# The vutinfth class\*

Thomas Auzinger thomas.auzinger@cg.tuwien.ac.at

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### Abstract

This class provides a  $\LaTeX$ 2 $\varepsilon$  template for theses at the Faculty of Informatics at the Vienna University of Technology. In the current version, bachelor and master theses as well as dissertations are supported in both English and German.

<sup>\*</sup>This document corresponds to vutinfth v1.3, dated 2014/11/25.

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### 1 Introduction

This class provides a LATEX  $2\varepsilon$  template for all theses at the Faculty of Informations at the Vienna University of Technology. Further information on the document class and accompanying support can be found at https://gitlab.cg.tuwien.ac.at/auzinger/vutinfth. Further guidelines may apply to both the format and structure of certain theses. These can be found at http://www.informatik.tuwien.ac.at/dekanat. Thesis authors are advised to consult Section 2 for a documentation of all relevant commands. Information for class developers is provided in Section 3.

### 2 Usage for Document Authors

This section contains relevant information for authors of theses that are based on the vutinfth document class.

### 2.1 Data

To allow the generation of the title pages, signature fields, statements, etc., several pieces of information have to be set by the author using the commands in the subsequent sections. We discern several categories of data: (i) textual data, which is given by a simple text string, (ii) persons, which are defined by their names, optional titles, and their gender, as well as, (iii) dates and (iv) list data, which allow the selection of one argument from a list of permissible arguments. Several commands have polylingual capabilities and support different languages (see Section 2.1.5). A superscript P, i.e., \command^P, indicates such a command.

### 2.1.1 Textual Data

\setaddress
\setregnumber
\settitle
\setsubtitle
\setcurriculum
\setfirstreviewerdata
\setsecondreviewerdata

All commands in this section are called with one mandatory argument, e.g., as  $\command{\langle text \rangle}$ , where  $\langle text \rangle$  defines the content of the commands. For polylingual commands, given by  $\command^P$ , one  $\langle text \rangle$  argument has to supplied for each language (see Section 2.1.5). The following textual data can be set:

| Command                          | Role                              | Type    | Optional     |
|----------------------------------|-----------------------------------|---------|--------------|
| \setaddress                      | Address of the author             | All     | No           |
| \setregnumber                    | Registration number of the author | All     | No           |
| $ackslash$ settitle $^{ m P}$    | Title of the thesis               | All     | No           |
| $ackslash$ setsubtitle $^{ m P}$ | Subtitle of the thesis            | All     | Yes          |
| $\strut_{ m P}$                  | Name of the curriculum            | B, M    | No           |
| T D 1 1 /D                       | ) M + (M) D + 1(D) DID (          | 1 1 (D) | A 11 / A 11\ |

Types: Bachelor (B), Master (M), Doctoral (D), PhD School (P), All (All)

| Command  | Role                                       | Type | Optional |  |
|--|--|------|----------|--|
| \setfirstreviewerdata  | Affiliation and country of first reviewer  | Р    | No       |  |
| \setsecondreviewerdata   | Affiliation and country of second reviewer | Р    | No       |  |
| Types: Bachelor (B), Master (M), Doctoral (D), PhD School (P), All (All) |  |      |          |  |

### 2.1.2 Persons

\setauthor \setadvisor \setsecondadvisor \setfirstassistant \setsecondassistant \setthirdassistant \setfirstreviewer \setsecondreviewer All commands in this section are called with four mandatory arguments, e.g., as  $\command{\langle pretitle \rangle}{\langle name \rangle}{\langle name \rangle}{\langle posttitle \rangle}{\langle gender \rangle}$ , where  $\langle name \rangle$  defines both the first name(s) and family name(s) of the person. A title that is placed before the name is assigned with  $\langle pretitle \rangle$ , while a trailing title is given with  $\langle posttitle \rangle$ . Both  $\langle pretitle \rangle$  and  $\langle posttitle \rangle$  can be left empty, to indicate an absence of such a title; the insertion of appropriate glue between titles and names is handled by the vutinfth class. The declaration of the persons gender via  $\langle gender \rangle$  allows the use of gender-specific terms in languages that support them, e.g., German. The possible options for  $\langle gender \rangle$  are male and female (see Section 2.1.4). The following persons can be set:

| Command             | Role                         | Type | Optional |
|---------------------|------------------------------|------|----------|
| \setauthor          | Author of the thesis         | All  | No       |
| \setadvisor         | Main advisor of the thesis   | All  | No       |
| \setsecondadvisor   | Second advisor of the thesis | P    | Yes      |
| \setfirstassistant  | First advising assistant     | B, M | Yes      |
| \setsecondassistant | Second advising assistant    | B, M | Yes      |
| \setthirdassistant  | Third advising assistant     | B, M | Yes      |
| \setfirstreviewer   | First thesis reviewer        | D, P | No       |
| \setsecondreviewer  | Second thesis reviewer       | D, P | No       |

Types: Bachelor (B), Master (M), Doctoral (D), PhD School (P), All (All)

### **2.1.3** Dates

\setdate

All commands in this section are called with three madatory arguments, e.g., as  $\command{\langle day \rangle}{\langle month \rangle}{\langle year \rangle}$ . The syntax is identical to the last three arguments of the  $\command$  of the datetime package, from which these commands derive. The following dates can be set:

| Command  | Role         | Type | Optional                                |
|--|--------------|------|---|
| \setdate   | Signing date | All  | No                                      |
| Types: Bachelor (B), Master (M), Doctoral (D), PhD School (P), All ( |              |      | Doctoral (D), PhD School (P), All (All) |

### 2.1.4 List Data

All commands in this section are called with at least one madatory argument called  $\langle list \rangle$ , e.g., as  $\backslash command... \{\langle list \rangle\}...$ , where  $\langle list \rangle$  is given one element from a set of possible arguments.

\setauthor \setadvisor

When setting a person, the person's gender is specified with a list argument (see Section 2.1.2):

| Command  | Options        | Description   |
|--|----------------|---|
| $- \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\$ | male<br>female | Specifies a male person. Specifies a female person. |

\setthesis

The thesis type is selected from one of the fundamental types:

| Command                               | Options                                    | Description   |
|---------------------------------------|--|---|
| \setthesis $\{\langle list \rangle\}$ | bachelor<br>master<br>doctor<br>phd-school | Specifies a bachelor's thesis. Specifies a master's thesis. Specifies a dissertation. Specifies a dissertation at the Vienna PhD school of Informatics. |

\setmasterdegree

With a master's curriculum, different degrees can be achieved and the appropriate type has to be chosen based on the curriculum that the author is enroled in:

| Command                                     | Options      | Description                    |
|---|--------------|--------------------------------|
| \setmasterdegree $\{\langle list \rangle\}$ | dipl.        | Specifies the degree           |
|   |              | 'Diplom-Ingenieur(in)'.        |
|   | master       | Specifies the degree           |
|   |              | 'Master of Science'.           |
|   | rer.nat.     | Specifies the degree           |
|   |              | 'Magist(er/ra) der Natur-      |
|   |              | wissenschaften'.               |
|   | rer.soc.oec. | Specifies the degree           |
|   |              | 'Magist(er/ra) der Sozial- und |
|   |              | Wirtschaftswissenschaften'.    |

\setdoctordegree

With a doctorate study, different degrees can be achieved and the appropriate type has to be chosen based on the program that the author is enrolled in:

| Command                                     | Options      | Description  |
|---|--------------|--|
| \setdoctordegree $\{\langle list \rangle\}$ | techn.       | Specifies the degree 'Doktor(in) der Technischen' Wissenschaften'.           |
|   | rer.nat.     | Specifies the degree 'Doktor(in) der Naturwissenschaften'.                   |
|   | rer.soc.oec. | Specifies the degree 'Doktor(in) der Sozial- und Wirtschaftswissenschaften'. |

### 2.1.5 Polylingual Data

#### \setcurriculum

Used as  $\ensuremath{\mbox{\mbox{$\backslash$}}}{\langle\mbox{$\backslash$}}$ , it sets the name of the curriculum that the student is enrolled in. The name can be given in English, with  $\langle\mbox{$\langle$} english\rangle$ , and in German, with  $\langle\mbox{$\langle$} german\rangle$ . Note that the curriculum name does not need to be supplied for all thesis types, since, e.g., doctoral studies do not have a curriculum per se. If a title page of one of the languages is not used, the corresponding argument can be left empty.

#### \settitle

Used as  $\stitle{\langle english\rangle}$ } ( $\langle german\rangle$ ), it sets the title of the thesis. The title can be given both in an English version, with  $\langle english\rangle$ , and in a German version, with  $\langle german\rangle$ . For title pages in a given language, the corresponding title will be used. Unused languages can be supplied as empty brackets and it is possible to use the English or German title for both language versions.

#### \setsubtitle

Used as  $\setsubtitle{\langle english\rangle}{\langle german\rangle}$ , it sets the subtitle of the thesis. The same specifications as for \settitle apply.

### \addtitlepage

The titlepage can be generated in the following languages (see Section 2.2):

| Command  | Options   | Description                      |
|--|-----------|----------------------------------|
| $\verb \addtitlepage{ \langle list \rangle } $ | english   | Generates an English title page. |
|  | naustrian | Generates a German title page.   |

Note that a non-English title page is not available for a dissertation at the Vienna PhD School of Informatics.

### 2.2 Layout

Most of the data that is supplied with the commands of the previous sections is used to generate the front matter of the thesis. It consists of obligatory items such as the title page(s) and the statement of originality as well as optional items such as the acknowledgements or the abstract in different languages. In the remainder of this section, the available items of the front matter are given.

\addtitlepage

Used as  $\addtitlepage{\langle lang \rangle}$ , where  $\langle lang \rangle$  is the name of a language as given in the babel package (see Section 2.1.4). The necessary pieces of information have to be set beforehand (as described in Section 2.1). This command is usually used directly after  $\begin{described} begin{described} begin{des$ 

\addstatementpage

Used as \addstatementpage, it generates a page with the statement of originality.

acknowledgements acknowledgements\*

Used as <text> this environment generates a chapter with the English acknowledgements, this environment generates a chapter with the English acknowledgements. Use the starred version, i.e., acknowledgements\*, to remove the table of content entry of this environment.

danksagung\*

Used as  $\ensuremath{\verb|begin{danksagung}|\langle text\rangle|}\ensuremath{\verb|content||}\ensuremath{\verb|content||}\ensuremath{\verb|content||}\ensuremath{\verb|content||}\ensuremath{\verb|content||}\ensuremath{\verb|content||}\ensuremath{\verb|content||}\ensuremath{\verb|content||}\ensuremath{\verb|content||}\ensuremath{\verb|content||}\ensuremath{\verb|content||}\ensuremath{\verb|content||}\ensuremath{\verb|content||}\ensuremath{\verb|content||}\ensuremath{\verb|content||}\ensuremath{\verb|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\ensuremath{\ensuremath{|content||}\$ 

abstract\*

Used as  $\ensuremath{\operatorname{begin}{\operatorname{abstract}}}\operatorname{dext}\$ , this environment generates a chapter with the English abstract. Use the starred version, i.e.,  $\operatorname{abstract*}$ , to remove the table of content entry of this environment.

kurzfassung\*

### 3 Usage for Class Writers

To accommodate shifting requirements, the **vutinfth** class provides various convenience functions that allow the modification and extension of its functionality.

### 3.1 Data

To compose several parts of the thesis layout, input from the thesis author is required. For the vutinfth class, this is realized by the commands provided in Section 2.1. Additional data can be defined with the the commands in the remainder of this section.

\CreateData

Used as  $\colon \colon \colon$ 

\CreatePerson

Used as  $\command \set (name)$ , it generates a command  $\set (name)$ . Used

as  $\set\langle name\rangle \{\langle pretitle\rangle\} \{\langle personname\rangle\} \{\langle posttitle\rangle\} \{\langle gender\rangle\}$ , the newly created command assigns the supplied values to the corresponding internal variables  $\tvutinfth@person@\langle name\rangle@...$  as given in the table below.

| Argument  | Internal Variable   |
|---|---|
| $\langle pretitle \rangle$<br>$\langle personname \rangle$<br>$\langle posttitle \rangle$<br>$\langle gender \rangle$ | $\label{eq:cond_name} $$ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$ |

The command  $\vert$  when verifying the existance of a specific person. Furthermore, the command  $\vert$  with existing titles and correct whitespace in between. The person's gender is either  $\vert$  vutinfth@person@male or  $\vert$  vutinfth@person@male, depending on the input. See Section 4.2.6 for examples.

\AddLanguage

Used as  $\AddLanguage\{\langle lang \rangle\}$ , it enables the language  $\langle lang \rangle$  to by used by polylingual expressions.  $\langle lang \rangle$  has to be chosed from the languages of the babel package that is used by this class. Currently, vutinfth uses two languages, i.e., english for English expressions and naustrian for German expressions.

\CreatePolylingual

Used as  $\colon colon c$ 

\CreatePolylingual[english=advisor,naustrian=Betreuer]{advisor} \CreatePolylingual[english=Advisor,naustrian=Betreuer]{Advisor} \CreatePolylingual[english=ADVISOR,naustrian=BETREUER]{ADVISOR}. See Section 4.2.6 for examples.

### 3.2 Layout

Several key elements in the layout of the frontmatter are encapsulated to allow a convenient extension of this functionality.

\SignatureFields

Used as  $SignatureFields[\langle mode \rangle] \{\langle center \rangle\} \{\langle right \rangle\}$ , it creates a place and date description and/or one or two signature fields.  $\langle mode \rangle$  can be set to y, which adds an entry with date and place to the left, to h, which adds the corresponding whitespace, or to n, which adds nothing. If text is supplied to  $\langle center \rangle$ , it is added below a rule, right to the possible date and place entry. If text is supplied to

 $\langle right \rangle$ , it is added below a rule, right to the possible signature field created by  $\langle center \rangle$ . This command ensures a uniform width and positioning of the signature fields on both the title pages and the statement of originality.

\SignatureBlock

Used as \SignatureBlock, it generates the signature fields for both author and advisor.

\ReviewerBlock

Used as \ReviewerBlock, it generates the signature fields for both reviewers.

\AdvisorBlock

Used as \AdvisorBlock, it generates the name fields for both the advisor and the potential assistants.

\AddTitlePage

Used as \AddTitlePage, it generates a title page in the current language. This command contains the placement of the header graphics, the footer, the appropriate blocks, etc.

\AddStatementPage

Used as \AddStatementPage, it generates a chapter with the statement of originality together with the author's signature field.

SFFont

Alters the sans serif font inside the environment. Called with one mandatory argument as  $\ensuremath{\texttt{SFFont}}{\langle family \rangle}$ , which determines the sans serif font family that should be used, e.g., phv for Helvetica.

### 4 Implementation

### 4.1 Initialization

### 4.1.1 Class Options

Pass the options to the underlying memoir class.

- 1 \DeclareOption\*{%
- 2 \PassOptionsToClass{\CurrentOption}{memoir}%
- 3 }%
- 4 \ProcessOptions\relax

### 4.1.2 Loaded Class and Packages

The vutinfth class is based on the memoir class.

- 5 \LoadClass[a4paper,11pt]{memoir}%
- 6 \chapterstyle{veelo}%

The following packages are required for the functionality and style of the document class.

7 \RequirePackage[scaled]{helvet}%

```
8 \RequirePackage{lmodern}%
9 \RequirePackage{courier}%
10 \RequirePackage[T1]{fontenc}%
11 \RequirePackage[english,naustrian]{babel}%
12 \RequirePackage[nodayofweek]{datetime}%
13 \RequirePackage{geometry}%
14 \RequirePackage{calc}%
15 \RequirePackage{etoolbox}%
16 \RequirePackage{graphicx}%
17 \graphicspath{{graphics}}}%
```

### 4.1.3 Low-Level Functionality

This section provides low-level functionality for macro definitions and macro expansions.

\@namexdef Globally defines a control sequence with an expanded argument.

18 \newcommand{\@namexdef}[1]{\expandafter\xdef\csname#1\endcsname}%

\ifestrequal A variant of \ifstrequal that fully expands the first two arguments.

```
19 \newcommand{\ifestrequal}[4]{%
20 \begingroup
21 \edef\vutinfth@tempa{{#1}}%
22 \edef\vutinfth@tempb{{#2}}%
23 \expandafter\expandafter\ifstrequal
24 \expandafter\vutinfth@tempa\vutinfth@tempb{#3}{#4}%
25 \endgroup
26 }%
```

### 4.1.4 Fonts

```
\vutinfth@HUGE
\vutinfth@Large
\vutinfth@Large
\vutinfth@large
\vutinfth@large
\vutinfth@large
\vutinfth@normalsize

\vutinfth@normalsize

Initializes the font sizes.

27 \newcommand{\vutinfth@HUGE}{\fontsize{30}{34}\selectfont}%

28 \newcommand{\vutinfth@huge}{\fontsize{20}{23}\selectfont}%

29 \newcommand{\vutinfth@Large}{\fontsize{17}{22}\selectfont}%

30 \newcommand{\vutinfth@Large}{\fontsize{14}{18}\selectfont}%

31 \newcommand{\vutinfth@large}{\fontsize{12}{14.5}\selectfont}%

32 \newcommand{\vutinfth@normalsize}{\fontsize{11}{13.6}\selectfont}%

Selects the given font family as sans serif font.
```

33 \newenvironment{SFFont}[1]{%

Stores the current sans serif font in \vutinfth@f@family@tmp and changes to the given sans serif font.

```
34 \begingroup
35 \sffamily
36 \global\let\vutinfth@f@family@tmp=\f@family
37 \endgroup
38 \renewcommand{\sfdefault}{#1}%
```

In case the outer scope is already sans serif, the new font has to be activated.

```
39 \ifdefstrequal{\f@family}{\vutinfth@f@family@tmp}{\sffamily}{}% 40 }{%
```

The scope of the font change is the environment itself. Thus, no cleanup code is required in case the outer scope was already sans serif.

```
41 \renewcommand{\sfdefault}{\vutinfth@f@family@tmp}% 42 }%
```

### 4.2 Data

### 4.2.1 Dates

\setdate Creates the internal storage for the signing date.

```
43 \newcommand{\setdate}[3]{%  
44 \newdate{vutinfth@date@signing}{#1}{#2}{#3}%  
45 }%
```

### 4.2.2 Textual Data

\vutinfth@def@data Creates the internal storage for simple data entries.

```
46 \newcommand{\vutinfth@def@data}[2]{%
47 \@namedef{vutinfth@data@#1@def}{}%
48 \@namedef{vutinfth@data@#1}{#2}%
49 }%
```

\vutinfth@def@data@invalid Initializes the internal storage with error messages.

```
50 \newcommand{\vutinfth@def@data@invalid}[2]{%
51 \@namedef{vutinfth@data@#1@error}{%
52 \ClassError{vutinfth}{No #2 issued}{Set #1 with #2.}%
53 }%
54 \@namedef{vutinfth@data@#1}{\@nameuse{vutinfth@data@#1@error}}%
55}%
```

\CreateData Issues the construction of a setter function for a data entry given by \setdata.

```
56 \newcommand{\CreateData}[1]{%
57 \@namedef{set#1}##1{%
58 \vutinfth@def@data{#1}{##1}%
59 }%
60 \vutinfth@def@data@invalid{#1}{\string\set#1}%
61 }%
```

### 4.2.3 Persons

\vutinfth@person@male \vutinfth@person@female Two genders are differentiated for each person: male and female.

- 62 \newcommand{\vutinfth@person@male}{male}%
  63 \newcommand{\vutinfth@person@female}{female}%
- \ifmale

Convenience macros to determine the gender of a person.

```
64 \newcommand{\ifmale}[2]{%
65 \ifcsstring{vutinfth@person@#1@gender}{\vutinfth@person@male}{#2}{}%
66 }%
67 \newcommand{\iffemale}[2]{%
68 \ifcsstring{vutinfth@person@#1@gender}{\vutinfth@person@female}{#2}{}%
69 }%
```

\vutinfth@def@person

Creates the internal storage for a person's name, titles and gender.

```
70 \newcommand{\vutinfth@def@person}[5]{%
71
    \@namedef{vutinfth@person@#1@def}{}%
72
    \@namedef{vutinfth@person@#1@pretitle}{#2}%
73
    \@namedef{vutinfth@person@#1@name}{#3}%
74
    \@namedef{vutinfth@person@#1@posttitle}{#4}%
75
    \ifdefstring{\vutinfth@person@male}{#5}{%
76
      \Onamedef{vutinfthOpersonO#1Ogender}{\vutinfthOpersonOmale}%
77
    }{}%
    \ifdefstring{\vutinfth@person@female}{#5}{%
78
      \@namedef{vutinfth@person@#1@gender}{\vutinfth@person@female}%
79
80
    }{}%
```

For the full name, additional spaces have to be inserted depending on the presence of pre- or posttitles.

```
81 \ifstrempty{#3}{%
82 \ifstrempty{#2}{%
83 \@namedef{vutinfth@person@#1@fullname}{#4}%
84 }{%
85 \ifstrempty{#4}{%
86 \@namedef{vutinfth@person@#1@fullname}{#2}%
87 }{%
```

```
\Onamedef{vutinfthOpersonO#1Ofullname}{#2 #4}%
 88
 89
         }%
       }%
 90
     }{%
 91
        \ifstrempty{#2}{%
 92
 93
          \ifstrempty{#4}{%
 94
            \@namedef{vutinfth@person@#1@fullname}{#3}%
          }{%
 95
 96
            \Onamedef{vutinfthOpersonO#1Ofullname}{#3 #4}%
         }%
 97
       }{%
 98
 99
          \ifstrempty{#4}{%
100
            \Onamedef{vutinfthOpersonO#1Ofullname}{#2 #3}%
101
            \Onamedef{vutinfthOpersonO#1Ofullname}{#2 #3 #4}%
102
          }%
103
       }%
104
     }%
105
106 }%
Initializes the internal storage with error messages.
```

\vutinfth@def@person@invalid

```
107 \newcommand{\vutinfth@def@person@invalid}[2]{%
108
     \@namedef{vutinfth@person@#1@error}{%
       \ClassError{vutinfth}{No #2 issued}{Set #1 with #2.}%
109
    }%
110
     \@namedef{vutinfth@person@#1@name}{%
111
       \@nameuse{vutinfth@person@#1@error}}%
112
     \@namedef{vutinfth@person@#1@pretitle}{%
113
114
       \@nameuse{vutinfth@person@#1@error}}%
     \@namedef{vutinfth@person@#1@posttitle}{%
115
116
       \@nameuse{vutinfth@person@#1@error}}%
     \@namedef{vutinfth@person@#1@gender}{%
117
       \@nameuse{vutinfth@person@#1@error}}%
118
     \@namedef{vutinfth@person@#1@fullname}{%
119
120
       \@nameuse{vutinfth@person@#1@error}}%
121 }%
```

\CreatePerson Issues the construction of a setter function for a person given by \setperson.

```
122 \newcommand{\CreatePerson}[1]{%
    \@namedef{set#1}##1##2##3##4{%
123
     124
   }%
125
    \vutinfth@def@person@invalid{#1}{\string\set#1}%
126
127 }%
```

### 4.2.4 Polylingual Text

This class supports bi- and polylingual text via a key-value mechanism. See the \CreatePolylingual command further down for the actual definition of polylingual expressions.

\AddLanguage

Constructs the temporary variables and the permanent storage for polylingual text in the given language.

```
128 \newcommand{\AddLanguage}[1]{%
```

First, the key for the current language, given by its name in the babel package, is created. Keys of the keyval package are internally stored as KV@family@keyname, where we use vutinfth as family name and the argument as key name. The value that is given to this key as part of a function argument is assigned to a temporary storage.

```
129 \@namedef{KV@vutinfth@#1}##1{%
130 \@namedef{vutinfth@current@#1}{##1}%
131 }%
```

The key value is initialized as empty.

```
132 \@nameuse{KV@vutinfth@#1}{}%
```

The transfer from temporary to permanent storage is achieved by adding code to the already existing transfer routine. This causes each new language to issue the transfer for the previously defined language.

```
133 \ifundef{\vutinfth@allocate@polylingual}{%
```

Define the transfer function, if it has not been defined so far.

```
134 \newcommand{\vutinfth@allocate@polylingual}[1]{\@empty}% 135 \}{}%
```

Store the current transfer function via \let to allow recursion.

```
136 \@namelet{vutinfth@allocate@polylingual@#1}%
137 \vutinfth@allocate@polylingual
```

Define the transfer function to permanent storage.

```
138 \renewcommand{\vutinfth@allocate@polylingual}[1]{%
```

Call the transfer routine of the previously defined language.

```
139 \Onameuse{vutinfth@allocate@polylingual@#1}{##1}%
```

To define the permanent storage, **\Qnamexdef** is used the definition's scope has to be global.

```
140 \Qnamexdef{vutinfthQ##1Q#1}{%
141 \ifcsempty{vutinfthQcurrentQ#1}{%
```

In draft mode we mark unassigned languages, i.e., polylingual expression that were not defined for a language that is in use when the polylingual expression is called.

```
142     \ifdraftdoc{%
143          [Draft: No '#1' text for polylingual '##1'.]%
144      }\else{%
145          \relax
146     }\fi
147  }{%
```

The use of \@namexdef expands the content of the temporary storage before assigning it to the permanent one.

```
148 \@nameuse{vutinfth@current@#1}%
149 }%
150 }%
151 }%
```

At time of usage, the language, which is given as an argument, is checked against the currently active language.

```
152 \ifundef{\vutinfth@selectlanguage@polylingual}{%
```

Define the language selection function, if it has not been defined so far.

```
% loss than the select language quantum of the select languag
```

Store the current selection function via \let to allow recursion.

```
155 \@namelet{vutinfth@selectlanguage@polylingual@#1}%
156 \vutinfth@selectlanguage@polylingual
```

Define the selection function.

```
157 \renewcommand{\vutinfth@selectlanguage@polylingual}[1]{%
```

Call the selection routine of the previously defined language.

```
\label{local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_local_loc
```

The currently active language is given by \languagename. If it matches the language, which was supplied as the argument, the content of the current permanent storage is returned.

```
160 }%
161 }%
```

\CreatePolylingual

Creates the actual polylingual expressions.

```
162 \newcommand{\CreatePolylingual}[2][]{%
163 \begingroup
```

The key-value pairs of the optional argument define the text that is returned for the respective languages. We use vutinfth as the family name for the keys.

```
164 \setkeys{vutinfth}{#1}%
```

Each key was already assigned a temporary storage, whose content has to be transfered to permanent storage.

```
165 \vutinfth@allocate@polylingual{#2}%
166 \endgroup
```

The mandatory argument  $\{\langle arg \rangle\}$  is used to define the macro that returns the appropriate text for the currently active language.

```
167 \@namedef{vutinfth@polylingual@#2}{%
168 \vutinfth@selectlanguage@polylingual{#2}}%
169 }%
```

### 4.2.5 Thesis Types

n@thesis@basetype@undergraduate tinfth@thesis@basetype@graduate Two thesis categories are differentiated: undergraduate and graduate.

```
170 \newcommand{\vutinfth@thesis@basetype@undergraduate}{%
171 vutinfth@undergraduate}%
172 \newcommand{\vutinfth@thesis@basetype@graduate}{%
173 vutinfth@graduate}%
```

# \ifundergraduate \ifgraduate

Convenience macros to determine the category of the selected thesis type.

```
174 \newcommand{\ifundergraduate}[1]{%
175
    \ifestrequal{\vutinfth@thesis@basetype}{%
176
       \vutinfth@thesis@basetype@undergraduate
177
    }{#1}{}%
178 }%
179 \newcommand{\ifgraduate}[1]{%
     \ifestrequal{\vutinfth@thesis@basetype}{%
180
       \vutinfth@thesis@basetype@graduate
181
   }{#1}{}%
182
183 }%
```

cinfth@thesis@doctortype@doctor vutinfth@thesis@doctortype@phd

Two doctor thesis categories are differentiated: doctor and phd, where the latter is for dissertation in the context of the Vienna PhD School of Informatics.

```
184 \newcommand{\vutinfth@thesis@doctortype@doctor}{%
    vutinfth@doctor}%
186 \newcommand{\vutinfth@thesis@doctortype@phd}{%
   vutinfth@phd}%
```

\ifdoctor Convenience macros to determine the category of the selected doctor thesis type. \ifphd These need to be nested inside \ifgraduate conditions.

```
188 \newcommand{\ifdoctor}[1]{%
     \ifestrequal{\vutinfth@thesis@doctortype}{%
189
       \vutinfth@thesis@doctortype@doctor
190
    }{#1}{}%
191
192 }%
193 \newcommand{\ifphd}[1]{%
     \ifestrequal{\vutinfth@thesis@doctortype}{%
       \vutinfth@thesis@doctortype@phd
195
   }{#1}{}%
196
197 }%
```

\vutinfth@thesis@basetype \vutinfth@thesis@doctortype \vutinfth@thesis@thesisname \vutinfth@thesis@degreename Initialize the thesis category, the type and the specific degree with error messages.

```
198 \newcommand{\vutinfth@thesis@basetype}{%
     \ClassError{vutinfth}{No \string\setthesis \space issued}{%
199
200
       Set thesis type with \string\setthesis.}%
201 }%
202 \newcommand{\vutinfth@thesis@doctortype}{%
     \ClassError{vutinfth}{No \string\setthesis \space issued}{%
       Set thesis type with \string\setthesis.}%
204
205 }%
206 \newcommand{\vutinfth@polylingual@degreename}{%
     \ClassError{vutinfth}{No \string\setthesis \space issued}{%
       Set thesis type with \string\setthesis.}%
208
209 }%
210 \newcommand{\vutinfth@polylingual@thesisname}{%
    \ClassError{vutinfth}{No \string\setthesis \space issued}{%
211
       Set thesis type with \string\setthesis.}%
212
213 }%
```

\vutinfth@thesis@bachelor \vutinfth@thesis@master \vutinfth@thesis@doctor \vutinfth@thesis@phd Four main thesis types are differentiated: bachelor, master, doctor, and phd-school.

```
214 \newcommand{\vutinfth@thesis@bachelor}{bachelor}%
215 \newcommand{\vutinfth@thesis@master}{master}%
216 \newcommand{\vutinfth@thesis@doctor}{doctor}%
217 \newcommand{\vutinfth@thesis@phd}{phd-school}%
```

```
\@setthesisname
                                                        Internal convenience macros.
                  \@setdegreename
                                                        218 \newcommand{\@setthesisname}[1]{%
\@setgendereddegreename
                                                                    \verb|\command{\wwtinfth@polylingual@thesisname}{\#1}}|
                                                        220 \newcommand{\@setdegreename}[1]{%
                                                                    \renewcommand{\vutinfth@polylingual@degreename}{#1}}%
                                                        221
                                                        222 \newcommand{\@setgendereddegreename}[2]{%
                                                                   \ifmale{author}{\@setdegreename{#1}}%
                                                        223
                                                                   \iffemale{author}{\@setdegreename{#2}}%
                                                        224
                                                        225 }%
                             \setthesis Sets the thesis type.
                                                        226 \newcommand{\setthesis}[1]{\%
                                                                  \ifdefstring{\vutinfth@thesis@bachelor}{#1}{%
                                                        Initializes bachelor thesis type.
                                                        228
                                                                        \renewcommand{\vutinfth@thesis@basetype}{%
                                                                             \vutinfth@thesis@basetype@undergraduate}%
                                                        229
                                                                        \@setthesisname{\vutinfth@polylingual@BACHELORTHESIS}%
                                                        230
                                                                        \@setdegreename{\vutinfth@polylingual@Bdeg}%
                                                        231
                                                                    \ifdefstring{\vutinfth@thesis@master}{#1}{%
                                                        Initializes master thesis type.
                                                                        \renewcommand{\vutinfth@thesis@basetype}{%
                                                        234
                                                                             \vutinfth@thesis@basetype@undergraduate}%
                                                        235
                                                        236
                                                                        \@setthesisname{%
                                                                             \ClassError{vutinfth}{No \string\setmasterdegree \space issued}{%
                                                        237
                                                        238
                                                                                  Set masterdegree with \string\setmasterdegree.}%
                                                                        }%
                                                        239
                                                                        \@setdegreename{%
                                                        240
                                                                             \ClassError{vutinfth}{No \string\setmasterdegree \space issued}{%
                                                        241
                                                        242
                                                                                 Set master degree with \string\setmasterdegree.}%
                                                        243
                                                                        }%
                                                        244
                                                                    \ifdefstring{\vutinfth@thesis@doctor}{#1}{%
                                                        Initializes doctor thesis type.
                                                                      \renewcommand{\vutinfth@thesis@basetype}{%
                                                        246
                                                        247
                                                                           \vutinfth@thesis@basetype@graduate}%
                                                                      \renewcommand{\vutinfth@thesis@doctortype}{%
                                                        248
                                                                           \vutinfth@thesis@doctortype@doctor}%
                                                        249
                                                                      \@setthesisname{\vutinfth@polylingual@DOCTORTHESIS}%
                                                        250
                                                                      \@setdegreename{%
                                                        251
                                                                           \verb|\ClassError{vutinfth}{No \string\setdoctordegree \space issued}{%} % and the property of t
                                                        252
                                                        253
                                                                                Set doctor degree with \string\setdoctordegree.}%
```

}%

254

```
}{}%
255
     \ifdefstring{\vutinfth@thesis@phd}{#1}{%
256
Initializes phd-school thesis type.
      \renewcommand{\vutinfth@thesis@basetype}{%
257
258
        \vutinfth@thesis@basetype@graduate}%
      \renewcommand{\vutinfth@thesis@doctortype}{%
259
260
        \vutinfth@thesis@doctortype@phd}%
261
      \@setthesisname{\vutinfth@polylingual@PHDTHESIS}%
262
      \@setdegreename{\vutinfth@polylingual@Pdeg}%
263
     }{}%
264 }%
Four master degrees can be selected: dipl., master, rer.nat., and
rer.soc.oec..
265 \newcommand{\vutinfth@thesis@mdeg@dipl}{dipl.}%
266 \newcommand{\vutinfth@thesis@mdeg@master}{master}%
267 \newcommand{\vutinfth@thesis@mdeg@rernat}{rer.nat.}%
268 \newcommand{\vutinfth@thesis@mdeg@rersocoec}{rer.soc.oec.}%
Sets the specific master degree.
269 \newcommand{\setmasterdegree}[1]{%
270
     \ifdefstring{\vutinfth@thesis@mdeg@dipl}{#1}{%
       \@setthesisname{\vutinfth@polylingual@DIPLOMATHESIS}%
271
       \@setgendereddegreename{%
272
         \vutinfth@polylingual@MdegDiplMale
273
274
       }{%
         \vutinfth@polylingual@MdegDiplFemale
275
276
       }%
277
     \ifdefstring{\vutinfth@thesis@mdeg@master}{#1}{%
278
279
       \@setthesisname{\vutinfth@polylingual@MASTERTHESIS}%
280
       \@setdegreename{\vutinfth@polylingual@MdegMaster}%
281
     ጉ ና ጉ %
     \ifdefstring{\vutinfth@thesis@mdeg@rernat}{#1}{%
282
283
       \@setthesisname{\vutinfth@polylingual@MASTERTHESIS}%
       \@setgendereddegreename{%
284
285
         \vutinfth@polylingual@MdegRerNatMale
       }{%
286
         \vutinfth@polylingual@MdegRerNatFemale
287
       }%
288
289
     }{}%
290
     \ifdefstring{\vutinfth@thesis@mdeg@rersocoec}{#1}{%
291
       \@setthesisname{\vutinfth@polylingual@MASTERTHESIS}%
292
       \@setgendereddegreename{%
293
         \vutinfth@polylingual@MdegRerSocOecMale
```

\vutinfth@thesis@mdeg@dipl \vutinfth@thesis@mdeg@master

\setmasterdegree

\vutinfth@thesis@mdeg@rernat

vutinfth@thesis@mdeg@rersocoec

}{%

294

```
295
                                        \vutinfth@polylingual@MdegRerSocOecFemale
                                      }%
                               296
                                   }{}%
                               297
                               298 }%
                               Three doctor degrees can be selected: rer.nat., techn., and rer.soc.oec..
  \vutinfth@thesis@ddeg@rernat
   \vutinfth@thesis@ddeg@techn
                               299  \newcommand{\vutinfth@thesis@ddeg@rernat}{rer.nat.}%
vutinfth@thesis@ddeg@rersocoec
                               300 \newcommand{\vutinfth@thesis@ddeg@techn}{techn.}%
                               \setdoctordegree
                               Sets the specific doctor degree.
                               302 \newcommand{\setdoctordegree}[1]{%
                                    \ifdefstring{\vutinfth@thesis@ddeg@rernat}{#1}{%
                               304
                                      \@setgendereddegreename{%
                                        \vutinfth@polylingual@DdegRerNatMale
                               305
                               306
                                        \vutinfth@polylingual@DdegRerNatFemale
                               307
                                      }%
                               308
                                    }{}%
                               309
                                    310
                               311
                                      \@setgendereddegreename{%
                               312
                                        \vutinfth@polylingual@DdegTechnMale
                               313
                                      }{%
                                        \verb|\vutinfth@polylingual@DdegTechnFemale| \\
                               314
                                      }%
                               315
                                    }{}%
                               316
                                    \ifdefstring{\vutinfth@thesis@ddeg@rersocoec}{#1}{%
                               317
                                      \@setgendereddegreename{%
                               318
                                        \vutinfth@polylingual@DdegRerSocOecMale
                               319
                                      }{%
                               320
                                        \vutinfth@polylingual@DdegRerSocOecFemale
                               321
                                      }%
                               322
                                   }{}%
                               323
                               324 }%
                               4.2.6
                                      Declarations
                 Textual Data
                               Creates the required textual data entries.
                               325 \CreateData{address}%
                               326 \CreateData{regnumber}%
                               327 \CreateData{firstreviewerdata}%
                               328 \CreateData{secondreviewerdata}%
                               Creates the required person entries.
                      Persons
```

329 \CreatePerson{author}%

```
330 \CreatePerson{advisor}%
              331 \CreatePerson{secondadvisor}%
              332 \CreatePerson{firstassistant}%
              333 \CreatePerson{secondassistant}%
              334 \CreatePerson{thirdassistant}%
              335 \CreatePerson{firstreviewer}%
              336 \CreatePerson{secondreviewer}%
              Adds the desired languages to the polylingual expressions. All added languages
   Languages
              have to be given as arguments to the babel package.
              337 \AddLanguage{english}%
              338 \AddLanguage{naustrian}%
PolyLinguals Creates the polylingual expressions.
              339 \CreatePolylingual[
              340 english=Advisor,
              341 naustrian=Betreuung]{Advisor}%
              342 \CreatePolylingual[
              343 english=Second advisor]{Secondadvisor}%
              344 \CreatePolylingual[
              345
                   english=submitted in partial fulfillment of the requirements
              346
                     for the degree of,
                   naustrian=zur Erlangung des akademischen Grades]{submission}%
              347
              348 \CreatePolylingual[
              349
                   english=in,
                   naustrian=im Rahmen des Studiums]{in}%
              350
              351 \CreatePolylingual[
              352 english=within the]{within}%
              353 \CreatePolylingual[
              354 english=Vienna PhD School of Informatics]{School}%
              355 \CreatePolylingual[
              356 english=by,
                   naustrian=eingereicht von]{by}%
              357
              358 \CreatePolylingual[
                   english=Registration Number,
                   naustrian=Matrikelnummer]{Registrationnumber}%
              361 \CreatePolylingual[
              362 english=to the Faculty of Informatics,
                  naustrian=an der Fakult\"at f\"ur Informatik]{faculty}%
              364 \CreatePolylingual[
              365 english=at the Vienna University of Technology,
              366 naustrian=der Technischen Universit\"at Wien]{university}%
              367 \CreatePolylingual[
              368 english=Assistance,
              369 naustrian=Mitwirkung]{Assistance}%
              370 \CreatePolylingual[
                   english=The dissertation has been reviewed by:,
                   naustrian=Diese Dissertation haben begutachtet:]{Reviewed}%
```

```
373 \CreatePolylingual[
     english=External reviewers:]{Reviewers}%
374
375 \CreatePolylingual[
    english=Vienna,
376
     naustrian=Wien]{Place}%
377
378 \CreatePolylingual[
     english=Declaration of Authorship,
     naustrian=Erkl\"arung zur Verfassung der Arbeit]{StatementChapter}%
381 \CreatePolylingual[
     english={I hereby declare that I have written this Doctoral Thesis
382
       independently, that I have completely specified the utilized
383
       sources and resources and that I have definitely marked all parts
384
       of the work - including tables, maps and figures - which belong
       to other works or to the internet, literally or extracted, by
386
       referencing the source as borrowed.},
387
     naustrian={Hiermit erkl\"are ich, dass ich diese Arbeit
388
       selbst\"andig verfasst habe, dass ich die verwendeten Quellen
389
       und Hilfsmittel vollst\"andig angegeben habe und dass ich die
390
391
       Stellen der Arbeit -- einschlie{\ss}lich Tabellen, Karten und
392
       Abbildungen --, die anderen Werken oder dem Internet im Wortlaut
       oder dem Sinn nach entnommen sind, auf jeden Fall unter Angabe
393
       der Quelle als Entlehnung kenntlich gemacht habe.}]{Statement}%
394
```

### Degree titles.

```
395 \CreatePolylingual[
    english=Bachelor of Science,
    naustrian=Bachelor of Science]{Bdeg}%
398 \CreatePolylingual[
     english=Master of Science,
399
    naustrian=Master of Science]{MdegMaster}%
400
401 \CreatePolylingual[
     english=Diplom-Ingenieur,
     naustrian=Diplom-Ingenieur]{MdegDiplMale}%
403
404 \CreatePolylingual[
405
     english=Diplom-Ingenieurin,
     naustrian=Diplom-Ingenieurin]{MdegDiplFemale}%
407 \CreatePolylingual[
     english=Magister der Naturwissenschaften,
     naustrian=Magister der Naturwissenschaften]{MdegRerNatMale}%
410 \CreatePolylingual[
     english=Magistra der Naturwissenschaften,
     naustrian=Magistra der Naturwissenschaften]{MdegRerNatFemale}%
413 \CreatePolylingual[
     english=Magister der Sozial- und Wirtschaftswissenschaften,
414
415
     naustrian=Magister der Sozial- und Wirtschaftswissenschaften]{%
     MdegRerSocOecMale}%
417 \CreatePolylingual[
     english=Magistra der Sozial- und Wirtschaftswissenschaften,
418
     naustrian=Magistra der Sozial- und Wirtschaftswissenschaften]{%
```

```
420 MdegRerSocOecFemale}%
          421 \CreatePolylingual[
          422 english=Doktor der Naturwissenschaften,
          423 naustrian=Doktor der Naturwissenschaften]{DdegRerNatMale}%
          424 \CreatePolylingual[
          425 english=Doktorin der Naturwissenschaften,
               naustrian=Doktorin der Naturwissenschaften]{DdegRerNatFemale}%
          427 \CreatePolylingual[
               english=Doktor der Technischen Wissenschaften,
               naustrian=Doktor der Technischen Wissenschaften]{DdegTechnMale}%
          430 \CreatePolylingual[
                english=Doktorin der Technischen Wissenschaften,
                naustrian=Doktorin der Technischen Wissenschaften]{DdegTechnFemale}%
          433 \CreatePolylingual[
          434 english=Doktor der Sozial- und Wirtschaftswissenschaften,
               naustrian=Doktor der Sozial- und Wirtschaftswissenschaften]{%
          435
               DdegRerSocOecMale}%
          436
          437 \CreatePolylingual[
          438 english=Doktorin der Sozial- und Wirtschaftswissenschaften,
          439 naustrian=Doktorin der Sozial- und Wirtschaftswissenschaften]{%
          440 DdegRerSocOecFemale}%
          441 \CreatePolylingual[
               english=Doctor of Technical Sciences]{%
          442
               Pdeg}%
          443
          Thesis types.
          444 \CreatePolylingual[
          445 english=BACHELOR'S THESIS,
          446 naustrian=BACHELORARBEIT] {BACHELORTHESIS}%
          447 \CreatePolylingual[
               english=MASTER'S THESIS,
          448
          449 naustrian=MASTERARBEIT]{MASTERTHESIS}%
          450 \CreatePolylingual[
               english=DIPLOMA THESIS,
               naustrian=DIPLOMARBEIT]{DIPLOMATHESIS}%
          452
          453 \CreatePolylingual[
          454 english=DISSERTATION,
          455 naustrian=DISSERTATION]{DOCTORTHESIS}%
          456 \CreatePolylingual[
          457 english=PhD THESIS]{PHDTHESIS}%
\settitle Sets the title of the thesis.
          458 \mbox{ \newcommand{\settitle}[2]{}}
          459 \CreatePolylingual[english=#1,naustrian=#2]{Title}%
          460 }%
```

\setsubtitle Sets the subtitle of the thesis.

```
\CreatePolylingual[english=#1,naustrian=#2]{Subtitle}%
                                                                             463 }%
                                \setcurriculum Sets the curriculum name.
                                                                             464 \newcommand{\setcurriculum}[2]{%
                                                                             465 \CreatePolylingual[english=#1,naustrian=#2]{Curriculum}%
                                                                             466 }%
                                                                             4.3
                                                                                              Layout
                                                                             4.3.1 Setup
           \vutinfth@squarebullet
                                                                            Set internal convenience macros.
                                                                             467 \newcommand{\newsetlength}[2]{%
                                                                             468
                                                                                          \newlength{#1}%
                                                                             469
                                                                                          \setlength{#1}{#2}%
                                                                             471 \newcommand{\vutinfth@squarebullet}{\rule[0.47ex]\{0.4ex\}}%
        \vutinfth@tmp@parindent
                                                                             Temporary storage for page layout lengths.
\vutinfth@tmp@baselineskip
                                                                             472 \newlength{\vutinfth@tmp@parindent}%
              \vutinfth@tmp@parskip
                                                                             473 \newlength{\vutinfth@tmp@baselineskip}%
                                                                             474 \newlength{\vutinfth@tmp@parskip}%
                                                                             Saves and restores relevant page layout lengths.
                \vutinfth@savelayout
        \vutinfth@restorelayout
                                                                             475 \newcommand{\vutinfth@savelayout}{%
                                                                                           \setlength{\vutinfth@tmp@parindent}{\parindent}%
                                                                             476
                                                                                           \setlength{\vutinfth@tmp@baselineskip}{\baselineskip}%
                                                                             477
                                                                                           \setlength{\vutinfth@tmp@parskip}{\parskip}%
                                                                             478
                                                                             479 }%
                                                                             480 \newcommand{\vutinfth@restorelayout}{%
                                                                                           \setlength{\parindent}{\vutinfth@tmp@parindent}%
                                                                             481
                                                                                           \verb|\colored| \colored| with {\tt Ctmp@baselineskip}| \colored| \col
                                                                             482
                                                                                           \setlength{\parskip}{\vutinfth@tmp@parskip}%
                                                                             483
                                                                             484 }%
```

461 \newcommand{\setsubtitle}[2]{%

### 4.3.2 Title Page

Initialize the header graphics. The vertical placement of the header graphics on the title pages are given by \vutinfth@header@placement, while the composition of the graphical elements are determined by the subsequent lengths, which constitute

direct measurements of the graphics. If the header graphics are changed, these values have to be adapted.

```
485 \newsetlength{\vutinfth@header@placement}{-41.49731pt}%
                             486 \newsetlength{\vutinfth@bar@width}{511bp}%
                             487 \verb|\newsetlength{\vutinfth@bar@height}{47bp}|| %
                             488 \newsetlength{\vutinfth@bar@pivot@x}{330.71bp}%
                             489 \newsetlength{\vutinfth@bar@pivot@y}{25.31bp}%
                             490 \newsetlength{\vutinfth@logo@height}{46bp}%
                             491 \newsetlength{\vutinfth@logo@pivot@x}{4.57bp}%
                             492 \newsetlength{\vutinfth@logo@pivot@y}{5.37bp}%
                             494 + \vutinfth@bar@pivot@y - \vutinfth@logo@pivot@y}%
                             495 \verb|\newsetlength{\vutinfth@logo@offset@x}{-\vutinfth@bar@width}|
                                 + \vutinfth@bar@pivot@x - \vutinfth@logo@pivot@x}%
                             497 \newsetlength{\vutinfth@logo@offset@y}{
                             498 - \vutinfth@bar@pivot@y + \vutinfth@logo@pivot@y}%
                            Initialize header.
 \vutinfth@header@titlepage
                             499 \newcommand{\vutinfth@header@titlepage}{%
                             500
                                  \centering
                             501
                                  \begin{minipage}[b][\vutinfth@logo@offset@height][t]{%
                             502
                                      \vutinfth@bar@width
                             503
                                    \includegraphics{TU_INF_header}%
                             504
                             505
                                    \hspace*{\vutinfth@logo@offset@x}%
                                    \raisebox{\vutinfth@logo@offset@y}{%
                             506
                             507
                                      \includegraphics[scale=1]{TU_INF_Logo_gray}%
                             508
                                   }%
                             509
                                 \end{minipage}%
                             510 }%
                            Initialize footer.
 \vutinfth@footer@titlepage
                             \centering
                             512
                                  \begin{minipage}{\textwidth}%
                             513
                                   \centering\vutinfth@normalsize\sffamily
                             514
                                   Technische Universit\"{a}t Wien\\
                             515
                                   A-1040 Wien \vutinfth@squarebullet\space
                             516
                                   Karlsplatz 13 \vutinfth@squarebullet\space
                             517
                                   Tel. +43-1-58801-0 \vutinfth@squarebullet\space
                             518
                                   www.tuwien.ac.at%
                             519
                             520
                                 \end{minipage}%
                             521 }%
                            Generate the title page style.
vutinfth@pagestyle@titlepage
```

522 \makepagestyle{vutinfth@pagestyle@titlepage}%

```
523 \makerunningwidth{vutinfth@pagestyle@titlepage}[\textwidth]{%
524 \vutinfth@bar@width}%
525 \makeheadposition{vutinfth@pagestyle@titlepage}{%
526 center}{center}{center}%
527 \makeevenhead{vutinfth@pagestyle@titlepage}{}{%
528 \vutinfth@header@titlepage}{}{%
529 \makeoddhead{vutinfth@pagestyle@titlepage}{}{%
530 \vutinfth@header@titlepage}{}{%
531 \makefootrule{vutinfth@pagestyle@titlepage}{}{%
532 \vutinfth@pagestyle@titlepage}{}{%
533 \makeevenfoot{vutinfth@pagestyle@titlepage}{}{%
534 \vutinfth@footer@titlepage}{}{%
535 \makeoddfoot{vutinfth@pagestyle@titlepage}{}{%
536 \vutinfth@footer@titlepage}{}{%
536 \vutinfth@footer@titlepage}{}{%
```

Set style element specifications.

537 \newsetlength{\vutinfth@bigskipamount}{6mm}%

Helper functions.

538 \newcommand{\vutinfth@bigskip}{\vspace{\vutinfth@bigskipamount}}%

\AdvisorBlock

Generates a block with the advisor's name (and potential assistances' names). An error is thrown, if the advisors are not defined consecutively, starting with the first.

```
539 \newcommand{\AdvisorBlock}{%
     \ifundergraduate{%
540
       \begin{minipage}[t][2.5cm][t]{\textwidth}%
541
         \vutinfth@normalsize
542
543
         \begin{tabular}{0{}10{}}1%
           \vutinfth@polylingual@Advisor: &
544
           \vutinfth@person@advisor@fullname\\
545
           \ifdef{\vutinfth@person@firstassistant@def}{%
546
547
             \vutinfth@polylingual@Assistance: &
548
             \vutinfth@person@firstassistant@fullname\\
549
           }{}%
           \ifdef{\vutinfth@person@secondassistant@def}{%
550
             \ifundef{\vutinfth@person@firstassistant@def}{%
551
               \vutinfth@person@firstassistant@error
552
             }{%
553
               & \vutinfth@person@secondassistant@fullname\\
554
             }%
555
           }{}%
556
           \ifdef{\vutinfth@person@thirdassistant@def}{%
557
             \ifundef{\vutinfth@person@firstassistant@def}{%
558
                \vutinfth@person@firstassistant@error
559
560
             }{%
561
               \ifundef{\vutinfth@person@secondassistant@def}{%
```

```
\vutinfth@person@secondassistant@error
562
                }{%
563
                  & \vutinfth@person@thirdassistant@fullname\\
564
               }%
565
             }%
566
567
          }{}%
568
         \end{tabular}%
       \end{minipage}%
569
     }%
570
     \ifgraduate{%
571
       \begin{minipage}[t][1.6cm][t]{\textwidth}%
572
573
         \vutinfth@normalsize
         \vutinfth@polylingual@Advisor:
574
         \vutinfth@person@advisor@fullname
575
         \ifphd{%
576
            \ifdef{\vutinfth@person@secondadvisor@def}{%
577
578
             \vutinfth@polylingual@Secondadvisor:
579
580
              \vutinfth@person@secondadvisor@fullname
581
           }{}%
         }%
582
583
       \end{minipage}\par%
    }%
584
585 }%
```

\vutinfth@signature@height \vutinfth@signature@width \vutinfth@placedate@width

Set lengths of the signature blocks.

```
586 \newsetlength{\vutinfth@signature@height}{25mm}%
587 \newsetlength{\vutinfth@signature@width}{51mm}%
588 \newsetlength{\vutinfth@placedate@width}{50mm}%
```

\SignatureFields

Generates a block with signatures and an optional place-date entry. The first argument is optional and adds an entry with date and place [y], or adds corresponding whitespace [h] or adds nothing [n], which is also the default value. The second arguments adds a rule and the given text below it, if a text is given, or the corresponding whitespace, if not. The third argument adds a rule and the given text below it, if a text is given.

```
589 \newcommand{\SignatureFields}[3][n]{%
     {\vutinfth@normalsize
590
591
       \left\{ \frac{\#1}{y} \right\}
          \begin{minipage}[b][\vutinfth@signature@height]{%
592
593
              \vutinfth@placedate@width
594
            }%
            \vutinfth@polylingual@Place,
595
            \displaydate{vutinfth@date@signing}\vspace*{\baselineskip}%
596
         \end{minipage}%
597
598
          \hfill
       }{}%
599
```

```
600
       \left\{ 1\right\} 
601
       \left\{ \frac{41}{h}\right\} 
          \hspace*{\vutinfth@placedate@width}%
602
603
          \hfill
       }{}%
604
605
       \ifstrempty{#2}{%
606
          \hspace*{\vutinfth@signature@width}%
          \hfill
607
       }{%
608
          \begin{minipage}[b][\vutinfth@signature@height]{%
609
              \vutinfth@signature@width
610
            }%
611
612
            \centering
            \rule{\vutinfth@signature@width}{0.5pt}\\
613
614
          \end{minipage}%
615
          \hfill
616
       }%
617
618
       \left\{ \frac{43}{3} \right\}
619
          \begin{minipage}[b][\vutinfth@signature@height]{%
              \vutinfth@signature@width
620
            }%
621
622
            \centering
            \rule{\vutinfth@signature@width}{0.5pt}\\
623
            #3%
624
625
          \end{minipage}%
626
       }%
627
     }%
628 }%
Generates a block with the relevant signatures.
629 \newcommand{\ReviewerBlock}{%
630
     \ifgraduate{%
       \ifdoctor{%
631
632
          {\vutinfth@normalsize
            \vutinfth@polylingual@Reviewed\\
633
            \SignatureFields[h]{%
634
              \vutinfth@person@firstreviewer@name
635
            }{%
636
              \vutinfth@person@secondreviewer@name
637
```

\ReviewerBlock

```
}%
638
         }%
639
       }%
640
       \ifphd{%
641
642
         {\vutinfth@normalsize
643
           \vutinfth@polylingual@Reviewers\\
           \vutinfth@person@firstreviewer@name.
644
645
            \vutinfth@data@firstreviewerdata.\\
646
            \vutinfth@person@secondreviewer@name.
```

\SignatureBlock Generates a block with the relevant signatures.

```
652 \newcommand{\SignatureBlock}{%
653
     \ifundergraduate{%
        {\vutinfth@normalsize
654
655
          \SignatureFields[y]{%
            \vutinfth@person@author@name
656
          }{%
657
            \vutinfth@person@advisor@name
658
         }%
659
       }%
660
661
     }%
     \ifgraduate{%
662
663
        {\vutinfth@normalsize
          \ifdoctor{%
664
            \SignatureFields[y]{}{%
665
666
              \vutinfth@person@author@name
            }%
667
668
          \ifphd{%
669
            \SignatureFields[y]{%
670
              \vutinfth@person@author@name
671
            }{%
672
              \vutinfth@person@advisor@name
673
            }%
674
675
         }%
676
       }%
677
     }%
678 }%
```

\AddTitlePage Generates the language-dependant title page. Multiline title and subtitle are supported.

```
679 \newcommand{\AddTitlePage}{
680 \thispagestyle{vutinfth@pagestyle@titlepage}%
```

Set a new page geometry where the header separation length (headsep) places the header. The actual header height (head) has to be large enough to contain the header content otherwise the underlying memoir class issues a warning.

```
681 \newgeometry{%
682 left=2.4cm,right=2.4cm,bottom=2.5cm,top=2cm,
683 headsep=\vutinfth@header@placement,
684 head=2\vutinfth@logo@offset@height
```

```
685 }%
```

 $724 \\ 725$ 

726

\vutinfth@bigskip

Save the current page layout lengths for later restoration.

```
\vutinfth@savelayout
686
             \setlength{\parindent}{0pt}%
687
688
             \setlength{\baselineskip}{13.6pt}%
             \setlength{\parskip}{Opt plus 1pt}%
Set title page text to helvetica.
             \begin{SFFont}{phv}%
690
691
                  \sffamily
                  {\centering
692
                       693
Title and subtitle are bottom aligned and grow upwards.
                        \begin{minipage}[t][5cm][b]{\textwidth}%
694
695
                             \centering
                             \vutinfth@HUGE{\bfseries\vutinfth@polylingual@Title}\\
696
                             \bigskip
697
                             \vutinfth@huge{\bfseries
698
699
                                  \ifdef{\vutinfth@polylingual@Subtitle}{%
700
                                        \vutinfth@polylingual@Subtitle}{%
                                 }%
701
                            }%
702
                       \end{minipage}\par
703
                       \vutinfth@bigskip\vutinfth@bigskip
704
                       {\tt \{\vutinfth@LARGE\vutinfth@polylingual@thesisname\}\par}
705
                        \vutinfth@bigskip
706
                        {\vutinfth@large\vutinfth@polylingual@submission}\par
707
708
                        \vutinfth@bigskip
                        \ifundergraduate{%
709
                             {\tt \{\vutinfth@LARGE\{\bfseries\vutinfth@polylingual@degreename\}}\pare for the polylingual of the polylingua
710
                             \vutinfth@bigskip
711
712
                             {\vutinfth@large\vutinfth@polylingual@in}\par
713
                             \vutinfth@bigskip
                             {\vutinfth@Large{\bfseries\vutinfth@polylingual@Curriculum}}\par
714
                       }%
715
                        \ifgraduate{%
716
                             {\vutinfth@LARGE{\bfseries\vutinfth@polylingual@degreename}}\par
717
                             \ifphd{%
718
719
                                  \vutinfth@bigskip
                                  {\vutinfth@large\vutinfth@polylingual@within}\par
720
721
                                  \vutinfth@bigskip
                                  {\vutinfth@LARGE{\bfseries\vutinfth@polylingual@School}}\par
722
                            }%
723
                       }%
```

{\vutinfth@large\vutinfth@polylingual@by}\par

```
727
         \vutinfth@bigskip
         {\vutinfth@Large{\bfseries\vutinfth@person@author@fullname}}\par
728
         \smallskip
729
         {\vutinfth@large\vutinfth@polylingual@Registrationnumber\
730
         \vutinfth@data@regnumber}\par
731
732
733
       \vutinfth@bigskip\vutinfth@bigskip
       \ifgraduate{\ifphd{\vspace*{-8mm}}}%
734
       \begin{minipage}[b][1.6cm][c]{\textwidth}%
735
         \vutinfth@normalsize%
736
         \vutinfth@polylingual@faculty\par
737
         \vutinfth@polylingual@university
738
739
       \end{minipage}\par
       \AdvisorBlock\par
740
```

Add stretchable glue between the advisor block and the signatures. This ensures that the signature part is always at the bottom of the page.

```
741
       \vfill
742
       \ReviewerBlock\par
       \SignatureBlock\par
743
       \vspace*{1cm}%
744
     \end{SFFont}%
745
     \pagestyle{empty}%
746
747
     \cleardoublepage
     \vutinfth@restorelayout
749
     \restoregeometry
750 }%
```

### 4.3.3 Front Matter Material

\AddStatementPage Generates the statement page.

751 \newcommand{\AddStatementPage}{

Set the same page geometry as for the titlepages.

```
752 %^A \newgeometry{%
753 %^A left=2.4cm,right=2.4cm,bottom=2.5cm,top=2cm,
754 %^A headsep=\vutinfth@header@placement,
755 %^A head=2\vutinfth@logo@offset@height
756 %^A }%
```

Save the current page layout lengths for later restoration.

```
757 \vutinfth@savelayout
758 \setlength{\parindent}{0pt}%
759 \setlength{\baselineskip}{13.6pt}%
760 \setlength{\parskip}{0pt plus 1pt}%
761 \begin{SFFont}{phv}%
```

```
762
                           \sffamily
                             \chapter*{\vutinfth@polylingual@StatementChapter}%
                    763
                             \verb|\vutinfth@person@author@fullname|| \\
                    764
                             \vutinfth@data@address\par
                    765
                             \vspace{1.2cm}%
                    766
                    767
                             {\normalfont\vutinfth@polylingual@Statement}\par
                    768
                             \vspace{1.2cm}%
                             \SignatureFields[y]{\vutinfth@person@author@name}{}%
                    769
                    770
                         \end{SFFont}%
                         \cleardoublepage
                    771
                         \vutinfth@restorelayout
                    773 %^^A \restoregeometry
                    774 }%
    \addtitlepage
                   Generates the titlepage in given language.
                    775 \newcommand{\addtitlepage}[1]{%
                         \selectlanguage{#1}%
                        \AddTitlePage
                    777
                    778 }%
\addstatementpage
                   Generates the statement page.
                    779 \newcommand{\addstatementpage}{%
                    780
                         \selectlanguage{naustrian}%
                         \ifundergraduate{\AddStatementPage}%
                    781
                    782
                         \ifgraduate{%
                    783
                           \ifdoctor{\AddStatementPage}%
                    784
                           \ifphd{%
                             \selectlanguage{english}%
                    785
                             \AddStatementPage
                    786
                           }%
                    787
                        }%
                    788
                    789 }%
 acknowledgements
                   Generates the English acknowledgement section.
                    790 \newenvironment{acknowledgements}{%
                         \selectlanguage{english}%
                         \chapter{Acknowledgements}%
                    792
                    793 }{%
                    794 \cleardoublepage
                    795 }%
acknowledgements*
                    Generates the English acknowledgement section without an entry in the table of
                    contents.
                    796 \newenvironment{acknowledgements*}{%
                        \selectlanguage{english}%
```

```
\chapter*{Acknowledgements}%
             799 }{%
                 \cleardoublepage
             800
             801 }%
             Generates the German acknowledgement section.
danksagung
             802 \newenvironment{danksagung}{%
                 \selectlanguage{naustrian}%
                 \chapter{Danksagung}%
             805 }{%
             806 \cleardoublepage
             807 }%
             Generates the German acknowledgement section without an entry in the table of
danksagung*
             contents.
             808 \newenvironment{danksagung*}{%
                  \selectlanguage{naustrian}%
             810 \chapter*{Danksagung}%
             811 }{%
             812 \cleardoublepage
             813 }%
             Generates the English abstract.
             814 \renewenvironment{abstract}{%
                 \selectlanguage{english}%
                  \chapter{Abstract}%
             816
             817 }{%
                  \cleardoublepage
             818
             819 }%
             Generates the English abstract without an entry in the table of contents.
  abstract*
             820 \newenvironment{abstract*}{%
                  \selectlanguage{english}%
             822
                  \chapter*{Abstract}%
             823 }{%
             824 \cleardoublepage
             825 }%
kurzfassung Generates the German abstract without an entry in the table of contents.
             826 \newenvironment{kurzfassung}{%
                  \selectlanguage{naustrian}%
             828 \chapter{Kurzfassung}%
             829 }{%
             830 \cleardoublepage
```

831 }%

```
Generates the German abstract.
             kurzfassung*
                           832 \newenvironment{kurzfassung*}{%
                                \selectlanguage{naustrian}%
                                \chapter*{Kurzfassung}%
                           835 }{%
                           836 \cleardoublepage
                           837 }%
                           4.3.4 Page Style
                           Define the default page style of the thesis.
vutinfth@pagestyle@default
                           838 \makepagestyle{vutinfth@pagestyle@default}%
                           840 \verb|\makeoddfoot{vutinfth@pagestyle@default}{}{}{\thepage}{}\% \\
              \frontmatter Apply the default page style to the thesis.
              \mainmatter
                           841 \aliaspagestyle \chapter) {\tt vutinfth@pagestyle@default} \% \\
              \backmatter
                           842 \aliaspagestyle{part}{vutinfth@pagestyle@default}%
                           843 \addto\frontmatter{\pagestyle{vutinfth@pagestyle@default}}%
                           844 \add to \main matter {\pagestyle {\c vutinfth@pagestyle@default}} \%
                           845 \add to \backmatter{\pagestyle{vutinfth@pagestyle@default}}\%
                                Change History
                           5
```

| v0.9                               | Issue #1                          | 29 |
|------------------------------------|-----------------------------------|----|
| General: Pre-release version 1     | Updated to support PhD School     |    |
| v1.0                               | mentioning and fixed the associ-  |    |
| General: Initial release version 1 | ated vertical overflow. Issue #4  | 29 |
| v1.1                               | \AdvisorBlock: Updated to sup-    |    |
| General: Added references to the   | port second advisor. Issue #4     | 26 |
| GitLab environment 1               | Persons: Updated to support sec-  |    |
| v1.3                               | ond advisor. Issue Issue $\#4$    | 20 |
| General: Added support for a dis-  | Textual⊔Data: Updated to support  |    |
| sertation at the Vienna Phd        | external reviewer data. Issue     |    |
| School of Informatics. Issue #4 1  | #4                                | 20 |
| \AddStatementPage: Updated to      | \ifdoctor: Added to support mul-  |    |
| support multiple languages. Is-    | tiple dissertation types. Issue   |    |
| sue #4 31                          | #4                                | 17 |
| \addstatementpage: Updated to      | \ifphd: Added to support multiple |    |
| support english version. Issue     | dissertation types. Issue $#4$    | 17 |
| $#4 \dots 32$                      | PolyLinguals: Added to support    |    |
| \AddTitlePage: Added check for     | multiple dissertation types. Is-  |    |
| subtitle existance before usage.   | sue #4                            | 21 |

| \ReviewerBlock: Updated to sup-           | sertation types. Issue #4 17             |
|---|--|
| port external reviewers. Issue            | \vutinfth@thesis@doctortype@doctor:      |
| $#4 \dots 28$                             | Added to support multiple dis-           |
| \setthesis: Altered to support            | sertation types. Issue #4 17             |
| multiple dissertation types. Is-          | \vutinfth@thesis@doctortype@phd:         |
| sue #4                                    | Added to support multiple dis-           |
| port multiple dissertation types.         | sertation types. Issue #4 17             |
| Issue #4 29                               | \vutinfth@thesis@phd: Added to           |
| \vutinfth@thesis@doctortype:              | support multiple dissertation            |
| Added to support multiple dis-            | types. Issue #4 17                       |
|   |  |
| Index                                     |  |
|   |  |
| Symbols                                   | 200 200 200 200 200 215                  |
| \"  |  |
| \@empty                                   |  |
| \@namedef 47, 48, 51, 54, 57, 71, 72, 73, |  |
| 108, 111, 113, 115, 117, 119, 123,        |  |
| \@namelet                                 |  |
| \@nameuse 54, 112, 114                    |  |
| \@namexdef                                |  |
| \@setdegreename                           |  |
| \@setgendereddegreename                   |  |
| \\ 515, 545, 548, 554, 564, 578.          |  |
| 110, 545, 546, 554, 564, 576,             | , 013, 023, 033, 043, 043, 047, 030, 704 |
|   | 720                                      |
| \   |  |
| ${f A}$                                   |  |
| abstract (environment)                    |  |
| abstract* (environment)                   |  |
| acknowledgements (environment)            |  |
| acknowledgements* (environment)           |  |
| \AddLanguage                              | · · · · · · · · · · · · · · · · · · ·    |
| \AddStatementPage                         | · ——·                                    |
| \addstatementpage                         |  |
| \AddTitlePage                             |  |
| \addtitlepage                             |  |
| \addto                                    |  |
| \AdvisorBlock                             |  |
| \aliaspagestyle                           | 841, 842                                 |
| В   |  |
| \backmatter                               |  |

| \baselineskip                            |        |      |      |       |      |         | 477   | , 482   | 1,596  | , 688               | , 759         |
|--|--------|------|------|-------|------|---------|-------|---------|--------|---------------------|---------------|
| \begin 501                               | , 513, | 541, | 543  | , 572 | 592  | , 609   | , 619 | , 690   | , 694  | $\frac{1}{2}$ , 735 | , 761         |
| \begingroup                              |        |      |      |       |      |         |       |         | 2      | 0, 34               | , 163         |
| \bfseries                                |        |      |      |       | 696  | , 698   | , 710 | , 714   | ., 717 | , 722               | , 728         |
| \bigskip                                 |        |      |      |       |      |         |       |         |        |                     | 697           |
| -  |        |      |      |       |      |         |       |         |        |                     |               |
| C  |        |      |      |       |      |         | ٠     |         |        |                     |               |
| \centering                               |        |      |      |       |      |         |       |         |        |                     |               |
| \chapter                                 |        |      |      |       |      |         |       |         |        |                     |               |
| \chapterstyle                            |        |      |      |       |      |         |       |         |        |                     |               |
| \ClassError                              |        |      |      |       |      |         |       |         |        |                     |               |
| \cleardoublepage                         |        |      |      |       |      |         |       |         |        |                     |               |
| \CreateData                              |        |      |      |       |      |         |       |         |        |                     |               |
| \CreatePerson                            |        |      |      |       |      |         |       |         |        |                     |               |
| $\$ CreatePolylingual . $8$ ,            |        |      |      |       |      |         |       |         |        |                     |               |
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