Master's thesis

Master's Programme in Computer Science

Title

Firstname Lastname

January 16, 2024

Faculty of Science

University of Helsinki

Contact information

P. O. Box 68 (Pietari Kalmin katu 5)
00014 University of Helsinki,Finland

Email address: info@cs.helsinki.fi
URL: http://www.cs.helsinki.fi/

HELSINGIN YLIOPISTO – HELSINGFORS UNIVERSITET – UNIVERSITY OF HELSINKI

Tiedekunta — Fakultet — Faculty	Koulutusohjelma — Utbildningsprogram — Study programme
Faculty of Science	Master's Programme in Computer Science

Tekijä — Författare — Author

Firstname Lastname

Työn nimi — Arbetets titel — Title

Title

Ohjaajat — Handledare — Supervisors

Prof. D.U. Mind, Dr. O. Why

Työn laji — Arbetets art — Level	Aika — Datum — Month and year	Sivumäärä — Sidoantal — Number of pages
Master's thesis	January 16, 2024	6 pages, 5 appendix pages

Tiivistelmä — Referat — Abstract

Write your abstract here.

In addition, make sure that all the entries in this form are completed.

Finally, specify 1–3 ACM Computing Classification System (CCS) topics, as per https://dl.acm.org/ccs. Each topic is specified with one path, as shown in the example below, and elements of the path separated with an arrow. Emphasis of each element individually can be indicated by the use of bold face for high importance or italics for intermediate level.

ACM Computing Classification System (CCS)
General and reference → Document types → Surveys and overviews
Applied computing → Document management and text processing → Document management → Text editing

Avainsanat — Nyckelord — Keywords

algorithms, data structures

Säilytyspaikka — Förvaringsställe — Where deposited

Helsinki University Library

Muita tietoja — övriga uppgifter — Additional information

Software study track

Contents

1 Introduction

2 Methods

3 Results

4 Discussion

5 Conclusions

Bibliography

Einstein, A. (1905). "Zur Elektrodynamik bewegter Körper. (German) [On the electrodynamics of moving bodies]". In: *Annalen der Physik* 322.10, pp. 891–921. DOI: http://dx.doi.org/10.1002/andp.19053221004.

Goossens, M., Mittelbach, F., and Samarin, A. (1993). *The LaTeX Companion*. Reading, Massachusetts: Addison-Wesley.

Knuth, D. E. (1999). *Digital Typography*. CLSI Lecture Notes (78). The Center for the Study of Language and Information.

Appendix A Sample Appendix

You can add one or more appendices to your thesis.

Appendix B Instructions for LaTex

B.1 General Setup

In the HY-CS-main.tex file you will find the following STEPS 0–5. Below you can find related instructions.

STEP 0 – Access the thesis template

- Import the thesis template into a new Overleaf project. The easiest way to do it is to:
  - Obtain a zip file of the LaTeX template from the webpage of your programme.
  - Go to https://www.overleaf.com/edu/helsinki and login to Overleaf with your university credentials.
  - Go to the list of your projects at https://www.overleaf.com/project, click "New Project" and "Upload Project"., the projects under your account
  - Then upload the zip with the template.
  - You are now ready to write your thesis in Overleaf by editing the template, you can start by renaming the project.

STEP 1 – BSc or MSc thesis?

1. Select whether your are writing BSc (tkt) or MSc (csm for CS) thesis.
2. Select your language: `finnish`, `english`, or `swedish`.
3. If you are writing MSc select your line / track.

STEP 2 – Set up your personal information

1. Specify the title of your thesis with `\title{}`.
2. Specify your name to the author field with `\author{}`.
3. Specify the names of your supervisors of the thesis with `\supervisors{}`.

4. Specify the keywords of the thesis with `\keywords{}`.
5. Specify the ACM classification terms of the thesis with `\classification{}`. See https://dl.acm.org/ccs for more information.

STEP 3 – Write your abstract

- You can have the abstract in multiple languages with the `otherlanguages` environment. The example below shows how to provide an English abstract:

```
\begin{otherlanguage}{english}
\begin{abstract}
Your abstract text goes here.
\end{abstract}
\end{otherlanguage}
```

STEP 4 – Writing your thesis

1. There are some minimal contents and instructions below
2. Remove, or comment out, this appendix from your thesis.

STEP 5 – Set your bibliography style

- The default is Author-Year style (Einstein, 1905), but it can be easily changed to numbered [1] or alphabetical [Ein05] , as the examples of these are in comments.
- Discuss the style to use with your supervisor.

B.2 Bibliography in Latex

The bibliography is defined in a separate `.bib` file. For this template, it is named `bibliography.bib` and includes the content show in Figure B.1.

Chapter Bibliography lists all the works that you refer to in your text. You refer to the works in the bibliography using an appropriate *citation key*.

References are done using `\citep{einstein}`, which generates in text a citation formatted according to the selected style (Einstein, 1905), or `\citep{latexcompanion,knuth99}`,

which generates (Goossens et al., 1993; Knuth, 1999). As examples of a different kinds of citations (see how these look in the Latex source), we can write (Einstein, 1905) to refer to the work written by Einstein in 1905, because the work by Einstein (1905) appears in the bilbliography included in this template.

Note that there are different possible styles for the bibliography and citation keys. Consult your supervisors on the chosen style – and once you arrive at a preferred style, use it consistently throughout the thesis.

```
@article{einstein,
    author =       "Albert Einstein",
    title =        "{Zur Elektrodynamik bewegter K{\"o}rper}. ({German})
        [{On} the electrodynamics of moving bodies]",
    journal =      "Annalen der Physik",
    volume =       "322",
    number =       "10",
    pages =        "891--921",
    year =         "1905",
    DOI =          "http://dx.doi.org/10.1002/andp.19053221004"
}

@book{latexcompanion,
    author    = "Michel Goossens and Frank Mittelbach and Alexander Samarin",
    title     = "The \LaTeX\ Companion",
    year      = "1993",
    publisher = "Addison-Wesley",
    address   = "Reading, Massachusetts"
}

@book{knuth99,
    author    = "Donald E. Knuth",
    title     = "Digital Typography",
    year      = "1999",
    publisher = "The Center for the Study of Language and Information",
    series    = "CLSI Lecture Notes (78)"
}
```

Figure B.1: Examples of bibliographic reference in .bib file.

B.3 Some instructions about writing in Latex

The following gives some superficial instructions for using this template for a Master's thesis. For guidelines on thesis writing you can consult various sources, such as university courses on scientific writing or your supervisors.

For more detailed instructions, just google, e.g., "Overleaf table positioning", and your

chances of finding good info are pretty good.

B.4 Figures

Besides text, here are simple examples how you can add figures and tables in your thesis. Remember always to refer to each figure in the main text and provide them with a descriptive caption.

Figure B.2 is an example of a figure in the document (see the source about how to add them).

Figure B.2: University of Helsinki flame-logo for Faculty of Science.

B.5 Tables

Table B.1 gives an example of a table. Remember always to cite the table in the main text, table captions go on top of the table.

Table B.1: Experimental results.

Experiment	1	2	3
A	2.5	4.7	-11
B	8.0	-3.7	12.6
$A + B$	10.5	1.0	1.6