

# Π Ο Λ Υ Γ Λ Ω Σ Σ Ι Α

## Polyglossia: A Babel Replacement for X<sub>Y</sub>LaTeX

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### Contents

<b>1</b>	<b>Introduction</b>	<b>2</b>
<b>2</b>	<b>Loading language definition files</b>	<b>3</b>
2.1	The recommended way . . . . .	3
2.2	The “Babel way” . . . . .	4
2.3	Supported languages . . . . .	4
<b>3</b>	<b>Language-switching commands</b>	<b>5</b>
3.1	Other commands . . . . .	6
<b>4</b>	<b>Font setup</b>	<b>6</b>
<b>5</b>	<b>Language-specific options and commands</b>	<b>7</b>
5.1	arabic . . . . .	7
5.2	bengali . . . . .	7
5.3	catalan . . . . .	7
5.4	dutch . . . . .	8
5.5	english . . . . .	8
5.6	esperanto . . . . .	8
5.7	farsi . . . . .	8
5.8	german . . . . .	9
5.9	greek . . . . .	10

5.10	hebrew	10
5.11	hindi	10
5.12	lao	10
5.13	lsorbian and usorbian	10
5.14	magyar	11
5.15	russian	11
5.16	sanskrit	11
5.17	serbian	11
5.18	syriac	11
5.19	thai	11
6	Modifying or extending captions and date formats	12
7	Non-Western decimal digits	12
8	Alphabetic numbering in Greek, Arabic, Hebrew, Syriac and Farsi	12
9	Calendars	13
9.1	Hebrew calendar (hebrewcal.sty)	13
9.2	Islamic calendar (hijrical.sty)	13
9.3	Farsi (jalālī) calendar (farsical.sty)	14
10	Acknowledgements (by François Charette)	14

## 1 Introduction

Polyglossia is a package for facilitating multilingual typesetting with  $\text{\LaTeX}$ . Basically, it can be used as a replacement of [Babel](#) for performing the following tasks automatically:

1. Loading the appropriate hyphenation patterns.
2. Setting the script and language tags of the current font (if possible and available), via the package [fontspec](#).
3. Switching to a font assigned by the user to a particular script or language.
4. Adjusting some typographical conventions according to the current language (such as afterindent, frenchindent, spaces before or after punctuation marks, etc.).
5. Redefining all document strings (like “chapter”, “figure”, “bibliography”).

6. Adapting the formatting of dates (for non-Gregorian calendars via external packages bundled with polyglossia: currently the Hebrew, Islamic and Farsi calendars are supported).
7. For languages that have their own numbering system, modifying the formatting of numbers appropriately (this also includes redefining the alphabetic sequence for non-Latin alphabets).<sup>1</sup>
8. Ensuring proper directionality if the document contains languages that are written from right to left (via the package `bidir`, available separately).

Several features of `Babel` that do not make sense in the  $\text{\LaTeX}$  world (like font encodings, shorthands, etc.) are not supported. Generally speaking, `polyglossia` aims to remain as compatible as possible with the fundamental features of `Babel` while being cleaner, light-weight, and modern. The package `antomega` has been very beneficial in our attempt to reach this objective.

**Requirements:** The current version of `polyglossia` makes use of some convenient macros defined in the `etoolbox` package by Philipp Lehmann. Being designed specifically for  $\text{\LaTeX}$ , it obviously also relies on `fontspec` by Will Robertson. For languages written from right to left, it needs the package `bidir` by Vafa Khalighi (وفا خلیقی). `Polyglossia` also bundles three packages for calendaric computations (`hebrewcal`, `hijrical`, and `farsical`).

## 2 Loading language definition files

### 2.1 The recommended way

You can determine the default language by means of the command:

```
\setdefaultlanguage [options]{lang}
```

(or equivalently `\setmainlanguage`). Secondary languages can be loaded with

```
\setotherlanguage [options]{lang}
```

These commands have the advantage of being explicit and of allowing you to set language-specific options.<sup>2</sup> It is also possible to load a series of secondary languages at once using

```
\setotherlanguages {lang1, lang2, lang3, ...}
```

Language-specific options can be set or changed at any time by means of

```
\setkeys {<lang>}{opt1=value1, opt2=value2, ...}
```

<sup>1</sup> For the Arabic script this is now done by the bundled package `arabicnumbers`.

<sup>2</sup> More on language-specific options below.

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## 2.2 The “Babel way”

← **Warning:** `polyglossia` no longer supports loading language definition files as package options!

## 2.3 Supported languages

Table 2.3 lists all languages currently supported. Those in red have specific options and/or commands that are explained in section 5 below.

albanian	croatian	hebrew	norsk	swedish
amharic	czech	hindi	nynorsk	syriac
arabic	danish	icelandic	occitan	tamil
armenian	divehi	interlingua	polish	telugu
asturian	dutch	irish	portuges	thai
bahasai	english	italian	romanian	turkish
bahasam	esperanto	lao	russian	turkmen
basque	estonian	latin	samin	ukrainian
bengali	farsi	latvian	sanskrit	urdu
brazil[ian]	finnish	lithuanian	scottish	usorbian
breton	french	lsorbian	serbian	vietnamese
bulgarian	galician	magyar	slovak	welsh
catalan	german	malayalam	slovenian	
coptic	greek	marathi	spanish	

Table 1: Languages currently supported in `polyglossia`

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v1.1.1

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*NB:* The support for Amharic ← should be considered an experimental attempt to port the package `ethiop`.<sup>3</sup> Version 1.1.1 ← added support for Asturian, Lithuanian, and Urdu. Version 1.2 ← adds support for Armenian, Occitan, Bengali, Lao, Malayalam, Marathi, Tamil, Telugu, and Turkmen.<sup>4</sup>

v1.1.1

Polyglossia can also be loaded with the option ‘babelshorthands’ ←, which globally activates `Babel` shorthands whenever available. Currently shorthands are only implemented for German and Catalan: see below for details.

v1.2.0

Another option (turned off by default) is ‘localmarks’, which redefines the internal  $\text{\LaTeX}$  macros `\markboth` and `\markright`. ← Note that this was formerly turned on by default, but we now realize that it causes more problems than oth-

<sup>3</sup> Feedback is welcome.

<sup>4</sup> See acknowledgements at the end for due credit to the various contributors.

erwise. For backwards-compatibility the opposite option ‘nolocalmarks’ is still available.

There is also the option ‘quiet’ which turns off most info messages and some of the warnings issued by  $\text{\LaTeX}$ , `fontspec` and `polyglossia`.

### 3 Language-switching commands

Whenever a language definition file `gloss-⟨lang⟩.ldf` is loaded, the command `\text{⟨lang⟩}` becomes available for short insertions of text in that language. For example `\textrussian{\today}` yields 12 октября 2011 г. Longer passages are better put between the environment `⟨lang⟩` (again with the possibility of setting language options locally. For instance the following allows us to quote the beginning of Homer’s *Iliad*:

```
\begin{greek}[variant=ancient]
μη̃νιν ἄειδε θεὰ Πηληϊάδεω Ἀχιλῆος οὐλομένην, ἣ μυρί' Ἀχαιοῖς ἄλγε'
ἔθηκε, πολλὰς δ' ἰφθίμους ψυχὰς Ἄϊδι προΐαψεν ἡρώων, αὐτοὺς δὲ ἐλώρια
τεῦχε κύνεσσιν οἰωνοῖσι' τε πᾶσι, Διὸς δ' ἔτελείετο βουλή, ἐξ οὗ δὴ τὰ
πρῶτα διαστήτην ἐρίσαντε Ἀτρεΐδης τε ἄναξ ἀνδρῶν καὶ δῖος Ἀχιλλεύς.
\end{greek}
```

μη̃νιν ἄειδε θεὰ Πηληϊάδεω Ἀχιλῆος οὐλομένην, ἣ μυρί' Ἀχαιοῖς ἄλγε' ἔθηκε, πολλὰς δ' ἰφθίμους ψυχὰς Ἄϊδι προΐαψεν ἡρώων, αὐτοὺς δὲ ἐλώρια τεῦχε κύνεσσιν οἰωνοῖσι' τε πᾶσι, Διὸς δ' ἔτελείετο βουλή, ἐξ οὗ δὴ τὰ πρῶτα διαστήτην ἐρίσαντε Ἀτρεΐδης τε ἄναξ ἀνδρῶν καὶ δῖος Ἀχιλλεύς.

Note that for Arabic one cannot use the environment `arabic`, as `\arabic` is defined internally by  $\text{\LaTeX}$ . In this case we need to use the environment `Arabic` instead. This is the beginning of Ibn Khaldūn’s *Muqaddima*:

```
\begin{Arabic}
هو إذ الغاية؛ شريف الفوائد، جمّ المذهب، عزيز فنّ التاريخ فنّ أن اعلم
والملوك سيرهم، في والأنبياء أخلاقهم، في الأمم من الماضين أحوال على يوقفنا
أحوال في يرومه لمن ذلك في الإقتداء فائدة تتمّ حتّى وسياستهم؛ دولهم في
والدنيا. الدين
\end{Arabic}
```

اعلم أنّ فنّ التاريخ فنّ عزيز المذهب، جمّ الفوائد، شريف الغاية؛ إذ هو يوقفنا على أحوال الماضين من الأمم في أخلاقهم، والأنبياء في سيرهم، والملوك في دولهم وسياستهم؛ حتّى تتمّ فائدة الإقتداء في ذلك لمن يرومه في أحوال الدين والدنيا.

### 3.1 Other commands

The following commands are probably of lesser interest to the end user, but ought to be mentioned here.

<code>\selectbackgroundlanguage</code>	▶ <code>\selectbackgroundlanguage</code> : this selects the global font setup and the numbering definitions for the default language.
<code>\resetdefaultlanguage</code>	▶ <code>\resetdefaultlanguage</code> (experimental): completely switches the default language to another one in the middle of a document: <i>this may have adverse effects!</i>
<code>\normalfontlatin</code>	▶ <code>\normalfontlatin</code> : in an environment where <code>\normalfont</code> has been re-defined to a non-latin script, this will call the font defined with <code>\setromanfont</code> etc. Likewise it is possible to use <code>\rmfamilylatin</code> , <code>\sffamilylatin</code> , and <code>\ttfamilylatin</code> .
<code>\rmfamilylatin</code>	
<code>\sffamilylatin</code>	
<code>\ttfamilylatin</code>	▶ Some macros defined in <a href="#">Babel</a> ’s <code>hyphen.cfg</code> (and thus usually compiled into the xelatex format) are redefined, but keep a similar behaviour, namely <code>\selectlanguage</code> , <code>\foreignlanguage</code> , and the environment <code>otherlanguage</code> .
<code>\selectlanguage</code>	
<code>\foreignlanguage</code>	
<code>otherlanguage</code>	

Since the Xe<sub>La</sub>TeX format incorporates [Babel](#)’s `hyphen.cfg`, the low-level commands for hyphenation and language switching defined there are also accessible.

## 4 Font setup

With polyglossia it is possible to associate a specific font with any script or language that occurs in the document. That font should always be defined as `\(script)font` or `\(language)font`. For instance, if the default roman font defined by `\setromanfont` does not support Greek, then one can define the font used to display Greek with:

```
\newfontfamily\greekfont[Script=Greek, (...)]{font}.
```

Note that polyglossia will use the font thus defined as is. for instance if `\arabicfont` is explicitly defined, then one should take care of including the option `Script=Arabic` in that definition. See the [fontspec](#) documentation for more information. If a specific sans or monospace font is needed for a particular script or language, it can be defined by means of `\(script)fontsf` or `\(language)fontsf` and `\(script)fonttt` or `\(language)fonttt`, respectively.

Whenever a new language is activated, [polyglossia](#) will first check whether a font has been defined for that language or – for languages in non-Latin scripts – for the script it uses. If it is not defined, it will use the currently active font and – in the case of OpenType fonts – will attempt to turn on the appropriate

OpenType tags for the script and language used, in case these are available in the font, by means of `fontspec`'s `\addfontfeature`. If the current font does not appear to support the script of that language, an error message is displayed.

## 5 Language-specific options and commands

This section gives a list of all languages for which options and end-user commands are defined. The default value of each option is given in *italic*.

### 5.1 arabic

Options:

- `calendar` = *gregorian* or *islamic* (= *hijri*)
- `locale` = *default*,<sup>5</sup> *mashriq*,<sup>6</sup> *libya*, *algeria*, *tunisia*, *morocco*, or *mauritania*. This setting influences the spelling of the month names for the Gregorian calendar, as well as the form of the numerals (unless overridden by the following option).
- `numerals` = *mashriq* or *maghrib* (the latter is the default when `locale` = *algeria*, *tunisia* or *morocco*)
- `abjadjimnotail` = *false* or *true*. ← Set this to *true* if you want the *abjad* form of the number three to be ٣ – as in the manuscript tradition – instead of the modern usage ج.

v1.0.3

Commands:

- |   |  |
|---|--|
| <code>\abjad</code><br><code>\abjadmaghribi</code><br><code>\aemph</code> | <ul style="list-style-type: none"> <li>▸ <code>\abjad</code> and <code>\abjadmaghribi</code> (see section 8)</li> <li>▸ <code>\aemph</code> to emphasize Arabic text with <code>\overline</code>: ← <code>\textarabic{مثال: \aemph{اب}}</code> yields <code>مثال: أب</code>. This command is also available for Farsi, Urdu, etc.</li> </ul> |
|---|--|

v1.2.0

### 5.2 bengali

← Options:

- `numerals` = *Western* or *Devanagari*

v1.2.0

### 5.3 catalan

Options:

- `babelshorthands` = *false* or *true*. ← Activates the shorthands "l and "L to type geminated l's.

v1.1.1

<sup>5</sup> For Egypt, Sudan, Yemen and the Gulf states.

<sup>6</sup> For Iraq, Syria, Jordan, Lebanon and Palestine.

#### Commands:

- `\l.l` and `\L.L` behave as in [Babel](#) to type a geminated l, as in *collaborar*. ←
- In polyglossia the same can also be achieved with `\l·l` and `\L·L`.<sup>7</sup>

v1.1.1

`\l.l`

`\L.L`

### 5.4 dutch

#### Options:

- `babelshorthands` = *false* or *true*. ← if this is turned on, all shorthands defined in [Babel](#) for fine-tuning the hyphenation of Dutch words are activated.
  - `"-` for an explicit hyphen sign, allowing hyphenation in the rest of the word
  - `"~` for a compound word mark without a breakpoint
  - `"|` disables the ligature at this position
  - `" "` is like `"-`, but produces no hyphen sign (for compound words with a hyphen, e.g., `foo-" "`bar)
  - `"/` to enable hyphenation in two words written together but separated by a slash.

v1.1.1

`\-`

- In addition, the macro `\-` is redefined to allow hyphens in the rest of the word.

### 5.5 english

#### Options:

- `variant` = *american* (= us), *usmax* (same as ‘american’ but with additional hyphenation patterns), *british* (= uk), *australian* or *newzealand*
- `ordinalmonthday` = *true/false* (true by default only when `variant` = *british*)

### 5.6 esperanto

#### Commands:

- `\hodiaun` and `\hodiau` are special forms of `\today` (see the [Babel](#) documentation)

`\hodiaun`

`\hodiau`

### 5.7 farsi

#### Options:

- `numerals` = *western* or *eastern*

---

<sup>7</sup> NB: `·` is the glyph U+00B7 MIDDLE DOT.



- **locale** (not yet implemented)
- **calendar** (not yet implemented)

**Commands:**

- `\abjad` ‣ `\abjad` (see section 8)
- `\aemph` ‣ `\aemph` (see section 5.1).

## 5.8 german

**Options:**

- **spelling** = *new* (= 1996) or *old* (= 1901): indicates whether hyphenation patterns for traditional (1901) or reformed (1996) orthography should be used. The latter is the default.
- **latesthyphen** = *false* or *true*: if this option is set to *true*, the latest (experimental) hyphenation patterns '(n)german-x-latest' will be loaded instead of 'german' or 'ngerman'. NB: This is based on the file `language.dat` that comes with T<sub>E</sub>XLive 2008 and later.
- **babelshorthands** = *false* or *true*: ← if this is turned on, all shorthands defined in **Babel** for fine-tuning the hyphenation of German words are activated.
  - `"ck` for `ck` to be hyphenated as `k-k`
  - `"ff` for `ff` to be hyphenated as `ff-f`; this is also available for the letters `l`, `m`, `n`, `p`, `r` and `t`
  - `"|` disables the ligature at this position
  - `"-` for an explicit hyphen sign, allowing hyphenation in the rest of the word
  - `" "` is like `"-`, but produces no hyphen sign (for compound words with a hyphen, e.g., `foo-" "bar`)
  - `"~` for a compound word mark without a breakpoint
  - `"=` for a compound word mark with a breakpoint, allowing hyphenation in the composing words.

There are also four shorthands for quotation signs:

- `"`` for German left double quotes („)
- `"'` for German right double quotes (")
- `"<` for French left double quotes («)
- `">` for French right double quotes (»).
- **script** = *latin* or *fraktur*. ← Setting `script=fraktur` modifies the captions for typesetting German in Fraktur.

v1.0.3

v1.2.0

## 5.9 greek

### Options:

- **variant** = *monotonic* (= mono), *polytonic* (= poly), or *ancient*
- **numerals** = *greek* or *arabic*
- **attic** = *false/true*

### Commands:

<code>\Greeknnumber</code>	▸ <code>\Greeknnumber</code> and <code>\greeknumber</code> (see section 8).
<code>\greeknumber</code>	▸ The command <code>\atticnumeral</code> (= <code>\atticnum</code> ) (activated with the option <code>attic=true</code> ), displays numbers using the acrophonic numbering system (defined in the Unicode range U+10140–U+10174). <sup>8</sup>
<code>\atticnumeral</code>	
<code>\atticnum</code>	

## 5.10 hebrew

### Options:

- **numerals** = *hebrew* or *arabic*
- **calendar** = *hebrew* or *gregorian*

### Commands:

<code>\hebrewnumeral</code>	▸ <code>\hebrewnumeral</code> (= <code>\hebrewalph</code> ) (see section 8).
<code>\hebrewalph</code>	▸ <code>\aemph</code> (see section 5.1).
<code>\aemph</code>	

## 5.11 hindi

v1.2.0

### ← Options:

- **numerals** = *Western* or *Devanagari*

## 5.12 lao

v1.2.0

### ← Options:

- **numerals** = *lao* or *arabic*

## 5.13 Isorbian and usorbian

### Commands:

<code>\oldtoday</code>	▸ <code>\oldtoday</code> : see the <a href="#">Babel</a> documentation.
------------------------	---

---

<sup>8</sup> See the documentation of the [xgreek](#) package for more details.

## 5.14 magyar

### Commands:

- `\ontoday`      ▶ `\ontoday` (= `\ondatemagyar`): special forms of `\today` (see the [Babel](#) documentation).
- `\ondatemagyar`

## 5.15 russian

### Options:

- ▶ `spelling` = *modern* or *old* (for captions and date only, not for hyphenation)

## 5.16 sanskrit

### Options:

v1.0.2

- ▶ `Script` (default = Devanagari). ← The value is passed to `fontspec` in cases where `\sanskritfont` or `\devanagarifont` are not defined. This can be useful if you typeset Sanskrit texts in scripts other than Devanagari.

## 5.17 serbian

### Options:

- ▶ `script` = *cyrillic* or *latin*

## 5.18 syriac

### Options:

v1.0.1

- ▶ `numerals` = *western* (i.e., 1234567890), *eastern* (for which the Oriental Arabic numerals are used: ١٢٣٤٥٦٧٨٩٠), or *abjad*. ←.

### Commands:

- `\abjadsyriac`      ▶ `\abjadsyriac` (see section 8)
- `\aemph`          ▶ `\aemph` (see section 5.1).

## 5.19 thai

### Options:

- ▶ `numerals` = *thai* or *arabic*

To insert the word breaks, you need to use an external processor. See the documentation to [thai-latex](#) and the file `testthai.tex` that comes with this package.

## 6 Modifying or extending captions and date formats

To redefine internal macros, you can use the command `\gappto` from the package [etoolbox](#). For compatibility with [Babel](#) the command `\addto` is also available with the same effect. For instance, to change the `\chaptername` for language `lingua`, you can do this:

```
\gappto\captionslingua{\renewcommand{\chaptername}{Caput}}
```

## 7 Non-Western decimal digits

Several scripts have their own versions of the decimal digits commonly called ‘Arabic numerals’. With the appropriate language option set, [polyglossia](#) will automatically convert the output of internal LaTeX counters to their localized forms, for instance to display page, chapter and section numbers.

In previous versions this conversion was achieved by means of TECKit font-mappings. If needed they can be activated with the `fontspec` option `Mapping=arabidigits` (or `farsidigits` or `thaidigits`). For instance if `\arabicfont` is defined with the option `Mapping=arabidigits`, then by typing `\textarabic{2010}` one will obtain ٢٠١٠.

v1.1.1

`\arabidigits`  
`\farsidigits`  
`\thaidigits`

With version v1.1.1 ← the same conversion is achieved directly by simple TeX macros. This prevents some problems that occur when the value of a counter has to be written and read from auxiliary files.<sup>9</sup> These macros (currently `\arabidigits`, `\farsidigits` and `\thaidigits` are provided) are also available to the users. For instance in an Arabic environment `\arabidigits{9182/738543-X}` yields ٩١٨٢/٧٣٨٥٤٣-X.

## 8 Alphabetic numbering in Greek, Arabic, Hebrew, Syriac and Farsi

In certain languages, numbers can be represented by a special alphanumerical notation.<sup>10</sup>

`\greeknumeral`  
`\Greeknumeral`

The Greek numerals are obtained with `\greeknumeral` (or `\Greeknumeral` in uppercase). Example: `\greeknumeral{1863}` yields ,αωξγ’.

<sup>9</sup> For instance the package [lastpage](#) did not work with [polyglossia](#) in situations where the display of counters was redefined to include a font-switching command.

<sup>10</sup> See, e.g., [http://en.wikipedia.org/wiki/Greek\\_numerals](http://en.wikipedia.org/wiki/Greek_numerals), [http://en.wikipedia.org/wiki/Abjad\\_numerals](http://en.wikipedia.org/wiki/Abjad_numerals), and [http://en.wikipedia.org/wiki/Hebrew\\_numerals](http://en.wikipedia.org/wiki/Hebrew_numerals).



Arabic or in roman transliteration, depending of the current writing direction. You can define a new format or redefine one with the command

```
\DefineHijriDateFormat <lang>{<code>}
```

The command `\Hijritoday` also accepts an optional argument to add or subtract a correction (in days) to the date computed by the arithmetical algorithm.<sup>13</sup> For instance if `\Hijritoday` yields the date “7 Rajab 1429” (which is the date that was displayed on the front page of [aljazeera.net](http://aljazeera.net) on 11th July 2008), `\Hijritoday[1]` would rather print “8 Rajab 1429” (the date indicated the same day on the site [gulfnews.com](http://gulfnews.com)).

### 9.3 Farsi (jalālī) calendar (farsical.sty)

This package is an almost verbatim copy of `Arabiftoday.sty` (in the `Arabi` package), itself a slight modification of `ftoday.sty` in `FarsiTEX`.<sup>14</sup> Here we have renamed the command `\ftoday` to `\Jalalitoday`.

```
\Jalalitoday
```

## 10 Acknowledgements (by François Charette)

`Polyglossia` is notable for being a recycle box of previous contributions by other people. I take this opportunity to thank the following individuals, whose splendid work has made my task almost trivial in comparison: Johannes Braams and the numerous contributors to the `Babel` package (in particular Boris Lavva and others for its Hebrew support), Alexej Kryukov (`antomega`), Will Robertson (`fontspec`), Apostolos Syropoulos (`xgreek`), Youssef Jabri (`arabi`), and Vafa Khalighi (`xepersian` and `bidi`). The work of Mojca Miklavc and Arthur Reutenauer on hyphenation patterns with their package `hyph-utf8` is of course invaluable. I should also thank other individuals for their assistance in supporting specific languages: Yves Codet (Sanskrit), Zdenek Wagner (Hindi), Mikhal Oren (Hebrew), Sergey Astanin (Russian), Khaled Hosny (Arabic), Sertaç Ö. Yıldız (Turkish), Kamal Abdali (Urdu), and several other members of the `XYTEX` user community, notably Enrico Gregorio, who has sent me many useful suggestions and corrections and contributed the `\newXeTeXintercharclass` mechanism in `xelatex.ini` which is now used by `polyglossia`. More recently, Kevin Godby of the `Ubuntu`

<sup>13</sup> The Islamic calendar is indeed a purely lunar calendar based on the observation of the first visibility of the lunar crescent at the beginning of the lunar month, so there can be differences between different localities, as well as between civil and religious authorities.

<sup>14</sup> One day I may rewrite `farsical` from scratch using the algorithm in Reingold & Gershowitz (ref. n. 12).

[Manual](#) project has contributed very useful feedback, bug hunting and, with the help of translators, new language definition files for Asturian, Lithuanian, Occitan, Bengali, Malayalam, Marathi, Tamil, and Telugu. It is particularly heartening to realize that this package is used to typeset a widely-read document in dozens of different languages! Support for Lao was also added thanks to Brian Wilson. I also thank Alan Munn for kindly proof-reading the penultimate version of this documentation. And of course my gratitude also goes to Jonathan Kew, the formidable author of Xe<sub>3</sub>TeX!