INTRODUCING UTM THESIS TYPESETTING USING LYX

M. N. MARSONO

UNIVERSITI TEKNOLOGI MALAYSIA

PSZ 19:16 (Pind. 1/13)

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Date	:	October 12, 2018

*Replace this page with the Cooperation Declaration form, which can be obtained from SPS or your faculty. This page is **OPTIONAL** when your research is done in collaboration with other institutions that requires their consent to publish the finding in this document.*

INTRODUCING UTM THESIS TYPESETTING USING LYX

M. N. MARSONO

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

School of Electrical Engineering
Faculty of Engineering
Universiti Teknologi Malaysia

SEPTEMBER 2018

DECLARATION

I declare that this thesis entitled *"Introducing UTM Thesis Typesetting Using LyX"* is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature	:	
Name of Supervisor	:	M. N. Marsono
Date	:	October 12, 2018

DEDICATION

To coffee...

ACKNOWLEDGEMENT

I dedicate this template to those who have spent countless hours to make this possible. I just put a simple instruction on using LyX to typeset UTM Thesis.

ABSTRACT

A 1-page abstract is a *movie (thesis) trailer*. Avoid summarizing your Introduction chapter. Focus on the problem statement, hypothesis/objective, research approach, quantitative validation summary, and implication of your findings. For Ph.D., emphasize on original contributions.

ABSTRAK

The Malay abstract is written as the sentence structure of the English abstract. All specific terms must be checked with Dewan Bahasa and Pustaka (`http://prpm.dbp.gov.my/`).

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LIST OF ABBREVIATIONS

XML	–	Extensible Markup Language
GIS	–	Geographical Information System
PC	–	Personal Computer
UTM	–	Universiti Teknologi Malaysia
WWW	–	World Wide Web

LIST OF SYMBOLS

γ	–	Whatever
k_i	–	Whatever

LIST OF APPENDICES

CHAPTER 1

INTRODUCTION

This template conforms with the Universiti Teknologi Malaysia (UTM) 2018 new requirement [1]. Students who wish to learn more on LyX should refer to documentations available here [2]. You do not need to know deep on LaTeX [3] to use this LyX template.

1.1 Definition of thesis

Thesis (generic term, see also Figure 1.1) is a documented evidence of defined scope and length that a candidate is

- Understand relevant theoretical issues
- Technically competent
- Has critical-thinking ability
- Able to *conduct scholarly research*

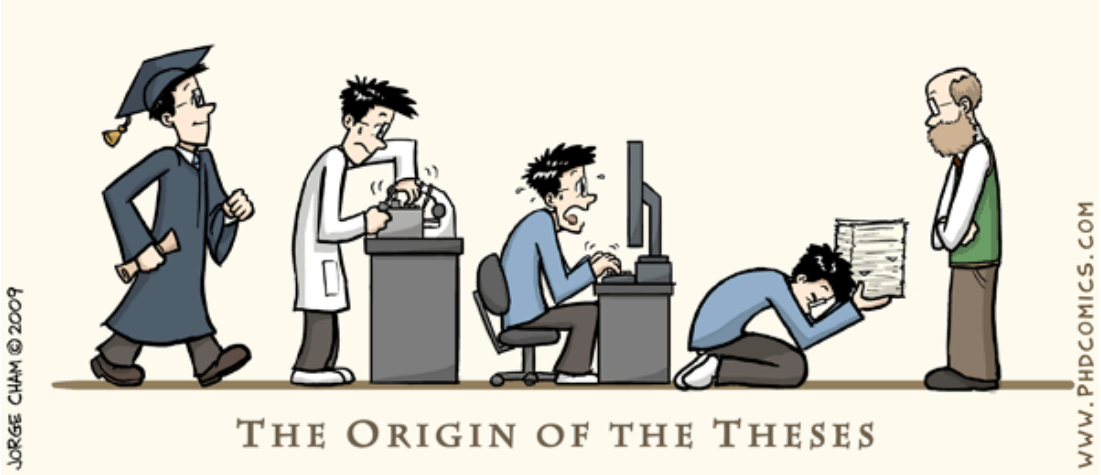


Figure 1.1 As it goes

Students have to write a scientific document of a defined scope and length to demonstrate the achievement. According to UTM nomenclature

- UG FYP - *report*
- Master by taughtcourse project - *project report*
- Master by taughtcourse and research (mixed-mode) - *dissertation*
- Master by research and PhD - *thesis*

Different degree level has different expectation

- Undergraduate report demonstrates the capacity to apply basic research skills in an area of interest. At this level, the focus is on gaining **broad competencies**.
- Masters thesis/dissertation/report demonstrates the capacity to apply advanced research skills (i.e. move **beyond basic** research skills) in an area of interest to a Master student is able to incorporate some critical insights in his/her study. At this level, the focus is on developing critical thinking in a subject area.
- PhD thesis demonstrates the capacity to apply **specialized** research skills (i.e. expert knowledge of a particular concept or method) in an area of interest so that a PhD student can make significant and original contribution to knowledge. At this level, the focus is on identifying a 'gap' in knowledge and addressing it, hence advancement in knowledge in a field of study.

1.2 Main steps in thesis/dissertation/report writing

- Plan/elaborate the outline
  - A *plot* for your thesis writing
  - Target: *logical story* for the document
  - Results
    - Stand-alone tables/graphs

* Describe each, then number crunch
* Use Appendices for detailed items

- Get feedback from the supervisor
- If you are writing in a language other than your mother language, consider getting specialized editing help

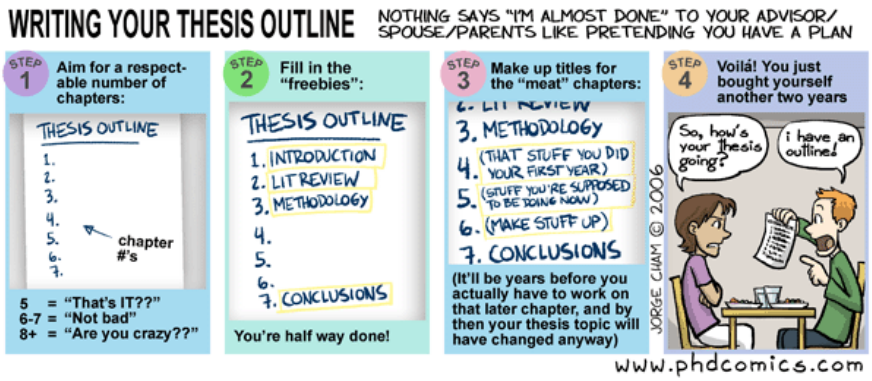


Figure 1.2 Thesis outline

CHAPTER 2

THESIS STRUCTURE SHOWN AS A VERY VERY VERY VERY VERY VERY VERY VERY VERY VERY VERY VERY VERY VERY VERY VERY VERY VERY VERY VERY VERY VERY LONG TITLE

2.1 Thesis title (SPS guidelines)

- Thesis title should be a concise description of the main focus and contribution of the research. It should not contain more than 15 words excluding grammatical words such as articles, conjunction and prepositions.
- To avoid redundancy, titles should not contain phrases which reflect research exercise such as “An investigation of ...”, “A preliminary study of ...”, “A study of ...”, “Analysis of ...”, “On the ...”, “Theory of ...”, “Some „„”, and “Toward a ...”.
- Thesis title should not contain formulas, symbols or subscripts, Greek letters, or other non-alphabetical symbols. Word substitutes should be used instead.
- Thesis title should not contain acronyms or even acronyms in brackets unless the term is commonly used in the field of the study (eg: DNA, GPS). For example, “GIS” should be written as “Geographical Information System” and should not be written as “Geographical Information System (GIS)”.
- Thesis title should not contain punctuation such as colon “:”, semicolon “;”, etc. except commas “,” when necessary.

2.2 Flow of arguments

Each thesis is unique and depends on the writer and the editor (your supervisor). There is no cast-on-stone and rigid thesis structure. The following example a good starting point:

2.2.1 Thesis

Thesis title should be a concise description of the main focus and contribution of the research

2.2.2 Abstract

- A short summary of the the thesis/dissertation/report
  - Describe the problem and the research approach
  - Emphasize the original contributions
  - A movie trailer and not a summary of thesis

2.2.3 Introducing your work

- An overview of the problem
  - Problem motivation and why it is important
  - Problem definition highlight what had been done before and the research gap to be studied, worthy a (PhD, Master, or UG) degree
  - Your hypothesis or objective of the thesis
  - Organization of the thesis – you should guide the readers on what to expect next
- Make it readable by anyone

2.2.4 Discussion of the problem and state-of-the-art solutions to problem

- Usually titled as Literature Review

- Not a literature survey in general, but rather a synthesis of the state-of-the-art related to the thesis!
  - Can also include a background information – brief synthesis of the most relevant aspects related to the thesis in order to help the reader understand the context and the contributions coming from other disciplines.
  - It can also be used to better motivate the research question.
  - Identify gaps/limitations of existing state-of-the-arts
  - Background & related work may overlap
    * Need to discuss related work at start to set the scene
    * Need to discuss related work at end to demonstrate your originality
    * But not cut and paste!
    * Exercise your synthesis and critic skills!
  - Make the definitions precise, concise, and unambiguous.

2.2.5 Your proposed work

- Usually entitled Methodology, but not necessary
- Here you develop your conceptual contribution, i.e. the central concept of your work
  - Discussion of the thesis and different perspectives of analysis of the research question
    * Definition of problem
    * Formulation of concepts, definitions, theories
  - Research design
    * Elaboration of frameworks, models, architectures
    * Methods and procedure, variables
    * May include description of a prototype system implementation

and its use towards solving the research problem

  - Can include some context information (e.g. development software, test environment, procedure, limitations, assumptions, range of validity)
  - But not too many details!!!

2.2.6 Validation of hyposthesis

- Usually titled as Result and Discussion
- Describe experiment details that provide evidence in support of your thesis
  - Developing a prototype may not enough to validate the thesis – at most it is a proof of feasibility of your system
  - Validation is about collecting (enough) evidence to convince the other researchers about the validity of the thesis through
    - A proper (systematic) method
    - Organized argumentation (is important)
  - Analysis and concepts form the heart of the work
  - It must state what was learned, not only the facts that were gathered!

2.2.7 Take home message to readers

- Summarize what was learned and how it can be applied
  - Include the broader implications of your results
  - Do not repeat word for word the abstract, introduction or discussion
  - Mention the possibilities for future research

2.2.8 References to back up your statements

- If you make a statement, back it up with your own data or a reference
  - All references cited in the text must be listed
  - UTM supports either the numbering or author-year format
  - Try to avoid inclusion of references as footnotes
- Refer to Section 3.7.2 on page 18.

2.2.9 Appendices

- This is an optional part
  - It can include:
    * Implementation details
    * Detailed experiment data
  - May be important to
    * Convince the reader
    * Help others replicating the experiment
  - ... but are “boring” or too detailed to include in the main body of the thesis

2.3 Suggested order for writing

- Begin by writing the chapters that describe your research (2,3, 4, and 5 in the above outline)
- Define all technical terms and make the definitions precise and formal
- After reading the main chapters to verify terminology, write the conclusions
- Write the introduction

- Complete with an abstract

2.4 The revision journey

- Revise them and start getting feedback
  - **think-plan-write-revise** cycles
- Get early feedback from colleagues
  - Starting with the key chapters
- Carefully revise those chapters before giving them to your supervisor
- When you have a complete draft
  - Consider 2 or 3 complete revision/editing iterations!
  - Could be more

CHAPTER 3

LYX FOR UTM THESIS

3.1 Installation

3.1.1 Local installation

- To use LyX as a LaTeX frontend, you need to install a TeX distribution, preferably before installing LyX itself. For Windows there are two main choices: MiKTeX and TeXLive.
  - See `https://wiki.lyx.org/Windows/TeXLive` for TeX distribution installation guide
  - Then install LyX from this link `https://www.lyx.org/Download`.
- Or, you may download and install Lyx Bundle version. The last supported version is `https://ftp.lip6.fr/pub/lyx/bin/2.3.0/LyX-230-Bundle-005.exe`

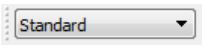
3.1.2 Online access

- Use LyX on rollApp `https://www.rollapp.com/app/lyx`
  - Need subscription for saving to cloud storage.
  - Without able to save what you wrote, it sucks.
  - See Appendix A on page 31.
- For LaTeX user, you may check Overleaf `https://www.overleaf.com/`

3.1.3 UTM thesis template

- Download UTM thesis template
  - Local experimental copy `http://www.fke.utm.my/nadzir/docs/UTM-thesis-LyX-template-v6.zip`
  - You can use the template for both numbering or author-year citation styles
  - Official UTM Template on GitHub `https://github.com/utmthesis/utmthesis`
- Testing the template. Check (open) **utmthesis.layout** using a text editor
  - Check line 13
    - Change to Format 60
  - Previous version uses Format 49
- Generating pdf
  - Open **thesis-template-numbering.lyx**
  - **File ▹ Export ▹ PDF (pdflatex)**
  - A PDF should be generated

3.2 Writing Flow

- Vital information
- Select from the **Environment** choice box 

- Preamble pages
  - Acknowledgement
  - Dedication
  - Abstract
  - Abstrak

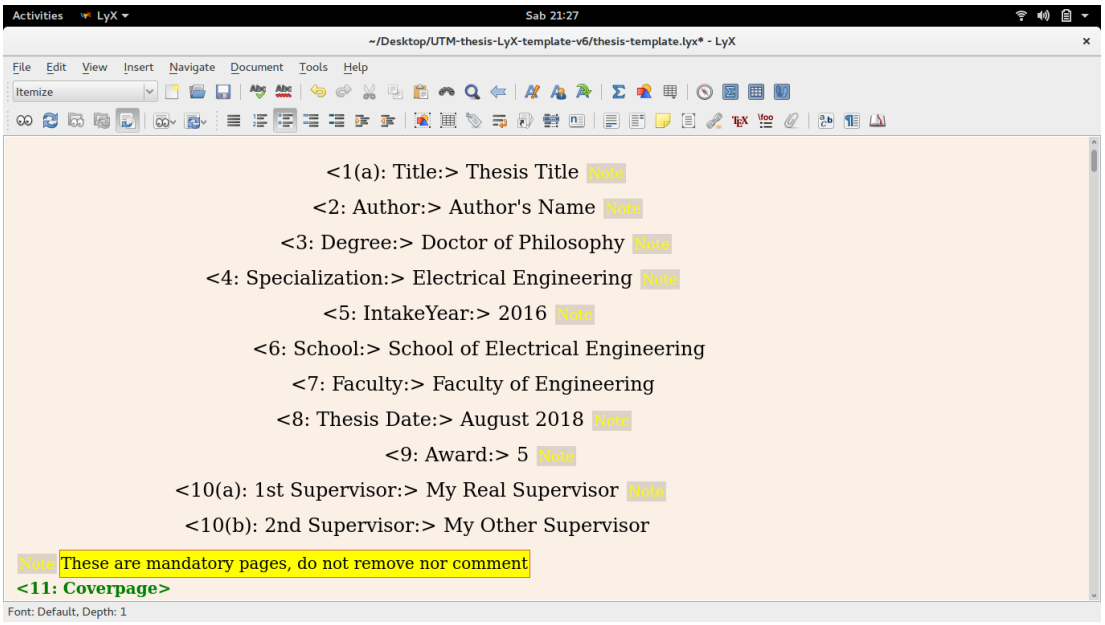


Figure 3.1 LyX user interface

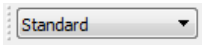
  - List of Abbreviations
  - List of Symbols
- Main Matters: Parts, Chapters, and Sections
  - Chapter (e.g., 2)
  - Section (e.g., 2.1)
  - Subsection (e.g., 2.1.1)
  - Subsubsection (e.g., 2.1.1.1)
  - Do not to go beyond this. Restructure your chapter.
    * If unable to do this, **quit**!

3.3 LyX Basic Features

- Cut/Paste/Copy – Like MS Word.
- WYSIWYM, not WYSWYG
  - The hardest things for new users: How LyX handles whitespace.
  - Protected Break, which you get by typing **Ctrl+Return**

- Protected Space, which you get by typing **Ctrl+Space**

3.4 LyX Environments

- Document classes are another major part of the WYSIWYM philosophy.
  - It tells LyX how to typeset the document, so you do not need to know how.
  - UTMthesis class is a **book-type derived class**.
- Different parts of a document have different purposes; we call these parts *environments*.
  - Certain types of documents have special environments (an abstract and a title for journal, but not letter)
  - An environment may require a certain font style, font size, indenting, line spacing, and more.
  - The Environment choice box is located on the left end of the toolbar and looks like this: 

.
- Paragraph alignment
  - The default in most cases is justified alignment.
- Using Different Character Styles
  - Noun style (toolbar button )
  - Emphasized style (toolbar button )
  - *Don't overuse character styles!*
- Lists and sublists
  - Enumerate
  - Itemized
  - List (not native to LaTeX)
  - Description

- Footnotes
  - Footnotes can be added using the toolbar button or the menu Insert ▸ Footnote.

3.5 Abbreviations

- You can add abbreviations through the newly-included environments.

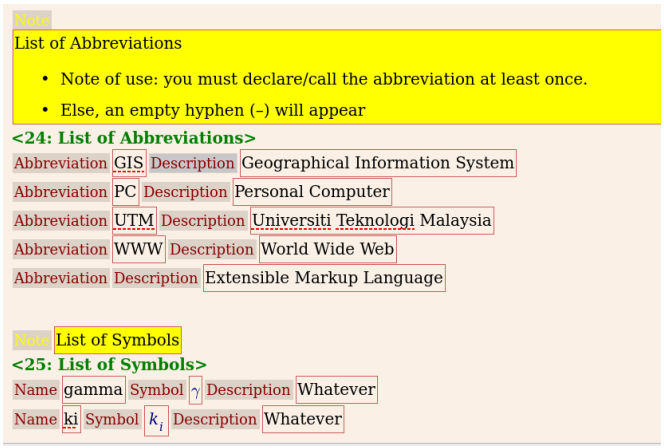


Figure 3.2 Adding abbreviations

- To call an abbreviation, **Insert ▸ Custom Insets ▸ Abbre**

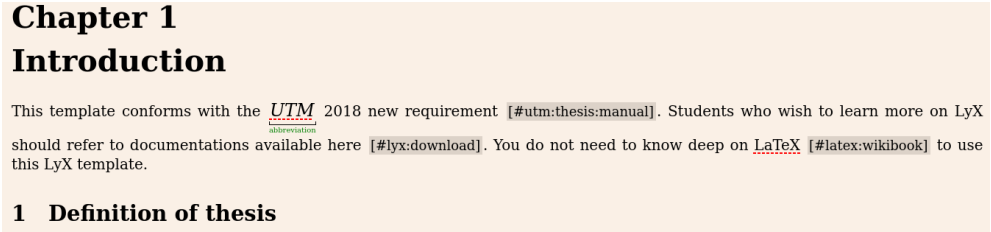


Figure 3.3 Calling a defined abbreviation

- Must make sure you type it correctly as you defined it in the List of Abbreviations
  - Case-sensitive
- If you did not declare, even once, an empty hyphen would appear in your List of Abbreviations and List of Symbols

3.6 Cross-Referencing and Bibliography

- The use of label and cross-reference.
  - Dynamic numbering of
    * <reference>: prints the float number, this is the default.
    * (<reference>): prints the float number within two parentheses, e.g. for Equation.
    * <page>: prints the page number.
    * on page <page>: prints the text "on page" and the page number.
    * **<reference> on page <page>**: prints the float number, the text "on page", and the page number.
    * Formatted reference: prints a self defined cross-reference format (haven't explored yet).
- Use it to refer to figures, tables, equations, chapters etc.

3.7 Bibliographies

3.7.1 Using BiBTEX

- Insert citation by 

```
@book{Oetiker:2013,
Author = {Tobias Oetiker and Hubert Partl and Irene Hyna and Elisabeth
Schlegl},
Title = {The Not So Short Introduction to \LaTeX 2$\varepsilon$},
Year = {2013},
URL = {http://ctan.tug.org/tex-archive/info/lshort/english/lshort.pdf}
}
```

```
@ELECTRONIC{lyx:download,
title = {LyX},
year = {2013},
month = {November},
URL = {http://www.lyx.org},
}
```

```
@INPROCEEDINGS{Androutsopoulos:2000,
Author = {Androutsopoulos, I. and Paliouras, G. and Karkaletsis, V. and
Sakkis, G. and Spyropoulos, C. and Stamatopoulos, P.},
Title = {Learning to filter spam e-mail:  A comparison of a naive {B}ayesian
and a memory-based approach},
BOOKTITLE = {Workshop on Machine Learning and Textual Information Access, the
4th European Conference on Principles and Practice of Knowledge Discovery in
Databases (PKDD)},
Year = {2000},
Month = {September},
Address = {Lyon, France},
Pages = {1--13}
}
```

```
@ARTICLE{ramakrishna:1997,
AUTHOR = {M.V. Ramakrishna and E. Fu and E. Bahcekapili},
TITLE = {Efficient Hardware Hashing Functions for High Performance
Computers},
JOURNAL = {IEEE Transaction on Computers},
YEAR = {1997},
volume = {46},
number = {12},
pages = {1378--1381},
}
```

```
@techreport{axelsson:1998,
Author = {Axelsson, S.},
Title = {Research in Intrusion Detection System:  A Survey},
Institution = {Chalmers University of Technology},
Number = {TR 98-17},
Type = {Technical Report},
Month= {December 15, 1998},
Year = {1998},
}
```

```
@MASTERSTHESIS{fahmi:2004,
Author = {Fahmi, I. },
Title = {Examining Learning Algorithms for Text Classification in Digital
Libraries},
School = {University of Grongingen},
Type = {Master of Arts Theses},
Year = {2004}
}
```

- Where to get?
  - Mendeley (citations manager)
  - Google Scholar
  - Publishers
  - **May Require manual edit**

3.7.2 BibTEX style

- UTM supports either numbering (mostly science and engineering) or author-year (social sciences) format.
- Note that the latest UTM thesis manual [1] allows any standard styles, provided that it is used consistently (I could not see otherwise) in the thesis.
- For numbering, use **utmthesis-numbering.bst** (or any other numbering BibTeX styles such as **IEEEtran.bst**)

  - **Document ▹ Settings ▹ Bibliography ▹ Citation Style ▹ Basic (BibTeX)**
  - Click on BibTeX Generated Bibliography to change the BibTeX style **Style ▹ Browse** and select **utmthesis-numbering.bst**
- For author-year, use **utmthesis-authordate.bst** (or any other numbering BibTeX styles such as APA)
  - **Document ▹ Settings ▹ Bibliography ▹ Citation Style ▹ NatBib (BibTeX)**
  - Click on BibTeX Generated Bibliography to change the BibTeX style **Style ▹ Browse** and select **utmthesis-authordate.bst**

3.8 Typesetting Maths

- In order to create a formula, just click the toolbar button  or use the menu Insert ▹ Math ▹ Inline Formula
  - Also for **Display Formula** and **Numbered Formula**.
  - For multiline equations, use **Eqnarray**
- Examples of Math Mode Features
  - Exponents and Subscripts – e.g., **x^2y**, you will get x^{2y} and type **a_1** to get a_1.
  - Fractions – by typing **\frac** or using the icon  in the Math Panel.
  - Roots – using the Math Panel button  or the commands **\sqrt** or **\root**.
  - Operators with Limits – Sum ($\sum$) and integral ($\int$) operators
  - Math Symbols – includes Greek, Operators , Relations, Arrows. Also AMS additional symbols.
  - Altering Spacing – using protected space.
  - Brackets and Delimiters – Auto-sizing delimiter via icon  .
  - Arrays and Multi-line Equations – Matrices are entered using the Math Panel matrix button  .

- Cases – **Insert ▹ Math ▹ Cases Environment**

3.9 Floats

- A float doesn't have a fixed location.
  - It can "float" forward or backward to wherever it fits best to get a high quality layout.
  - Caption as part of a float.
  - Can create subfigure with double **Insert ▹ Float ▹ Figure** and again, **insert ▹ Float ▹ Figure**
- Float Placement
  - **Here if possible**: try to place the float at the position where it is inserted
  - **Top of page**: try to place the float at the top of the current page
  - **Bottom of page**: try to place the float at the bottom of the current page
  - **Page of floats**: try to place the float at an own page

3.9.1 Graphic and Images

A good thesis needs good diagrams/graphs/illustrations. Spend some time doing in properly. A good picture tells a thousand words.

- Place the cursor and click on the toolbar icon or select **Insert ▸ Graphics** from the menu.
- You can copy and paste as well (just like MS Word) but will result in bipmap image. Not good enough.
- Use scalable images such as SVG, EPS, PDF.
- If you drew diagrams using Microsoft Word, you may copy-and-paste it to Visio or PowerPoint. Then export as scalable images.

Figure 3.4 Figure caption that appear in text, with citation [4]

(a) Figure caption that appear in text, with citation [4]

(b) Figure caption that appear in text

Figure 3.5 Figure caption which is very very very very very very very very very very very very very very very very very very very very very very very very very very very very very very very looooooong.

3.9.2 Tables

If you need to show exact values (instead of trend for graphs), use tables instead.

- Insert a table using either the toolbar button or the menu **Insert ▸ Table**
- Use with cross-referencing, such as Table 3.1.

Table 3.1 Table caption

a	b	c	d
1			

3.10 PSZ Declaration Form

The Library Declaration form (**library-form.pdf**) in the **fig** folder. The pdf is fillable. However, the filled pdf when compiled will have the filled text disappear. This is the LaTeX problem. A quick solution for this is to first fill the form, print and save-as-pdf function to render it again. While the document now being no longer a editable PDF-form, the filled out fields are now included and rendered correctly. Else, use a third party tool (Acrobat) or write by hand.

3.11 Use Notes

3.11.1 Turn on the spelling checker

Sloppily-written thesis spells disaster. If the examiners feel that you could care less with your thesis, they will do likewise.

- **Tools ▹ Preferences ▹ Language Setting ▹ Spellchecker ▹ Spellchecker engine**
  - Turn on Spellcheck continuously

3.11.2 Track changes between reviews

Revision is a daunting process. Help your supervisor to visualize changes been made.

- **Document ▹ Change tracking ▹ Track changes**
  - If you need to show the changes in pdf, select **Document ▹ Change tracking ▹ Show changes in output**

3.11.3 Add-on features

- Depending on needs, you may need to include advanced features and/or specialized packages. Please read the accompanying documentations
  - Built-in LyX advanced features such as Theorem, **Document ▹ Settings ▹ Modules ▹ Theorems (Numbered by Chapter)**
  - LaTeX packages such as for displaying URL, geometry, etc.

3.11.4 Fine typesetting

- Only perform fine typesetting (page break, vertical skip, etc.) before finalizing the document.

3.11.5 One-side or double-side printing

- UTM allow either single or double-sided printing for submission of thesis for oral examination purposes (UTM Thesis Guideline, 2018) **Section 2.3** on page 13.
  - **Document ▹ Settings ▹ Page Layout** then select (check) **Two-sided document**
  - Uncheck it will make it a single-sided document

3.11.6 Font type

- You can also choose different font types (UTM Thesis Guideline, 2018) **Section 2.4** on page 14–15.
  - **Document ▹ Settings ▹ Fonts ▹ Default family** then select either **Roman** (default) or **Sans Serif**
  - You may also define font type packages in LaTeX preamble **Document ▹ Settings ▹ LaTeX Preamble**
    - **\usepackage{times}** for Times New Roman (obselete, but can be used)
    - **\usepackage{helvet}** for Arial-like

CHAPTER 4

CONCLUSION

Hope you can find this useful. Chiao....

REFERENCES

1. UTM Thesis Guideline, 2018. URL http://sps.utm.my/wp-content/uploads/2018/08/Thesis-Preparation-05082018.pdf.

2. LyX, 2013. URL http://www.lyx.org.

3. LaTeX Wikibook, 2013. URL http://en.wikibooks.org/wiki/LaTeX.

4. Ramakrishna, M., Fu, E. and Bahcekapili, E. Efficient Hardware Hashing Functions for High Performance Computers. *IEEE Transaction on Computers*, 1997. 46(12): 1378–1381.

LIST OF PUBLICATIONS

Journal with Impact Factor

1. Paper 1
2. Paper 2

Indexed Journal (SCOPUS)

1. Paper 3

Non-Indexed Journal

1. Paper 4

Indexed conference proceedings

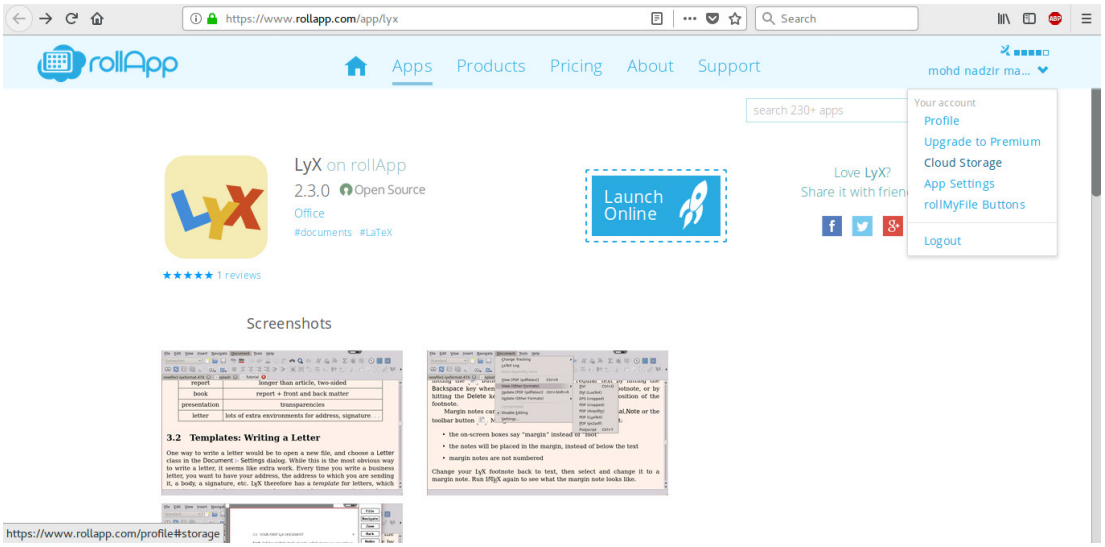
1. Paper 5

Non-Indexed conference proceedings

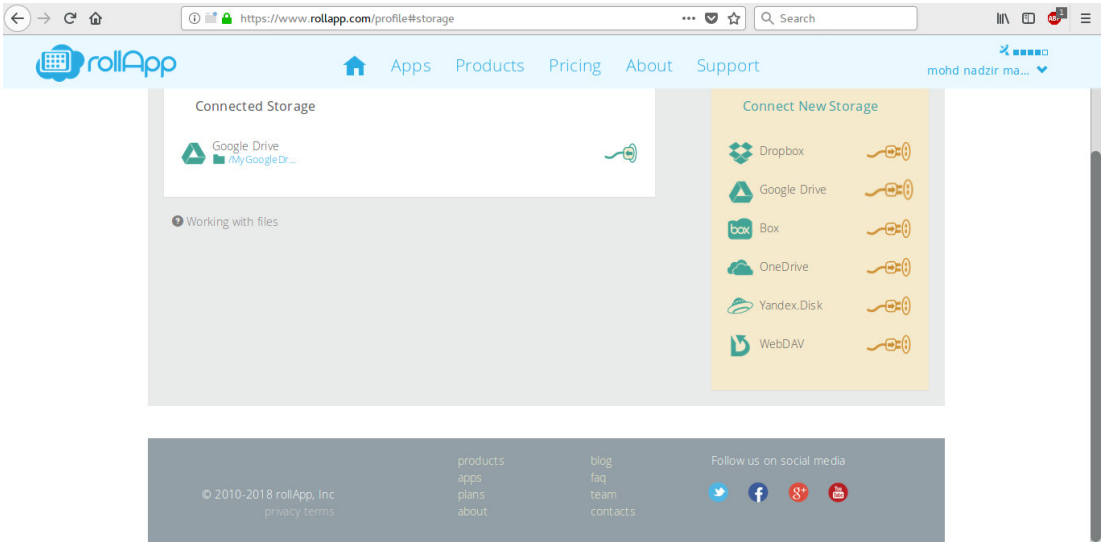
1. Paper 6

Appendix A Using LyX on rollApp Thesis title should be a concise description of the main focus and contribution of the research. It should not contain more than 15 words excluding grammatical words such as articles, conjunction

- I prefer you to install LyX locally
  - rollApp requires subscription to write to cloud storage, i.e., you cannot save
- If you need to access LyX on rollApp, click here `https://www.rollapp.com/app/lyx`
- You need to register as a first-time user, or select other log-in option



- Download UTM thesis template
- Upload to GoogleDrive
- Connect the GoogleDrive to rollApp



- Now, you can access LyX online