

MASARYK UNIVERSITY
FACULTY OF INFORMATICS



L^AT_EX Thesis Style

BACHELOR THESIS

Stanislav Filipčík

Brno, autumn 2008

Declaration

Hereby I declare, that this paper is my original authorial work, which I have worked out by my own. All sources, references and literature used or excerpted during elaboration of this work are properly cited and listed in complete reference to the due source.

Stanislav Filipčík

Advisor: RNDr. David Antoš, Ph.D.

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Abstract

The aim of the bachelor thesis is to provide modified version of *fithesis*, L^AT_EX thesis class, used for formatting bachelor and master thesis submitted at Masaryk University. The thesis contains guide to help students with writing thesis using the L^AT_EX class.

Keywords

Fithesis, thesis, L^AT_EX class, tutorial, template, official thesis assignment forms

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1 Introduction

L^AT_EX typesetting system allows to produce beautifully crafted documents. But high-quality documents cannot be achieved without good knowledge of the system. Although, the learning curve of L^AT_EX is a bit steeper compared to common word processors, it pays off in the end as document produced in L^AT_EX has professional look.

Different types of documents requires different structure and style of the page. Choosing the right structure is very important. L^AT_EX system allows to define the structure of the document in the files called classes or packages. These files contain definitions of document layout.

This thesis presents modification of L^AT_EX class file used to typeset bachelor and master thesis submitted at Faculty of Informatics Masaryk University. The class file is documented with tutorial describing its usage. This tutorial is suitable for complete novices to L^AT_EX system as it starts from the beginning.

The structure of the thesis is as follows: in the chapter 2 we present information about *fithesis* class and the reasons that led to modify it. Chapter 3 describes survey conducted in order to make using *fithesis* class more comfortable. Chapter 4 contains information about modifications implemented into *fithesis2* class. Chapter 6 describes usage of official bachelor and master thesis assignment forms implemented in L^AT_EX system.

2 *Fithesis* Document Class

Fithesis is L^AT_EX document class used for formatting bachelor and master theses created by Daniel Marek in 1998 as his bachelor project under supervision of Petr Sojka. Afterwards, the class was modified by Jan Pavlovič to add support for DocBook based system. Current maintainers of the *fithesis* class are Jan Pavlovič and Petr Sojka. The latest version of the class has been released July 27, 2008 and has version number 0.2.12. From now, we will refer to this version. All versions of *fithesis*, with the the latest version included, are available for download from [Pavlovič, 2008].

2.1 About *fithesis*

The primary aim of the *fithesis* class is to unify the visual style of bachelor and master thesis submitted at Faculty of Informatics Masaryk University (FI) or generally at Masaryk University (MU). Moreover, it helps users with typesetting compulsory and facultative parts of their thesis.

Despite the fact that the primary aim has not changed, the main usage of *fithesis* class is now different. Since the time it was modified, the class is used more as a template for *xslt2 module*¹ created by Jan Pavlovič. The module is used to transform XML documents into several other document formats such as HTML or formatting objects for generating PDF files. [Clark et al., 1999]

Fithesis is based on *scrreprt* class that is part of KOMA-Script bundle. L^AT_EX document classes and packages included in the bundle were designed as counterparts or even replacements to the standard L^AT_EX classes such as *article*, *book* and *report*. But offers many additional features and provide own unique look and feel with new possibilities and options for document layout [Kohm and Morawski, 2008]. The classes were designed with emphasis on European typography standards.

1. XSLT language template. Further information about *xslt2 module* is available on [Pavlovič, 2006].

2.2 Software Licence

Fithesis is distributed under the conditions of the recent version of L^AT_EX Project Public License (LPPL) 1.3 [L^AT_EX3 Project, 2008] which is besides L^AT_EX base system also used for most third-party L^AT_EX packages [Wikipedia, 2008]. This licence is considered free under the terms of Debian Free Software guidelines [Perens, 2004]. It allows modification of the source code of the software distributed under it on conditions that the modified version of the source code must not be distributed with the filename of the original file. Therefore, we decided to rename the modified version of *fithesis* class to *fithesis2* as it satisfies terms of LPPL.

2.3 Shortcomings of *fithesis* Class

During the time, few shortcomings of *fithesis* class have occurred. Many of them were corrected in new releases. Nevertheless, some were not corrected even though the problems were known and reported. In the chapter 3, we would like to present our search for *fithesis* shortcomings, discussed found problems and suggest possibilities of eliminating them. Finally, the patches will be incorporated into the modified version of the thesis class named *fithesis2*.

Modifications implemented into *fithesis2* class are closely described in the chapter 4.

3 Survey

Since one of the goals of this thesis is to make using thesis class more comfortable, knowing user's main challenges and issues with *fithesis* is very important.

Problems regarding *fithesis* class were repeatedly discussed in the discussion groups of Masaryk University Information System (IS). Moreover, the discussion groups are good place to find users' feedback and also ideas of improving and modifying the thesis class. Therefore we searched the discussion group archive to make a concept of *fithesis* shortcomings.

To prove our concept of *fithesis* issues and reassure our idea of described problems, we sent e-mails to most involved persons in the discussion as we wanted to know their opinions.

3.1 Discussion Groups

As mentioned above, we searched the discussion group archive and the discussion group archive of PB029 (Electronic Document Preparation) course to find recurring problems of *fithesis* class. The main discussed problems regarded:

- The documentation of *fithesis* is out-dated and contains information that do not match actual situation (E.g., the default size of *fithesis* is according to documentation both 11 points and 12 points. However, the *fithesis* class sets 11 points as the default.). Moreover, the documentation supposes advanced knowledge of $\text{T}_{\text{E}}\text{X}$ of $\text{L}_{\text{A}}\text{T}_{\text{E}}\text{X}$ typesetting system and therefore it is not suitable for beginners and not so advanced users.
- The download archive does not include all logos of MU faculties¹, but the *fithesis* class supports them.
- Not only beginners to $\text{T}_{\text{E}}\text{X}$ are confused by built-in input encoding. Even though this shortcoming can be cleared away by

1. Only logo of FI (in METAFONT format) is distributed with the download package.

editing the source code of `fithesis.cls`, locating this problem and finding solution is worsen as the class documentation does not contain information about built-in encoding.

3.2 E-mail questionnaire

The second part was based on e-mail questionnaire sent to the persons participated in the discussion groups mentioned in the previous part of the survey. We decided to send e-mail to five students who were the most involved contributors in the discussions and who helped others to master typesetting of their thesis.

The e-mail questionnaire contained these questions:

1. According to you, what were the main problems of `fithesis` class that you had to deal with when typesetting your thesis?
2. Which features should be incorporated in modified version of the class?
3. Which subjects should not be forgotten to included in the \LaTeX thesis class documentation?

Four of five respondents answer the e-mail questionnaire. The majority of respondents replied to the first question that the main problem of *fithesis* class is documentation which is not regularly updated along with releasing new version of *fithesis*. Moreover, the documentation is not user-friendly for absolute beginners and not so advanced users. Additionally, respondents find annoying built-in support for only one character encoding – ISO/IEC 8859-2, or less formally Latin-2.

Some new ideas were suggested as an answer to the second question. The suggestions were concerned about built-in support for *hyperref* package. Furthermore, respondents suggested addition of logos for other MU faculties.

Multiple subjects for the new documentation were suggested in answers to the third question. Respondents' ideas were for example:

- adding section about possibilities of typesetting programming code in \LaTeX ,

- notice L^AT_EX language support,
- present options of *hyperref* package.

The ideas obtained from questionnaire survey were included in the chapter *A Guide on Writing Thesis Using fithesis2 Class*. This guide is distributed along with *fithesis2* class and is available from [Stanislav Filipčík, 2008].

4 Modifications Implemented into *fithesis2*

The original *fithesis* class was designed in really good manner hence complete reimplementation would be similar to “reinventing the wheel”. Therefore we decided to modify the class to clear away its shortcomings and include new ideas retrieved from conducted survey. In the next sections, we present modifications of *fithesis* class that was included in its version fork – *fithesis2*.

4.1 Removal of Built-in Latin-2 Encoding Support

As mentioned in the previous chapter, one of the shortcomings of *fithesis* class is that it has built-in support for Latin-2 input encoding and users are not able to change the default encoding without re-defining the document class. Moreover, the information about single built-in input encoding is not mentioned in the documentation to *fithesis* class. This feature was the most mentioned shortcoming in discussion groups.

As suggested in both discussion groups and answers to e-mail questionnaire, we removed the single input encoding support.

Nowadays, the user chooses appropriate input encoding by himself. Instructions on how to achieve this are available in the in the section [A.2.3](#) of *Guide on Writing Thesis Using fithesis2 Class*.

4.2 Modification of Page Layout

4.2.1 Chapter Heading

According to requirements demanded by FI [\[FI MU, 2008b\]](#), the bachelor thesis can be considered as short works as the demanded length of the thesis is around 30 pages. The chapter heading defined in the *fithesis* class covers approximately 25 % of page place. Therefore we modified the layout of the chapter headings so that it would save more place (and paper of course).

The modification was achieved by redefining macro commands `\makechapterhead` and `\makeschapterhead`. The former command defines numbered chapter headings (obtained by `\chapter{ }`

command) whereas the latter defines non-numbered chapter headings that do not appear in the table of content (this heading can be obtained by `\chapter*{}` command).

4.2.2 Student's Name in Thesis Declaration

One of the requisites demanded by FI in [FI MU, 2008b] is that student has to sign thesis on the page with declaration. Therefore, we modified the layout of the thesis declaration page that it contains name of the student under the text of declaration. The modification was accomplished by adding

```
\vskip 2cm
\hfill\@thesisstudent
```

into the command `\DeclarationText` which defines layout of the thesis declaration text.

4.3 Non-ASCII Characters of Slovak Language

L^AT_EX enables usage of accents and special characters to support many different languages. For example to achieve “č” without loading *inputenc* package, we can insert `\v{c}` into document source.

As the *fithesis2* class does not use *inputenc* package to specify input encoding, we should use only ASCII characters in the class file.

As most of the non-English words with accents used in the source code of the *fithesis* class were correctly “escaped” (the accents were produced by the previously mentioned method), few Slovak words stayed in non ASCII characters. Not escaping these words would let to generating misspelled headings of thesis compulsory parts such as *Kľúčové slová*. Therefore, it was necessary to edit these words manually.

4.4 Support for Faculty of Sport Studies

Faculty of Sport Studies was the only one faculty of MU not supported by *fithesis* class. Therefore we added support for by defining new option for `\thesisfaculty{}` macro command. The new option is

defined in `fithesis.cls` file along with definitions of options for other faculties.

```
\def\Fsps{fsps}
```

The name of Faculty of Sport Studies was already defined both in Czech and English language in the class thus no other definition was needed. Users can now typeset the title of Faculty of Sport Studies by defining macro `\thesisfaculty{}` with *fsps* option.

4.5 Default Font Size

Even though that documentation of *fithesis* class states that the default font size of Palatino typeface is 12 points, reality is different. The `fithesis.cls` by default loads `fit11.clo` file that defines size options of the basic font used in thesis. We redefined the `fithesis.clo` so as to load standardly `fit12.clo` file that defines sets default font size on 12 points. The 12 points sized font produces averagely 60 characters per line.

User can change the the default size by specifying size option in the definition of command `\documentclass{fithesis2}`. This possibility is in detail described in the *fithesis2 guide*.

4.6 Logos

Another suggested feature of new L^AT_EX thesis class was that the download package should contain logos of all MU faculties as the thesis class supports all the faculties of MU.

Logos of MU faculties in digital form are available to download from [MU, 2008] in Encapsulated PostScript (EPS) and Tagged Image File (TIF) formats. We downloaded logos in EPS as it is type of vector image format and is suitable for our job.

The logos were transformed into Portable Document Format (PDF). Finally the logos were converted into grayscale image using Inkscape¹ program.

1. Inkscape is free and open source vector graphics editor application

4. MODIFICATIONS IMPLEMENTED INTO *fithesis2*

The modified logos are distributed along with *fithesis2* class within the directory `loga`.

5 Guide to *fithesis2* Class

As resulted from conducted survey, one of the main problems of *fithesis* class was lack of available documentation. We also took into account suggestions presented by respondents of the conducted survey.

According to assignment of this thesis, the documentation should help complete beginners to \LaTeX typesetting system on the one hand, but should not burden advanced users with \LaTeX trivia on the other hand. Therefore, we decided to create tutorial that would help thesis authors to ease their writing. The tutorial is divided into section that navigates users through whole process of typesetting thesis from creating title page to generating appendices.

5.1 Supplementary Materials

Whereas advanced users of \LaTeX typesetting systems can straightforwardly start writing thesis using the *Guide on Writing Thesis Using *fithesis2* Class*, beginners to the system should start with one of the recommended supplementary materials. We suggest *The Not So Short Introduction to $\text{\LaTeX}2\epsilon$* by [Oetiker et al., 2008] in the first places as number of translations is available¹ for download. Moreover, the document gives both overview of the \LaTeX typesetting system and solid grounds for future work with it.

Alternatively, we recommend *Guide to the \LaTeX markup language* on [Wikibooks, 2008].

Both previously mentioned supplementary documents are recommended by [\LaTeX project team, 2007].

5.2 Structure of the Guide

5.2.1 Getting Started

The section A.2 describes \LaTeX typesetting system and presents arguments for choosing it to typeset the thesis. Main arguments are that

1. Czech translation by Kočer and Sýkora is available from [Oetiker et al., 1998].

L^AT_EX produces documents with high typographical quality that can not be obtained with common word processors [Oetiker et al., 2008] and that L^AT_EX enables users to easily typeset mathematical formulae.

The obtaining and installing T_EX distribution on Windows, Linux and Mac OS X operating systems is described in the section A.2.1. It also gives references to the recommended T_EX distributions.

In the next parts of *Getting started* section, we present information that should help complete beginners to understand how L^AT_EX works and what are necessary conditions (e.g., which image formats L^AT_EX supports and what are the alternatives for generating output) for generating documents. These parts include information on handling input encoding of document source. In addition, we show types of encoding used in Central and Eastern Europe on various platforms.

As most of the *fithesis2* users will write thesis in different language than English, we offer instructions how to enable multilingual support with *babel* package.

5.2.2 Installation

The section A.3 presents guide how to successfully enable *fithesis2* support and what is distributed within download package.

5.2.3 Typesetting Thesis

The section A.4 starts with example of sample document. This source code can be used as a template for writing thesis. Besides, the section explains document class options that change default behaviour of the *fithesis2* class.

Next parts describes L^AT_EX macro commands used to typeset title page of the thesis. Because the *fithesis2* class can be used to typeset thesis submitted to schools different than MU, we present options of editing the default layout of thesis title page. Moreover these parts illustrate options how to typeset additional parts of thesis. These parts are for example table of content and appendices.

5.2.4 Generating Bibliography

The section [A.5](#) explains usage of Bib \TeX program that produces bibliography references in documents and reasons of choosing external program instead of \TeX `thebibliography` environment. It also describes structure of Bib \TeX file, database of references, and gives an exemplary entry of such file.

Moreover, the section explains why the document must be translated multiple times to satisfy cross-references.

5.2.5 Additional Tips

Purpose of the section [A.6](#) is to give additional information concerning \LaTeX typesetting system. Additionally, it contains useful hyperlinks for further study of \TeX related topics.

5.3 Converting \LaTeX source to HTML format

5.3.1 \TeX 4ht

\TeX 4ht is tool dedicated mainly to convert \LaTeX and \TeX documents into hypertext formats such as (X)HTML, DocBook and OpenDocument. Its advantage to other similar converting systems is its highly configurable possibilities and ability to convert \TeX -based documents into several, not only web-based, formats.

\TeX 4ht is available to download from [[Gurari, 2008](#)]. It supports Unix-like and Microsoft Windows systems. Besides, the tool is also available in some \TeX distributions such as MiKTeX and TeX Live. The guide on how to enable support in these distributions is available on project web page.

The process of converting \LaTeX or \TeX document into hypertext is what differs \TeX 4ht from other converting systems such as \LaTeX 2HTML. Instead of parsing \LaTeX source code, \TeX 4ht uses \TeX (or \LaTeX) to produce a non-standard DVI file that is then processed [[Gurari, 2008](#)]. This principle avoids difficulties arising from irregularity of \TeX (and \LaTeX) syntax.

5.3.2 Converting *fithesis2* guide to HTML

We used previously mentioned \TeX 4ht for converting [Guide on Writing Thesis Using *fithesis2* Class](#) to format suitable for web presentation. Hence \TeX 4ht enables converting to SGML-based formats, we chose HTML as it seems sufficient for our purposes. The program is executed by command in the form:

```
htlatex filename "options"
```

For example, if we want to convert document `source.tex` into HTML format, we should use command:

```
htlatex source.tex 'html'
```

This will generate one page long document in HTML 4.01 Transitional format. In our case we had long document therefore breaking up the output into multiple separate web pages was useful. The partition was be done by executing command with additional option:

```
htlatex source.tex 'html,2'
```

The output produced by \TeX 4ht does not have to be necessary valid and therefore it should be checked by validators for proper syntax. We employed *tidy* program [[Raggett, 2008](#)] to fix invalid HTML syntax. Moreover, the tool was also used to automatically indent lines of code in order to provide higher readability of the source code.

The converted guide is available from [[Stanislav Filipčík, 2008](#)].

6 Official Thesis Assignment Form

According to [FI MU, 2008b] FI demands on students submitting bachelor or master thesis to fill in and print out official assignment of bachelor, respectively master, thesis. This assignment form is available only in DOC format from [FI MU, 2008b]. Although DOC is proprietary format native to Microsoft Office Word (Word), users of free software word processors (e.g., OpenOffice.org Writer, AbiWord, etc.) are able to read and edit the DOC format. However, the page layout of assignment form opened in the free software word processor does not correspond to the same assignment form opened in Word. As you can see from figure 6.1, the heading “Masarykova univerzita” in assignment form, opened in OpenOffice.org Writer version 2.4.1¹, is crossed with line.

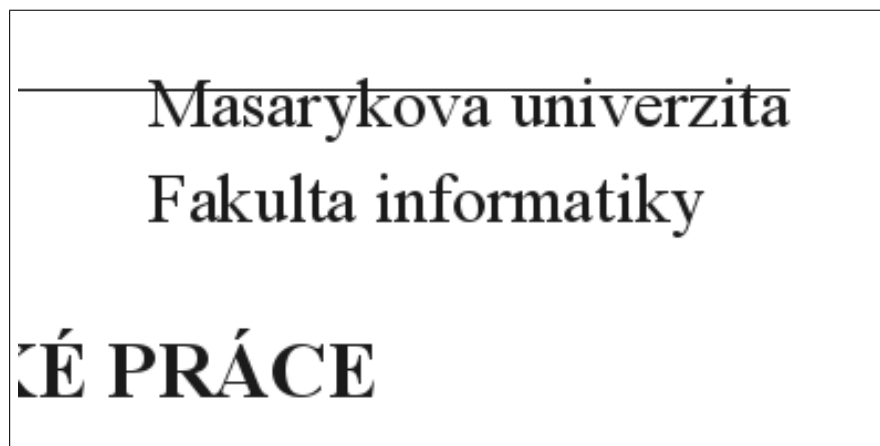


Figure 6.1: Cut of the official assignment

6.1 Implementation of Assignment Form in \LaTeX

As the reading and editing of assignment forms in DOC format is not flawless in word processors other than Word, we created assignment

1. This flaw also occurs in the assignment forms opened in the latest version of OpenOffice.org 3.

form as L^AT_EX document template. This template visually matches the assignment form in DOC format.

The template uses *scrreprt* class, but the base class can be modified to *article* class just by replacing *scrreprt* with *article*. The preset font size is 10 points, but can be as well modified to any suitable. Option of *babel* package specifies that default language support is set to Czech. The template uses logo of FI in METAFONT format, therefore the logo must be placed in the same directory along with the template source.

Assignment forms for bachelor and master thesis has different content to fill in. To enable generating both forms from single template, we defined L^AT_EX command `\dimplomka{}`. The options for this command are *true* or *false*. The former typesets master thesis assignment form whereas the latter bachelor thesis assignment form.

6.1.1 Macro Commands

The following macro commands are used in the template to typeset bachelor or master thesis assignment form. Filling these commands with appropriate option will produce assignment form.

`\dimplomka{true/false}` Description of command is in section 6.1.

`\datum{<date>}` This macro command sets the date defined with `<date>` option. Preset value is `\today`.

`\student{<name>}` Prints name the thesis author defined by option `<name>`.

`\program{<study programme>}` Specifies the program that the thesis author is studying.

`\vedouci{<name>}` Sets the name of supervisor.

`\nazev{<title>}` Specifies the title of the thesis.

`\zadani{<assignment text>}` Typesets the assignment of the thesis.

If you want to typeset bachelor thesis assignment form, you must specify option of macro command `\pracoviste{<supervisor's department>}`.

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On the contrary, if you want to typeset master thesis assignment form, you should specify options of `\specializace{<student's specialization>}` and `\garant{<name>}` commands. The option of latter command specifies name of programme guarantee.

7 Conclusion

In this thesis we propose modified version of the \LaTeX *fithesis* class used to typeset bachelor and master thesis submitted at Faculty of Informatics Masaryk University. Implemented modifications described in the chapter 4 of the *fithesis2* class were supported by survey. The aim of the survey was to find shortcoming of *fithesis* class. Method of conducting survey is described in the chapter 3.

The class is documented with guide describing its installation and usage. Style of the guide is described in chapter 5. As the guide is written in English language, it does not limit non Czech speaking users to employ the class for writing thesis. Additionally, the guide is suitable for beginners to \LaTeX typesetting system.

Another goal of this thesis was to implement official master and bachelor thesis assignment forms in \LaTeX format. The implementation is described in the chapter 6.

A Guide on Writing Thesis Using *fithesis2* Class

A.1 Introduction

This document is intended as a guide on how to use *fithesis2* \LaTeX document class in order to write bachelor and master thesis. It describes installation and usage of *fithesis2* class as a template for writing thesis. Even though the purpose of the class is aimed at students of Faculty of Informatics Masaryk university (FI), the usage is not limited only to them.

On the one hand this document shows options on writing thesis, on the other hand it is not intended as a complete guide to \LaTeX typesetting system. Therefore, if you are complete beginner to \LaTeX or \TeX , I recommend that you first read one of the documents bellow, as this guide assumes you have a basic knowledge of \LaTeX system.

- *The (Not So) Short Introduction to $\LaTeX 2_{\epsilon}$* by Tobias Oetiker et al. with a number of translations available on [Oetiker et al., 2008]. Czech translation is available from [Oetiker et al., 1998].
- *\LaTeX for Complete Novices* by Nicola Talbot available on [Talbot, 2008].
- *Guide to the \LaTeX markup language* available on Wikibooks [Wikibooks, 2008].

In reading this document, the following presents summary of typographic conventions used in this document.

Lines containing examples of \LaTeX commands are illustrated in a typewriter type of font.

```
\documentclass{fithesis2}
```

Names of \LaTeX packages or classes are displayed using slanted font (e.g., *fithesis2*).

In addition to that, executable commands are illustrated with typewriter font in a rectangular box.

```
pdflatex document.tex
```

A.2 Getting Started

L^AT_EX is a macro package based on T_EX typesetting program. It enables users to typeset their documents at the highest typographical quality that usually can *not* be achieved when using WYSIWYG¹ common word processor. Among others, main advantages of using L^AT_EX are:

- L^AT_EX produces professionally crafted documents.
- Mathematical formulae can be easily created.
- Complex structures such as indexes, table of content, etc. can be easily typeset.

A.2.1 Installing T_EX distribution

This part of the the guide contains information on how to obtain and install T_EX distribution on Windows, Linux and Mac OS X to enable L^AT_EX support. If you already have some T_EX distribution installed on your system, you can skip this section.

MS Windows

We recommend for Windows users installing MiKTeX distribution. Significant feature of MiKTeX is that it will download all necessary packages by itself. The distribution can be downloaded from <http://www.miktex.org>. Installation guide is available on the same page.

GNU/Linux

Whereas MiKTeX is the best choice for Windows platform, users of Unix-like should pick TeX Live distribution. If you are using Linux, there's a high chance that you have T_EX distribution already installed or can be simply installed by your Linux distribution package manager. If it is not your case, please refer to the TeX Live project page available on <http://www.tug.org/texlive/> where the information on download and installation can be found.

1. WYSIWYG stands for "What You See Is What You Get". MS Word and OpenOffice.org are example of such concept.

Mac OS X

Mac users can download and install MacTeX distribution which provides full installation of L^AT_EX. The distribution and all necessary information, including installation guide, are available on <http://tug.org/mactex/>.

A.2.2 Producing Document

L^AT_EX is able to natively produce documents in two formats – DVI and PDF. Many others can be used by various types of transformations. The figure A.1 shows options of obtaining PDF, DVI and PS formats from L^AT_EX source. The file formats are represented by boxed red text, where L^AT_EX is the source file. Blue text represents executable commands that are needed in order to produce demanded file format. Finally, the green text under the boxes with file formats represents which images formats are supported.

For example, if you want to produce your thesis in PDF format. You should execute command `pdflatex your_thesis.tex`. If your thesis contains images, they should be in .jpg, .png or .pdf format.

Alternatively, you can produce the thesis in PDF format by executing:

```
latex your_thesis.tex
dvipdfm your_thesis.dvi
```

commands. However, if your thesis contains images, these should be only in .eps format.

A.2.3 Encoding of the Input Document

L^AT_EX is employed on various types of computer systems that use plenty of different encodings. In order to handle the input encoding, you should use *inputenc* package that tells L^AT_EX which encoding is used. To employ the package, add the following line in the document preamble².

2. The area between commands `\documentclass` and `\begin{document}`.

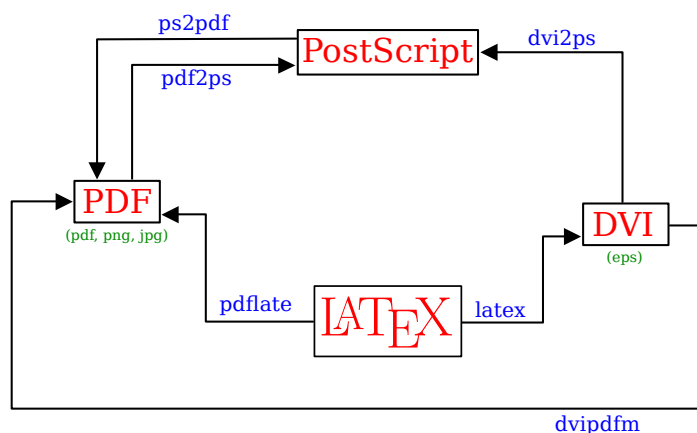


Figure A.1: Formats generatable from \LaTeX source (Image source: Wikibooks)

Operating system	encodings
Windows	cp1250
Unix-like	utf8, latin2

Table A.1: Standard Central and Eastern European encodings

```
\usepackage[<encoding>]{inputenc}
```

The parameter *<encoding>* specifies encoding of input document. Standard encodings used in Central and Eastern Europe are shown in the table [A.1](#).

A.2.4 Language Support

Every language has its specific typographic rule. Therefore, we should tell \LaTeX which language support should be activated. Activation is done by adding package *babel* to preamble of the document.

```
\usepackage[<language>]{babel}
```

The *babel* package supports more than 40 different languages³. For example, if you want to enable support for Czech language, you should use

```
\usepackage[czech]{babel}
```

command. For more information concerning language support, see Internationalization section in [Wikibooks, 2008].

A.2.5 Advice on Writing a Thesis

This guide concerns exclusively about the visual style of the thesis. For information about contentual style, please refer to directions published by school you are studying.

Students of FI should read through the article *Rady pro psaní odborného textu*⁴ [FI MU, 2008a]. As mentioned above, student of other MU faculties or schools should consult instructions published by school they are studying. To put the previously mentioned article in a nutshell:

1. You should have an idea what you want to communicate to readers.
2. You should know who your thesis is addressed to.
3. Write an outline of your thesis.
4. Follow the typography principles.

Besides, your thesis should satisfy requisites (e.g., thesis must contain table of contents, keywords, etc.) demanded by the school you are studying. FI requires formalities stated in the article *Pokyny pro vypracování závěrečné práce* [FI MU, 2008b]. Again, if you are studying other faculty than FI, refer to the article concerning thesis requisites issued by your school.

3. Multiple languages have even option for dialect specification.

4. Unfortunately, the article is available only in Czech.

A.3 Installation

A.3.1 About *fithesis2*

Fithesis2 is modified version of *fithesis* document class [Pavlovič, 2008]. As well as *fithesis*, *fithesis2* is based on *scrreprt* class that is part of KOMA-Script bundle [KOMA-Script, 2008] developed in order to replace standard L^AT_EX classes with emphasis on European typesetting standards. Therefore, if your T_EX distribution doesn't come with *scrreprt*, you should install it manually⁵.

Furthermore, *fithesis2* uses Palatino typeface. As the it is standard part of all T_EX distribution, no additional download nor installation is needed.

A.3.2 Download Package

The archive you have downloaded comes with `fithesis2.cls` file and three additional files `fit10.clo`, `fit11.clo` and `fit12.clo`. The former is L^AT_EX document class, the latter are classes with size specifications of Palatino typeface loaded by the *fithesis2* class. Besides, the download archive contains directory `loga` with logos of MU's faculties.

The `tutorial.pdf` is the class documentation (i.e., this document).

A.3.3 Enabling *fithesis2* Support

The simplest way of enabling *fithesis2* support is to move class files into the directory of your choice along with a source file of your thesis and directory `loga`. Then when calling *(pdf)T_EX*, program will at first search the directory with thesis source file to find the document class.

Alternatively, you can install *fithesis2* system-widely⁶. To do so, you can install it either by moving `fithesis.cls` to appropriate

5. Most of the T_EX distribution includes KOMA-Script bundle. In case your distribution is exception, information on installing the bundle is available in document [KOMA-Script, 2008].

6. System-wide installation allows other users of the computer to use the *fithesis2* support whereas personal installation will enable the *fithesis2* support only for your

texmf directory or by using package manager⁷ of your TeX distribution. In both cases, you should refer to documentation of your distribution.

A.4 Typesetting Thesis

A.4.1 Sample Document

The following example illustrates usage of *fithesis2*. The source code can be used as a template for writing your thesis. Don't be afraid that you probably don't understand L^AT_EX commands bellow, they will be described in detail in the next section. The percent sign indicates start of the comment.

```
\documentclass[12pt,oneside]{fithesis2}
\usepackage[english]{babel} % package for multilingual support
\usepackage[cp1250]{inputenc} % Windows OS encoding
\usepackage[T1]{fontenc}
\usepackage[plainpages=false,pdfpagelabels,unicode]{hyperref}

\thesistitle{Sample thesis} % enter thesis title
\thesisstitle{Bachelor thesis}
\thesisstudent{Jane Doe} % name of the author
\thesiswoman{true} % defines author's gender
\thesisfaculty{fi}
\thesisyear{spring 2008}
\thesisadvisor{John Foo, Ph.D.} % fill in advisor's name
\thesislang{en} % thesis is in English

\begin{document}
\FrontMatter
\ThesisTitlePage

\begin{ThesisDeclaration}
\DeclarationText
\AdvisorName
\end{ThesisDeclaration}

\begin{ThesisThanks}
I would like to thank my supervisor...
```

computer account. The system-wide installation mostly requires administration's password.

7. This feature is available in MiKTeX and TeX Live 2008.

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```
\end{ThesisThanks}

\begin{ThesisAbstract}
The aim of the bachelor work is to provide...
\end{ThesisAbstract}

\begin{ThesisKeyWords}
keyword1, keyword2, etc.
\end{ThesisKeyWords}

\MainMatter
\chapter{Introduction}
This is the first chapter of the thesis.

\chapter{Another chapter}
...

\tableofcontents           % prints table of contents

\chapter{Introduction}     % the first chapter followed by
                           % many others

\bibliographystyle{plain} % sets plain bibliography style
\bibliography{bib-db}     % BibTeX database file

\end{document}
```

A.4.2 Document Class and Its Options

The first line of the thesis has to contain command specifying document class. To enable *fithesis2* support, your first line of the source code should be:

```
\documentclass[<options>]{fithesis2}
```

The *<options>* parameter allows to override class file default behaviour. *fithesis2* supports following options:

10pt, 11pt, 12pt Sets the base font size of the thesis. If no size options is given, 12pt is default.

oneside, twoside Defines whether single or double sided thesis should be produced. When *twoside* option is given, begin-

ning of chapter is generated on odd page (i.e., right-hand page). When no option is given, `oneside` is the default.

onecolumn, twocolumn Specifies whether the document should be typeset in one column (this is default and recommended) or two columns.

draft, final If you use the option `draft`, lines with “overfull hbox” (this mostly occurs when L^AT_EX is not able to hyphenate a word) will be mark with black rectangle on the right side to indicate this. Moreover, the option `draft` is, when specified, passed to other packages like *graphicx*, *hyperref*, etc. In such cases you can use `final` option to suppress this behaviour.

The easiest way to understand this is to look at an example:

```
\documentclass[12pt,oneside,draft]{fithesis2}
```

instructs L^AT_EX to generate the thesis with a base font size of 12 *points*. The layout will be *single sided* with text in *one column*. Additionally, the “overfull hbox” lines will be indicated with black rectangle as *draft* option is specified.

A.4.3 Title Page

To correctly typeset title page of the thesis, few simple macro commands must be included in the document’s preamble. The necessary macros are listed below.

Students of schools other than MU should read the section bellow this one to produce title page with information about their school.

\thesistitle{<title>} Inserts title of the thesis where <title> parameter defines the title.

\thesissubtitle{<subtitle>} Defines type of the thesis. <subtitle> parameter stands for the type (e.g., Bachelor thesis, Master thesis, Bakalářská práce, etc.).

\thesisstudent{<name>} Sets the name of the thesis author.

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`\thesiswoman{true/false}` Sets the author's gender. If the value is *true*, the author of thesis is woman, *false* value indicates man.

`\thesislang{<language>}` Specifies language of the thesis. Supported values are *cs*, *sk*, *en*, which stands for Czech, Slovak and English language.

`\thesisadvisor{<name>}` *<name>* specifies the name of the thesis supervisor.

`\thesisfaculty{<faculty>}` Sets faculty the author is studying at and typesets its name and corresponding logo on the title page. Currently supported values (i.e., faculties of MU) are:

- *fi* – Faculty of Informatics,
- *sci* – Faculty of Science,
- *law* – Faculty of Law,
- *eco* – Faculty of Economics and Administration,
- *fss* – Faculty of Social Studies,
- *med* – Faculty of Medicine,
- *ped* – Faculty of Education,
- *phil* – Faculty of Arts,
- *fsps* – Faculty of Sports Studies.

`\thesisyear{<year>}` Inserts year of thesis elaboration.

Typesetting of the title page itself is done by inserting macro commands

```
\FrontMatter
\ThesisTitlePage
```

The two macros should be the very first two commands inserted immediately after `\begin{document}`. `\FrontMatter` macro turns on page numbering to Roman numerals.

Title Page for Non MU Thesis

To produce title page with the name and logo of your school you have to add following extra macro commands to those mentioned above. Besides, don't include macro `\thesisfaculty{}`.

`\thesisuniversity{<name>}` Parameter *name* specifies the name of your school that will appear on the title page of your thesis.

`\thesislogo{logo_file}` The macro specifies which file should be typeset on the title page. Parameter *logo_file* must have the same name as the logo to print. More information about supported formats are in the section [A.4.3](#).

Additionally, to typeset the place of your school on the title page, the macro `\thesisyear{}` should contain name of your school. For example:

```
\thesisyear{Boston, 2008}
```

Logo

In order to properly typeset logos of MU faculties, you have to copy appropriate logo from directory `loga` to directory with your thesis source. For example, if you are studying Faculty of Arts, choose file `phil-logo.pdf` (if you are compiling with *pdflatex* program) or `phil-logo.eps` (if you are compiling with *latex*) and paste it to the directory with thesis source.

If the logos included in `loga` directory does not suit your needs (e.g., you are not student of MU), you can use your own logo. Instructions how to use your logo can be divided into two parts:

1. Author of the thesis is student of MU, therefore logo file should be named `<faculty>-logo.<img_format>`. For example, logo of Faculty of Arts has to be named

```
phil-logo.<image_format>.
```

Image formats supported by \LaTeX are illustrated in figure [A.1](#).

2. Author of the thesis is not from MU. In such case, logo file should be named as parameter specified in `\thesislogo{}` macro command.

For example, the macro is `\thesislogo{b-logotype}` so the logo file must be named `b-logotype.<img_format>`. Again, the image formats supported by L^AT_EX are illustrated in figure A.1.

In order to properly typeset logos of MU faculties, one thing must be fulfilled. The logo file to print must be included in the same directory as file `fithesis2.cls`.

If the logos of faculties of MU in the directory `loga` does not suit your needs. You can optionally replace them with your own.

A.4.4 Thesis Requisites

This section describes formal requisites to thesis demanded by FI [FI MU, 2008b] and the methods of fulfilling them. If you are submitting the thesis to school other than MU, you should learn thesis requisites compulsory for your school.

Declaration

Declaration is printed by inserting L^AT_EX `ThesisDeclaration` environment with two macro commands `\DeclarationText` and `\AdvisorName` within the environment.

```
\begin{ThesisDeclaration}
\DeclarationText
\AdvisorName
\end{ThesisDeclaration}
```

If the text of the declaration does not suit your needs, you can change it by redefining `\DeclarationText` macro. Redefinition can be done by command `\renewcommand{\DeclarationText}{custom text of declaration}`.

Acknowledgement

You can express your gratitude to those who help you in the process of writing the thesis, e.g. your supervisor. The acknowledgement can be printed by inserting the environment `ThesisThanks` with the thankful words within.

The acknowledgement is not compulsory, albeit appropriate. The length of it should not exceed one page.

Abstract

To typeset abstract of the thesis, you should insert the environment `ThesisAbstract` with your summary of the thesis inside it.

The abstract should give an indication of the parameters of the thesis study, its context and the scholarly contribution it makes. The length should not be longer than one page.

Keywords

Keywords⁸ should be placed within `ThesisKeyWords` environment separated by a comma. The number of keywords is usually from five to ten.

A.4.5 Main Part of the Thesis

To indicate the beginning of the thesis main part, `\MainMatter` macro must be inserted before the first chapter of the thesis. It switches page numbering back to Arabic and restarts the page counter. Because two types of numbering – Roman and Arabic – are used, you should load *hyperref* package with options *plainpages=false* and *pdfpagelabels*. This is done inserting

```
\usepackage[plainpages=false,pdfpagelabels]{hyperref}
```

in the document preamble. The *hyperref* package should be the very last line before `\begin{document}` as it redefines lots of commands. For more details on *hyperref* package, refer to [Rahtz and Oberdiek, 2008].

8. Keyword can be composed of one or more words

Sectioning command	<i>level</i>
<code>\chapter{}</code>	0
<code>\section{}</code>	1
<code>\subsection{}</code>	2
<code>\subsubsection{}</code>	3
<code>\paragraph{}</code>	4
<code>\subparagraph{}</code>	5

Table A.2: Sectioning commands with depth level values

Table of Contents

Although, the table of contents (TOC) is not demanded by [FI MU, 2008b], it is highly recommended to include it as it makes easier for reader to navigate through the thesis.

To put the TOC in the document, add `\tableofcontents` command. TOC will be printed at the place where the command is issued. By default, *fithesis2* adds to TOC all non-asterisk sectioning commands up to `\subsubsection{}`. To change the depth to which sectioning commands will be included in TOC, you can use command `\setcounter{tocdepth}{level}`. Parameter *level* indicates the depth of TOC. For example, if the *level* is 2, TOC would contain sections `chapter`, `section` and `subsection`. For further details refer to table A.2.

Optionally, you can typeset list of figures and list of tables with commands `\listoffigures`, respectively `\listoftables`. Both macros operate analogously to the `\tableofcontents` command.

Main Document

In order to structure your thesis, you should use sectioning commands described in the table A.2. The first chapter should be *Introduction* which introduces the aim of your thesis and sets it in the context. Logically, the last chapter should be *Conclusion* which summarizes thesis contribution and findings.

Appendices

Beginning of thesis appendices is indicated by command `\appendix`. Following numbering of sectioning commands will be switched from decimal numbers to capital letters.

A.5 Generating Bibliography with BibTeX

Incorporating bibliography into the thesis is not only important task, but also compulsory (according to [FI MU, 2008b]). The bibliography should be printed after the last section of the thesis and before appendices.

To produce the bibliography, you can use either the environment `thebibliography` or auxiliary program called BibTeX that standardly comes bundled with TeX distribution. The advance of BibTeX program is that it is more powerful and flexible than the `thebibliography` environment. BibTeX allows to store references in an external plain-text file⁹.

BibTeX file is consisted of one or multiple entries. The structure of the entry is illustrated on the example:

```
@book{knuth73,  
  author = "Donald E. Knuth",  
  title = "Seminumerical Algorithms",  
  volume = 2,  
  series = "The Art of Computer Programming",  
  publisher = "Addison-Wesley",  
  year = "1973",  
}
```

Each entry begins with declaration of reference type in the form `@type`. Except the *book* in example, BibTeX supports several other types such as *article* *phdthesis* and *inproceedings* for conference papers. The attribute after the opening curly bracket is called citation key. It is used to cite the certain document in the thesis source. The attributes behind the citation key are used to describe cited document and are separated by comma. For further details on the structure of BibTeX file, see section *Bibliographies* available on [Roberts, 2005].

9. The file has usually `.bib` extension.

To cite certain document (must be specified in `.bib` file), insert command `\cite{cite_key}` in place where you want to see the citation. To produce thesis bibliography, place following commands in the document.

```
\bibliographystyle{plain}
\bibliography{bib_file}
```

The first command tells L^AT_EX which bibliography style (i.e., how to format references) to use – *plain* style in this case. The second command specifies the `.bib` file with bibliography items.

Note that to print bibliographic references correctly, sequence of commands

1. `pdflatex your_thesis`
2. `bibtex your_thesis` (do not use `.tex` extension)
3. `pdflatex your_thesis`
4. `pdflatex your_thesis`

must be executed in order to satisfy all cross-references. The first command generates the PDF file with no citation at all. That is because the external tool, BibT_EX, was used to handle references. Therefore, the next thing is to run `bibtex` on the thesis source to define references within thesis. The third and the fourth command are required in order to incorporate the references into the document and to update all of the cross-references.

A.6 Additional Tips

A.6.1 Typesetting Czech Quotation Marks

Some T_EX distributions do not provide macro command to correctly typeset Czech quotation marks. If it is the case of your distribution, download `cslatexquotes.sty` created by Michal Růžička from [Růžička, 2008], place it in the directory along with your thesis and load the package with command `\usepackage{cslatexquotes}`

in the thesis preamble. You are now able to print the Czech quotation marks with `\uv{ }` command. For more details see the project's web page [Růžička, 2008].

A.6.2 Typesetting Programming Code

To put programming code into the thesis, you can use either the `verbatim` environment for long listings and `\verb` command for code snippets or you can use *listings* package. The latter supports all the common programming languages. Moreover, the package automatically breaks long lines and supports highlighting of code. For more details on usage see [Heinz and Moses, 2007].

A.6.3 Useful Links

As this guide does not cover all information related to L^AT_EX typesetting system, you can use the following hyperlinks for further study of L^AT_EX or T_EX system.

- *TeX Frequently Asked Questions on the Web* available from <http://www.tex.ac.uk/faq>,
- *The Comprehensive TeX Archive Network* available from <http://www.ctan.org/>.
- *Často kladené otázky o TeXu a odpovědi na ně* available on <http://www.fi.muni.cz/cstug/csfaq/>,

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