What is LATEX and Why Should You Use It?
Using LATEX to Create an Electronic Thesis
Summary

Creating a UW Electronic Thesis with LATEX

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What is LaTeX and Why Should You Use It?
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Outline

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What Is LaTeX Anyway?
Why Use LaTeX Instead of . . . ?

LaTeX The Language

- LaTeX (Lamport 1983) is a mark-up language for printed documents, much as HTML is a mark-up language for Web documents.
- It's actually a set of higher level macros written in the TeX language (Knuth 1977).
- LaTeX and TeX produce documents according to established typesetting practices.
- Output was designed to be "device independent" (DVI). Post-processing tools turn DVI into PS, PDF, *etc.*
- Formatting mathematics was especially important in the design.

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LaTeX The Document Formatting System

- Beyond the language, LaTeX is a set of programs that process the marked-up document.
- Main members of the suite include:
    - **latex** — the main document processor (creates DVI files)
    - **pdflatex** — creates PDF output directly
    - **metafont**, **metapost** — font generation tools
    - **bibtex** — processes bibliographic citations
    - **makeindex** — processes index entries
    - **dvips** — converts device-independent output to PS

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Other Applications Bundled into a Distribution

- A LATEX distribution consists of the core programs, plus others for convenience:
    - **ghostscript**/**ghostview** — PS and PDF viewer and converters
    - **yap** — or other DVI output viewer
    - **dvipdfm** — converts device-independent output to PDF
    - **acrobat** — Adobe's PDF viewer
- LATEX distributions are often developed around a particular OS.
- **MikTeX** is recommended for Windows, **MacTex** for the Mac, **TeXLive** for Linux (and is also cross-platform).

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Editors and Front-Ends for LATEX

- Since LATEX input files are just plain text, any editor will do.
- However, more sophisitcated environments for document creation can be convenient.
- Some prefer an IDE-style editor/compilers like **TeXMaker**, **TeXnicCenter**, **WinEdt**.
- Others prefer a more WYSIWYG-like environment such as **LyX**.
- All of the above are freeware or shareware. There are also **commercial** applications:
    - **Scientific Workplace** — A WYSIWYG front-end
    - **TeXtures** — An IDE-style environment for the Macintosh

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Advantages of LaTeX

- It's free software.
- Document files are plain text (small and portable).
- It separates the content from the look of the document.
- Numbering of document structures is automatic.
- It handles large, complex documents with ease.
- It is great for formatting complex mathematics.

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LATEX and PDF
Postscript Fonts
Hyperlinks
Margins and Page Dimensions

LATEX and PDF

- A UW electronic thesis can be created entirely with LATEX and other free software.
- There are **two** methods for creating the PDF:

  latex Input file $\Rightarrow$ DVI $\Rightarrow$ PS $\Rightarrow$ PDF

  Or Input file $\Rightarrow$ DVI $\Rightarrow$ PDF

  pdflatex Input file $\Rightarrow$ PDF

- The main difference between **latex** and **pdflatex** is in the type of graphics that each allows.

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latex — Tried and True

- Create drawings in EPS format.
- Convert any photos to EPS as well.
- use **dvips** as the output driver option for `graphicx` and `hyperref` packages.
- Use **latex** to create DVI
- Use **dvips** (with the **-Ppdf** option) to create PS.
- Use **Acrobat** or **GSview** to create PDF.
- **Alternate Method**: Use **dvipdfm** to convert DVI to PDF.
- Advantage: Most standard and portable method.

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pdflatex — Fewer Steps

- Create drawings in PNG format, or convert EPS to PDF.
- JPEG or TIFF bitmapped photos may be used directly.
- use **pdftex** as the output driver option for `graphicx` and `hyperref` packages.
- Use **pdflatex** to create PDF directly.
- Advantage: Convenience
- Disadvantage: More work needed for print publications to convert figures.

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Postscript Fonts 1

- By default LATEX uses the Computer Modern font in bitmapped format.
- This is fine for printed documents, but not good for generating PDF (not scalable).
- LATEX allows use of Type 1 PS fonts, and there is a Type 1 version of Computer Modern bundled with most distributions.
- It is necessary to ensure that a PS font is used when processing your thesis.
- This is done when processing DVI to PDF (automatically with **pdflatex**).

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Postscript Fonts 2

- Type 1 PS fonts may be selected for your thesis by adding a package *e.g.*,
  \usepackage{times,pstimesm} in the preamble.
- Note that not all PS fonts have all the math symbols. If not, Computer Modern is used.
- Best fonts to use if you're typesetting math are:
    - Computer Modern (think twice before changing!)
    - Times-Roman (packages times and pstimesm for math)
    - LucidaBright (package licidbry — commercial fonts!)
- When using the default Computer Modern font, and **latex** formatter, use **dvips - Ppdf** to ensure the PS fonts are being used to create the PS.

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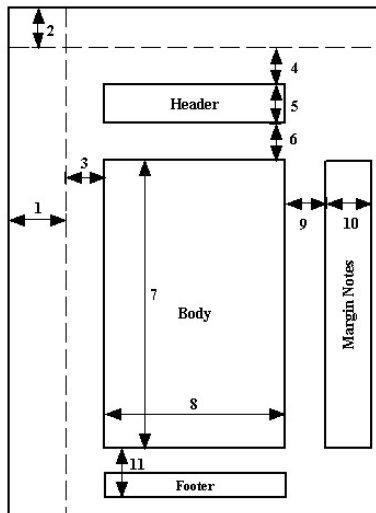
`hyperref` Package

- The `hyperref` package automatically hyperlinks your document's table of contents, references, cross-references, *etc.*
- List `hyperref` as the last added package in the document preamble.
- `hyperref` needs a DVI driver as an option:

    dvips   A common DVI to PS driver
    pdftex For users of **pdflatex**
    dvipdfm The DVI to PDF driver that comes with MikTeX

- Add your own hyperlinks with `\href{URL}{link text}`

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Setting Margins and Page Dimensions

- Make sure you check the current Thesis Regulations and Guide (from the Grad Studies Office)
- Page layout dimensions are set in the document preamble.
- Use the \setlength command to change the defaults, *e.g.*,
  \setlength{\marginparwidth}{0pt}

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Page Dimensions Defined

1. **One inch + \hoffset**
2. **One inch + \voffset**
3. \oddsidemargin
4. \topmargin
5. \headheight
6. \headsep
7. \textheight
8. \textwidth
9. \marginparsep
10. \marginparwidth
11. \footskip

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- LATEX is an excellent choice for a technical thesis.
- LATEX has all the tools to create a UW electronic thesis.
- Just keep in mind proper PS fonts and graphics formats.
- Use `hyperref` to hyperlink your thesis.
- Make sure you check the Thesis Regulations and Guide!
- Make use of the UW LaTeX Thesis Template