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Bachelorarbeit

A Tool for the Estimation of Lattice Parameters

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Abstract

<Short summary of the thesis>

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Acronyms

ER error rate. 42

FR Fehlerrate. 42

RDBMS Relational Database Management System. 42

1 Introduction

This thesis starts with Chapter 2.

We can also typeset `<text>verbatim text</text>`. Backticks are also rendered correctly: `` `words in backticks` ``.

2 Chapter Two

LaTeX hints are provided in Appendix A.

3 Heading on Level 0 (chapter)

Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. $\sin^2(\alpha) + \cos^2(\beta) = 1$. If you read this text, you will get no information $E = mc^2$. Really? Is there no information? Is there a difference between this text and some nonsense like "Huardest gefburn"? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. $\sqrt[n]{a} \cdot \sqrt[n]{b} = \sqrt[n]{ab}$. This text should contain all letters of the alphabet and it should be written in of the original language. $\frac{\sqrt[n]{a}}{\sqrt[n]{b}} = \sqrt[n]{\frac{a}{b}}$. There is no need for special content, but the length of words should match the language. $a\sqrt[n]{b} = \sqrt[n]{a^n b}$.

3.1 Heading on Level 1 (section)

Hello, here is some text without a meaning. $\mathrm{d}\Omega = \sin\vartheta \mathrm{d}\vartheta \mathrm{d}\varphi$. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like "Huardest gefburn"? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. $\sin^2(\alpha) + \cos^2(\beta) = 1$. This text should contain all letters of the alphabet and it should be written in of the original language $E = mc^2$. There is no need for special content, but the length of words should match the language. $\sqrt[n]{a} \cdot \sqrt[n]{b} = \sqrt[n]{ab}$.

3.1.1 Heading on Level 2 (subsection)

Hello, here is some text without a meaning. $\frac{\sqrt[n]{a}}{\sqrt[n]{b}} = \sqrt[n]{\frac{a}{b}}$. This text should show what a printed text will look like at this place. $a\sqrt[n]{b} = \sqrt[n]{a^n b}$. If you read this text, you will get no information. $\mathrm{d}\Omega = \sin\vartheta \mathrm{d}\vartheta \mathrm{d}\varphi$. Really? Is there no information? Is there a difference between this text and some nonsense like "Huardest gefburn"? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language. $\sin^2(\alpha) + \cos^2(\beta) = 1$.

Heading on Level 3 (subsubsection)

Hello, here is some text without a meaning $E = mc^2$. This text should show what a printed text will look like at this place. $\sqrt[n]{a} \cdot \sqrt[n]{b} = \sqrt[n]{ab}$. If you read this text, you will get no information. $\frac{\sqrt[n]{a}}{\sqrt[n]{b}} = \sqrt[n]{\frac{a}{b}}$. Really? Is there no information? Is there a difference between this text and some nonsense like "Huardest gefburn"? Kjift – not at all! A blind text like this gives you information

about the selected font, how the letters are written and an impression of the look. $a\sqrt[n]{b} = \sqrt[n]{a^n b}$. This text should contain all letters of the alphabet and it should be written in of the original language. $\mathrm{d}\Omega = \sin\vartheta \mathrm{d}\vartheta \mathrm{d}\varphi$. There is no need for special content, but the length of words should match the language.

Heading on Level 4 (paragraph) Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. $\sin^2(\alpha) + \cos^2(\beta) = 1$. If you read this text, you will get no information $E = mc^2$. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. $\sqrt[n]{a} \cdot \sqrt[n]{b} = \sqrt[n]{ab}$. This text should contain all letters of the alphabet and it should be written in of the original language. $\frac{\sqrt[n]{a}}{\sqrt[n]{b}} = \sqrt[n]{\frac{a}{b}}$. There is no need for special content, but the length of words should match the language. $a\sqrt[n]{b} = \sqrt[n]{a^n b}$.

3.2 Lists

3.2.1 Example for list (itemize)

- First item in a list
- Second item in a list
- Third item in a list
- Fourth item in a list
- Fifth item in a list

Example for list (4*itemize)

- First item in a list
  - First item in a list
    - First item in a list
      - First item in a list
      - Second item in a list
    - Second item in a list
  - Second item in a list
- Second item in a list

3.2.2 Example for list (enumerate)

1. First item in a list
2. Second item in a list
3. Third item in a list
4. Fourth item in a list
5. Fifth item in a list

Example for list (4*enumerate)

1. First item in a list
    a) First item in a list
        i. First item in a list
            A. First item in a list
            B. Second item in a list
        ii. Second item in a list
    b) Second item in a list
2. Second item in a list

3.2.3 Example for list (description)

First item in a list

Second item in a list

Third item in a list

Fourth item in a list

Fifth item in a list

Example for list (4*description)

First item in a list

First item in a list

First item in a list

First item in a list

Second item in a list

Second item in a list

Second item in a list

Second item in a list

4 Related Work

Describe relevant scientific literature related to your work.

5 Conclusion and Outlook

Outlook

All links were last followed on March 17, 2018.

A LaTeX Hints

> We cannot solve our problems with the same level of thinking that created them
>
> *(Albert Einstein)*

One sentence per line. This rule is important for the usage of version control systems. A new line is generated with a blank line. As you would do in Word: New paragraphs are generated by pressing enter. In LaTeX, this does not lead to a new paragraph as LaTeX joins subsequent lines. In case you want a new paragraph, just press enter twice (!). This leads to an empty line. In word, there is the functionality to press shift and enter. This leads to a hard line break. The text starts at the beginning of a new line. In LaTeX, you can do that by using two backslashes (\\). This is rarely used.

Please do *not* use two backslahes for new paragraphs. For instance, this sentence belongs to the same paragraph, whereas the last one started a new one. A long motivation for that is provided at http://loopspace.mathforge.org/HowDidIDoThat/TeX/VCS/#section.3.

One can write *emphasized text (rendered in italics)* and **bold text**.

A.1 File Encoding and Support of Umlauts

The template offers foll UTF-8 support. All recent editors should not have issues with that.

A.2 Citations

References are set by means of `\cite[key]`.

Code:

```
Example: \cite{WSPA} or by author input: \
citet{WSPA}.
```

Result:

Example: [**WSPA**] or by author input: **WSPA**.

The following sentence demonstrates 1. the capitalization of author names at the beginning of the sentence, 2. the correct citation using author names and the reference, 3. that the author names are a hyperlink to the bibliography and that 4. the bibliography contains the name prefix “van der” of “Wil M. P. van der Aalst”.

Code:

```
Example: \cite{WSPA} or by author input: \
citet{WSPA}.
```

Result:

Example: [**WSPA**] or by author input: **WSPA**.

The following sentence demonstrates that you can overwrite the text part of the generated label using `label` in a bibliopgrahie-entry, but the year and the uniqueness is still generated by biber.

Code:

```
Example: \cite{WSPA} or by author input: \
citet{WSPA}.
```

Result:

Example: [**WSPA**] or by author input: **WSPA**.

Code:

```
Example: \cite{WSPA} or by author input: \
citet{WSPA}.
```

Result:

Example: [**WSPA**] or by author input: **WSPA**.

When creating the Bibtex file it is recommended to make sure that the DOI is listed.

A.3 Formulas and Equations

Code:

```
Example: \cite{WSPA} or by author input: \
citet{WSPA}.
```

Result:

Example: [**WSPA**] or by author input: **WSPA**.

A list with all available mathematical symbols is provided at http://texdoc.net/pkg/symbols-a4.

Code:

```
Example: \cite{WSPA} or by author input: \
citet{WSPA}.
```

Result:

Example: [**WSPA**] or by author input: **WSPA**.

For the documentation of editing mathematical formulas read the package documentation of `amsmath`[1].

[1] http://texdoc.net/pkg/amsmath

Listing A.1 The code is separated by two horizontal lines in the listings environment.

```
<listing name="second sample">
  <content>not interesting</content>
</listing>
```

Equation **??** is numbered and can be referenced in the text:

Code:

```
Example: \cite{WSPA} or by author input: \
citet{WSPA}.
```

Result:

Example: [**WSPA**] or by author input: **WSPA**.

Following equation is not numbered because of using `\align*` as environment.

Code:

```
Example: \cite{WSPA} or by author input: \
citet{WSPA}.
```

Result:

Example: [**WSPA**] or by author input: **WSPA**.

The template offers `\abs` to enable the bars scaling well at the absolute value:

Code:

```
Example: \cite{WSPA} or by author input: \
citet{WSPA}.
```

Result:

Example: [**WSPA**] or by author input: **WSPA**.

More details about mathematical environments provides the documentation available at http://www.ctan.org/tex-archive/help/Catalogue/entries/voss-mathmode.html.

A.4 Sourcecode

Listing A.1 shows how to emmbed source code. With `\lstinputlisting` the source code can be loaded directly from files.

Code:

```
Example: \cite{WSPA} or by author input: \
citet{WSPA}.
```

Result:

Example: [**WSPA**] or by author input: **WSPA**.

Algorithm A.1 Sample algorithm

procedure SAMPLE(a,v_e)
  parentHandled $\leftarrow$ (a = process) $\vee$ visited(a'), $(a', c, a) \in$ HR
                                  // $(a', c'a) \in$ HR denotes that a' is the parent of a
  if parentHandled $\wedge$ ($\mathcal{L}_{in}(a) = \emptyset \vee \forall l \in \mathcal{L}_{in}(a)$: visited(l)) **then**
    visited(a) $\leftarrow$ true
    $$\text{writes}_\circ(a, v_e) \leftarrow \begin{cases} \text{joinLinks}(a, v_e) & |\mathcal{L}_{in}(a)| > 0 \\ \text{writes}_\circ(p, v_e) & \exists p : (p, c, a) \in \text{HR} \\ (\emptyset, \emptyset, \emptyset, false) & \text{otherwise} \end{cases}$$
    if $a \in \mathcal{A}_{basic}$ **then**
      HANDLEBASICACTIVITY(a,v_e)
    else if $a \in \mathcal{A}_{flow}$ **then**
      HANDLEFLOW(a,v_e)
    else if a = process **then** // Directly handle the contained activity
      HANDLEACTIVITY(a',v_e), $(a, \perp, a') \in$ HR
      $\text{writes}_\bullet(a) \leftarrow \text{writes}_\bullet(a')$
    end if
    for all $l \in \mathcal{L}_{out}(a)$ **do**
      HANDLELINK(l,v_e)
    end for
  end if
end procedure

A.5 Pseudocode

Algorithm A.1 shows a sample algorithm.

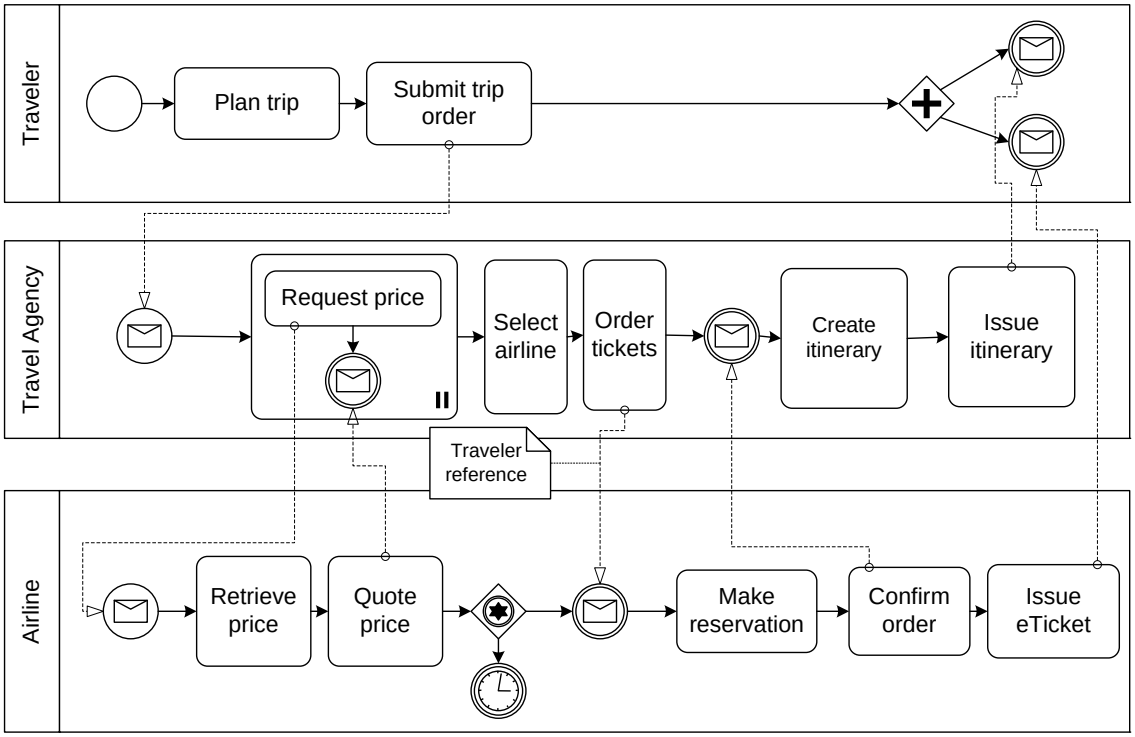


Figure A.1: Example Choreography

And if you want to write an algorithm that goes over several pages, you can only do this with the following **dirty** hack:

Algorithmus A.2 Description

code goes here
test2

A.6 Figures

The Figure A.1 and A.2 are important to understand this document. In the appendix Figure A.4 on page 35 shows again the complete choreography.

Figure A.3 shows the usage of the package subcaption. It is indeed possible to reference to sub figures: Figure A.3a.

It is possible to convert SVGs to PDF directly during compilation. This is described in the source code of latex-tipps.tex, but commented out.

A.7 More Illustrations

Figures A.4 and A.5 show two choreographies, which should further explain the facts. The second figure is rotated 90 degrees to demonstrate the `pdflscape` package.

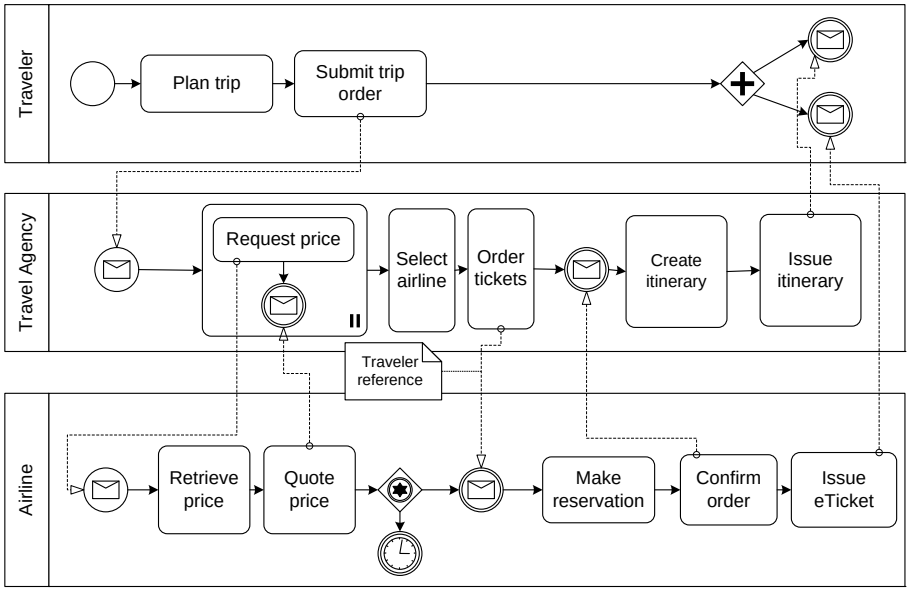
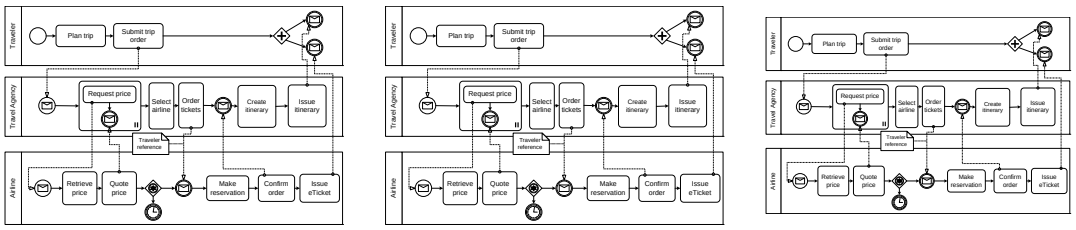


Figure A.2: The example choreography. Now slightly smaller to demonstrate `\textwidth`. And also the use of alternative captions for the list of images. However, the latter is only conditionally recommended, because who reads so much text under a picture? Or is it just a matter of style?



(a) Choreography 1 **(b)** Choreography 2 **(c)** Choreography 3

Figure A.3: Example to place 3 illustrations next to each other. Further, it is possible to reference each separately.

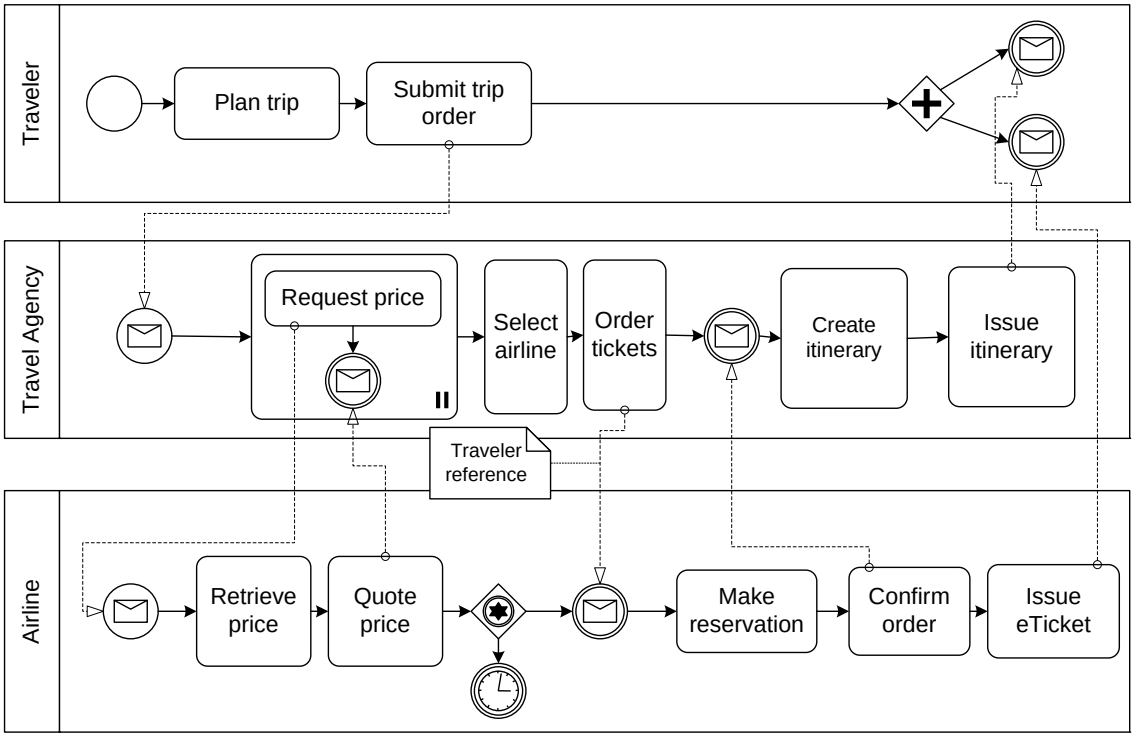


Figure A.4: Example Choreography I

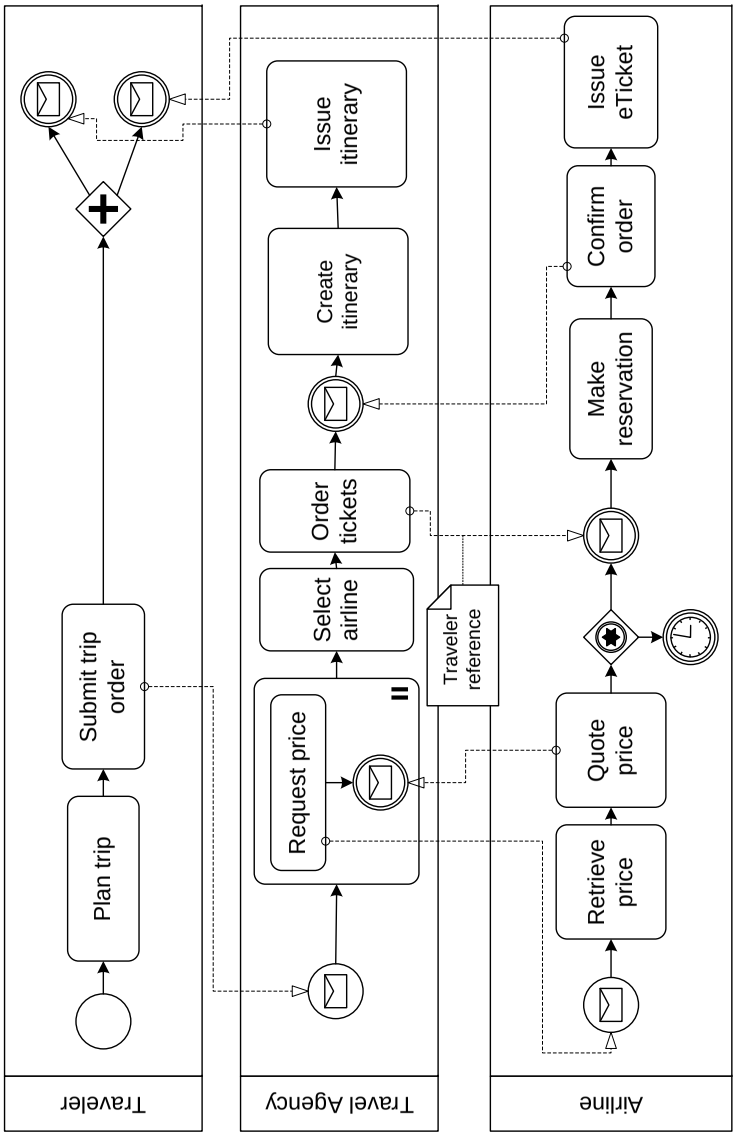


Figure A.5: Example Choreography II

A.8 Plots with pgfplots

The package pdfplots provides plotting of functions directly in LaTeX like with matlab or gnuplot. Some visual examples are available here[2].

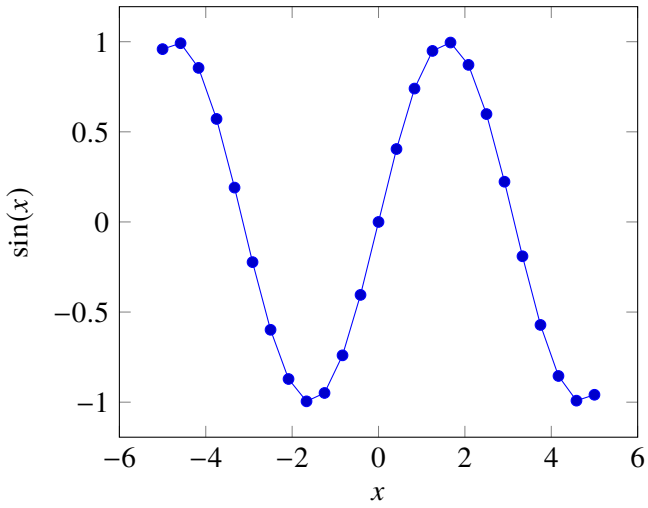


Figure A.6: Plot of $\sin(x)$ direclty inside the figure environment with pgfplots.

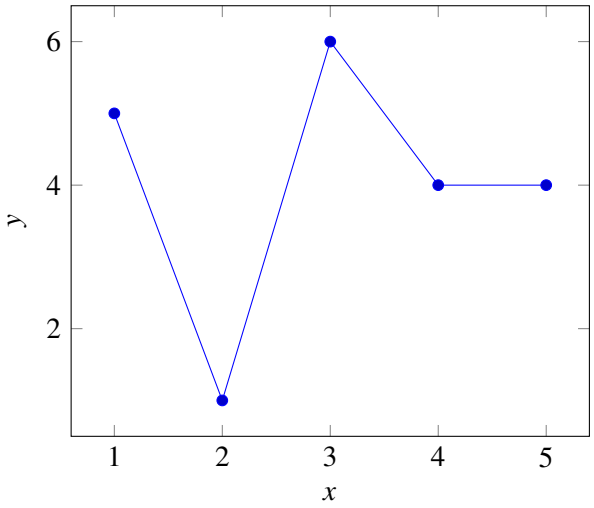


Figure A.7: Coordinates x and y read from csv file and plotted pgfplots.

A.9 Figures with tikz

The tikz is a package for creating graphics programmatically. With this package grids or other regular strucutres can be easliy generated.

[2] http://texdoc.net/pkg/visualtikz

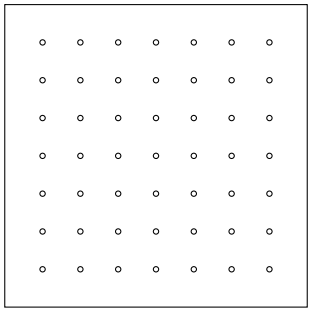


Figure A.8: A regular grid genrated with easily with two for loops.

summed		Title
Table tabsatz.pdf	as recommended	in gesetzt
Example	a nice example for using “multirow”	

Table A.1: Exampe Table – see http://www.ctan.org/tex-archive/info/german/tabsatz/

A.10 UML diagrams using tikz-uml

Figure A.9 presents a class diagram typeset using tikz-uml.

A.11 UML diagrams using PlantUML

In case LuaLaTeX is used and PlantUML is installed, UML diagrams can be defined using PlantUML.

A.12 Linguistic Forests

Code:

```
Example: \cite{WSPA} or by author input: \
citet{WSPA}.
```

Result:

Example: [**WSPA**] or by author input: **WSPA**.

A.13 Tables

Table A.1 shows results and Table A.2 shows how numerical data can be represented in a table.

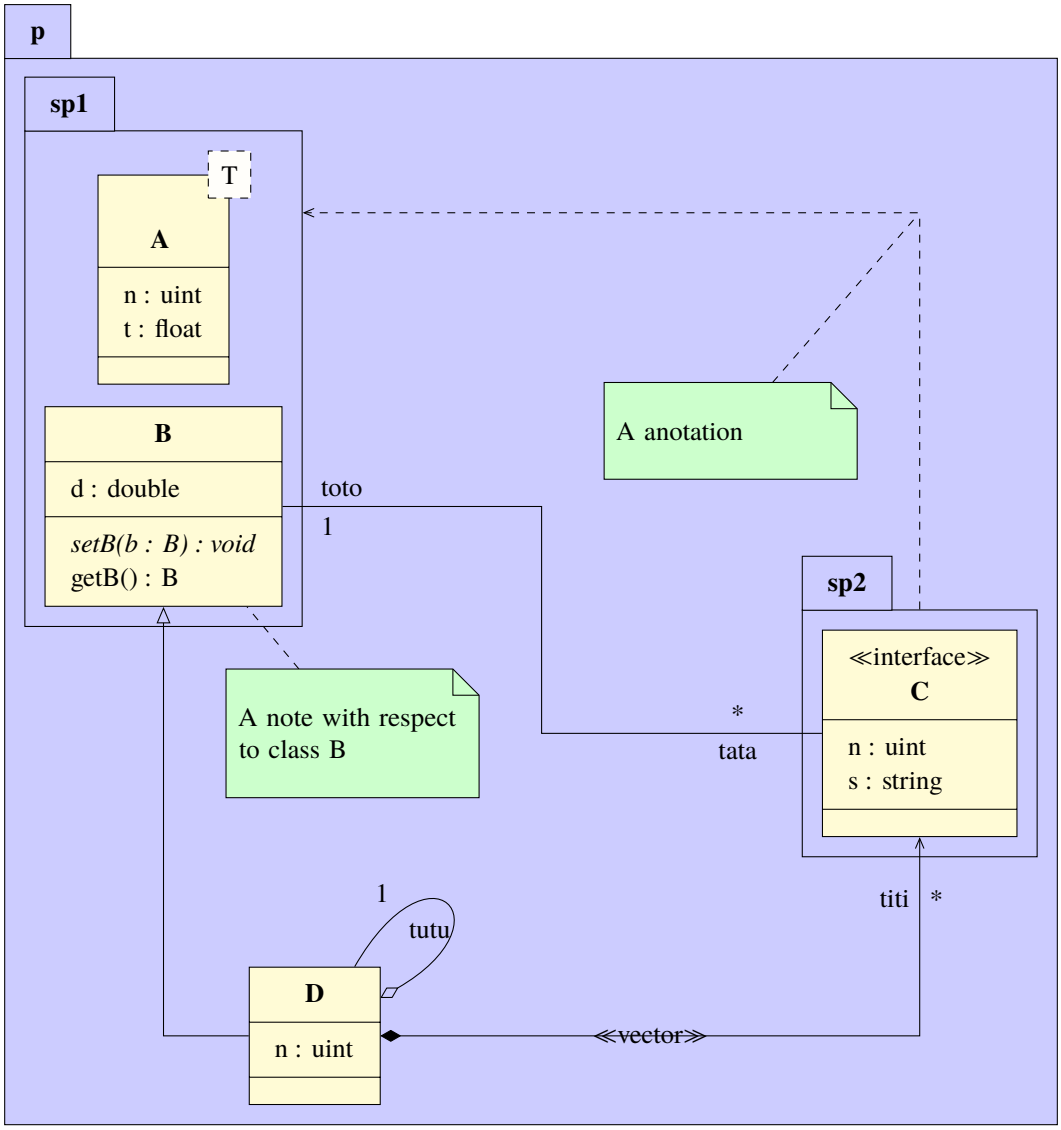


Figure A.9: Class diagram generated with tikz-uml. Example adapted from Nicolas Kielbasiewicz.

	Parameter 1		Parameter 2		Parameter 3		Parameter 4	
Bedingungen	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**
W	1.1	5.55	6.66	.01				
X	22.22	0.0	77.5	.1				
Y	333.3	.1	11.11	.05				
Z	4444.44	77.77	14.06	.3				

Table A.2: Example table for 4 constraints (W-Z), each having 4 parameters with (M und SD). Note: use always the same number of decimal places.

A.13.1 Tables with pgfplots

With the pgfplotstable package tables can be directly generated from a csv file.

	b	c	d
1	4	5	1
2	3	1	5
3	5	6	1
4	1	4	9
5	3	4	7

Table A.3: Table direclty generated from the values of a csf file.

A.14 Tables spanning multiple pages

Table A.4: A sample long table.

First column	Second column	Third column
A	BC	D
A	BC	D
A	BC	D
A	BC	D
A	BC	D
A	BC	D
A	BC	D
A	BC	D
A	BC	D
A	BC	D
A	BC	D
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A	BC	D
A	BC	D
A	BC	D
A	BC	D
A	BC	D
A	BC	D
A	BC	D
A	BC	D
A	BC	D
A	BC	D
A	BC	D

Continued on next page

Table A.4 – continued from previous page

First column	Second column	Third column
A	BC	D
A	BC	D
A	BC	D
A	BC	D
A	BC	D
A	BC	D
A	BC	D
A	BC	D
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A	BC	D
A	BC	D
A	BC	D

Continued on next page

Table A.4 – continued from previous page

First column	Second column	Third column
A	BC	D
A	BC	D
A	BC	D
A	BC	D
A	BC	D
A	BC	D
A	BC	D
A	BC	D
A	BC	D
A	BC	D
A	BC	D
A	BC	D
A	BC	D
A	BC	D
A	BC	D
A	BC	D
A	BC	D
A	BC	D

A.15 Abbreviations

At the first pass the Fehlerrate (FR) was 5. At the second pass was FR 3. The plural form can be seen here: error rates (ERs). To demonstrate what the list of abbreviations looks like for longer description texts, Relational Database Management Systems (RDBMS) must be mentioned here.

With `\gls{...}` you can enter abbreviations, the first time you call it, the long form is used. When reusing `\gls{..}` the short form is automatically displayed. The abbreviation is also automatically inserted in the abbreviation list. With `\glspl{...}` the plural form is used. If you want the short form to appear directly at the first use, you can use `\glsunset{..}` to mark an abbreviation as already used. The opposite is achieved with `\glsreset{..}`.

Abbreviations are defined in `\content\ausarbeitung.tex` by means of `\newacronym{...}{...}{...}`.

More information at: http://tug.ctan.org/macros/latex/contrib/glossaries/glossariesbegin.pdf

A.16 References

For distant sections “varioref” is recommended: “See Appendix A.3 on page 30”. The command `\vref` works similar to `\cref` the difference beeing that a reference to the page is additionally added. `vref`: “Appendix A.1 on page 29”, `cref`: “Appendix A.1”, `ref`: “A.1”.

If “varioref” causes difficulties, then “cref” can be used instead. This also creates the word “section” automatically: Appendix A.3. This is also possible for illustrations etc. In English please use `\Cref{...}` (with large “C” at the beginning).

A.17 Definitions

Definition A.17.1 (Title)
Definition Text

Definition A.17.1 shows . . .

A.18 Footnotes

Footnotes are provided by the command `\footnote{...}`[3]. Citing footnotes is possible by provinding a label`\footnote{\label{...}...}` and cite the footnote with `\cref{...}` in the text[3].

A.19 Various Things

Code:

```
Example: \cite{WSPA} or by author input: \
citet{WSPA}.
```

Result:

Example: [**WSPA**] or by author input: **WSPA**.

The words “workflow” and “dwarflike” can be copied from the PDF and pasted to a text file.

Code:

```
Example: \cite{WSPA} or by author input: \
citet{WSPA}.
```

Result:

Example: [**WSPA**] or by author input: **WSPA**.

A.20 Closing remarks

Please feel free to provide enhancements for this template and create a new ticket on GitHub (https://github.com/latextemplates/uni-stuttgart-computer-science-template/issues).

[3] Example footnote.

Declaration

I hereby declare that the work presented in this thesis is entirely my own and that I did not use any other sources and references than the listed ones. I have marked all direct or indirect statements from other sources contained therein as quotations. Neither this work nor significant parts of it were part of another examination procedure. I have not published this work in whole or in part before. The electronic copy is consistent with all submitted copies.

---

place, date, signature