CSIP5403: Research Methods and Applications

Lecture 8: Typesetting Documents with LaTeX

Basic document structures

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Outline

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LaTeX is

- a document preparation system widely used in the fields of mathematics, spreading to many other disciplines
- a *typesetting* program, not a word processor
- a set of markup commands for the preparation of a wide variety of documents
- totally open software system and platform independent

LaTeX contains features for:

- Typesetting journal articles, technical reports, books, and slide presentations
- Control over large documents containing sectioning, cross-references, tables and figures.
- Automatic generation of bibliographies and indexes
- Multi-lingual typesetting
- Inclusion of artwork, and process or spot colour
- Typesetting of complex mathematical formulae

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Skills Needed

- LaTeX is a very easy system to learn
- Requires no specialist knowledge
- Assumed that you are familiar with using a computer

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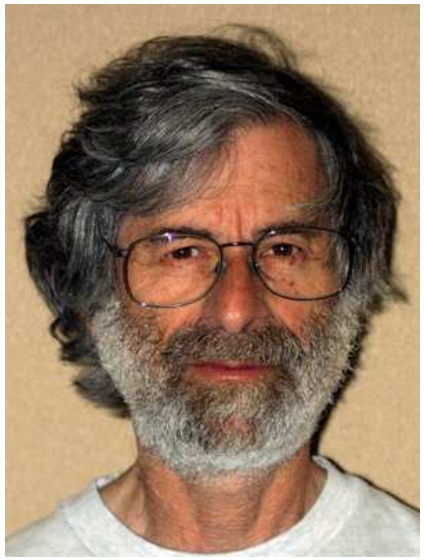
We are using LaTeX 2$_\varepsilon$

LaTeX 2$_\varepsilon$: A descendant of LaTeX designed by Leslie Lamport (1985), based on TeX originated by Donald E. Knuth (1978)



Leslie Lamport

Donald E. Knuth

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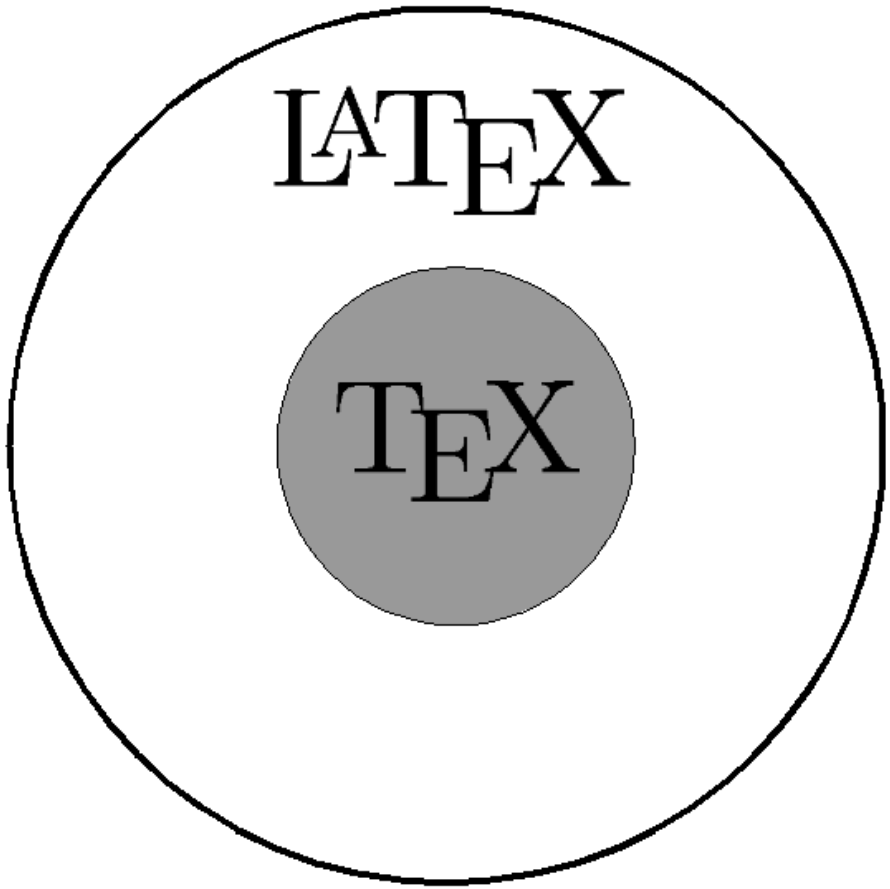
LaTeX is built on top of TeX



How to install LaTeX

- How to install LaTeX depends on the platform to be used
- Go to http://www.latex-project.org/ where you will find all the information and links needed to get LaTeX for any platform
- The necessary material for the installation of LaTeX under Windows can be downloaded from http://www.tug.org/protext/
- To install LaTeX on a Mac go to http://www.tug.org/mactex/
- To install LaTeX under Linux open Synaptic Package Manager, search for texlive and mark it for installation

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LaTeX is not a WYSIWYG program

There is no graphic interface with LaTeX to allow the visualisation in real time of the document we are creating

Compilation Process

Set of instructions that are applied to the *source file* (plain text file) produces an output file (for example a PDF file)

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The LaTeX Source File

- LaTeX source file is a **plain-text** file
- its suffix is `.tex`
- can be edited with any editor (WordPad, WinEdt, . . .)
- We use WinEdt (Windows platform – shareware) or Texmaker (free cross-platform LaTeX editor) for this purpose and therefore we recommend both
- In a LaTeX source file, the text is typed along with 'commands' to identify the important parts of the document by name

  title, section, figure, etc.
- LaTeX does all the formatting automatically in the compilation process

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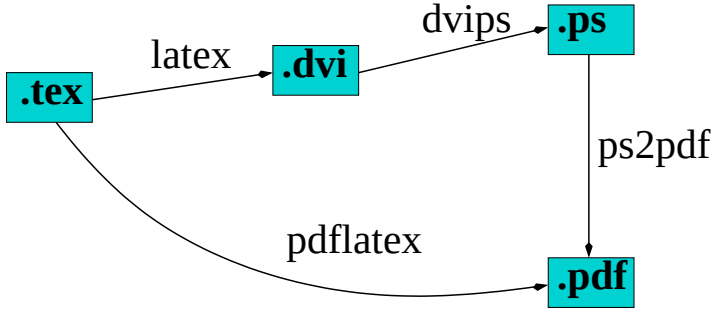
Compilation Process *Steps*

Step 1. Create and Save the LaTeX Source file: myfile.tex

Step 2. Run LaTeX Click on the LaTeX toolbar icon;
or type latex myfile in a command window



Step 3. Preview document: Click on the DVI Preview toolbar icon;
or type yap myfile

Step 4. Print it: Click on the print toolbar icon within the previewer

If you want to generate a pdf output then you can:

a. After Step 2: open myfile.ps with GSview and convert to pdf or
dvips myfile.dvi (myfile.ps) $\Rightarrow$ ps2pdf myfile.ps (myfile.pdf)

b. After Step 1: pdflatex myfile.tex (myfile.pdf)

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Text and Commands

- The source file contains more than just text
- Markup commands that control the formatting or indicate the structure

NOTE

Important to recognise what is text and what is a command

LaTeX Commands

- a certain single character that cannot be used as text character

  or
- a backslash \ followed by either:
  - a single non-letter

    or
  - a string of letters (name of the command)

NOTE

LaTeX is case sensitive!
Enter all commands in lower case unless explicitly directed to do otherwise

LaTeX Commands

Single characters

$ & # % _ { } ^ ~

Backslash plus a single non-letter

\% to print the % symbol

Applies to all the special characters

Backslash plus a string of letters

noindent

These commands end with the first non-letter (space or another command)

LaTeX Commands Arguments

Required arguments are placed in curly brackets { }

$$\textit{chapter}\{\text{Poetic Form}\}$$

Optional arguments are placed in square brackets: []

$$\textit{documentclass}[12\textit{pt}]\{\text{article}\}$$

commands without arguments

$$\textit{noindent}$$

The Basic Structure of a LaTeX Source File

Every LaTeX Source File contains a *preamble* and a *body*

```
% This is myfile.tex
% notes to yourself can go here

\documentclass[options]{style}
 optional specifications
 — e.g., declaring use of packages

\begin{document}
⋮
\end{document}
```

} Anything following % is ignored (used for comments).

} *Preamble* (blank lines do not matter)

} *Body* This is the document environment.

All that follows is ignored (could be used for comments).

Example of a LaTeX Source Document: myfile.tex

```
\documentclass[12pt]{article}
\begin{document}
\section{Simple Text} % This command makes a section title.

Words are separated by one or more spaces.  Paragraphs are separated
by one or more blank lines.  The output is not affected by adding
extra spaces or extra blank lines to the input file.

\noindent Emphasized text is typed like this: \emph{this is
emphasized}. Bold text is typed like this: \textbf{this is bold}.

\subsection{A Warning}  % This command makes a subsection title.

The single characters  \$  \&  \#  \% \_ \{ \} \^{} \~{} and
\textbackslash all have special meanings. Remember, don't type them
except as directed! The first nine can be printed by typing a
backslash in front of them.

\end{document}
```

The Document Class Declaration

The first information LaTeX needs to know is the type of document

$$\backslash documentclass[options]\{class\}$$

MAIN DOCUMENT CLASSES

`article` for articles in scientific journals, presentations, short reports, program documentation, invitations, ...

`report` for longer reports containing several chapters, small books, PhD theses, ...

`book` for real books

Document Class Options

Separated by commas

- `10pt`, `11pt`, `12pt`
- `a4paper`, `a5paper`, `b5paper`, `letterpaper`, `legalpaper`, `executivepaper`
- `landscape` – default is portrait
- `titlepage`, `notitlepage` – select if separate title page
- `fleqn` – default is centred
- `leqno` – default is right
- `onecolumn`, `twocolumn`
- `twoside`, `oneside` – except for book class
- `openright`, `openany` – where chapters start (book)

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The Preamble

- The area between $\backslash documentclass$ and $\backslash begin\{document\}$ is called the *preamble*
- Include commands that influence the style of the whole document, or
- Load packages that add new features to the LaTeX system.
- To load such a package you use the command

$$\backslash usepackage\{\ldots\}$$

Example

To include graphics in a document we use the following package

$$\backslash usepackage\{graphicx\}$$

The Document Environment

- The body of the document is enclosed between two commands which identify the beginning and end of the actual document:

$$\begin{document}$$
$$\vdots$$
$$\end{document}$$

- Text goes where the dots are
- Anything after $\end{document}$ will be ignored by LaTeX

How to Create the Title

1. *title*{Here goes my title}
2. *author*{Here goes my name and details}
3. *date*{*today*}
3. *maketitle*

The order of the first three commands is not important, but the maketitle command must come last.

Sections

- Part – *part* – Only in books and reports
- Chapter – *chapter* – Only in books and reports
- Section – *section* – Not in letters
- Subsection – *subsection* – Not in letters
- Subsubsection – *subsubsection* – Not in letters
- Titled paragraph – *paragraph* – Not in letters
- Titled subparagraph – *subparagraph* – Not in letters

Title of the part, chapter, etc. goes in curly brackets after the command

LaTeX automatically calculates correct numbering and prints the title in bold

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LaTeX Environments

- The pair \begin{document} . . . \end{document} is an example of a common LaTeX structure called an environment
- All environments start with \begin{...} and end with \end{...}, putting the name of the environment in the curly brackets

Example

Use the name **center** to centre text

LaTeX Environments

- Arrays
- Lists
- Equation
- Table
- Figures
- Quotations
- References – Bibliography

Next . . .

The above plus

- Abstract, Table of Contents
- Footnotes, Margin Notes
- Spaces and Boxes
- Page Styles, Type faces
- Math formula
- Cross References
- and more . . .

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Free Guides

Tobias Oetiker.

The (Not So) Short Introduction to LaTeX 2ε.

ftp://ctan.tug.org/tex-archive/info/lshort/

Peter Flynn.

A beginner's introduction to typesetting with LaTeX 2ε.

http://www.ctan.org/tex-archive/info/beginlatex

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Books

Leslie Lamport.
LaTeX: A Document Preparation System.
Addison-Wesley, 2nd edition, ISBN 0-201-52983-1

Frank Mittelbach, Michel Goossens, Johannes Braams, David Carlisle, Chris Rowley.
The LaTeXCompanion
Addison-Wesley, 2nd edition, ISBN 0-201-36299-6

Helmut Kopka, Patrick W. Daly
A Guide to LaTeX
Addison-Wesley, 4th edition, ISBN-10: 0-321-17385-6

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