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Master of Science

A Very Long and Impressive Thesis Title with a Forced Line Break

Thesis submitted in partial fulfillment
of the requirements for the degree of

Doctor of Philosophy in
⟨**Scientific Field**⟩

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FACULDADE DE
CIÊNCIAS E TECNOLOGIA
UNIVERSIDADE NOVA DE LISBOA

⟨**month**⟩, ⟨**year**⟩

A Very Long and Impressive Thesis Title with a Forced Line Break

Dedicatory lorem ipsum.

Acknowledgements

The acknowledgements. You are free to write this section at your own will. However, usually it starts with the institutional acknowledgements (adviser, institution, grants, workmates, ...) and then comes the personal acknowledgements (friends, family, ...).

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 the main language and English. And if the main language is English, it assumes English and Portuguese. You may change this behaviour by adding

```
\abstractorder(<MAIN_LANG>):={<LANG_1>,...,<LANG_N>}
```

e.g.,

```
\abstractorder(de):={de,en,it}
```

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 should 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: Keyword 1, Keyword 2, Keyword 3, ...

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 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?

E agora vamos fazer um teste com uma quebra de linha no hífen a ver se a LaTeX duplica o hífen na linha seguinte...

zzzz zzz zzzz zzz zzzz zzz zzzz zzz zzzz zzz zzzz zzz zzzz zzz zzzz comentar--lhe zzz zzzz zzz zzzz

Sim! Funciona! :)

Palavras-chave: Palavra-chave 1, Palavra-chave 2, Palavra-chave 3, ...

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Glossary

computer An electronic device which is capable of receiving information (data) in a particular form and of performing a sequence of operations in accordance with a predetermined but variable set of procedural instructions (program) to produce a result in the form of information or signals. Teste de citação [2] 11

Acronyms

aaa	acornym aaa 11
aab	acornym aab 11
aba	acornym aba 11
abbrev	abbreviation of a longer text 11
bbb	acornym bbb 11
DI	Department of Computer Science and Informatics 1
FCT	NOVA School of Science and Technology 1
NOVA	NOVA University Lisbon 1
NOVAthesis	NOVAthesis LaTeX template 1, 2, 3, 4, 5, 6, 7
novathesis.cls	novathesis.cls class 5, 6, 7
xpto	and extension of a xpto xpto xpto xpto xpto xpto xpto xpto xpto xpto xpto xpto xpto xpto xpto xpto xpto xpto xpto xpto xpto xpto 11

Symbols

π the numerical value of pi 11

r the radius of a circle 11

Chapter 1

Introduction

1.1 The *NOVAthesis* template

The NOVAthesis LaTeX template (NOVAthesis) was initially directed to the PhD and MSc students thesis at Department of Computer Science and Informatics (DI) of the NOVA School of Science and Technology (FCT) of the NOVA University Lisbon (NOVA), Portugal, but currently (v5.2.1) it supports other degrees and Schools, namely:

- NOVA University Lisbon

NOVA School of Science and Technology (FCT-NOVA)

NOVA School of Social Sciences and Humanities (FCSH-NOVA)

NOVA Information Management School (NOVA-IMS)

National School of Public Heath (ENSP-NOVA)

- University of Lisbon

Instituto Superior Técnico (IST-UL)

Faculdade de Ciências (FC-UL)

- Instituto Politécnico de Lisboa

Instituto Superior de Engenharia de Lisboa (ISEL-IPL)

- Instituto Politécnico de Setúbal

Escola Superior de Tecnologia de Setúbal (ESTS-IPS)

- Escola Superior de Enfermagem do Porto (ESEP)

Escola Superior de Enfermagem do Porto (ESEP)

The NOVAthesis LaTeX template also supports the following degrees from Universities' Consortia:

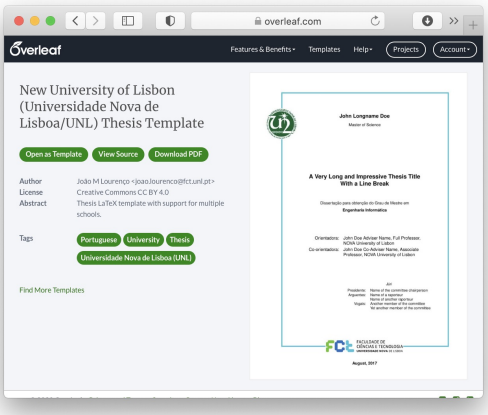
Erasmus Mundus Masters Program in Geospatial Technologies

1.2 Getting Started

The template provides an *easy to use* setting for you to write your thesis/dissertation in LaTeX:

- Select your school;
- Fill your thesis metadata (title, research field, etc) in the file "`template.tex`";
- Create your thesis/dissertation contents using the files in folder "`Chapters`"; and
- Process using you favorite LaTeX processor (pdfLaTeX, XeLaTeX or LuaLaTeX).

1.2.1 Using Overleaf

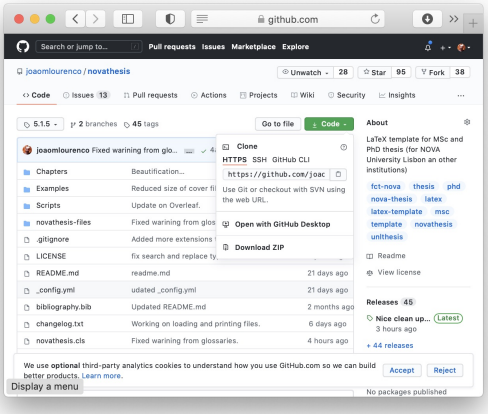


If you do not have an account in Overleaf, you must create one first.

Once you have an account, please access the NOVAthesis LaTeX template in Overleaf and select the green button *Open as Template*.

Please note that the version currently available in Overleaf (v4.1.3) is outdated. A new version will be submitted to Overleaf soon.

1.2.2 Using a Local LaTeX Installation



Just access the NOVAthesis LaTeX template in GitHub, select the green button *Code* and then *download* (or *clone*) the template. You will always get the latest version of the template (currently v5.1.8).

1.3 Getting Help

Please do not send me emails! I will not answer them!

1.3.1 Google

Remember, when looking for hints or help, *Google is your best friend*! And if you prefix your Google query with "*LaTeX*", your fist link will most probably direct you to `tex.stackexchange.com`.

1.3.2 Group Support

To get directed help on the NOVAthesis LaTeX template please join:

- the NOVAtheis Facebook group, or
- the NOVAthesis Google group.

There were huge changes from version 4.x.y to version 5.a.b so, please, **always** state the version number you are using when asking for help.

1.3.3 Reporting Problems

If you just need some help, see above Subsection 1.3.1 and Subsection 1.3.2.

If you believe *you found a bug* or if *you need some improvement* in the template, please fill an issue in github at `https://github.com/joaomlourenco/novathesis/issues`.

1.4 Donations

This template is the result of hundreds (yes! *may hundreds*!) of hours of work from the main developer. If you think this template really made you life easier while writing your thesis, please consider **making a donation**. We will keep a list thanking to all the identified donors that identify themselves in the "*Add special instructions to the seller*" box.

Donors 2020

João Carvalho, David Romão, DisplayersereStream, and António Estêvão.

Donors 2019

Jorge Barreto and Raissa Almeida.

1.5 Disclaimer

Although this template is endorsed by the FCT-NOVA and even linked from its web site, this is still not an official template. This template exists to make your life easier and we do our best to make the NOVAthesis template compliant to the supported Schools' regulations, but in the end of the line you and only you are accountable for both the look and the contents of the document you submit as your thesis/dissertation.

CHAPTER 2

THESISDIFCTNL *USER'S MANUAL*

2.1 Introduction

This chapter describes how to use the NOVAthesis LaTeX template (NOVAthesis) and the novathesis.cls class (novathesis.cls) file.

Let's start with some simple suggestions: [6, 10].

1. No! You don't have to use this template to write your thesis. You don't even have to use LaTeX. However, writing a thesis is serious stuff, and which tool you shall use to write it is not a decision to make lighthearted.

2. LaTeX is hard enough by itself. This template aims at making your life easier, but not easy. If you choose to use this template to write your thesis, you are very welcome. However, don't expect me to provide you help with LaTeX. Look for help with your friends (you have some friends, don't you?), or search the web, or try even to read some book(s) on LaTeX. In the end you will certainly find the experience rewarding.

3. So, don't forget, when you come to the point of "*How do I do this with LaTeX?*" look for help! Google is your best friend.

4. If you believe the difficulty is related with the NOVAthesis template itself (and not with LaTeX), please **do not** send me an email asking for help. Please look for help in the NOVAthesis Google Group (URL) and the NOVAthesis Facebook group (URL). If you can't find help there from previous posts/messages, then post your own question. Hopefully someone will answer you.

Now, let's go to a major issue for Windows users. Characters have to be encoded in files as numbers, and that is how character encodings were born. ASCII and EBCDIC standards are long lost in the past. The world now uses UTF-8. Well, not all the world...

Windows is still stick in its *codepages*, and "latin1" is what windows uses as the codepage for Western Europe. This messes up with the template. Please be sure you use an editor with UTF-8 support. *Go to the preferences/options/... of your text editor and set up its default file encoding as UTF-8.*

2.2 Folder Structure

The NOVAthesis template is organized into files and folders. At the main level it includes the following files and folders:

`novathesis.cls`	*file*	The main class file. It will include additional files from `NOVAthesisFiles` folder.
`template.tex`	*file*	The main user file. Use this file as the main file for your thesis.
`bibliography.bib`	*file*	An example of a bibliography file. You may have has many as you want.
`template.pdf`	*file*	A possible result of applying pdfLaTeX to the `template.tex` file. The template supports multiple types of documents (e.g., MSc dissertation, PhD thesis, ...) and multiple Schools (e.g., FCT-NOVA, FCSH-NOVA, IST-UL, FC-UL, ...) and each will produce different results.
`Chapters`	*folder*	Examples of thesis chapters. Replace them with your own chapters.
`Examples`	*folder*	Some more examples of the use of the template for different document types and Schools.
`Scripts`	*folder*	Some (possibly useful) scripts for Unix-based systems (Linux, Mac OSx). If you are a windows user, ignore this folder (you may safely delete it if you want).
`NOVAthesisFiles`	*folder*	Additional files for the novathesis.cls file. Unless you know what you are doing, avoid messing up with the files and folders inside this folder (except for deleting the unused Schools, see below).

The `NOVAthesisFiles` folder contains additional files and folders that complement the main novathesis.cls file. These are:

`README.txt`	*file*	A file that should be read! :)
`fix-babel.tex`	*file*	Simple fixes to the `babel` package.
`lang-text.ldf`	*file*	Translations of important strings used in the template. Currently fully supported are Portuguese and English, but French is on the way. If you add translations for your own language, please be so kind and send them to me. Thank you!
`options.tex`	*file*	Processing of novathesis.cls options. *Don't mess with this!*
`packages.tex`	*file*	Additional packages to be loaded into the NOVAthesis template. *You should not mess with this!*
`spine.tex`	*file*	This file is loaded only if the option `spine=true`, and includes the typesetting of the book spine.
`ChapStyles`	*folder*	Contains a lot of files, one for each chapter style. If you really know what you are doing, you may add your own chapter style here.
`FontStyles`	*folder*	Contains a few files, one for each set of fonts (main text font, chapter font, section font, subsection font, etc). If you really know what you are doing, you may add your own set here.
`Schools`	*folder*	Configuration files for each school. This folder is organized into subfolders, one for each university. *You may safely delete all the subfolders except the one for your University.* Then open the subfolder of your University and *you may safely delete all the subfolders except the one for your School/Faculty*.

As stated above, the `Schools` folder contains per-university folders and per-school (faculty) subfolders. Currently these are the available folders:

`ul / ist`	*folder*	The folder for the *Instituto Superior Técnico* of the *University of Lisbon*.
`nova / fcsh`	*folder*	The folder for the *Faculty of Human and Social Sciences* of the *NOVA University of Lisbon*.
`nova / fct`	*folder*	The folder for the *Faculty of Sciences and Technology* of the *NOVA University of Lisbon*.
`nova / novaims`	*folder*	The folder for the *Information and Management School* of the *NOVA University of Lisbon*.

2.3 novathesis.cls Class Options

The novathesis.cls can be customized with the options listed below.

---

docdegree=OPT phd(*), phdplan, phdprop, msc, mscplan, bsc

The type of the document: PhD Thesis (default), PhD Plan, PhD Proposal, MSc Dissertation, MSc Plan, BSc Report

---

school=OPT nova/fct(*), nova/fcsh, nova/ims, ul/ist, ul/fc

The name of the school. This option changes the typesetting of the cover and some School specific formating, like margins, fonts, paragraph spacing and indentation, etc...

---

lang=OPT en(*), pt

The main language for the document. Currently only Portuguese and English are supported. Other languages are expected to be support in forthcoming versions.

---

fontstyle=OPT bookman, charter, fourier, kpfonts(*), mathpazo1, mathpazo2, newcent

The font set to be used in the document. Please note that a font set include definitions for the main text, headings, maths, etc.

---

chapstyle=OPT bianchi, bluebox, brotherton, dash, default, elegant(*), ell, ger, hansen, ist, jenor, lyhne, madsen, pedersen, veelo, vz14, vz34, vz43

The chapter style, i.e., the look of the chapter beginning.

---

converlang=OPT en, pt(*)

The language to be used when typesetting the cover page.

---

otherlistsat=OPT front(*), back

Where to put the other lists besides the table of contents. The default is (`front`) before the main text. But some scientific areas prefer them at the end of the document (`back`), just before the Appendixes.

---

aftercover=OPT true, false(*)

Include or don't include the contents of the "`aftercover`" file. The default is for this file to be ignored (if it exists).

---

linkscolor=OPT darkblue(*), black

The color for all the hyperlinks in the PDF file. The "`media=paper`" option (see below) will override this option to "`black`"

---

spine=OPT true, false(*)

Generate the book spine and the last page in the PDF.

---

biblatex=OPT OPT={list of options for `biblatex`}

Customize `biblatex`, the bibliography management system used in this class. Probably you will want to change the value of the `biblatex` "`style`" option. For other customizations of `biblatex` check its manual.

---

memoir=OPT OPT={list of options for `memoir`}

*Customize the base class `memoir`. The `memoir` manual should be the first document to be consulted when looking for "**how can I do this?**" You may what to change the base font size from 11pt to a smaller (10pt) or larger (12pt) size. Also, remember to change the "`draft`" to final when your document is finished.*

---

media=OPT screen(*), paper

Behavior to be customized in the school options/configuration. Expected definitions for screen are: left and right margins are equal and use colored links. Expected definitions for paper are: left and right margins are different and use black links.

2.4 Additional considerations about the class options

In this section we will provide some additional considerations about some of the customizations available as class options.

2.4.1 The main language

The choice of the main language with the option "`lang=0PT`" affects:

- **The order of the summaries.** First is printed 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 for Portuguese, it will also automatically switch the order of the summaries to "resumo" and then "abstract".
- **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 bibliography.** 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.

2.4.2 Class of Text

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

1. **bsc** — BSc graduation report.
2. ***mscplan** — Preparation of MSc dissertation. This is a preliminary report graduate students at DI-FCT-NOVA must prepare to conclude the first semester of the two-semesters MSc work. The files specified by `\ntdedicatoryfile` and `\acknowledgmentsfile` are ignored, even if present, for this class of document.
3. **msc** — MSc dissertation.

4. **phdprop** — Proposal for a PhD work. The files specified by `\ntdedicatoryfile` 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-NOVA must prepare before the end of the third semester of PhD work. The files specified by `\ntdedicatoryfile` and `\acknowledgmentsfile` are ignored, even if present, for this class of document.

6. **phd** — PhD dissertation.

2.4.3 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.

2.4.4 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...

2.4.5 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.

2.4.6 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]{thesisdifct-nova}`

- MSc dissertation, in English, with 12pt size and to be printed double sided
  `\documentclass[msc,en,12pt,twoside,utf8]{thesisdifct-nova}`

2.5 How to Write Using LaTeX

Please have a look at Chapter 3, where you may find many examples of LaTeXconstructs, such as Sectioning, inserting Figures and Tables, writing Equations, Theorems and algorithms, exhibit code listings, etc.

2.6 Example glossary, acronyms, and symbols

This is the first occurrence of an abbreviation: abbreviation of a longer text (abbrev). And now the second occurrence of the same abbreviation: abbrev. And a new acronym with capital letter: And extension of a xpto xpto xpto xpto xpto xpto xpto xpto xpto xpto xpto xpto xpto xpto xpto xpto xpto xpto xpto xpto (xpto) and reused xpto. Let's also use a few other acronyms such as acornym aaa (aaa), acornym aab (aab), acornym aba (aba), acornym bbb (bbb) and xpto. In geometry, the area enclosed by a circle of radius r is πr^2. Here the Greek letter π is equal to the ratio of the circumference of any circle to its diameter. Lets add "computer" to the glossary!

Chapter 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 al-ternative ways for achieving similar results.

3.1 Document Structure

3.2 Dealing with Bibliography

3.3 Inserting Tables

3.4 Importing Images

3.5 Floats, Figures and Captions

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

sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

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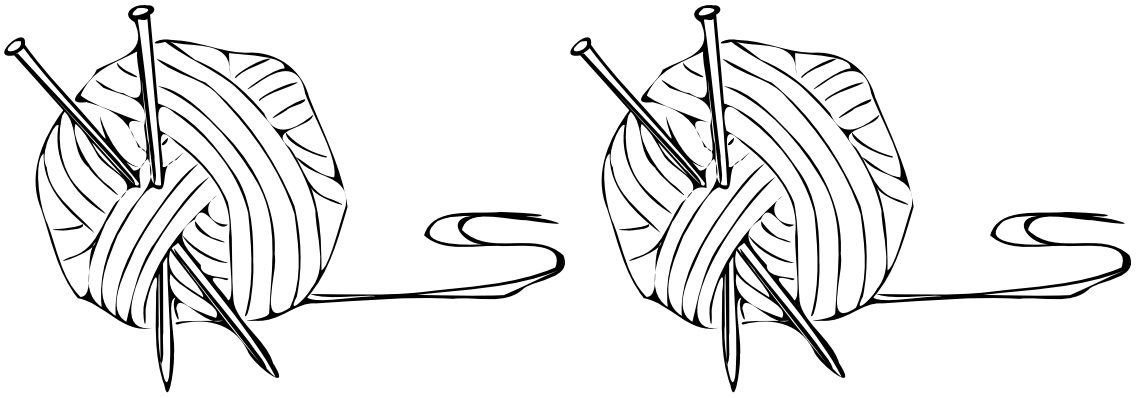

(a) One sub-figure (b) Another sub-figure

Figure 3.1: A figure with two sub-figures!

And this is a small text that references the Figure 3.1 and its Subfigures 3.1(a) and 3.1(b).

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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 [2], usar um "~" para ligar o `\cite{...}` à palavra que o precede (`...referência~\cite{Artho04}`). Caso queira fazer múltiplas citações [7, 8, 6], 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.

Table 3.1: Test results summary.

Test	Anomalies	Warnings	Correct	Categories	Missed
[3] Connection	2	2	1	*C*	1
[1] Coordinates'03	1	4	1	*2B, 1C*	0
[1] Local Variable	1	2	1	*A*	0
[1] NASA	1	1	1	—	0
[2] Coordinates'04	1	4	1	*3C*	0
[2] Buffer	0	7	0	*2A, 1B, 2C, 2D*	0
[2] Double-Check	0	2	0	*1A, 1B*	0
[4] StringBuffer	1	0	0	—	1
[9] Account	1	1	1	—	0
[9] Jigsaw	1	2	1	*C*	0
[9] Over-reporting	0	2	0	*1A, 1C*	0
[9] Under-reporting	1	1	1	—	0
[5] 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 3.2) não escalam bem e têm reflexos negativos na qualidade do seu documento. Pelo contrário, as imagens *vectoriais* Figura 3.3 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*.

Para agregar várias figuras numa única... Poderá assim referenciar o conjunto como Figura 3.4 ou as sub-figuras separadamente como 3.4() e 3.4(a).

E mais uma referência à

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

$$aa$$

$$a \tag{3.2}$$

$$b \tag{3.3}$$

$$c \tag{3.4}$$

$$\tag{3.5}$$

Figure 3.2: Imagem em formato *bitmap* (JPG)

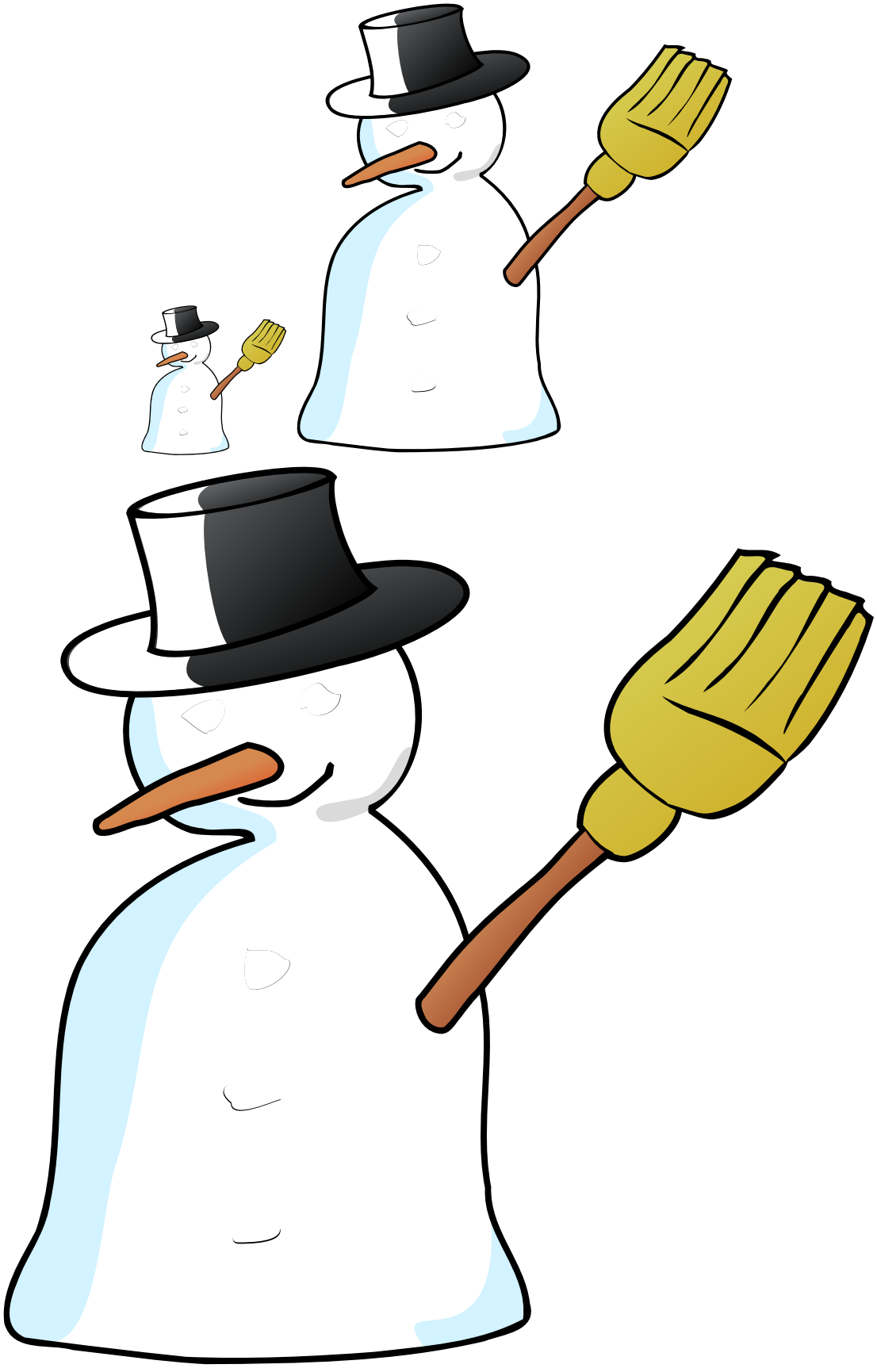
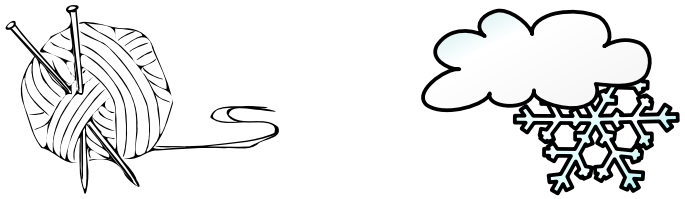


Figure 3.3: Imagem em formato PDF vectorial



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

Figure 3.4: Exemplo de utilização de *subbottom*

Bibliography

[1] C. Artho, K. Havelund, and A. Biere. *High-Level Data Races*. 2003. URL: citeseer.ist.psu.edu/artho03highlevel.html.

[2] C. Artho, K. Havelund, and A. Biere. "Using Block-Local Atomicity to Detect Stale-Value Concurrency Errors". In: *ATVA*. Ed. by F. Wang. Vol. 3299. Lecture Notes in Computer Science. Springer, 2004, pp. 150–164. ISBN: 3-540-23610-4.

[3] N. E. Beckman, K. Bierhoff, and J. Aldrich. "Verifying Correct Usage of Atomic Blocks and Typestate". In: *SIGPLAN Not.* 43.10 (2008), pp. 227–244. ISSN: 0362-1340. DOI: http://doi.acm.org/10.1145/1449955.1449783.

[4] C. Flanagan and S. N. Freund. "Atomizer: a dynamic atomicity checker for multithreaded programs". In: *POPL '04: Proceedings of the 31st ACM SIGPLAN-SIGACT symposium on Principles of programming languages*. Venice, Italy: ACM, 2004, pp. 256–267. ISBN: 1-58113-729-X. DOI: http://doi.acm.org/10.1145/964001.964023.

[5] *IBM's Concurrency Testing Repository*.

[6] J. E. B. Moss. *Nested transactions: an approach to reliable distributed computing*. Cambridge, MA, USA: Massachusetts Institute of Technology, 1985. ISBN: 0-262-13200-1.

[7] N. Shavit and D. Touitou. "Software transactional memory". In: *PODC '95: Proceedings of the fourteenth annual ACM symposium on Principles of distributed computing*. Ottowa, Ontario, Canada: ACM, 1995, pp. 204–213. ISBN: 0-89791-710-3. DOI: http://doi.acm.org/10.1145/224964.224987.

[8] A. Silberschatz, H. F. Korth, and S. Sudarshan. *Database System Concepts*. Fifth. McGraw-Hill, 2006. ISBN: 007-124476-X.

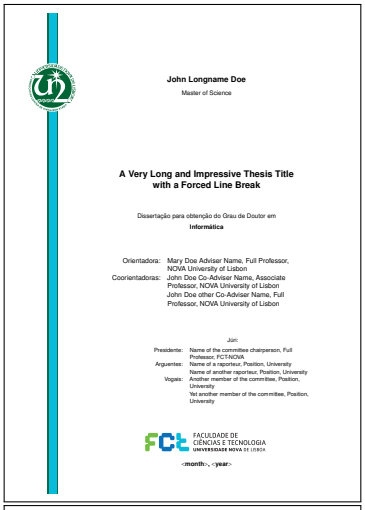
[9] C. von Praun and T. R. Gross. "Static Detection of Atomicity Violations in Object-Oriented Programs". In: *Journal of Object Technology*. 2003, p. 2004.

[10] F. Wang, ed. *Automated Technology for Verification and Analysis: Second International Conference, ATVA 2004, Taipei, Taiwan, ROC, October 31-November 3, 2004. Proceedings*. Vol. 3299. Lecture Notes in Computer Science. Springer, 2004. ISBN: 3-540-23610-4.

APPENDIX

A

NOVAthesis COVERS SHOWCASE



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Master of Science

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Coorientadoras: John Doe Co-Adviser Name, Associate Professor, NOVA University of Lisbon
John Doe other Co-Adviser Name, Full Professor, NOVA University of Lisbon

Júri:
Presidente: Name of the committee chairperson, Full Professor, FCT-NOVA
Arguentes: Name of a raporteur, Position, University
Name of another raporteur, Position, University
Vogais: Another member of the committee, Position, University
Yet another member of the committee, Position, University

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UNIVERSIDADE NOVA DE LISBOA

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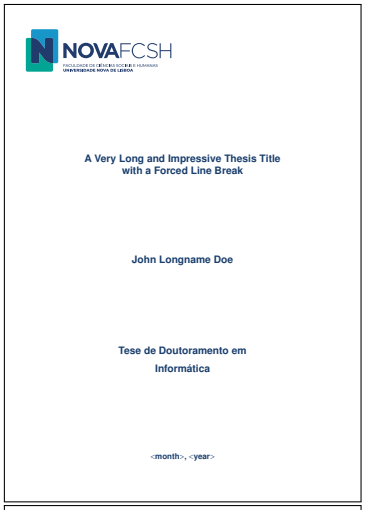

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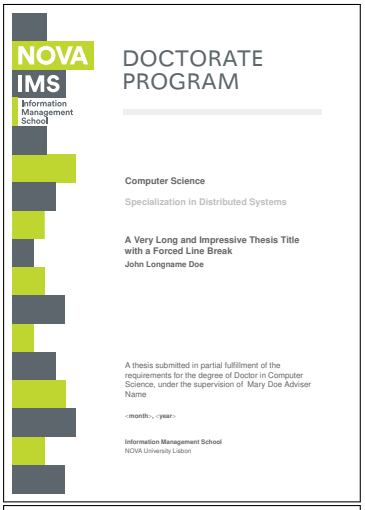

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DOCTORATE PROGRAM

Computer Science

Specialization in Distributed Systems

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John Longname Doe

A thesis submitted in partial fulfillment of the requirements for the degree of Doctor in Computer Science, under the supervision of Mary Doe Adviser Name

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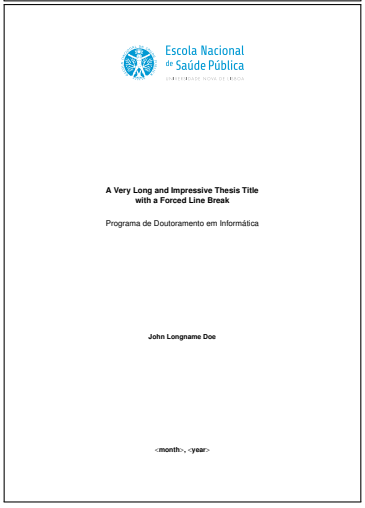
NOVA University Lisbon



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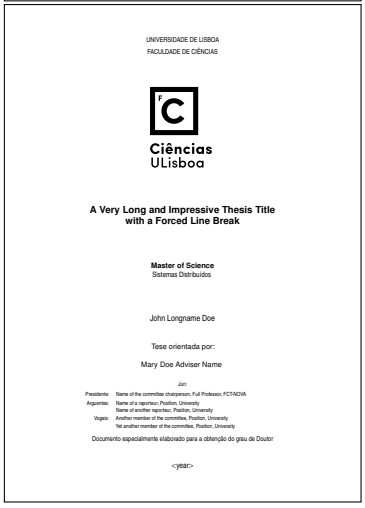

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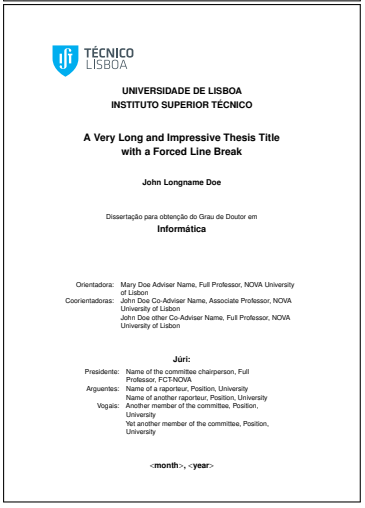

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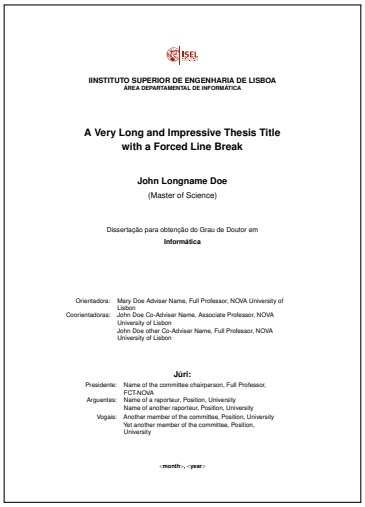

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Yet another member of the committee, Position, University

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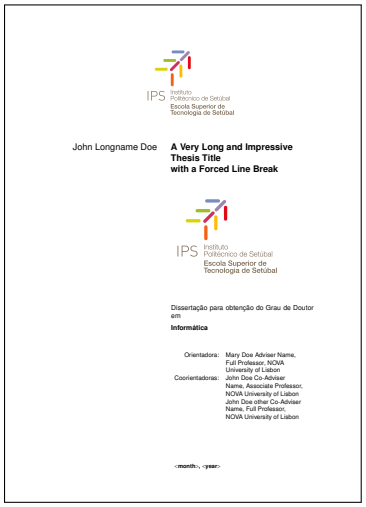

John Longname Doe **A Very Long and Impressive Thesis Title with a Forced Line Break**

Instituto Politécnico de Setúbal
Escola Superior de Tecnologia de Setúbal

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Coorientadoras: John Doe Co-Adviser Name, Associate Professor, NOVA University of Lisbon
John Doe other Co-Adviser Name, Full Professor, NOVA University of Lisbon

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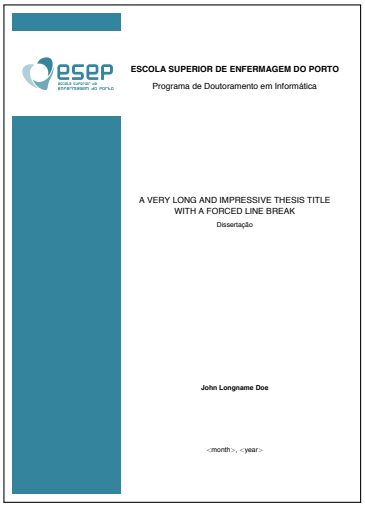

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Programa de Doutoramento em Informática

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Dissertação

John Longname Doe

<month>, <year>

Appendix B

Appendix 2 Lorem Ipsum

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

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Annex I

Annex 1 Lorem Ipsum

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