FH | JOANNEUM
University of Applied Sciences

Solving a Zero World Problem

Improving conditions to foster innovation targeting human beings.

Bachelor Thesis
submitted in conformity with the requirements for the degree of
Bachelor of Science in Engineering (BSc)
Bachelor's degree programme **Software Design**

FH JOANNEUM (University of Applied Sciences), Kapfenberg

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Formal declaration

I hereby declare that the present bachelor's thesis was composed by myself and that the work contained herein is my own. I also confirm that I have only used the specified resources. All formulations and concepts taken verbatim or in substance from printed or unprinted material or from the Internet have been cited according to the rules of good scientific practice and indicated by footnotes or other exact references to the original source.

The present thesis has not been submitted to another university for the award of an academic degree in this form. This thesis has been submitted in printed and electronic form. I hereby confirm that the content of the digital version is the same as in the printed version.

I understand that the provision of incorrect information may have legal consequences.

Kapfenberg, September 2017

[TODO: Remove this comment. Add your signature!]
Julia Feelgood

Abstract

Write your abstract here. (Note: the abstract should contain the whole work[1] – especially the results).

[1]Learn from others. For examples, read the abstract of paper https://arxiv.org/abs/1609.03677. Did you notice the *Current Status*, *The Problem*, *The Innovation*, *The Approach/Method* as well as *The Results* and *The Improvements Achieved*?

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Chapter 1

Infos About LaTeX / Your Thesis

"Research is formalised curiosity. It is poking and prying with a purpose."

[Zora Neale Hurston]

Each chapter should start with a short explanation what is inside the upcoming chapter and why it has been included (at this position) in your work: This template shall provide some considerations[1] and text examples for your Bachelor's or Master's thesis.

1.1 About this chapter

Selected LaTeX examples.

1.1.1 Examples for named paragraphs

Background. Describe the background, the prerequisites for your work ...

Objective. The aim of this master's thesis is ...

Terms and definitions. Technical terms ... abbreviations are summarised at the end (in Chapter 7 "Acronyms"), e.g. application binary interface (ABI) or man-in-the-

[1] In addition to the references at the end of this chapter, consider recommended ways of writing learnt in the lecture *Scientific Writing*. Find the official requirement-documents as well as supporting material at the E-Learning platform.

middle (MITM). If ABI is referenced again, only the acronym is printed (as hyperlink though).

1.1.2 About Research Resources

For literature research[2] use e.g. *ACM Digital Library* (ACM, Inc. (Association for Computing Machinery), 2014) or *IEEE Xplore Digital Library* (IEEE (Institute of Electrical and Electronics Engineers), 2017) as available from the FH JOANNEUM Libary web page.

1.1.3 About Citation Styles

Harvard citation style is implemented in this template. For information about a topic like RFID paraphrased in your own words (cf. Batina et al., 2012, pg 317) do not forget to use *cf.* and – if available the relevant page numbers – along with *citep*. Direct quotations would not need the *cf.*. If you need to use the title of a reference, for example the RFID Authentication Protocol by Fernàndez-Mir et al. (2012) you might use *citet*. For references without parentheses (find more in Li et al., 2008) just use *cite*.

Note the use of *ibid* (in German *ebd* or *ebenda*) for referencing (several pages of) the same resource subsequently. For example, see (cf. Batina et al., 2012, pg 317) and (cf. ibid., pg 321) (cf. ibid., pg 399).

You might cite URLs, e.g. about (tools for checking) Accessibility (cf. Google Inc., 2016, 2017), as online resources with a date of your last visit.

1.2 Some more LaTeX

This section is a *really very short* summary of LaTeX features. Do not forget to remove it after finishing your thesis.

Here you have an included graphic (Figure 1.1). Note the short title used for the list of figures.

[2] You might start your search at URL http://dl.acm.org/ or http://ieeexplore.ieee.org/.

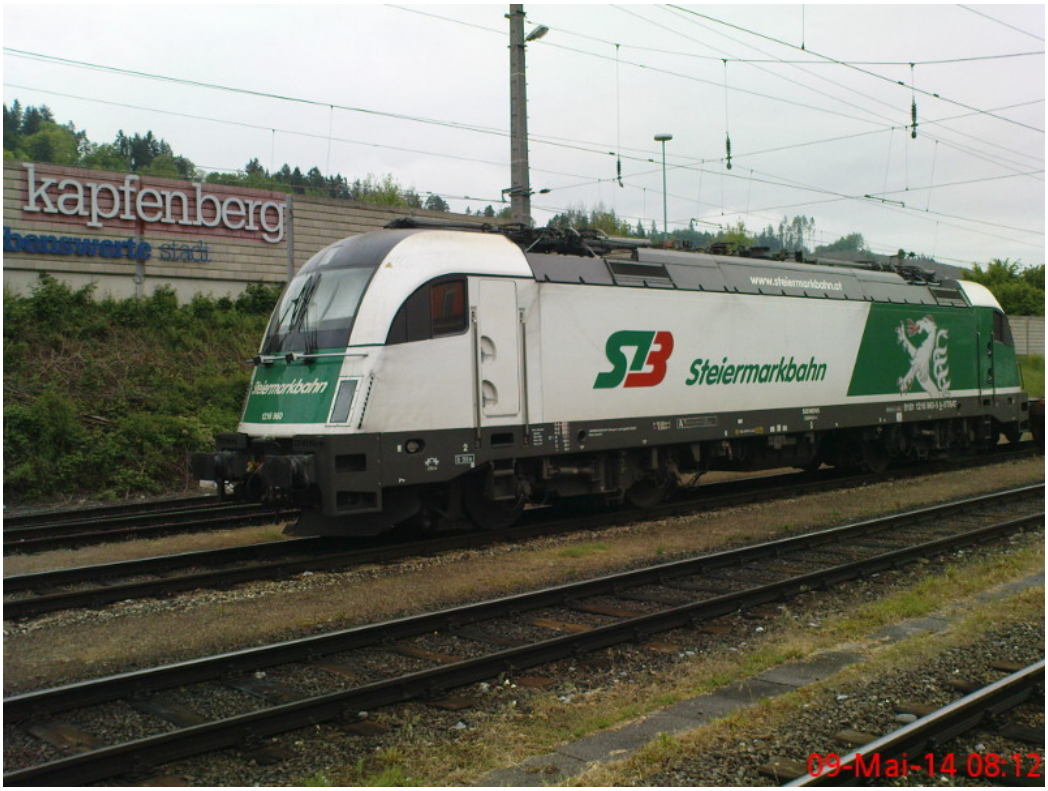

Figure 1.1: Note the logo attached to the train engine spotted in Kapfenberg main station.

Code listings require the *listings* package which, in turn, requires some settings[3]; see command `\lstset{}` in preamble of this template. Additionally the package *courier* should be used because the defaults do not provide for proper syntax highlighting.

```
1 void main(int argc, char *argv[])
2 {
3   printf("Hello world!");
4 }
```

Listing 1.1: Listing subtitles could and should contain whole sentences describing the important aspect of the listing.

In order to see what's possible – here are two fancy tables, see Table 1.1 and Table 1.2 which show ....

View also the preamble of this file for explanations.

[3] ... because the defaults do not fit all purposes

Version	Description	Author(s)	Date
1.0	Initial	Ohrt	July 15, 2014
1.1	Filled section “Open Issues”	Ohrt	July 16, 2014
1.2	Added section “Restrictions”	Ohrt	September 15, 2014

Table 1.1: Olive green heading used for this fancy table.

Error	Solution
Java.lang.OutOfMemoryError: PermGen space *(32-/64-bit issue)*	-XX:MaxPermSize=1024M
Error occurred during initialization of VM *or* Could not reserve enough space for object heap	increase or remove -Xms value e.g. -Xms128m -Xmx512m (Eclipse default: -Xms40m -Xmx512m)

Table 1.2: A more or less simple grey table. Better try to put tables and figures at *top*[t] or *bottom*[b] (optional use whole *page*[p]) of a page. Avoid location specifier *here*[h].

Here is a reference to Listing 1.1. Note the line numbers. Referenced listings, tables and figures are written in uppercase first letter: *L*isting X, *T*able Y and *F*igure Z.

1.2.1 Prototype

Find in Listing 1.2 an example of the JavaScript closure. Only parts of the original source code have been included. That allows to extract and display parts of working code!

Mathematical expressions are rendered beautifully by LaTeX. Now enjoy the first Maxwell equation $\text{rot}\vec{H} = \vec{J} + \frac{\partial \vec{D}}{\partial t}$.

Selected resources about scientific working:

- Writing for Computer Science: . . . elements of good writing - clarity, simplicity, accuracy, and organization . . . by Zobel, 2004.
- Case Study Research: . . . offers comprehensive coverage of the design and use of the case study method as a valid research tool . . . by Yin, 2013.
- The Elements of Style: . . . first edition about 1935; includes a list of valuable recommendations: be clear, do not overwrite . . . by Strunk and White, 2000.
- How to Design and Report Experiments: . . . Planning an Experiment, Experimental Designs, Descriptive Statistics, Inferential Statistics . . . Answering the Question ’So What?’ . . . by Field and Hole, 2003.

```
print("we go in for closures now :)")

function nextNumber(){
        var startWith=222;
        function nxt(){
                startWith+=1 // !!
                return startWith
        }
        return nxt
}
var nn = nextNumber()
print( nn() )
print( nn() )
```

Listing 1.2: Demo implementation of a JavaScript *Closure*.

- The Craft of Research: ... What Is Research? Creating a Relationship with Your Reader: Your Role, Finding a Good Research Problem ... by Booth, Colomb, and Williams, 2008.
- The Craft of Scientific Writing: ... your writing is the principle way in which people learn about your work. When you communicate well, you receive credit for your ... by Alley, 1998.
- Wie man eine wissenschaftliche Abschlussarbeit schreibt: Doktor-, Diplom- und Magisterarbeit in den Geistes- und Sozialwissenschaften: ... Warum muss man eine wissenschaftliche Abschlussarbeit schreiben und was ist sie? ... by Eco, 2010.
- Writer's Handbook: ... you will find many instructional materials we've developed for our Writing Center teaching: Planning and Writing Research Papers, Creating an Argument, ... by The Writing Center, 2004.

Finally, before starting to write you might take a look at some of these references.

Final note: at the end of each chapter you might sum up the contents of the chapter in a sentence or two. Then you might tell the reader what will be presented in the upcoming section (to make her/him curious).

Chapter 2

Introduction

Your text here (what is the problem? what does not work well at the moment? what do people need?) ...

2.1 Problem Statement

Your text here (what is the overall problem? give examples. motivate, why does someone needs (better/faster/different) solution to the problem described?) ...

2.2 Research Questions

Your text here (focus on two to four main research questions and detail on them) ...

2.3 Hypthesis

Your text here (a hypothesis – a rough idea – of how you think a solution might look like. How to possibly solve a given problem) ...

2.4 Method

Your text here (your structured, academic approach[1] to find a solution) ...

[1] Find an extensive explanation of how to write a *Method* section at http://www.mrcophth.com/publishorperish/methods.html.

Chapter 3

Related Work

Your text here (describe other research related to your work. state what is different to your solution) ...

Chapter 4

Concept

Your text here (describe an overall concept of a solution, which could possibly solve a given problem, design a novel solution) ...

Chapter 5

Implementation

Your text here (describe what is relevant and special about your working prototype, state how the single features help to solve the given problem) ...

Chapter 6

Evaluation

Your text here (describe, how you could prove, that your implementation really solved the stated problem. I.e. accept or reject your hypotheses) ...

Chapter 7

Conclusion and Outlook

Your text here (sum up the results achieved, state current limitations of your solution, suggest further research by explaining how others could built on your results) ...

Acronyms

ABI application binary interface

ACL access control list

GUI graphical user interface

KISS keep it small and simple

MITM man-in-the-middle

OS operating system

UART universal asynchronous receiver/transmitter

UID unique identifier

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