

se2thesis – A Thesis Class for the Chair of Software Engineering II at the University of Passau, Germany*

Stephan Lukasczyk[†]

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Abstract

One can choose from a wide variety of templates to write a thesis. Many universities provide very rigorous style guides and force their students to obey to those guides, even though they might be questionable from a typography point of view. Other universities do not provide such guides and leave it to their students to choose or come up with a template. The latter is causing very differently-looking theses. To avoid such a situation in the future this bundle combines several L^AT_EX packages and classes for the use at the Chair of Software Engineering II at the University of Passau. We provide, among others, a document class for theses that shall be used by our students. The bundle is designed in a way that one can use the basic components as standalone packages to allow their reuse for other projects.

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[†]E-mail: tex@lukasczyk.me

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Part I

User Documentation

This documentation is split into two parts: the first part is the documentation for the user, which provides all macros, variables, and functions that are provided by the `se2thesis` bundle. The second part (starting on page 13) shows the implementation. This might be interesting for you if you are curious how certain things are defined or if you need to change some of the default implementation.

1 Introduction

The University of Passau does not provide a common thesis template to its students. For theses, written at the Chair of Software Engineering II, many students chose between two templates that were provided by different people from the chair; other students chose from the large variety of templates available from the internet, causing each thesis looking differently.

The author of this package provided a template, which he initially created for his bachelor and master thesis, that was recommended and used by many students. The implementation of that template, however, was very hacky and required some changes over time. This led to the idea of creating a new template from scratch, that shall be used by all our students for their various types of theses, from bachelor to PhD level. The result is the `se2thesis` bundle.

The bundle itself consists of several L^AT_EX classes and packages that also allow reuse of various parts of it. Its main class is the `se2thesis` document class, an extension of the KOMA-Script `scrreprt` document class. The packages `se2colors` (documented in Section 4) and `se2fonts` (documented in Section 5) provide necessary colour and font settings for the `se2thesis` class. They are available as separate packages, however, to allow their reuse for other classes, packages, and projects, as well.

They all have in common one macro, `\IfFormatAtLeastTF`; this macro is part of the latest L^AT_EX kernel. However, not all users might have upgraded their T_EX installation to a level using a recently-enough kernel version. Therefore, every class and package of this bundle will conditionally define the following macro:

<code>\IfFormatAtLeastTF</code>	<code>\IfFormatAtLeastTF {<version>} {<then block>} {<else-block>}</code>
---------------------------------	---

Checks whether the used L^AT_EX format is at least the one from the given date value. The date needs to be specified either in YYYY/MM/DD or in YYYY-MM-DD format.

2 License

Permission is granted to copy, distribute, and/or modify this software under the terms of the L^AT_EX Project Public License (LPPL), version 1.3c or later (<https://www.latex-project.org/lppl.txt>). The software has the status ‘maintained’.

3 The se2thesis class

The `se2thesis` class is the central component of this bundle. It provides a wide variety of settings, mostly regarding the title page (see Section 3.1) and the type area (see Section 3.2).

We aim to keep the `se2thesis` class relatively small, especially considering packages that we load. Currently, the class itself loads the `se2colors` (see Section 4) and `se2fonts` (see Section 5) packages. The following packages and classes are loaded: `expl3`, `l3keys2e` in case one uses a L^AT_EX kernel from before 2022-06-01, `graphicx`, `translations`, `KOMA-Script`, `xcolor`, `ifthen`, as well as `fontspec` and `unicode-math` if one uses L^uA_TE_X; for pdfL^AT_EX we load `fontenc`, `FiraMono`, `tgheros`, `tgpagella` instead of the latter two. Furthermore, we load `microtype`; when using L^uA_TE_X, we also load `lua-widow-control` and `selnolig`.

However, we recommend to use a couple of further packages, together with some further options to those package. We describe these settings in Section 3.3. Please consider looking at this section when starting to write your document.

3.1 The title page

Designing a title package for a thesis can be complicated. There might be some requirements that are not obvious to the user, especially considering the positioning of elements. The University of Passau, for example, requires the logo to be positioned on the top right of a page; theses—especially PhD theses that shall be published through the University’s library system—could be rejected from publication by the library until this is fixed.

We thus redeclare the standard `\maketitle` macro from `KOMA-Script` and customise it to our needs.

<code>\@maketitle</code>	<code>\@maketitle</code>
--------------------------	--------------------------

We override the definition of the `\@maketitle` macro for our needs.

In addition to the macros provided by the `KOMA-Script` classes for the title-page values (e.g. `\author`, `\title`, we provide some further macros that can be used. Setting values to these macros is optional in any case, if they are not set, the corresponding value is not put to the title page.

<code>\version</code>	<code>\version {\version}</code>
-----------------------	----------------------------------

Specify the version of the document. This can, for example, be a `git` hash of the current version.

<code>\degreeprogramme</code>	<code>\degreeprogramme {\programme-name}</code>
-------------------------------	---

Specify the degree programme the thesis is meant to be accepted in. Possible values are, among others, ‘Informatik’ if you are writing your thesis in German, or ‘Computer Science’ if you are writing the thesis in English.

<code>\supervisor</code>	<code>\supervisor {\name}</code>
<code>\cosupervisor</code>	<code>\cosupervisor {\name}</code>

Specify the name of your supervisor and co-supervisor. Both people usually are professors.

<hr/> <code>\advisor</code>	<code>\advisor {<name>}</code>
<hr/> <code>\coadvisor</code>	<code>\coadvisor {<name>}</code>
	Specify the name of your advisor and co-advisor. Both people usually are PhD students or postdocs.
<hr/> <code>\department</code>	<code>\department {<name>}</code>
<hr/> <code>\institute</code>	<code>\institute [{<short-name>}] {<name>}</code>
	Specify the department and institute. The department is, for example, ‘Faculty of Computer Science and Mathematics’, the institute, for example, ‘Chair of Software Engineering II’. If the <code>\department</code> value is not specify, we use ‘Faculty of Computer Science’ as the default value for English theses and ‘Fakultät für Informatik und Mathematik’ as the default value of German theses.
<hr/> <code>\external</code>	<code>\external {<name>}</code>
	Specify the name of an external referee.
<hr/> <code>\location</code>	<code>\location {<name-of-town>}</code>
	Specify the name of your residence town for the signature field. To define the path to the logo graphics we require a different workflow: We do not bundle logo graphics with this package due to legal restrictions. They can be downloaded from the University’s website; please note that the website for downloading the logo graphics is only accessible from within the University’s campus network or a VPN connection. To specify the path to the logo graphics, we provide a load-time option to the <code>se2thesis</code> class:
<hr/> <code>logfile</code>	<code>logfile = {<path-to-logo>}</code>
	Sets the path to the logo graphics for the title page. When printing the thesis in two-side mode—which we recommend—the back of the title page again denotes author and title on the bottom.
<hr/> <code>\@lowertitleback</code>	<code>\l@lowertitleback</code>
	Override this internal macro of KOMA-Script to print this information on the back side of the title page. Additionally, we provide some internal rewritings to standard macros from KOMA-Script that allow to automatically split authors using the <code>\and</code> command.
<hr/> <code>\author</code>	<code>\author {<author>}</code>
<hr/> <code>\@author</code>	We rewrite the definitions of <code>\author</code> and <code>\@author</code> to do this splitting automatically. Additionally, this also adds a correctly translated version of ‘and’ between the author names if required.

3.2 Type-area settings

The `se2thesis` class manipulates the type area compared to the default settings of the KOMA-Script classes. Our settings are inspired by the `classicthesis` package, which itself is inspired by the style used by famous statistician Edward Tufte. We provide predefined settings for DIN-A4, DIN-A5, and DIN-B5 papers. If you need settings for

other paper sizes, please open an issue on this package’s GitHub repository (<https://github.com/se2p/se2thesis>) and we will happily include those settings in a future release of this bundle.

Additionally, we are setting the page footer in a way that it contains the page numbers in the outer margin and the headmarks split from the page numbers by a vertical bar.

3.3 Recommended additional packages

Several packages can be useful for writing a thesis. We list them in this section; for the recommended option settings, please have a look at our examples. Please note that you might not need all these packages, however, having a look at them (especially their documentation) might give you an insight, whether to use a package. Our general recommendation is to use as few packages as you can; some might have conflicts, others basically do the same or are outdated. Please consider reading the documentation of each package you are using to figure out whether they have any conflicts with other packages (for example, one cannot use the recommended `siunitx` package together with `Slunits`) or they might require to be loaded at special places in your preamble (for example, `hyperref` is usually meant to be loaded as the last package, except you are also using `cleveref`, which needs to be loaded *after* `hyperref`).

3.3.1 Quoting with `csquotes`

The `csquotes` package allows for intelligent quoting of text. While verbose quotes are not that common on computer science, the package still provides some useful macros to the user.

3.3.2 Number formatting with `siunitx`

While `siunitx`’s original purpose was to format physical quantities, it provides a lot of useful features when typesetting theses (and other documents) in computer science. When you skim through its documentation, especially look at the `\qty` and `\num` macros, as well as the section on typesetting tabular material. We also recommend reading an extensive discussion on number formatting, precision of presented numbers, and many more related topics in Beyer et al.’s journal paper on requirements and solutions for reliable benchmarking [1].

When using the `siunitx` package, we recommend adding the following lines to your document’s preamble

```
\usepackage[
  group-minimum-digits=4,
  list-final-separator={, and },
  add-integer-zero=false,
  free-standing-units,
  round-mode=figures,
  round-precision=3,
  detect-weight=true,
  detect-inline-weight=math,
  separate-uncertainty=true,
  uncertainty-mode=separate,
]{siunitx}
```

3.3.3 Code listings with minted

We prefer using the `minted` package for code listings. However, this package requires the installation of Python and the setting of the `-shell-escape` option to your \TeX engine. Please read the package's documentation to set it up. If you do not want to install Python and the dependencies, we also provide settings for the alternative `listings` package in the next subsection.

When using `minted` we recommend the following settings:

```
\usepackage[newfloat=true]{minted}
\setminted{
  autogobble,
  breaklines=true,
  fontsize=\footnotesize,
  linenos=false,
  resetmargins=true,
  xleftmargin=1em,
  xrightmargin=1em,
  frame=single,
}
```

3.3.4 Code listing with listings

In case you do not want to use the aforementioned `minted` package, please consider using `listings` for typesetting your code listings.

```
\usepackage{listings}
\lstset{
  frame=single,
  extendedchars=true,
  basicstyle=\footnotesize\ttfamily,
  keywordstyle=\color{blue}\bfseries,
  showstringspaces=false,
  showspaces=false,
  tabsize=2,
  breaklines=true,
  showtabs=false,
  captionpos=t,
}
```

Please be aware to use *either* `minted` *or* `listings`!

3.3.5 Designing tables

A basically mandatory package to all users of tables is the `booktabs` package. Especially its documentation is a must read! It provides a large variety of hints for designing tables, most notably that one should never ever use vertical lines; horizontal lines should be used sparsely; `booktabs` provides three macros for lines that shall be used: `\toprule` for a rule on the top of a table, above the column heads, `\midrule` to separate column heads and the content but, and `\bottomrule` to mark the bottom of a table.

Note that captions of tables shall be put *above* the table whereas captions of figures shall go *below* the figure. The rationale is that a figure should be more of less self explaining whereas a table almost always needs some explanation.

Unfortunately, the distances when using a `\caption` above a table are wrong by default; when creating tables, consider loading the `hvfloats` package and use its `\tabcaption` instead of `\caption` for tables. The `hvfloats` package furthermore provides additional useful things to typeset all kinds of floats.

3.3.6 Use `biblatex` for bibliographic references

The standard way of typesetting bibliographic references was using `BIBTEX`. The original `BIBTEX`, however, seems to be very outdated in various ways: it originally supported only 7 bit character sets and creating citation styles requires the usage of an archaic language. `BibLATEX` resolves many of the drawbacks of `BIBTEX`; when combined with the `biber` engine, it supports full UTF-8 unicode, therefore correct sorting of the references now works out of the box; also creating citation styles can now be done using simple `LATEX` commands.

```
biblatex biblatex =  $\langle true, false \rangle$ 
```

For easier usage, we provide the load-time option `biblatex` that already sets all settings.

Set this options to `se2thesis` and add your reference file using the `\addbibresource` macro. `\printbibliography` will print your references.

3.3.7 Use `cleveref` for internal references

`LATEX` provides an easy-to-use reference mechanism using the `\label` and `\ref` macros. However, this requires some manual effort and the text needs to specify whether a reference is to a figure, section, or table. We often see things in drafts such as ‘we discuss our findings in 4’; but what is ‘4’ here? Is it a section, a table, a figure? To avoid such confusion, use the `cleveref` package, which automatically infers the type of the reference (see its documentation on how this works). The `cleveref` package furthermore avoids one additional mistake: between the name of the element and its reference one needs to have a non-breaking space that often is forgotten.

Please note that, in contrast to most other packages, `cleveref` has to be loaded *after* the `hyperref` package!

3.4 Abstract for the thesis

Each thesis shall come with an abstract that summarises its content. The abstract should be written in the language the thesis is written in. Additionally, there is the requirement to provide a German abstract if the thesis is written in a foreign language.

```
\abstract \abstract
```

We ensure that the `\abstract` command is defined for all document classes.

`abstract (env.)` To typeset an abstract, we provide an environment called `abstract`. The environment takes an optional argument that specifies the language that is used in this abstract. Setting the abstract’s language will cause its title to change to the respective language; additionally, hyphenation is also changed for that language.

```
\begin{abstract}[language]
  Your abstract text.
\end{abstract}
```


3.5 Acknowledgements

`acknowledgements` (*env.*) We provide the `acknowledgements` environment to typeset acknowledgements for your thesis. Using this environment is optional. Usually, bachelor and master thesis do not contain such an acknowledgements section, however, there is no general rule to this.

```
\begin{acknowledgements}[language]
  Your acknowledgements.
\end{acknowledgements}
```

3.6 Document structuring

A larger work, such as a thesis, is usually structured in three large blocks: a frontmatter that provides all the overview, such as abstract, table of contents, etc., a mainmatter that contains all the actual content, and a backmatter for appendices. `se2thesis` ensures that the following macros are defined because they are not provided by all KOMA-Script classes.

<code>\frontmatter</code>	<code>\frontmatter</code>
<code>\mainmatter</code>	<code>\mainmatter</code>
<code>\backmatter</code>	<code>\backmatter</code>

Switches between frontmatter, mainmatter, and backmatter. Most notably, the frontmatter will have roman page numbers, while the other two will have arabic page numbers.

3.7 Authorship declaration

The University of Passau requires its students to provide an authorship declaration as part of their thesis for submission. They provide a template form, which would not fit the style of the `se2thesis` class. Thus, we provide the `\authorshipDeclaration` macro to typeset such a declaration. It uses the original (German) text of the declaration and fills in the values that are specified by the `\author` and `\location` macros.

<code>\authorshipDeclaration</code>	<code>\authorshipDeclaration</code>
-------------------------------------	-------------------------------------

Print the authorship declaration text.

Please note: the authorship declaration will always be printed in German, no matter what the language of the thesis is. This happens due to legal requirements. In order to make this work, you have to load the `babel` or `polyglossia` package in a way that it also supports German hyphenation. For example, use

```
\usepackage[ngerman,main=UKenglish]{babel}
```

for a thesis with *traditional English*¹ as its main language and support for German.

<code>\signatureBox</code>	<code>\signatureBox</code> [<i><width></i>] { <i><signature-name></i> }
----------------------------	---

A helper macro to print the signature box for the authorship declaration. The optional argument [*<width>*] allows to specify a custom width for the signature line. The default is 5 cm. The mandatory argument {*<signature-name>*} specifies the name of the signee, which will be typeset below the signature line.

¹there is a nice, probably photoshopped, picture of a Steam setup dialogue stating that American English is a ‘simplified version’ of British English, see <https://jakubmarian.com/is-american-english-simplified-and-british-english-traditional/>.

3.8 Research Questions and findings summaries

Most theses written at our Chair will require the student to provide some empirical evaluation of their work to shed insights whether their proposed ideas are actually useful. For an empirical study, one needs to specify research questions and maybe also hypotheses. The `se2thesis` class supports this by providing environments for this.

`resq (env.)` The `resq` environment shall be used to specify a research question.
`hyp (env.)` The `hyp` environment shall be used to specify a hypothesis.
`summary (env.)` After describing the results, we recommend to give an explicit summary of the findings for a research question or hypothesis. This summary shall be given in one or two sentences. The `summary` environment provides a convenient way for this; it will be typeset in a highlighted box that is easy to spot and also allows readers of the work to quickly grasp the main findings.

```
\begin{summary}{label-reference}
  The summary text itself.
\end{summary}
```

The environment expects as a parameter a label, for example, to a research question; however, this can also be arbitrary text.

4 The `se2colors` package

Several colours are specific to the university and we want to have a comprehensive interface to access them throughout all our packages.

The `se2colors` package provides this exact features. One can load it using `\usepackage{se2colors}` in the document preamble.

```
colormode colormode = <choice>
```

Selects the colour mode that shall be used for creating the results, a choice from the options specified in Table 1. The default setting is `4C`.















Table 1: Options provided by `se2colors`.

Option	Description
<code>colormode=4C</code>	Define colours in CMYK colour space (<i>default</i>).
<code>CMYK</code> , <code>cmyk</code>	Aliases for the previous.
<code>colormode=RGB</code>	Define colours in RGB colour space.
<code>RGB</code> , <code>rgb</code>	Aliases for the previous.
<code>colormode=BW</code>	Define colours in black-and-white colour space.
<code>colormode=1C</code>	Alias for the previous.
<code>gray</code>	Alias for the previous.

We define two basic colours that are taken from the University’s logo, namely `UPSE2-Gray`  and `UPSE2-Orange` .

Additionally, we define 15 supplementary colours:

- `UPSE2-DarkGreen` ,

- UPSE2-MediumGreen ,
- UPSE2-LightGreen ,
- UPSE2-DarkBlue ,
- UPSE2-MediumBlue ,
- UPSE2-LightBlue ,
- UPSE2-DarkPurple ,
- UPSE2-MediumPurple ,
- UPSE2-LightPurple ,
- UPSE2-DarkOcher ,
- UPSE2-MediumOcher ,
- UPSE2-LightOcher ,
- UPSE2-DarkRed ,
- UPSE2-MediumRed , and
- UPSE2-LightRed 

5 The `se2fonts` package

The `se2fonts` package sets the fonts for the document. By default, we recommend using Hermann Zapf’s beautiful *Palatino* font as the main text font, accompanied with his sans-serif font *Optima* and *Neo Euler* as the default math font; we set *Meslo LGS Nerd Font Mono* as the monospaced font. *Palatino* and *Optima* get shipped with any macOS system, the user, however, needs to download *Neo Euler* themselves². Being aware that these fonts might not be available on every user’s system, we recommend using *TeX Gyre Pagella* as an alternative to *Palatino*, *TeX Gyre Heros* as an alternative to *Optima*, and the *TeX Gyre Pagella Math* as the default math font; *Fira Code* is a nice monospaced font. Although they look different in various details they still provide a nice-looking alternative that is bundled with a recent standard \TeX distribution.

If you are using \LuaTeX , fonts are expected to be present as open-type fonts; using \pdfLaTeX will fallback to Type-1 fonts, and will use *TeX Gyre Pagella*, *TeX Gyre Heros*, *Fira Code*, and *TeX Gyre Pagella Math* as the default fonts.

Note that the package does not support \XeLaTeX !

The following option is defined by the `se2fonts` package to influence the selection of the fonts.

fontmode `fontmode = <choice>`

Sets the font-selection mode based on a choice: **original** selects the fonts we recommend for using, **replacement** selects fonts that are part of a standard \TeX distribution, in case one has no access to the **original** fonts; **auto** selects fonts automatically, preferring the **original** fonts if available. The default is **auto**.

The following list provides examples for each of the fonts:

²for example from <https://fontlibrary.org/en/font/euler-otf>.

- An example text in Palatino
- An example text in T_EX Gyre Pagella
- An example text in Optima
- An example text in T_EX Gyre Heros
- An example text in MesloLGS
- An example text in Fira Code
- An example text in Neo Euler
- An example text in T_EX Gyre Pagella Math

The package provides additional helper functions that are also available to the user.

<code>\pdftexengine</code>	<code>\pdftexengine</code>
<code>\xetexengine</code>	<code>\xetexengine</code>
<code>\luatexengine</code>	<code>luatexengine</code>

These commands alias the built-in L^AT_EX3 macros `\sys_if_engine_pdftex_p:`, `\sys_if_engine_xetex_p:`, and `\sys_if_engine_luatex_p:`. They can be used to check which engine the user is currently running.

<code>\ifengineTF</code>	<code>\ifengineTF {<engine>} {<then block>} {<else block>}</code>
<code>\ifengineT</code>	<code>\ifengineT {<engine>} {<then block>}</code>
<code>\ifengineF</code>	<code>\ifengineF {<engine>} {<then block>}</code>

Allows to execute code based on the running engine. The base variant `\ifengineTF` expects the user to specify a condition, which can be built of combinations of the `\pdftexengine`, `\xetexengine`, and `\luatexengine` macros, followed by the code that will be executed if the condition holds and the code that will be executed if the condition does not hold.

For convenience, we provide the variants `\ifengineT` and `\ifengineF` that allow to omit an empty then or else branch, respectively.

Part II

Implementation

1 Global helpers

These helpers might be useful for many exported packages and classes, thus we keep them on the global level of this implementation.

```

1 <*init>
    Load only the essential support (expl3) ‘up-front’, and only if required.
2 \ifundefined{ExplLoaderFileDate}
3 {\RequirePackage{expl3}}
4 {}
    Make sure that the version of l3kernel in use is sufficiently new. We use
\ExplFileDate as \ifpackagelater does not work for pre-loaded expl3 in the absence
of the package.
5 \ifl@t@r\ExplLoaderFileDate{2020-01-09}
6 {}
7 {%
8   \PackageError{se2colors}{Support package expl3 too old}
9   {%
10    You need to update your installation of the bundles 'l3kernel' and
11    'l3packages'.\MessageBreak
12    Loading~se2colors~will~abort!%
13   }%
14   \endinput
15 }%
```

`\IfFormatAtLeastTF` This macro is not present in older kernels, thus we use the L^AT_EX 2_ε mechanism as this is correct for this case.

```

16 \providecommand \IfFormatAtLeastTF { \ifl@t@r \fmtversion }
```

(End definition for `\IfFormatAtLeastTF`. This function is documented on page 3.)

```

17 </init>
```

2 The se2thesis implementation

Start the DocStrip guards.

```

18 <*class>
```

Identify the internal prefix (L^AT_EX3 DocStrip convention): only internal material in this *submodule* should be used directly.

```

19 <@@=slcd>
```

Identify the class and give the overall version number.

```

20 \ProvidesExplClass {se2thesis} {2022-09-09} {1.0.0}
21 {A thesis class for the Chair of Software Engineering II}
```

Load required packages early.

```

22 \RequirePackage{graphicx}
23 \RequirePackage{translations}
24 \LoadDictionary{se2translations}
25 \DeclareTranslationFallback{version-of-date}{%
26   Version~\l__slcd_version_tl\ of~\@date
27 }
28 \DeclareTranslation{German}{version-of-date}{%
29   Version~\l__slcd_version_tl\ vom~\@date
30 }
31 \DeclareTranslation{English}{version-of-date}{%
32   Version~\l__slcd_version_tl\ of~\@date
33 }

```

2.1 Define Variables

The following variables are necessary for the argument handling.

`\l__slcd_paper_int` A variable to store the key of the page size selected by the user.

```
34 \int_new:N \l__slcd_paper_int
```

(End definition for \l__slcd_paper_int.)

We also need properties to store class options that are not for us, thus shall be handled by the underlying base class.

`\l__slcd_base_class_tl` Store the base class, the known, and the unknown class options. The latter will be forwarded to the base class later.

```

\l__slcd_clsopts_prop
\l__slcd_unknown_clsopts_prop
35 \tl_new:N \l__slcd_base_class_tl
36 \prop_new:N \l__slcd_clsopts_prop
37 \prop_new:N \l__slcd_unknown_clsopts_prop

```

(End definition for \l__slcd_base_class_tl, \l__slcd_clsopts_prop, and \l__slcd_unknown_clsopts_prop.)

`\l__slcd_biblatex_bool` The user wants to load the biblatex package together with our settings.

```
38 \bool_new:N \l__slcd_biblatex_bool
```

(End definition for \l__slcd_biblatex_bool.)

Define internal variables to hold the values of the fields of the title page.

```

\l__slcd_version_tl
\l__slcd_degreeprogramme_tl
39 \tl_new:N \l__slcd_version_tl
\l__slcd_supervisor_tl
40 \tl_new:N \l__slcd_degreeprogramme_tl
\l__slcd_cosupervisor_tl
41 \tl_new:N \l__slcd_supervisor_tl
\l__slcd_advisor_tl
42 \tl_new:N \l__slcd_cosupervisor_tl
\l__slcd_coadvisor_tl
43 \tl_new:N \l__slcd_advisor_tl
\l__slcd_department_tl
44 \tl_new:N \l__slcd_coadvisor_tl
\l__slcd_institute_tl
45 \tl_new:N \l__slcd_department_tl
\l__slcd_external_tl
46 \tl_new:N \l__slcd_institute_tl
\l__slcd_logofile_tl
47 \tl_new:N \l__slcd_external_tl
\l__slcd_signature_tl
48 \tl_new:N \l__slcd_logofile_tl
\l__slcd_location_tl
49 \tl_new:N \l__slcd_signature_tl
50 \tl_new:N \l__slcd_location_tl

```

(End definition for `\l__slcd_version_tl` and others.)

Define several dimensions for the `typearea` package to define the package style.

```

\l__slcd_marginspace_dim
\l__slcd_headmarkspace_dim
\l__slcd_rulespace_dim
\l__slcd_pagemark_minipage_dim
\l__slcd_ruleraise_dim
\l__slcd_rulewidth_dim
\l__slcd_rulethickness_dim
51 \dim_new:N \l__slcd_marginspace_dim
52 \dim_new:N \l__slcd_headmarkspace_dim
53 \dim_new:N \l__slcd_rulespace_dim
54 \dim_new:N \l__slcd_pagemark_minipage_dim
55 \dim_new:N \l__slcd_ruleraise_dim
56 \dim_new:N \l__slcd_rulewidth_dim
57 \dim_new:N \l__slcd_rulethickness_dim
58 \dim_gset:Nn \l__slcd_marginspace_dim { -1.85cm }
59 \dim_gset:Nn \l__slcd_headmarkspace_dim { 0.75cm }
60 \dim_gset:Nn \l__slcd_rulespace_dim { 10pt }
61 \dim_gset:Nn \l__slcd_pagemark_minipage_dim { 1.5cm }
62 \dim_gset:Nn \l__slcd_ruleraise_dim { -100pt }
63 \dim_gset:Nn \l__slcd_rulewidth_dim { 1.25pt }
64 \dim_gset:Nn \l__slcd_rulethickness_dim { 110pt }

```

(End definition for `\l__slcd_marginspace_dim` and others.)

2.2 Load-time options

We define the key-value interface for the class.

```

\l__slcd_base_class_tl
\l__slcd_unknown_clsopts_prop
\l__slcd_paper_int
\l__slcd_thesis_type_tl
\l__slcd_license_type_tl
\l__slcd_licensemodifier_tl
\l__slcd_licenseversion_tl
\l__slcd_colormode_tl
\l__slcd_fontmode_tl
65 \keys_define:nn { seiithesis }
66 {
67   class .choice:,
68   class / report .meta:n = {class=scrreprt},
69   class / scrreprt .code:n = \tl_gset:Nn \l__slcd_base_class_tl {scrreprt},
70   class / article .meta:n = {class=scrartcl},
71   class / scrartcl .code:n = \tl_gset:Nn \l__slcd_base_class_tl {scrartcl},
72   class / book .meta:n = {class=scrbook},
73   class / scrbook .code:n = \tl_gset:Nn \l__slcd_base_class_tl {scrbook},
74   class .initial:n = scrreprt,
75
76   paper .choices:nn = {a4,a5,b5}{
77     \int_gset_eq:NN \l__slcd_paper_int \l_keys_choice_int
78   },
79   paper .initial:n = a4,
80
81   logfile .tl_gset:N = \l__slcd_logofile_tl,
82   logfile .initial:n =,
83
84   thesistype .choice:,
85   thesistype / bachelor .code:n = \tl_gset:Nn \l__slcd_thesis_type_tl {bachelor},
86   thesistype / bachelorproposal .code:n = {
87     \tl_gset:Nn \l__slcd_thesis_type_tl {bachelorproposal}
88   },
89   thesistype / master .code:n = \tl_gset:Nn \l__slcd_thesis_type_tl {master},
90   thesistype / masterproposal .code:n = {
91     \tl_gset:Nn \l__slcd_thesis_type_tl {masterproposal}
92   },

```

```

93 thesistype / phd .code:n = \tl_gset:Nn \l__slcd_thesis_type_tl {phd},
94 thesistype / phdproposal .code:n = {
95   \tl_gset:Nn \l__slcd_thesis_type_tl {phdproposal}
96 },
97 thesistype .initial:n = master,
98
99 biblatex .bool_gset:N = \l__slcd_biblatex_bool,
100 biblatex .initial:n = false,
101
102 colormode .choices:nn = {cmyk,rgb,bw}{
103   \tl_gset_eq:NN \l__slcd_colormode_tl \l_keys_choice_tl
104 },
105 colormode .initial:n = cmyk,
106
107 fontmode .choices:nn = {original,replacement,auto}{
108   \tl_gset_eq:NN \l__slcd_fontmode_tl \l_keys_choice_tl
109 },
110 fontmode .initial:n = auto,
111
112 unknown .code:n = {
113   \prop_gput:NVn \l__slcd_unknown_clsopts_prop \l_keys_key_tl {#1}
114 },
115 }

```

(End definition for \l__slcd_base_class_tl and others.)

Handle the options

```

116 \IfFormatAtLeastTF { 2022-06-01 }
117 { \ProcessKeyOptions [ seiithesis ] }
118 {
119   \RequirePackage{ l3keys2e }
120   \ProcessKeysOptions { seiithesis }
121 }

```

Handle the known options for base class

```

122 \prop_map_inline:Nn \l__slcd_clsopts_prop
123 {
124   \tl_if_empty:nTF {#2}
125   { \PassOptionsToClass {#1} {\l__slcd_base_class_tl} }
126   {
127     \clist_map_inline:nn {#2}
128     { \PassOptionsToClass {#1=##1} {\l__slcd_base_class_tl} }
129   }
130 }

```

Load the base class

```

131 \LoadClass{\l__slcd_base_class_tl}

```

Attempt to handle the unknown options

```

132 \prop_map_inline:Nn \l__slcd_unknown_clsopts_prop
133 {
134   \cs_if_exist:cT {KV@KOMA.\l__slcd_base_class_tl.cls@#1}
135   {
136     \tl_if_empty:nTF {#2}
137     { \KOMAOptions{#1} }
138     { \KOMAoption{#1}{#2}}

```



```

139     }
140 }

```

2.3 Package loading

We load some packages with options that depend on options to the `se2thesis` class. Thus, we load them here to be able to hand them over the respective values.

We start with the `se2colors` and `se2fonts` packages.

```

141 \PassOptionsToPackage{\l__slcd_colormode_tl}{se2colors}
142 \RequirePackage{se2colors}
143
144 \PassOptionsToPackage{\l__slcd_fontmode_tl}{se2fonts}
145 \RequirePackage{se2fonts}

```

Load the `microtype` package. We also set some options to `microtype`, namely the penalties for widows and orphans (which might also be corrected by `lua-widow-control` when using `LuaTeX`) and a thin space around the m-dash. We are aware of the discussion whether to have a space around the m-dash in English, however, we think it looks more beautiful. We took this from a [TeX.StackExchange post](#).

```

146 \RequirePackage{microtype}
147 \clubpenalty=10000
148 \widowpenalty=10000
149 \displaywidowpenalty=10000
150 \SetExtraKerning{
151   encoding = {OT1,T1,T2A,LY1,OT4,QX,T5,TS1,EU1,EU2}
152 }{
153   \textemdash = {167,167},
154   - = {167,167}
155 }

```

When using `LuaTeX` load the `lua-widow-control` package for a better control of orphans and widows.

```

156 \ifengineT { \luatexengine }
157 {
158   \IfFileExists { lua-widow-control.sty }
159   { \RequirePackage{lua-widow-control} }
160   {
161     \msg:nnn { seiithesis }
162     { lua-widow-control-not-available }
163     {
164       Could~ not~ find~ lua-widow-control.sty.~ You~ might~ want~ to~
165       install~ it~ for~ better~ control~ over~ orphans~ and~ widows.
166     }
167     \msg_note:nn { seiithesis } { lua-widow-control-not-available }
168   }
169 }

```

Similarly, load `ligtype` when using `LuaTeX`.

```

170 \ifengineT { \luatexengine }
171 {
172   \IfFileExists { selnolig.sty }
173   { \RequirePackage{selnolig} }
174   {
175     \msg:nnn { seiithesis }

```

```

176         { selnolig-not-available }
177     {
178         Could~ not~ find~ selnolig.sty.~ You~ might~ want~ to~ install~ it~
179         for~ better~ ligatures~ control.
180     }
181     \msg_note:nn { seiithesis } { selnolig-not-available }
182 }
183 }

```

When the user requests the biblatex option, also load biblatex

```

184 \bool_if:NT \l__slcd_biblatex_bool
185 {
186     \PassOptionsToPackage
187     {
188         backend=biber,
189         hyperref=true,
190         backref=true,
191         backrefstyle=none,
192         style=alphabetic,
193         maxnames=100,
194         minalphanames=3,
195         sorting=nyt,
196         giveninits=true,
197     }{biblatex}
198     \RequirePackage{biblatex}

```

Define strings for back-referencing.

```

199     \DefineBibliographyStrings{english}{
200         backrefpage = {\lowercase{c}ited~ on~ p.},
201         backrefpages = {\lowercase{c}ited~ on~ pp.},
202     }
203     \DefineBibliographyStrings{german}{
204         backrefpage = {\lowercase{z}itiiert~ auf~ S.},
205         backrefpages = {\lowercase{z}itiiert~ auf~ S.},
206     }

```

Design the page-ref format.

```

207     \DeclareFieldFormat{pagerefformat}{
208         {
209             \color{UPSE2-Gray}
210             \mkbibparens{\mkbibemph{#1}}
211         }
212     }
213     \renewbibmacro*{pageref}{
214         \iflistundef{pageref}{}{
215             \printtext[pagerefformat]{
216                 \ifnumgreater{
217                     \value{pageref}
218                 }{1}{
219                     {\bibstring{backrefpages}\ppspace}
220                     {\bibstring{backrefpage}\ppspace}
221                     \printlist[pageref] [-\value{listtotal}]{pageref}
222                 }
223             }
224         }

```

End of the BibLaTeX settings.

```
225 }
```

2.4 User macros for the title page

In addition to the macros provided by the KOMA-Script classes for the title-page values (e.g. `\author`, `\title`), provide these additional macros to the user.

`\version` Specify the version of the document, e.g., a git hash.

```
226 \ProvideDocumentCommand \version { m }
227 {
228   \tl_set:Nn \l__slcd_version_tl {#1}
229 }
```

(End definition for `\version`. This function is documented on page 4.)

`\degreeprogramme` Specify the degree programme the thesis is meant to be accepted in.

```
230 \ProvideDocumentCommand \degreeprogramme { m }
231 {
232   \tl_set:Nn \l__slcd_degreeprogramme_tl {#1}
233 }
```

(End definition for `\degreeprogramme`. This function is documented on page 4.)

`\supervisor` Specify the supervisor and co-supervisor of the thesis, usually a professor.
`\cosupervisor`

```
234 \ProvideDocumentCommand \supervisor { m }
235 {
236   \tl_set:Nn \l__slcd_supervisor_tl {#1}
237 }
238 \ProvideDocumentCommand \cosupervisor { m }
239 {
240   \tl_set:Nn \l__slcd_cosupervisor_tl {#1}
241 }
```

(End definition for `\supervisor` and `\cosupervisor`. These functions are documented on page 4.)

`\advisor` Specify the advisor and co-advisor of the thesis, usually a PhD student or postdoc.
`\coadvisor`

```
242 \ProvideDocumentCommand \advisor { m }
243 {
244   \tl_set:Nn \l__slcd_advisor_tl {#1}
245 }
246 \ProvideDocumentCommand \coadvisor { m }
247 {
248   \tl_set:Nn \l__slcd_coadvisor_tl {#1}
249 }
```

(End definition for `\advisor` and `\coadvisor`. These functions are documented on page 4.)

`\department` Specify the university's department and institute you are writing the thesis for.
`\institute`

```
250 \ProvideDocumentCommand \department { m }
251 {
252   \tl_set:Nn \l__slcd_department_tl {#1}
253 }
254 \ProvideDocumentCommand \institute { o m }
255 {
```

```

256   \tl_set:Nn \l__slcd_institute_tl {#2}
257 }

```

(End definition for `\department` and `\institute`. These functions are documented on page 4.)

\external Specify an external referee.

```

258 \ProvideDocumentCommand \external { m }
259 {
260   \tl_set:Nn \l__slcd_external_tl {#1}
261 }

```

(End definition for `\external`. This function is documented on page 5.)

\location Specify the location for the signature field.

```

262 \ProvideDocumentCommand \location { m }
263 {
264   \tl_set:Nn \l__slcd_location_tl {#1}
265 }

```

(End definition for `\location`. This function is documented on page 5.)

2.5 Define logo, paper size, and paper style

For the logo on the titlepage, we define further variables to store its height and a box to store the logo itself.

```

\l__slcd_logo_height_dim
\l__slcd_logo_box
266 \dim_if_exist:NF \l__slcd_logo_height_dim
267 {
268   \dim_new:N \l__slcd_logo_height_dim
269   \dim_gset:Nn \l__slcd_logo_height_dim { 67.5pt }
270 }
271 \box_if_exist:NF \l__slcd_logo_box
272 {
273   \box_new:N \l__slcd_logo_box
274 }
275 \tl_if_empty:NF \l__slcd_logofile_tl
276 {
277   \hbox_gset:Nn \l__slcd_logo_box
278   {
279     \includegraphics[%
280       height=\l__slcd_logo_height_dim%
281     ]{\l__slcd_logofile_tl}
282   }
283 }

```

(End definition for `\l__slcd_logo_height_dim` and `\l__slcd_logo_box`.)

Set the paper size depending on the selected `paper` option.

```

284 \int_compare:nTF { \l__slcd_paper_int=1 }
285 {
286   \areaset[current]{336pt}{630pt}
287   \setlength{\marginparsep}{8.5cm}
288   \setlength{\marginparsep}{1em}
289 }{
290   \int_compare:nTF { \l__slcd_paper_int=2 }

```

```

291     {
292       \areaset[current]{238pt}{445pt}
293       \setlength{\marginparsep}{6.0cm}
294       \setlength{\marginparsep}{0.71em}
295     }{
296       \areaset[current]{291pt}{545pt}
297       \setlength{\marginparsep}{7.4cm}
298       \setlength{\marginparsep}{0.87em}
299     }
300   }

```

Provide the package style. We start by loading the `scrlayer-scrpage` package with the appropriate options and set some basic properties.

```

301 \PassOptionsToPackage{automark}{scrlayer-scrpage}
302 \RequirePackage{scrlayer-scrpage}
303 \clearpairofpagestyles
304 \setkomafont{pagefoot}{\normalfont\sffamily}

```

We can then define the footer for odd pages, which will appear on the right side of the page's footer. This definition contains first, as an optional argument, the style of a page with `pagestyle` set to `empty`, i.e., a page where a new chapter starts, and afterwards the style of a regular right-hand side page.

```

305 \rofoot[{%
306   \group_begin: \ \group_end:
307   \footnotesize%
308   \hspace*{\l__slcd_headmarkspace_dim}%
309   \group_begin:
310     \color{UPSE2-DarkBlue}%
311     \rule[\l__slcd_ruleraise_dim]{\l__slcd_rulewidth_dim}{\l__slcd_rulethickness_dim}%
312   \group_end:
313   \hspace*{\l__slcd_rulespace_dim}%
314   \begin{minipage}[b]{\l__slcd_pagemark_minipage_dim}%
315     \normalsize\textbf{\pagemark}%
316   \end{minipage}%
317   \hspace{\l__slcd_marginspace_dim}%
318 }]{%
319   \group_begin: \ \group_end:
320   \footnotesize%
321   \group_begin:
322     \color{UPSE2-DarkBlue}\headmark
323   \group_end:
324   \hspace*{\l__slcd_rulespace_dim}%
325   \group_begin:
326     \color{UPSE2-DarkBlue}%
327     \rule[\l__slcd_ruleraise_dim]{\l__slcd_rulewidth_dim}{\l__slcd_rulethickness_dim}%
328   \group_end:
329   \hspace*{\l__slcd_rulespace_dim}%
330   \begin{minipage}[b]{\l__slcd_pagemark_minipage_dim}%
331     \normalsize\textbf{\pagemark}%
332   \end{minipage}%
333   \hspace{\l__slcd_marginspace_dim}%
334 }

```

Similarly, we define the footer for even pages, which will appear on the left side of the page's footer.

```

335 \lefoot[{\%
336   \null\hspace{\l__slcd_marginspace_dim}%
337   \footnotesize%
338   \begin{minipage}[b]{\l__slcd_pagemark_minipage_dim}%
339     \raggedleft\normalsize\textbf{\pagemark}%
340   \end{minipage}%
341   \footnotesize%
342   \hspace*{\l__slcd_rulespace_dim}%
343   \group_begin:
344     \color{UPSE2-DarkBlue}%
345     \rule[\l__slcd_ruleraise_dim]{\l__slcd_rulewidth_dim}{\l__slcd_rulethickness_dim}%
346   \group_end:
347 }]{\%
348   \null\hspace{\l__slcd_marginspace_dim}%
349   \footnotesize%
350   \begin{minipage}[b]{\l__slcd_pagemark_minipage_dim}%
351     \raggedleft\normalsize\textbf{\pagemark}%
352   \end{minipage}%
353   \footnotesize%
354   \hspace*{\l__slcd_rulespace_dim}%
355   \group_begin:
356     \color{UPSE2-DarkBlue}%
357     \rule[\l__slcd_ruleraise_dim]{\l__slcd_rulewidth_dim}{\l__slcd_rulethickness_dim}%
358   \group_end:
359   \hspace*{\l__slcd_headmarkspace_dim}%
360   \group_begin:
361     \color{UPSE2-DarkBlue}\headmark
362   \group_end:
363 }

```

Finally, set the page style.

```

364 \pagestyle{scrheadings}

```

2.6 The title page

We start out by adjusting some KOMA-Script fonts.

```

365 \setkomafont{title}{\Huge}
366 \setkomafont{subtitle}{\Large}
367 \setkomafont{subject}{\normalsize}
368 \setkomafont{author}{\large}
369 \setkomafont{date}{\normalsize}
370 \setkomafont{publishers}{\normalsize}

```

`\author` Allow for automated splitting of author's names.

```

\@author
371 \seq_new:N \l__slcd_author_seq
372 \renewcommand*\author[2][]{
373   \seq_gset_split:Nnn \l__slcd_author_seq {\and} {#2}
374   \tl_if_empty:nTF {#1}
375     { \tl_set:Nn \l__slcd_signature_tl {#2} }
376     { \tl_set:Nn \l__slcd_signature_tl {#1} }
377 }
378 \renewcommand*\@author{
379   \group_begin:
380     \hyphenpenalty=100000

```

```

381 \seq_use:Nnnn \l__slcd_author_seq {-\GetTranslation{and}~} {,~} {-\&~}
382 \group_end:
383 }

```

(End definition for `\author` and `\@author`. These variables are documented on page 5.)

Define a new layer using the functionality from `scrlayer-scrpage` for the logo image.

```

384 \DeclareNewLayer[
385   mode=picture,
386   foreground,
387   align=tr,
388   hoffset=\oddsidemargin+1.5in+\textwidth,
389   voffset=\coverpagetopmargin+1.5in+\ht\strutbox,
390   width=\textwidth - \box_wd:N \l__slcd_logo_box,
391   height=\box_ht:N \l__slcd_logo_box,
392   contents={\putUL{\box_use:N \l__slcd_logo_box}},
393 ]{title.seii.logo}
394 \DeclareNewPageStyleByLayers{title.seii}{title.seii.logo}
395 \renewcommand*{\titlepagestyle}{title.seii}

```

Redefine the `\maketitle` command. The following code is an adapted version of the corresponding KOMA-Script macro by Markus Kohm.

```

396 \renewcommand*{\maketitle}[1][1]{
397   \begin{titlepage}
398     \setcounter{page}{#1}
399     \def\thefootnote{\fnsymbol{footnote}}
400     \edef\titlepage@restore{%
401       \noexpand\endgroup
402       \noexpand\global\noexpand\@colht\the\@colht
403       \noexpand\global\noexpand\@colroom\the\@colroom
404       \noexpand\global\vsizethe\vsizethe
405       \noexpand\global\noexpand\@titlepageiscoverpagefalse
406       \noexpand\let\noexpand\titlepage@restore\noexpand\relax
407     }%
408     \begingroup
409     \topmargin=\dimexpr \coverpagetopmargin-1in\relax
410     \oddsidemargin=\dimexpr 0in\relax
411     \evensidemargin=\dimexpr 0in\relax
412     \textwidth=\dimexpr \paperwidth-2in\relax
413     \textheight=\dimexpr
414     \paperheight-\coverpagetopmargin-\coverpagebottommargin\relax
415     \headheight=0pt
416     \headsep=0pt
417     \footskip=\baselineskip
418     \@colht=\textheight
419     \@colroom=\textheight
420     \vsizethe\textheight
421     \columnwidth=\textwidth
422     \hsize=\textwidth
423     \linewidth=\hsize
424     \setparsizes{\z@}{\z@}{\z@\@plus 1fil}\par@update relative
425     \thispagestyle{title.seii}
426     %
427     \@maketitle
428     %

```

```

429 \if@twoside
430 \@tempswatrue
431 \if@tempswa
432 \next@tpage
433 \begin{minipage}[t]{\textwidth}
434 \@uppertitleback
435 \end{minipage}
436 \vfill
437 \begin{minipage}[b]{\textwidth}
438 \@lowertitleback
439 \end{minipage}\par
440 \@thanks\let\@thanks\@empty
441 \fi
442 \fi
443 \ifx\titlename@restore\relax\else\clearpage\titlename@restore\fi
444 \end{titlename}
445 }

```

`\l__slcd_title_box` Define a box for the title if it does not yet exist.

```

446 \box_if_exist:NF \l__slcd_title_box
447 {
448   \box_new:N \l__slcd_title_box
449 }

```

(End definition for \l__slcd_title_box.)

`\@maketitle` Redefine the `\@maketitle` macro.

```

450 \renewcommand*{\@maketitle}{%
451 \group_begin:
452 \setparsizes{\z@}{\z@}{\z@\@plus 1fil}\par@updaterelative
453 \thispagestyle{title.seii}
454 \hbox_gset:Nn \l__slcd_title_box
455 {
456   \parbox{\textwidth}{\l__slcd_print_title:}
457 }
458 \null
459 \skip_vertical:n { 2.5 \box_ht:N \l__slcd_logo_box }
460 \box_use:N \l__slcd_title_box
461 \skip_vertical:n { .5 \box_ht:N \l__slcd_logo_box }
462 \group_end:
463 \@thanks\let\@thanks\@empty
464 }

```

(End definition for \@maketitle. This variable is documented on page 4.)

Load the `ifthen` package.

```

465 \RequirePackage{ifthen}

```

Prints the title formatted appropriately. We start with printing the title, optional subtitle, and the author names.

```

466 \cs_new:Nn \l__slcd_print_title:
467 {
468   \group_begin:
469   \usekomafont{title}\centering\@title\par
470   \group_end:

```



```

471 \ifx\@subtitle\@empty\else{%
472   \medskip\usekomafont{subtitle}\centering\@subtitle\par%
473 }\fi
474 \bigskip
475 \group_begin:
476   \usekomafont{author}\centering\@author\par
477 \group_end:
478 \bigskip

```

The next block generates the text that describes the thesis. In case of a PhD thesis, this text is predefined to match the requirements. In case of a bachelor or master thesis, or a proposal thereof, we generate a text based on the values of the `thesistype` load-time option and the values of the `\degreeprogramme`, `\department`, and `\institute` variables.

```

479 \exp_args:NV
480 {
481   \begin{center}
482     \tl_if_eq:NnTF \l__slcd_thesis_type_tl { phd }
483     {
484       Dissertation~ zur~ Erlangung~ des~ Doktorgrades\\
485       der~ Naturwissenschaften~ (Dr.\,rer.\,nat.)\\
486       eingereicht~ an~ der~ Fakultät~ für~ Informatik~ und~ Mathematik\\
487       der~ Universität~ Passau\\
488       \rule{\textwidth}{.1pt}\\
489       Dissertation~ submitted~ to\\
490       the~ Faculty~ of~ Computer~ Science~ and~ Mathematics\\
491       of~ the~ University~ of~ Passau\\
492       in~ partial~ fulfillment~ of~ obtaining\\
493       the~ degree~ of~ a~ Doctor~ of~ Natural~ Sciences
494     } {
495       \tl_if_eq:NnT \l__slcd_thesis_type_tl { bachelor }
496       { \GetTranslation{Bachelor-thesis} }
497       \tl_if_eq:NnT \l__slcd_thesis_type_tl { bachelorproposal }
498       { \GetTranslation{Bachelor-thesis-proposal} }
499       \tl_if_eq:NnT \l__slcd_thesis_type_tl { master }
500       { \GetTranslation{Master-thesis} }
501       \tl_if_eq:NnT \l__slcd_thesis_type_tl { masterproposal }
502       { \GetTranslation{Master-thesis-proposal} }
503       \tl_if_eq:NnT \l__slcd_thesis_type_tl { phdproposal }
504       { \GetTranslation{PhD-thesis-proposal} }
505       \tl_if_empty:NF \l__slcd_degreeprogramme_tl
506       {
507         \ in~\l__slcd_degreeprogramme_tl
508       }
509       \par
510       \tl_if_empty:NF \l__slcd_department_tl { \l__slcd_department_tl \par }
511       \tl_if_empty:NF \l__slcd_institute_tl { \l__slcd_institute_tl \par }
512     }
513   \end{center}\par\bigskip

```

Finally, generate a table with information about supervisors, advisors, etc.

```

514 \begin{center}
515   \begin{tabular}{@{} l @{\quad} l}
516     \tl_if_empty:NF \l__slcd_supervisor_tl
517     {

```

```

518         \GetTranslation{Supervisor}      & \l__slcd_supervisor_tl \\
519     }
520     \tl_if_empty:NF \l__slcd_cosupervisor_tl
521     {
522         \GetTranslation{Co-supervisor} & \l__slcd_cosupervisor_tl \\
523     }
524     \tl_if_empty:NF \l__slcd_advisor_tl
525     {
526         \GetTranslation{Advisor}      & \l__slcd_advisor_tl \\
527     }
528     \tl_if_empty:NF \l__slcd_coadvisor_tl
529     {
530         \GetTranslation{Co-advisor}    & \l__slcd_coadvisor_tl \\
531     }
532     \tl_if_empty:NF \l__slcd_external_tl
533     {
534         \GetTranslation{External}      & \l__slcd_external_tl \\
535     }
536     \end{tabular}
537     \end{center}
538     \par\medskip

```

Last, print the date or the version.

```

539     \group_begin:
540         \usekomafont{date}
541         \centering
542         \tl_if_empty:NTF \l__slcd_version_tl
543         { \@date }
544         { \GetTranslation{version-of-date} }
545     \par\smallskip
546     \group_end:
547 }
548 }

```

`\@lowertitleback` Afterwards, override the definition of `\@lowertitleback`.

```

549 \renewcommand*{\@lowertitleback}{%
550 \group_begin:
551     \noindent\textbf{\@author}:\@
552     \emph{\@title}\\
553     \tl_if_eq:NnT \l__slcd_thesis_type_tl { bachelor }
554     { \GetTranslation{Bachelor-thesis},~ }
555     \tl_if_eq:NnT \l__slcd_thesis_type_tl { master }
556     { \GetTranslation{Master-thesis},~ }
557     \tl_if_eq:NnT \l__slcd_thesis_type_tl { phd }
558     { \GetTranslation{PhD},~ }
559     \GetTranslation{up},~\the\year.
560 \group_end:
561 }

```

(End definition for \@lowertitleback. This variable is documented on page 5.)

2.7 Provide an environment for abstracts

We want to allow abstracts in German and English, which is also a requirement when writing a thesis in English. First, ensure that the `\abstract` macro is available for all

classes.

`\abstract`

```
562 \providecommand{\abstract}{}{}
```

(End definition for `\abstract`. This function is documented on page 8.)

Then redefine the `abstract` environment such that it provides an optional argument for language selection.

`abstract (env.)` Used to typeset an abstract for the thesis. The optional argument allows to specify a language. As a default the current document language will be used.

```
563 \RenewDocumentEnvironment { abstract } { o }
564 {
565   \group_begin:
566   \IfNoValueF {#1} { \selectlanguage{#1} }
567   \scr@ifundefinedorrelax{chapter}{
568     \Iftocfeature{toc}{leveldown}
569     {\subsection*}
570     {\section*}
571   }{
572     \let\clearpage\relax
573     \Iftocfeature{toc}{leveldown}
574     {\section*}
575     {\chapter*}
576   } { \GetTranslation{Abstract} }
577 } {
578   \group_end:
579 }
```

2.8 Provide an environment for acknowledgements

Often, especially in a PhD thesis, one wants to acknowledge the help of certain people, for example, supervisors, family, and friends.

`acknowledgements (env.)` Use to typeset the acknowledgements for the thesis.

```
580 \NewDocumentEnvironment { acknowledgements } { o }
581 {
582   \group_begin:
583   \IfNoValueF {#1} { \selectlanguage{#1} }
584   \scr@ifundefinedorrelax{chapter}{
585     \Iftocfeature{toc}{leveldown}
586     {\subsection*}
587     {\section*}
588   }{
589     \Iftocfeature{toc}{leveldown}
590     {\section*}
591     {\chapter*}
592   } { \GetTranslation{Acknowledgements} }
593 } {
594   \group_end:
595 }
```

2.9 Document structuring macros

Ensure that these macros are defined.

`\frontmatter` Starts the frontmatter. Most notably, set the page numbers to roman.

```
596 \providecommand*\frontmatter{
597   {
598     \if@twoside\cleardoublepage\else\clearpage\fi
599     \@mainmatterfalse
600     \pagenumbering { roman }
601   }
```

(End definition for \frontmatter. This function is documented on page 9.)

`\mainmatter` Starts the mainmatter or the backmatter. Most notably, set the page numbers to arabic.

```
\backmatter
602 \providecommand*\mainmatter{
603   {
604     \if@twoside\cleardoublepage\else\clearpage\fi
605     \@mainmattertrue
606     \pagenumbering { arabic }
607   }
608 \providecommand*\backmatter{
609   {
610     \if@twoside\cleardoublepage\else\clearpage\fi
611     \@mainmatterfalse
612   }
```

(End definition for \mainmatter and \backmatter. These functions are documented on page 9.)

2.10 Declaration of authorship

`\authorshipDeclaration` Provide a command to typeset the authorship declaration.

```
613 \NewDocumentCommand \authorshipDeclaration { o }
614   {
615     \par
616     \group_begin:
617       \selectlanguage{ngerman}
618       \IfNoValueF {#1}
619         { \tl_gset:Nn \l__slcd_location_tl {#1} }
620
621       \tl_if_empty:NT \l__slcd_location_tl
622         {
623           \msg_new:nnn { seiithesis }
624             { no-location-specified }
625           {
626             You~ need~ to~ specify~ a~ location~ for~ the~ authorship~
627             declaration.~ Either~ via~ the~ location~ macro~ or~ via~ the~
628             optional~ argument~ of~ the~ authorshipDeclaration~ macro.
629           }
630           \msg_warning:nn { seiithesis } { no-location-specified }
631         }
632
633       \scr@ifundefinedorrelax{chapter}{
634         \IfTocFeature{toc}{level down}
635         {\subsection*}
```

```

636         {\section*}
637     }{
638         \Iftocfeature{toc}{leveldown}
639         {\section*}
640         {\chapter*}
641     } { Eigenständigkeitserklärung }
642
643     Hiermit~ versichere~ ich,~ \l__slcd_signature_tl,
644     \begin{enumerate}
645         \item dass~ ich~ die~ vorliegende~ Arbeit~ selbstständig~ und~ ohne~
646             unzulässige~ Hilfe~ verfasst~ und~ kein~ anderen~ als~ die~
647             angegebenen~ Quellen~ und~ Hilfsmittel~ benutzt,~ sowie~ die~
648             wörtlich~ und~ sinngemäß~ übernommenen~ Passagen~ aus~ anderen~
649             Werken~ kenntlich~ gemacht~ habe.
650         \item Außerdem~ erkläre~ ich,~ dass~ ich~ der~ Universität~ ein~
651             Nutzungsrecht~ zum~ Zwecke~ der~ Überprüfung~ mittels~ einer~
652             Plagiatsoftware~ in~ anonymisierter~ Form~ einräume.
653     \end{enumerate}\par
654     \bigskip
655     \noindent \l__slcd_location_tl,~ \@date\hfill
656     \signatureBox{\l__slcd_signature_tl}
657     \group_end:
658     \\ \strut \cleardoublepage
659 }

```

(End definition for `\authorshipDeclaration`. This function is documented on page 9.)

`\signatureBox` Provide a box for the signature.

```

660 \newcommand*{\signatureBox}[2][5cm]{
661     \parbox[t]{#1}{
662         \centering
663         \rule{\linewidth}{.3pt} \\ \makebox[0pt][c]{#2}
664     }
665 }

```

(End definition for `\signatureBox`. This function is documented on page 9.)

2.11 Research questions and summary boxes

We utilise the `ntheorem` package for defining new theorem environments that are used for defining research questions and hypotheses. Therefore, start with loading this package. `ntheorem`.

```

666 \PassOptionsToPackage{amsmath}{ntheorem}
667 \RequirePackage{ntheorem}
668 \theoremseparator{:}

```

`resq (env.)` We can then define the `resq` and `hyp` environments using the `\newtheorem` macro from `hyp (env.)` `ntheorem`.

```

669 \newtheorem{resq}{Research Question}
670 \newtheorem{hyp}{Hypothesis}

```

For the summary boxes, we utilise the `tcolorbox` package. We start with loading this package.

```

671 \RequirePackage{tcolorbox}

```

`summary (env.)` The `summary` environment expects a label and has the summary text in its content.

```

672 \NewDocumentEnvironment { summary } { m }
673 { \begin{tcolorbox}[title={Summary (#1)}] }
674 { \end{tcolorbox} }

675 \end{class}

```

3 Translations for se2thesis

676 `<*translations>`

3.1 English Translations

677 `<*english>`

We provide the following English translations.

```

678 \ProvideDictionaryFor{English}{se2translations}[2022/09/09]
679 \ProvideDictTranslation{abstract}{abstract}
680 \ProvideDictTranslation{Abstract}{Abstract}
681 \ProvideDictTranslation{acknowledgement}{acknowledgement}
682 \ProvideDictTranslation{Acknowledgement}{Acknowledgement}
683 \ProvideDictTranslation{acknowledgements}{acknowledgements}
684 \ProvideDictTranslation{Acknowledgements}{Acknowledgements}
685 \ProvideDictTranslation{advisor}{advisor}
686 \ProvideDictTranslation{Advisor}{Advisor}
687 \ProvideDictTranslation{advisors}{advisors}
688 \ProvideDictTranslation{Advisors}{Advisors}
689 \ProvideDictTranslation{co-advisor}{co-advisor}
690 \ProvideDictTranslation{Co-advisor}{Co-advisor}
691 \ProvideDictTranslation{co-advisors}{co-advisors}
692 \ProvideDictTranslation{Co-advisors}{Co-advisors}
693 \ProvideDictTranslation{supervisor}{supervisor}
694 \ProvideDictTranslation{Supervisor}{Supervisor}
695 \ProvideDictTranslation{co-supervisor}{co-supervisor}
696 \ProvideDictTranslation{Co-supervisor}{Co-supervisor}
697 \ProvideDictTranslation{external}{external examiner}
698 \ProvideDictTranslation{External}{External Examiner}
699 \ProvideDictTranslation{degreeprogramme}{programme}
700 \ProvideDictTranslation{Degreeprogramme}{Programme}
701 \ProvideDictTranslation{Bachelor-thesis}{Bachelor Thesis}
702 \ProvideDictTranslation{Bachelor-thesis-proposal}{Bachelor Thesis Proposal}
703 \ProvideDictTranslation{Master-thesis}{Master Thesis}
704 \ProvideDictTranslation{Master-thesis-proposal}{Master Thesis Proposal}
705 \ProvideDictTranslation{PhD-thesis}{PhD Thesis}
706 \ProvideDictTranslation{PhD-thesis-proposal}{PhD Thesis Proposal}
707 \ProvideDictTranslation{date}{date}
708 \ProvideDictTranslation{Date}{Date}
709 \ProvideDictTranslation{university-of-passau}{University of Passau}
710 \ProvideDictTranslation{up}{University of Passau}
711 \ProvideDictTranslation{fim}{Faculty of Computer Science and Mathematics}

712 \end{english}

```

3.2 German Translations

713 `<*german>`

We provide the following German translations.

```

714 \ProvideDictionaryFor{German}{se2translations}[2022/09/09]
715 \ProvideDictTranslation{abstract}{Zusammenfassung}
716 \ProvideDictTranslation{Abstract}{Zusammenfassung}
717 \ProvideDictTranslation{acknowledgement}{Danksagung}
718 \ProvideDictTranslation{Acknowledgement}{Danksagung}
719 \ProvideDictTranslation{acknowledgements}{Danksagungen}
720 \ProvideDictTranslation{Acknowledgements}{Danksagungen}
721 \ProvideDictTranslation{advisor}{Betreuer}
722 \ProvideDictTranslation{Advisor}{Betreuer}
723 \ProvideDictTranslation{advisors}{Betreuer}
724 \ProvideDictTranslation{Advisors}{Betreuer}
725 \ProvideDictTranslation{co-advisor}{Mitbetreuer}
726 \ProvideDictTranslation{Co-advisor}{Mitbetreuer}
727 \ProvideDictTranslation{co-advisors}{Mitbetreuer}
728 \ProvideDictTranslation{Co-advisors}{Mitbetreuer}
729 \ProvideDictTranslation{supervisor}{Prüfer}
730 \ProvideDictTranslation{Supervisor}{Prüfer}
731 \ProvideDictTranslation{co-supervisor}{Zweitprüfer}
732 \ProvideDictTranslation{Co-supervisor}{Zweitprüfer}
733 \ProvideDictTranslation{external}{Externer Gutachter}
734 \ProvideDictTranslation{External}{Externer Gutachter}
735 \ProvideDictTranslation{degreeprogramme}{Studiengang}
736 \ProvideDictTranslation{Degreeprogramme}{Studiengang}
737 \ProvideDictTranslation{Bachelor-thesis}{Bachelorarbeit}
738 \ProvideDictTranslation{Bachelor-thesis-proposal}{Bachelorarbeitsproposal}
739 \ProvideDictTranslation{Master-thesis}{Masterarbeit}
740 \ProvideDictTranslation{Master-thesis-proposal}{Masterarbeitsproposal}
741 \ProvideDictTranslation{PhD-thesis}{Dissertation}
742 \ProvideDictTranslation{PhD-thesis-proposal}{Dissertationsproposal}
743 \ProvideDictTranslation{date}{Datum}
744 \ProvideDictTranslation{Date}{Datum}
745 \ProvideDictTranslation{university-of-passau}{Universität Passau}
746 \ProvideDictTranslation{up}{Universität Passau}
747 \ProvideDictTranslation{fim}{Fakultät für Informatik und Mathematik}
748 \langle german \rangle
749 \langle /translations \rangle

```

4 The se2colors implementation

Start the DocStrip guards.

```

750 \langle *colors \rangle

```

Identify the internal prefix (L^AT_EX3 DocStrip convention): only internal material in this *submodule* should be used directly.

```

751 \langle @@=slcd_colors \rangle

```

Identify the package and give the overall version information.

```

752 \ProvidesExplPackage {se2colors} {2022-09-09} {1.0.0}
753 {A colour support package for the se2thesis bundle}

```

4.1 Load-time options

`\l__slcd_colors_colormode_tl` Holds the colour mode selected by the user as a package load-time option.

```

754 \keys_define:nn { seiicolors }
755 {
756   colormode .choice:,
757   colormode / 4C .code:n = {
758     \PassOptionsToPackage{cmyk}{xcolor}
759     \tl_gset:Nn \l__slcd_colors_colormode_tl {4C}
760   },
761   colormode / RGB .code:n = {
762     \PassOptionsToPackage{rgb}{xcolor}
763     \tl_gset:Nn \l__slcd_colors_colormode_tl {RGB}
764   },
765   colormode / BW .code:n = {
766     \PassOptionsToPackage{gray}{xcolor}
767     \tl_gset:Nn \l__slcd_colors_colormode_tl {BW}
768   },
769   colormode / CMYK .meta:n = {colormode=4C},
770   colormode / cmyk .meta:n = {colormode=4C},
771   colormode / rgb .meta:n = {colormode=RGB},
772   colormode / gray .meta:n = {colormode=BW},
773   RGB .meta:n = {colormode=RGB},
774   rgb .meta:n = {colormode=rgb},
775   CMYK .meta:n = {colormode=4C},
776   cmyk .meta:n = {colormode=4C},
777   gray .meta:n = {colormode=BW},
778 }
779 \keys_set:nn { seiicolors } { colormode = 4C }

```

(End definition for `\l__slcd_colors_colormode_tl`.)

4.2 Option handling

```

780 \IfFormatAtLeastTF { 2022-06-01 }
781 { \ProcessKeyOptions [ seiicolors ] }
782 {
783   \RequirePackage { l3keys2e }
784   \ProcessKeysOptions { seiicolors }
785 }

```

4.3 Colour definitions

Load the xcolor package for colour definitions.

```

786 \RequirePackage{xcolor}

```

Define the primary colours gray and orange as given by the University of Passau's style guides.

```

787 \definecolorset[named]{RGB/cmyk}{UPSE2-}{-}{%
788   Gray,123,131,133/.08,.02,0,.48;%
789   Orange,229,137,0/0,.40,1.0,.10%
790 }

```

Define the additional colours.

```

791 \definecolorset[named]{RGB/cmyk}{UPSE2-}{-}{%

```



```

792 DarkGreen,85,100,85/.6,.2,.6,.35;%
793 MediumGreen,105,150,115/.55,0,.55,.10;%
794 LightGreen,140,175,130/.4,0,.5,.05;%
795 DarkBlue,80,110,150/.70,.40,0,.15;%
796 MediumBlue,105,155,190/.55,.1,0,.1;%
797 LightBlue,135,185,200/.4,0,.10,.05;%
798 DarkPurple,100,80,120/.6,.8,.05,.15;%
799 MediumPurple,130,90,125/.35,.7,.1,.15;%
800 LightPurple,160,135,170/.3,.45,.05,0;%
801 DarkOcher,120,100,80/.35,.45,.65,.25;%
802 MediumOcher,150,130,95/.25,.3,.6,.15;%
803 LightOcher,185,145,100/.1,.25,.6,.1;%
804 DarkRed,180,20,40/.05,1,.8,.05;%
805 MediumRed,210,90,80/0,.75,.6,.1;%
806 LightRed,255,145,125/.05,.5,.45,.05%
807 }
808 </colors>

```

5 The se2fonts implementation

Start the DocStrip guards.

```

809 < *fonts >
      Identify the internal prefix (LATEX3 DocStrip convention): only internal material in
      this submodule should be used directly.
810 < @@=slcd_fonts >
      Identify the package and give the overall version information.
811 \ProvidesExplPackage {se2fonts} {2022-09-09} {1.0.0}
812   {A font-selection support package for the se2thesis bundle}

```

5.1 Load-time options

`\l_slcd_fonts_fontmode_tl` Holds the font-selection mode specified by the user as a package load-time option.

```

813 \keys_define:nn { seiifonts }
814 {
815   fontmode .choice:,
816   fontmode / original .code:n = {
817     \tl_gset:Nn \l_slcd_fonts_fontmode_tl {original}
818   },
819   fontmode / replacement .code:n = {
820     \tl_gset:Nn \l_slcd_fonts_fontmode_tl {replacement}
821   },
822   fontmode / auto .code:n = {
823     \tl_gset:Nn \l_slcd_fonts_fontmode_tl {auto}
824   },
825   original .meta:n = {fontmode=original},
826   replacement .meta:n = {fontmode=replacement},
827   auto .meta:n = {fontmode=auto},
828 }
829 \keys_set:nn { seiifonts } { fontmode = auto }

```

(End definition for `\l_slcd_fonts_fontmode_tl`.)

5.2 Option handling

```

830 \IfFormatAtLeastTF { 2022-06-01 }
831   { \ProcessKeyOptions [ seiifonts ] }
832   {
833     \RequirePackage{ l3keys2e }
834     \ProcessKeysOptions { seiifonts }
835   }

```

5.3 Helper macros

`\pdftexengine` We define several alias macros to identify which engine the user is running.

```

\pdftexengine 836 \cs_new_eq:NN \pdftexengine \sys_if_engine_pdftex_p:
\etexengine    837 \cs_new_eq:NN \etexengine \sys_if_engine_etex_p:
\luatexengine  838 \cs_new_eq:NN \luatexengine \sys_if_engine_luatex_p:

```

(End definition for `\pdftexengine`, `\etexengine`, and `\luatexengine`. These functions are documented on page 12.)

`\ifengineTF` True, if the engine used matches the given first argument.

```

\ifengineTF 839 \NewExpandableDocumentCommand \ifengineTF { mmm }
\ifengineT  840   {
\ifengineF  841     \bool_if:nTF { #1 } { #2 } { #3 }
            842   }
            843 \NewExpandableDocumentCommand \ifengineT { mm }
            844   {
            845     \bool_if:nT { #1 } { #2 }
            846   }
            847 \NewExpandableDocumentCommand \ifengineF { mm }
            848   {
            849     \bool_if:nF { #1 } { #2 }
            850   }

```

(End definition for `\ifengineTF`, `\ifengineT`, and `\ifengineF`. These functions are documented on page 12.)

The package is not tested with XeTeX , thus we provide an error to the user and stop the execution, when they want to use the package with XeTeX .

```

851 \ifengineT { \etexengine }
852   {
853     \msg_set:nnnn { seiifonts } { xetex-not-supported }
854     { XeTeX~ is~ not~ supported~ by~ the~ se2fonts~ package. }
855     { Switch~ to~ pdfTeX~ or~ (preferably)~ LuaTeX. }
856     \msg_error:nn { seiifonts } { xetex-not-supported }
857   }

```

5.4 Font loading

Depending on the engine used by the user, we can use `fontspec` for loading fonts.

```

858 \ifengineTF { \luatexengine }
859   {
      If the user uses  $\text{LuaTeX}$ , load fontspec and unicode-math.
860     \RequirePackage{fontspec}
861     \RequirePackage{unicode-math}

```

The user wants to have the original fonts, which are Palatino, Optima, MesloLGS Nerd Font Mono, and Neo Euler.

```

862 \tl_if_eq:NnT \l__slcd_fonts_fontmode_tl {original}
863 {
864   \setmainfont{Palatino}[Ligatures=TeX]
865   \setsansfont{Optima}[Ligatures=TeX]
866   \setmonofont{MesloLGS Nerd Font Mono}
867   \setmathfont{Neo Euler}[Ligatures=TeX]
868 }

```

The user wants to have the replacement fonts, which are T_EX Gyre Pagella, T_EX Gyre Heros, Fira Code, and T_EX Gyre Pagella Math.

```

869 \tl_if_eq:NnT \l__slcd_fonts_fontmode_tl {replacement}
870 {
871   \setmainfont{TeX Gyre Pagella}[Ligatures=TeX]
872   \setsansfont{TeX Gyre Heros}[Ligatures=TeX, Scale=0.9]
873   \setmonofont{Fira Code}[Ligatures=TeX]
874   \setmathfont{TeX Gyre Pagella Math}[Ligatures=TeX]
875   \setmathfont{Latin Modern Math}[range={\mathcal,\mathbb}]
876 }

```

The user set the auto mode, which causes the package to check whether a font from the original fonts exists on the system. If such a font exists, it will be used; otherwise, a replacement font will be used.

```

877 \tl_if_eq:NnT \l__slcd_fonts_fontmode_tl {auto}
878 {
879   \IfFontExistsTF { Palatino }
880   { \setmainfont{Palatino}[Ligatures=TeX] }
881   { \setmainfont{TeX Gyre Pagella}[Ligatures=TeX] }
882   \IfFontExistsTF { Optima }
883   { \setsansfont{Optima}[Ligatures=TeX] }
884   { \setsansfont{TeXGyre Heros}[Ligatures=TeX] }
885   \IfFontExistsTF{ MesloLGS Nerd Font Mono }
886   { \setmonofont{MesloLGS Nerd Font Mono} }
887   { \setmonofont{Fira Code}[Scale=0.85] }
888   \IfFontExistsTF { Neo Euler }
889   { \setmathfont{Neo Euler}[Ligatures=TeX] }
890   {
891     \setmathfont{TeX Gyre Pagella Math}[Ligatures=TeX]
892     \setmathfont{Latin Modern Math}[range={\mathcal,\mathbb}]
893   }
894 }
895 } {

```

The user does neither use LuaT_EX, fall back

```

896 \PassOptionsToPackage{T1}{fontenc}
897 \RequirePackage{fontenc}
898 \RequirePackage{FiraMono}
899 \RequirePackage{tgheros}
900 \RequirePackage{tgpagella}
901 }
902 </fonts>

```

References

- [1] Dirk Beyer, Stefan Löwe, and Philipp Wendler: *Reliable benchmarking: requirements and solutions*. STTT 21(1): 1–29 (2019)

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