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Dissertação para obtenção do Grau de Mestre em
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Júri:

Presidente: [Nome do presidente do júri]

Arguentes: [Nome do primeiro arguente]
[Nome do segundo arguente]

Vogais: [Nome do primeiro vogal]
[Nome do segundo vogal]
[Nome do terceiro vogal]
[Nome do quarto vogal]

FACULDADE DE
CIÊNCIAS E TECNOLOGIA
UNIVERSIDADE NOVA DE LISBOA

Outubro, 2012

[Título da tese]

Ao meu piriquito

Agradecimentos

Os agradecimentos. Apesar de haver total liberdade no conteúdo e forma desta secção, normalmente inicia-se com os agradecimentos institucionais (orientador, instituição, bolsas, colegas de trabalho, ...) e só depois os pessoais (amigos, família, ...)

Resumo

Independentemente da língua em que está escrita a dissertação, é necessário um resumo na língua do texto principal e um resumo noutra língua. Assume-se que as as duas línguas em questão serão sempre o Português e o Inglês.

O *template* colocará automaticamente em primeiro lugar o resumo na língua do texto principal e depois o resumo na outra língua. Por exemplo, se a dissertação está escrita em Português, primeiro aparecerá o resumo em Português, depois em Inglês, seguido do texto principal em Português. Se a dissertação está escrita em Inglês, primeiro aparecerá o resumo em Inglês, depois em Português, seguido do texto principal em Inglês.

O resumo não deve exceder uma página e deve responder às seguintes questões:

- Qual é o problema?
- Porque é que ele é interessante?
- Qual é a solução?
- O que resulta (implicações) da solução?

Palavras-chave: Palavras-chave (em português) ...

Abstract

The dissertation must contain two versions of the abstract, one in the same language as the main text, another in a different language. The package assumes that the two languages under consideration are always Portuguese and English.

The package will sort the abstracts in the appropriate order. This means that the first abstract will be in the same language as the main text, followed by the abstract in the other language, and then followed by the main text. For example, if the dissertation is written in Portuguese, first will come the summary in Portuguese and then in English, followed by the main text in Portuguese. If the dissertation is written in English, first will come the summary in English and then in Portuguese, followed by the main text in English.

The abstract shoul not exceed one page and should answer the following questions:

- What's the problem?
- Why is it interesting?
- What's the solution?
- What follows from the solution?

Keywords: Keywords (in English) ...

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Introduction

This package is distributed under GPLv3 License. If you have questions or doubts concerning the guarantees, rights and duties of those who use packages under GPLv3 License, please read http://www.gnu.org/licenses/gpl.html.

A marginpar note!

A a note in a line by itself.

Please note that

this package and template are not official for FCT/UNL.

2

ThesisDIFCTNL User's Manual

2.1 Introduction

This chapter describes how to use the LaTeX style thesis. This style file is a major rewrite from a previous style used in our Department, which was in turn adapted from a style file from the University of Pernambuco, Brazil. We aimed at providing an improved visual layout and, simultaneously, a *very easy to use* template (aka, a LaTeX template for dummies). ;)

The first main rule you must know is that **you must** specify the encoding of your text files. A simple *rule of thumb* is: if you are using Windows add "latin1" to the list of package options; if you are using other systems, such as Linux or Mac OSx, add "utf8" to the list of package options.

2.2 Folder Structure

The template file for writing dissertations in LaTeX if organized into a main directory and a set of files and sub-directories:

ThesisDIFCTUNL This is the main directory and includes:

Logo Directory with University logos;

Scripts Directory with useful bash scripts, e.g., for cleaning all temporary files;

User Directory where to put user files (text and figures);

alpha-pt.bst A file with bibliographic names in portuguese, e.g., "Relatório Técnico" e "Tese de Doutoramento" instead of "Technical Report" and "PhD Thesis." This file is used automatically if Portuguese is selected as the main language (see below);

defaults.tex A file with the main default values for the package (institution name, degree name and similars);

template.tex The main file. You should run LaTeX in this one. Please refrain from changing the file content outside of the well defined area;

thesisdifctunl.cls The LaTeX class file for the thesis style. Currently, some of the defaults are stored here instead of `defaults.tex`. This file should not be changed, unless you'er ready to play with fire! :)

Again, we would like to recall that all the user LaTeX files should be stored in the `User` directory, and all the images in `User/Figures` directory.

Yet another note!

2.3 Package Options

The thesis style includes the following options, that must be included in the options list in the `\documentclass[options]{thesisdifctunl}` line at the top of the `texplate.tex` file.

The list below aggregates related options in a single item. For each list, the default value is prefixed with a *.

2.3.1 Language Related Options

You must choose the main language for the document. The available options are:

1. **pt** — The text is written in Portuguese (with a small abstract in English).
2. ***en** — The text is written in English (with a small abstract in Portuguese).

The language option affects:

- **The order of the summaries.** First the abstract in the main language and then in the foreign language. This means that if your main language for the document in english, you will see first the abstract (in english) and then the "resumo" (in portuguese). If you switch the main language for the document, it will also automatically switch the order of the summaries.
- **The names for document sectioning.** E.g., "Chapter" vs. "Capítulo", "Table of Contents" vs. "Índice", "Figure" vs. "Figura", etc.

- **The type of documents in the bibliogrpahy.** E.g., "Technical Report" vs. "Relatório Técnico", "PhD Thesis" vs. "Tese de Doutoramento", etc.

No mater which language you chose, you will always have the appropriate hyphenation rules according to the language at that point. You always get portuguese hyphenation rules in the "Resumo", english hyphenation rules in the "Abstract", and then the main language hyphenation rules for the rest of the document.

2.3.2 Class of Text

You must choose the class of text for the document. The available options are:

1. **bsc** — BSc graduation report.
2. ***prepmsc** — Preparation of MSc dissertation. This is a preliminary report graduate students at DI-FCT-UNL must prepare to conclude the first semester of the two-semesters MSc work. The files specified by `\dedicatoryfile` and `\acknowledgmentsfile` are ignored, even if present, for this class of document.
3. **msc** — MSc dissertation.
4. **propphd** — Proposal for a PhD work. The files specified by `\dedicatoryfile` and `\acknowledgmentsfile` are ignored, even if present, for this class of document.
5. **prepphd** — Preparation of a PhD thesis. This is a preliminary report PhD students at DI-FCT-UNL must prepare before the end of the third semester of PhD work. The files specified by `\dedicatoryfile` and `\acknowledgmentsfile` are ignored, even if present, for this class of document.
6. **phd** — PhD dissertation.

2.3.3 Printing

You must choose how your document will be printed. The available options are:

1. **oneside** — Single side page printing.
2. ***twoside** — Double sided page printing.

2.3.4 Font Size

You must select the encoding for your text. The available options are:

1. **11pt** — Eleven (11) points font size.
2. ***12pt** — Twelve (12) points font size. You should really stick to 12pt...

2.3.5 Text Encoding

You must choose the font size for your document. The available options are:

1. **latin1** — Use Latin-1 (ISO 8859-1) encoding. Most probably you should use this option if you use Windows;
2. **utf8** — Use UTF8 encoding. Most probably you should use this option if you are not using Windows.

2.3.6 Examples

Let's have a look at a couple of examples:

- Preparation of PhD thesis, in portuguese, with 11pt size and to be printed single sided (I wonder why one would do this!)
  `\documentclass[prepphd,pt,11pt,oneside,latin1]{thesisdifctunl}`
- MSc dissertation, in english, with 12pt size and to be printed double sided
  `\documentclass[msc,en,12pt,twoside,utf8]{thesisdifctunl}`

2.4 How to Write Using LaTeX

Please have a look at Chapter **??**, where you may find many examples of LaTeXconstructs, such as Sectioning, inserting Figures and Tables, writing Equations, Theorems and algorithms, exhibit code listings, etc.

3

A Short LaTeX Tutorial with Examples

This Chapter aims at exemplifying how to do common stuff with LaTeX. We also show some stuff which is not that common! ;)

Please, use these examples as a starting point, but you should always consider using the *Big Oracle* (aka, Google, your best friend) to search for additional information or alternative ways for achieving similar results.

3.1 Document Structure

3.2 Dealing with Bibliogrpahy

3.3 Inserting Tables

3.4 Importing Images

3.5 Floats, Figures and Captions

3.6 Text Formatting

3.7 Generating PDFs from LaTeX

3.7.1 Generating PDFs with pdflatex

You may create PDF files either by using `latex` to generate a DVI file, and then use one of the many DVI-2-PDF converters, such as `dvipdfm`.

Alternatively, you may use `pdflatex`, which will immediately generate a PDF with no intermediate DVI or PS files. In some systems, such as Apple, PDF is already the default format for LATEX. I strongly recommend you to use this approach, unless you have a very good argument to go for `latex` + `dvipdfm`.

A typical pass for a document with figures, cross-references and a bibliography would be:

```
$ pdflatex template
$ bibtex template
$ pdflatex template
$ pdflatex template
```

You will notice that there is a new PDF file in the working directory called `template.pdf`. Simple :)

Please note that, to be sure all table of contents, cross-references and bibliographic citations are up-to-date, you must run `latex` once, then `bibtex`, and then `latex` twice.

3.7.2 Dealing with Images

You may process the same source files with both `latex` or `pdflatex`. But, if your text include images, you must be careful. `latex` and `pdflatex` accept images in different (exclusive) formats. For `latex` you may use EPS ou PS figures. For `pdflatex` you may use JPG, PNG or PDF figures. I strongly recommend you to use PDF figures in vectorial format (do not use bitmap images unless you have no other choice).

3.7.3 Creating Source Files Compatible with both latex and pdflatex

Do not include the extension of the file in the `\includegraphics` command. E.g., use
`\includegraphics{sonwman}`
and not
`\includegraphics{sonwman.eps}`.
If you use the first form, `latex` or `pdflatex` will add an appropriate file extension.

This means that, if you plan to use only `pdflatex`, you need only to keep (preferably) a PDF version of all the images. If you plan to use also `latex`, then you also need an EPS version of each image.

To be included in the sections above

Para fazer citações, deverá usar-se a chave da referência no ficheiro BibTeX. Se for uma única referência [AHB04], usar um "~" para ligar o `\cite{...}` à palavra que o precede (`...referência~\cite{Artho04}`). Caso queira fazer múltiplas citações [ST95, SKS06, Mos85], deverá agrupá-las dentro de um úinico `\cite{...}`.

Note que o ficheiro de bibliografia pode ter tantas entradas quantas quiser. Apenas aquelas cuja chave seja referenciada no texto é que serão incluidas na listagem de bibliografia.

Footnotes[1] will be numbered and shown in the bottom of the page.

A Tabela 3.1 ilustra alguns conceitos importantes associados à contrução de tabelas:

i) Não usar linhas verticais;

ii) A legenda deve ficar por cima da tabela;

iii) Usar as macros `\toprule`, `\midrule` e `\bottomrule` para fazer a linha horizontal superior, interiores e inferior, respectivamente.

Tabela 3.1: Test results summary.

Test	Anomalies	Warnings	Correct	Categories	Missed
[BBA08] Connection	2	2	1	*C*	1
[AHB03] Coordinates'03	1	4	1	*2B, 1C*	0
[AHB03] Local Variable	1	2	1	*A*	0
[AHB03] NASA	1	1	1	—	0
[AHB04] Coordinates'04	1	4	1	*3C*	0
[AHB04] Buffer	0	7	0	*2A, 1B, 2C, 2D*	0
[AHB04] Double-Check	0	2	0	*1A, 1B*	0
[FF04] StringBuffer	1	0	0	—	1
[vG03] Account	1	1	1	—	0
[vG03] Jigsaw	1	2	1	*C*	0
[vG03] Over-reporting	0	2	0	*1A, 1C*	0
[vG03] Under-reporting	1	1	1	—	0
[IBM] Allocate Vector	1	2	1	*C*	0
Knight Moves	1	3	1	*2B*	0
Total	**12**	**33**	**10**	**5A, 6B, 10C, 2D**	**2**

As figuras a inserir no documento deverão ser de qualidade, preferencialmente em formato vectorial (PDF vectorial) e não em *bitmap* (PNG, JPG, etc). As imagens *bitmap* (Figura 3.1) não escalam bem e têm reflexos negativos na qualidade do seu docuemnto. Pelo contrário, as imagens *vectoriais* Figura 3.2 escalam muito tanto quanto o necessário sem degradar a qualidade da imagem.

Só deve usar *screenshots* se não tive mesmo nenhuma alternativa. Em vez e gerar um *screenshot*, tente usar uma impressora virtual PDF e imprimir para um ficheiro PDF.

[1] This is a simple footnote.

Regra geral obterá um PDF vetorial. Mesmo que o seu PDF contenha imagens, elas terão sempre qualidade maior ou igual à que obteria com um *screenshot*.

Pode usar o pacote *subfigure* para agragar várias figuras numa única. Poderá assim referenciar o conjunto 3.3, a priemira delas 3.3(a) ou a segunda 3.3(b).

Para incluir listagens de código no seu documento, deverá incluir o pacote *listings* e depois usar o ambiente *lstlisting*, como exemplificado na Listagem 3.1.

Listing 3.1: Hello World

```
/**
 * The HelloWorldApp class implements an application that
 * simply prints "Hello World!" to standard output.
 */
class HelloWorldApp {
    public static void main(String[] args) {
        System.out.println("Hello World!"); // Display the string.
    }
}
```

3.8 Equações

O LaTeX é uma ferramenta poderosa para escrever em estilo matemático. Permite inserir fórmulas no meio do texto como por exemplo esta: $ax^2 + bx + c = 0$. Também permite que as fórmulas sejam destacadas numa linha separada e centradas na página

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

ou numeradas

$$aaa \tag{3.1}$$

que depois pode ser referida no texto como sendo a equação 3.1

$$aa$$

$$a \tag{3.2}$$

$$b \tag{3.3}$$

$$c \tag{3.4}$$

$$\tag{3.5}$$

Contributors for the examples:

Figura 3.1: Imagem em formato *bitmap* (JPG)

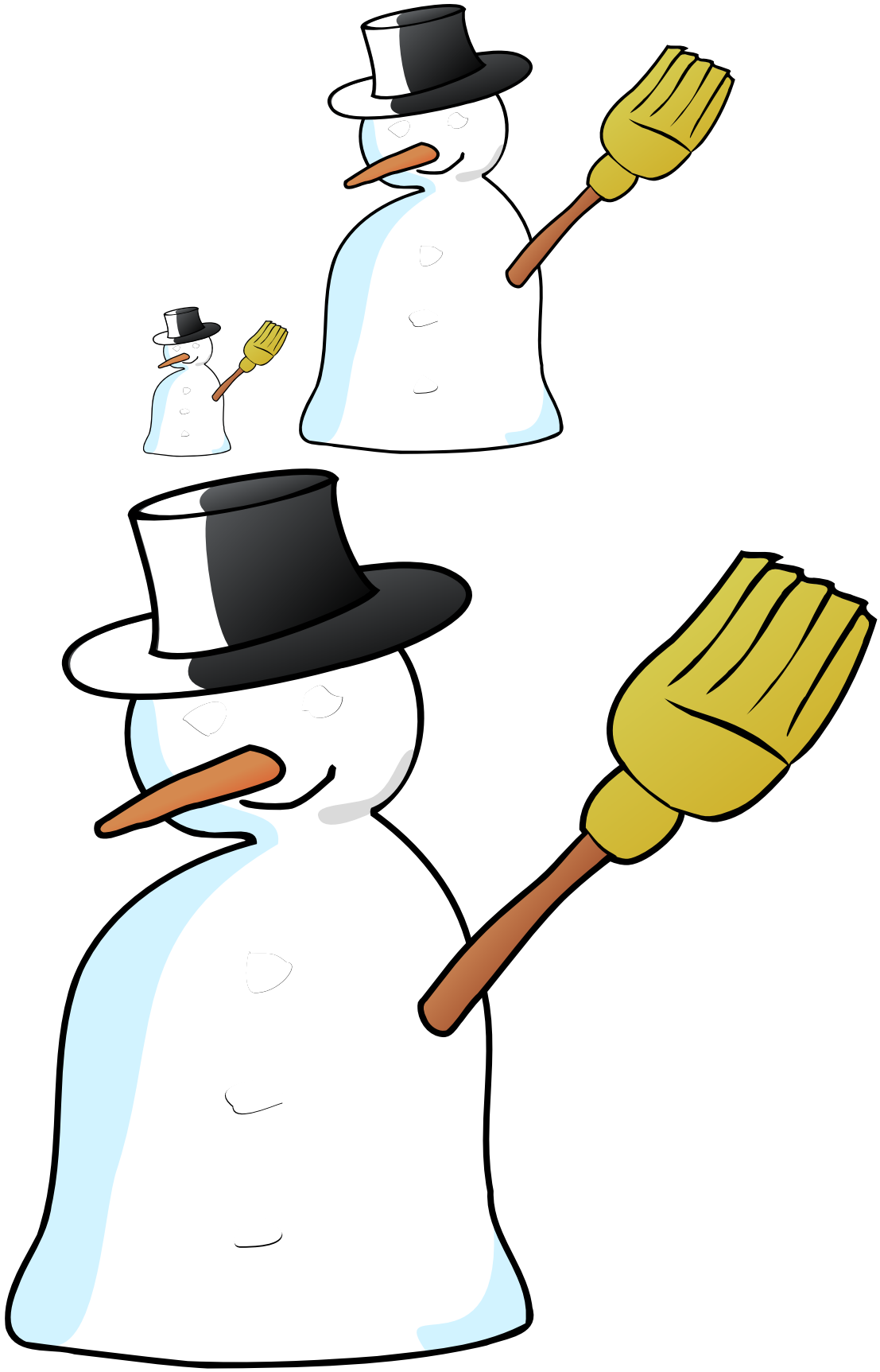
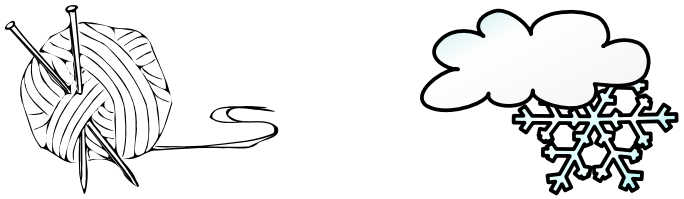


Figura 3.2: Imagem em formato PDF vectorial



(a) Novelo de lã (b) Tempestade com neve

Figura 3.3: Exemplo de utilização de *subfigure*

João Lourenço (Joao.Lourenco@di.fct.unl.pt)
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Vitor Duarte (Vitor.Duarte@di.fct.unl.pt)
Ricardo Dias (rjfd@di.fct.unl.pt)

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[vG03] Christoph von Praun e Thomas R. Gross. Static detection of atomicity violations in object-oriented programs. In *Journal of Object Technology*, pág. 2004, 2003.

4

Lorem Ipsum

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Etiam semper eleifend lorem eleifend vestibulum. Phasellus blandit, justo in varius iaculis, risus nisl commodo nulla, sed ultricies sem mi vitae mi. Proin rutrum pulvinar erat laoreet pulvinar. In at dapibus orci. Curabitur sagittis mattis fringilla. Ut ut libero neque, sed aliquet lectus. Suspendisse vulputate aliquam sapien sit amet luctus. Etiam quis est velit. Cras mi nibh, vehicula a porta ut, venenatis ac purus. Praesent eu odio magna, eu gravida ligula. Sed ultrices luctus pharetra. Nullam et ipsum turpis. Donec lectus nisl, pretium in venenatis in, rutrum non enim. Aenean venenatis augue non neque elementum ut tempus nulla viverra. Fusce ac massa eget quam varius pretium.

Vestibulum nibh neque, malesuada cursus congue id, consectetur sed lacus. Aenean volutpat elementum elit eu convallis. Vestibulum odio enim, egestas a tincidunt ut, accumsan sollicitudin tortor. Sed felis velit, vestibulum a consequat ut, iaculis sed lectus. Proin quis faucibus tellus. Nulla tempor iaculis nisi. Phasellus rutrum tellus id risus

hendrerit aliquam. Praesent venenatis neque ac lectus viverra semper. Curabitur consectetur enim ac quam aliquet pellentesque laoreet magna elementum. Maecenas purus urna, suscipit sit amet posuere vel, sagittis eget diam. Nullam condimentum augue quis lectus mattis malesuada. Nulla porttitor sagittis mollis. Ut sit amet odio vitae tellus consectetur aliquet. Donec venenatis eros sed nibh luctus laoreet non non nunc. Etiam aliquam, ipsum vel laoreet consectetur, magna urna elementum elit, at euismod lacus neque nec dolor. Nulla facilisis viverra mauris, eget rhoncus leo aliquam eget. Nunc dictum malesuada tellus vitae scelerisque. Cras id eros sapien.

Nullam scelerisque interdum dolor, vitae luctus enim dictum sagittis. Suspendisse potenti. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Pellentesque ut eros quis est tempor accumsan. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Donec eu eros laoreet nibh tempus imperdiet. Nulla lacinia convallis tempus. Nulla id turpis risus, nec sagittis dui. Donec odio enim, laoreet id porta sit amet, consequat at lacus. Etiam luctus, ante ut dapibus sodales, felis erat elementum enim, non accumsan ante lacus sed nisi. Vestibulum augue ipsum, faucibus sed posuere a, volutpat vitae purus. Mauris sodales interdum orci nec lobortis. Sed ac pretium eros. Curabitur posuere, sem quis vehicula semper, nisl justo mollis velit, ac suscipit enim nunc accumsan risus.

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