
Writing Your Thesis in L^AT_EX

A Tutorial

Ming-Chao Chiang

`mcchiang@cse.nsysu.edu.tw`

Department of Computer Science and Engineering
National Sun Yat-sen University
Kaohsiung, Taiwan 84024

March 27, 2009

Outline

- Before We Begin
- Introduction
- Getting Started
- Setting up L^AT_EX
- The Template
- Verifying the Setup
- Inside the Template
- Compiling the Thesis
- Bibliography
- Q&A
- Conclusion

Before We Begin (1/5)

● Why L^AT_EX?

Before We Begin (1/5)

- Why L^AT_EX?
- What is L^AT_EX?

Before We Begin (1/5)

- Why $\text{\LaTeX}$?
- What is $\text{\LaTeX}$?
 - $\text{\LaTeX}$ is a set of macros built on $\text{\TeX}$.
 - You may think of $\text{\LaTeX}$ as a high-level language such as C or C++.

Before We Begin (1/5)

- Why $\text{\LaTeX}$?
- What is $\text{\LaTeX}$?
 - $\text{\LaTeX}$ is a set of macros built on $\text{\TeX}$.
 - You may think of $\text{\LaTeX}$ as a high-level language such as C or C++.
- Now, what is $\text{\TeX}$?

Before We Begin (1/5)

- Why $\text{\LaTeX}$?
- What is $\text{\LaTeX}$?
 - $\text{\LaTeX}$ is a set of macros built on $\text{\TeX}$.
 - You may think of $\text{\LaTeX}$ as a high-level language such as C or C++.
- Now, what is $\text{\TeX}$?
 - $\text{\TeX}$ is a new typesetting system written by Donald E. Knuth, who says that it is “intended for the creation of beautiful books—and especially for books that contain a lot of mathematics.”
 - You may think of $\text{\TeX}$ as a low-level language such as assembly.
 - It is composed of 300 or so primitives (or built-in control sequences).

Before We Begin (2/5)

```
1 \begin{gather}
2   \sqrt{1+
3     \sqrt{1+
4       \sqrt{1+
5         \sqrt{1+
6           \sqrt{1+
7             \sqrt{1+x+x^2}}}}}}}\backslash
9   \sqrt{1+\sqrt{1+\sqrt{1+x+x^2+x^3+x^4+x^5+x^6}}}}
10 \end{gather}
```

$$\sqrt{1 + \sqrt{1 + \sqrt{1 + \sqrt{1 + \sqrt{1 + \sqrt{1 + x + x^2}}}}}} \quad (1)$$

$$\sqrt{1 + \sqrt{1 + \sqrt{1 + x + x^2 + x^3 + x^4 + x^5 + x^6}}} \quad (2)$$

Before We Begin (3/5)

```
1 \begin{equation}
2   \cfrac{1}{\sqrt{2}}+
3     \cfrac{1}{\sqrt{3}}+
4       \cfrac{1}{\sqrt{4}}+
5         \cfrac{1}{\sqrt{5}}+
6           \cfrac{1}{\sqrt{6}}+
7             \cfrac{1}{\sqrt{7}+\dotsb}}}}}
8 \end{equation}
```

$$\sqrt{2} + \frac{1}{\sqrt{3} + \frac{1}{\sqrt{4} + \frac{1}{\sqrt{5} + \frac{1}{\sqrt{6} + \frac{1}{\sqrt{7} + \dots}}}}}} \quad (3)$$

Before We Begin (4/5)

```
1 \begin{displaymath}
2   \begin{split}
3     \left(\int_{-\infty}^{\infty} e^{-x^2} dx\right)^2 &= \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} e^{-(x^2+y^2)} dx dy \\
4     &= \int_0^{2\pi} \int_0^{\infty} e^{-r^2} r dr d\theta \\
5     &= \int_0^{2\pi} \left( -\frac{e^{-r^2}}{2} \Big|_{r=0}^{r=\infty} \right) d\theta \\
6     &= \pi.
7   \end{split}
8 \end{displaymath}
```

$$\begin{aligned} \left(\int_{-\infty}^{\infty} e^{-x^2} dx \right)^2 &= \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} e^{-(x^2+y^2)} dx dy \\ &= \int_0^{2\pi} \int_0^{\infty} e^{-r^2} r dr d\theta \\ &= \int_0^{2\pi} \left(-\frac{e^{-r^2}}{2} \Big|_{r=0}^{r=\infty} \right) d\theta \\ &= \pi. \end{aligned}$$

Before We Begin (5/5)

```
1 \begin{displaymath}
2   B(x)=\left\{
3     \begin{array}{ll}
4       {\displaystyle \int_{x-\alpha}^{x+\alpha}vG(x-z)\,dz,} & {\displaystyle x < x_0-\alpha} \\
5       {\displaystyle \int_{x-\alpha}^{x_0}vG(x-z)\,dz+\int_{x_0}^{x+\alpha}(v+\delta)G(x-z)\,dz,} & {\displaystyle x_0-\alpha\leq x\leq x_0+\alpha} \\
6       {\displaystyle \int_{x-\alpha}^{x+\alpha}(v+\delta)G(x-z)\,dz,} & {\displaystyle x > x_0+\alpha}
7     \end{array} \right.
8 \end{displaymath}
```

$$B(x) = \begin{cases} \int_{x-\alpha}^{x+\alpha} vG(x-z) dz, & x < x_0 - \alpha \\ \int_{x-\alpha}^{x_0} vG(x-z) dz + \int_{x_0}^{x+\alpha} (v+\delta)G(x-z) dz, & x_0 - \alpha \leq x \leq x_0 + \alpha \\ \int_{x-\alpha}^{x+\alpha} (v+\delta)G(x-z) dz, & x > x_0 + \alpha \end{cases}$$

Introduction (1/2)

- We will first show you the steps needed to write your thesis in $\text{\LaTeX}$.
- We will then show you a sample thesis step by step.
- We won't cover how to use $\text{\LaTeX}$ itself, but many useful references are available.
 - Frank Mittelbach, Michel Goossens, Johannes Braams, David Carlisle, and Chris Rowley. *The $\text{\LaTeX}$ Companion, Second Edition*. Addison-Wesley, Reading, 2004.
 - Michel Goossens, Frank Mittelbach, and Alexander Samarin. *The $\text{\LaTeX}$ Companion*. Addison-Wesley, Reading, 1994.
 - Leslie Lamport. *$\text{\LaTeX}$: A Document Preparation System—User's Guide and Reference Manual*. Addison-Wesley, Reading, 1986.
 - Donald E. Knuth. *The $\text{\TeX}$ book, Volume A of Computers and Typesetting*. Addison-Wesley, Reading, 1986.
 - ...

Introduction (2/2)

- Many more useful references are available on the Internet.
 - The Not So Short Introduction to L^AT_EX 2_ε
<http://www.ctan.org/tex-archive/info/lshort/english/lshort.pdf>
 - 大家來學L^AT_EX
<http://edt1023.sayya.org/tex/latex123/latex123.html>
 - ...

Getting Started

- Step 1: Setting up $\text{\LaTeX}$
- Step 2: Setting up a $\text{\LaTeX}$ aware editor (optional)
- Step 3: Installing the template
- Step 4: Writing your thesis, using the template as a starting point
- Step 5: Getting some useful references for $\text{\LaTeX}$ (optional)

Setting up L^AT_EX

● Linux

● T_EX Live

<http://www.tug.org/texlive>

An easy way to get T_EX/L^AT_EX up and running on most flavors of Unix and also Windows.

● Windows

● MiK_TE_X^a

<http://www.miktex.org>

... typesetting beautiful documents ...

^aMiK_TE_X 2.7 or later is recommended.

Setting up a L^AT_EX aware editor

● Linux

● kile^a

<http://kile.sourceforge.net>

An integrated L^AT_EX environment for KDE and Gnome.

● emacs with auctex

<http://www.gnu.org/software/emacs>

<http://www.gnu.org/software/auctex>

An extensible package for writing and formatting T_EX files in Emacs.

● Windows

● WinEdt^b

<http://www.winedt.com>

A powerful and versatile editor for Windows with a strong predisposition towards the creation of T_EX/L^AT_EX documents ...

^aSorry, I never use it myself. You are on your own.

^bDitto!

Installing the Template

- The template is in a tar file named
`latex-template-nsysuthesis-v1.1.tar.gz`.
- It consists of a quick start guide and the template that is specific to the National Sun Yat-sen University thesis format in the folder
`latex/template`.
- It is available upon request by sending me e-mail, tentatively.

Verifying the Setup

- Change to the folder `latex/template/nsysuthesis-v1.1`.
- Double click `compile.bat`.
- If everything goes well, you will get `nsysuthesis.pdf`, which should look exactly the same as `template.pdf`.

Inside the Template (1/3)

- `nsysuthesis.sty`—the style file for the NSYSU thesis
- `compile.bat`—a batch file for compiling the thesis on Windows
- `compile-linux.bat`—a batch file for compiling the thesis on Linux
- `template.pdf`—a precompiled thesis for verifying the setup of $\text{\LaTeX}$

Inside the Template (2/3)

- `nsysuthesis.tex`—the main file
- `nsysuthesis.bib`—the bibliography file
- `abschinese.tex`—Abstract in Chinese
- `absenglish.tex`—Abstract in English
- `ack.tex`—Acknowledgement
- `chap01.tex`—Chapter 1
- `chap02.tex`—Chapter 2
- `chap03.tex`—Chapter 3
- `chap04.tex`—Chapter 4
- `chap05.tex`—Chapter 5
- `app01.tex`—Appendix 1
- `app02.tex`—Appendix 2

Inside the Template (3/3)

- `lstset.tex`—setups for listings
- `macros.tex`—macros
- `figs/osw.pdf`—example figure in pdf
- `figs/versatile.jpg`—example figure in jpg
- `logo/nsysu-wm.jpg`—NSYSU watermark
- `logo/nsysulogo.jpg`—NSYSU logo

Structure of the Thesis (1/2)

```
1 \documentclass{report} % the standard class ‘report’
2 % document preamble
3 \usepackage{nsysuthesis}
4 \usepackage{CJKutf8}
5 \usepackage{...}
6 ...
7 \begin{document}
8     % front matter of the thesis
9     \thesistitlepage
10    \thesiscopyrightpage
11    \input abschinese.tex
12    \input absenglish.tex
13    \tableofcontents
14    \listoftables
15    \listoffigures
16    \listoflistings
17    \input ack.tex
```

Structure of the Thesis (2/2)

```
18      % body of the thesis
19      \input chap01.tex
20      \input chap02.tex
21      ...
22      \input chapNN.tex
23      % back matter of the thesis
24      \bibliographystyle{ieeetr}
25      \bibliography{nsysuthesis}
26      \appendix
27      \input app01.tex
28      \input app02.tex
29      ...
30      \input appMM.tex
31  \end{codument}
```

nsysutthesis.tex (1/9)

```
1  %%% =====
2  %%% File: nsysutthesis.tex, version 1.1, March 2009
3  %%% File: nsysutthesis.tex, version 1.0, June 2008
4  %%% File: nsysutthesis.tex, version 0.1, November 2005
5  %%% Copyright (C) 2005-2009 by M. C. Chiang. All rights reserved.
6  %%% =====
7  %%% File: utthesis.doc, version 1.0, April 1999
8  %%% =====
9  %%% Copyright (c) 1994 by Dinesh Das. All rights reserved.
10 %%% This file is free and can be modified or distributed as long as
11 %%% you meet the following conditions:
12 %%% (1) This copyright notice is kept intact on all modified copies.
13 %%% (2) If you modify this file, you MUST NOT use the original file name.
14 %%% =====
15
```

nsysuthesis.tex (2/9)

```
16 \documentclass[a4paper,12pt]{report}
17 \usepackage{nsysuthesis}
18 \usepackage{CJKutf8}
19 \usepackage{times}
20 \usepackage[pdftex]{graphicx}
21 \usepackage[pdftex,unicode,plainpages=false,bookmarksnumbered,
    bookmarksopenlevel=3]{hyperref}
22 \usepackage{color}
23
24 \parindent 0pt
25
26 \input lstset.tex
27 \input macros.tex
28
29 \setcounter{tocdepth}{4}
30 \setcounter{secnumdepth}{4}
31
```

nsysuthesis.tex (3/9)

```
32 %\singlespace %1.1
33 \oneandhalfspace %1.5
34 %\doublespace %1.7
35
36 \leftchapter
37 %\centerchapter
38 %\rightchapter
39
40 %\mastersthesis
41 \phdthesis
42
43 %\thesisdraft
44
45
46
47 \begin{document}
48   \begin{CJK*}{UTF8}{bkai}
49
```

nsysuthesis.tex (4/9)

```
50      \newcommand{\myuniversity}{國立中山大學}
51      \newcommand{\mydepartment}{資訊工程學系}
52      \newcommand{\mythesistype}{碩士論文}
53      %% Comment out the above line and then uncomment one of the
54      %% following three lines
55      % \newcommand{\mythesistype}{碩士論文}
56      % \newcommand{\mythesistype}{博士論文}
57      % \newcommand{\mythesistype}{博士論文計畫書}
58      \newcommand{\mythesistitlechinese}{論文中文名稱}
59      \newcommand{\mythesistitleenglish}{Thesis Title in English}
60      \newcommand{\myname}{林秀菁}
61      \newcommand{\myadvisor}{江明朝}
62      \newcommand{\mythesisyear}{中華民國九十七年六月}
63
```

```
64     \hypersetup{
65         pdftitle={\myuniversity 學位論文典藏.PDF},
66         pdfauthor={\myuniversity~\mydepartment~\myname},
67         pdfsubject={\mythesistitlechinese},
68         pdfkeywords={\LaTeX, \TeX}
69     }
70
```

nsysuthesis.tex (6/9)

```
71      \renewcommand{\thesisuniversityname}{\myuniversity\mydepartment}
72      \renewcommand{\thesistype}{\mythesistype}
73      \renewcommand{\thesistitlechinese}{\mythesistitlechinese}
74      \renewcommand{\thesistitleenglish}{\mythesistitleenglish}
75      \renewcommand{\thesisauthor}{研究生：~~\myname~~撰}
76      \renewcommand{\thesisadvisor}{指導教授：~~\myadvisor~~博士}
77      \renewcommand{\thesisyear}{\mythesisyear}
78      \renewcommand{\thesisdedication}{Dedication Text}
79
```

nsysuthesis.tex (7/9)

```
80     \pagenumbering{alph}
81     %% Generate the title page.
82     \thesistitlepage
83
84     %% Generate the copyright page.
85     \renewcommand{\thesisauthor}{\myname}
86     \thesiscopyrightpage
87
88     %% Generate the abstract pages.
89     \input abschinese.tex
90     \input absenglish.tex
91
```

nsysuthesis.tex (8/9)

```
92      %% Generate table of contents, list of tables, list of figures, and
93      %% list of listings.
94      % \contenttabfiglst
95      \tableofcontents
96      \listoftables
97      \listoffigures
98      % \listoflistings
99
100     %% Generate the acknowledgement page.
101     \input ack.tex
102
```

nsysuthesis.tex (9/9)

```
103      %% Generate the dedication page.
104      % \thesisdedicationpage
105
106      \input chap01.tex
107      \input chap02.tex
108      \input chap03.tex
109      \input chap04.tex
110      \input chap05.tex
111
112      \bibliographystyle{ieeetr}
113      \bibliography{nsysuthesis}
114
115      \appendix
116      \input app01.tex
117      \input app02.tex
118
119      \end{CJK*}
120  \end{document}
```

```
1  % Abstract in English
2  \renewcommand{\thesisabstracthead}{ABSTRACT}
3  \renewcommand{\thesistitle}{\thesistitleenglish}
4  \begin{thesisabstract}
5
6    Abstract in English $\ldots$
7
8    \vspace{\baselineskip}
9    \noindent
10   \textbf{Keyword:} $\ldots$
11
12 \end{thesisabstract}
13
```

```
1  % Abstract in Chinese
2  \renewcommand{\thesisabstracthead}{摘要}
3  \renewcommand{\thesistitle}{\thesistitlechinese}
4  \begin{thesisabstract}
5
6      中文摘要 . . .
7
8      \vspace{\baselineskip}
9      \noindent
10     \textbf{關鍵詞：} . . .
11
12
13
14 \end{thesisabstract}
15
```

```
1 \renewcommand{\thesisacknowledgmenthead}{Acknowledgments}
2 \begin{thesisacknowledgments}
3
4   Here is the acknowlegments $\ldots$
5
6   Whatever you think of and want to put here $\ldots$
7
8   \vspace{1in}
9   \verb|???~!@#$$%^&*()_+ -={} [] <>???|
10  \vspace{1in}
11
12  \myname\
13  于~~西子灣\
14  August 1, 2008
15
16 \end{thesisacknowledgments}
```

```
1 \chapter{Introduction}
2 \label{ch:intro}
3
4 Here is the introduction to, and motivation for, your thesis $\ldots$
5
6 \section{Motivation}
7 \label{sec:motivation}
8
9 First, the motivation $\ldots$
10
11 \section{Contributions of the Thesis}
12 \label{sec:contributions}
13
14 Then, the contributions $\ldots$
15
16 \section{Organization of the Thesis}
17 \label{sec:organization}
18
19 Finally, the organization $\ldots$
```

```
1 \chapter{Hello, World!}  
2  
3 Here is the first chapter of the appendix.  
4
```

Compiling the Thesis (1/3)

- On Linux
 - Using the command `sh compile-linux.bat`
 - Using the command `make`
 - Using the command provided by the editor you use
- On Windows
 - Using the command `compile.bat`
 - Using the command provided by the editor you use

Compiling the Thesis (2/3)

● `compile.bat`

```
1 pdflatex nsysuthesis
2 bibtex nsysuthesis
3 pdflatex nsysuthesis
4 pdflatex nsysuthesis
```

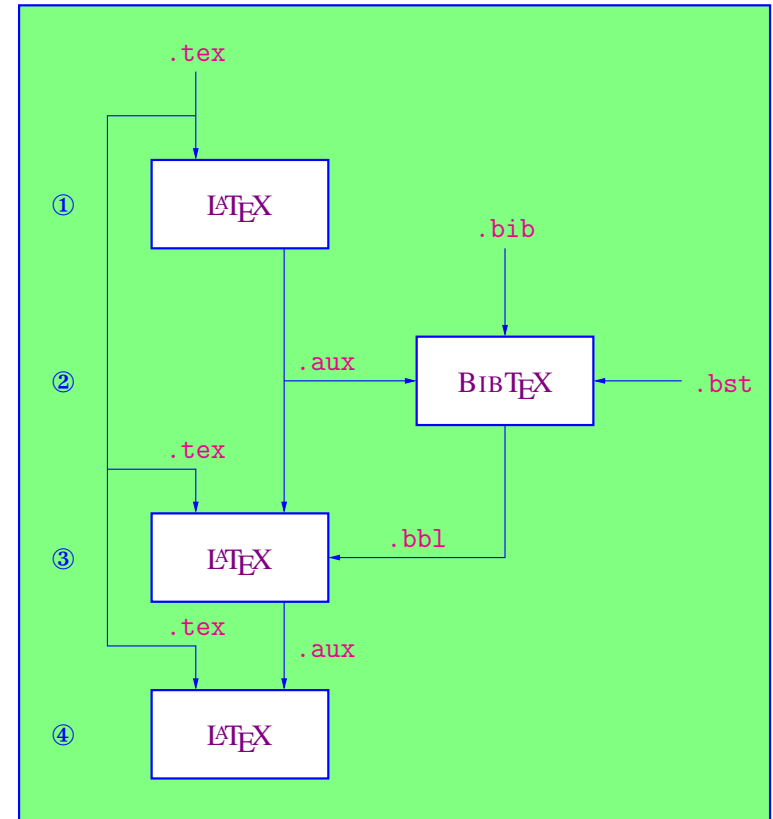
● `compile-linux.bat`

```
1 pdflatex nsysuthesis
2 bibtex nsysuthesis
3 pdflatex nsysuthesis
4 pdflatex nsysuthesis
```

- The only difference between these two batch files is in that each line in `compile.bat` ends with CR/LF while each line in `compile-linux.bat` ends with LF.

Compiling the Thesis (3/3)

- ① Run $\text{\LaTeX}$, which generates a list of `\cite` in `.aux`.
- ② Run $\text{\BibTeX}$, which reads `.aux`, looks up the references in `.bib`, and then generates `.bbl` containing the formatted references specified in `.bst`.
- ③ Run $\text{\LaTeX}$ again, which now reads `.bbl`.
- ④ Run $\text{\LaTeX}$ a third time to resolve all references.



Bibliography (1/3)

● How entries in the `bib` file look alike?

```
1 @article{Meng_2002,  
2     author    = "Weiyi Meng and Clement Yu and King-Lup Liu",  
3     title     = "Building Efficient and Effective Metasearch Engine",  
4     journal   = "ACM Computing Surveys",  
5     volume    = "34",  
6     number    = "1",  
7     year      = "2002",  
8     pages     = "48-84"  
9 }
```

● How entries in the `bib` file are cited in the main text?

```
1 Meng \cite{Meng_2002} points out that $\ldots$
```

```
1 Meng [Meng et al., 2002] points out that ...
```

Bibliography (2/3)

Using `ieeetr`

```
1 \begin{thebibliography}{1}  
2  
3 \bibitem{Meng_2002}  
4 W.~Meng, C.~Yu, and K.-L. Liu, ‘‘Building effieient and effective metasearch  
5 engine,’’ {\em ACM Computing Surveys}, vol.~34, no.~1, pp.~48--84, 2002.  
6  
7 \end{thebibliography}
```

Bibliography (2/3)

Using `ieeetr`

```
1 \begin{thebibliography}{1}  
2  
3 \bibitem{Meng_2002}  
4 W.~Meng, C.~Yu, and K.-L. Liu, “Building effieient and effective metasearch  
5 engine,” {\em ACM Computing Surveys}, vol.~34, no.~1, pp.~48--84, 2002.  
6  
7 \end{thebibliography}
```

Bibliography

- [1] W. Meng, C. Yu, and K.-L. Liu, “Building effieient and effective metasearch engine,” *ACM Computing Surveys*, vol. 34, no. 1, pp. 48–84, 2002.

Bibliography (3/3)

Using *apalike*

```
1 \begin{thebibliography}{}
2
3 \bibitem[Meng et~al., 2002]{Meng_2002}
4 Meng, W., Yu, C., and Liu, K.-L. (2002).
5 \newblock Building effieient and effective metasearch engine.
6 \newblock {\em ACM Computing Surveys}, 34(1):48--84.
7
8 \end{thebibliography}
```

Bibliography (3/3)

Using `apalike`

```
1 \begin{thebibliography}{}  
2  
3 \bibitem[Meng et~al., 2002]{Meng_2002}  
4 Meng, W., Yu, C., and Liu, K.-L. (2002).  
5 \newblock Building effieient and effective metasearch engine.  
6 \newblock {\em ACM Computing Surveys}, 34(1):48--84.  
7  
8 \end{thebibliography}
```

Bibliography

[Meng et al., 2002] Meng, W., Yu, C., and Liu, K.-L. (2002). Building effieient and effective metasearch engine. *ACM Computing Surveys*, 34(1):48–84.

Questions?

Conclusion

Thank you.