Session – 22 : Getting started with LaTeX
11-10-2019, 08:00 – 09:00 Hrs, RJN 302

[1] Installation:

On Linux you need to install texlive package group to have the latex typesetting environment in your OS. On windows you can install miktex for the same. You can use TeXmaker as editor for the latex files. The usual vi editor can be used but TeXmaker can help with one-click compilation of files to display the output. If you are using KDE in place of Gnome for your desktop then kile is also a good editor to compile latex files.

You can also use LaTeX on the cloud. Register yourself on https://www.overleaf.com/ using your smail address and you will gain access to unlimited private projects, ability to share with unlimited number of people etc., The string "iitm.ac.in" in the email tells overleaf that your account is part of the university package that IITM has paid for.

[2] The LaTeX typesetting process

Creating a neatly typeset document using LaTeX is like writing a program. You need to prepare the content in a file that has ".tex" ending. You compile the file using the command "latex". The output is a file called device independent file with ".dvi" extension. You can use dvips to convert it to ".ps" extension, a postscript file ready for viewing and printing to a laserjet printer. You can convert ".dvi" file to ".pdf" using dvipdf. Alternatively you can use "ps2pdf" to convert ".ps" file to ".pdf". You can also compile a latex file directly to a ".pdf" file by using "pdflatex". The final output pdf will look as professional and neat as any scientific publication from an international journal – for a simple reason that most of them also use LaTeX.

You can install the package "okular" or "evince" to view the files of type ".dvi", ".ps" and ".pdf".

[3] Format of a LaTeX file

The simplest LaTeX file that will compile to give an output is the following:

```
\documentclass{article}
\begin{document}
Hello, World.
\end{document}
```

All commands of LaTeX start with a backslash. We use the "article" class for simple articles. There are other classes such as letter, report, book, sides, and beamer.

Any content between a `\begin{blah}` and `\end{blah}` is said to be in the "blah" environment. Many of the environments can be nested.

All the content you wish to typeset should be within the document environment. In each document, there is exactly one such environment.

Content within an article can be organized into sections and subsections. These will be numbered automatically and formatted with meaningful sizes.

You can import packages that offer you useful features, commands and fonts.

[4] Important environments in a LaTeX file

Environment	Purpose
{itemize}	A bunch of items as a bulleted list.
{enumerate}	A bunch of items in a numbered list.
{equation}	A mathematical equation with automatic numbering.
{tabular}	A table with multiple rows and columns.

[5] A sample tex file

```
\documentclass[12pt,a4paper]{article}
\usepackage{amsmath}
\usepackage{amsfonts}
\usepackage{amssymb}
\usepackage[left=2cm,right=2cm,top=2cm,bottom=2cm]{geometry}

\author{Gandham Phanikumar}
\title{My First LaTeX document}
\date{October 11, 2019}

\begin{document}

\maketitle

\section{Introduction}

LaTeX allows one to think of typesetting in a structured manner - as opposed to
visual manner. For programmers, this could be a natural way of putting down
their thoughts.

\section{Discussion}

One of the important reasons why people choose LaTeX for document preparation
is because of the way equations can be written and typeset.

\begin{equation}
      \text{erf}(\eta) = \frac{2}{\sqrt{\pi}} \int_{0}^{\eta}{ \text{exp}(-x^2)
dx}
\end{equation}

Bulleted items can be listed using the itemize environment.

\begin{itemize}
\item Each item starts with the item command.
\item You can nest them if you wish.
\end{itemize}
```

```
Numbered items can be listed using the enumerate environment.

\begin{enumerate}
\item There must be a formulation
\item It follows numerical implementation
\item Then comes the program development
\item Benchmarking is important
\item Original work can show up now
\end{enumerate}

Tables are formatted using the tabular environment. Each column is separated by
an ampersand. The line ends with double backslash. Horizontal lines are given
using the hline command. Vertical lines are given using pipe symbols in the
options of tabular environment. The symbol l states that the column should be
left justified. One can choose r or c for right or center justified columnds,
respectively.


\begin{tabular}{|c|r|l|}
\hline
      & program & purpose \\
\hline
      1 & awk & Line by line processing - numerical and otherwise \\
      2 & sed & Line by line processing - string operations \\
      3 & python & Interpreted object oriented language \\
      4 & sage & Symbolic Computational environment \\
\hline
\end{tabular}

\section{Conclusion}

As you can see, document preparation can be like writing a program. Structured
thinking can lead to neatly typeset documents with the help of LaTeX.

\end{document}
```

The output of the above LaTeX file is in the following pages.

My First LaTeX document

Gandham Phanikumar

October 11, 2019

1 Introduction

LaTeX allows one to think of typesetting in a structured manner - as opposed to visual manner. For programmers, this could be a natural way of putting down their thoughts.

2 Discussion

One of the important reasons why people choose LaTeX for document preparation is because of the way equations can be written and typeset.

$$\mathrm{erf}(\eta) = \frac{2}{\sqrt{\pi}} \int_0^{\eta} \exp(-x^2) dx \tag{1}$$

Bulleted items can be listed using the itemize environment.

- Each item starts with the item command.
- You can nest them if you wish.

Numbered items can be listed using the enumerate environment.

1. There must be a formulation
2. It follows numerical implementation
3. Then comes the program development
4. Benchmarking is important
5. Original work can show up now

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	program	purpose
1	awk	Line by line processing - numerical and otherwise
2	sed	Line by line processing - string operations
3	python	Interpreted object oriented language
4	sage	Symbolic Computational environment

3 Conclusion

As you can see, document preparation can be like writing a program. Structured thinking can lead to neatly typeset documents with the help of LaTeX.