An Introduction to Using LaTeX

What is LaTeX (lay-teck) or LaTeX, but not latex or Latex?

- LaTeX is an open document preparation system used by many students, academics, and publishers whose content involves technical topics (*e.g.* math professors, engineers, students of Kevin Clarke).
- LaTeX is a markup language which means that the content and structure are described by "tags." If you go to the University of Rochester's website (`www.rochester.edu`) and view the HTML source for the main page it will look (incredibly) different from how that source code is rendered by your browser. LaTeX is much more similar to HTML source than it is to a word processor (*e.g.* MS Word, OpenOffice Writer, Google Documents). When you work with a LaTeX file, you describe how the file should look, but this is not displayed for you in real-time.

Why Would You Use LaTeX?

LaTeX has a number of distinct advantages:

1. A LaTeX document is very pleasing to the eye without the need for any customization.
2. As a graduate student, you mainly produce content and are neither a publisher nor a graphic designer. LaTeX separates content from appearance.
3. LaTeX's ability to incorporate math is un-rivaled.
4. People in this discipline who do things like what you will do will expect it.
5. You will never get locked out from the fruits of your intellectual labor because of licenses or old software. The software is open and the files you create are "flat text" files. If someone has a computer, they can read your LaTeX files.
6. The markup code for LaTeX math is one of the canonical ways of representing math in plain-text environments (*e.g.* email, instant messaging).

How Does LaTeX Work?

The process of creating a LaTeX document is quite different from creating one in a word processor. Although most of the technical details can safely be ignored,

some understanding of the different components comprising a functioning LaTeX system is helpful and very useful when asking for assistance.[1]

The steps to creating a document are:

1. Have an idea!
2. Create a plain text document containing the content in a text editor.
3. Submit the plain text document to the LaTeX binaries.
4. LaTeX pulls in any additional files that are asked for—but they have to be asked for—and creates, among other files, the document you will print or email.
5. View the result/rendering of your LaTeX document.
6. Be happy.

Notice that this is different from the word processor workflow. In that case, Steps 2, 4, and 5 are basically integrated. Step 3 is unnecessary. Step 6 may or may not happen.

Step 2 In the star lab, the Windows machines have the WinEdt text editor. You could use any number of other text editors, but WinEdt is nice because it integrates a lot of the other tools seamlessly. We typically denote LaTeX files with the `.tex` file extension. Although it isn't necessary in some cases, most software and operating systems will make your life easier if you are willing to name LaTeX files what they expect you to name them.

Step 3 You can achieve this either using the WinEdt interface or issuing a command at the command prompt (in most cases, this is no real choice). TeX is different from LaTeX. The differences aren't important here, but know that the TeX buttons will likely not work.

Also, LaTeX-ing your document can proceed through one of two different branches. I will focus on the `pdflatex` branch and not the `latex` branch. `pdflatex` will convert your `.tex` file into a `.pdf` document. Included images must be `.jpg`, `.png`, or `.pdf` files. `latex` will convert your file into a `.dvi` file which you'll eventually convert to a `.pdf`. Included images must be `.eps` or `.ps` files. There are some advantages to the pdf-less `latex` branch, I prefer the `pdflatex` branch and we will walk through this one together.

[1] This section is meant to be accompanied by the workflow diagram available at `http://www.rochester.edu/college/gradstudents/jolmsted/files/teaching/LaTeX/LaTeX_Workflow.svg`.

Step 4 Sometimes various markup in the LaTeX file will require contributed packages which tell the LaTeX binaries how the content should be rendered. However, making sure these packages are placed in the right spot on your system and up-to-date can be involved. LaTeX package managers simplify this. On the machines in the star lab MikTeX is used. By and large, you can and should ignore this fact in the beginning of your LaTeX experience. What is important is to realize the following:

$$\text{LaTeX} \neq \text{WinEdt} \neq \text{MikTeX}.$$

Step 5 In the star lab, Adobe programs are available to view (and edit) `.pdf` files. This can be achieved through the WinEdt interface.

Step 6 No software necessary.

A Simple Task

1. Go to `www.rochester.edu/college/gradstudents/jolmsted/teaching/LaTeX/`.
2. Save the file `FakeFile.tex` to the desktop.
3. Open this file in WinEdt.
4. Run `pdflatex` on the `.tex` file and view it.
5. Run `latex` on the `.tex` file and view it.
6. Notice how many extra files this process creates.

You have successfully created your first LaTeX document and simultaneously learned to always keep LaTeX files/projects in separate directories because the output will create clutter. Consider this a windfall!

Summary

- why you care
- a brief understanding of what LaTeX is and isn't
- how to run LaTeX on a properly specified source file
- how not to store LaTeX files

Next Time . . .

- LaTeX's interpretation of plain text
- `.tex` input file structure
- output file structure
- environments
- error debugging
- solving problems