UMEÅ UNIVERSITY

The title of your thesis

If you have a subtitle

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Abstract

An abstract is a short description (10-20 lines) of your thesis. Because on-line search databases typically contain only abstracts, it is vital to write a complete but concise description of your work to entice potential readers into obtaining a copy of the full paper.

Although an abstract is brief, it should do almost as much work as the multi-page paper that follows it. Each chapter or section is typically a single sentence, but there is always room for creativity. In particular, parts may be merged or spread among a set of sentences.

This template for a Bachelor's or Master's Thesis report using LaTeX is written by Pedher Johansson, associate professor at the Department of Computing Science, Umeå University. Parts of the files are besed o work done in 2004 by Jonas Birmé, modified by Per Lindström. Ola Ringdahl added the new UMU logo (2019).

Acknowledgements

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7.1 Producing PDF-documents

In some LaTeX distributions there exist a program called `pdflatex`. This program makes the production of good looking PDF documents easy. Use it like you use `latex`. The difference is that this program does not produce a dvi-file, but instead makes a PDF-document directly. You should be careful with graphics, avoid using the pstricks package if you like to use `pdflatex` and also read the following section about image inclusion.

If `pdflatex` of some reason does not work for you, you could use ps2pdf instead. It does not do as good job as pdflatex, and you have to be careful with the input flags, otherwise the PDF-document will look horrible, but you might have less trouble getting your latex documents though the compiler.

`ps2pdf`, as the name says, converts PS-files to PDF-documents. So, first run latex, then dvips, and finaly ps2pdf. Notice the flags used below, they makes sure, the correct fonts are used.

```
> latex thesis.tex
> dvips -D 600 -Z -G0 -Ppdf thesis.dvi | thesis.ps
> ps2pdf thesis.ps
```

7.2 Including pictures

One of the pros of LaTeX is that it produces very good looking documents, and therefore you also want the graphics to look nice. If you have found a program that can produce vector graphics, use it. It can often convert the pictures to the desired formats.

However, graphics can be a mess. Graphics and LaTeX is no exception. In this package, the `graphicx` package is used as it provides some good functionality. Unfortunately LaTeX is a bit tricky about which graphics formats to use. If you use `pdflatex` PDF-files and PNG-files can be used but with standard `latex` only EPS-files works (EPS stands for Encapsulated PostScript). Both EPS and PDF are a good format for vector graphics but not so good for bitmaps.

So, if you both like to produce PS as well as PDF documents, you often need two versions of the pictures. This is probably not a problem when they are easily exported to the desired format in the image-software used (Illustrator, XFig etc.).

But how to make LaTeX understand which picture to use? Well, LaTeX does this automagicaly. First we can tell LaTeX where to find our pictures,

```
\graphicspath{{pictures/}}
```

This makes LaTeX search the subfolder `./pictures/` for pictures to include as well as the current folder.

Secondly, use the `\includegraphics` command to include your pictures.

```
\includegraphics[width=70mm]{complicated}
```

Notice, that there are NO extension used on the name of the picture. This makes LaTeX search for the right one, e.g., a PNG- file if it is a PDF document, otherwise an EPS-file.

You can do all sorts of tricks with the include pictures, where scaling is the most common. Use 'scale', 'width', height' as in the example above.

Also notice how the graphics package are included below if you are not using this package.

7.3 References

There is a lot to be said about references. However. I recommend that you find some information on how to use bibtex. It can be a bit tricky at first but worth it any time in the long run. However, a few things can be useful to notice.

Authors should always be given with their full names, with the sir name last, e.g., Jan Pedher Johansson. If there are more then one author they should ALL be separated with an 'and', regardless if there are two, three or ten. This is all handeld and made correct by bibtex.

```
Bo Andersson and Anders Eriksson and Erik Bosson
```

Company names, abbreviations etc. can look funny using bibtex. Use { } if there are something you like to force.

{Umeå Universitet}	(so it does not become U. Universitet)
{HTML}	(so it does not become html or Html)

In the report document class references are not included in the table of contents. If you like it to be, use the trick described in the previous section.

Remember to cite the literature and web-papers in an appropriate way. There are many ways to do that, such as the following [?] where you can read about how to create a reference list in a LaTeXreport using BibTex.

7.4 Other tricks

Notice the `tabular*` and the `tabularx` (requires the tabularx package) environments. With these enviroments you can have tables with a fixed width:

```
\begin{tabular*}{0.8\linewidth}{rll}
\end{tabular*}
```

The `tabularx` has a great feature if you like a column that works like a p¡width¿-column but with a variable width. In this example the first column will stretch to use the full width of the table depending on the with of the two last columns.

```
\begin{tabularx}{0.8\linewidth}{Xll}
\end{tabularx}
```

Notice that `tabularx` can not be used in your own defined environments.

In some large documents, it can look nice if the first pages, with the abstract, possible acknowledgment, table of contents, list of figures etc are numbered differently then the rest of the document, usually with roman numbers. Then the numbering restarts with the first chapter using normal numbers. To achieve this, put

```
\pagenumbering{roman}
```

before the first page, then

```
\cleardoublepage
\setcounter{page}{1}
\pagenumbering{arabic}
\chapter{Introduction}
```

before the first chapter.

A First Appendix

If any.