COMP08009 RESEARCH METHODS IN COMPUTING & IT

Dr Martin Kenirons

Martin.kenirons@gmit.ie

Room 344A

Department of Computer Science & Applied Physics

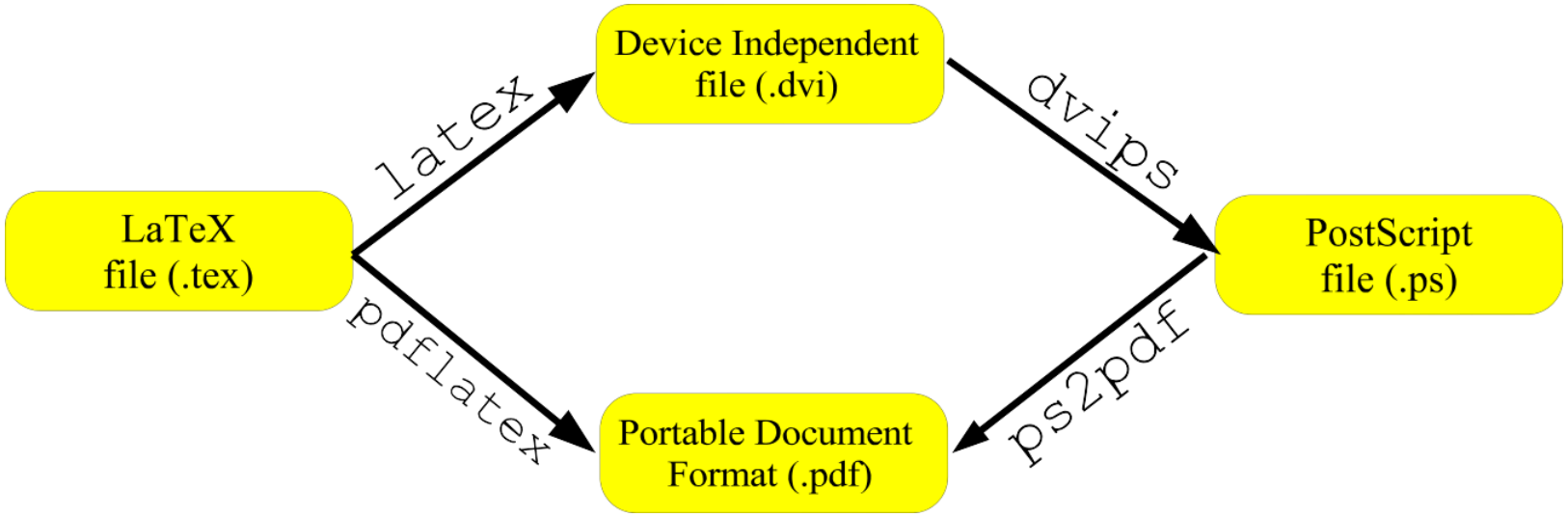
INTRODUCTION

LaTeX is a document preparation system. It is widely used in research publications.

- LaTeX is a set of markup commands used with the powerful typesetting program TeX.
- open software system, free of charge.
- maintained by the LaTeX3 Project group. Hundreds of user contributions.
- Platform Independent.

LaTeX is no word processor! LATEX stimulates placing emphasis on content (**logical markup**) instead of appearance (**typographical markup**).

INTRODUCTION



INTRODUCTION

The LaTeX language

- LaTeX commands always start with a backslash: \
- required command arguments are placed between curly brackets: { }
- optional command arguments are placed between brackets: [ ]
- comments start with a percentage symbol: %
- LaTeX takes care of the spacing between words and paragraphs (just like HTML).
- the commands **\begin**{ }and **\end**{ }create environments.

INTRODUCTION

A .tex file

```
\documentclass[options]{document_class}

% preamble

\begin{document}

% document

\end{document}
```

INTRODUCTION

```
\documentclass[12pt]{article}
\usepackage[english]{babel}

\begin{document}
\section{Introduction}

LaTeX is a document preparation system used to create documents of high quality typography.

It can be used in any type of publication.
\end{document}
```

MIKTEX

- MiKTeX is an up-to-date TeX implementation for the Windows operating system.
  - can be downloaded from http://www.miktex.org
  - contains all LaTeX related binaries, like latex.exe, pdflatex.exe, yap.exe, bibtex.exe, dvips.exe, ps2pdf.exe
  - contains all standard packages (will be discussed later)

COMMANDS

A command is an instruction to LATEX to do something special. Three types of command names:

- the single characters # $ & ~ _ ^ % { } all have special meaning
- to print one of these characters, precede it with a backslash: *\$ \# \%*
- the backslash character \ plus a sequence of letters, ending with the first non-letter*: \large \Large \bfseries*

COMMANDS

Many commands operate on some piece of text, which then appears as an argument in curly braces following the command name.
Examples:

\section{Introduction}

\textbf{bold text}

\begin{document}

COMMANDS

Many commands operate on some piece of text, which then appears as an argument in curly braces following the command name.

Examples:

\section{Introduction}

\textbf{bold text}

\begin{document}

Optional arguments are put into square brackets and mandatory arguments into curly brackets:

\documentclass[11pt]{article}

\usepackage[dutch]{babel}

ENVIRONMENTS

An environment affects the text within it treating it differently according to the environment parameters. This text will not appear centered.

```
\begin{center}
        This text will appear centered.
        This text will appear centered.
\end{center}
This text will not appear centered.
```

DECLARATIONS

A declaration is a command that changes the values or meanings of certain parameters or commands without printing any text. The effect ends when another declaration of the same type is encountered.

This text appears normal while \bfseries this text appears boldface.

DECLARATIONS

A declaration is a command that changes the values or meanings of certain parameters or commands without printing any text. The effect ends when another declaration of the same type is encountered.

This text appears normal while {\bfseries this text appears boldface}. This text is normal again.

```
\begin{center}
\bfseries
This text appears bold.
\end{center}
This text is normal again.
```

LOADING PACKAGES

A package is a set of LATEX commands (or symbols, environments, declarations) stored in a file with the extension .sty. To invoke a package, simply call

\usepackage{package_name}
in the preamble!

Example: LATEX does not have a command to include graphics, so if we want to include graphics in our document, we should load the package graphicx
which defines a new command

\includegraphics

SPACES

Special Characters – Spaces Some rules:
- one blank is the same as a thousand, only the first one counts.
- blanks at the beginning of an input line are ignored.
- blanks terminating a command name are removed.
- the end of a line is treated as a blank.

To force a space to appear where it would otherwise be ignored: \ .
To create a smaller space: \,
A protected space: ~ ensures that certain words remain together.
To force a new line: *newline* or \\

But you should never use \\, but start a new paragraph instead.

SPACES

Special Characters – Spaces Spacing of any desired size may be inserted into the text with the commands

\hspace{10cm}
\hspace{-3mm}*

\hspace has no effect if it should come at the beginning of a line. The *-form will insert the spacing no matter where it occurs. \hfill
The command \hfill is an abbreviation for \hspace{\fill} which inserts enough space at that point to force the text on either side to be pushed to the left and right margins:

Left \hfill Right

Left Right

SPACES

Spaces Vertical spacing is created using the \vspace or \vfill command:

\vspace{10cm}
\vspace{-3mm}*
\vfill

Further commands for increasing the spacing between paragraphs are:

\smallskip
\medskip
\bigskip

SPECIAL CHARACTERS

Quotation Marks
Single quotes are produced with: ` `
Double quotes are produced with: `` ``
Avoid using the double quote character "

He said: ‘Hello world’.
He said: “Hello world”.

SPECIAL CHARACTERS

The package textcomp defines a lot of special characters. First we have to load this package in the preamble:

```
\usepackage{textcomp}
```

Now we can use all the special characters:

```
\texteuro \copyright \textcelsius
```

€ © ℃

```
\today
```

September 12, 2017

DOCUMENT LAYOUT

DOCUMENT CLASS

The first command in a .tex file determines the global processing format for the entire document:

\documentclass[options]{class}

Supported classes are book, report, article, letter or slides.

Supported options:

- font sizes: 10pt 11pt 12pt
- paper size: a4paper letterpaper
- number of columns: onecolumn twocolumn
- print style: oneside twoside
- formula style: leqno fleqn

LOADING PACKAGES

Packages are loaded in the preamble.
A package is a set of LATEX commands (or symbols, environments, declarations) stored in a file with the extension .sty. Important packages:

Package	Description
a4wide	uses smaller page margins, which means that more text fits on one page.
amsmath	contains advanced mathematical symbols
babel	loads hyphenation rules for foreign languages.
europs	loads the Euro symbol: €
fancyhdr	is used to customise headers and footers.
graphicx	defines a command to load external graphics
hyperref	adds interactivity (hyperlinks, bookmarks) to your document.

PAGE STYLE

The package fancyhdr defines a new page style: fancy that the user can easily redefine. Now it is possible to specify the headers and footers manually:

\pagestyle{fancy}
\fancyhf{}
\lhead{...} \chead{...} \rhead{...}
\lfoot{...} \cfoot{...} \rfoot{...}

If you want to distinguish between odd and even pages, it becomes slightly more complicated:

\fancyhead[RO, LE]{...} \fancyfoot[C]{...}

L = Left, C = left, R = right, O = odd, E = even. The command \fancyhf{} clears all headers and footers.

MULTICOLUMN TEXT

• The document class option twocolumn sets the entire document in two columns per page
• Individual pages may be output in one or two columns:

```
\onecolumn
\twocolumn[header text]
```

Please note that these commands start a new page.

• To select a different number of columns within one page, use the multicols environment which is defined in the package multicol:

```
\usepackage{multicol} ...
\begin{multicols}{3}[header text] Text set in 3 columns.
\end{multicols}
```

Title Page

\title{Title text}
\author{Author names and addresses}
\date{Date text}
\maketitle

Use the \and command to define multiple authors: *\author{Homer Simpson\\ hs@gmit.ie \and Bart Simpson\\ bs@gmit.ie}*

Use the \thanks command to create a footnote:
\author{Homer Simpson\thanks{E-mail: hs@gmit.ie}}

ABSTRACT

The abstract is produced with the abstract environment:

```
\begin{abstract}
Text for the abstract.
\end{abstract}
```

In document class report the abstract appears on a separate page (without page number).

In document class article the abstract appears below the title.

SECTIONS AND CHAPTERS

The following commands produce automatic, sequential sectioning:

\chapter{ }	*\chapter*{ }*
\section{ }	*\section*{ }*
\subsection{ }	*\subsection*{ }*
\subsubsection{ }	*\subsubsection*{ }*

- The command \chapter exists in document classes book and report only.
- A * behind the command results in the unnumbered version which will not be included in the table of contents.
- The book class also provides a \part command..

TABLE OF CONTENTS

The table of contents is generated and printed with the command

\tableofcontents

(normally after title page and abstract). All entries are created automatically, based on the sectioning commands. You have to run latex twice to get all references right!

TABLES

The environments array and tabular create tables and matrices. The usage of array is the same as for tabular, but it can only be used in math mode (which will be discussed later).

\begin{array}[pos]{cols}
rows
\end{array}

\begin{tabular}[pos]{cols}
rows
\end{tabular}

The pos argument defines the vertical positioning for the table: t or b (just like for the parbox)

TABLES

The cols argument defines the column formatting. The possible formatting symbols are:
l the column contents are left justified
r the column contents are right justified
c the column contents are centred
p{width} the text in this column is set in a parabox of the specified width.
| draws a vertical line
|| draws a double vertical line

TABLES EXAMPLE 1

```
\begin{tabular}{|l|l|cccc|r|c|}
\hline
\multicolumn{8}{|c|}{Eredivisie 26 maart 2008} \\
\hline & & P & W & D & L & Pts & +/- \\
\hline 1 & PSV & 30 & 19 & 7 & 4 & 64 & 61 - 23 \\
2 & Ajax & 30 & 16 & 9 & 5 & 57 & 79 - 40 \\
18 & Excelsior & 30 & 6 & 5 & 19 & 23 & 29 - 67 \\
\hline
\end{tabular}
```

TABLES EXAMPLE 2

```
\begin{tabular}{lp{0.5\textwidth}r}
\bfseries Model & \bfseries Description &
\bfseries Price \\[1ex]

x & Description of x & 999.00 \\
y & Description of y & 123.00 \\

\end{tabular}
\end{document}
```

CLASS PROJECT

Put together the a report template for your 4th year project.

- Title page
- Abstract
- Table of Contents
- Chapters/Sections/Subsections
- Conclusion
- Appendix

- This should include tables etc……

QUESTIONS ?