

L^AT_EX



LaTeX Overview

CSI 500

Course material derived from:

Lamport, L. (1994). *L^AT_EX: a document preparation system: user's guide and reference manual*. Addison-Wesley.

What is LaTeX ?

- LaTeX is a system for producing high quality technical documentation
 - widely used in academia and scientific publishing
 - offers precise control over document layout, formatting, and design
 - powerful mathematical equation support
- LaTeX is not an editor or word processor!
 - user enters in content (text, tables, equations, graphics)
 - user enters in formatting command sequences
 - system "compiles" the document into a printable form
- LaTeX is derived from the earlier Tex typesetting system
 - originally created by computer scientist and author Donald Knuth in the 1970s

LaTeX document basics

- document preamble begins with `\documentclass` command
 - global document settings and parameters
- document must include `\begin{document}` `\end{document}` pair
 - includes comments, content and commands
 - comments indicated by %
 - content is just text
 - commands indicated by `\cmd_name`
 - extra spaces and line breaks are IGNORED
 - What You See Is What You Get (WYSIWYG) in other editing systems does not hold here

```
% Hello_world.tex
\documentclass[11pt]{article}
\pagestyle{plain}
```

```
%% opening
\title{Hello World}
\author{Your Name Here}
```

```
\begin{document}
```

```
\maketitle
```

```
\begin{abstract}
This is our first LaTeX
document.
\end{abstract}
```

```
\section{Greetings}
Hello world from \LaTeX !
\end{document}
```

preamble

document

LaTeX code and resulting typeset document

```
% Hello_world.tex
\documentclass[11pt]{article}
\pagestyle{plain}

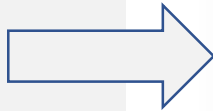
% opening
\title{Hello World}
\author{Your Name Here}

\begin{document}

\maketitle

\begin{abstract}
This is our first LaTeX
document.
\end{abstract}

\section{Greetings}
Hello world from \LaTeX !
\end{document}
```



Hello World

Your Name Here

January 7, 2018

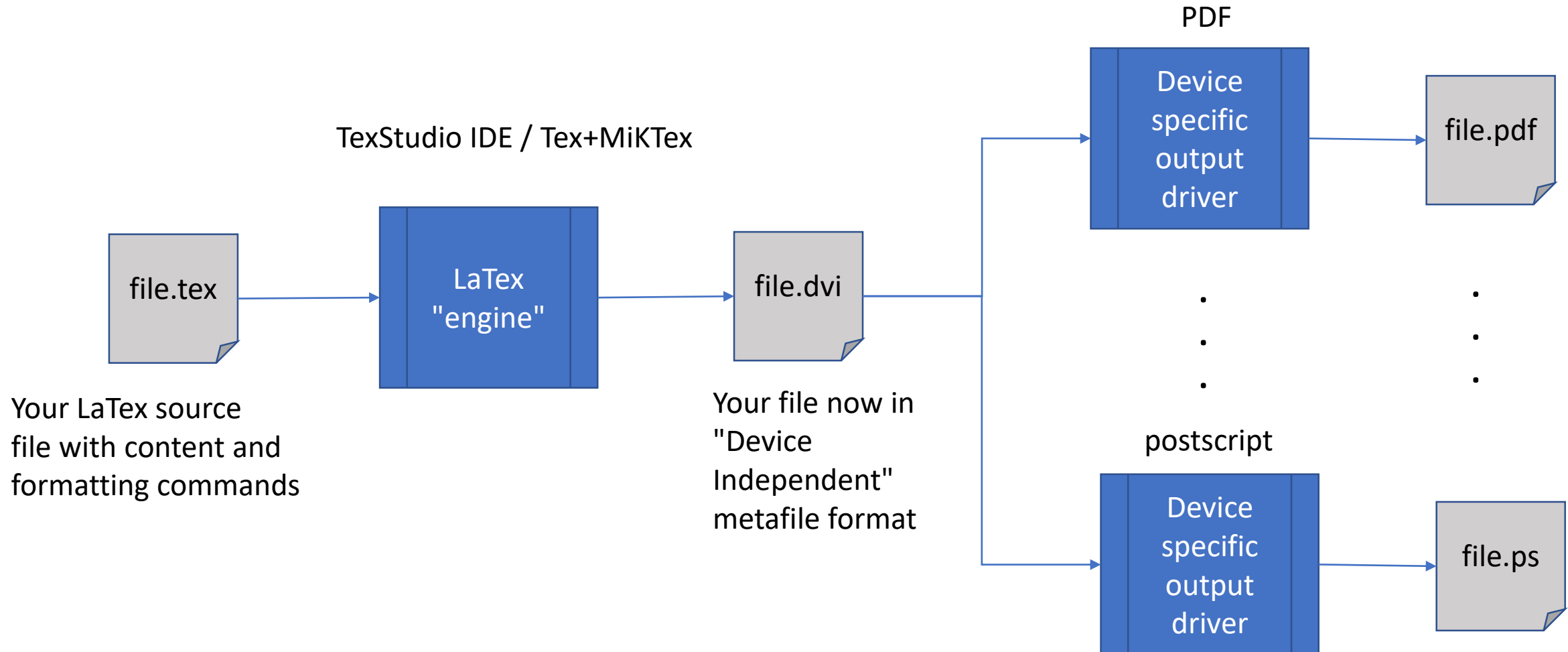
Abstract

This is our first LaTeX document.

1 Greetings

Hello world from \LaTeX !

The LaTeX workflow



Document Classes

- All LaTeX documents must have a specified *classname*
- Used at the beginning of the preamble to indicate general form
 - `\documentclass{ classname }`

LaTeX Document Classes

book

used for full length textbooks, novels, etc

report

used for technical reports, lab reports,
scientific publications

article

used for journal and conference papers

letter

used to write snail-mail letters

slides

used for presentation slides

Class options

- LaTeX classes may include options to control global formatting
 - examples:
 - `\documentclass[11pt, twosided]{article}`
 - `\documentclass[10pt]{letter}`
 - `\documentclass[12pt, twoside]{book}`

font size

10pt, 11pt (default), 12pt

paper size

letterpaper, a4paper

specify paper (std is 8.5x11 in)

two column format

twocolumn

prints content using 2 columns

two sided format

twoside

sets margins for L-R printed output

landscape orientation

landscape

rotate paper 90 deg

draft mode

draft

double spaced content

Packages

- LaTeX documents may import "packages" of predefined commands and settings
 - useful for standardizing "look and feel"
 - offer some extended features beyond default packages
- Indicated in the preamble before the `\document{begin}` command
- Examples:
 - `package{ fullpage }`
 - `package{ latexsym }`

`fullpage`

sets top, bottom, left, right margins to 1"

`any size`

allows you to set margins manually

`\margin size{left}{right}{top}{bottom}`

`multicol`

use specified number n of columns

`\begin{multicols}{n}`

`latexsym`

use LaTeX symbol font

`graphic`

used for images

`\includegraphics[width=x]{imagefile}`

`url`

used for URLs

`\url{http://www.latex-project.org}`

Titles

- LaTeX will automatically generate title info
 - Specify data using commands
 - `\author`
 - `\title`
 - specify new line with `\\`
 - use the `\begin{document}` command
 - Title is created using the `\maketitle` command

```
%% example.tex
\documentclass[11pt]{article}
\pagestyle{plain}
```

```
%%
%% title info here
%%
\title{Example Article}
\author{Steve Scott\\
College of Science\\
George Mason University\\
Fairfax, VA USA\\
sscotta@gmu.edu}
```

```
\begin{document}
\maketitle
```

```
[ rest of doc here ]
```

Example Article

Steve Scott
College of Science
George Mason University
Fairfax, VA USA
sscotta@gmu.edu

January 15, 2018

Abstract

This is an example of a \LaTeX article. It has a title and an author.
It also has some sections.

1 Introduction

This is the Introduction section. It also includes a literature review.

2 Methods

Document Structure

- LaTeX documents conform to a hierarchical structure
- sectioning commands automatically keep track of numbering
- numbering can be suppressed using the * operator

Component	LaTeX Designation with numbering	LaTeX Designation without numbering
part	<code>\part{ title }</code>	<code>\part*{ title }</code>
chapter	<code>\chapter { title }</code>	<code>\chapter*{ title }</code>
section	<code>\section { title }</code>	<code>\section*{ title }</code>
subsection	<code>\subsection { title }</code>	<code>\subsection*{ title }</code>
subsubsection	<code>\subsubsection{ title }</code>	<code>\subsubsection*{ title }</code>
paragraph	<code>\paragraph{ title }</code>	
subparagraph	<code>\subparagraph{ title }</code>	

Note: selective suppression can be done using `\setcounter{secnumdepth}[n]` for headings > x, with chapter having depth 0

Text environments

- LaTeX provides several pre-defined "environments" for special types of text
 - comment
 - quote, quotation
 - verse
- The default environment is *document*
 - You can invoke another environment as needed within your document

```
%% example
```

```
\documentclass[11pt]{article}
```

```
\usepackage{fullpage}
```

```
\begin{document}
```

Here is some normal text. It looks like normal text.

```
\begin{quote}[A. Author]
```

This is a pithy quote in a quote environment.

```
\end{quote}
```

```
\begin{quotation}[A. Famous Writer]
```

This is an even pithier quote, in a quotation environment. Note the indentation for the paragraph.

```
\end{quotation}
```

```
\begin{verse}[Mother Goose]
```

Humpty Dumpty sat on a wall,\\

Humpty Dumpty had a great fall.\\

All the kings horses and all the kings men,\\

Couldn't put Humpty together again.\\

```
\end{verse}
```

```
\end{document}
```

Lists

- LaTeX provides several built-in list formatting environments
- To use, specify `\begin{ list_env }`
 - **enumerate**: provides a numbered list
 - **itemize**: provides a bulleted list
 - **description**: provides a text based list
- Add items using the `\item` cmd
 - `\item text`
 - `\item[label] text` (for descriptions)
- End with `\end{ list_env }`

```
\documentclass[11pt]{article}
\usepackage{fullpage}
\begin{document}
```

Here is some normal text. It looks like normal text.

```
\begin{enumerate}
\item first numbered item
\item second numbered item
\item third numbered item
\end{enumerate}
```

```
\begin{itemize}
\item item one
\item item two
\item item three
\end{itemize}
```

```
\begin{description}
\item[first thing] this is the first thing
\item[second thing] this is the second thing
\item[final thing] this is the final thing
\end{description}
```

```
\end{document}
```

Here is some normal text. It looks like normal text.

1. first numbered item
2. second numbered item
3. third numbered item

- item one
- item two
- item three

first thing this is the first thing

second thing this is the second thing

final thing this is the final thing

References

- LaTeX provides several types of references
 - `\label{marker}` is used to declare a reference
 - `\ref{marker}` is used to invoke the previously declared label
 - `\pageref{marker}` returns the page on which the label was declared
 - `\footnote{text}` generates a footnote number and text at the page footer

```
\documentclass[11pt]{article}
\usepackage{fullpage}
```

```
\begin{document}
```

This example demonstrates LaTeX references.

```
\section{First Section}
```

```
\label{Sec1}
```

Here is some text.

```
\section{Second Section}
```

```
\label{Sec2}
```

Here is some more text. Here we refer to a prior section, `\ref{Sec1}` on page `\pageref{Sec1}`, and refer to a future section, `\ref{Sec3}` on page `\pageref{Sec3}`.

```
\section{Third Section}
```

```
\label{Sec3}
```

Here is more text. Again, we refer to a prior section `\ref{Sec2}`, and make a tangential comment via a footnote. `\footnote{We can add footnotes as well}`

```
\end{document}
```

This example demonstrates LaTeX references.

1 First Section

Here is some text.

2 Second Section

Here is some more text. Here we refer to a prior section, 1 on page 1, and refer to a future section, 3 on page 1.

3 Third Section

Here is more text. Again, we refer to a prior section 2, and make a tangential comment via a footnote.¹