LaTeX 101

LaTeX for absolute beginners

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Setup

Before we begin

- Please turn off your web cam, and mute your microphone.
- Please install the required packages:

  ```
  sudo dnf install texlive-latex texlive-bibtex git
  ```
- This session will be recorded, and the recording shared on the Fedora Youtube channel.
- The materials used in this session will be made available on Github.

LaTeX?

What is LaTeX?

TeX (pronounced *tech*)[1]:

- a typesetting program:
  - typesetting: formatting documents (articles, presentations, posters, pamphlets . . .).
  - focusses on appearance, rather than structure/content.

[1] Pronunciation of TeX.

[2] Levels of TeX.

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LaTeX (pronounced *la-tech*)[2]:

- set of macros (commands) built over TeX:
  - makes it easier to use, to quickly carry out common tasks.
  - lets the author focus on content.

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LaTeX:

- is Free software: it is free to use, share, modify, and study:
    - enables Open Science.

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- is easy to use (as you will see).

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- is available on Linux, MacOSX, and Windows.
- is easy to use (as you will see).
- has minimum requirements:
  - is written in plaintext: so any editor will do, and version control can be used (git!),
  - required LaTeX packages.

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- has minimum requirements:
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  - required LaTeX packages.
- generates easy to read, clean documents[3].

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Using LaTeX

Requirements

- a text editor, any text editor[4]: vim/emacs/gedit/atom/geany/. . . .
- LaTeX packages.

[4] Microsoft Word is not an editor. It is a text processor—it does not generate plaintext as output.

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- a text editor, any text editor[4]: vim/emacs/gedit/atom/geany/. . . .
- LaTeX packages.
- IDEs speed up writing:
  - Overleaf (web based).
  - Texmaker.
  - LyX.
  - Vim/Emacs/Atom/. . . + plug-ins.

[4] Microsoft Word is not an editor. It is a text processor—it does not generate plaintext as output.

Document structure

```latex
% Comments start with a %
% Comment blocks are not supported!
\documentclass{...}

% This region is called the preamble.
% Commands that setup the whole document go here.
% Such as inclusion of packages.

\begin{document}

% The text of the document goes here.

\end{document}
% Anything here will not be processed.
```

Document classes

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  - . . .
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```
% Let us write an article
\documentclass[a4paper]{article}
```

The preamble

- Commands for the whole document: commonly: inclusion of packages.
    - Packages provide extra functionality[5].

```
% Use Opensans fonts
\usepackage[default,osfigures,scale=0.95]{opensans}
% Use the hyperref packages for better links
\usepackage{hyperref}
% A title?
\title{An example \LaTeX{} document}
% The author?
\author{A. Human}
```

[5] Search CTAN for packages, and documentation

The text!

```
% Let LaTeX format the title
\maketitle
% Some text?
\LaTeX{} is easy!
```

The source file so far

```
% Filename: example-doc.tex
\documentclass[a4paper]{article}
\usepackage[default,osfigures,scale=0.95]{opensans}
\usepackage{hyperref}

\title{An example \LaTeX{} document}
\author{A. Human}

\begin{document}
\maketitle

\LaTeX{} is easy!

\end{document}
```

Generating the document: I

```
$ ls
example-doc.tex
$ latex example-doc
...
$ ls
example-doc.aux  example-doc.dvi  example-doc.log
example-doc.out  example-doc.tex
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- But, PDF is most common now. So:

```
$ pdflatex example-doc
...
$ ls
example-doc.aux  example-doc.dvi  example-doc.log
example-doc.out  example-doc.pdf  example-doc.tex
```

- View it with your favourite PDF viewer (Evince/Okular/Adobe/Zathura/…)

Text structures: sections, lists

```latex
\section{Our first section}
This is a new section.

\subsection{Lists}
\begin{itemize}
  \item An itemised list!
\end{itemize}

\begin{enumerate}
  \item A numbered list
\end{enumerate}
```

- Save, re-run `pdflatex`, view.

Text structures: mathematics

```
\begin{equation}
  h^2 = b^2 + p^2
\end{equation}
where \(h\), \(b\), and \(p\) are the lengths of the
hypotenuse, the base, and the perpendicular of a
right angled triangle respectively.
```

- Save, re-run `pdflatex`, view.

More text structures

- tables,
- figures, subfigures,
- headers, footers,
- source code snippets,
- algorithms,
- theorems,
- timelines,
- margin comments,
- indexes, glossaries,
- ...

Citations and referencing

Citations and referencing with BibTeX

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- A plethora of Free/Open source bibliography managers are available, almost all of which, support BibTeX:
  - JabRef.
  - Wikindx (Web based).
  - Zotero (Local and Web interfaces).

Citations and referencing with BibTeX II

- An example BibTeX entry:

```
% Save as mybib.bib in the same directory
% as the document
@Misc{RedHat2008,
author = {RedHat},
title  = {Fedora Project},
date   = {2008},
year   = {2008},
}
```

Citations and referencing with BibTeX III

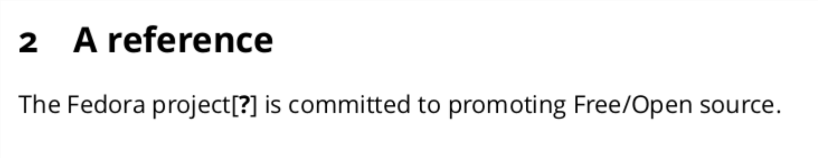
```latex
% Cite a reference in the text:
\section{A reference}
The Fedora project community\cite{RedHat2008} is committed
to promoting the Free/Open source philosophy.

% A list of citations
\bibliographystyle{plain}
\bibliography{mybib}
```

- Save, re-run `pdflatex`, view.

Citations and referencing with BibTeX IV

```
$ pdflatex example-doc
LaTeX Warning: There were undefined references.
```



2 A reference

The Fedora project[**?**] is committed to promoting Free/Open source.

Citations and referencing with BibTeX V

- Multiple passes are needed to generate the document. Simply:
  - the locations of the citations are stored in the first pass,
  - the bibliography is processed next,
  - the locations are completed with the required text.

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$ pdflatex example-doc && bibtex example-doc \
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- Most IDEs permit setting up the complete chain of necessary commands.
- Terminal users, try Latexmk (Yes, it's available in Fedora).

Collaborative writing

Using Git/Github

- Plaintext: multiple people can work on different parts of the text together.
- Use the power of version control (instead of this!)
- Can follow the standard pull/merge model.

[6] Include vs input

Using Git/Github

- Plaintext: multiple people can work on different parts of the text together.
- Use the power of version control (instead of this!)
- Can follow the standard pull/merge model.
- A few tips:
  - Write each sentence on a new line: this helps git to merge easily, since git looks fir differences between lines.
  - Break the main text into smaller files using `include` or `input` commands[6].

[6] Include vs input

Using Git/Github II

```
\begin{document}
% Let LaTeX format the title
\maketitle
% The text of the document goes here.

% sections in different files
\input{section1}
\input{section2}
\input{section3}

\bibliographystyle{plain}
\bibliography{mybib}

\end{document}
```

Epilogue

Common issues

- It isn't WYSIWYG (what you see is what you get, like Word)
    - That is the whole point: stop thinking about how it'll look. LaTeX will take care of that. Focus on writing the text!

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- I don't know Git:
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- Error messages are hard to understand:
  - Remove bits of the text to isolate what is causing the error. If that doesn't work, ask for help.

fedoraproject.org/wiki/Classroom

docs.fedoraproject.org/en-US/neurofedora/latex/