\textsc{LaTeX} Skills Seminar

David Troendle

University Of Mississippi
Department of Computer and Information Science

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Agenda

1. Introduction to the mark-up language approach to authoring.
2. User friendly editing environments.
3. Basic structure of a \LaTeX\ document.
4. Introduction to packages.
5. Some package examples.
6. Tables.
7. Equations.
8. Figures.
10. BibTeX and bibliography management.
Mark-Up Languages

All documents consist of three parts:

1. **Content** – These are the words, graphics, tables, etc. the author supplies.
2. **Structure** – These are the chapters, sections, subsections, paragraphs, lists etc in a document.
3. **Style** – How content and structure is presented. Samples include margins, line spacing, indentation, numbering, etc.

WYSIWYG word processors combine all three together using a specialized program.

Mark-up languages used a simple text editor for each part and use a rendering program. Specialized IDEs are helpful.

- HTML (content and structure) and style sheets are rendered by web browser.
- \LaTeX \textsuperscript{X} separates content, structure and style text into source files. They are typically compiled to PDF. You only worry about content and structure. There are standard styles (e.g., Turabian). Conferences and journals typically provide style files. Ideal for scientific papers.
Integrated Development Environments

- There are \LaTeX\-aware IDE’s.
- A comprehensive list of IDE’s can be found [here](#).
- Some good ones are:
  - [Texmaker](#) (Linux/Mac/Windows)
  - [TeXStudio](#) (Fork of Texmaker) (Linux/Mac/Windows)
  - [WinEdt](#) (Windows)
- Major features are:
  - \LaTeX\-aware editor.
  - Helps with structure, equations, etc.
  - Single key compile.
Basic structure of a LaTeX document

- % – Comment rest of line.
- \ – Escape character, especially begin content/structure command.
- \{···\} – Options to command or group as is.
- Sample LaTeX document follows. Video is here:

```latex
\documentclass{article}  % Simple article.

% Packages and configuration commands go here.

% Document body.
\begin{document}
  % Content and structure commands go here.
  Hello \LaTeX{}
\end{document}
```
Basic structure of a \LaTeX{} document

Conferences

- Go to conference website.
- Search for authoring instructions.
- You will almost always find a sample document and class (style) files.
- Get the sample files.
- Compile using your favorite \LaTeX{} IDE.
- Fix any errors. Most often these are missing packages (discussed later).
- Familiarize yourself with the sample document.
- Morph the document into your paper.
- Compile often. Don’t let unbalanced parenthesis and braces get out of control. The sooner you fix them the easier.
- Video of HPCA 2016 process is here.
Introduction to Packages

- The art of \LaTeX\ lies in mastering packages.
- A package enhances \LaTeX\’s content and structure capability.
- Packages are usually subordinate to style. If a structure or content conflicts with style, style usually wins. There is usually a way to override style.
- For instance, if you type multiples space, most styles will replace it with one. If you want to override the style, you can type a $\sim$ for each space.
- The Comprehensive \TeX\ Archive Network (CTAN):
  - Over 5,000 packages.
  - Complete documentation for each package.
  - Searchable URL: https://www.ctan.org.
- Under Windows, WinEdt automatically downloads packages.
- In Ubuntu you must use Software Center to download \LaTeX\ packages. Search for CTAN.
Example of Packages

- How to include images video is [here](#).
- How to include side-by-side images video is [here](#).
- Handling abbreviations video is [here](#).
- Handling itemizations video is [here](#).
- Handling enumerizations video is [here](#).
- **PGF/TikZ** is a powerful package for creating graphics. Computer science examples can be found [here](#). Video of a simple CS example is [here](#).
- **Graphviz** is a powerful graph visualization tool. A gallery is [here](#). Easiest way to use it is to generate an “eps” file and include that as a graphic. It can integrate into **\LaTeX** (see this [link](#)), but is not easy to use it this way. You must adjust your IDE’s compile steps.
Tables and Colors

▷ A nice color palette is here.
▷ The corresponding \texttt{\LaTeX} input file is here.
▷ Table documentation is here.
▷ The easiest way to make a table is with an online tool.
▷ \textbf{This one} is easy to use.
▷ A video showing how to make a table is here.
Equations

- The full documentation for the amsmath package at CTAN here.
- WikiBooks has a good document here.
- Most IDEs help with equations to some extent. LyX is an example of an IDE that has strong equation support.
- The easy way is to find the formula you want in Wikipedia and copy it.
- This video shows one way.
Figures

- The best way to create a figure is use a tool that can create a “eps” file and then include it as a graphics.
- An advantage of this approach is there are “eps” file editors that can make finishing touches. Inkscape is a good multi-platform editor.
- We need to find out how to display an “eps” file. This video shows how.
- This video shows how to create a graph in an “eps” file using Calc.
- This video shows how to create a graphic in an “eps” file using Draw.
Using Google to Solve Problems

- **\LaTeX** is a large package that can be tricky to use, especially if you are trying to override style.
- Terminology may be hard to guess.
- Use Google to search for a solution. Always put “latex” as the first search term.
- If you have an error message, include it in the search.
- If you are stuck and need to ask for help, do not ask someone to solve the problem for you. Rather, ask them to show you how to solve the problem.
- If you have made a reasonable effort, I am willing to help by showing you how to solve the problem. I won’t solve it for you. I am usually on campus Wednesdays and Fridays.
Bibtex and Bibliography Management

- Bookmark **UMissMe**.
- An important part of writing a scientific paper is your bibliography.
- **\LaTeX** uses the **BibTeX** format for citations.
- **JabRef** is a good multi-platform program for managing a library of papers and citations in BibTeX format.
- A contrived example video showing the process is [here](#). The HPCA 2016 template was morphed into a document on two of my favorite algorithms – Quicksort and FFT. The video shows how to find the seminal papers, download them and create a BibTeX file.
Final Thoughts

- Usually the styles are given, and all you need focus on is content and structure.
- This presentation is a counter-example. It is a \LaTeX\ document using the “beamer” style.
- The presentation source is here.
- A Zip file of all files is here (∼28MB).
- Skill requires practice. There are styles for homework assignments. That’s a good way to practice and impress your teacher.