



Freie Universität Bozen  
Libera Università di Bolzano  
Università Lìdia de Bulsan

Fakultät für Informatik  
Facoltà di Scienze e Tecnologie informatiche  
Faculty of Computer Science

**Bachelors in Computer Science and Engineering**

**Bachelor Thesis**

**App based solution for new  
school children from different  
countries to integrate and adjust  
in German schools in South  
Tyrol.**

Candidate: Muhammad Methab Kayani

Supervisor: Andrea Janes

July, 2018



# Abstract

**Motivation** Why do we care about the problem and the results? If the problem isn't obviously "interesting" it might be better to put motivation first; but if your work is incremental progress on a problem that is widely recognized as important, then it is probably better to put the problem statement first to indicate which piece of the larger problem you are breaking off to work on. This section should include the importance of your work, the difficulty of the area, and the impact it might have if successful.

**Problem statement** What problem are you trying to solve? What is the scope of your work (a generalized approach, or for a specific situation)? Be careful not to use too much jargon. In some cases it is appropriate to put the problem statement before the motivation, but usually this only works if most readers already understand why the problem is important.

**Approach** How did you go about solving or making progress on the problem? Did you use simulation, analytic models, prototype construction, or analysis of field data for an actual product? What was the extent of your work (did you look at one application program or a hundred programs in twenty different programming languages?) What important variables did you control, ignore, or measure?

**Results** What's the answer? Specifically, most good computer architecture papers conclude that something is so many percent faster, cheaper, smaller, or otherwise better than something else. Put the result there, in numbers. Avoid vague, hand-waving results such as "very", "small", or "significant." If you must be vague, you are only given license to do so when you can talk about orders-of-magnitude improvement. There is a tension here in that you should not provide numbers that can be easily misinterpreted, but on the other hand you don't have room for all the caveats.

**Conclusions** What are the implications of your answer? Is it going to change the world (unlikely), be a significant "win", be a nice hack, or simply serve as a road sign indicating that this path is a waste of time (all of the previous results are useful). Are your results general, potentially generalizable, or specific to a particular case?



# **Riassunto**

**Motivazione**

**Problema**

**Approccio**

**Risultati**

**Conclusioni**



# **Zusammenfassung**

**Motivation** Hi...

**Problemstellung**

**Ansatz**

**Ergebnisse**

**Fazit**





# Acknowledgements



# Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
1.1	Motivation . . . . .	1
1.1.1	Test . . . . .	1
1.2	Objective . . . . .	1
1.3	Approach . . . . .	1
1.4	Structure of the thesis . . . . .	2
<b>2</b>	<b>Background Information</b>	<b>3</b>
<b>3</b>	<b>Problem Statement</b>	<b>5</b>
<b>4</b>	<b>Review of the state of the art</b>	<b>7</b>
<b>5</b>	<b>Problem Solution</b>	<b>9</b>
<b>6</b>	<b>Evaluation</b>	<b>11</b>
<b>7</b>	<b>Discussion</b>	<b>13</b>
<b>8</b>	<b>Conclusion and Further Studies</b>	<b>15</b>
<b>A</b>	<b>Appendix</b>	<b>17</b>
<b>B</b>	<b>Some help on <math>\LaTeX</math></b>	<b>19</b>
B.1	Text . . . . .	19
B.2	Figures . . . . .	19
B.3	Citations . . . . .	20
B.4	Footnotes . . . . .	20
B.5	Formulas . . . . .	20
B.6	Tables . . . . .	20
B.7	Code . . . . .	21
B.8	Landscape . . . . .	22



**List of Tables**

B.1 Caption of the table within the text. . . . . 21



# List of Figures

B.1 Caption for the index . . . . . 20





# List of Listings

B.1 A listing example . . . . . 21



# Chapter 1

## Introduction

You can't write a good introduction until you know what the body of the paper says. Consider writing the introductory section(s) after you have completed the rest of the paper, rather than before.

Be sure to include a hook at the beginning of the introduction. This is a statement of something sufficiently interesting to motivate your reader to read the rest of the paper, it is an important/interesting scientific problem that your paper either solves or addresses. You should draw the reader in and make them want to read the rest of the paper.

The next sections are important: explain *why* you did this work (motivation), *what* the concrete goal was (objective), and *how* you did it (approach).

### 1.1 Motivation

Why does it matter? Why is it important to deal with the subject you are describing? What is the research question? Is it a good question? (has it been answered before? is it a useful question to work on?)

#### 1.1.1 Test

### 1.2 Objective

This section describes the goal of the paper: why the study was undertaken, or why the paper was written. Do not repeat the abstract and just give an overview. You have space in chapter 3 to describe the objective in detail.

### 1.3 Approach

What belongs in the "approach" section of a scientific paper?

- Information to allow the reader to assess the believability of your results.
- Information needed by another researcher to replicate your experiment.
- Description of your materials, procedure, theory.
- Calculations, technique, procedure, equipment, and calibration plots.
- Limitations, assumptions, and range of validity.

The methods section should answer the following questions and caveats:

1. Could one accurately replicate the study (for example, all of the optional and adjustable parameters on any sensors or instruments that were used to acquire the data)?
2. Could another researcher accurately find and reoccupy the sampling stations or track lines?
3. Is there enough information provided about any instruments used so that a functionally equivalent instrument could be used to repeat the experiment?
4. If the data is in the public domain, could another researcher lay his or her hands on the identical data set?
5. Could one replicate any laboratory analyses that were used?
6. Could one replicate any statistical analyses?
7. Could another researcher approximately replicate the key algorithms of any computer software?

Citations in this section should be limited to data sources and references of where to find more complete descriptions of procedures. Do not include descriptions of results.

## **1.4 Structure of the thesis**

State a verbal “road map” or verbal “table of contents” guiding the reader to what lies ahead. (Something like the following paragraph.)

This thesis is divided into six sections; it starts with an introduction, pointing out the problem, the objective and giving an overview of the applied approach. Then it goes over to an extensive SLR revealing existing active RFID technologies. Afterwards follows a discussion of the aim of this work. The next step is then a description of the system’s architecture illuminating the system from different viewpoints. Furthermore, the thesis goes over to the evaluation of the individual developed components. Finally the last section summarizes the major activities that were conducted, their relevance and illustrates faced technical problems and some possible future work.

## **Chapter 2**

# **Background Information**

A brief section giving background information may be necessary, especially if your work spans two or more traditional fields. That means that your readers may not have any experience with some of the material needed to follow your thesis, so you need to give it to them. A different title than that given above is usually better; e.g., “A Brief Review of Frammis Algebra.”



## **Chapter 3**

# **Problem Statement**





## **Chapter 4**

### **Review of the state of the art**

In this chapter you should cite previous research in this area. It should cite those who had the idea or ideas first, and should also cite those who have done the most recent and relevant work. You should then go on to explain why more work was necessary (your work, of course.)



## **Chapter 5**

### **Problem Solution**

This part of the thesis is much more free-form. It may have one or several sections and subsections. But it all has only one purpose: to convince the examiners that you answered the question or solved the problem that you set for yourself in chapter 3. So show what you did that is relevant to answering the question or solving the problem: if there were blind alleys and dead ends, do not include these, unless specifically relevant to the demonstration that you answered the thesis question.



## Chapter 6

# Evaluation

Solving a problem is one thing, evaluating how good the solution is, is another thing. In this chapter you evaluate your solution analyzing it using various scientific methods, e.g., experiments, interviews, etc.

Here you should include

1. The results are actual statements of observations, including statistics, tables and graphs.
2. Indicate information on range of variation.
3. Mention negative results as well as positive. Do not interpret results — save that for the discussion.
4. Lay out the case as for a jury. Present sufficient details so that others can draw their own inferences and construct their own explanations.
5. Break up your results into logical segments by using subheads



## Chapter 7

# Discussion

While in chapter 6 you just report the results of the evaluation, here you discuss what the implications of the entire work are. It is like making a step back and rethinking what you did and how it contributed to the research questions you posed yourself.

This section should be introduced by a few sentences that summarize the most important results. The rest of this section should answer the following questions:

1. What are the major patterns in the observations?
2. What are the relationships, trends and generalizations among the results?
3. What are the exceptions to these patterns or generalizations?
4. What are the likely mechanisms underlying these patterns?
5. Is there agreement or disagreement with previous work?
6. What is the relationship of the present results to the original question?
7. What are the things we now know or understand that we did not know or understand before the present work?
8. What is the significance of the present results: why should the reader care?





## Chapter 8

# Conclusion and Further Studies

Conclusions are *not* a rambling summary of the thesis: they are *short, concise* statements of the inferences that you have made because of your work. It helps to organize these as short numbered paragraphs, ordered from most to least important. All conclusions should be directly related to the research question stated in chapter 3.



## **Appendix A**

# **Appendix**

Sometimes there is data or some longer part that would distract the reader when it is presented within the main part of the thesis. Such information comes here. If you use an appendix, change the title to what it contains, e.g., “Testing data set”.



## Appendix B

# Some help on L<sup>A</sup>T<sub>E</sub>X

This chapter contains examples of elements you will need. You can keep this and copy/paste from here whenever you need to use an instruction. Please read also the instructions for each element!

### B.1 Text

When you write text and you want to make a new line, make *two* new lines in the source; on the final PDF you will just see one. Within Visual Studio Code (if you installed the re-wrap plugin), you can use `Alt+Q` to format the text so that it fits on the screen.

**Do not** use:

1. `\\` to make a new line.
2. `\newpage` to switch to a new page.
3. `\noindent` to avoid the indentation of a new paragraph.

If you use these commands, it shows that you formatted something else incorrectly and now you want to fix a problem that is the consequence of the first mistake. Then it is better to fix the initial mistake. Usually this is because of a wrong positioning of figures or tables.

### B.2 Figures

Figure B.1 shows an example image. It describes various types of data on different levels of abstraction.

Remember:

- Figures have to be referenced in the text using `\ref` and briefly explained. Do not worry if the image ends up on the following page, probably there is no space to have it at the place where you inserted it.
- Images should be vector images or saved with at least 600 dpi, so that when printed they do not look blurry.
- If the caption in the text and the index are the same, you can leave the parameter for the caption for the index away, e.g., like `\caption{Caption within the text.}`

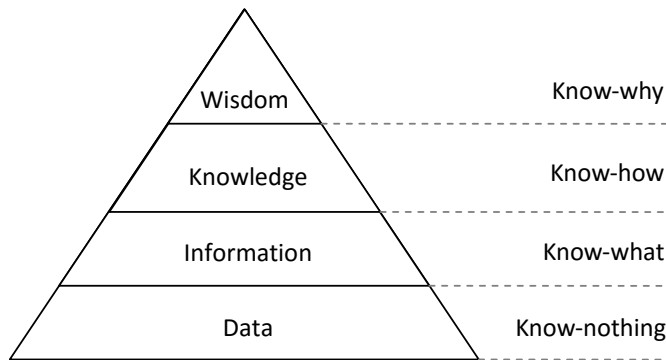


Figure B.1: Caption within the text [1].

**Do not** use:

1. `\begin{figure}[H!]` to force  $\text{\LaTeX}$  to place a figure where you want. Usually there is a good reason why a picture ends up where it is positioned. Just refer to it with `\ref` and describe it. The reader is perfectly capable to find the image.

### B.3 Citations

You have to define reference material in a separate file called “bibliography.bib”. Example of citations: [2, 3, 4]. Have a look at [5].

### B.4 Footnotes

Here is an example of a footnote<sup>1</sup>. Please use footnotes to provide the web site of any technology or product, e.g., Microsoft Word<sup>2</sup>, so that everyone knows what you are talking about.

### B.5 Formulas

$\text{\LaTeX}$  is perfect for formulas:

$$\frac{d}{dx} \arctan(\sin(x^2)) = -2 \frac{\cos(x^2)x}{-2 + (\cos(x^2))^2} \quad (\text{B.1})$$

As you see in formula B.1, you can insert very nice formulas in your thesis too! Like figures, refer to the formula using `\ref` and describe what the reader is seeing.

### B.6 Tables

There are many ways to make a table, the table B.1 is a bit more complicated, but has many advantages, e.g., that you can have a table that breaks from one page to another.

---

<sup>1</sup> But do not use it too frequently :)

<sup>2</sup> Microsoft Word, <http://office.microsoft.com/en-us/word>

Table B.1: Caption of the table within the text.

A	B	C
Left aligned	Center aligned	Right aligned
Left aligned	Center aligned	Right aligned
Left aligned	Center aligned	Right aligned
Left aligned	Center aligned	Right aligned

Like for pictures and formulas, refer to the table using `\ref` and describe what the reader is seeing.

**Do not** use:

1. Vertical lines in a table
2. Double lines in a table

## B.7 Code

If you want to include code examples, you should use the `lstlisting` environment, as in listing B.1.

```

1 public ArrayList getList() {
2     ArrayList l = new ArrayList();
3     Connection c = null;
4     try {
5         c = DatabaseTools.getConnection();
6         Statement p = c.createStatement();
7         ResultSet r = p.executeQuery("SELECT id, name,
            readonly FROM group ORDER BY name");
8         while (r.next()) {
9             HashMap h = new HashMap();
10            h.put("id", r.getString(1));
11            h.put("name", r.getString(2));
12            h.put("readonly", new Boolean(r.getBoolean(3)));
13            l.add(h);
14        }
15    } catch (Exception e) {
16        e.printStackTrace();
17    } finally {
18        if (c != null) {
19            try {
20                c.close();
21            } catch (Exception e) {
22                e.printStackTrace();
23            }
24        }
25    }
26 }
```

```
27  return l;  
28 }
```

Listing B.1: A listing example

Using the line numbers it is also easier to reference to them within the text.

## B.8 Landscape

Sometimes, you need to show a picture or a table that requires a lot of space. To avoid that the text in the picture or table becomes unreadable, you can insert it in landscape mode, like the text on the next page.



Some text in landscape mode.



# Bibliography

- [1] Soren Lauesen. *Software Requirements: Styles and Techniques*. Addison Wesley, 2002.
- [2] L. Bass, P. Clements, and R. Kazman. *Software Architecture in Practice*. SEI Series in Software Engineering. Pearson Education, 2012.
- [3] Vladimir A. Rubin, Alexey A. Mitsyuk, Irina A. Lomazova, and Wil M. P. van der Aalst. Process mining can be applied to software too! In *8th ACM/IEEE International Symposium on Empirical Software Engineering and Measurement*, New York, NY, USA, 2014. ACM.
- [4] Dictionary.com. Dictionary.com unabridged, Feb 2015. <http://dictionary.reference.com/browse/process>.
- [5] Alan Ford, Costin Raiciu, Mark J. Handley, and Olivier Bonaventure. TCP Extensions for Multipath Operation with Multiple Addresses. RFC 6824, January 2013.