



**Writing Your Thesis with LaTeX and It's A Very Long
Title That It Span to Two Lines**

by

**BUDIN BIN BUYUNG
(161150042)**

A thesis submitted in fulfilment of the requirements for the degree of
Doctor of Philosophy

**School of Mechatronic Engineering
UNIVERSITI MALAYSIA PERLIS**

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ACKNOWLEDGEMENT

Many thanks to Prof. Donald Knuth for giving us \TeX , and Leslie Lamport for \LaTeX .

I first heard about \LaTeX as a postgraduate student in Australia. But back then, I have no idea how the \LaTeX works. Then, I started to learn how to **use** \LaTeX for conference/journal paper. I planned to write my Doctor of Engineering (DE) thesis (University of Fukui, Japan) in \LaTeX but somehow my supervisor is more comfortable with standard word processor. So, good bye \LaTeX !!.

Back in Malaysia, I picked it up again because I want to make a \LaTeX template for postgraduate thesis in UniMAP. But, I started with FYP level first. Thanks to the `usmthesis.cls` template provided by Lim Lian Tze.

One thing led to another, and I now conduct trainings and consultations on \LaTeX in UniMAP (for the time being). ☺

Hope everyone can GOT!

Mohd Hanafi Mat Som, DE

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LIST OF ABBREVIATIONS

CGS	Centre for Graduate Studies
PPKMt	Pusat Pengajian Kejuruteraan Mekatronik
USM	Universiti Sains Malaysia
UniMAP	Universiti Malaysia Perlis

LIST OF SYMBOLS

\lim	limit
θ	angle in radians

Menulis Thesis Anda dengan LaTeX dan Ia Merupakan Satu Tajuk yang Sangat Panjang Merangkumi Dua Baris

ABSTRAK

Ini merupakan abstrak Melayu untuk tesis UniMAP. Ianya disediakan dengan sistem penyediaan dokumen \LaTeX .

Writing Your Thesis with LaTeX and It's A Very Long Title That It Span to Two Lines

ABSTRACT

This is the English abstract of a UniMAP thesis. It was prepared with the L^AT_EX document typesetting system.

CHAPTER 1: SAMPLES OF BASIC L^AT_EX

1.1 Background History

Hello and welcome, Universiti Malaysia Perlis (UniMAP) research postgrad! The `unimapcls` class and template files were written in the hope that they may help you prepare your research thesis using L^AT_EX, based on the Centre for Graduate Studies (CGS) requirements (CGS UniMAP, 2017). **Please note that this version is based on the guidelines, in force 2017 onwards.** Also, I would like to give credit to Lim Lian Tze, where this document class is created based on her *usmthesis.cls* Lim (2007b). The explanation beyond this paragraph also heavily edited based on her *usmthesis.cls* document class.

L^AT_EX is powerful and produces beautiful documents. However, there is definitely a learning curve to it – one that is worth the effort. If you find any errors in these templates or documents, or have any suggestions or feedback, do e-mail me about it (mhanafi@unimap.edu.my). The author cannot always guarantee prompt response, however. ☺

MiK_TE_X, my recommended L^AT_EX distribution for Windows, is available on the <https://miktex.org/howto/install-miktex>. Macbook users can opt to install MacTeX <http://www.tug.org/mactex/>. The complete version of MacTeX (over 2 gigabytes of material) installs TeXShop, a GUI front end to TeX, TeX Live 2018, a GUI front end to manage L^AT_EX core and packages, and other important materials. The basic version of MacTeX is lightweight (around 110 megabytes) but require user to install TeX

Live 2018 separately.

1.2 Some Simple Command Usages.

There are plenty of free L^AT_EX tutorials online. This sample thesis includes some examples to do some common tasks. We start with some examples for lists (both bulleted and numbered), highlighting texts in bold and italic, and URLs:

```
\begin{enumerate}
\item bulleted and numbered lists,
\item font effects such as

\begin{itemize}
\item \textbf{bold},
\item \emph{italic}, and
\item \texttt{typewriter-like}
\end{itemize}

\item URLs and e-mail addresses: \url{http://www.mohdhanafi.unimap.edu.
my/template}, \url{dummy.add@outlook.com};
\item citations: see Chapter \ref{chap:review}.
\end{enumerate}
```

Figure 1.1: Common Layout and Formatting Tasks. Note how this long title wraps around I hope it works anyway. Look it needs more, so here's some more longer text. Is that enough? I hope it is.

1. bulleted and numbered lists,
2. font effects such as
 - **bold**,
 - *italic*, and
 - typewriter-like

3. URLs and e-mail addresses:

`http://www.mohdhanafi.unimap.edu.my/template, dummy@outlook.com;`

4. citations: see Chapter 2

Incidentally, if you feel that the lists above are too far apart vertically, you can customise them using the `enumitem` package. The effect is then like the following:

```
\begin{enumerate}[nosep]
\item item one,
\item item two,
\item item three.
\end{enumerate}

\begin{itemize}[nosep]
\item item one,
\item item two,
\item item three.
\end{itemize}
```

Figure 1.2: Compact Lists

1. item one,
2. item two,
3. item three.

- item one,
- item two,
- item three.

Granted, the lists are still wide, but this is because we need to honour the requirement for double line-spacing.

1.3 Special Characters

Bear in mind that certain characters are special \LaTeX symbols and need to be escaped, as shown in Table 1.1.

Table 1.1: Special Characters in \LaTeX

Symbol	Name	Escape code
#	hash, pound	\#
\$	dollar	\\$
%	percent	\%
^	“hat”	\~{ }
&	ampersand	\&
_	underscore	_
{	left brace	\{
}	right brace	\}
~	tilde	\~{ }
~	wide tilde	\$\sim\$
“	open double quotes	“
”	close double quotes	”

Note that for quotation marks, you might prefer ‘‘this’’ and ‘that’ (“this” and ‘that’) instead of "this" and 'that' ("this" and 'that').

If you need to typeset special characters (such as ☹, ☹, ☺, ☹, etc), take a look at the Comprehensive \LaTeX Symbol List. It should be under C: \ProgramFiles\MiKTeX2.9\doc\info\symbols\comprehensive\symbols-a4.pdf if you installed MiKTeX on a Windows machine.

1.4 Useful Resources

(Mittelbach, Goossens, Braams, Carlisle, & Rowley, 2004) is a *very* useful book — but it's quite an investment at RM180++. A worthy one, nevertheless. Roberts (2005) has a website with very good L^AT_EX tutorials at <http://www.comp.leeds.ac.uk/andyr/misc/latex/>, too. Don't forget the famous `lshort` tutorial (Oetiker, Partl, Hyna, & Schlegl, 2006).

You can also find the list compiled by Lim Lian Tze (the template owner of `usmthesis.cls`, which this thesis is based on) at <http://liantze.penguinattack.org/latextypesetting> (Lim, 2007a).

CHAPTER 2: CITATIONS AND BIBLIOGRAPHY

This chapter should have been a survey on the history of $\text{T}_{\text{E}}\text{X}$ and $\text{L}_{\text{A}}\text{T}_{\text{E}}\text{X}$, and a comparison to conventional word processors in preparing academic documents. Due to lack of time on the author's part, and also the abundance of such discussions on the web, we look at ways to prepare the bibliography and citations instead.

2.1 The *.bib File

First of all, bear in mind that your bibliography file (*.bib files) is like a database like Mendeley. That means you can maintain a centralised list, and reuse it for all your publications. $\text{L}_{\text{A}}\text{T}_{\text{E}}\text{X}$ will only list sources that you actually cite in the text for each document, according to the bibliography and citation style you select in each document. But you can still hack it so that your own publications are listed, even if you did not cite it.

```
@BOOK{latex:companion,  
  title = {The {\LaTeX} Companion},  
  publisher = {Addison-Wesley},  
  year = {2004},  
  author = {Frank Mittelbach and Michel Goossens and Johannes Braams and  
    David Carlisle and Chris Rowley},  
  series = {Addison-Wesley Series on Tools and Techniques for Computer  
    Typesetting},  
  address = {Boston, MA, USA},  
  edition = {2nd}  
}
```

Figure 2.1: A BibTeX Entry

As an example, in mybib.bib I created a BibTeX entry with JabRef, the source

text of which is shown in Figure 2.1.

One thing to note about authors' names: Bib_TE_X recognises “Mittelbach” as the last name for both Frank Mittelbach and Mittelbach, Frank. So for a name like “Mohd Hanafi Mat Som” and “Lim Lian Tze”, you would have to specify it as Mat Som, Mohd Hanafi and either Lian Tze Lim or Lim, Lian Tze for Bib_TE_X to recognise “Mat Som” and “Lim” as the last name correctly. In addition, note that my surname (or family name) consists of multiple words, thus enclose it with braces to avoid surprises, like so: Mohd Hanafi {Mat Som}.

2.2 Citations using the apacite package

The unimapcgs class imports the apacite package which provides citation mechanism as per required by the CGS, so see its documentation for more details. On a MiK_TE_X installation, use the command prompt to issue `mthelp --view apacite` to access the documentation. On TeXLive, simply type `texdoc apacite` and the documentation will be displayed automatically, if it's found on your machine.

The basic citation commands are `\citet` and `\citep`, which stands for *textual* and *parenthetical* citation respectively. They take extra arguments, too, for adding notes in the citations. Please refer to the apacite manual.

2.2.1 Author-Year System

The default bibliography style is APA:

- `\citet{latex:companion}` → Mittelbach et al. (2004)
- `\citet[chap.~2]{latex:companion}` → Mittelbach et al. (2004, chap. 2)
- `\citep{latex:companion}` → (Mittelbach et al., 2004)
- `\citep[chap.~2]{latex:companion}` → (Mittelbach et al., 2004, chap. 2)
- `\citep[see also][]{latex:companion}` → (see also Mittelbach et al., 2004)
- `\citep[see also][chap.~2]{latex:companion}` → (see also Mittelbach et al., 2004, chap. 2)
- `\citet{latex:companion,roberts}` → Mittelbach et al. (2004); Roberts (2005)
- `\citep{latex:companion,roberts}` → (Mittelbach et al., 2004; Roberts, 2005)

You may also want to write only the author's name or year occasionally:

- `\citeauthor{latex:companion}` → Mittelbach et al.
- `\citeyear{latex:companion}` → 2004
- `\citeyearpar{latex:companion}` → (2004)

2.2.1.1 Testing the TOC

This section is a dummy section. But please avoid this subsection in your thesis.

CHAPTER 3: FIGURES, TABLES, EQUATIONS, ALGORITHMS, ETC

(This is supposed to be the design or methodology chapter. Instead, we include examples on inserting figures, tables, mathematical equations. . . i.e. things that you might want to include in your thesis.)

3.1 Inserting Figures

You can draw diagrams with special \LaTeX commands, but this may take some extra time to learn. I’ve had some forays into the `pgf` and `tikz` packages and must say I quite like the results; but as I said, they take time to learn. If you want a faster solution, you can draw your diagrams using other applications, and saving them as graphic files (EPS, PNG, JPG, PDF).

\LaTeX requires EPS (encapsulated postscript) graphic files when generating DVI output, and PNG, JPG or PDF when generating PDF output.

For exporting to EPS, try <http://www.cloudconvert.com>. It’s like a Swiss knife for converting from almost any format, to almost any format.

Here’s how to insert a picture with the filename `pythag.eps` or `pythag.png`. I’m going to display it here with 5cm width, and the caption “Pythagoras’ Theorem”.

The result would be:

```

\begin{figure}[hbt!]\centering
\includegraphics[width=50mm]{pythag}
\caption{Pythagoras' Theorem}
\label{fig:pythagoras}
\end{figure}

```

Figure 3.1: Including a Graphics File

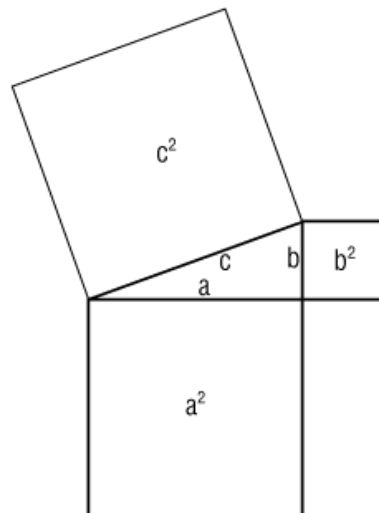


Figure 3.2: Pythagoras' Theorem

Don't specify the extension of the graphic file. The template will automatically look for the EPS or the PNG (or otherwise) versions, depending on whether `latex` or `pdflatex` was used. The figure environment will also ensure that that an entry is inserted into the *List of Figures* automatically – including the figure numbering, caption and page number.

In addition, the width of the included graphics can also be specified as a percentage of the text width, e.g. `width=.2\textwidth` would cause the graphics to occupy 20% of the text width.

Notice that I inserted a `\label` just after the `\caption`. This can be used for referencing the figure number, like this:

Figure `\ref{fig:pythagoras}` → Figure 3.2

This works the same for chapters, sections, tables, equations too. In `chap-intro.tex`, I labelled the Introduction chapter with `\label{chap:intro}`. I also labelled the section on inserting figures, `\label{sec:figure}`. So now I can do

Chapter `\ref{chap:intro}` → Chapter 1

section `\ref{sec:figure}` → section 3.1

Everytime the numbering of the heading changes, the reference will change automatically as well. **This is another advantage of using L^AT_EX**: you do not need to manually update the reference counters (nor the Table of Contents, List of Figures and Tables) whenever you add or remove figures, tables, sections or chapters.

You might also want to try out Inkscape or FlowframTk. Both program are a vector graphics and drawing application, and can export to L^AT_EX code which you can paste into your L^AT_EX source. Inkscape and FlowframTk are available from <https://inkscape.org/> and <https://www.dickimaw-books.com/software/flowframtk/>.

3.2 How Do I Do Subfigures?

Here's an example on how to do subfigures (and similarly subtables):

3.3 Inserting Tables

Typesetting tables can be a little troublesome especially with complex layouts. Look up (Roberts, 2005) to learn about some tips, or you can use the online L^AT_EX table generator (<https://www.tablesgenerator.com/>) to help you.

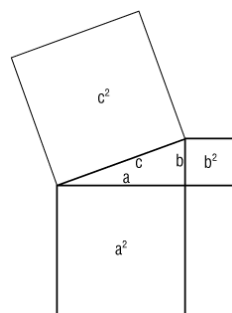
```

\begin{figure}[hbt!]
  \begin{minipage}{.49\textwidth}
    \centering
    \subfloat[First caption]{\includegraphics[width=3cm]{pythag}} \label{
      fig:sub1}
    \end{minipage}
    \hfill
    \begin{minipage}{.49\textwidth}
      \subfloat[Second caption]{\includegraphics[width=0.8\textwidth]{
        USMScience}}\label{fig:sub2}
    \end{minipage}

    \caption{This is the main caption of the figure.}
    \label{fig:main}
  \end{figure}

```

Figure 3.3: Creating subfigures within figures



(a) First caption



(b) Second caption

Figure 3.4: This is the main caption of the figure.

When you're done designing the table, copy the whole table as \LaTeX code, and paste it in your source file. (You may add additional formatting commands, like bold, italics, etc.) If this is going to be a numbered table, remember to surround it with `\begin{table}` and `\end{table}`, and give it a caption, like this:

Table 3.1: Sample Table Only

Name	Category	Quantity
Apple	Fruit	10
Cucumber	Vegetable	25
Daisy	Flower	5

Note also that `unimapcgs` is configured such that captions for figures are placed

```

\begin{table}[hbt!]\centering
\begin{tabular}{| l | c || r |}
\hline
\textbf{Name} & \textbf{Category} & \textbf{Quantity} \\
\hline\hline
Apple & Fruit & 10 \\
\hline
Cucumber & Vegetable & 25 \\
\hline
Daisy & Flower & 5 \\
\hline
\end{tabular}
\caption{Sample Table Only} \label{table:sample}
\end{table}

```

Figure 3.5: Typesetting Tables

below the figures, and captions for tables are placed *above* them, in accordance with the formatting guidelines.

Many of us would have had massive headaches about lining up decimal places in table columns if not for this tip from (Mittelbach et al., 2004, pp. 274–276). This method uses the `dcolumn` package (already loaded by `unimapcgs.cls`). Instead of using `L`, `C` or `R` as the column type in the tabulary declaration, use `D{input sep}{output sep}{decimal places}`. Note that in Table 3.2, I use `tabulary` instead of `tabular`. The `tabulary` package is awesome. The column width is set automatically so that it will wrap long sentences into a few lines as demonstrated in Table 3.4.

The \LaTeX code in Figure 3.6 will give you Table 3.2.

Table 3.2: A table with decimal data

Item	Reading
A	1.11
B	3.999
C	22.2


```

\begin{table}[htb!]\centering
\begin{tabulary}{\textwidth}{| C | D{.}{.}{3} |}
\hline
Item & \multicolumn{1}{c|}{Reading}\\\hline
A & 1.11\\\hline
B & 3.99\\\hline
C & 2.27\\\hline
\end{tabulary}
\caption{A table with decimal data}
\end{table}

```

Figure 3.6: Aligning decimal data in tables

Without using `dcolumn`, you'd get something like this:

Table 3.3: A table with decimal data (mis-aligned)

Item	Reading
A	1.11
B	3.999
C	22.2

Table 3.4: This is an example to for a table. This is straightforward version.

Short sentences	short one	Long sentences
This is short.	173	This is much loooooooooonger, because there are many more words.
This is not shorter.	put some word here	This is still loooooooooonger, because there are many more words. This table make use of tabulary package.

In Table 3.4 and 3.5, I specify the position of the table as `H` instead of `tbh!` so that the table will appear **HERE** instead of giving the decision to `LATEX` for placing the table either *top*, *bottom*, or *here*.

```

\begin{table}[H]\centering \singlerow
\caption{This is another example for a table. Advance
version of a table.} \label{tab:tablemulticolumnrow}
\begin{tabulary}{0.8\textwidth}{|C|R|C|}
\hline
\multicolumn{2}{|c|}{\textbf{Merge 2 columns}} & \textbf{Long sentences} \\ \hline
\multirow{2}{=}{[-4.5mm]{This is short text LoL.}} & \multicolumn{1}{c|}{\multirow{2}{*}{173}} & This is
much loooooooooonger, because there are many more words.
\\ \cline{2-3}
& put some word here & This is still loooooooooonger,
because there are many more words. \\ \hline
\end{tabulary}
\end{table}

```

Figure 3.7: Note the differences between this table and previous tables.

Table 3.5: This is another example for a table. Advance version of a table.

Merge 2 columns		Long sentences
This is short text LoL.	173	This is much loooooooooonger, because there are many more words.
	put some word here	This is still loooooooooonger, because there are many more words.

Table 3.5 set the table width so that it will occupy 80% of the paper width. Then, I use `multirow` package to span through 2 columns. This package also can be made to adjust the vertical alignment in a table whenever a row occupy more than a single line of sentence. `multicolumn` not only use to merge two or more column, but can also be used to change a properties of a single row and column such as the text alignment and table border.

Table 3.6: This is an example to for a table

Merge 2 columns		Long sentences
This is short.	173	This is much loooooooooonger, because there are many more words.
	put some word here	This is still loooooooooonger, because there are many more words.

If you want to specify the exact size of each column, then make use of `p{size}`, `m{size}`, or `b{size}`. `p` means normal cells, they are like `parbox` with alignment at the top line. `b` means alignment at the bottom, so the baseline is at the bottom line. `m` means alignment in the vertical center, i.e. the baseline is in the center. However, they not work very well with `multitrow`.

3.4 Full-paged, Sideways Figures and Tables

To make a figure appear on a landscape, full-page layout, put your `\includegraphics` command in a `sidewaysfigure` environment (Figure 3.8).

```
\begin{sidewaysfigure}\centering
\includegraphics[width=\textwidth]{latex-win-comp}
\caption{A full-page, sideways figure}\label{fig:sidewaysfig}
\end{sidewaysfigure}
```

Figure 3.8: Including a sideways, full-page graphic

The resultant figure (Figure 3.9) should appear on the next page.

For a sideways table, use the `sidewaystable` environment instead around your usual tabular material.

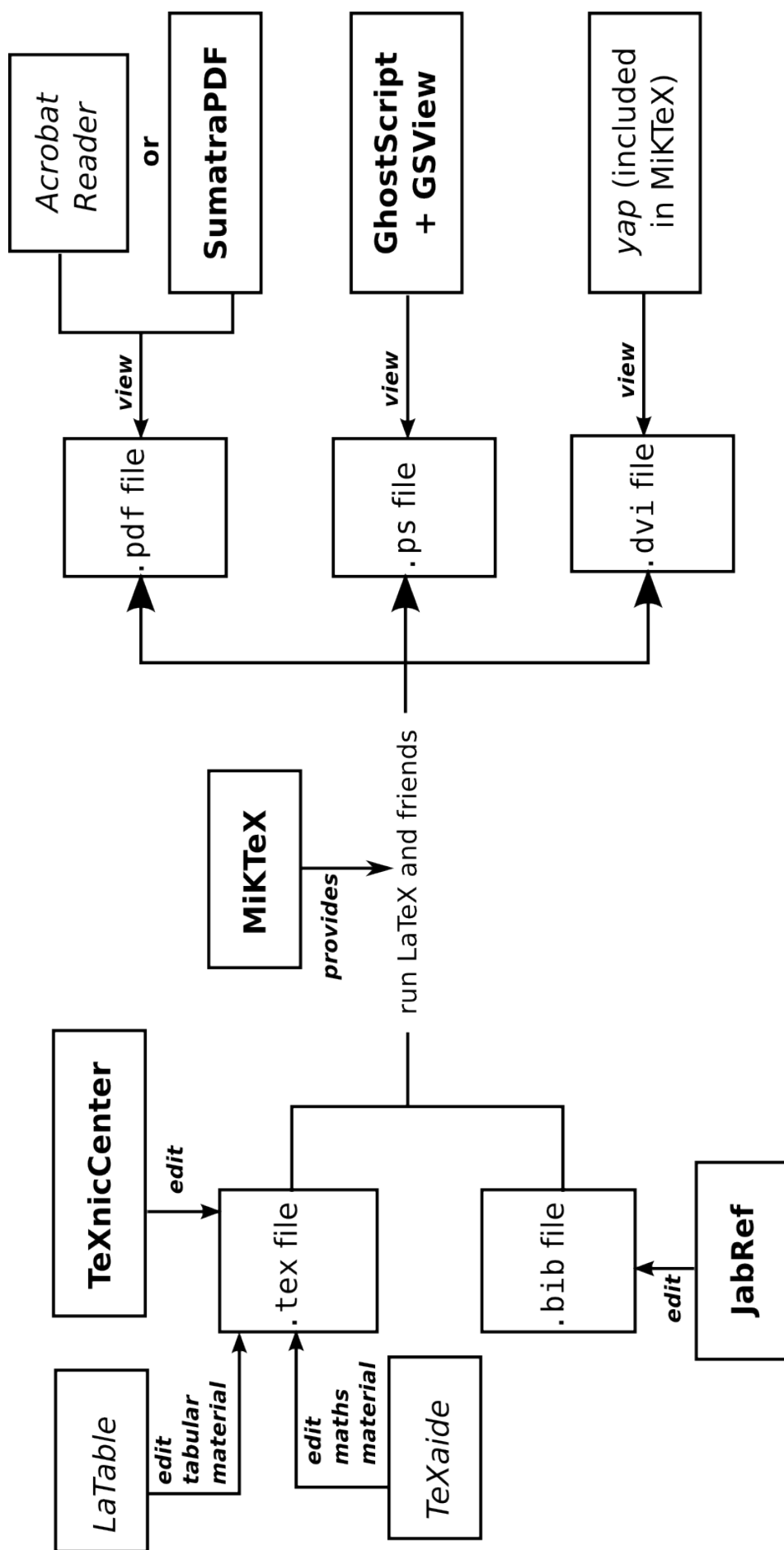


Figure 3.9: A full-page, sideways figure

3.5 Mathematical Equations

Typesetting mathematical material is one of, if not *the*, strongest capabilities of L^AT_EX. After all, that was the Knuth's main motivation for creating T_EX. As it is impossible to enumerate all possible mathematically-related commands and macros here, we will just give some examples. The reader is directed to the many well-written online tutorials, such as (Roberts, 2005), for more elaborate examples. TeXnicCenter also provides many shortcut buttons for inserting mathematical symbols.

```
\begin{equation}\label{eq:pythagoras}
z^2 = x^2 + y^2
\end{equation}

\begin{equation}\label{eq:golden:ratio}
\phi = \frac{1}{2} (1 + \sqrt{5})
\end{equation}

\begin{equation}\label{eq:golden:ratio}
\phi = \frac{1}{2} (1 + \sqrt{5})
\end{equation}
\begin{equation}\label{eq:golden:ratio:fibonacci}
\phi = 1 + \sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{F_n F_{n+1}}
\end{equation}

Equation~\ref{eq:pythagoras} is the Pythagoras Theorem.
\eqref{eq:golden:ratio} gives the golden ratio  $\phi$ , and
\eqref{eq:golden:ratio:fibonacci} relates it to the Fibonacci
series.
```

Figure 3.10: Typesetting Mathematical Equations

$$z^2 = x^2 + y^2 \tag{3.1}$$

$$\phi = \frac{1}{2}(1 + \sqrt{5}) \tag{3.2}$$

$$\phi = 1 + \sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{F_n F_{n+1}} \quad (3.3)$$

Equation 3.1 is the Pythagoras Theorem. Equation (3.2) gives the golden ratio ϕ , and equation (3.3) relates it to the Fibonacci series.

The \LaTeX code to generate the above mathematics materials are shown in Figure 3.10. As you can see, references to equations can be achieved with either `\ref` or `\eqref`.

You might want to try the online equation edit <https://www.mathcha.io/> or <https://www.latex4technics.com/> to familiarize with the \LaTeX equation.

3.6 Acronyms

If you have a list of acronyms or symbols, edit the file `loa.tex` as in Figure 3.11.

```
\begin{acronym}[MMMMMM] %% replace 'MMMMMM' with the longest acronym in
    your list
\acro{CGS}{Centre for Graduate Studies}
\acro{PPKMT}{Pusat Pengajian Kejuruteraan Mekatronik}
\acro{USM}{Universiti Sains Malaysia}
\acro{UniMAP}{Universiti Malaysia Perlis}
\end{acronym}
```

Figure 3.11: The template `loa.tex` for acronyms

You can also use this acronym list to help expand it the first time you mention it in your text. For example, the first time you use `\ac{UniMAP}`, ‘Universiti Malaysia Perlis (UniMAP)’ will be the output (without the quotes). After that, all calls to `\ac{UniMAP}` will give ‘UniMAP’ (without the quotes). For more information, see the documentation

for the acronym package.

3.7 Program Listings

You may have noticed that I used the `lstlisting` environment to typeset some of the L^AT_EX examples – with pretty-printing¹, too, including automatic line-breaking. For more information, see the documentation for the `listings` package: it’s available online at <http://www.texdoc.net/pkg/listings>.

Just to give some simple example here. For example, to typeset a “Hello World” Java program with syntax highlighting, you can use the following code:

```
\lstset{basicstyle=\small\ttfamily, language=Java, breaklines=true,
        columns=fullflexible, tabsize=2}
\begin{lstlisting}
public class HelloWorld {
    public static void main( String arg[] ) {
        for (int i = 0; i < 10; i++) {
            System.out.println( "Hello World!" + i);
        }
    }
}
\end{lstlisting}
```

Figure 3.12: Typesetting a Java program listing

```
public class HelloWorld {
    public static void main( String arg[] ) {
        for (int i = 0; i < 10; i++) {
            System.out.println( "Hello World!" + i);
        }
    }
}
```

Figure 3.13: A pretty-printed Java program listing with syntax highlighting

¹Whether you agree that it *is* pretty is another story altogether.

If you want to turn off the syntax highlighting, set `language={}`. (See the listings documentation for a list of programming languages for which syntax highlighting is supported.) You can also change the `basicstyle` value to get different effects: e.g. a different font family, size or text formatting.

Here's another example for a C program:

```
\lstset{basicstyle=\sffamily, language=C, breaklines=true, columns=
  fullflexible, tabsize=2}
\begin{lstlisting}
int main() {
    int c = 0;
    c = c + 1;
    printf( "%d", c );
    return 0;
}
\end{lstlisting}
```

Figure 3.14: Typesetting a C program listing

```
int main() {
    int c = 0;
    c = c + 1;
    printf( "%d", c );
    return 0;
}
```

Figure 3.15: A pretty-printed C program listing with syntax highlighting

And here is the same C program listing *without* syntax highlighting (by setting `language={}`):

```
int main() {
    int c = 0;
    c = c + 1;
    printf( "%d", c );
    return 0;
}
```

Figure 3.16: A C program listing without syntax highlighting

CHAPTER 4: IMPLEMENTATION

Now is the time to “implement” your thesis with \LaTeX . Go forth and typeset!

Happy \LaTeX ing! ☺

4.1 Printing Your Thesis

This is *very* important. Assuming you’re printing your thesis from Acrobat Reader, make sure the following settings are chosen correctly in the Print window:

- A4 paper size is selected.
- Make sure your Printer settings is using A4 too.
- No page scaling.

Otherwise, the margins of your printed outputs may go horribly wrong. Print one or two pages first to make sure everything looks fine before printing your entire thesis.

CHAPTER 5: DISCUSSION

Just a placeholder for the discussion chapter.

CHAPTER 6: CONCLUSION

T-that's all folks. Have fun with \LaTeX !

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APPENDIX A

DATA USED

Put some test data here.

APPENDIX B

UML DIAGRAMS

Yet another dummy placeholder for appendix material.

APPENDIX C
DUMMY APPENDIX