Introduction to LaTeX

Lecture 1: Hello, LaTeX

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What is LaTeX

From Wikipedia, the free encyclopedia

LaTeX (lah-tekh, lah-tek or lay-tek, a shortening of Lamport TeX) is a document preparation system. When writing, the writer uses plain text in 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-references. A TeX distribution such as TeX Live or MikTeX is used to produce an output file (such as PDF or DVI) suitable for printing or digital distribution. Within the typesetting system, its name is stylised as LaTeX.

Reference: https://en.wikipedia.org/wiki/Latex

Installation of LaTeX

Though there are some other distributions of LaTeX(like MikTeX), TexLive is recommended in this lecture.

Windows & Linux

Download TeXLive on the following website (a mirror provided by HUST, Huazhong University of Science and Technology)
http://mirror.hust.edu.cn/CTAN/systems/texlive/Images/

MacOS

Download MacTeX on the following website
http://tug.org/mactex/mactex-download.html

Linux (Ubuntu or Debian)

Enter the command (fast if you have mirror apt sources)

```
sudo apt-get install texlive-full
```

Selection of IDEs

There are various IDEs recommended that support LaTeX, for example

Texmaker

http://www.xm1math.net/texmaker/

Sublime Text

http://www.sublimetext.com/

Follow the instructions on https://www.zhihu.com/question/36038602

Atom

http://www.atom.io/

And install the package atom-latex

They all have cross-platform support for Windows, Linux and MacOS.

Documentation on your computer

If you've installed a full version of TeXLive (as strongly recommended), the LaTeX documentation about all you want to is in front of you.

Open the command line and input the command
texdoc docname

You can also use the online version http://www.texdoc.net/

For example, you can use the following types for the docname

tex	about TeX
article	about documentclass article
beamer	about documentclass beamer (used to create slides)
pgf	about TikZ and PGF (used to draw graphs)

Try to texdoc about all new things and then you'll be an expert in LaTeX.

1 Getting Started

2 The Introduction Area
- A simple document
- Basic document classes
- Use packages
- Title page

3 Document Body

A simple document

A typical (simplest) LaTeX example is presented here.

Example

All begins with documentclass

Definition

In a LaTeX file, the first line must be

For example, you can use the following types for the class

ariticle Write a report or an science article

book Write a book

beamer Produce a lecture silde like this!

Some options can be added, like Some details about the article class will be introduced later in the lecture. More features about other classes and options can be found in the LaTeX Document on your own.

The article class

The article class is the most basic class in LaTeX, it provides you with some normalized structure and format for report writing. So usually you will use the following command as the first line of your tex document Some of the options values are listed below (the default values are alerted)

- 10pt, 11pt, 12pt - the font size of the document
- a4paper, a5paper, letterpaper - the size of paper
- fleqn - make the math equations left aligned (default middle aligned)
- leqno - display the serial numbers of math equations on the left (default on the right)
- titlepage, notitlepage - whether to make the title an entire page
- onecolumn, twocolumn - the number of columns of the document
- twoside, oneside - influence the position of something on the page

The beamer class

Read the source code of this project and you will learn much about it ...

Magic of packages

LaTeX is a macro-based language, where most of useful commands are not built-in commands. These commands are defined in various packages, which should be included between and .

Command

There are some very useful packages that you can ALWAYS include:

- amsmath Define various maths environments
- amssymb Define various maths symbols
- geometry Adjust the margin, paper size, and etc.
- enumerate Generate a list like this!
- graphicx Insert image of all types

The usages of these and more packages will be introduced further.

Common packages

Title, Author and Date

It's very useful to generate a title on the first page of a document, in order to achieve it, these commands should first be added between and .

Example

You can simply use to display your system date now.

Then in the document environment (will be introduced in the next section), use the command to generate the title page.

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3. Document Body
    - Body
    - Part, Chapter, Section and Paragraph
    - Learn more - syntax of LaTeX

Main body of document

The main body of your document which starts with and ends with is called the document environment. All of the contents you'd like to display should be in it, and it MUST be unique in the whole file.

Example

The title page and table of contents are also added in this example. The position and order of them can be arbitrary, and there can be multiple table of contents in one document.

Dividing into sections

Command

The default style of sections is like

1 Example Section Name

1.1 Example Subsection Name

1.1.1 Example Subsubsection Name

If a star(*) is added, the sequence number will be hidden, and it won't be added to the table of contents.

Note: (Sub)sections can be sorted into commands, not environments, so it doesn't have and clauses. However, the whole contents between two (sub)sections is belonged to one (sub)section.

Other structures - Chapter, Part and Paragraph

Command

In document classes such as report and book, some outer structures of section (and) can be used.
and are used for the title of small paragraphs in a (sub)section.
If a star(*) is added, the effect is the same.

The common syntax of LaTeX commands

Definition

Command is a word which can be identified by Latex and represents a certain function in output file, or in relation with some specific character or format

All LaTeX commands have the following syntax

\command_name<special_args>[optional_args]{required_args}

special_args Seldom used in basic usage, for certain special usages in some packages

optional_args Used to define mode of the command, if not specified, LaTeX will use the default mode

required_args Must be filled

If you want to connect a letter after a command, a space must be appended after the command or LaTeX won't be able to compile it correctly. But two commands can be directly connected since there is a \ before each command.

The common syntax of LaTeX environments

Definition

Environment is an encapsulated part which has a certain format so that it will not be influenced by outer context

All LaTeX environments have the following syntax

```
\begin{environment_name}<special_args>[optional_args]
...
\end{environment_name}
```

special_args Similar to commands

optional_args Similar to commands

It is recommended to have a tab indent in each environment or your tex codes will be difficult to read by others or even yourself.

Environment in enviornment

Of course, the environments can be nested.

Example

```
\begin{environment_name}
    ...
    \begin{environment_name_2}
        ...
    \end{environment_name_2}
    ...
\end{environment_name}
```

Questions

- A document is default in portrait layout, how to generate a document in landscape layout?
- What happens when a package is imported several times? Based on the fact that some packages use other packages as dependency, try to explain why package conflicts occur. How to avoid this problem?