popular LaTeX Systems

The LaTeX 'software' is available from multiple sources, in different varieties. It can either be installed on a PC/Mac or be used on a Live CD or be used online.

4.1. TeX Live—- TeX Live is a cross-platform, distribution that includes major TeX-related executables, macro packages, and fonts.[3]

4.2. MikTeX—- MiKTeX is a free and open-source distribution of the TeX/LaTeX typesetting system for Microsoft Windows.[4] It can work on Linux and Mac as well.

4.3. MacTeX—- MacTex is a version of TeX Live designed exclusively for Mac OS users.[5]

4.4. Overleaf—- It is an online, collaborative LaTeX editor. Requires no LaTeX installation and support almost all LaTeX features, including inserting images, bibliographies, equations, and many more.[6] It should be mentioned here that the online edition of *APT Tunes* is typeset with the help of the Overleaf editor.

5. Conclusion

In this tutorial, we gave an overview of LaTeX document preparation system and it's capabilities. In the subsequent issues of *APT Tunes*, we will see more details of working with LaTeX such as typesetting equations, using images and tables, bibliography etc.

Notes and References

[1] Readers can experiment with the code via Overleaf here

[2] See for example Learn LaTeX in 30 minutes or Getting to Grips with LaTeX

[3] Read More on TeX Live or get a copy from here.

[4] Details available here.

[5] Official Website.

[6] Overleaf.com Website.