

**THE UMALAYATHESIS L<sup>A</sup>T<sub>E</sub>X DOCUMENT CLASS**

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**INSTITUTE OF POSTGRADUATE STUDIES  
UNIVERSITY OF MALAYA  
KUALA LUMPUR**

**2018**

**THE UMALAYATHESIS L<sup>A</sup>T<sub>E</sub>X DOCUMENT CLASS**

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**THESIS SUBMITTED IN FULFILMENT OF THE  
REQUIREMENTS FOR THE DEGREE OF DOCTOR OF  
PHILOSOPHY**

**INSTITUTE OF POSTGRADUATE STUDIES  
UNIVERSITY OF MALAYA  
KUALA LUMPUR**

**2018**

**UNIVERSITI MALAYA**

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# THE UMALAYATHESIS L<sup>A</sup>T<sub>E</sub>X DOCUMENT CLASS

## ABSTRACT

An abstract must not exceed 500 words, typed in a single paragraph with double-spacing, and written in Bahasa Malaysia and English language. A maximum of five (5) keywords should also be listed below the abstract.

**Keywords:** Keyword, keyword, keyword, keyword.

**TAJUK DALAM BAHASA LAIN UNTUK ABSTRAK KEDUA**

**ABSTRAK**

Ini merupakan abstrak dalam Bahasa Melayu (satu perenggan).

## ACKNOWLEDGEMENTS

Thanks guys. I owe you many.

## TABLE OF CONTENTS

|  |          |
|--|----------|
| Abstract .....   | iii      |
| Abstrak .....  | iv       |
| Acknowledgements .....   | v        |
| Table of Contents .....  | vi       |
| List of Figures .....  | viii     |
| List of Tables .....   | ix       |
| List of Symbols and Abbreviations .....  | x        |
| List of Appendices .....   | xi       |
| <br>   |          |
| <b>CHAPTER 1: HOW TO USE UMALAYATHESIS TO WRITE YOUR<br/>THESIS, AND THEN SOME .....</b> | <b>1</b> |
| 1.1 Files.....   | 1        |
| 1.1.1 L <sup>A</sup> T <sub>E</sub> X IDE Configuration.....                             | 1        |
| 1.1.1.1 Tool Configuration for Generating the Glossary .....                             | 2        |
| 1.1.1.2 Tool Configuration for Generating the List of Publications ....                  | 3        |
| 1.2 Compiling thesis.tex .....   | 4        |
| 1.3 Printing from Acrobat Reader.....  | 4        |
| 1.4 Using the umalayathesis Class.....   | 4        |
| 1.4.1 Activation .....   | 4        |
| 1.4.2 Document Class Options.....  | 5        |
| 1.4.3 Author Information.....  | 6        |
| 1.4.4 Preliminary Pages.....   | 7        |
| 1.4.5 Acknowledgements.....  | 7        |
| 1.4.6 Abstract.....  | 7        |

|   |   |           |
|---|---|-----------|
| 1.4.7                                     | Table of contents, List of figures and tables ..... | 7         |
| 1.4.8                                     | Main Chapters .....                                 | 8         |
| 1.4.9                                     | Appendices .....                                    | 8         |
| 1.4.10                                    | Citations and Bibliography.....                     | 9         |
| 1.4.11                                    | List of Publications.....                           | 9         |
| 1.4.12                                    | Glossary.....                                       | 10        |
| <br><b>CHAPTER 2: INTRODUCTION .....</b>  |   | <b>12</b> |
| 2.1                                       | First Level Heading.....                            | 12        |
| 2.1.1                                     | Suggestions about Tables.....                       | 13        |
| 2.1.2                                     | Suggestion about Itemize and Enumerate Lists.....   | 14        |
| 2.2                                       | Citations .....                                     | 15        |
| 2.2.1                                     | Using Another Bibliography Style .....              | 15        |
| 2.2.1.1                                   | Symbols and Abbreviations.....                      | 15        |
| <br><b>CHAPTER 3: DUMMY CHAPTER .....</b> |   | <b>25</b> |
|   | References .....                                    | 26        |
|   | List of Publications and Papers Presented .....     | 27        |
|   | Appendices .....                                    | 28        |



## LIST OF FIGURES

|  |    |
|--|----|
| Figure 2.1: First figure. OK?.....                         | 12 |
| Figure 2.2: Second figure (caption without citation) ..... | 13 |
| (a) This is a subfigure.....                               | 13 |
| (b) This is another subfigure .....                        | 13 |
| Figure 3.1: Let's see. What have we got here? .....        | 25 |

## LIST OF TABLES

|   |    |
|---|----|
| Table 2.1: This is a table. ....            | 12 |
| Table 2.2: A trivial subtable example ..... | 13 |
| (a) One Subtable .....                      | 13 |
| (b) Two Subtables .....                     | 13 |
| Table 2.3: A sample longtable. ....         | 16 |
| Table 2.4: A sample supertabular. ....      | 21 |

## LIST OF SYMBOLS AND ABBREVIATIONS

- $\theta$  : temperature degree.  
LI : lexical item.  
NLP : Natural Language Processing.  
POS : part of speech.

## LIST OF APPENDICES

|   |    |
|---|----|
| Appendix A: Manuals, Technical Specifications, Documentations, Example<br>Scenarios ..... | 28 |
| Appendix B: Try .....   | 29 |

## CHAPTER 1: HOW TO USE UMALAYATHESIS TO WRITE YOUR THESIS, AND THEN SOME

umalayathesis is a  $\text{\LaTeX}$  class for authoring theses that fulfil formatting specifications required by Universiti Malaya (UM), Malaysia. The thesis preparation guide can be accessed at <http://bit.ly/2xaYpzN>.

### 1.1 Files

Here's a quick list of the files required when writing your thesis with the umalayathesis class. Easiest way to go about things is to put all the files in the same directory. (See 1.4 for more details.)

- **umalayathesis.cls**, the  $\text{\LaTeX}$  class file implementing the UM thesis formatting requirements.
- A “main driver” .tex file of your thesis, analogous to `int main()`. You can name this file anything you like; it is known as `thesis.tex` in this guide. (See 1.4.) **This is the *only* file that you should run the processing tools on!**
- Two .tex files containing your thesis abstract, in English and Bahasa Malaysia. (See 1.4.6.)
- .tex files containing your thesis chapters and appendices, one chapter per file. (See 1.4.8 and 1.4.9.)
- A .bib file containing your references and publications. (See 1.4.10).
- A .tex file containing your glossary. (See 1.4.12).

#### 1.1.1 $\text{\LaTeX}$ IDE Configuration

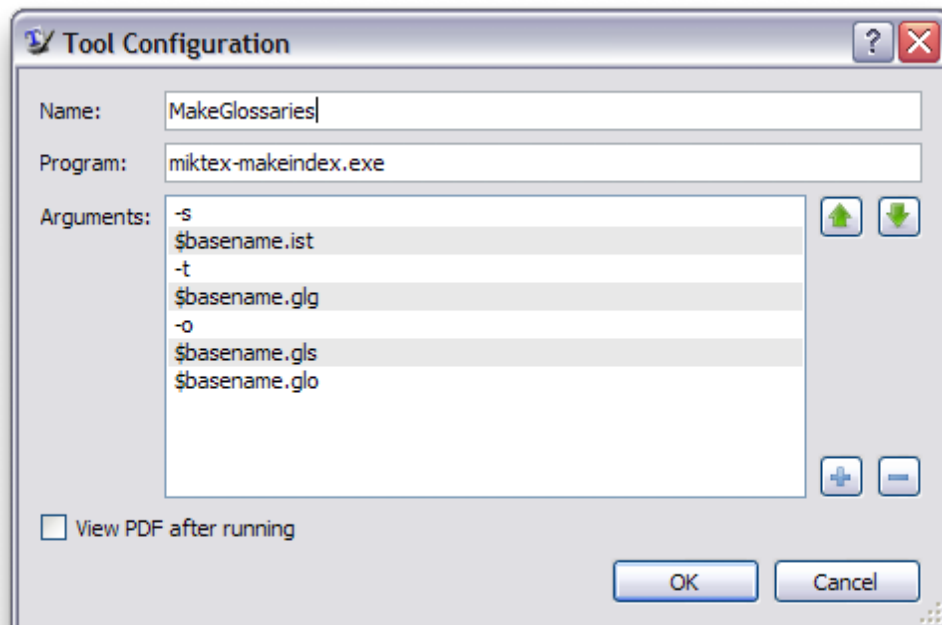
*This section is unnecessary if you are using Overleaf, arara or latexmk, as these build tools would automatically run the necessary processors.*

Assuming TeXworks is your L<sup>A</sup>T<sub>E</sub>X editor of choice on Windows, you will probably want to configure it so that you can process your glossary and list of own publications from within TeXworks.

(You can always, of course, opt to run the relevant commands from the command line prompt, or adapt these configurations for other editors and operating systems: I have tested on Windows XP/7, Ubuntu and Mac OS X.)

### 1.1.1.1 Tool Configuration for Generating the Glossary

Access the TeXworks menu Edit ▶ Preferences... ▶ Typesetting. Add a new processing tool called “MakeGlossaries”. Configure it as shown below:



Now **repeat the above step** for another similar tool called “MakeAcronyms”, but replace thesis.glg with thesis.alg; thesis.gls with thesis.acr; thesis.glo with thesis.acn.

On Linux and Mac systems, these are equivalent to the command lines

```
makeindex -s <base>.ist -t <base>.glg -o <base>.gls <base>.glo
```

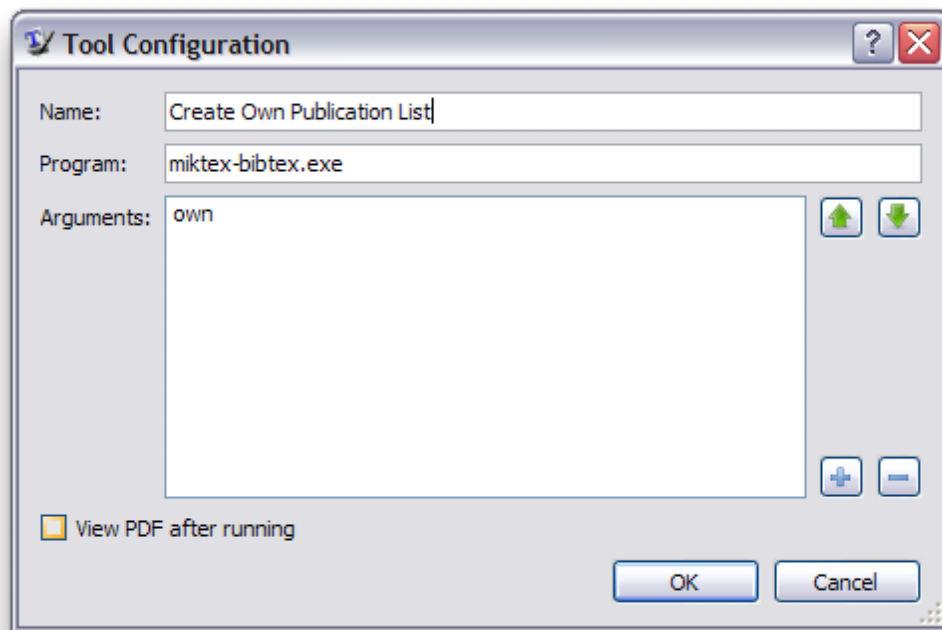
**If you have Perl installed** (likely if you’re using Linux or Mac), you can just run

```
makeglossaries <base>
```

and it'll process both the acronyms and the glossaries.

### 1.1.1.2 Tool Configuration for Generating the List of Publications

Now add a new processing tool called “Create Own Publication List” (or some other name). Configure it as shown below:



On Linux and Mac systems, these are equivalent to the command lines

```
bibtex own
```

If you are using the `splitpubs` environment for separating your published journal articles and conference proceedings, then you would need to set up similar processors for `ownjour` and `ownconf` instead:

```
bibtex ownjour  
bibtex ownconf
```

## 1.2 Compiling thesis.tex

The following processing tools/commands are triggered automatically on Overleaf as you edit your file, but you must execute them manually if compiling on your own machine.

(The \$ is the terminal command prompt; don't type that!)

```
$ pdflatex thesis
$ bibtex thesis
$ makeglossaries thesis <-- if you have acronyms and glossaries
$ makeindex thesis <-- if you have indices
$ pdflatex thesis
$ pdflatex thesis
```

You will need to run `makeglossaries` again if you add and use a *new glossary or acronym entry*.

If you do not have Perl installed on your system (Mac and GNU/Linux systems are likely to already have Perl installed), then you should execute the following commands to replace `makeglossaries`:

```
$ makeindex -s thesis.ist -t thesis.glg -o thesis.gls thesis.glo
$ makeindex -s thesis.ist -t thesis.alg -o thesis.acr thesis.acn
```

## 1.3 Printing from Acrobat Reader

Remember to set the **paper size** to **A4** and **page scaling** to **None** in the Print dialog, otherwise the margins would be incorrect.

## 1.4 Using the umalayathesis Class

### 1.4.1 Activation

To 'activate' the class, make sure your main document file (e.g. `thesis.tex`) starts off with `\documentclass{umalayathesis}`:

```
\documentclass{umalayathesis}
\usepackage{graphicx}
```



```
\usepackage{... other packages you need}
```

This will set up the page margins, paragraph spacing, indents, page numbers, font face and size, citation and bibliography format, amongst other things.

### 1.4.2 Document Class Options

Some faculties or departments may have varying, and sometimes conflicting, requirements on various formatting details, which may not have been explicitly described in the official thesis style guidelines. The following document class options may be used to address some of the more commonly requested changes: please also read the commented code in the sample `thesis.tex` carefully for examples and tips.

**english** (default) English thesis.

**bahasam** Malay thesis. At present `apacite` and `newapa` has not yet been localised to Bahasa Malaysia.

**apacite** (default) Loads the `apacite` package, which implements the APA citation and referencing styles strictly, including expansion of 3–5 authors on first citation.

**newapa** Loads the `natbib` and `apalike` package for a APA-like reference list but *does not fully implement* all APA citation styles. In particular, this option will not expand references with 3–5 authors on first citation. **Not recommended unless explicitly requested by examiner.**

**custombib** Does not pre-load any bibliography style or packages; you will need to specify `\bibliographystyle`, `\bibliographystyleown` etc yourself, or load `natbib` yourself if necessary. See 2.2.1 for an example.

**appendixhead** Add ‘APPENDICES’ before the first Appendix.

**altcaption** Caption in smaller fonts; only Figure X, Table Y bold.

**singlespacedlisttitles** Long titles in the ToC, LoT, LoF, LoA are single-spaced.

**listpageheader** If your faculty requires a “header row” at the top of the List of Figures/Tables. You can re-define `\lofpageheader` and `\lotpageheader` if necessary, e.g. `\renewcommand{\lofpageheader}{\hfill Page}`

**boldfrontmattertoc** If your faculty wants front matter “chapters” to be bold in the ToC.

**boldbackmattertoc** If the backmatter “chapters” are to be bolded as well.

**uppercasetoc** If all “chapters” level headings must be upper-cased in the ToC.

If further minor modifications are required, it is recommended to do so with re-issuing commands to change settings or `\renewcommand`, `\patchcmd` etc in the *preamble* of `thesis.tex`. Modifying `umalayathesis.cls` directly is discouraged, as far as possible, since this may complicate debugging and future maintenance.

### 1.4.3 Author Information

You need to provide some author information in the preamble. Example lines from `thesis.tex`:

```
\author{Lim Lian Tze}  
\title{My Ground-breaking Research}  
\othertitle{Hasil Penyelidikan yang Menggegarkan}  
\faculty{Faculty of Amazing Research}  
\submissionyear{2012}  
\degree{Doctor of Philosophy}
```

These information are needed to generate the preliminary pages.

If `\othertitle` is given, then the second abstract will display it (i.e. if your thesis is ‘english’ then this is printed on top of the Malay abstract. and if your thesis is ‘bahasam’ then this is printed on top of the English abstract). If no `\othertitle` is given, then the second abstract will not have any translated thesis title.

If you need to specify your department as well, you may write

```
\faculty{Department of Hyperboles\\Faculty of Amazing Research}
```

#### 1.4.4 Preliminary Pages

Once in the main document body, `\frontmatter` sets up the, well, front matter. This include setting the page numbers to lower-case Roman numerals.

`umalayathesis` can generate the cover page, title page and original literary work declaration page with the following lines (included in `thesis.tex`):

```
% \makecoverandtitlepage{\mastercoursework}
% \makecoverandtitlepage{\mastermixedmode}
% \makecoverandtitlepage{\masterresearch}
\makecoverandtitlepage{\doctoralresearch}
% \makecoverandtitlepage{\doctoralmixedmode}
\declarationpage
```

Please *uncomment* the correct `\makecoverandtitle` line to generate the correct statement on the title page.

#### 1.4.5 Acknowledgements

This is provided using `\acknowledgements`:

```
\acknowledgements{I would like to thank my parents, my family, my
supervisor...}
```

#### 1.4.6 Abstract

Write your abstracts in separate files (`sample-abstract.tex` for the English abstract and `sample-msabstract.tex` for the Malay abstract in this example), and include them in `thesis.tex` like this:

```
\abstractfromfile{sample-abstract}
\msabstractfromfile{sample-msabstract}
```

#### 1.4.7 Table of contents, List of figures and tables

These are auto-generated by the following lines (included in `thesis.tex`):

```
{\clearpage
\tableofcontents\clearpage
\listoffigures\clearpage
\listoftables\clearpage}
```

### 1.4.8 Main Chapters

I highly recommend that each chapter be written in a separate file. For example, chap-intro.tex has the contents

```
\chapter{Introduction}
This is the introduction chapter.

\section{Problem Background}
We study the...
```

And chap-litreview.tex:

```
\chapter{Literature Review}
We review the state of the art in...

\section{Early Approach}
Researchers first attempted to...
```

In thesis.tex, these chapter files are included with the following lines:

```
\mainmatter           % signal start of main chapters
\input{chap-intro}    % no .tex extension!
\input{chap-litreview}
\input{...}
```

### 1.4.9 Appendices

Again, I recommend keeping each appendix chapter in its own file e.g. app-umlDiagram.tex:

```
\chapter{UML Diagrams}
...
```

And in thesis.tex:

```
\begin{appendices}
\input{app-umldiagram}
\input{...}
\end{appendices}
```

#### 1.4.10 Citations and Bibliography

umalayathesis uses the apacite package with the natbibapa option to format citations and bibliography in the APA style. Here are some useful variants of the `\cite` command; see the apacite manual for full list.

- `\citep{Lim:2009}` → (Lim, 2009)
- `\citet{Lim:2009}` → Lim (2009)
- `\citealp{Lim:2009}` → Lim, 2009 (no parenthesis)
- `\citep[see][p.~7]{Lim:2009}` → (see Lim, 2009, p. 7)
- `\citeauthor{Lim:2009}` → Lim
- `\citeyearpar{Lim:2009}` → (2009)

In `thesis.tex`, these lines will print the bibliography list:

```
\backmatter % signal start of back matter
\bibliography{bibfile} % bibliography file name without .bib
extension
```

#### 1.4.11 List of Publications

First, make sure that you enter details about your own publications in your `.bib` file. Then in `thesis.tex`, search for the following line:

```
\nociteown{Lim:2009}
```

Replace the BibTeX key between the curly braces with that of your own publication. If you have more than one publications, simply separate them with commas inside the curly braces, like this:

```
\nociteown{lim:tang:2004,Lim:2009}
```

If you need your publications to be categorised by types (journal articles and conference proceedings), use the `splitpubs` environment with `\...jour` and `\...conf` instead:

```
\begin{splitpubs}
\nociteownjour{lim:tang:2004} % journal articles
\nociteownconf{Lim:2009} % conference proceedings
\bibliographyownjour{myrefs}
\bibliographyownconf{myrefs}
\end{splitpubs}
```

### 1.4.12 Glossary

You can maintain a consistent glossary and acronym list using the `glossaries` package.

It also supports acronym expansion on first mention!

First, define your acronyms and terms in a separate file e.g. `myacronyms.tex`:

```
% \newglossaryentry{label}{name={term},description={explanation}}
\newglossaryentry{lexicon}{
name={lexicon},
description={The vocabulary of a language, including its words
and expressions. More formally, it is a language's inventory
of lexemes}
}

% \newacronym[description={explanation}]{label}{abbrv}{full form}
\newacronym
[description={single word or words that are grouped in a
language's lexicon}]
{LI}{LI}{lexical item}

\newacronym[description={The application of computational
linguistics principles to problems}]
{NLP}{NLP}{Natural Language Processing}

% when the plural form is irregular, specify firstplural and
plural
\newacronym
[firstplural={parts of speech}, plural={POS},
description={linguistic category of lexical items}]
{POS}{POS}{part of speech}
```

Loading the glossary and acronym list, and later printing the list of acronyms and glossary in thesis.tex:

```
% Must be loaded BEFORE \begin{document}!
\loadglsentries{myacronyms}
\begin{document}
...
% List of acronyms is between list of tables and list of
  appendices
\listofacronyms\clearpage
...
\bibliography{bibfile}
% Glossaries is placed AFTER the bibliography
% (only entries that are actually used in the text will be listed)
\printglossary
...
```

To mention them in the text (i.e. chap-xxx.tex etc):

```
Let's talk about \acp{LI} and \acp{POS} in \ac{NLP}. I mention
  again \acp{LI}. We will also talk about \glsplural{lexicon}.
```

Notice how the acronyms are expanded on first use, as well as the use of `\glsplural` and `\acp` for plurals:

```
Let's talk about lexical items (LIs) and parts of speech (POS) in Natural Language
  Processing (NLP). I mention again LIs. We will also talk about lexicons.
```

You will need to run `pdflatex`, `makeglossaries`, then 2 more runs of `pdflatex` for the glossaries to appear properly.

Use `\Gls`, `\Glsplural`, `\Ac`, `\Acp` etc. if you need to capitalise the first letter of your terms at the beginning of sentences.

## CHAPTER 2: INTRODUCTION

### 2.1 First Level Heading

You can use the usual  $\text{\LaTeX}$  commands and environments: footnotes<sup>1</sup> too<sup>2</sup>, certainly with figures and tables as well.



**Figure 2.1: First figure. OK?**

**Table 2.1: This is a table.**

|       |             |         |
|-------|-------------|---------|
| Hey   | How's it    | Going?  |
| Fine! | Just great. | See ya! |
| Fine! | Just great. | See ya! |

This is a quotation:

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla.

You can create subfigures (and similarly subtables.)

---

<sup>1</sup> See here, how weird, how to fill out an entire line. See here, how weird, how to fill out an entire line. See here, how weird, how to fill out an entire line. See here, how weird, how to fill out an entire line. See here, how weird, how to fill out an entire line.

<sup>2</sup> don't you agree?





(a) This is a subfigure



(b) This is another subfigure

**Figure 2.2: Second figure. If you have a citation in the caption, you might want to provide an optional caption that doesn't contain the citation so that it won't appear in the List of Tables or Captions. (Audibert, 2004)**

**Table 2.2: A trivial subtable example**

(a) One Subtable

|       |      |
|-------|------|
| One   | Two  |
| Three | Four |
| Five  | Six  |

(b) Two Subtables

|            |          |
|------------|----------|
| $\alpha$   | $\beta$  |
| $\gamma$   | $\delta$ |
| $\epsilon$ | $\zeta$  |

### 2.1.1 Suggestions about Tables

$\LaTeX$  tables can be notoriously... *interesting* to do. But whatever you do, **please don't nest tabulars** i.e. put tabulars within tabulars. They are hard to read and debug, and prone to errors.

<http://www.tablesgenerator.com> is a handy tool, where you can design your tables and then export the  $\LaTeX$  code. You can even paste in some data you copied from Excel via the 'File > Paste table data' function.

For tables/columns that are too wide to fit nicely on the page, see this blog post for some suggestions: <http://tex.my/how-to-deal-with-wide-tables/>

For tables that are too long and must be broken up into multiple pages, use the `longtable` or `supertabular` packages: these have mechanisms for automatically breaking the tables, and repeating the table header/footer rows on each page. Click here for a `longtable` example, which is reproduced in Table 2.3. Table 2.4 shows a `supertabular` example.

### 2.1.2 Suggestion about Itemize and Enumerate Lists

umalayathesis v1.3 loads the `enumitem` package, which provides some mechanisms for customising lists.

If the space above the `itemize` and `enumerate` lists are too big for your liking:

- This is the first point and
- This is the second point

You can use the `nosep` option:

- This is the first point and
- This is the second point

To use a different bullet:

- ★ This is the first point and
- ★ This is the second point

And even different numbering scheme (you may need to change the list's left margin):

- (i) This is the first point and
- (ii) This is the second point

Other possible commands for changing the counter format are:

- `\arabic:` 1, 2, 3, ...
- `\roman:` i, ii, iii, ...
- `\Roman:` I, II, III, ...
- `\alph:` a, b, c, ...
- `\Alph:` A, B, C, ...

## 2.2 Citations

umalayathesis uses the apacite package (with natbibapa option) and bibliography style. Use \citep for parenthetical citations, such as this one (Audibert, 2004). To get text citations, use the \citet command and you'll get Audibert (2004).

Starting with umalayathesis v1.5.1, the APA7 guidelines is out, where first citations with many authors now *do not need to be expanded*. Therefore citations with  $3 \leq \text{authors} \leq 5$  are always abbreviated now; e.g. (Azarova et al., 2002).

### 2.2.1 Using Another Bibliography Style

If your faculty allows/requires you to use an entirely different bibliography style, use the custombib document class option. You are then responsible for loading any packages (e.g. natbib) and setting up the necessary \bibliographystyle, etc.

For example, if your faculty requires you to use the IEEEtran bibliography style, you can write

```
\documentclass[custombib]{umalayathesis}
\bibliographystyle{IEEEtran}
\bibliographystyleown{IEEEtran} %% Style for List of Publications
\bibliographystyleownjour{IEEEtran}
\bibliographystyleownconf{IEEEtran}
```

#### 2.2.1.1 Symbols and Abbreviations

If you're just starting to write your thesis, you may want to maintain a list of symbols and acronyms, and process it using the makeglossaries command, so that acronyms are automatically expanded/abbreviated, and listed in the List of Symbols and Abbreviations. See the umalayathesis-manual.pdf for further information. Great. Let's talk about lexical items (LIs) and parts of speech (POS) in Natural Language Processing (NLP). I

mention again LIs. Oh I have a symbol too, it's temperature degree ( $\theta$ ). And I talk a lot about lexicons.

Or if you've actually already nearly finished writing your thesis, it's probably much easier to forget about glossaries and the `myacronyms.tex` file, and just create a List of Symbols and Abbreviations manually yourself with a `tabular`:

```
\chapter{List of Symbols and Abbreviations}
\begin{tabular}{l @{} : {} l}
UM & University Malaya\\
KL & Kuala Lumpur\\
\end{tabular}
```

(a) *A Fifth Level Heading*

This will not be included in the Table of Contents.

Here's an example `longtable`. Beware: very large long tables can take a loooooong time to compile!

**Table 2.3: A sample `longtable`.**

| First column | Second column   | Third column |
|--------------|-----------------|--------------|
| One          | abcdef ghijklmn | 123.456778   |
| One          | abcdef ghijklmn | 123.456778   |
| One          | abcdef ghijklmn | 123.456778   |
| One          | abcdef ghijklmn | 123.456778   |
| One          | abcdef ghijklmn | 123.456778   |
| One          | abcdef ghijklmn | 123.456778   |
| One          | abcdef ghijklmn | 123.456778   |
| One          | abcdef ghijklmn | 123.456778   |
| One          | abcdef ghijklmn | 123.456778   |

Continued on next page







**Table 2.3, continued**

| <b>First column</b> | <b>Second column</b> | <b>Third column</b> |
|---------------------|----------------------|---------------------|
| One                 | abcdef ghijklmn      | 123.456778          |
| One                 | abcdef ghijklmn      | 123.456778          |
| One                 | abcdef ghijklmn      | 123.456778          |
| One                 | abcdef ghijklmn      | 123.456778          |
| One                 | abcdef ghijklmn      | 123.456778          |









**Table 2.4, continued**

| <b>First column</b> | <b>Second column</b> | <b>Third column</b> |
|---------------------|----------------------|---------------------|
| One                 | abcdef ghijklmn      | 123.456778          |
| One                 | abcdef ghijklmn      | 123.456778          |
| One                 | abcdef ghijklmn      | 123.456778          |
| One                 | abcdef ghijklmn      | 123.456778          |
| One                 | abcdef ghijklmn      | 123.456778          |
| One                 | abcdef ghijklmn      | 123.456778          |
| One                 | abcdef ghijklmn      | 123.456778          |
| One                 | abcdef ghijklmn      | 123.456778          |
| One                 | abcdef ghijklmn      | 123.456778          |
| One                 | abcdef ghijklmn      | 123.456778          |
| One                 | abcdef ghijklmn      | 123.456778          |
| One                 | abcdef ghijklmn      | 123.456778          |
| One                 | abcdef ghijklmn      | 123.456778          |
| One                 | abcdef ghijklmn      | 123.456778          |
| One                 | abcdef ghijklmn      | 123.456778          |
| One                 | abcdef ghijklmn      | 123.456778          |
| One                 | abcdef ghijklmn      | 123.456778          |
| One                 | abcdef ghijklmn      | 123.456778          |
| One                 | abcdef ghijklmn      | 123.456778          |
| One                 | abcdef ghijklmn      | 123.456778          |
| One                 | abcdef ghijklmn      | 123.456778          |

## CHAPTER 3: DUMMY CHAPTER

Hello!!

Test 3

**Figure 3.1: Let's see. What have we got here?**

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**APPENDIX A: MANUALS, TECHNICAL SPECIFICATIONS,  
DOCUMENTATIONS, EXAMPLE SCENARIOS**



## APPENDIX B: TRY

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.